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The dacine fruit flies (Diptera: Tephritidae: Dacini) of Oceania

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The dacine fruit flies (Diptera: Tephritidae: Dacini) of Oceania

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Abstract. A key, an annotated checklist with detailed distribution, biological and host information, and color photographic plates are provided for the 91 species of dacine fruit flies (Diptera: Tephritidae: Dacini) known to occur in Oceania. *Dacus virgatus* Coquillett, previously a synonym of *Bactrocera psidii* (Froggatt), is instead considered a **junior synonym** of *B. facialis* (Coquillett). The species originally described in 1971 as *Dacus* (*Asiadacus*) *perpusillus* Drew, later reassigned as *Bactrocera* (*Sinodacus*) *perpusilla* (Drew) and in recent years as *Zeugodacus* (*Sinodacus*) *perpusillus* (Drew) actually belongs to genus *Dacus*, and is transferred back to *Dacus*, but to the subgenus *Neodacus*, **restored combination**. The presence of *B. redunca* (Drew) is recorded for the first time in New Caledonia. New male lure records include isoeugenol and dihydroeugenol for both *B. neoxanthodes* Drew and Romig and *B. quadrisetosa* (Bezzi) and zingerone for *Dacus taui* (Drew and Romig), all in Vanuatu.

Key words. *Bactrocera*, *Dacus*, *Zeugodacus*, pest, taxonomy, identification, Pacific Islands

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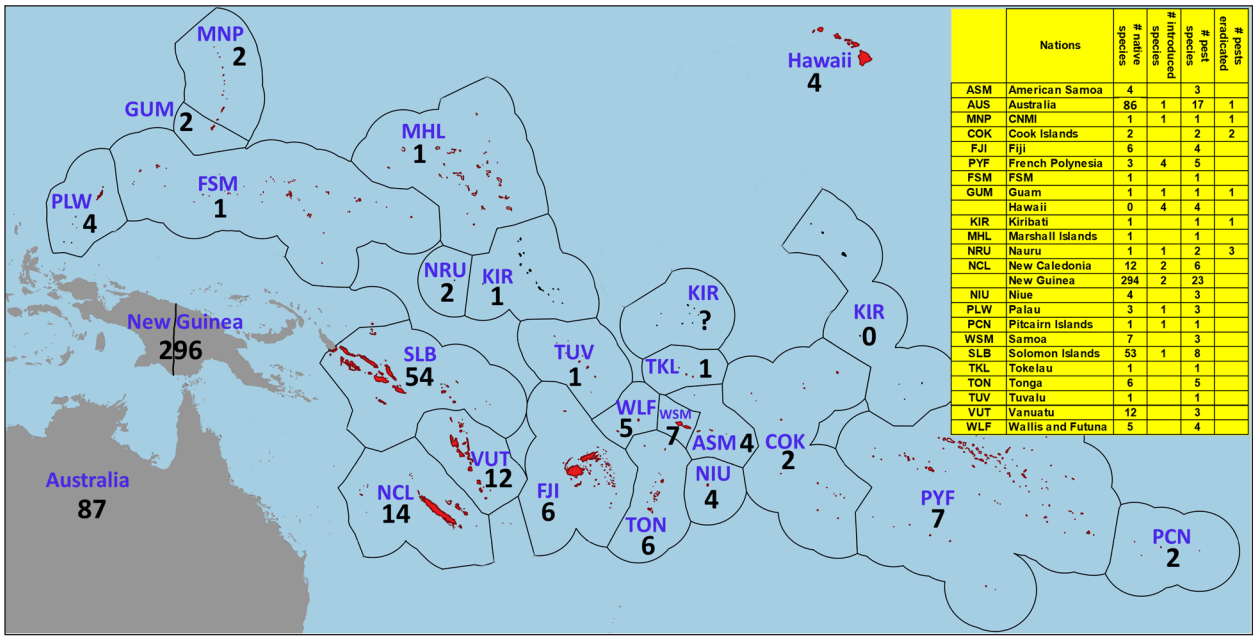
Introduction

The tribe Dacini is composed of 1,015 species, including those recently described from New Guinea (Drew and Romig 2022). In the region of Oceania, hereby treated as encompassing the Pacific Islands ranging from Palau east to the Pitcairn group and excluding New Guinea, Bougainville and Australia (Fig. 1), 91 species are known to occur, 24 of which are pests of fresh fruits or vegetables, especially cucurbits (Table 1) (Allwood and Leblanc



	Nations	# native species	# introduced species	# pest species	# pests eradicated
ASM	American Samoa	4		3	
AUS	Australia	86	1	17	1
MNP	CNMI	1	1	1	1
COK	Cook Islands	2		2	2
FJI	Fiji	6		4	
PYF	French Polynesia	3	4	5	
FSM	FSM	1		1	
GUM	Guam	1	1	1	1
	Hawaii	0	4	4	
KIR	Kiribati	1		1	1
MHL	Marshall Islands	1		1	
NRU	Nauru	1	1	2	3
NCL	New Caledonia	12	2	6	
	New Guinea	294	2	23	
NIU	Niue	4		3	
PLW	Palau	3	1	3	
PCN	Pitcairn Islands	1	1	1	
WSM	Samoa	7		3	
SLB	Solomon Islands	53	1	8	
TKL	Tokelau	1		1	
TON	Tonga	6		5	
TUV	Tuvalu	1		1	
VUT	Vanuatu	12		3	
WLF	Wallis and Futuna	5		4	

Figure 1. Number of Dacini species in each nation of Oceania.

Table 1. List and distribution of pest fruit flies in Oceania. See map in Figure 1 for explanation of locality abbreviations in the column headings. Numbers in the cells refer to the following localities: 1 – Rotuma Island. 2 – Futuna Island. 3 – Niuas Group. 4 – Austral Group.

		# hosts	PLW	GUM, MNP	FSM, MHL, KIR	NRU	SLB	VUT	NCL	FJI	TUV, TKL	WLF	TON	WSM, ASM	NIU	COK	PYF	PCN	HAWAII
B. bancroftii	**Pest of black mulberry**	3					X												
B. curvipennis	**Polyphagous fruit pest**	42							X										
B. distincta	**Oligophagous fruit pest**	8								X		2	X	X					
B. dorsalis	**Polyphagous fruit pest**	>500	X														X		X
B. facialis	**Polyphagous fruit pest**	64											X						
B. frauenfeldi	**Polyphagous fruit pest**	100	X		X	X	X												
B. hastigerina	**Pest of Jew plum**	1					X												
B. kirki	**Polyphagous fruit pest**	43								1		X	X	X	X		X		
B. latifrons	**Pest of Solanaceae**	59																	X
B. melanotus	**Polyphagous fruit pest**	31														X			
B. moluccensis	**Pest of Tahitian chestnut**	1					X												
B. mucronis	**Oligophagous fruit pest**	6							X										
B. oleae	**Pest of olive**	1																	X
B. passiflorae	**Polyphagous fruit pest**	48								X		X			X				
B. passiflorae (sp. nr.)	**Polyphagous fruit pest**	20									X		3						
B. perfusca	**Oligophagous fruit pest**	4															X		
B. psidii	**Polyphagous fruit pest**	31							X										
B. quadrisetosa	**Pest of Pacific lychee**	1					X	X											
B. trilineola	**Polyphagous fruit pest**	31						X	X										
B. tryoni	**Polyphagous fruit pest**	232							X								X	X	
B. umbrosa	**Pest of *Artocarpus* spp.**	2	X				X	X	X										
B. xanthodes	**Polyphagous fruit pest**	34								X		X	X	X	X	X	4		
D. solomonensis	**Pest of Cucurbitaceae**	5					X												
Z. cucurbitae	**Pest of Cucurbitaceae**	136		X		X	X												X

1997; Leblanc et al. 2013a; Vargas et al. 2015). Starting with the description of *Bactrocera longicornis* by Macquart in 1835 from a specimen collected in the Solomon Islands, the species count in the region has steadily grown over the years with new species descriptions and colonization by exotic species (Fig. 2).

The Regional Fruit Fly Projects in the Pacific, implemented and coordinated by Allan J. Allwood (FAO/AusAID/UNDP/SPC/NZODA projects) and Richard A.I. Drew (ACIAR projects), generated a wealth of information on the fruit flies of Oceania during their implementation period (1990–2002) (Allwood and Drew 1997; Allwood 2000; Leblanc et al. 2001b; Lidner and McLeod 2008). These projects greatly advanced knowledge on the distribution, host fruits and ecology of the indigenous and introduced fruit flies of Oceania. Protection of agriculture was improved by establishing quatantine surveillance to promptly detect pest invasions, formulating emergency response plans to eradicate incursions of invasive flies, and providing hands-on training to Pacific Islanders in an eradication exercise targeting three invasive species in Nauru. Reduction of pesticide use was promoted by demonstration and adoption of protein bait spraying, male annihilation, fruit bagging and crop sanitation to control

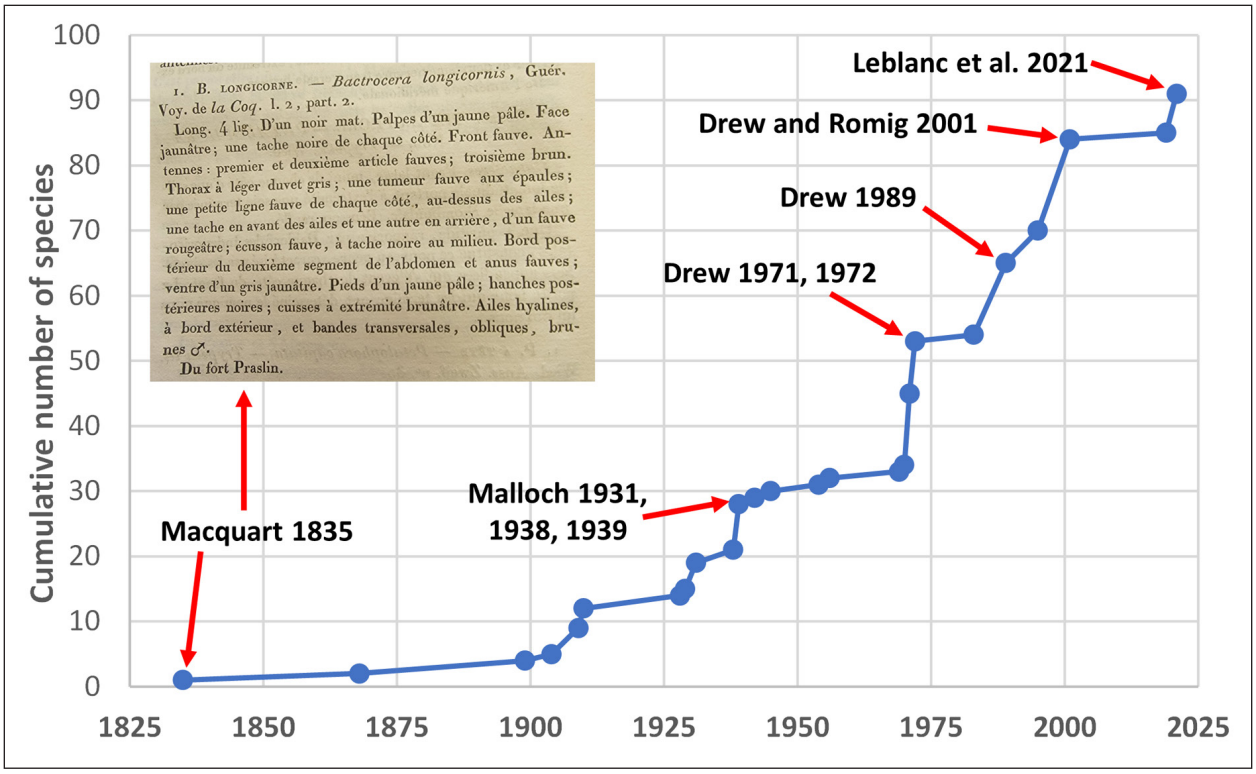


Figure 2. Cumulative number of species of Dacini in Oceania through time, starting with the description of *Bactrocera longicornis* (Macquart) in 1835 (insert).

fruit flies. Trade was enhanced by culturing flies in the laboratory to test heat tolerance and host compatibility of immature stages, enabling export market access of heat-treated fruits and reduced risk non-hosts. Some of the technology adopted with support from the projects include the conversion of brewery waste yeast into protein bait in Tonga and the establishment of forced hot air postharvest treatment units in Fiji, Tonga, Samoa, Cook Islands, New Caledonia and Vanuatu.

A wealth of literature was published during and in the years following the project, in great part included in the literature cited section. In this publication, I provide an identification key, species profiles, and color photographs for all 91 species, and previously unavailable biological information from unpublished technical reports and primary trapping data.

Materials and Methods

Trapping. Trapping data used to compile this publication were derived from networks of traps maintained by Pacific Island Countries and Territories between 1990 and 2002, to monitor pest species and detect incursions of exotic pest fruit flies. At each trapping site, two modified Steiner traps were maintained, separately baited with the male lures cue-lure and methyl eugenol as attractants. The modified Steiner trap (White and Elson-Harris 1992) (Fig. 3 A–B) consists of a horizontal plastic cylinder with an opening at both ends, one of which is removable. A cotton dental wick treated with the lure solution is suspended inside the trap. The solution is a mixture of four parts lure and one part Malathion (50% emulsifiable concentrate). Flies enter the trap through the lateral openings, feed on or come in contact with the lure and are killed by the insecticide. The trap is attached to a tree branch within the canopy, 2 meters above the ground, with a wire coated with a non-drying adhesive, such as Tanglefoot, to prevent ants, lizards, and other predators from accessing the trap and eating the flies. Depending on sites, traps

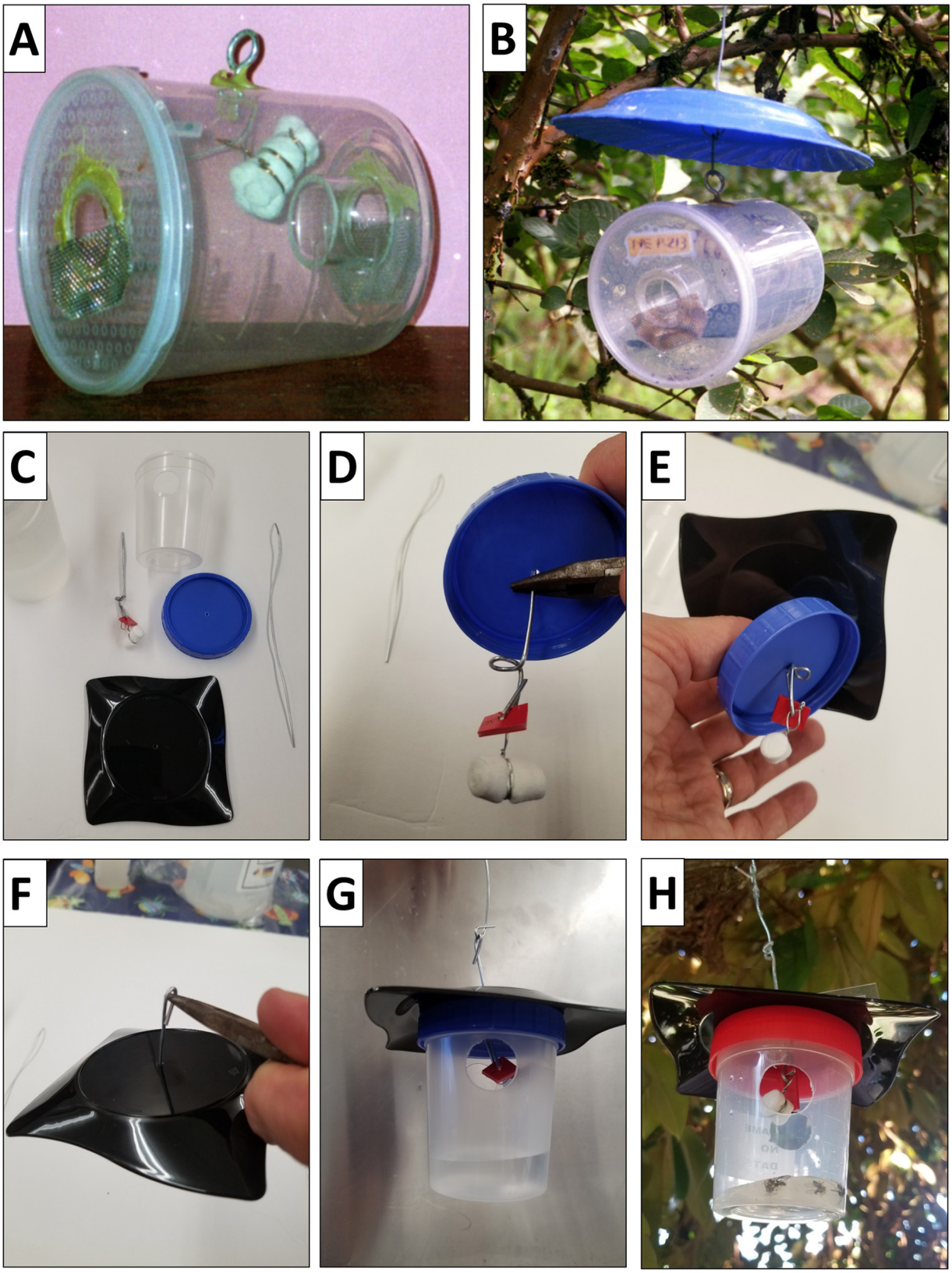


Figure 3. Traps for fruit fly sampling. **A–B)** Modified Steiner trap. **C–H)** Fruit fly trap model designed by the author.

were emptied weekly, every two weeks or monthly, and the lure mixture in the cotton wick was replenished every three months, using a dropper.

In more recent surveys in Palau (Leblanc et al. 2015), Solomon Islands (Leblanc et al. 2021), New Caledonia, Wallis and Vanuatu, I designed and used small vertical traps (Fig. 3 C–H) by modifying 5-oz urine sample cups (Stockwell Scientific, Scottsdale, AZ, USA). Two 20 mm wide lateral circular openings were drilled on opposite sides, 12 mm below the top, to allow flies to enter the trap. A small hole was also drilled in the lid center, through which a 30-cm-long, 15-gauge, aluminum tie wire was inserted and bent into a hook below the lid. The lure-dipped wick and a 10 × 10 mm piece of dichlorvos (DVVP) strip (Vaportape II; Hercon Environmental, Emingsville, PA) were attached to the hook below the lid. A 10-cm-wide black square plastic food plate (Waddington North America, Hartsville, SC, USA) was placed on top of the trap to prevent flooding by frequent rain. A solution of 25% propylene glycol (Better World Manufacturing, Fresno, CA, USA) was used in traps to preserve captured flies for DNA extraction, until they were transferred to 95% ethanol during trap servicing. In addition to the two lures cited above, a third trap was baited with zingerone (= vanillylacetone) lure (Royer et al. 2018, 2019a), prepared by dipping wicks in zingerone powder (Sigma-Aldrich, St. Louis, MO, USA) melted over a hot plate and allowed to solidify in the wicks.

The seasonal abundance graphs included in this publication were derived from years of unpublished trapping data (1990–2002) from nine countries and territories, available as spreadsheets to the author, who selected the relatively complete datasets, without gaps or obvious and unresovable errors, to generate graphs. In that process, trapping data, with varying collecting time intervals, were converted to monthly mean number of flies per trap per day (herewith referred to as FTD). Graphs were produced using data from sites with relatively high populations of flies, such as orchards, village environments and forests. The graphs summarize mean FTD for a varying number of selected sites, and their captions include number of sites, number of monthly FTD individual data points, and overall mean FTD throughout the trapping period covered by the graph.

Host fruit surveys. Extensive host fruit surveys in 14 countries and territories generated information for each fly species on the range of hosts attacked, levels of infestation (number of larvae per kilogram fruit and percentage of individual fruits infested), the stage of fruit maturity attacked, and the diversity and impact of natural parasitoids (Leblanc et al. 2012, 2013a).

In that process (Fig. 4), mature and ripe fruits were collected from the tree and/or the ground and temporarily stored in paper bags. In the laboratory, fruits from individual samples were weighed and counted and fruits were incubated in containers over moist finely sieved sawdust from untreated timber. Fruits likely to release lots of juice while breaking down were placed on fine gauze fabric over chicken wire fixed to the top of an inner plastic container, placed over the sawdust to collect juice. After 10–12 days of incubation, samples were checked by slicing open fruits to make sure that all larvae had completed their development and by sieving the sawdust with a strainer to extract the pupae. For each sample, the number of pupae was recorded, and they were placed in a petri dish with sterilized sawdust inside a small plastic container with the top covered with fine gauze fabric for ventilation. Adult flies that emerged from pupae were kept alive for at least five days, long enough to reach their final diagnostic color pattern, by providing them with sugar and a wet sponge on the fine gauze top covering the plastic emergence container.

Two approaches were used in sample handling. In broad host surveys, fruits from each sample were incubated together in bulk. In damage assessments, large samples of commercially important fruits were collected, and fruits set up and incubated individually in separate containers, to generate data on the proportion or percentage of individual fruits infested and document variations in number of larvae infesting individual fruits.

The complete host record and damage assessment data from surveys carried out under the Regional Fruit Fly Projects in the Pacific (including surveys in Papua New Guinea) were published a decade ago (Leblanc et al. 2012, 2013a). The host listing in this paper was revised to follow the most currently recognized botanical nomenclature, available at the World Flora Online database [http://www.worldfloraonline.org], and includes several additional recently published host records from Papua New Guinea (Drew and Romig 2022). In this paper, we only include records generated under the Regional Fruit Fly Projects. Additional records from Australia, Hawaii and Asia were separately published (Allwood et al. 1999; Hancock et al. 2000; Liquido et al. 2021; McQuate and Liquido 2016; McQuate et al. 2016). Pest categorization follows Vargas et al. (2015): Category

Figure 4. Fruit sample processing steps in host fruit surveys. **A)** Fruit sample weighing. **B–C)** Fruits placed over juice-collecting inner container inside larger container with moist sawdust for pupation. **D)** Fruits incubated on petri dishes over moist sawdust. **E)** Author sifting sawdust to extract fly pupae in French Polynesia. **F)** Pupae from individual samples placed in ventilated emergence containers with fresh sawdust, with water and sugar provided to maintain emerging adults alive.

A: widespread invasive polyphagous generalists or highly destructive specialists that have become established outside their native range; category B: polyphagous fruit pests or destructive specialists more restricted in distribution, but at elevated risk of spreading to new locations; category C: relatively minor oligophagous or specialist fruit pests; category D: species that have been occasionally bred from commercial/edible hosts. Data on parasitoid emergence from samples and introductions for biological control were presented and discussed in separate publications (Waterhouse 1993; Carmichael et al. 2006; Vargas et al. 2007, 2012a, 2012b; Leblanc et al. 2013b).

Specimen preparation and photography. Specimens collected in recent surveys and used in many of the photographs were prepared as follows. Specimens were pulled out of ethanol and pinned through the scutum with a 15 mm-long minuten pin and were soaked in diethyl-ether for 3–12 hours, to fix and preserve their natural coloration. Subsequently, the specimens were dried on paper towel and double-mounted, with the minuten pinned through a double-mount strip (Fig. 5). Mounted dry specimens, ethanol-preserved flies in petri dish or slide-mounted wings were photographed using either a Nikon D7100 camera attached to an Olympus SZX10 microscope (in Honolulu, HI), or a Leica DFC-295 camera mounted on a Leica M165 C (in Moscow, ID). In both cases, Helicon Focus Pro [https://www.heliconsoft.com/] was used to merge pictures taken at a range of focal planes.

Morphology, taxonomy, and key. The morphological terminology used in the key is based on the accounts published by White et al. (1999) and Cumming and Wood (2017) (for wing venation). The taxonomic classification largely follows the publications of R.A.I. Drew (Drew 1989; Drew and Romig 2013, 2016, 2022), except that I recognize *Zeugodacus* as a separate valid genus (De Meyer et al; 2015; Doorenweerd et al. 2018). Subgenus assignment for each species follows a series of recently published treatments by Drew and Hancock (Drew and Hancock 1995, 2016; Hancock and Drew 2006, 2015, 2017a, 2018a, 2018b; Drew and Romig 2013, 2022). In the key to species, the red arrows (→) point to diagnostic features indicated with red arrows on the species plates.

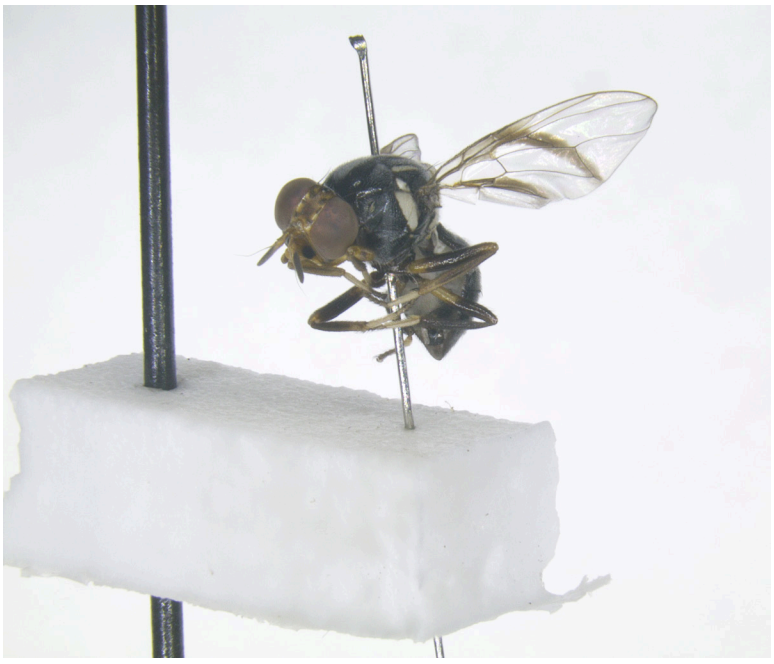


Figure 5. Double-mounted specimen of *Bactrocera frauenfeldi*.

Key to the Dacine Fruit Fly Species of Oceania

1. Elongate large wasp-like fly; antenna longer than height of face (→); abdomen elongate and petiolate (base of syntergite I+II longer than wide) (→), with a pronounced hump on tergite V in lateral view (unique to that species) (→) (Fig. 92) (cue-lure) (cucurbit fruit pest) . . . . . ***D.* (*Callantra*) *solomonensis* (Malloch)**

— More compact typical fly; antenna shorter than height of face; abdomen oval and not petiolate (base of syntergite I+II wider than long), and never with a hump on tergite V **2**

2(1). Wing membrane with infuscation in addition to costal band and anal streak (this may be conspicuous bands, narrow to faint infuscation on one or both of crossveins r-m and dm-m, or extensive uniform infuscation) **3**

— Wing membrane colorless or lightly infuscated, except for costal band and anal streak **42**

3(2). Scutum with yellow medial postsutural stripe (→) (Fig. 59) **4**

— Scutum without yellow medial postsutural stripe **11**

4(3). Prescutellar acrostichal seta absent; postsutural supra-alar seta present or absent **5**

— Prescutellar acrostichal and postsutural supra-alar seta present **7**

5(4). Postsutural supra-alar seta absent; abdomen fulvous with broad dark fuscous lateral stripes on tergites III–V (→) (Fig. 59) (zingerone) . . . . . ***B.* (*Tetradacus*) *pagdeni* (Malloch)**

— Postsutural supra-alar seta present; abdomen with black spot on tergite V (→) (Fig. 100) or with narrow medial and lateral stripes (→) (Fig. 99) **6**

6(5). Postpronotal lobe and notopleuron joined by lateral yellow band (→); wing hyaline with narrow fuscous costal band and narrow pale infuscation along crossveins r-m and dm-m (→); abdominal tergites entirely red–brown except for black spot in center of tergite V (→) (Fig. 100) (cue-lure) . . . . . ***Z.* (*Zeugodacus*) *univittatus* (Drew)**

— Postpronotal lobe and notopleuron not joined by yellow band (→); wing with fuscous tint throughout, with broad fuscous costal band extending posteriorly to vein R_{4+5} and narrow infuscation along crossvein r-m and broad infuscation along crossvein dm-m; abdominal tergites III–V with narrow medial black stripe (→) (Fig. 99) (cue-lure) . . . . . ***Z.* (*Javadacus*) *hamaceki* (Drew and Romig)**

7(4). Scutum glossy black, with or without red–brown markings; wing with S- or Z-shaped fuscous pattern across crossveins r-m and dm-m (→) (Fig. 95, 98) **8**

— Scutum largely red–brown; wing with infuscation on one or both crossveins, but not an S- or Z-shaped pattern **9**

8(7). Wing with Z-shaped pattern across r-m and dm-m, connected to costal band at two positions (→); scutum uniformly black (Fig. 95) (cue-lure) . . . . . ***Z.* (*Zeugodacus*) *amoenus* (Drew)**

— Wing with S-shaped pattern across r-m and dm-m, connected to costal band at one position (→); scutum black with large red–brown markings (→) (Fig. 98) (cue-lure) . . . ***Z.* (*Zeugodacus*) *gracilis* (Drew)**

9(7). Scutum red–brown with small dark markings and a very narrow medial postsutural stripe (→); scutellum with one or two pairs of setae (Fig. 96) (cue-lure, zingerone) (cucurbit fruit and flower pest) . . . . . ***Z.* (*Javadacus*) *cucurbitae* (Coquillett)**

— Scutum entirely red–brown or red–brown with large dark markings and a broader medial postsutural stripe (→) (Fig. 97); scutellum with two pairs of setae **10**

10(9). Wing with infuscation on crossveins r-m and dm-m (→); scutum red–brown with large black markings (→); abdominal tergites III–V red–brown usually with a black 'T'-shaped pattern formed by basal band on tergite III (reduced on Fig. 94) and the medial stripe over terga III–V (→) (Fig. 94) (cue-lure) . . . . . ***Z.* (*Javadacus*) *abdoangustus* (Drew)**

— Wing with infuscation on crossvein dm-m only (→); scutum entirely red–brown; abdominal tergites III–V red–brown without a distinct dark 'T'-shaped pattern (→) (Fig. 97) (cue-lure) . . . . . ***Z.* (*Javadacus*) *fuscipennulus* (Drew and Romig)**

11(3) Infuscation on wing, besides the costal band and anal streak, restricted to one or both crossveins only, which can be very faint (→) (Fig. 72) **12**

— Infuscation on wing more extensive, as very broad pattern across most of membrane, recurved band, or one or more transverse bands (→) (Fig. 85), or uniform diffuse fuscous coloration (→) (Fig. 25) **19**

12(11). Yellow marking anterior to transverse suture present (→) (Fig. 90) (zingerone, cue-lure) . . . . . ***D.* (*Neodacus*) *aneuvittatus* (Drew)**

— Yellow marking anterior to transverse suture absent **13**

13(12). Lateral postsutural stripe absent; infuscation along crossveins r-m and dm-m very faint **14**

— Lateral postsutural stripe present; infuscation along crossvein r-m faint (→) (Fig. 72) or clearly defined (→) (Fig. 44) **15**

14(13) Scutum and abdomen black (Fig. 45) (cue-lure) (polyphagous fruit pest) . . . . . ***B.* (*Bactrocera*) *melanotus* (Coquillett)**

— Scutum and abdomen orange–brown (Fig. 43) . . . . . ***B.* (*Bactrocera*) *luteola* (Malloch)**

15(13). Lateral postsutural stripe very short and narrowing posteriorly to end well before intra-alar seta (→) (Fig. 44) (methyl eugenol) . . . . . ***B.* (*Bactrocera*) *melanogaster* (Drew)**

— Lateral postsutural stripe broader, parallel sided (or with only a slight narrowing posteriorly) and ending at intra-alar seta (→) (Fig. 72) **16**

16(15). Scutellum with broad medial black stripe (→); infuscation along crossvein r-m very faint (→) (Fig. 72) (cue-lure) (polyphagous fruit pest) . . . . . ***B.* (*Bactrocera*) *psidii* (Froggatt)**

— Scutellum uniformly yellow, except for narrow basal black band; infuscation along crossvein r-m clearly defined (→) (Fig. 51) **17**

17(16). Costal cell colorless (→); legs yellow with apices of femora black (→); abdominal tergites black (Fig. 51) (methyl eugenol) . . . . . ***B.* (*Bactrocera*) *neonigrita* Drew**

— Costal cell pale fuscous (→) (Fig. 69); legs entirely yellow; abdominal tergites predominantly orange–brown with black markings **18**

18(17). Anepisternal stripe extending anteriorly to midway between anterior notopleural seta and anterior margin of notopleuron (→); microtrichia covering entire costal cell and distal corner of basal costal cell (→); abdominal tergites III–V with medial stripe absent (→) (Fig. 19) (cue-lure, isoeugenol) (polyphagous fruit pest) . . . . . ***B.* (*Bactrocera*) *curvipennis* (Froggatt)**

— Anepisternal stripe reaching postpronotal lobe (→); microtrichia in posterodistal corner of costal cell only (→); medial black stripe present on tergites III–V (→) (Fig. 69) (cue-lure) . . . . . ***B.* (*Bactrocera*) *phaea* (Drew)**

19(11). Scutellum with broad medial black stripe (→) (Fig. 88) or with apical dark spot; if yellow then costal band pale and indistinct beyond apex of R_1, and narrow transverse fuscous band present across wing (→) (Fig. 16) **20**

— Scutellum yellow or orange–brown, except for narrow basal black band; wing infuscation pattern not as above **28**

20(19). Costal band pale and indistinct beyond apex of R_1; narrow transverse fuscous band present across wing (→) (Fig. 16) **21**

— Costal band distinct over its entire length, or may be interrupted beyond apex of R_1 (→) (Fig. 56); infuscation across wing as single band, recurved band, or three broad bands **24**

21(20). Abdomen entirely black, without median pale stripes; postpronotal lobe yellow with anterodorsal corner black **22**

— Abdomen black with two parallel pale stripes (→) (Fig. 80); postpronotal lobe entirely black **23**

22(21). Lateral postsutural stripe present and well developed (→); scutellum yellow with medial black stripe very short (→); legs entirely yellow (Fig. 16) (cue-lure) . . . . . ***B.* (*Bactrocera*) *caledoniensis* Drew**

— Lateral postsutural stripe absent (→); scutellum yellow with medial black stripe extending to apex (→); legs black with fore femur and bases of mid and hind femora yellow (→) (Fig. 88) (zingerone) . . . . . ***B.* (*Bactrocera*) *vargasi* Leblanc and Doorenweerd**

23(21). Lateral postsutural stripe present (→); medial black stripe on scutellum triangular and ending in a point between apical setae (→); face fulvous with pair of black spots (→) (Fig. 29–30) (cue-lure, zingerone) (polyphagous fruit pest) . . . . . ***B.* (*Bactrocera*) *frauenfeldi* (Schiner)**

— Lateral postsutural stripe absent (→); medial black stripe on scutellum enclosing apical setae (→); face entirely black (→) (Fig. 80–81) (cue-lure) (polyphagous fruit pest) ***B.* (*Bactrocera*) *trilineola* Drew**

24(20). Wing with strongly oblique band across r-m and dm-m, recurved along CuA_1 (→) (Fig. 42, 75) **25**

— Wing with single band across r-m and dm-m (→) (Fig. 87) or if with three broad bands none present on most of CuA_1 (→) (Fig. 56) **26**

25(24). Wing with two bands forming U-shaped marking across r-m and dm-m and along CuA_1 (→) (Fig. 75) (methyl eugenol) . . . . . ***B.* (*Bactrocera*) *reclinata* Drew**

— Wing with broad recurved band across r-m and dm-m and along CuA_1 and narrow transverse band across apex (→) (Fig. 42) (cue-lure) . . . . . ***B.* (*Bactrocera*) *longicornis* Macquart**

26(24). Wing infuscation as three broad bands (→); costal band interrupted beyond apex of R_1 (→) and greatly expanded beyond interruption (→); abdomen with broad bands on bases of tergites III to V (→) (Fig. 56) (cue-lure) . . . . . ***B.* (*Bactrocera*) *ochrosiae* (Malloch)**

— Wing infuscation as single band over crossveins r-m and dm-m (→) (Fig. 38, 87); costal band not interrupted as above; abdominal tergites orange–brown with median stripe and black lateral markings **27**

27(26). Scutellum with broad medial black stripe (→); postpronotal lobe yellow except for anterior third dark fuscous to black; postpronotal lobe and notopleuron not joined by yellow stripe; scutum with lateral postsutural stripe short and narrow (→); abdomen tergites III–V orange–brown with small irregularly shaped sublateral markings and narrow medial stripe, with or without well defined black lateral markings (→) (Fig. 38) (cue-lure) . . . . . ***B.* (*Bactrocera*) *hollingsworthi* Drew and Romig**

— Scutellum yellow with at most an apical dark spot (→); postpronotal lobe entirely yellow (→); postpronotal lobe and notopleuron joined by narrow yellow stripe (→); scutum with lateral postsutural stripe well developed (→); abdomen tergites III–V orange–brown with black medial stripe and well defined black lateral markings (→) (Fig. 87) (cue-lure) . . . . . ***B.* (*Bactrocera*) *unitaeniola* Drew and Romig**

28(19). Wing with three broad transverse fuscous bands (→) (Fig. 84) (methyl eugenol) (pest of breadfruit and jackfruit) . . . . . ***B.* (*Bactrocera*) *umbrosa* (Fabricius)**

— Wing not so marked **29**

29(28). Postpronotal lobe and notopleuron joined by broad yellow stripe (→) (Fig. 85) (cue-lure) . . . . . ***B.* (*Bactrocera*) *unifasciata* (Malloch)**

— Postpronotal lobe and notopleuron not joined by yellow stripe **30**

30(29). Abdomen tergites III–V entirely black **31**

— Abdomen tergites III–V orange–brown with dark markings **34**

31(30). Wing membrane with uniform diffuse fuscous coloration, without clear infuscation pattern **32**

— Wing membrane with distinct pattern of fuscous markings **33**

32(31). Scutum without lateral postsutural stripe (→); abdomen entirely black (Fig. 25) (methyl eugenol) . . . . . ***B.* (*Bactrocera*) *ebenea* (Drew)**

— Scutum with lateral postsutural stripe (→); abdomen black with tergite II largely fulvous (→) (Fig. 67) (methyl eugenol) . . . . . ***B.* (*Bactrocera*) *pepisalae* (Drew)**

33(31). Wing with crossvein r-m strongly oblique (→); wing with moderately broad dark fuscous band from costal band to hind margin, enclosing crossveins r-m and dm-m but not extended to cover veins M and CuA_1 (→); legs entirely fulvous (Fig. 54) (methyl eugenol) . . . . . ***B.* (*Bactrocera*) *obliquivenosa* Drew and Romig**

— Wing with crossvein r-m not oblique; wing with very broad transverse fuscous band broad enclosing crossveins r-m and dm-m and extended to cover veins M and CuA_1 to wing apex (→); legs fulvous with apical half of mid and hind femora black (→) (Fig. 14) (methyl eugenol) . . . . . ***B.* (*Bactrocera*) *biarcuata* (Walker)**

34(30). Wing with Z-shaped fuscous pattern (→) (Fig. 53) **35**
— Wing with single transverse fuscous band of variable shape **36**

35(34). Scutum with lateral postsutural stripe short and tapering posteriorly (→); wing markings dark fuscous; abdominal tergites III–V with lateral and medial black stripes sometimes joined across base of tergite III (→) (Fig. 53) (cue-lure) ..... ***B.* (*Bactrocera*) *nigrescentis* (Drew)**
— Scutum with lateral postsutural stripe broad, parallel sided and reaching intra-alar seta (→); wing markings pale fuscous; abdominal tergites III–V with lateral and medial black stripes not joined (→) (Fig. 76) (cue-lure) ..... ***B.* (*Bactrocera*) *redunca* (Drew)**

36(34). Large species (body length 11 mm or more); wing with transverse fuscous band broad and covering more than distal half of discal medial cell (→) (Fig. 18) (methyl eugenol) ..... ***B.* (*Bactrocera*) *confluens* (Drew)**
— Moderately sized species (body length 9 mm or less); wing with transverse fuscous band of medium width, covering distal third of discal medial cell (→) (Fig. 20) **37**

37(36). Wing crossband dark fuscous and broad; costal band extending posteriorly to vein R_{4+5} (→) and greatly expanded at apex of wing (→) (Fig. 20) (cue-lure) ..... ***B.* (*Bactrocera*) *decumana* (Drew)**
— Wing crossband light fuscous; costal band not greatly expanded at apex of wing (→) (Fig. 83) **38**

38(37). Scutum dark fuscous to black with a broad orange–brown medial stripe, starting before notopleural suture and enlarged posteriorly to cover entire posterior margin of scutum (→); scutellum largely orange–brown, yellow only ventrally and narrowly on dorsolateral surface; anepisternal stripe moderately broad, dorsal margin extending anteriorly to mid distance between anterior and posterior notopleural setae dorsally (→) (Fig. 83) (zingerone) ..... ***B.* (*Bactrocera*) *tsatsiai* Leblanc and Doorenweerd**
— Scutum predominantly to entirely black, at most narrowly orange–brown laterally and posteriorly; scutellum yellow, with or without an apical dark spot; anepisternal stripe broad, dorsal margin extending anteriorly almost to anterior notopleural seta (→) (Fig. 9) **39**

39(38). Scutellum yellow with an apical dark spot (→) (can be very faint or nearly indistinct) (Fig. 9) (cue-lure) ..... ***B.* (*Bactrocera*) *anomala* (Drew)**
— Scutellum entirely yellow except for narrow basal black band **40**

40(39). Crossband on wing light, diffuse and sinuous (→); scutum black with orange–brown laterally and posteriorly (→) (Fig. 8) (cue-lure) ..... ***B.* (*Bactrocera*) *allodistincta* Leblanc and Doorenweerd**
— Crossband on wing darker fuscous and clearly distinct and straight (→) (Fig. 21); scutum uniformly black **41**

41(40). Costal band, including basal costal and costal cells, uniformly dark fuscous (→); microtrichia covering entire costal cell (→) (Fig. 21) (cue-lure) (oligophagous fruit pest) ..... ***B.* (*Bactrocera*) *distincta* (Malloch)**
— Costal band light fuscous (→); microtrichia in posterodistal corner of costal cell only (→) (Fig. 71) (cue-lure) ..... ***B.* (*Bactrocera*) *pseudodistincta* (Drew)**

42(2). Scutum with medial postsutural stripe, either broad and triangular if scutum mostly black scutum (→) (Fig. 65), or very narrow if scutum orange–brown (→) (Fig. 89) **43**
— Scutum without medial postsutural stripe **47**

43(42). Scutum black with medial postsutural stripe large and triangular (→); wing in male with swelling (bulla) in cua cell (→) (Fig. 65) ..... ***B.* (*Bulladacus*) *penefurva* Drew**
— Scutum light orange–brown with medial postsutural stripe narrow (→) (Fig. 89); wing in male without bulla **44**

44(43). Wing with costal band narrow and uniformly fuscous from end of vein R_{2+3} to apex (→); scutum red–brown, contrasting with fulvous abdomen; scutellum red–brown laterally, fulvous medially and with distinct whitish or yellow lateral margins over at least basal half (→); male sternite V deeply emarginate posteriorly (→); female oviscape extensively black posteriorly (→) (Fig. 89) (methyl eugenol, methyl-isoeugenol) (polyphagous fruit pest) ..... ***B.* (*Notodacus*) *xanthodes* (Broun)**

— Wing with costal band either broad and uniformly pale or narrow and pale except fuscous at apex; scutum and abdomen orange–brown; scutellum without distinct yellow margins, though indistinct yellow area sometimes present; male sternite V with shallow emargination posteriorly in described species (state unknown in undescribed species) (→) (Fig. 61); female oviscape entirely or almost entirely fulvous (→) (Fig. 61) **45**

45(44) Wing with costal band narrow and not extending posterior to vein R_{2+3} (→); scutellum fulvous centrally and broadly dark fulvous to pale fuscous laterally, sometimes with a small yellow basolateral area (Fig. 52) (isoeugenol, dihydroeugenol) . . . . . ***B.* (*Notodacus*) *neoxanthodes* Drew and Romig**

— Wing with costal band broad and extending posteriorly to vein R_{4+5} (→) (Fig. 61); scutellum not as above **46**

46(45). Wing with narrow, pale transverse infuscation enclosing both crossveins r-m and dm-m; scutellum fulvous without black lateral stripes (undescribed non-pest species in Samoa) . . . . . ***B.* (*Notodacus*) *paraxanthodes* (new species # 1 near)**

— Wing without pale, transverse infuscation enclosing crossveins r-m and dm-m; scutellum fulvous with black lateral stripe reaching apical setae posteriorly but ending narrowly before base anteriorly (Fig. 61) (methyl eugenol, dihydroeugenol?) (non-pest species in New Caledonia) . . . . . ***B.* (*Notodacus*) *paraxanthodes* Drew and Hancock**

47(42). Scutum without lateral postsutural stripe **48**

— Scutum with lateral postsutural stripe **64**

48(47). Scutum with yellow marking anterior to transverse suture (→) (Fig. 93) **49**

— Scutum without yellow marking anterior to transverse suture **50**

49(48). Scutum and abdomen orange–brown without dark markings; costal band broad (→) (Fig. 93) (zingerone) . . . . . ***D.* (*Neodacus*) *taui* Drew and Romig**

— Scutum largely to entirely black and abdomen orange–brown with extensive dark markings; costal band narrow (→) (Fig. 91) (cue-lure) . . . . . ***D.* (*Neodacus*) *perpusillus* Drew**

50(48). Scutellum yellow with broad medial black stripe (→) (Fig. 32) or entirely black **51**

— Scutellum largely yellow except for narrow basal black band and sometimes with pale fuscous apical spot **57**

51(50). Scutellum with two pairs of setae **52**

— Scutellum with one pair of setae **53**

52(51). Legs entirely fulvous; postpronotal lobe yellow (→) (Fig. 32) (zingerone, cue-lure) . . . . . ***B.* (*Bactrocera*) *fulvifacies* (Perkins)**

— Legs black with yellow at bases of femora (→); postpronotal lobe black (→) (Fig. 40) (zingerone) . . . . . ***B.* (*Bactrocera*) *kolombangarae* Leblanc and Doorenweerd**

53(51). Scutellum yellow with broad medial black stripe **54**

— Scutellum entirely black or at most narrowly yellow laterally **55**

54(53). Anepisternal stripe broad and yellow (→) (Fig. 68) (oligophagous fruit pest) . . . . . ***B.* (*Bactrocera*) *perfusca* (Aubertin)**

— Anepisternal stripe absent (→) (Fig. 11) (cue-lure) . . . . . ***B.* (*Bactrocera*) *atra* (Malloch)**

55(53). Abdomen entirely black; legs with femora and tibiae entirely black (Fig. 48) (cue-lure) . . . . . ***B.* (*Bactrocera*) *morula* Drew**

— Abdomen black with orange–brown markings; legs fulvous **56**

56(55). Abdomal tergites II–V black with two broad parallel orange–brown stripes (→); face fulvous with two black spots (→); postpronotal lobe yellow with anterodorsal corner black (→) (Fig. 39) (cue-lure) (polyphagous fruit pest) . . . . . ***B.* (*Bactrocera*) *kirki* (Froggatt)**

— Abdomal tergites II–V black with irregularly shaped orange–brown spots on either side of a broad medial black stripe (→); face entirely fulvous (→); postpronotal lobe entirely yellow (→) (Fig. 78) . . . . . ***B.* (*Bactrocera*) *setinervis* (Malloch)**

57(50). Wing with costal band absent except for apical spot (→) (Fig. 57) (pest of olive) ..... ***B.* (*Daculus*) *oleae* (Rossi)**

— Costal band well developed **58**

58(57). Postpronotal lobe fuscous to black **59**

— Postpronotal lobe yellow **61**

59(58). Abdomen orange–brown with narrow median black stripe (→); anterior supra-alar seta usually absent (Fig. 46) (cue-lure) ..... ***B.* (*Bactrocera*) *minuta* (Drew)**

— Abdomen entirely black or black with orange–brown markings; anterior supra-alar seta present ... **60**

60(59). Abdominal tergites mostly or entirely black (Fig. 62) (cue-lure) (polyphagous fruit pest) ..... ***B.* (*Bactrocera*) *passiflorae* (Froggatt)**

— Abdominal tergite I black, tergites II–V orange–brown with medial dark fuscous band over tergites III–V and two broad lateral glossy black bands over tergites II–V ..... ***B.* (*Bactrocera*) *samoae* Drew** (Fig. 77) (not responsive to known lures) (non-pest) and ***B.* (*Bactrocera*) *passiflorae* (sp. nr.)** (Fig. 63, 64) (cue-lure) (polyphagous fruit pests)

61(58). Scutum orange–brown (Fig. 43) ..... ***B.* (*Bactrocera*) *luteola* (Malloch)**

— Scutum black **62**

62(61). Anepisternal stripe reaching postpronotal lobe (→); abdomen elongate-oval; face fulvous without black spots (→) (Fig. 36) ..... ***B.* (*Bactrocera*) *grandistylus* Drew and Hancock**

— Anepisternal stripe not reaching postpronotal lobe (→) (Fig. 55); abdomen oval; facial spots present (→) (Fig. 55) **63**

63(62). Postpronotal lobe entirely yellow (→); costal band slightly extending posteriorly beyond vein R_{2+3}; abdominal tergites orange–brown with medial dark stripe on tergites III–V and a pair of anterolateral dark spots on each tergite (→) (Fig. 55) (cue-lure) ..... ***B.* (*Bactrocera*) *obscura* (Malloch)**

— Postpronotal lobe yellow with anterodorsal corner red–brown; costal band not extending posteriorly beyond vein R_{2+3} except apically; abdominal tergites entirely orange–brown, with at most narrow medial dark stripe (Fig. 66) (cue-lure) ..... ***B.* (*Bactrocera*) *peneobscura* Drew and Romig**

64(47). Costal band extending posteriorly to or beyond vein R_{4+5} **65**

— Costal band not extending posteriorly to vein R_{4+5} **73**

65(64). Scutum and abdominal tergites mostly red–brown **66**

— Scutum black or dark fuscous with pair of longitudinal black stripes; abdominal tergites mostly black or orange–brown or red–brown with dark markings **67**

66(65). Anepisternal stripe extending anteriorly to anterior notopleural seta (→); male abdominal tergite III with pecten (→) (Fig. 50) (methyl eugenol) ..... ***B.* (*Bactrocera*) *naucleae* Drew and Romig**

— Anepisternal stripe extending anteriorly to midway between anterior notopleural seta and anterior margin of notopleuron (→); male abdominal tergite III lacking pecten (Fig. 37) (pest of Jew plum) .... ***B.* (*Calodacus*) *hastigerina* (Hardy)**

67(65). Abdominal tergites III–V red–brown with black 'T'-shaped pattern formed by basal band on tergite III and the medial stripe over terga III–V and narrow lateral dark margins (→); pecten absent from male abdominal tergite III (Fig. 17) ..... ***B.* (*Calodacus*) *calophylli* (Perkins and May)**

— Abdominal tergites III–V mostly black or orange–brown with medial and two broad black stripes; pecten present on male abdominal tergite III **68**

68(67). Abdominal tergites III–V orange–brown with medial and two broad black stripes that are not joined at base of tergite III (Fig. 31) (methyl eugenol) ..... ***B.* (*Bactrocera*) *froggatti* (Bezzi)**

— Abdominal tergites mostly black **69**

69(68). Costal band extending posteriorly beyond vein R_{4+5} for entire length; abdominal tergites mostly black, with some orange–brown centrally on tergites IV and V **70**

— Costal band extending posteriorly to vein R_{4+5}; abdominal tergites entirely black **71**

70(69). Wing with light fuscous tinge as a broad, somewhat triangular area covering much of the middle of the wing, including the areas bordering r-m and dm-m (→) (Fig. 34) (cue-lure) . . . . . ***B.* (*Bactrocera*) *geminosimulata* Leblanc and Doorenweerd**

— Wing without light fuscous tinge in the area described above (→) (Fig. 79) (cue-lure) . . . . . ***B.* (*Bactrocera*) *simulata* (Malloch)**

71(69). Microtrichia covering both basal costal and costal cells in wing (→) (Fig. 73) (dihydroeugenol, isoeugenol) (pest of Pacific lychee) . . . . . ***B.* (*Bactrocera*) *quadrisetosa* (Bezzi)**

— Microtrichia restricted to posterodistal corner of costal cell in wing (→) (Fig. 27) **72**

72(71). Legs mostly black; scutellum with broad black basal band; anepisternal stripe narrow, just wider than notopleuron (→) (Fig. 27) (cue-lure) . . . . . ***B.* (*Bactrocera*) *epicharis* (Hardy)**

— Legs mostly fulvous; scutellum with narrow black basal band; anepisternal stripe reaching to anterior notopleural seta (→) (Fig. 12) (cue-lure) . . . . . ***B.* (*Bactrocera*) *atrabifasciata* Drew and Romig**

73(64). Scutellum yellow with dark markings or orange–brown and narrowly yellow laterally **74**

— Scutellum entirely yellow or entirely orange–brown **79**

74(73). Scutellum with dark apical spot (→) (Fig. 13) (methyl eugenol) (pest of black mulberry) . . . . . **some specimens of *B.* (*Bactrocera*) *bancroftii* (Tryon)**

— Scutellum with black or brown medial stripe over dorsal surface **75**

75(74). Scutum and abdomen predominantly black (Fig. 70) (methyl eugenol) . . ***B.* (*Bactrocera*) *picea* (Drew)**

— Scutum and abdomen predominantly red–brown **76**

76(75). Postpronotal lobe fuscous or orange–brown anteriorly and yellow posteriorly; abdominal tergites III–V with broad medial black stripe and with or without narrow sublateral black bands over tergites III–V, all all joined across posterior margin of tergite V by narrow transverse black band **77**

— Postpronotal lobe entirely yellow; abdominal tergites III–V with either narrow medial black band on all tergites or broad medial band on tergite V only **78**

77(76). Abdomen with broad sublateral black stripes on tergites III–V, in addition to medial stripe (→) (Fig. 26) (cue-lure) . . . . . ***B.* (*Bactrocera*) *enochra* (Drew)**

— Abdomen without sublateral black stripes on tergites III–V (→) (Fig. 74) (cue-lure) . . . . . ***B.* (*Bactrocera*) *quasienochra* Leblanc and Doorenweerd**

78(76). Anepisternal stripe reaching anterior notopleural seta (→); wing in male with swelling (bulla) in cua cell (→) (Fig. 58) . . . . . ***B.* (*Bulladacus*) *pacificae* Drew and Romig**

— Anepisternal stripe reaching midway between anterior notopleural seta and anterior margin of notopleuron (→); wing in male without bulla (Fig. 15) (cue-lure) . . ***B.* (*Neozeugodacus*) *buinensis* Drew**

79(73). Scutum pale-colored **80**

— Scutum predominantly black **84**

80(79) Lateral postsutural stripe very short and tapering to a point posteriorly (→); circular black spot present on tergite V (→) (Fig. 86) . . . . . ***B.* (*Bulladacus*) *unipunctata* (Malloch)**

— Lateral postsutural stripe short and tapering or long and reaching to intra-alar seta; abdominal tergites uniformly pale colored or with patterns of dark markings **81**

81(80). Scutum with narrow medial black stripe (→); wing in male with a swelling (bulla) in cua cell (→) (Fig. 6) . . . . . ***B.* (*Bulladacus*) *aenigmatica* (Malloch)**

— Scutum markings, if present, not as a medial black stripe; wing in male with bulla absent **82**

82(81). Costal cells fuscous (→); microtrichia covering both basal costal and costal cells (→) (Fig. 82) (cue-lure, zingerone) (polyphagous fruit pest) . . . . . ***B.* (*Bactrocera*) *tryoni* (Froggatt)**

— Costal cells fulvous or colorless; microtrichia in posterodistal corner of costal cell only **83**

83(82). Costal cells colorless (→); abdominal tergites III–V with broad lateral fuscous stripes (→) (Fig. 7) . . . . . ***B.* (*Bactrocera*) *aithogaster* Drew**

— Costal cells pale fuscous (→); abdominal tergites III–V with a black 'T'-shaped pattern formed by basal band on tergite III and the medial stripe over terga III–V (→) (Fig. 47) (cue-lure, zingerone) (pest of Tahitian chestnut) . . . . . ***B.* (*Bactrocera*) *moluccensis* (Perkins)**

84(79). Costal band noticeably expanded as apical spot (→) (Fig. 41) (latilure) (pest of solanaceaeous fruits) . . . . . ***B.* (*Bactrocera*) *latifrons* (Hendel)**

— Costal band not expanded apically **85**

85(84). Postpronotal lobe dark fuscous (→) (Fig. 33) (cue-lure) . . . . . ***B.* (*Bactrocera*) *furvescens* Drew**

— Postpronotal lobe yellow **86**

86(85). Abdominal tergites entirely black (Fig. 10) (cue-lure) . . . . . ***B.* (*Bactrocera*) *aterrima* (Drew)**

— Abdominal tergites orange–brown with or without dark color patterns **87**

87(86). Abdominal tergites either entirely orange–brown or with very narrow black lines anterolaterally on tergite III and occasionally with narrow medial black stripe over tergites III–V (Fig. 13) (methyl eugenol) (pest of black mulberry) . . . . . **some specimens of *B.* (*Bactrocera*) *bancroftii* (Tryon)**

— Abdominal tergites orange–brown with distinct dark markings laterally and medially **88**

88(87). Lateral postsutural stripe short and narrow, ending before posterior supra-alar seta **89**

— Lateral postsutural stripe long and broader, reaching posterior supra-alar seta **90**

89(88) Abdomen orange–brown and broadly black on lateral margins of tergite III and anterolateral corners of tergites IV and V (→), and with moderately broad medial black stripe on tergites III–V (→); lateral postsutural stripe short and narrow, ending long before intra-alar seta (→) (Fig. 28) (cue-lure) (polyphagous fruit pest) . . . . . ***B.* (*Bactrocera*) *facialis* (Coquillett)**

— Abdomen orange–brown with two broad lateral black bands on tergites III–V (→), and medial stripe absent (→); lateral postsutural stripe short, ending just behind intra-alar seta (→) (Fig. 49) (cue-lure) (oligophagous fruit pest) . . . . . ***B.* (*Bactrocera*) *mucronis* (Drew)**

90(88). Abdomen tergites III–V orange–brown with broad black lateral markings that meet at midline of anterior margin of tergite III (→) and broad medial black stripe which begins at posterior margin of tergite III and widens to end at posterior margin of tergite V (→); wing in male with a swelling (bulla) in cua cell (→) (Fig. 35) . . . . . ***B.* (*Bulladacus*) *gnetum* Drew and Hancock**

— Abdomen orange–brown with a 'T'-shaped pattern formed by basal band on tergite III and the medial stripe over terga III–V, and limited to extensive lateral markings; wing in male with bulla absent **91**

91(90). Abdomen with broad lateral black bands joined along anterior margin of tergite III (→); costal band extending posteriorly beyond vein R_{2+3} (→) (Fig. 60) (methyl eugenol) (non-pest species restricted to Solomon Islands) . . . . . ***B.* (*Bactrocera*) *parafroggatti* Drew and Romig**

— Abdomen with lateral black bands varying from very narrow to broad (Fig. 24), or very broad, as described above, in a small number of specimens (Fig. 24); costal band not extending posteriorly beyond vein R_{2+3} except apically (→) (Fig. 22–24) (methyl eugenol, zingerone) (polyphagous fruit pest widespread in Asia and introduced in Hawaii, French Polynesia, and Palau) . . . . . ***B.* (*Bactrocera*) *dorsalis* (Hendel) [sens. lat.]**

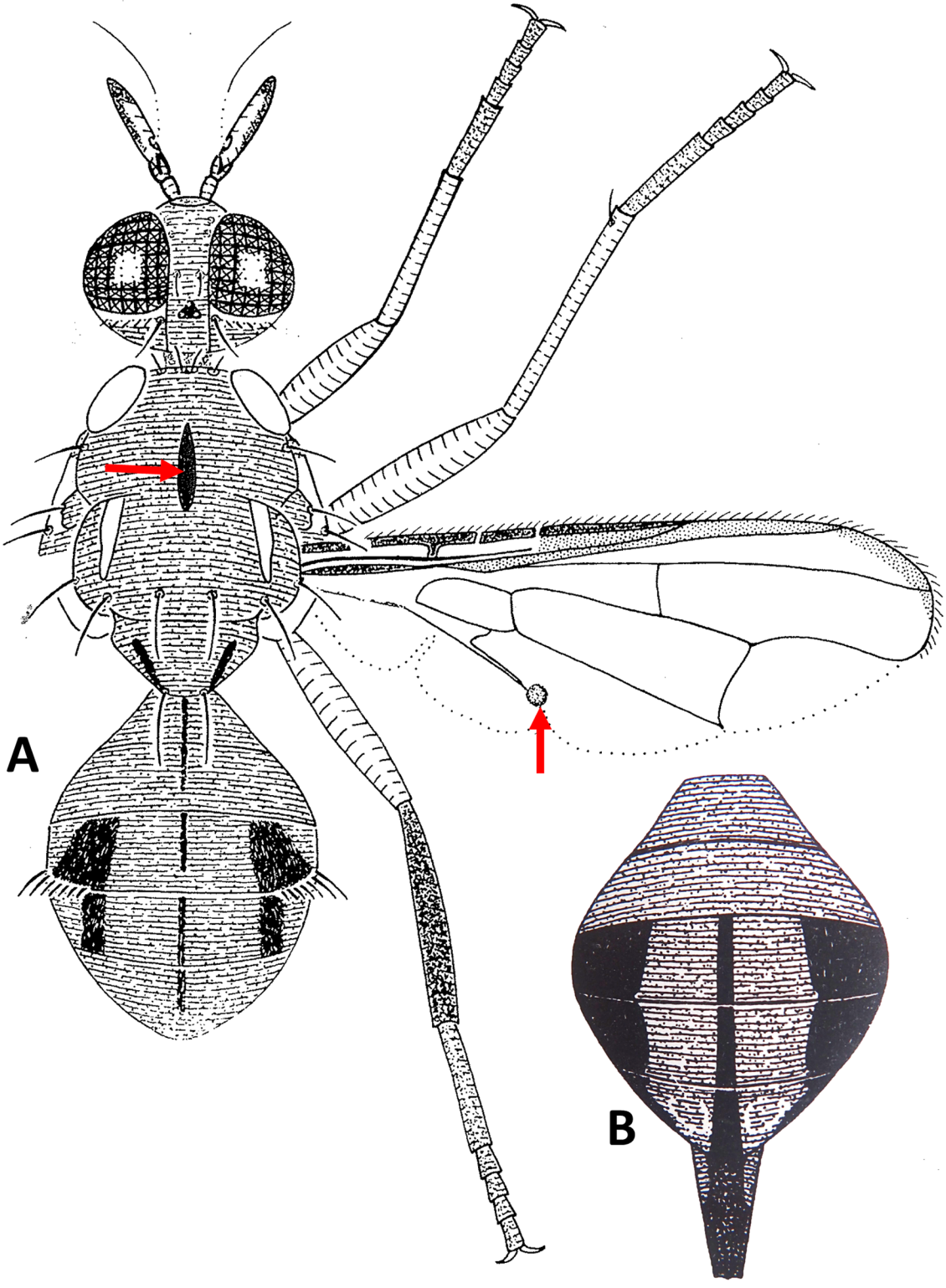


Figure 6. *Bactrocera* (*Bulladacus*) *aenigmatica* (Malloch). **A)** Male (from Drew and Hancock 1995). **B)** Abdomen, female (from Drew 1989).

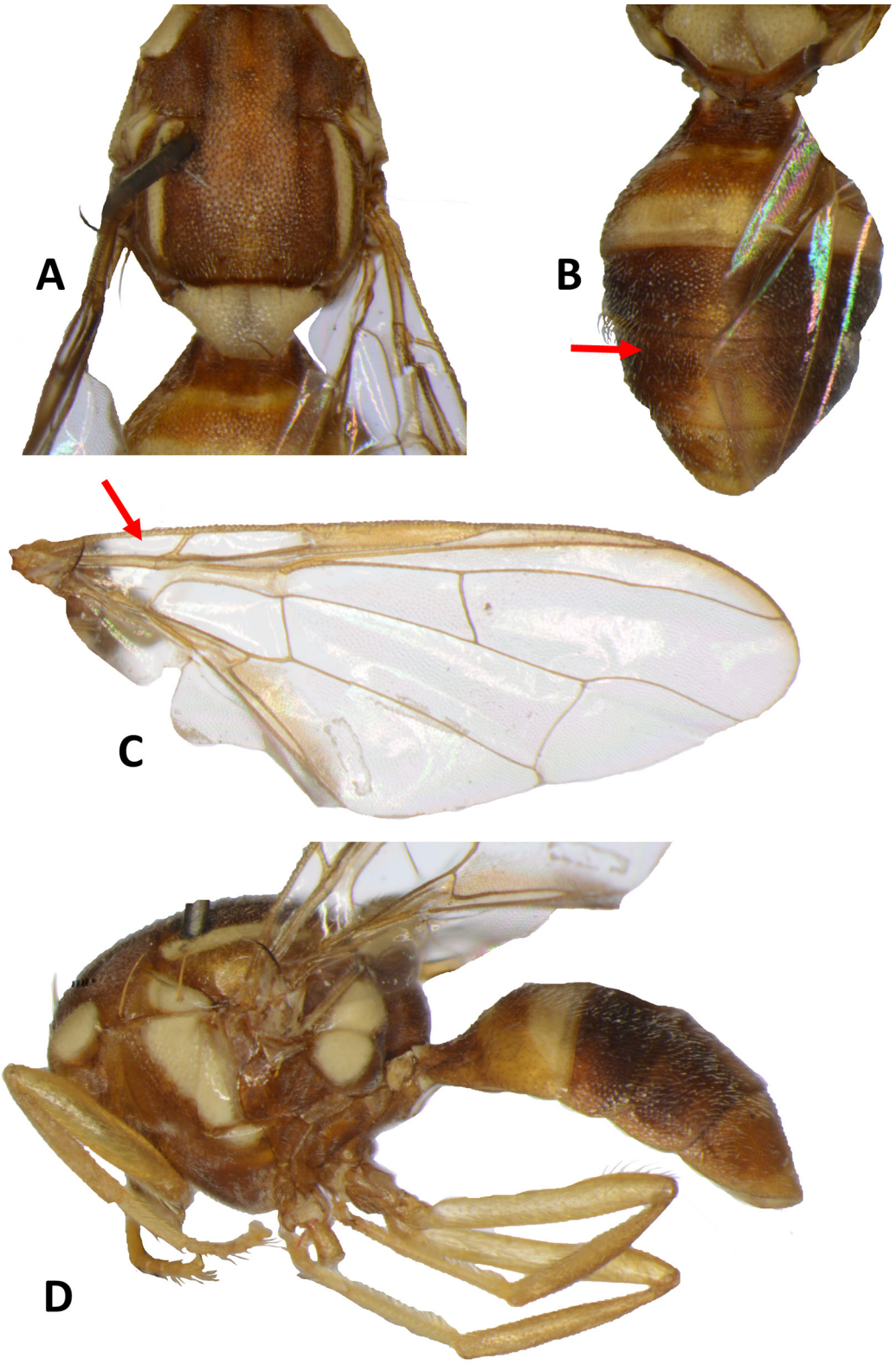


Figure 7. *Bactrocera* (*Bactrocera*) *aithogaster* Drew, male. **A)** Scutum (head missing on photographed specimen). **B)** Abdomen. **C)** Wing. D) Lateral view.

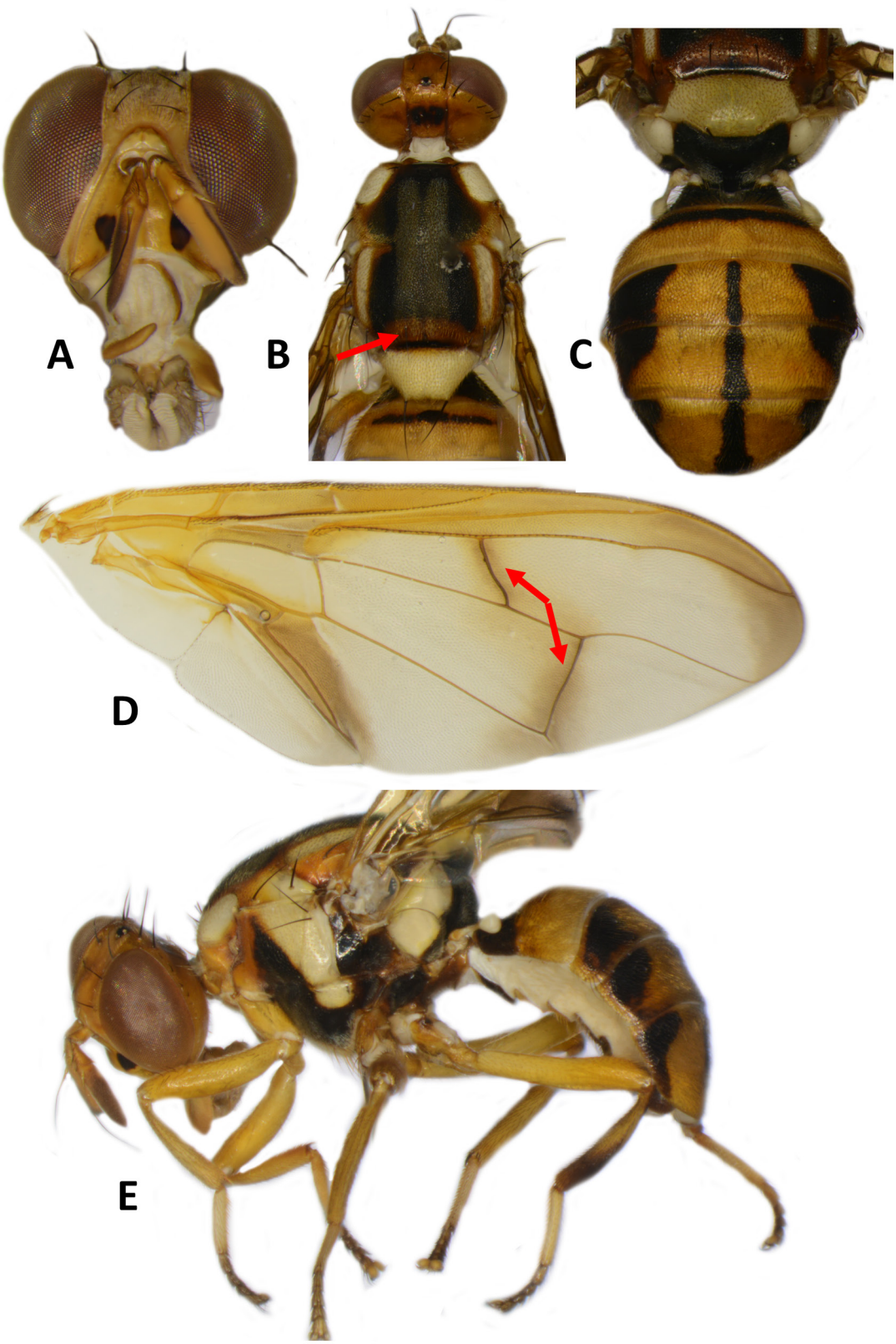


Figure 8. *Bactrocera* (*Bactrocera*) *allodistincta* Leblanc and Doorenweerd, male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view.

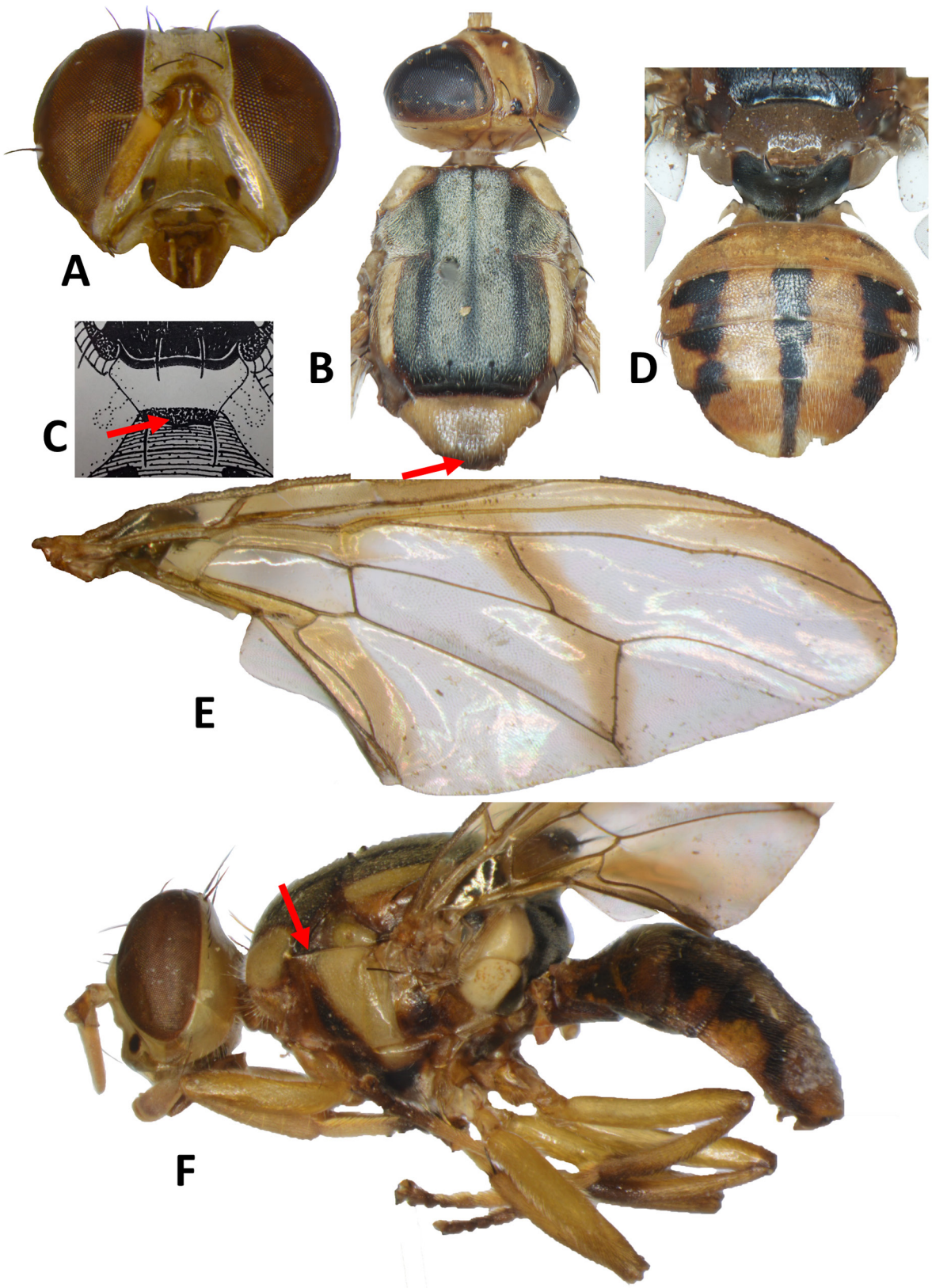


Figure 9. *Bactrocera* (*Bactrocera*) *anomala* (Drew), male. **A)** Head. **B)** Head and scutum. **C)** Scutellum details (from Drew 1989). **D)** Abdomen. **E)** Wing. **F)** Lateral view.

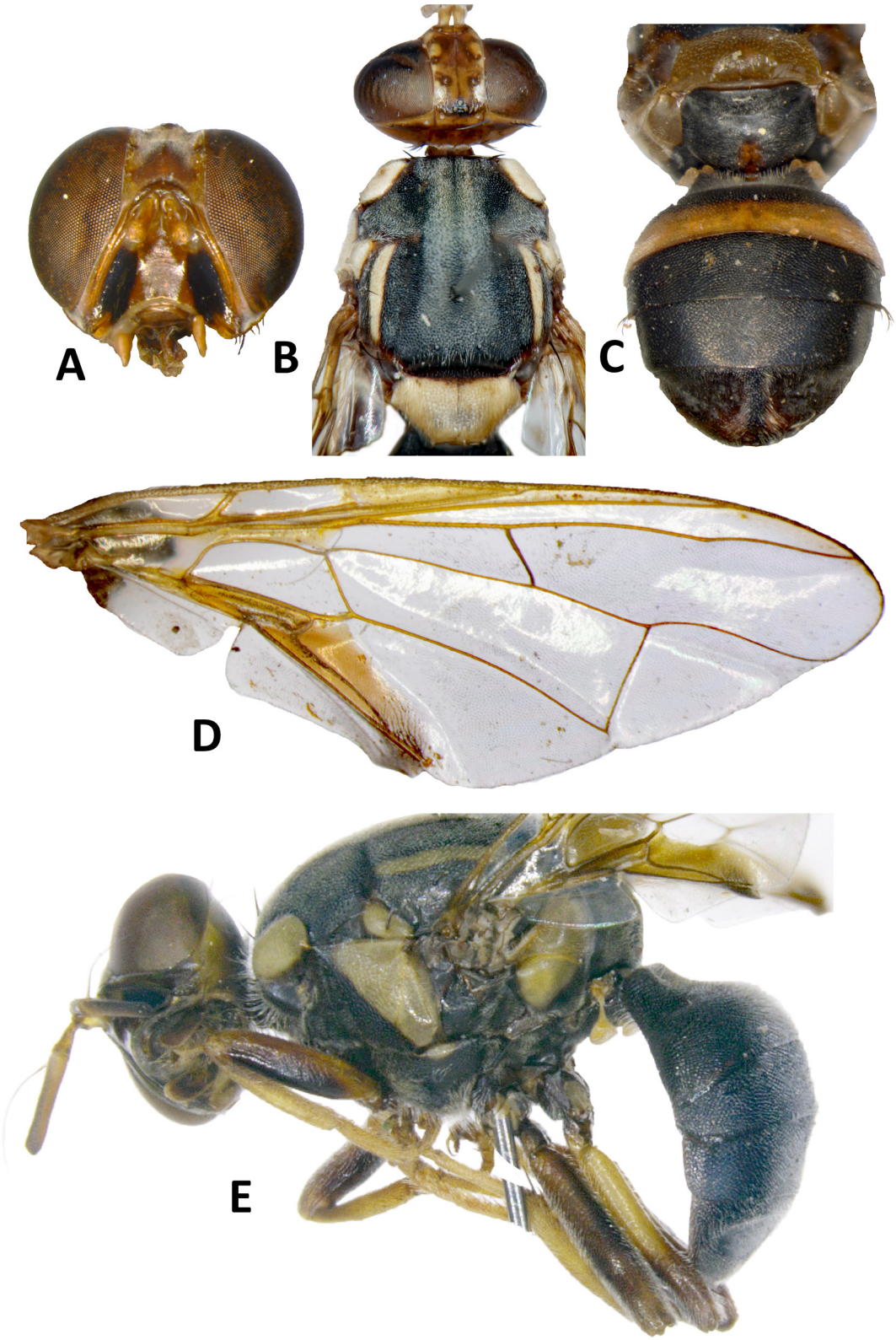


Figure 10. *Bactrocera* (*Bactrocera*) *aterrima* (Drew), male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view.

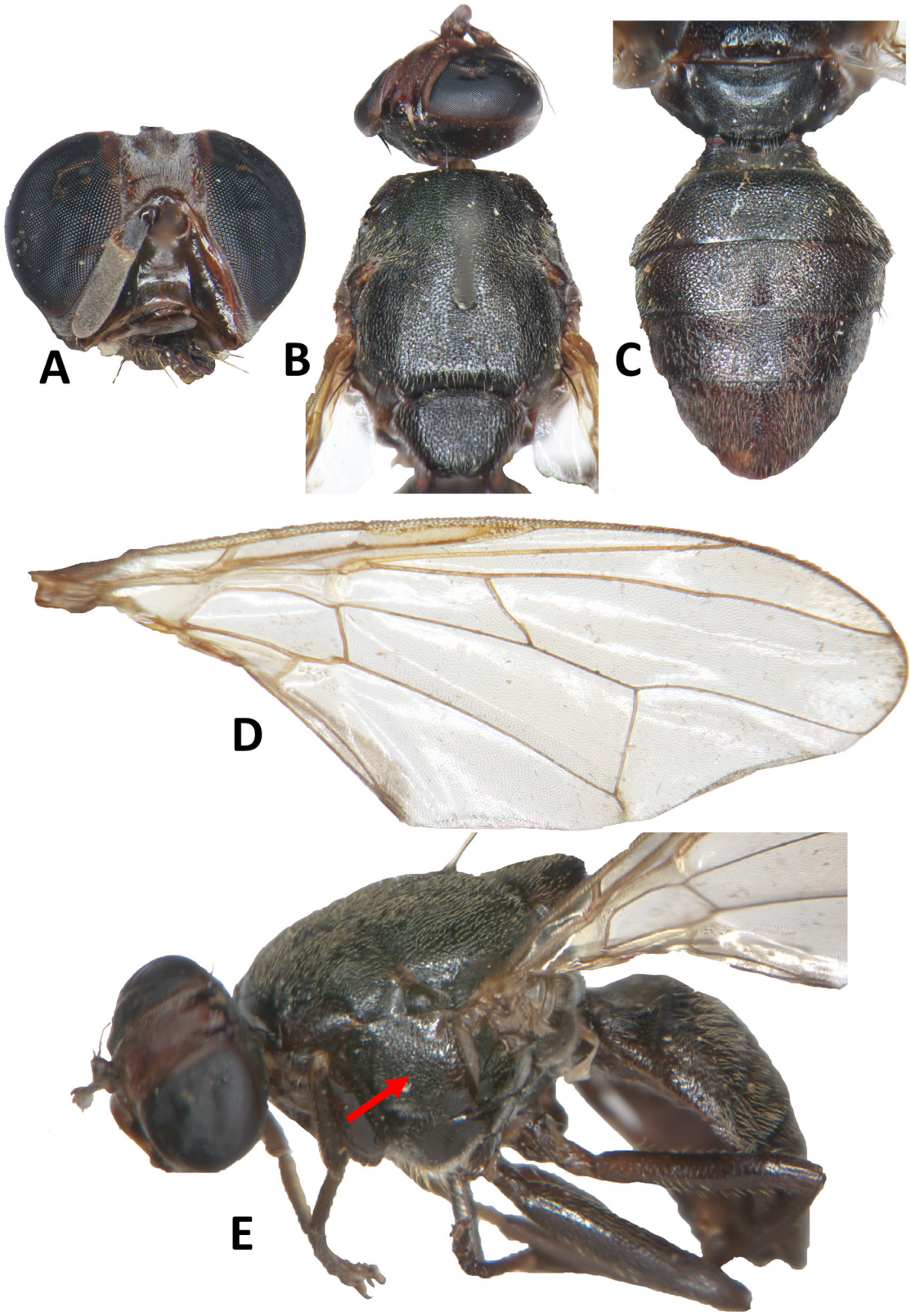


Figure 11. *Bactrocera* (*Bactrocera*) *atra* (Malloch), male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view.

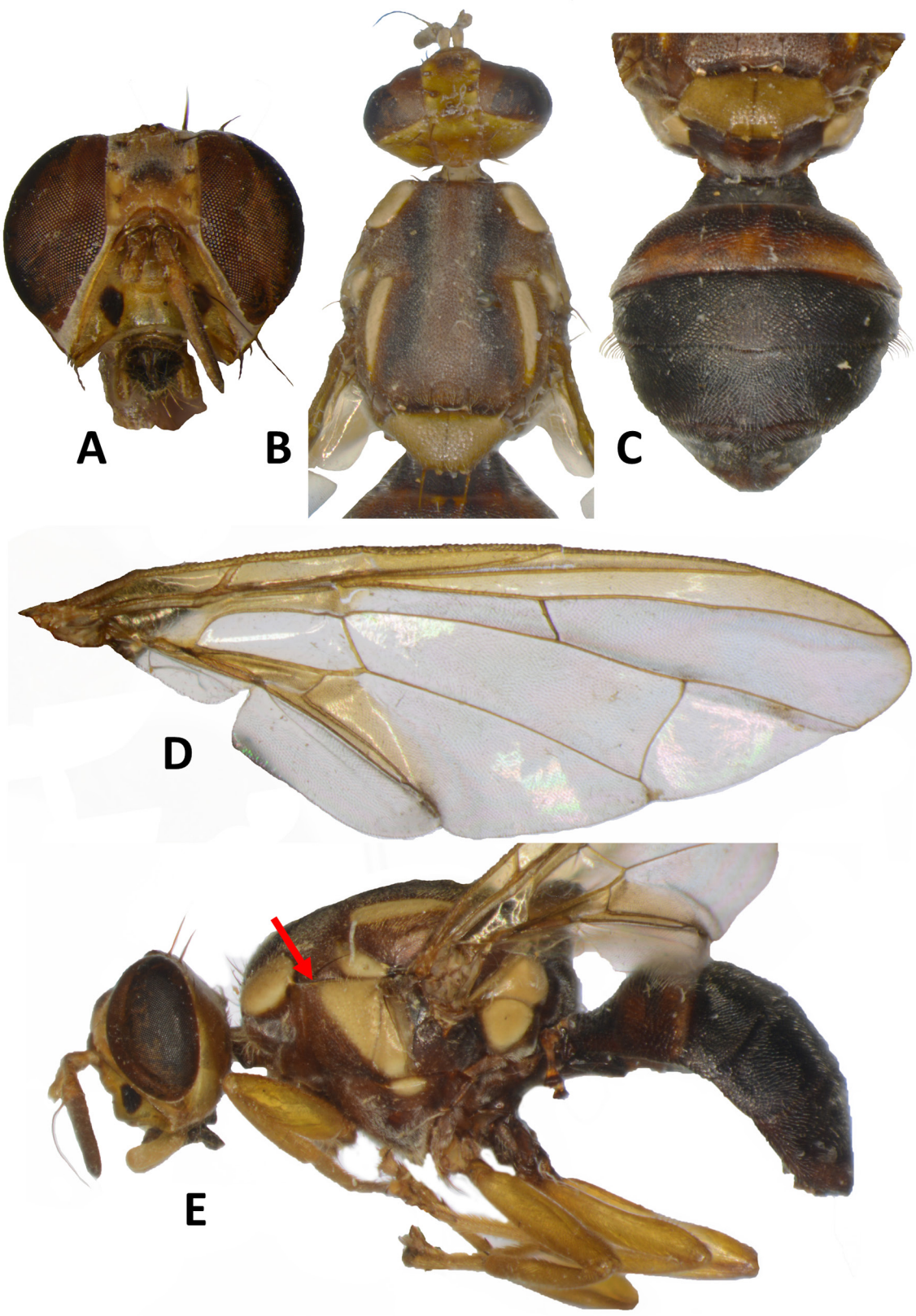


Figure 12. *Bactrocera* (*Bactrocera*) *atrabifasciata* Drew and Romig, male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view.

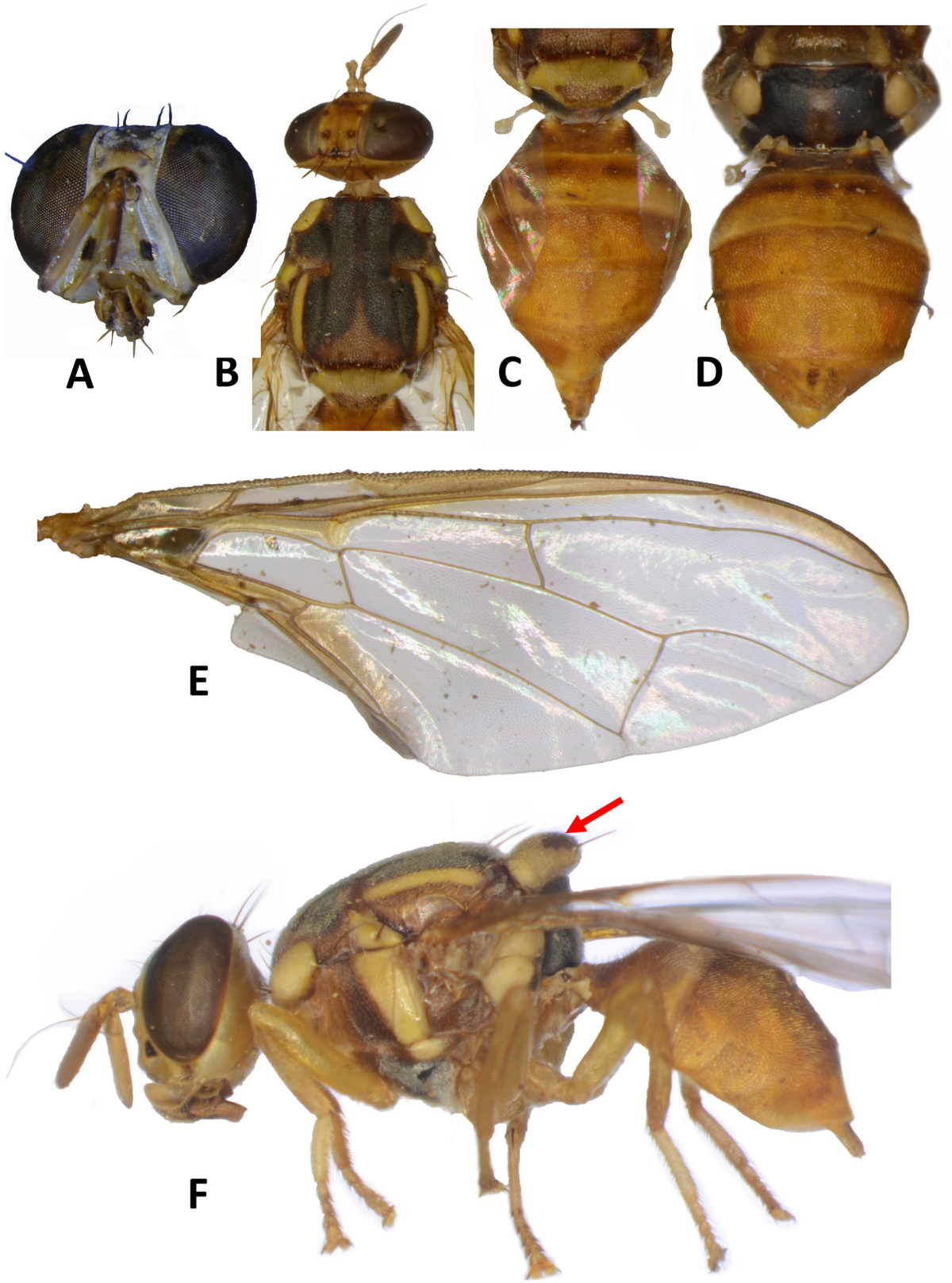


Figure 13. *Bactrocera* (*Bactrocera*) *bancroftii* (Tryon). **A)** Head. **B)** Head and scutum. **C)** Abdomen, female. **D)** Abdomen, male. **E)** Wing. **F)** Lateral view, female.

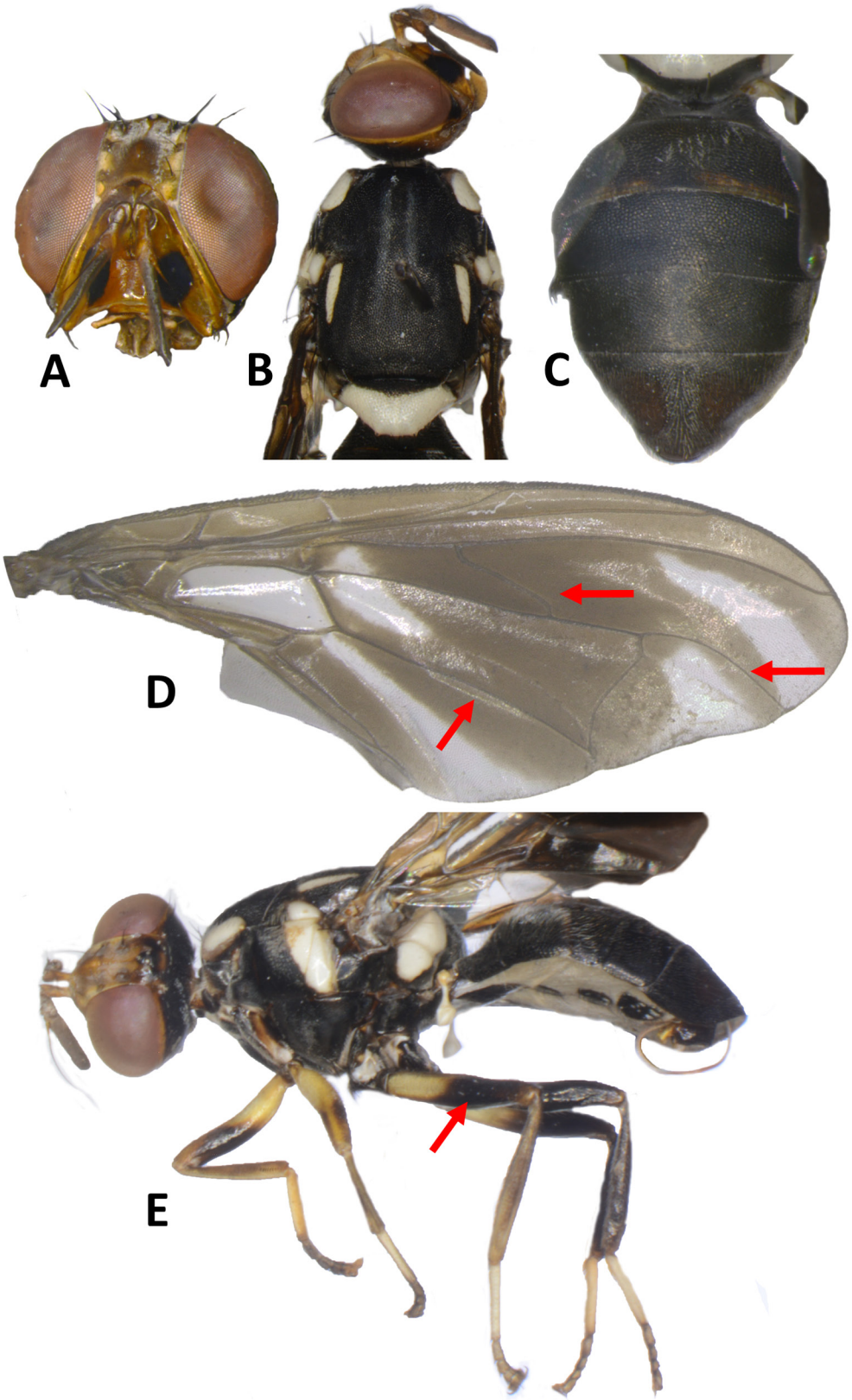


Figure 14. *Bactrocera* (*Bactrocera*) *biarcuata* (Walker), male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view.

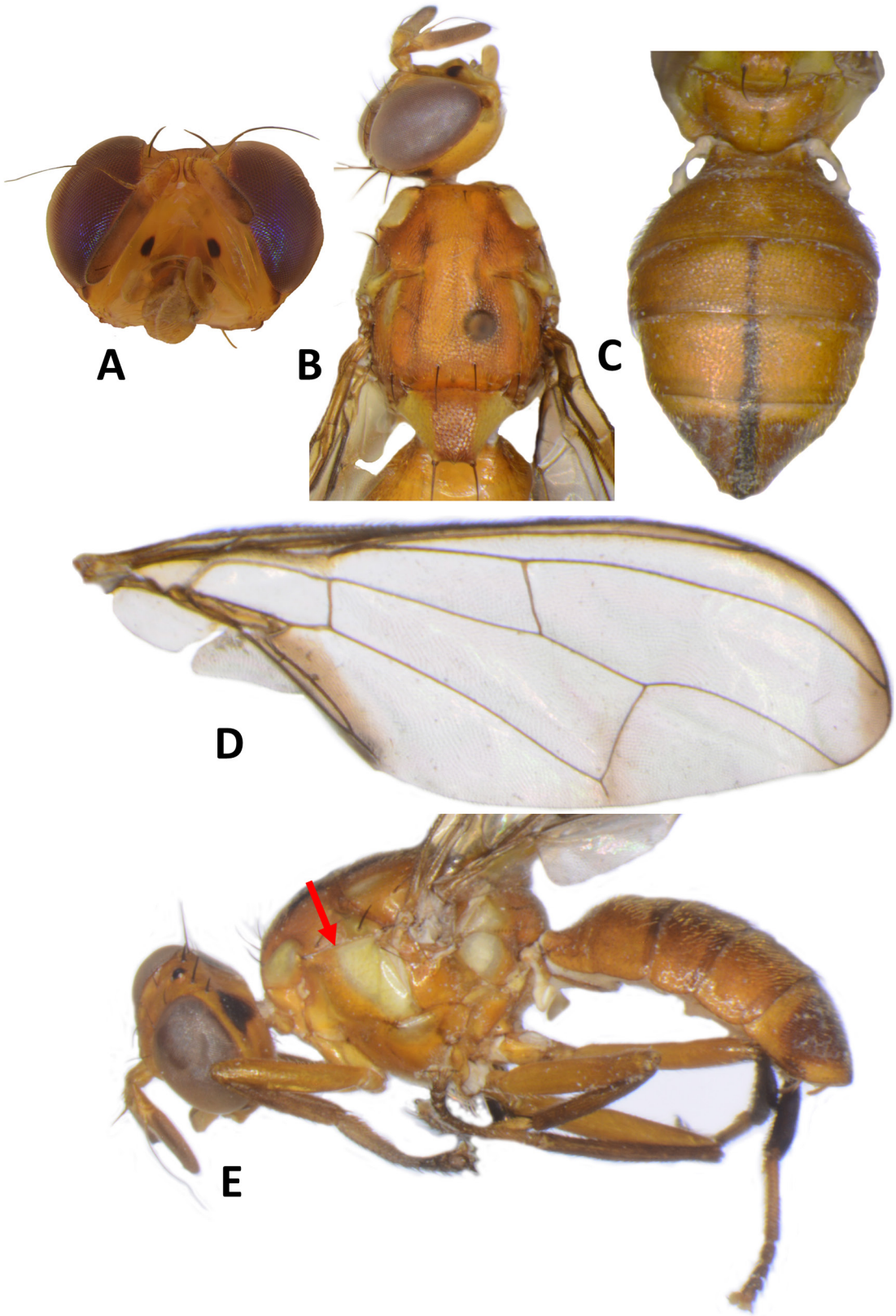


Figure 15. *Bactrocera* (*Bactrocera*) *buinensis* Drew, male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view.

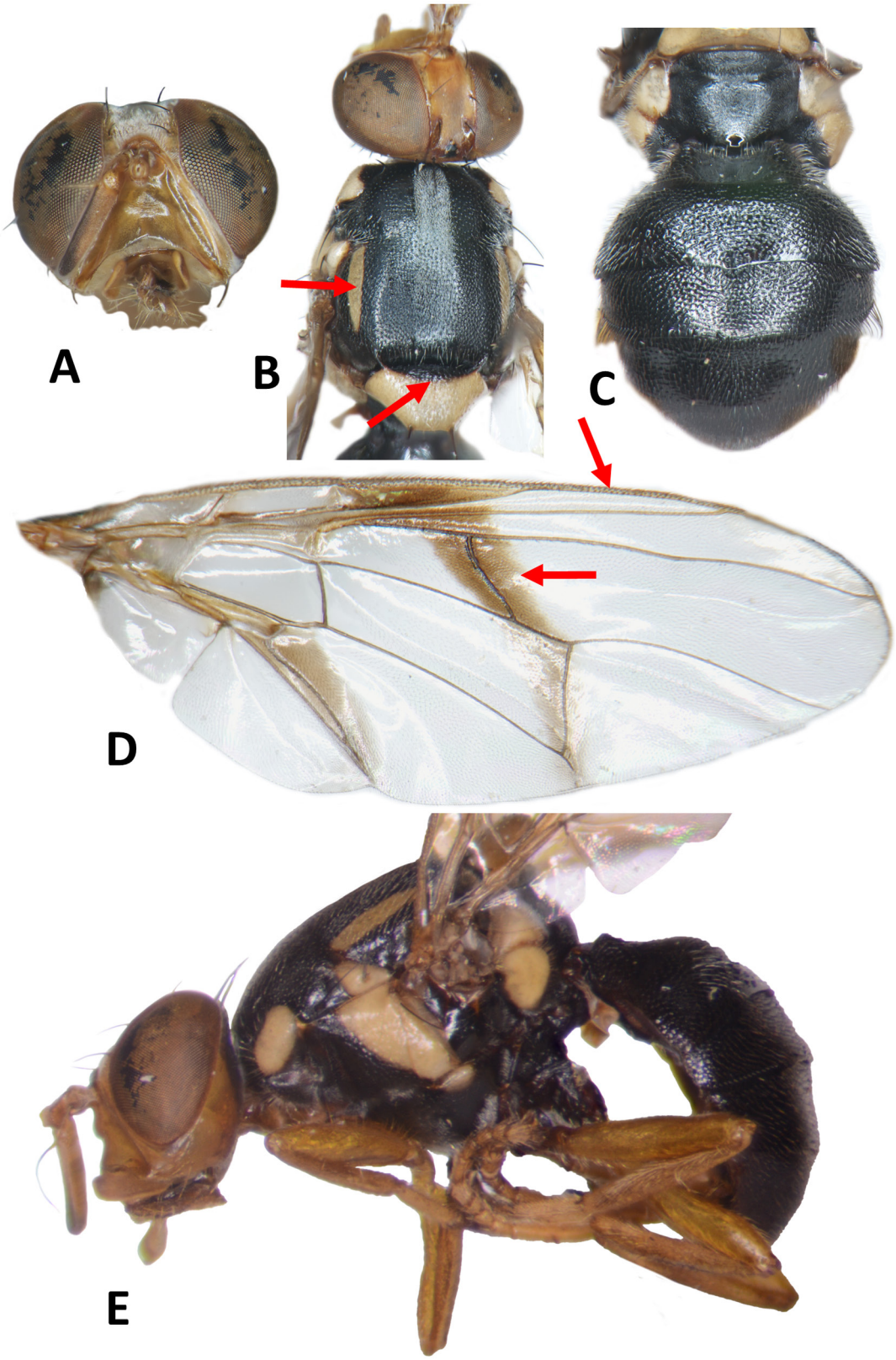


Figure 16. *Bactrocera* (*Bactrocera*) *caledoniensis* Drew, male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view.

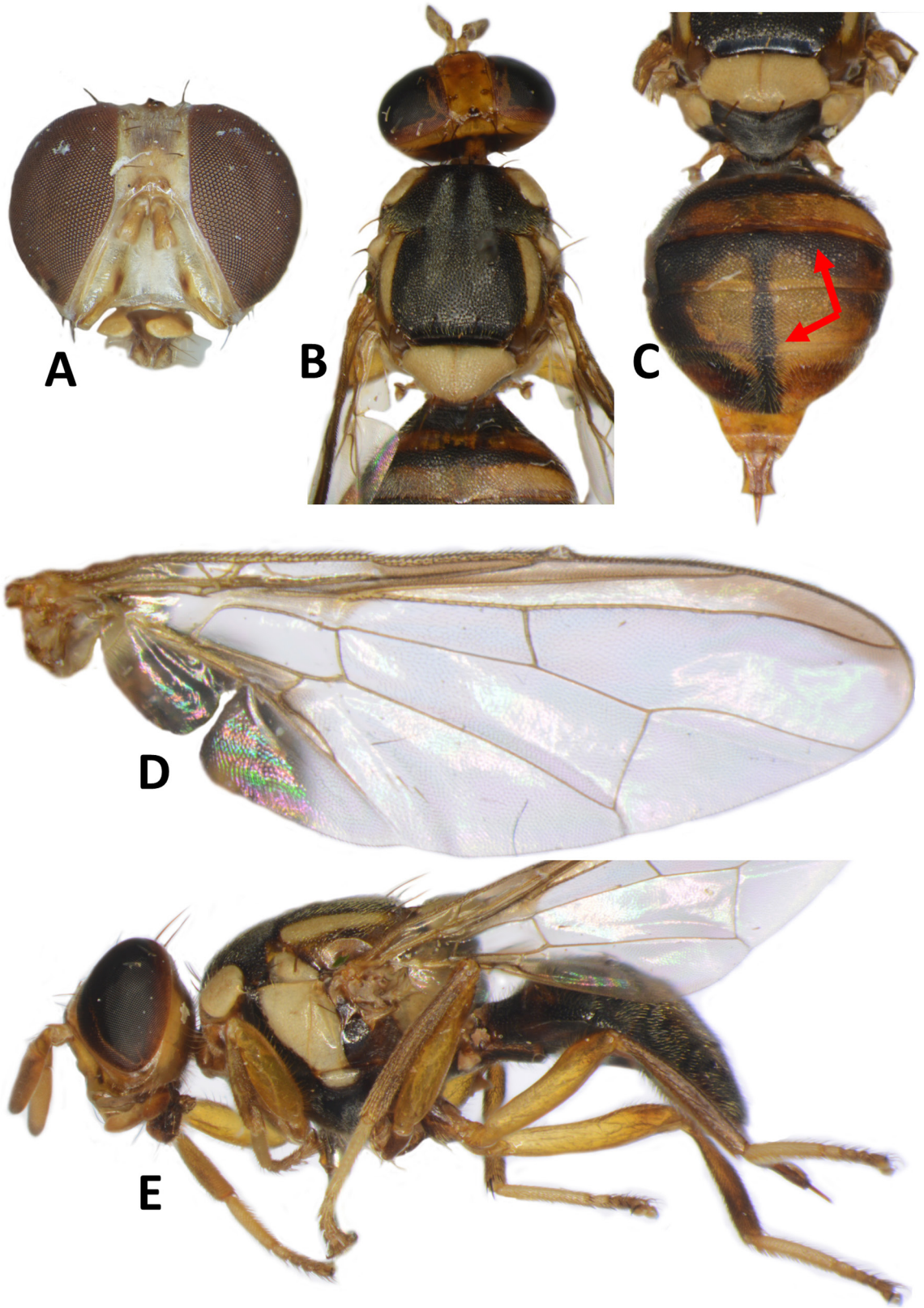


Figure 17. *Bactrocera* (*Calodacus*) *calophylli* (Perkins and May), female. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view.

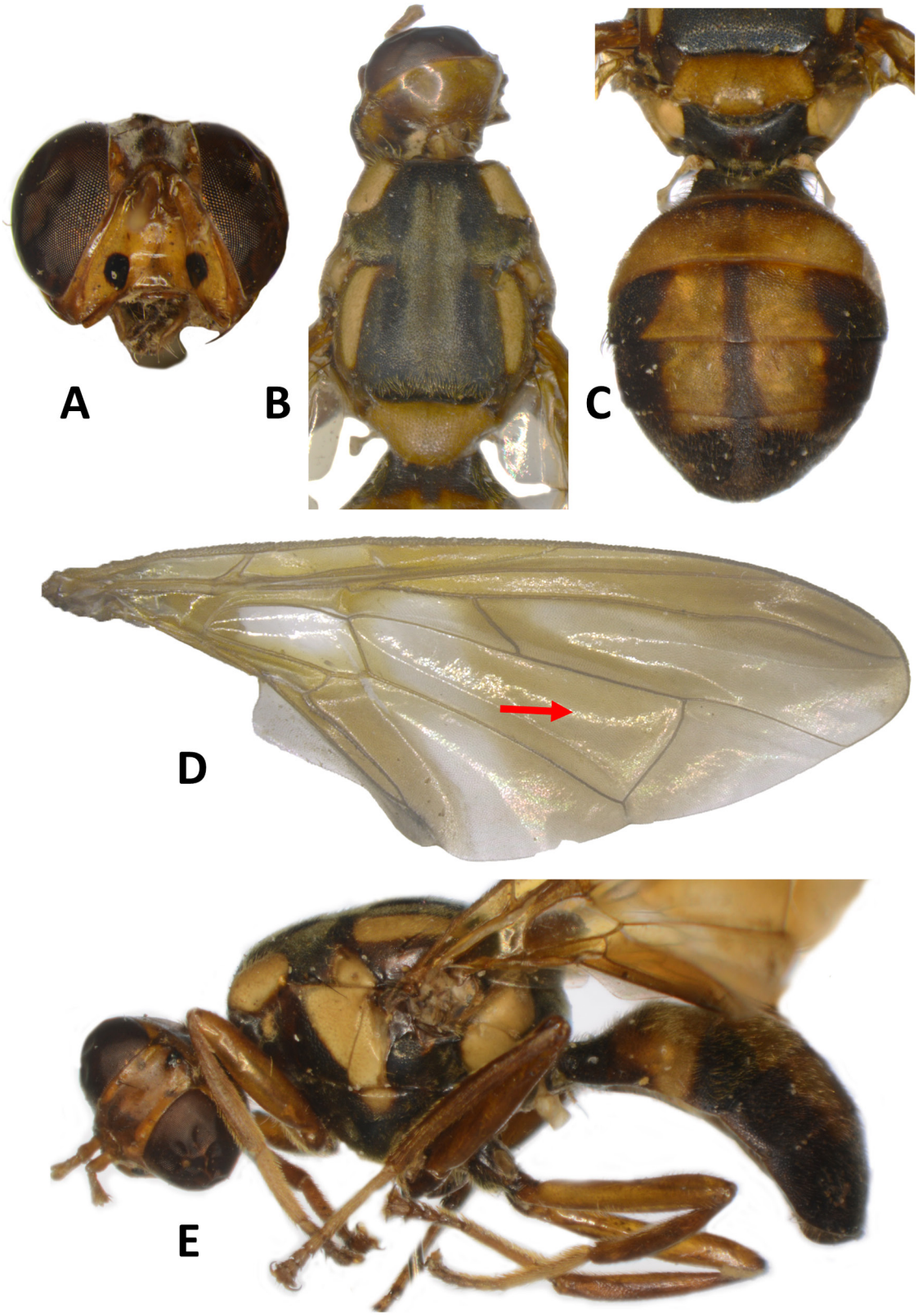


Figure 18. *Bactrocera* (*Bactrocera*) *confluens* (Drew), male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view.

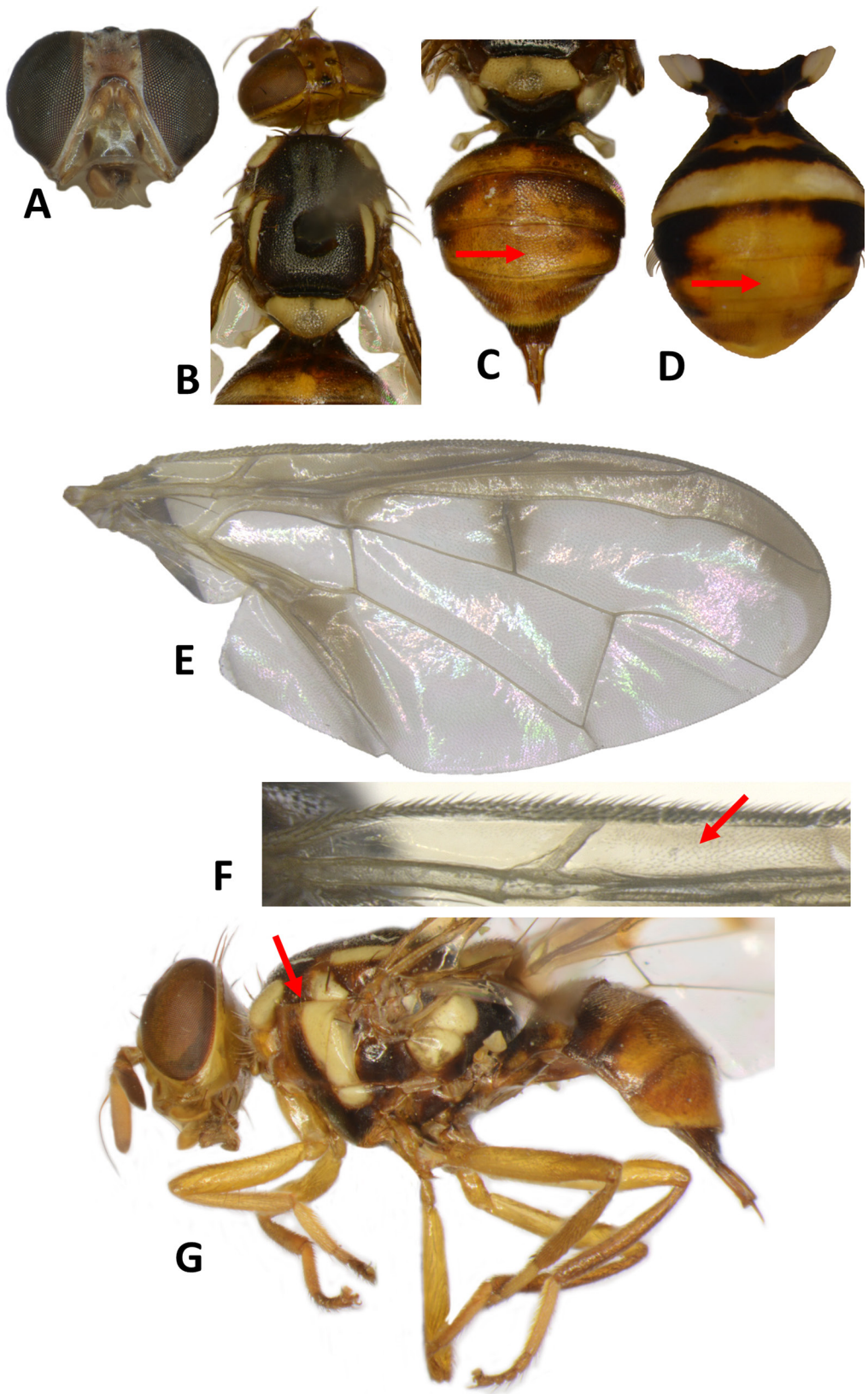


Figure 19. *Bactrocera* (*Bactrocera*) *curvipennis* (Froggatt). **A)** Head. **B)** Head and scutum. **C)** Abdomen, female. **D)** Abdomen, male. **E)** Wing. **F)** Wing, basal costal and costal cells. **G)** Lateral view, female.

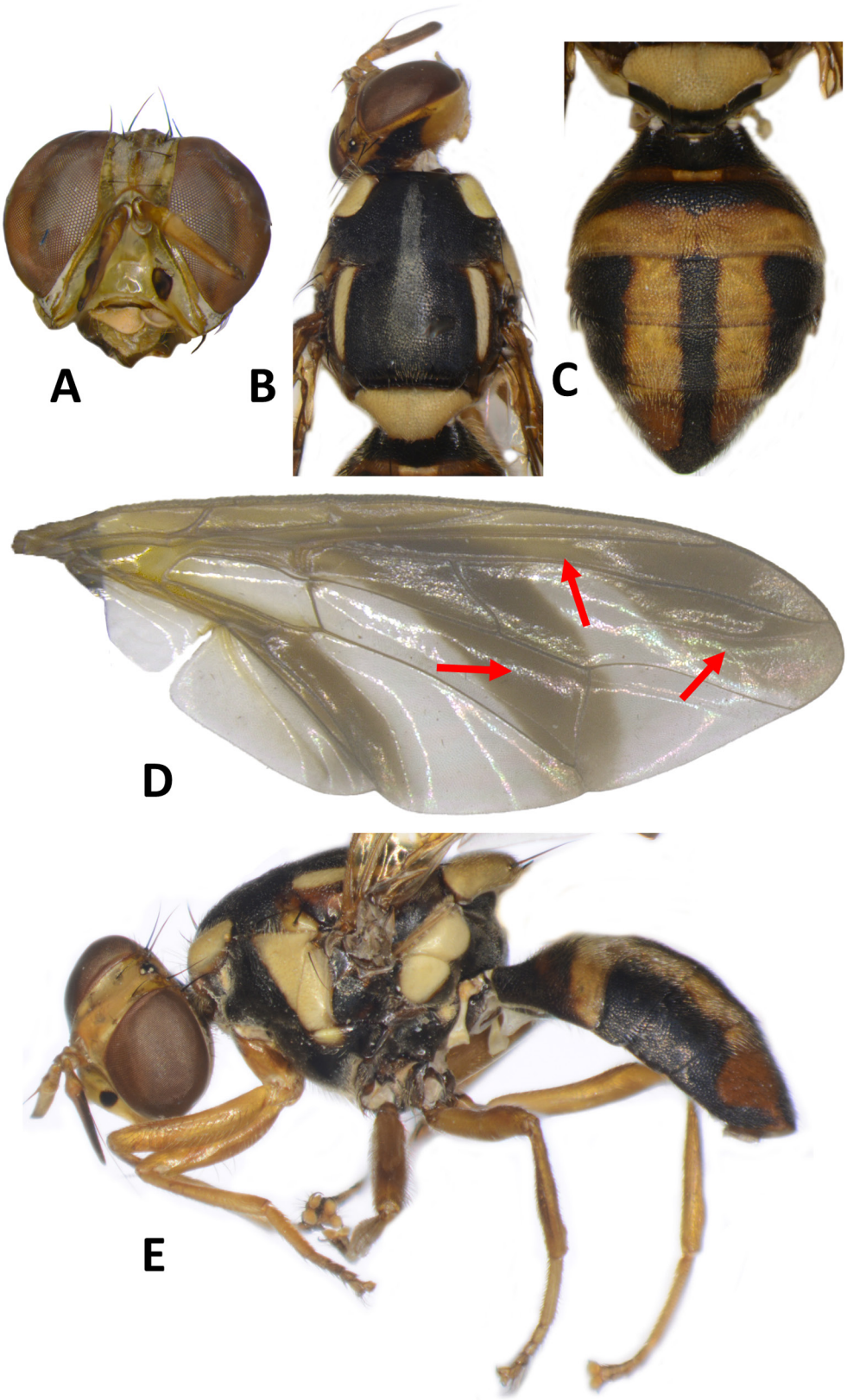


Figure 20. *Bactrocera* (*Bactrocera*) *decumana* (Drew), male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view.

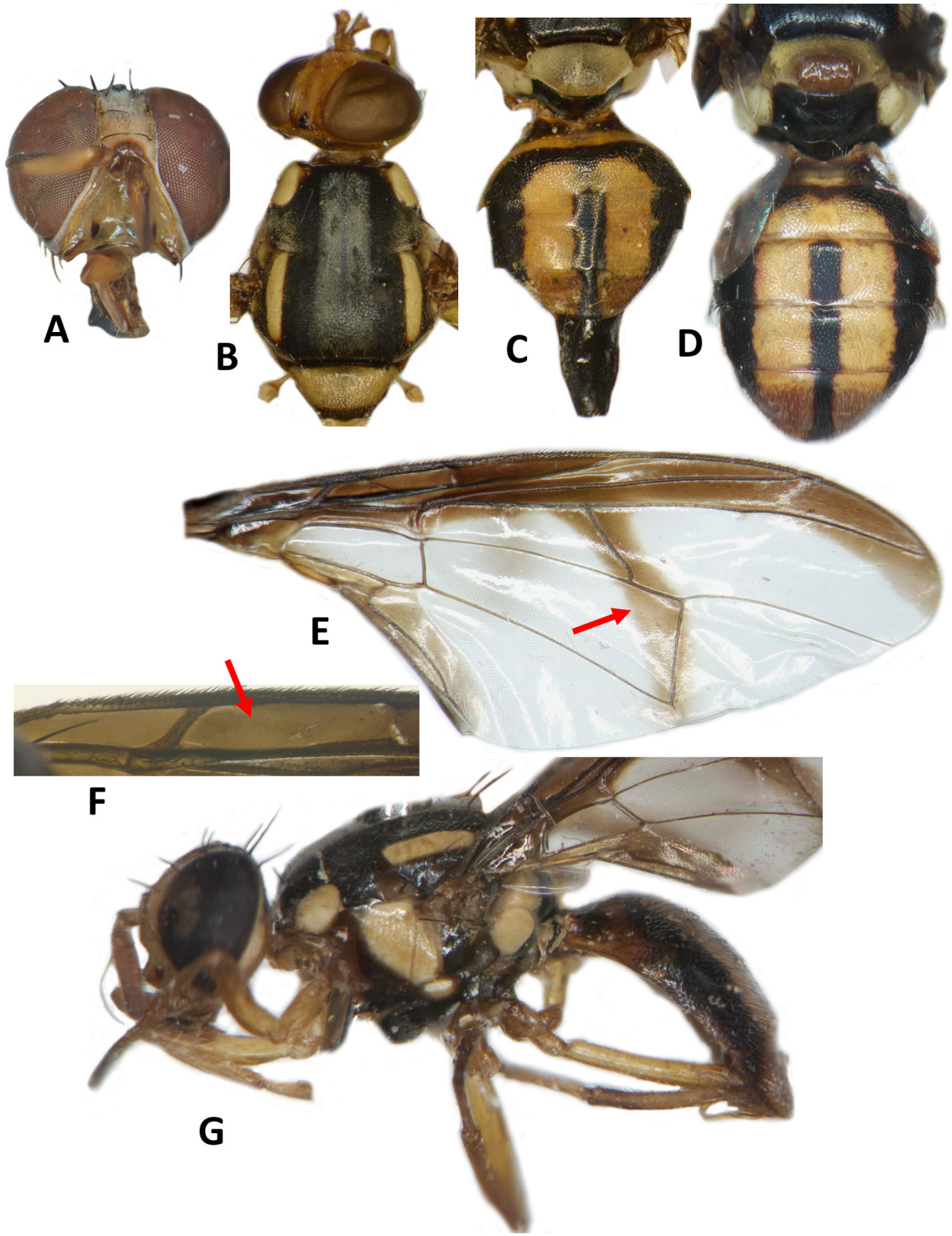


Figure 21. *Bactrocera* (*Bactrocera*) *distincta* (Malloch). **A)** Head. **B)** Head and scutum. **C)** Abdomen, female. **D)** Abdomen, male. **E)** Wing. **F)** Wing, basal costal and costal cells. **G)** Lateral view, male.

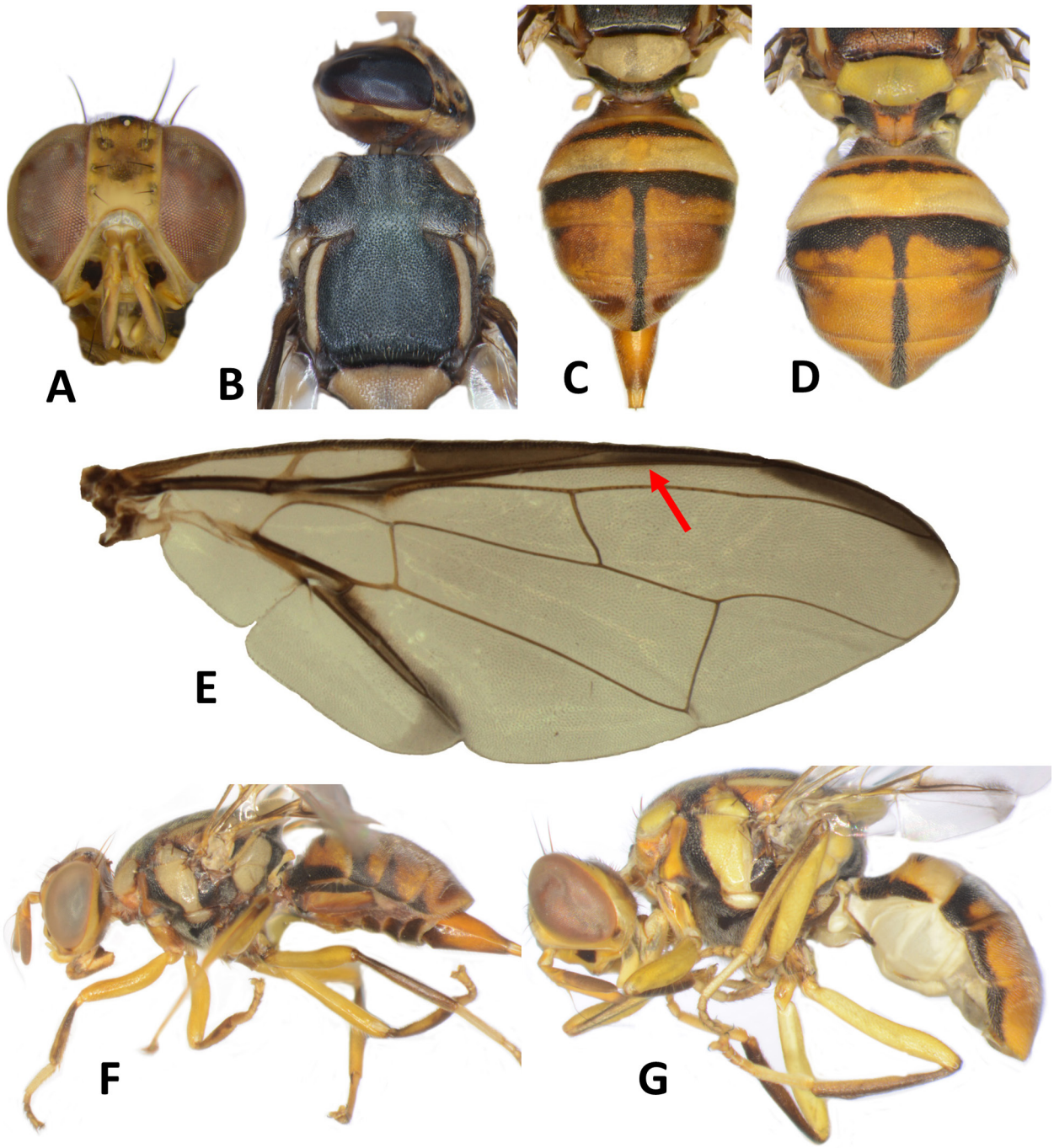


Figure 22. *Bactrocera* (*Bactrocera*) *dorsalis* (Hendel). **A)** Head. **B)** Head and scutum. **C)** Abdomen, female. **D)** Abdomen, male. **E)** Wing. **F)** Lateral view, female. **G)** Lateral view, male.

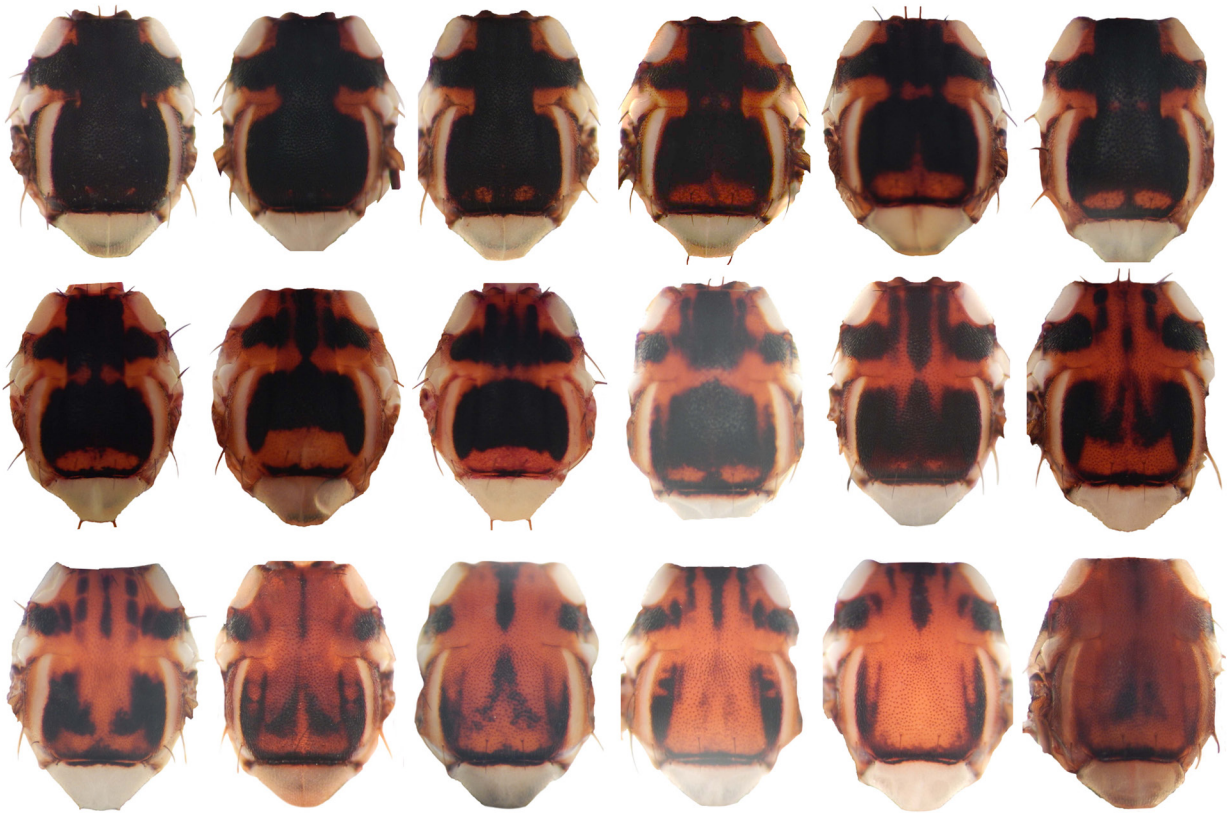


Figure 23. *Bactrocera* (*Bactrocera*) *dorsalis* (Hendel). Intraspecific variation in scutum color pattern.

Figure 24. *Bactrocera* (*Bactrocera*) *dorsalis* (Hendel). Intraspecific variation in abdomen color pattern.

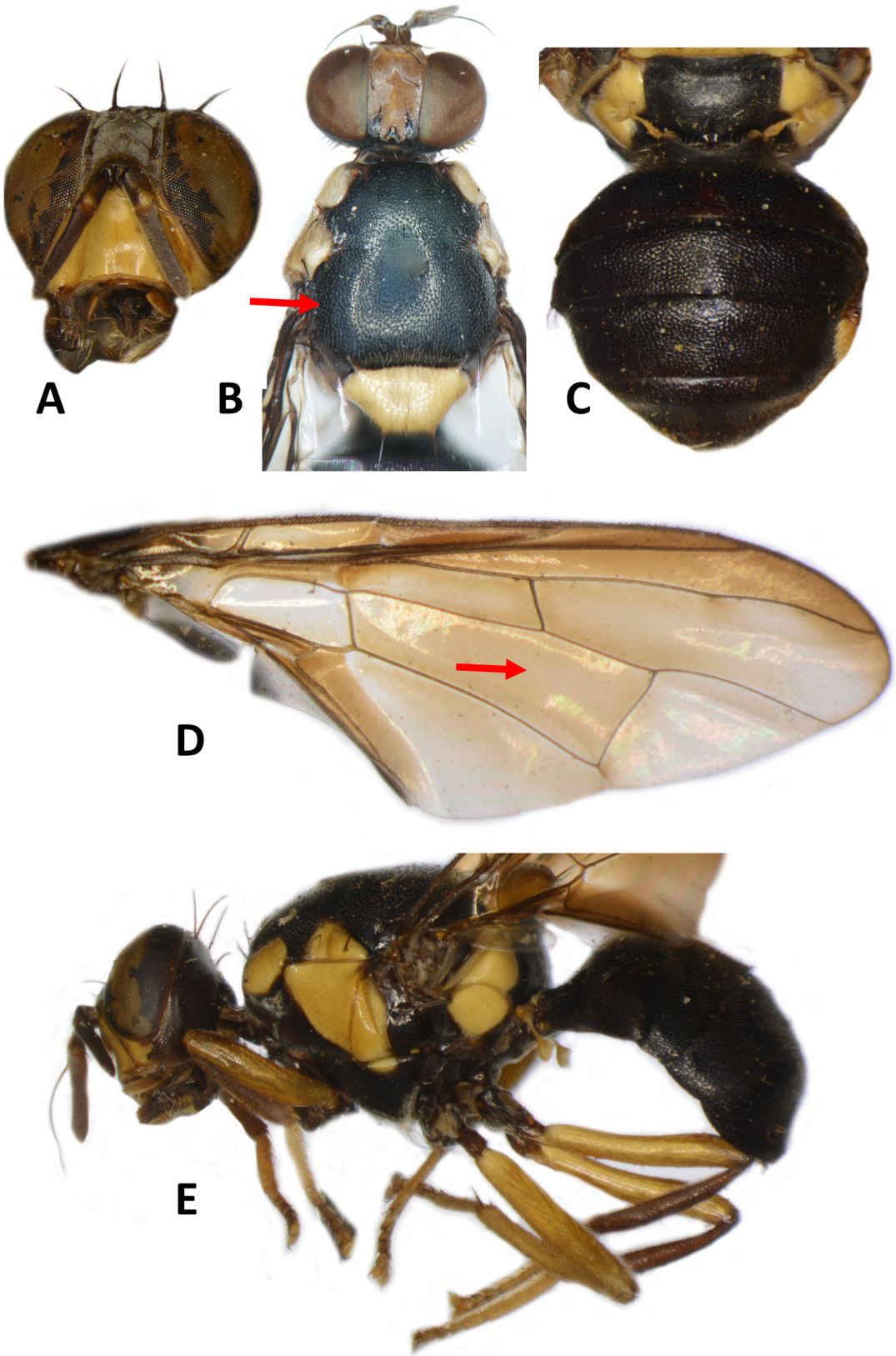


Figure 25. *Bactrocera* (*Bactrocera*) *ebenea* Drew, male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view.

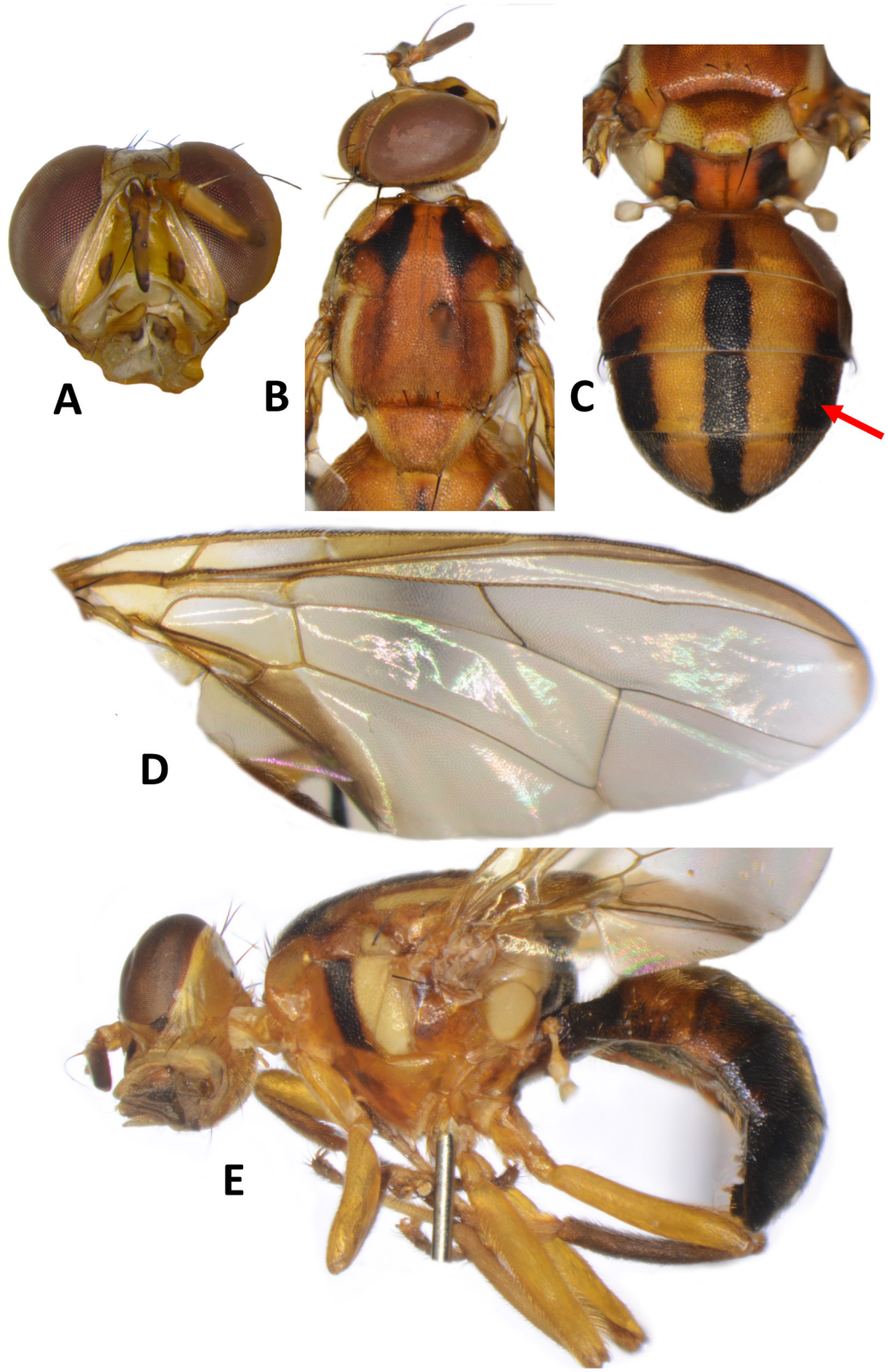


Figure 26. *Bactrocera* (*Bactrocera*) *enochra* (Drew), male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view.

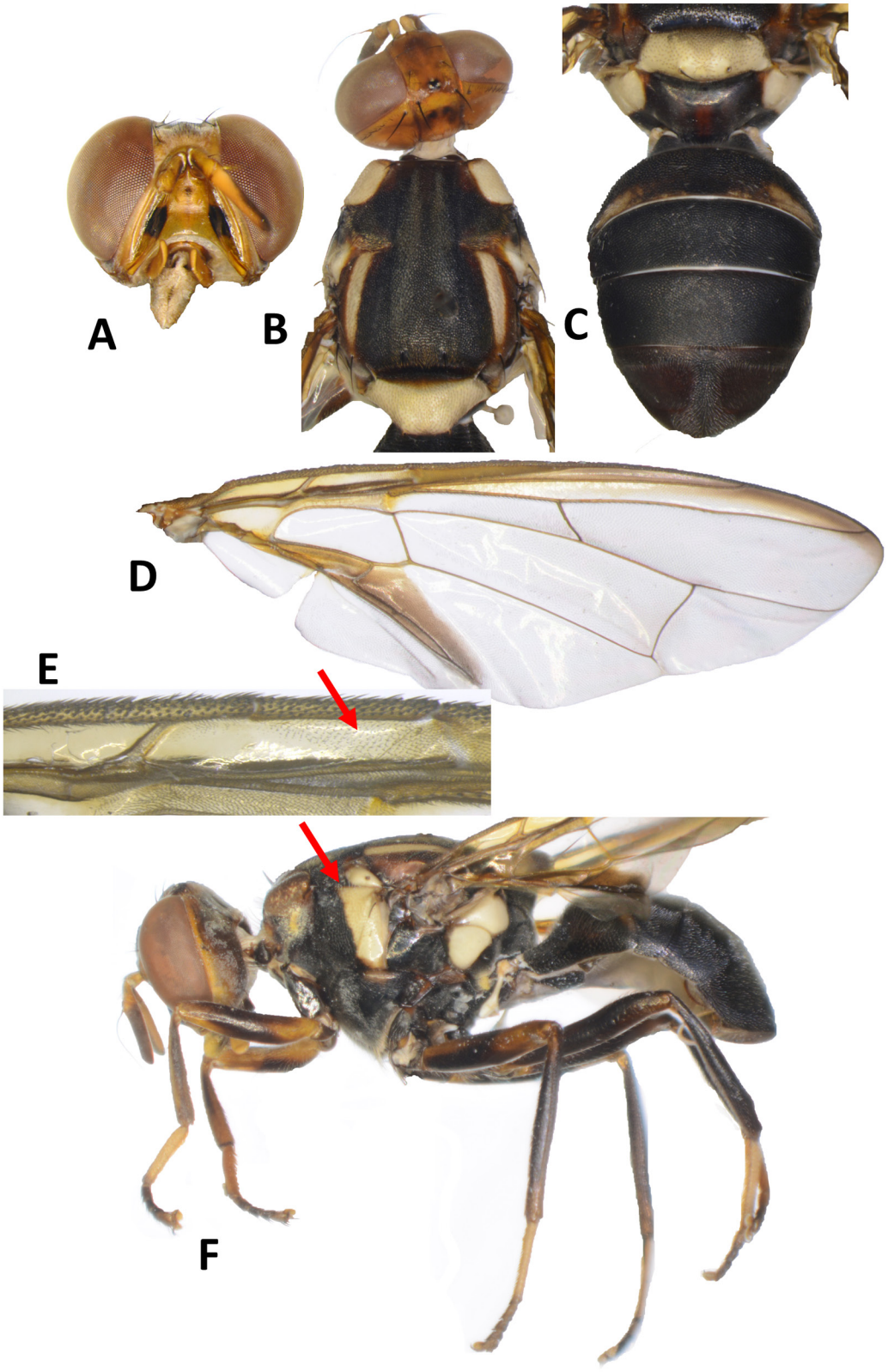


Figure 27. *Bactrocera* (*Bactrocera*) *epicharis* (Hardy), male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Wing, basal costal and costal cells. **F)** Lateral view.

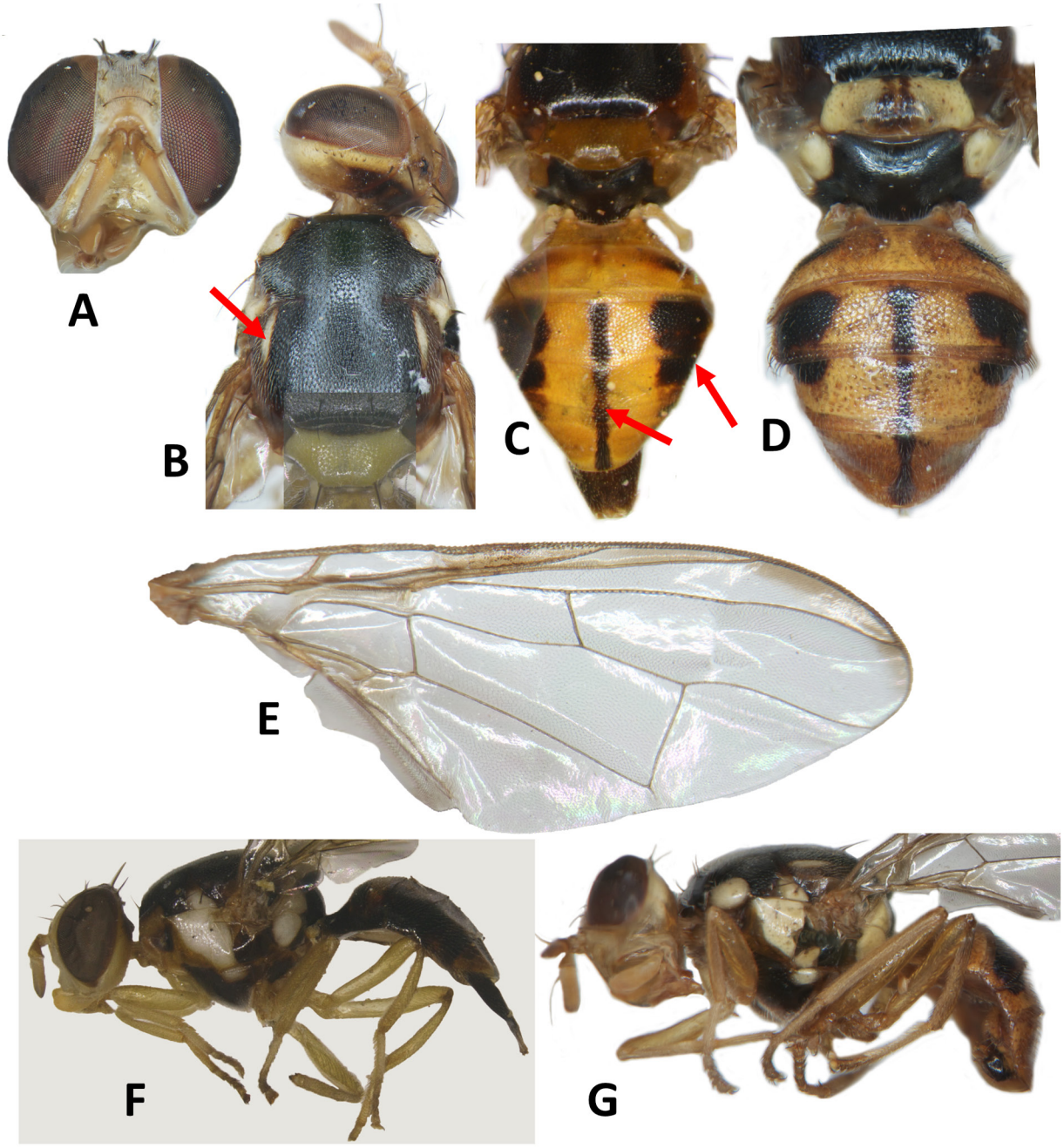


Figure 28. *Bactrocera* (*Bactrocera*) *facialis* (Coquillett). **A)** Head. **B)** Head and scutum. **C)** Abdomen, female. **D)** Abdomen, male. **E)** Wing. **F)** Lateral view, female. **G)** Lateral view, male.

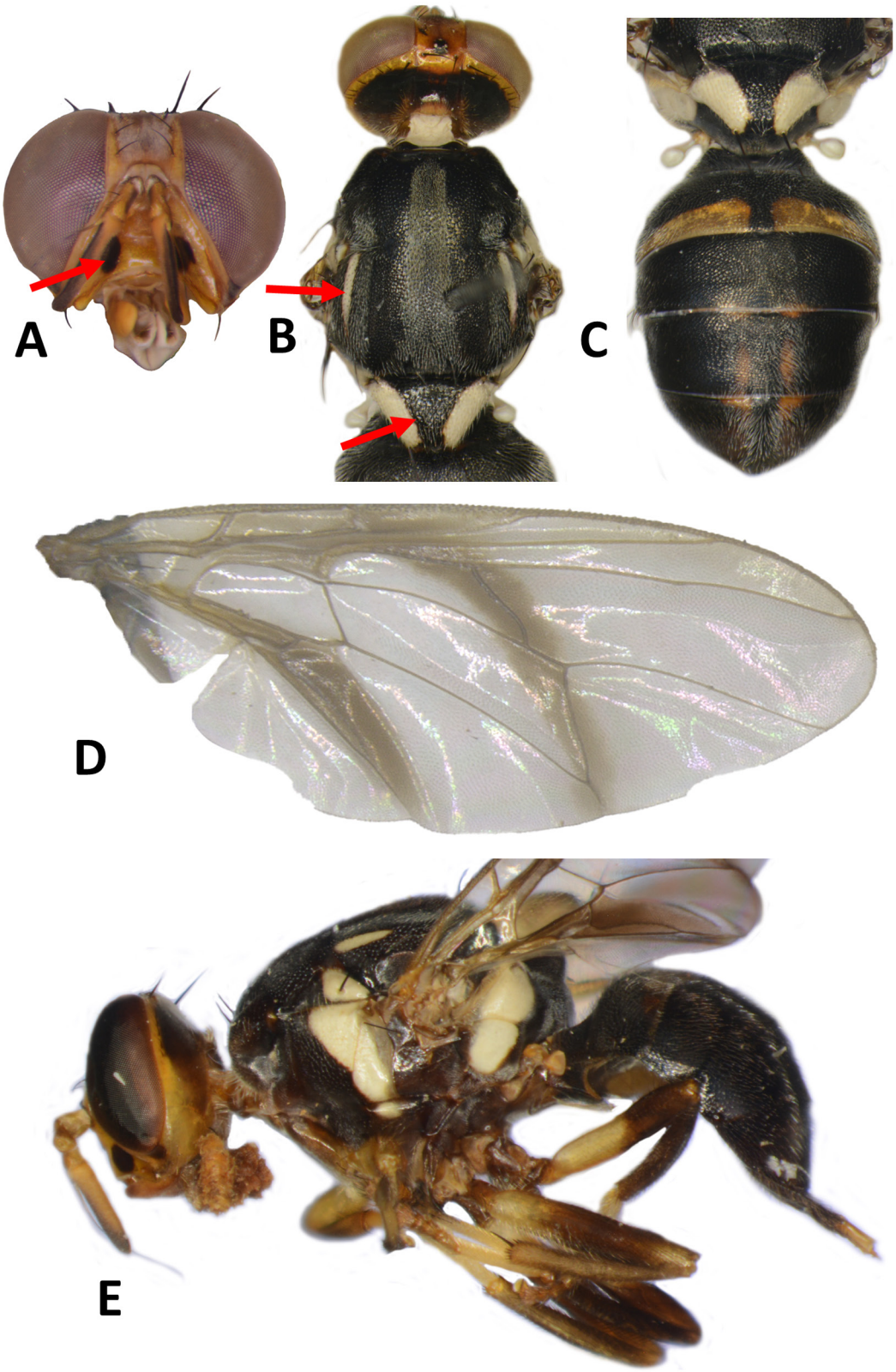


Figure 29. *Bactrocera* (*Bactrocera*) *frauenfeldi* (Schiner). **A)** Head. **B)** Head and scutum. **C)** Abdomen, male. **D)** Wing. **E)** Lateral view, female.

Figure 30. *Bactrocera* (*Bactrocera*) *frauenfeldi* (Schiner). Intraspecific variation in scutum and abdomen coloration.

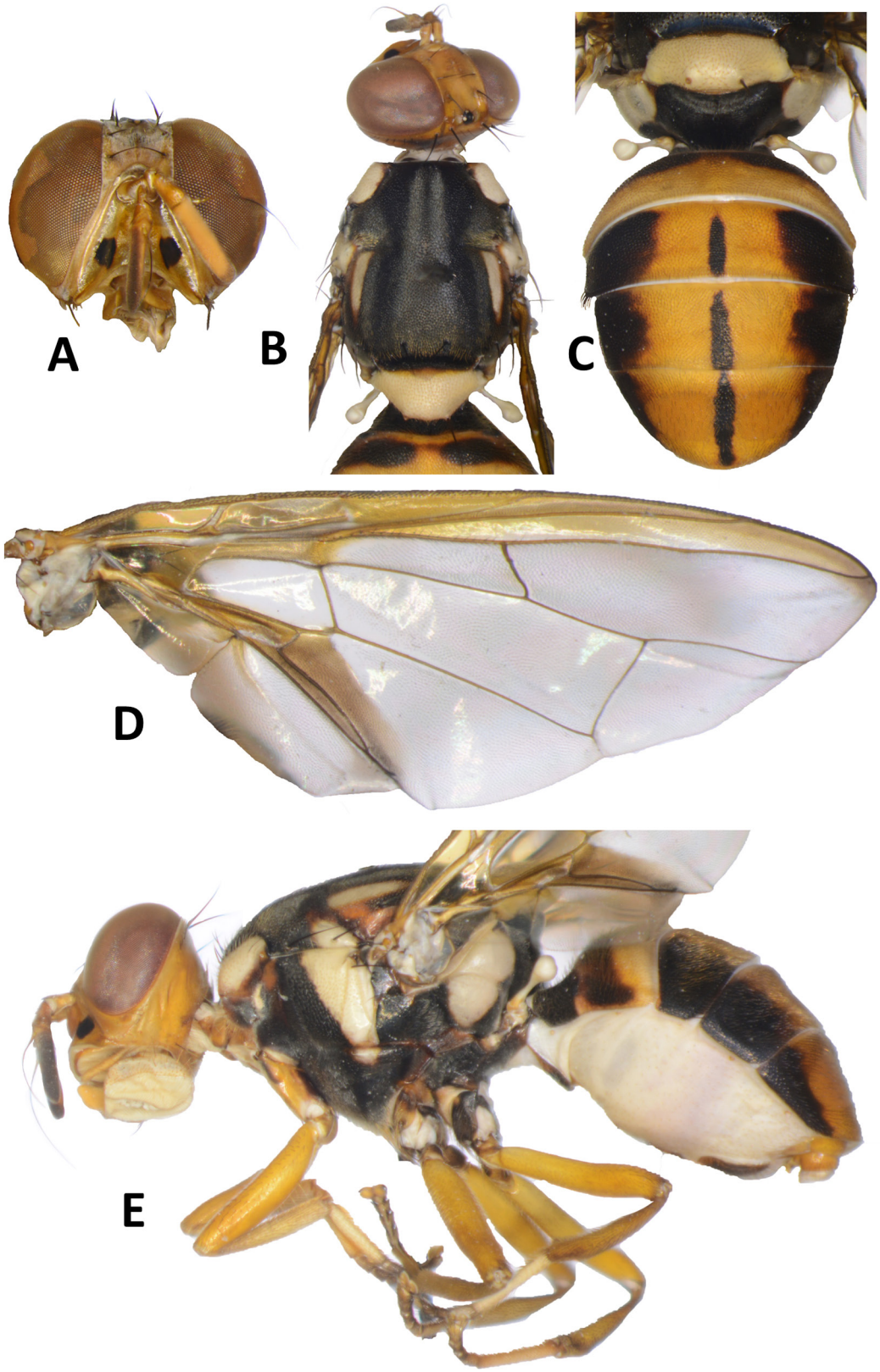


Figure 31. *Bactrocera* (*Bactrocera*) *froggatti* (Bezzi), male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view.

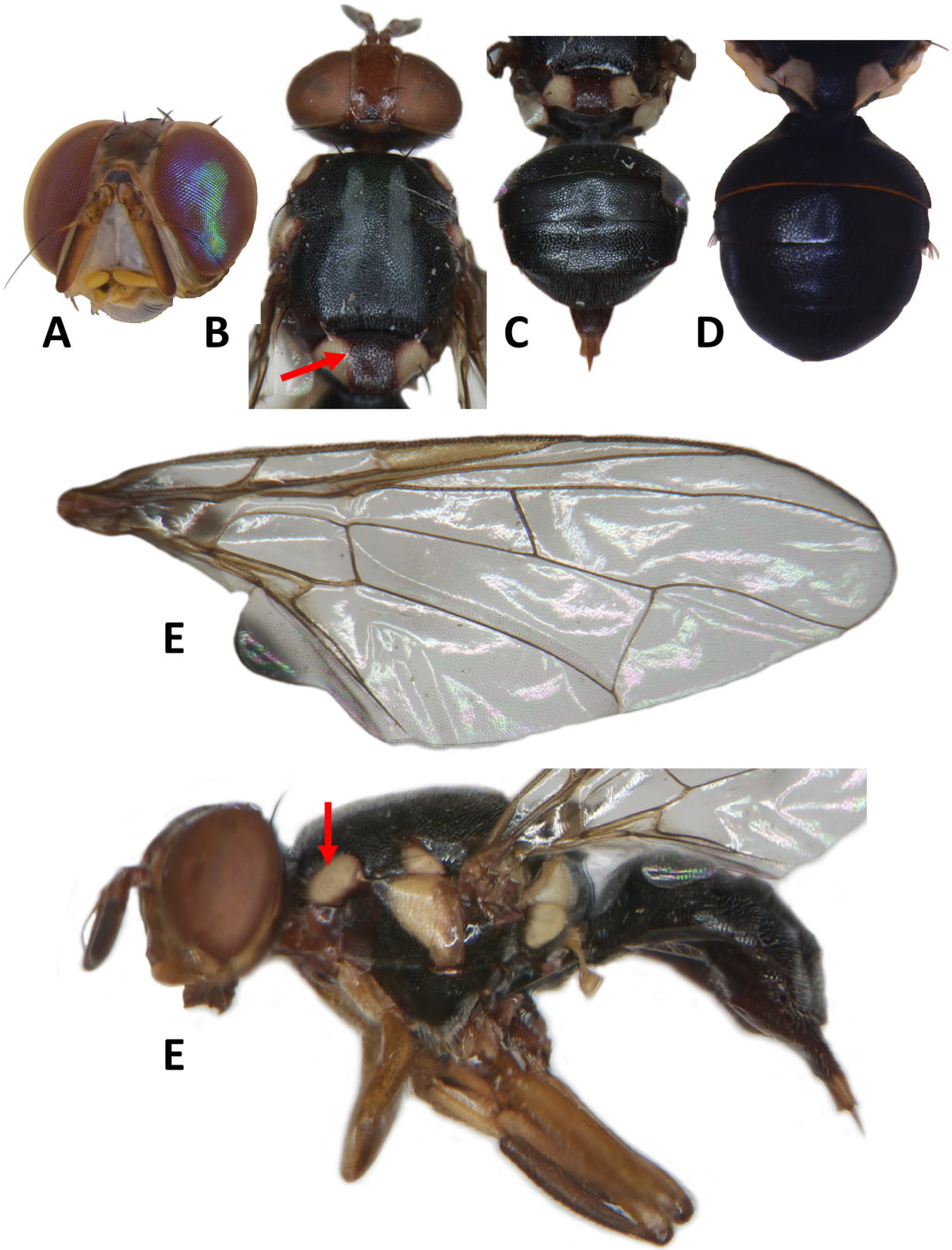


Figure 32. *Bactrocera* (*Bactrocera*) *fulvifacies* (Perkins). **A)** Head. **B)** Head and scutum. **C)** Abdomen, female. **D)** Abdomen, male. **E)** Wing. **F)** Lateral view, female.

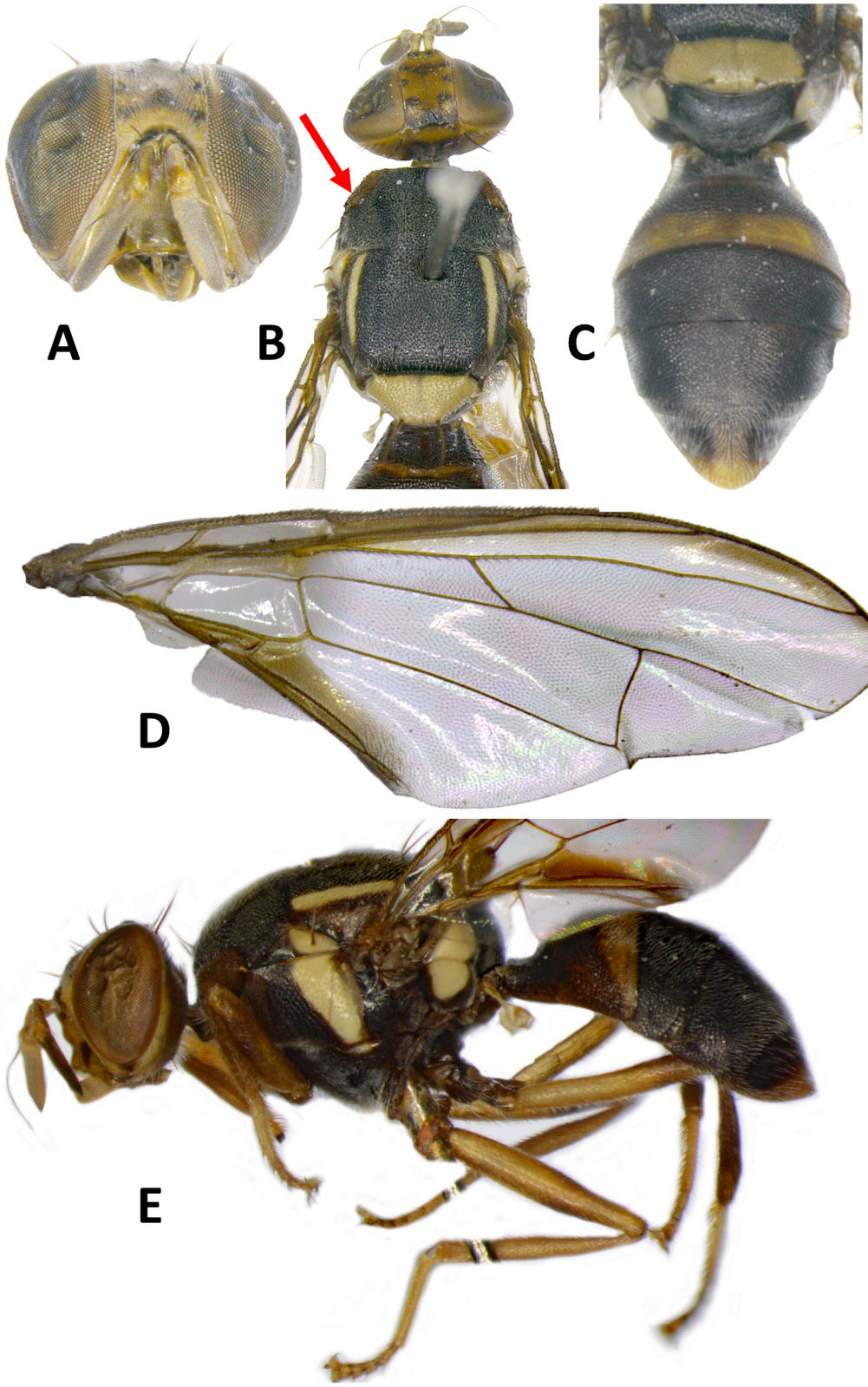


Figure 33. *Bactrocera* (*Bactrocera*) *furvescens* Drew, male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view.

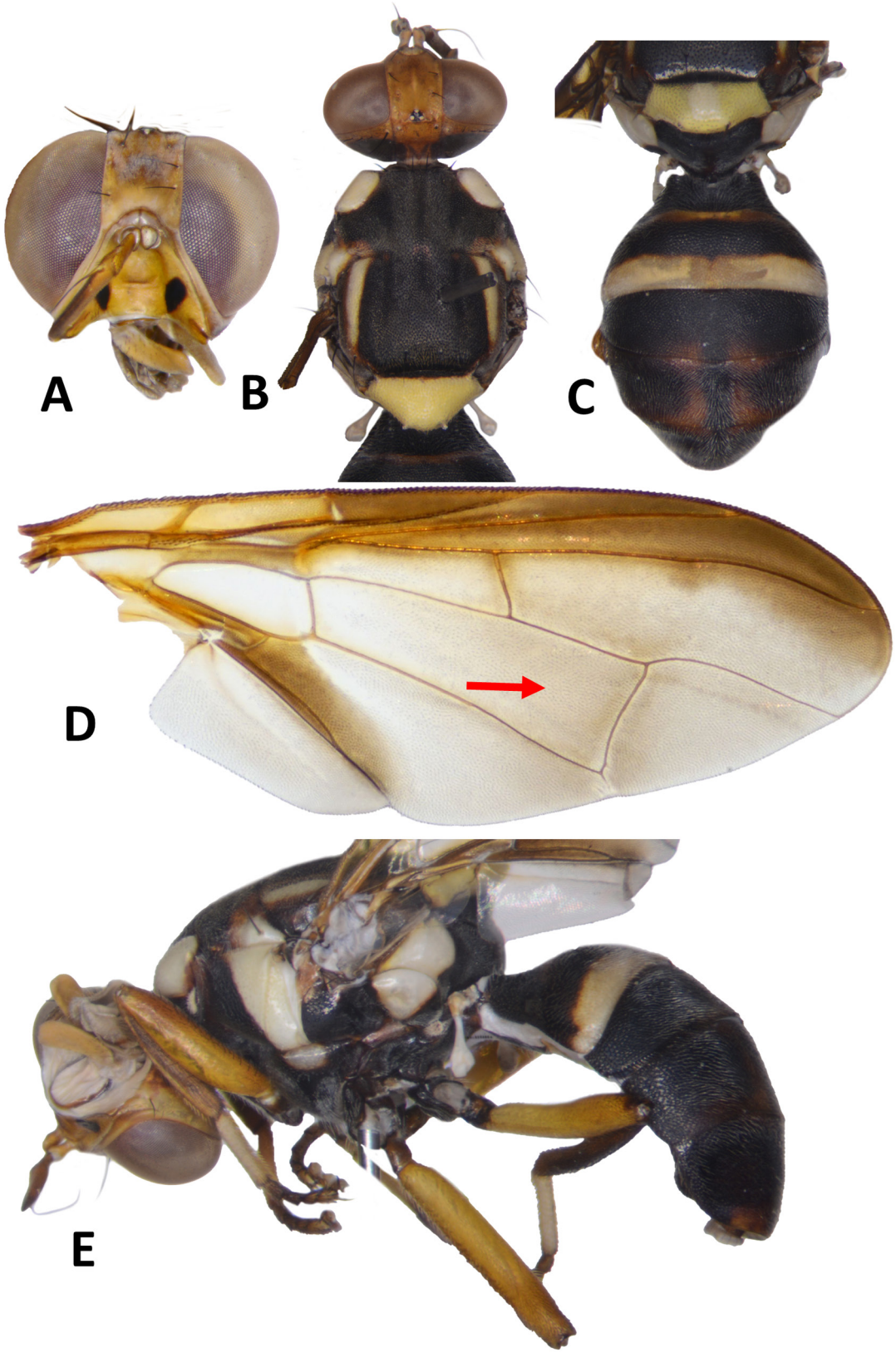


Figure 34. *Bactrocera* (*Bactrocera*) *geminosimulata* Leblanc and Doorenweerd, male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view.

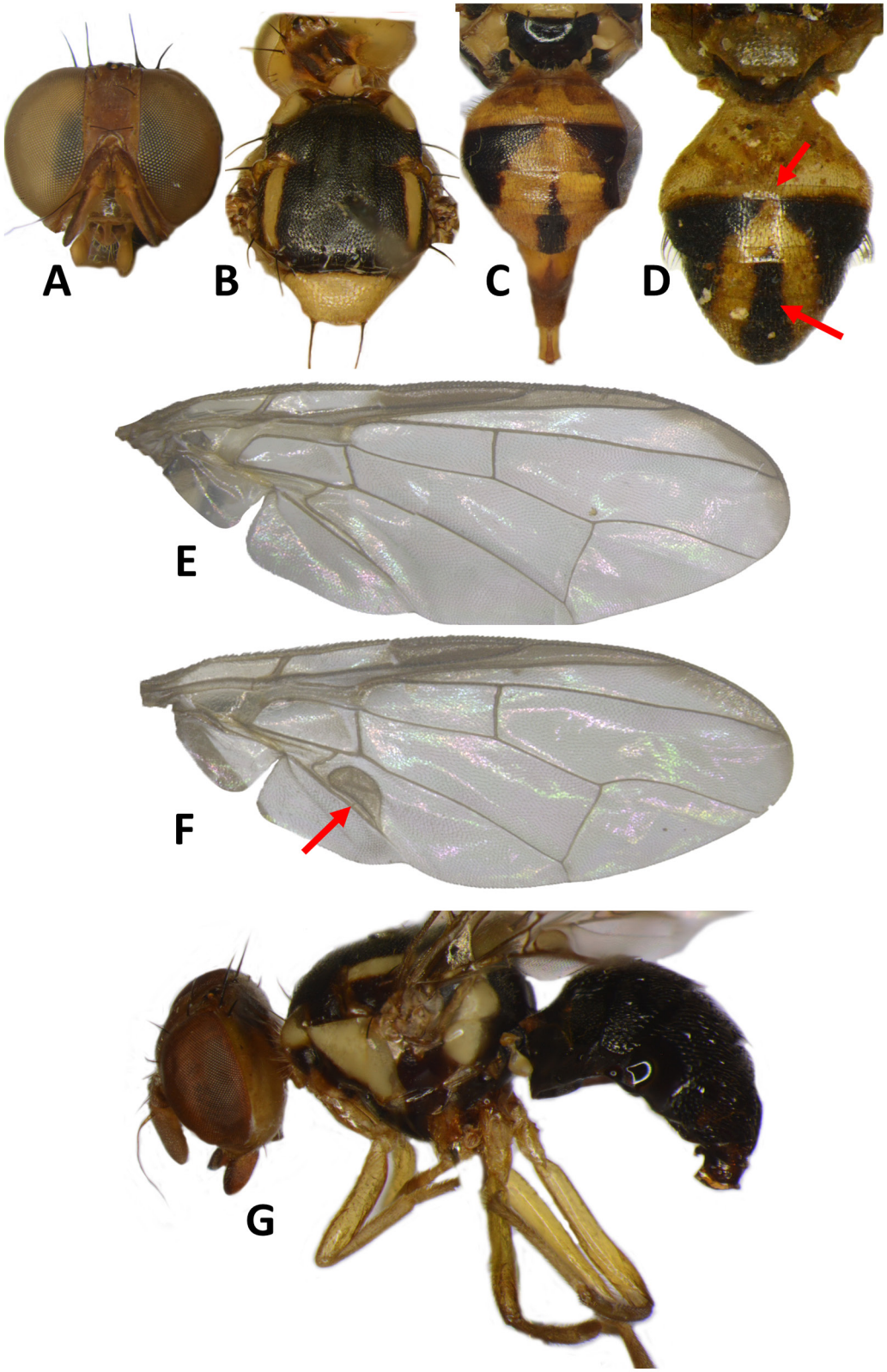


Figure 35. *Bactrocera* (*Bactrocera*) *gnetum* Drew and Hancock. **A)** Head. **B)** Head and scutum. **C)** Abdomen, female. **D)** Abdomen, male. **E)** Wing, female. **F)** Wing, male. **G)** Lateral view, male.

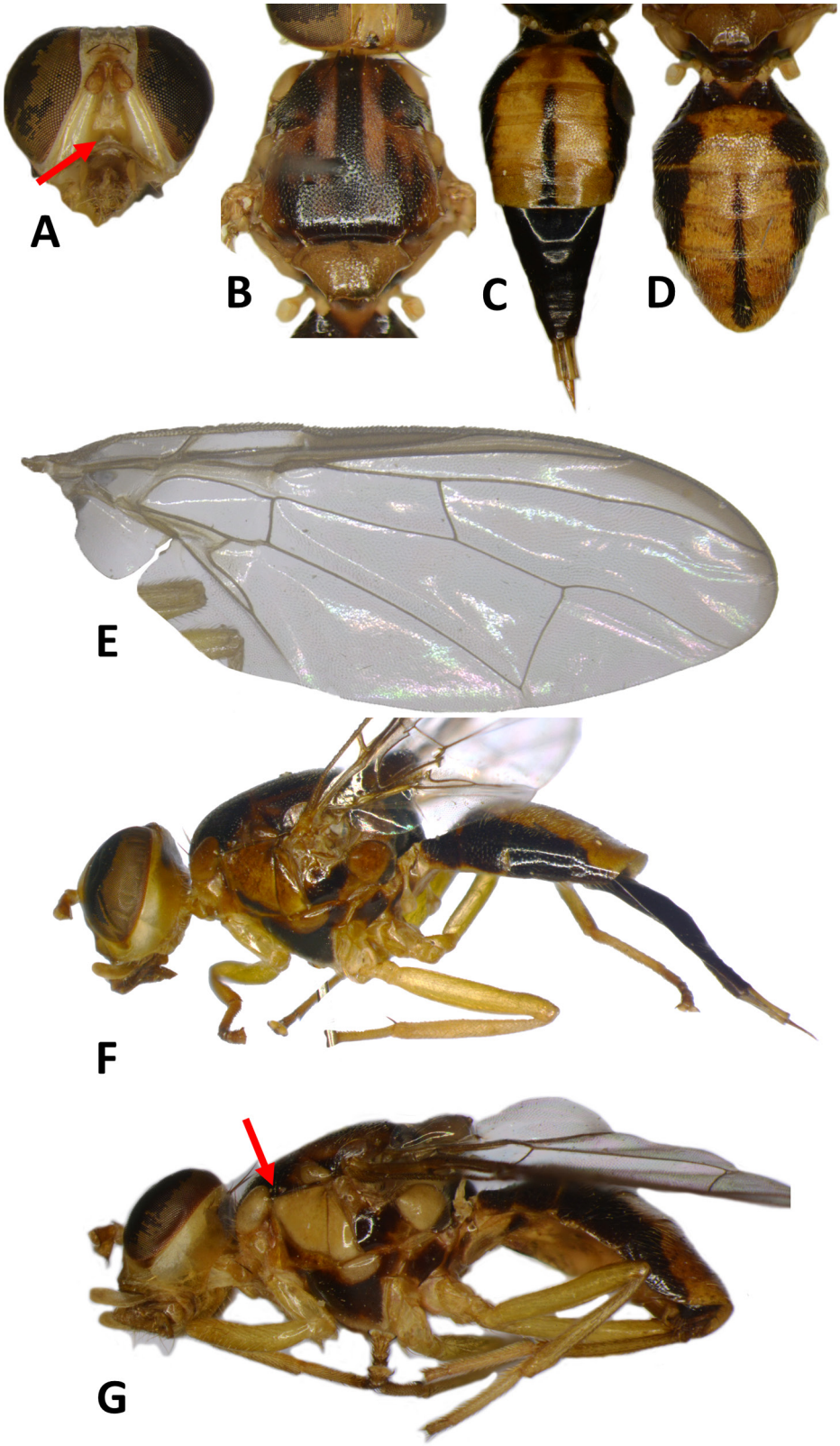


Figure 36. *Bactrocera* (*Bactrocera*) *grandistylus* (Drew and Hancock). **A)** Head. **B)** Head and scutum. **C)** Abdomen, female. **D)** Abdomen, male. **E)** Wing. **F)** Lateral view, female. **G)** Lateral view, male.

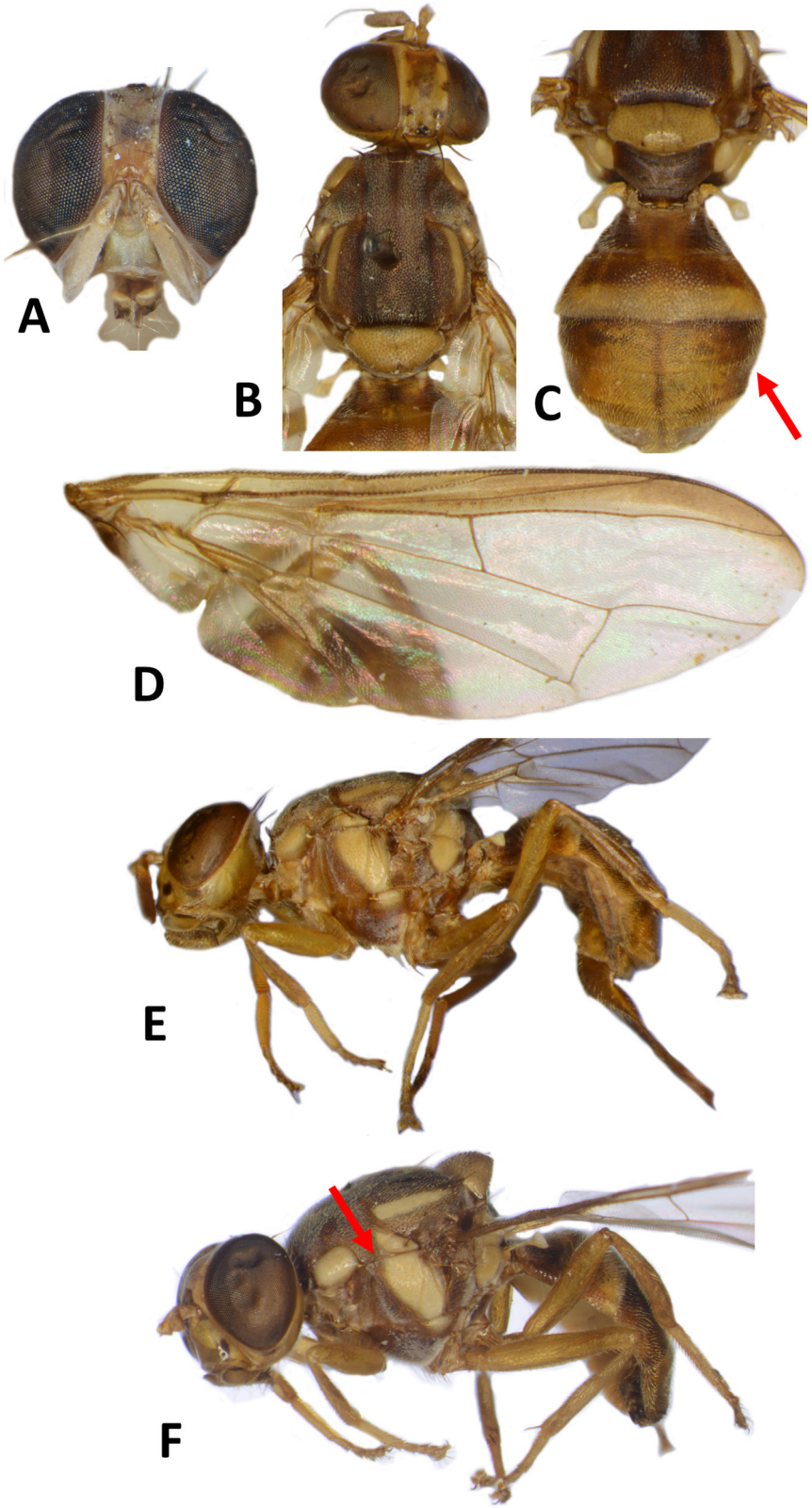


Figure 37. *Bactrocera* (*Calodacus*) *hastigerina* (Hardy). **A)** Head. **B)** Head and scutum. **C)** Abdomen, male. **D)** Wing. **E)** Lateral view, female. **F)** Lateral view, male.

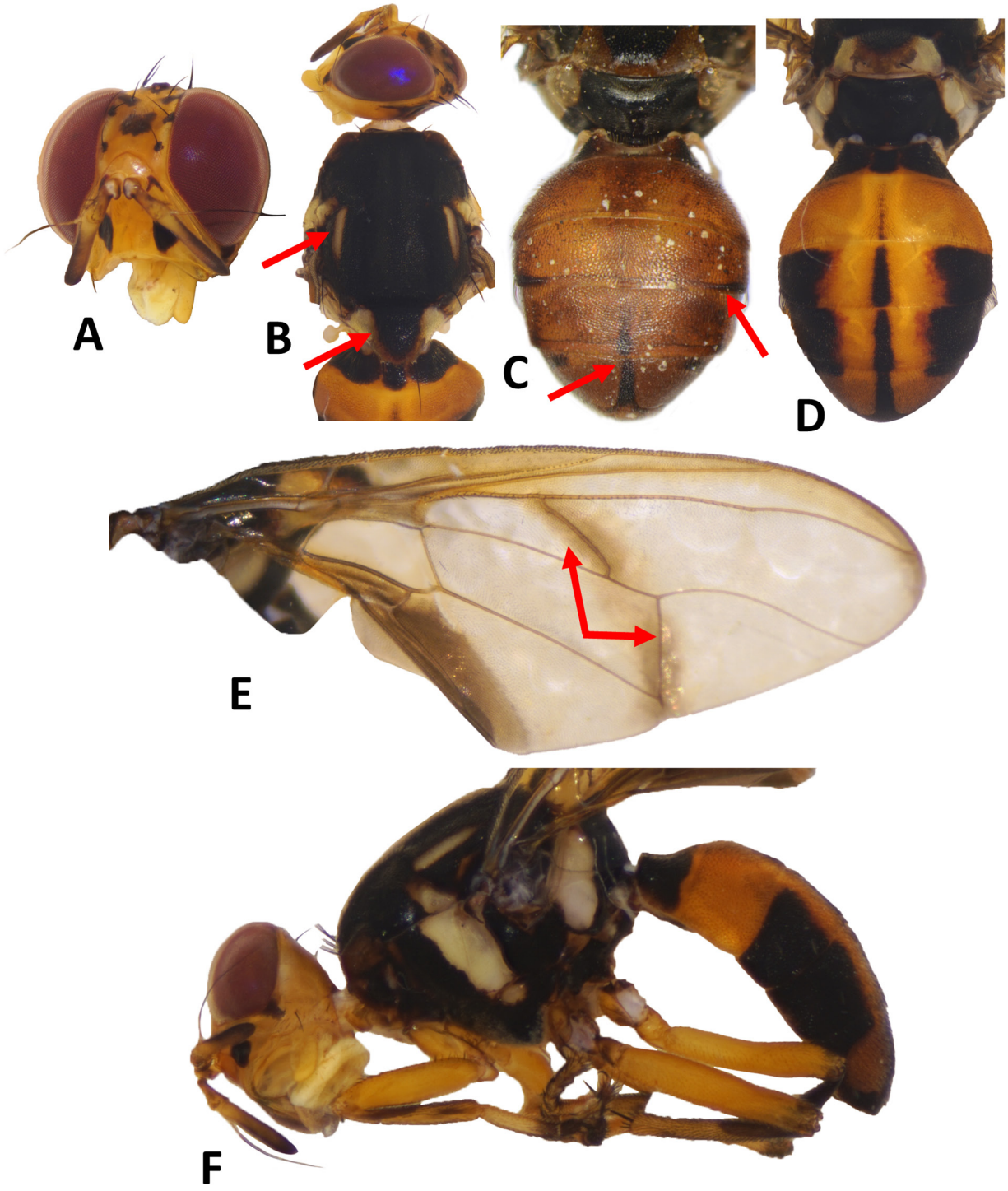


Figure 38. *Bactrocera* (*Bactrocera*) *hollingsworthi* Drew and Romig, male. **A)** Head. **B)** Head and scutum. **C–D)** Abdomen. **E)** Wing. **F)** Lateral view.

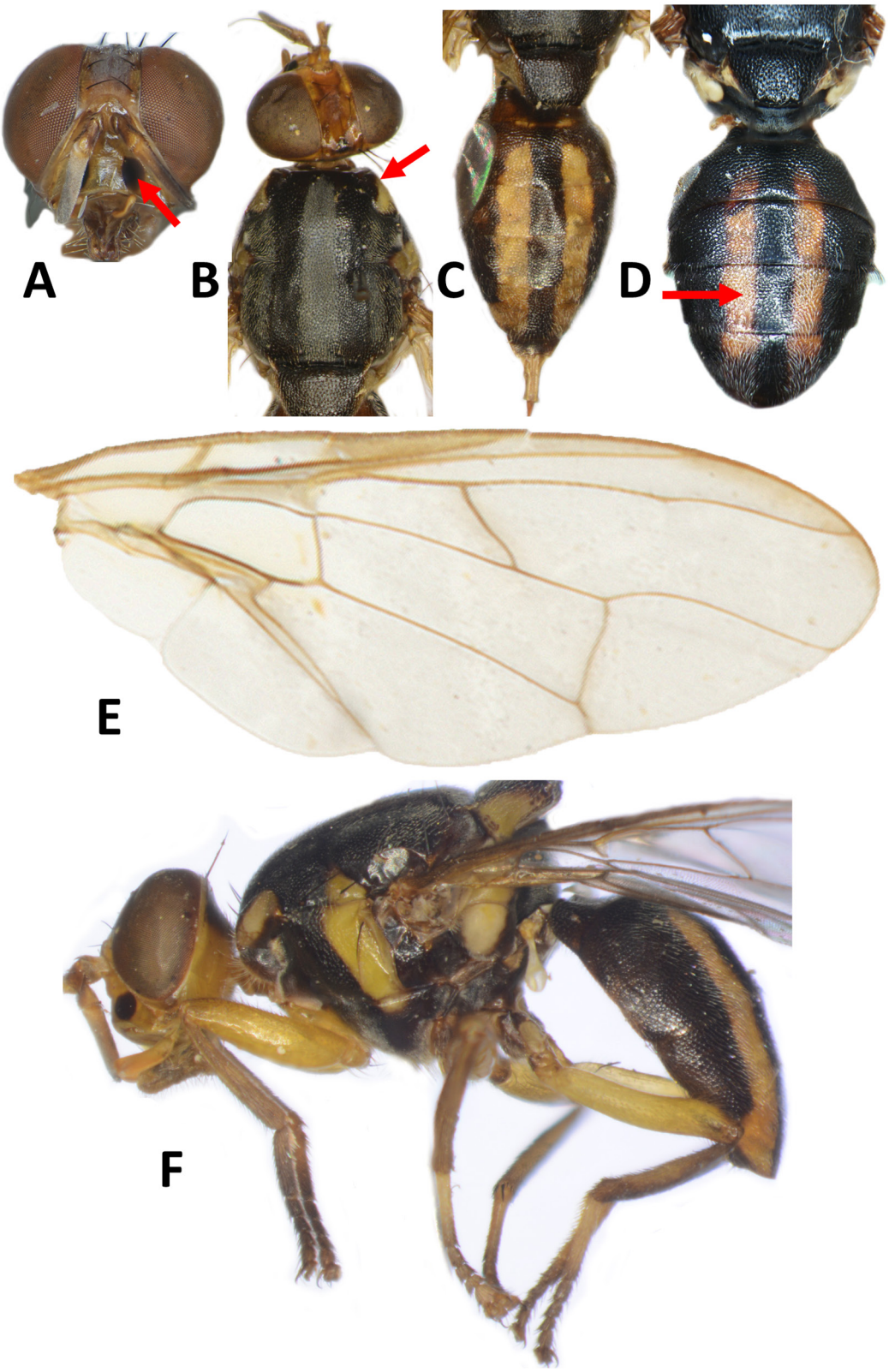


Figure 39. *Bactrocera* (*Bactrocera*) *kirki* (Froggatt). **A)** Head. **B)** Head and scutum. **C)** Abdomen, female. **D)** Abdomen, male. **E)** Wing. **F)** Lateral view, male.

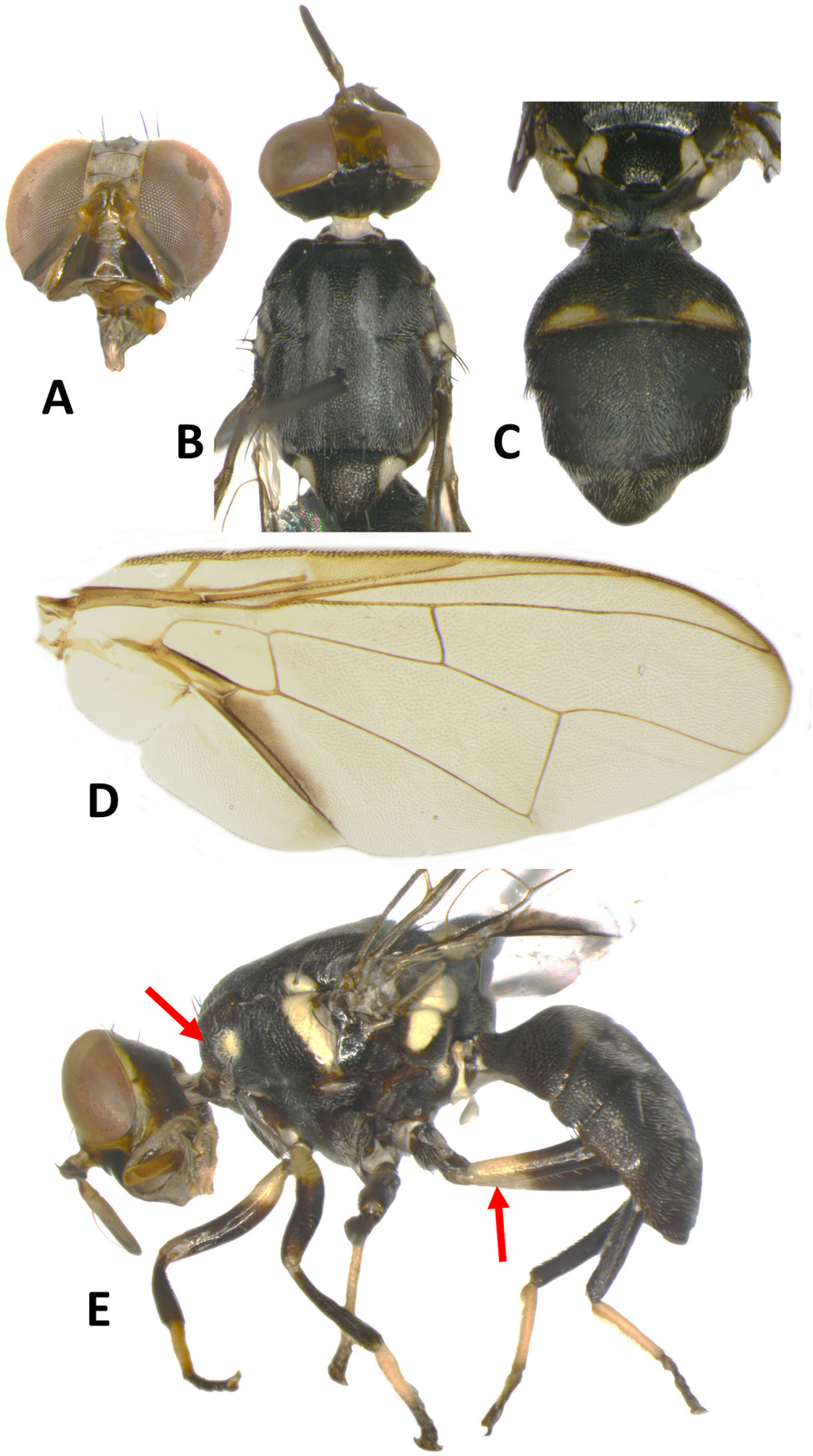


Figure 40. *Bactrocera* (*Bactrocera*) *kolombangarae* Leblanc and Doorenweerd, male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view.

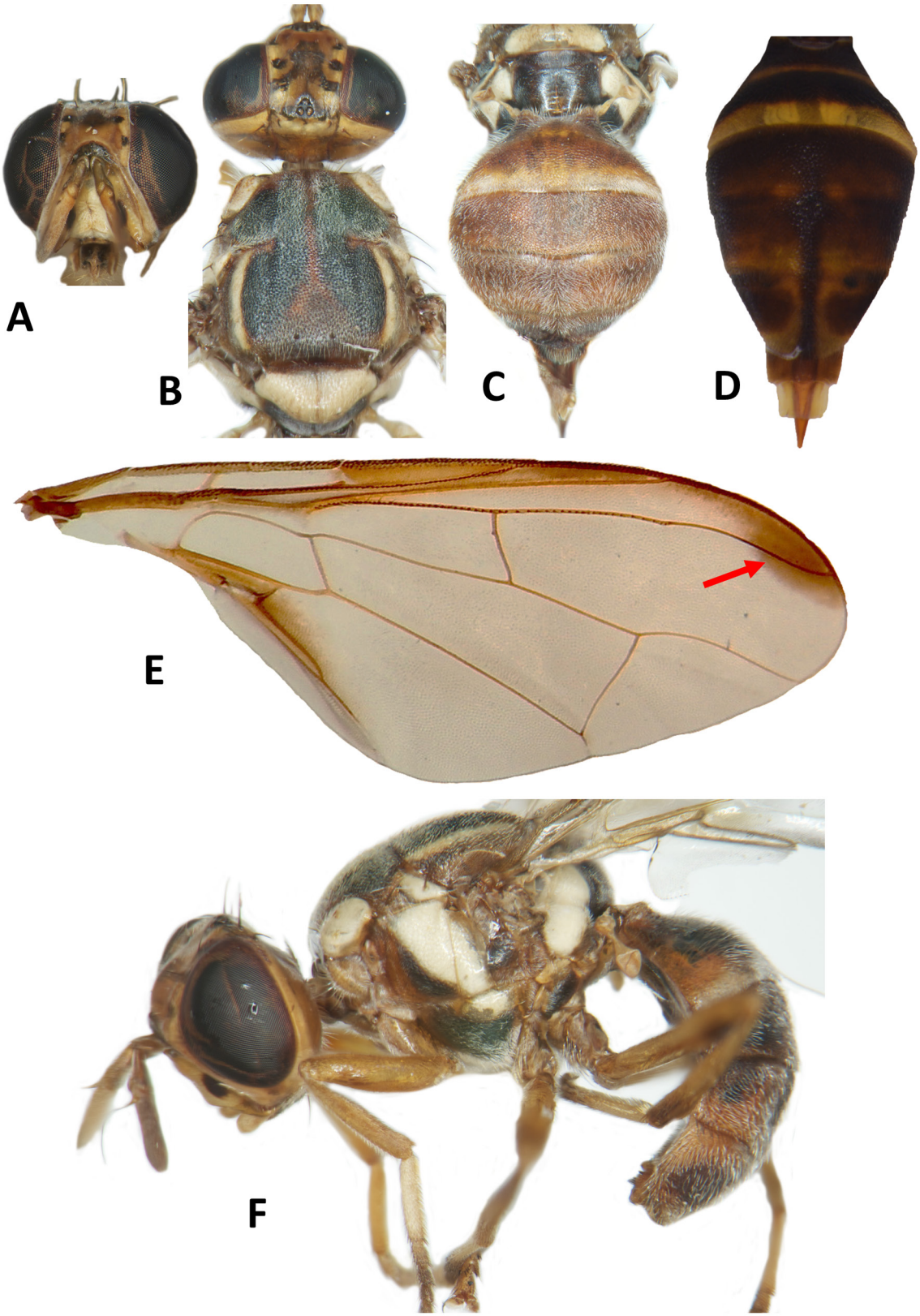


Figure 41. *Bactrocera* (*Bactrocera*) *latifrons* (Hendel). **A)** Head. **B)** Head and scutum. **C)** Abdomen, female. **D)** Abdomen, dark variant, female. **E)** Wing. **F)** Lateral view, male.

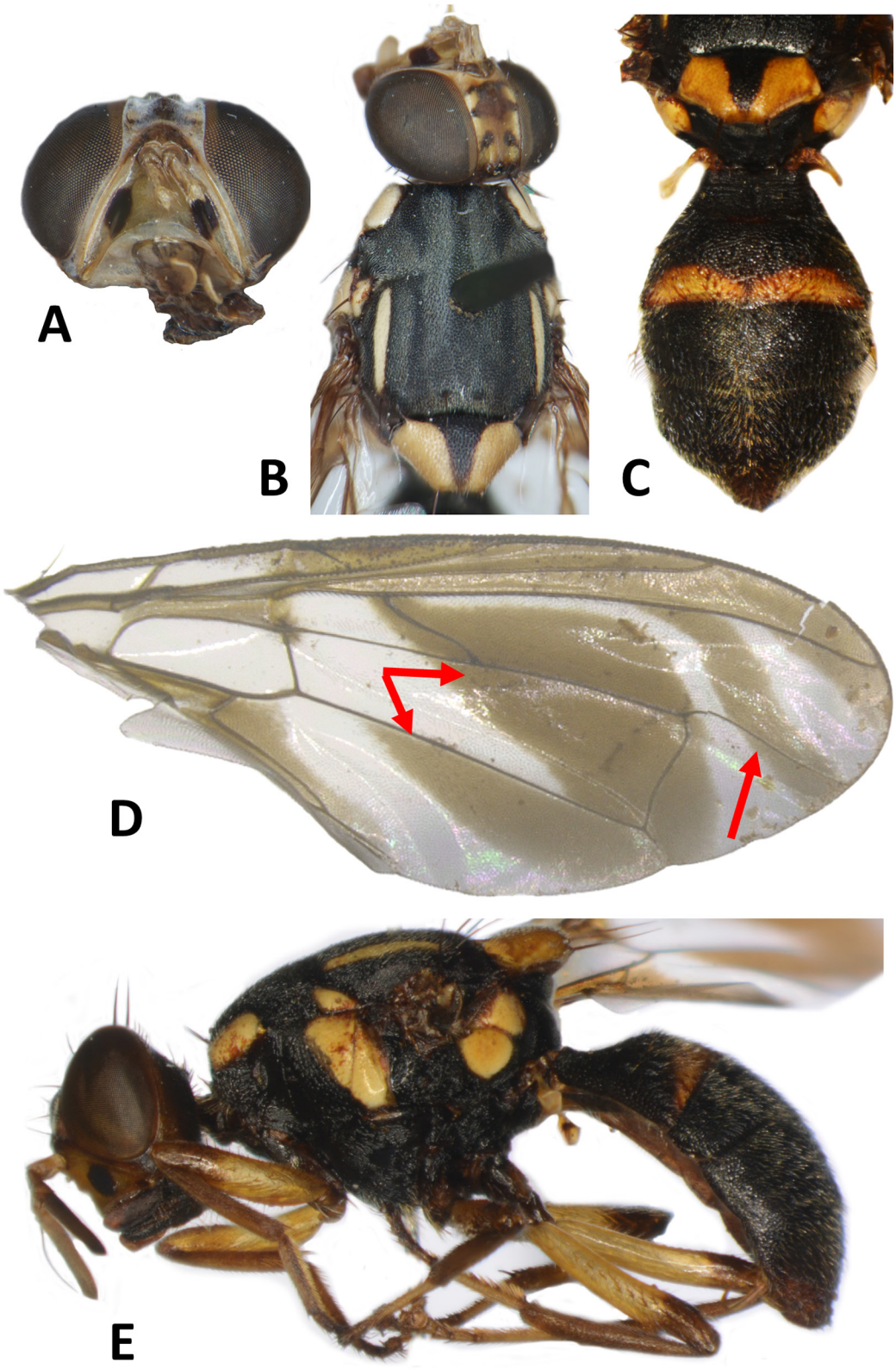


Figure 42. *Bactrocera* (*Bactrocera*) *longicornis* (Macquart), male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view.

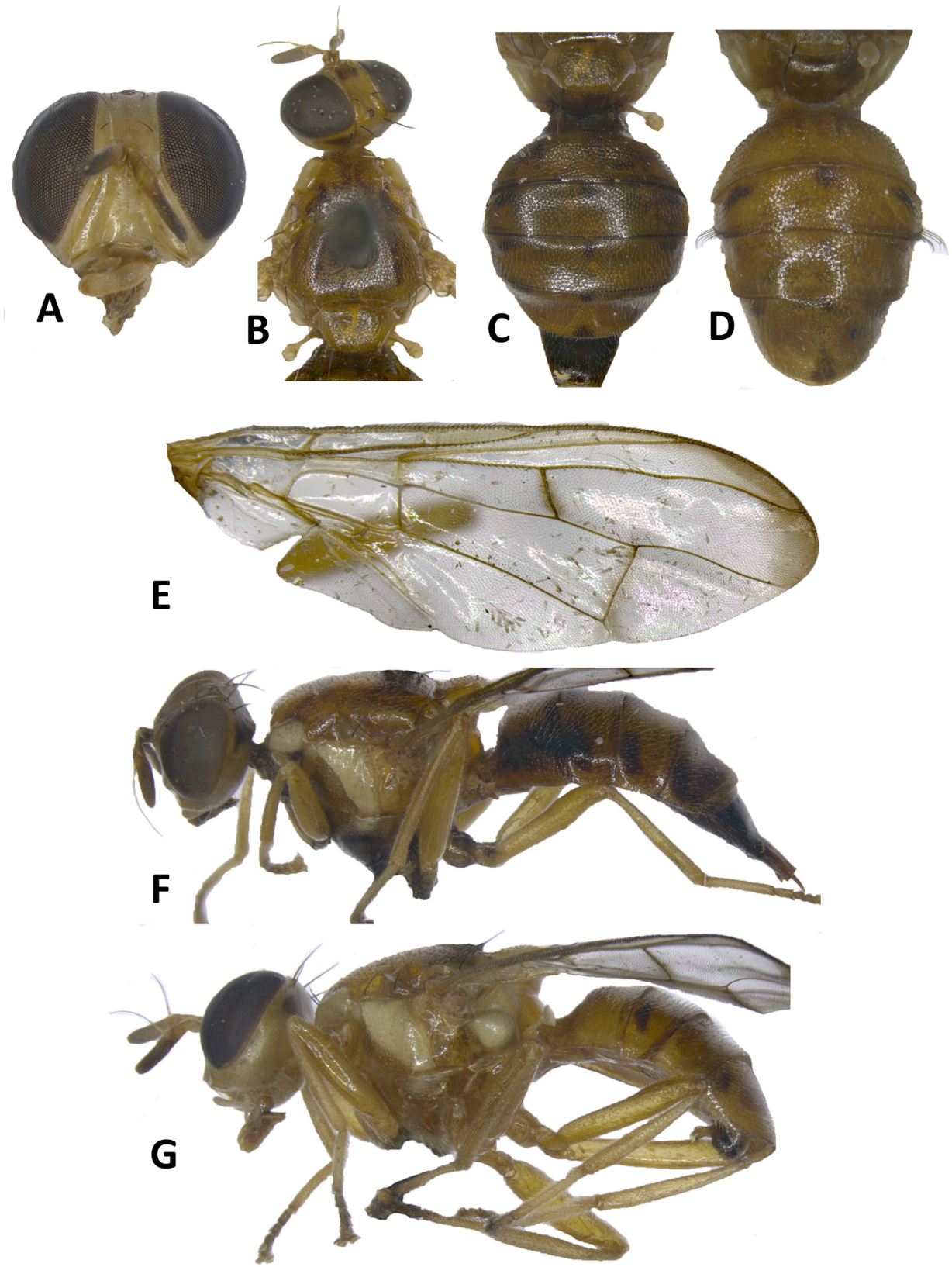


Figure 43. *Bactrocera* (*Bactrocera*) *luteola* (Malloch). **A)** Head. **B)** Head and scutum. **C)** Abdomen, female. **D)** Abdomen, male. **E)** Wing. **F)** Lateral view, female. **G)** Lateral view, male.

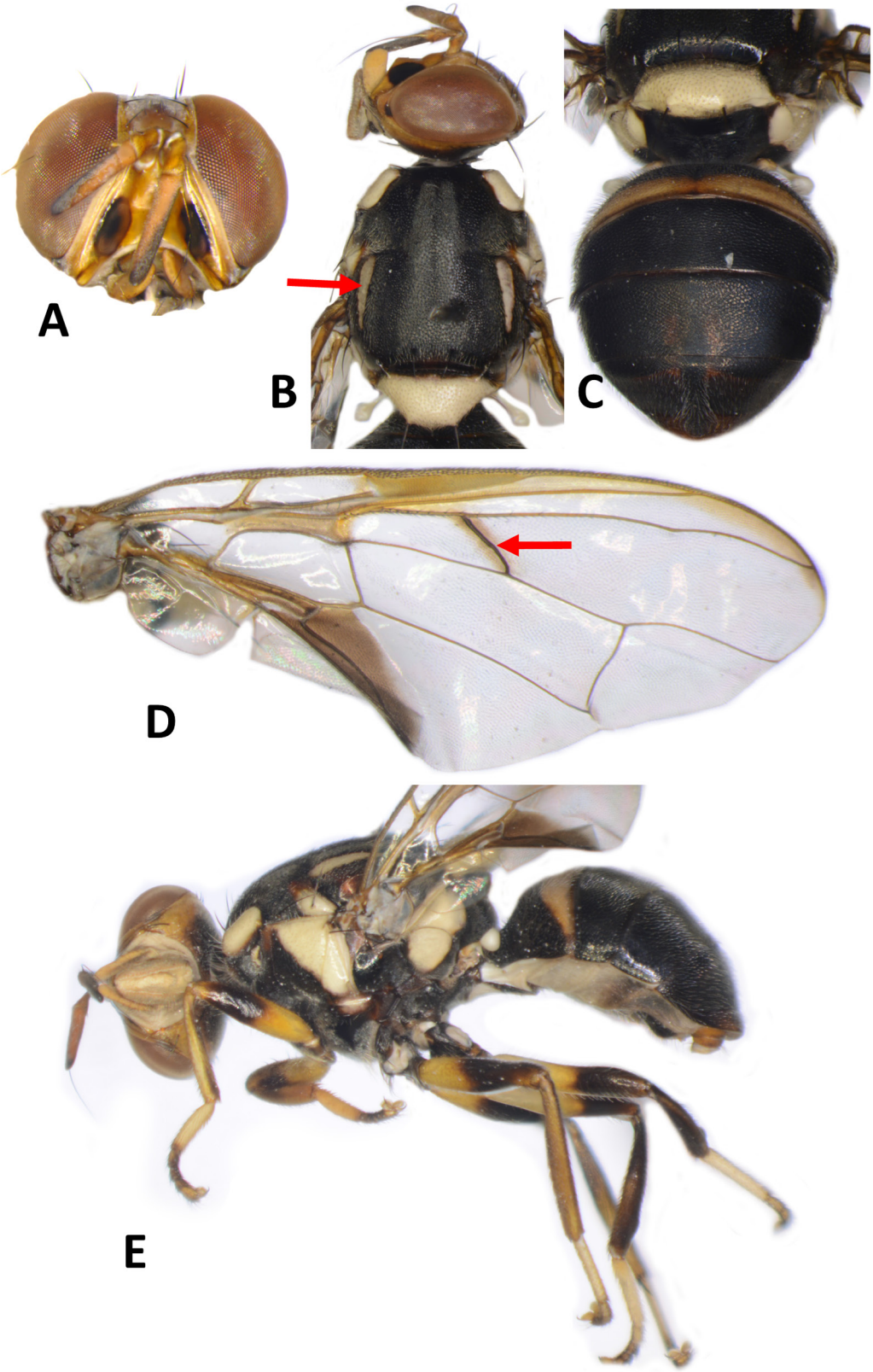


Figure 44. *Bactrocera* (*Bactrocera*) *melanogaster* (Drew), male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view.

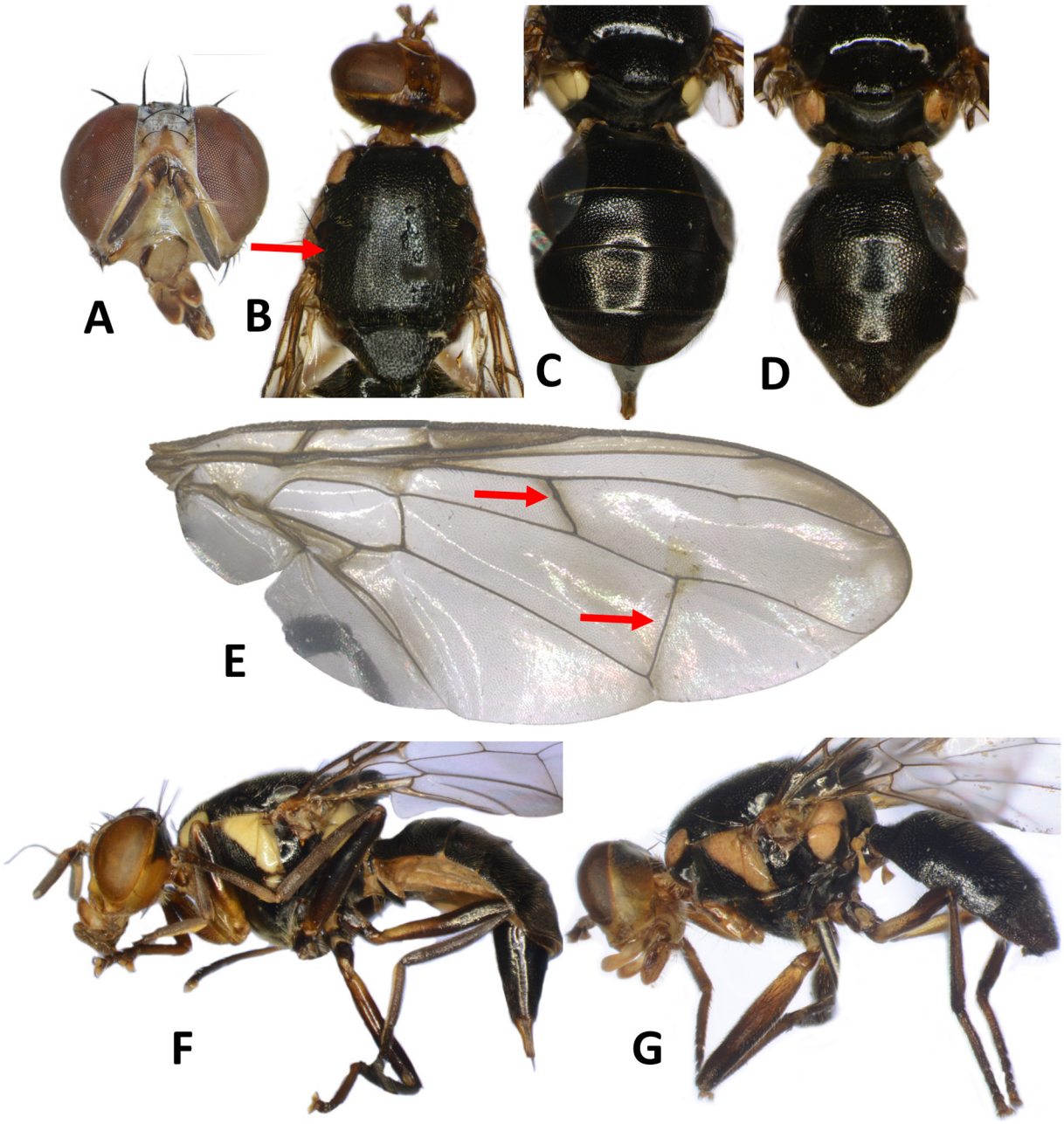


Figure 45. *Bactrocera* (*Bactrocera*) *melanotus* (Coquillett). **A)** Head. **B)** Head and scutum. **C)** Abdomen, female. **D)** Abdomen, male. **E)** Wing. **F)** Lateral view, female. **G)** Lateral view, male.

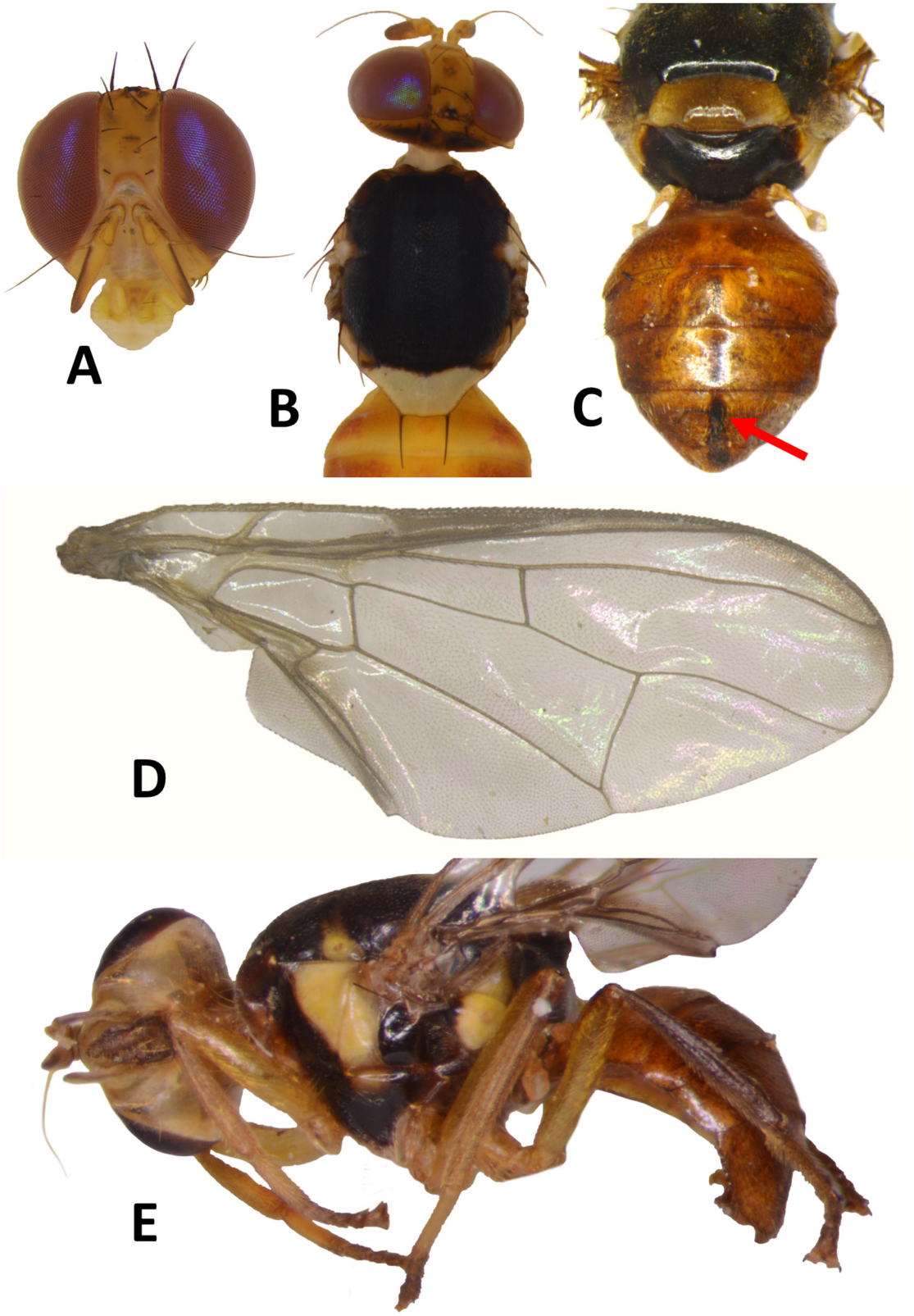


Figure 46. *Bactrocera* (*Bactrocera*) *minuta* (Drew), male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view.

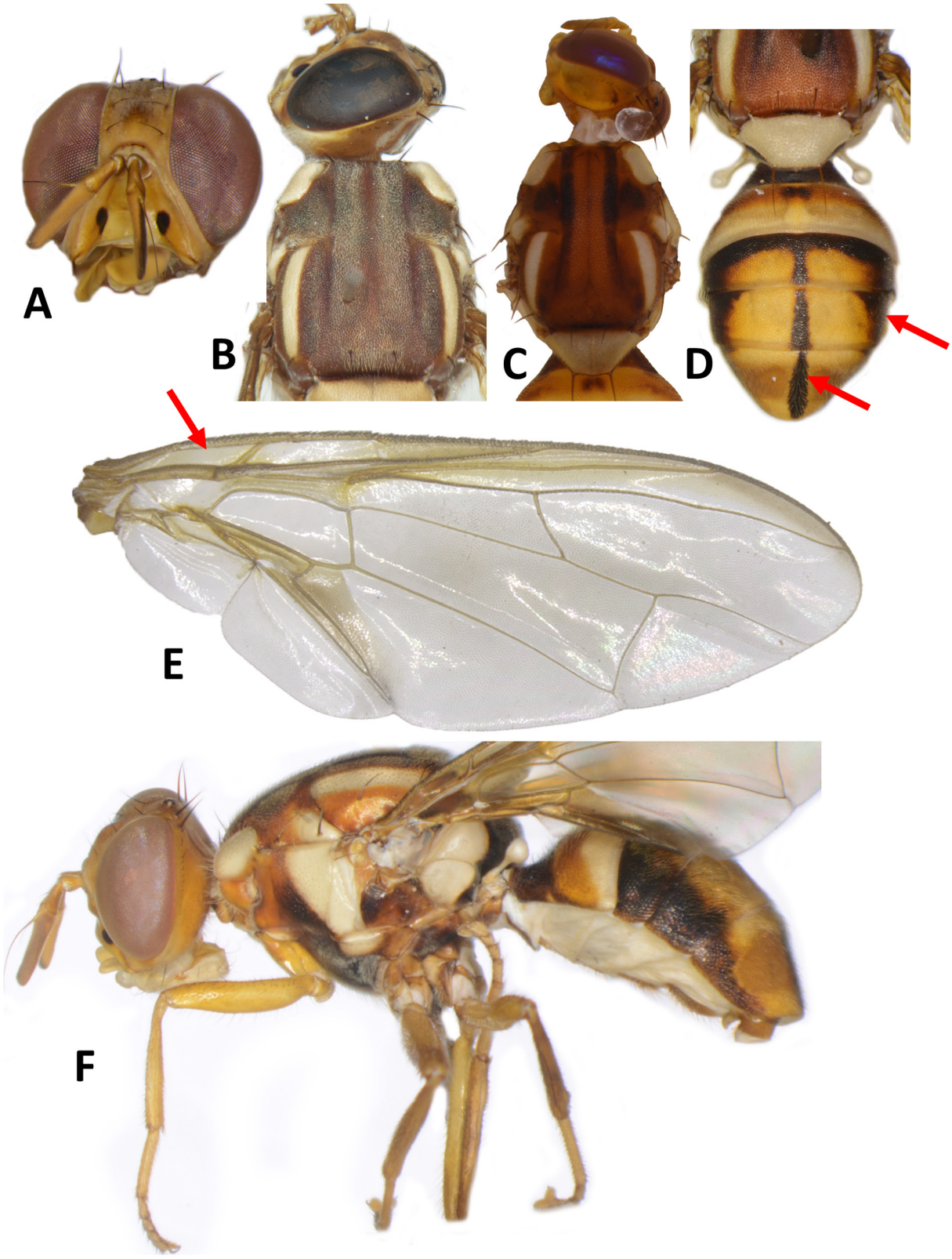


Figure 47. *Bactrocera* (*Bactrocera*) *moluccensis* (Perkins), male. **A)** Head. **B–C)** Head and scutum. **D)** Abdomen. **E)** Wing. **F)** Lateral view.

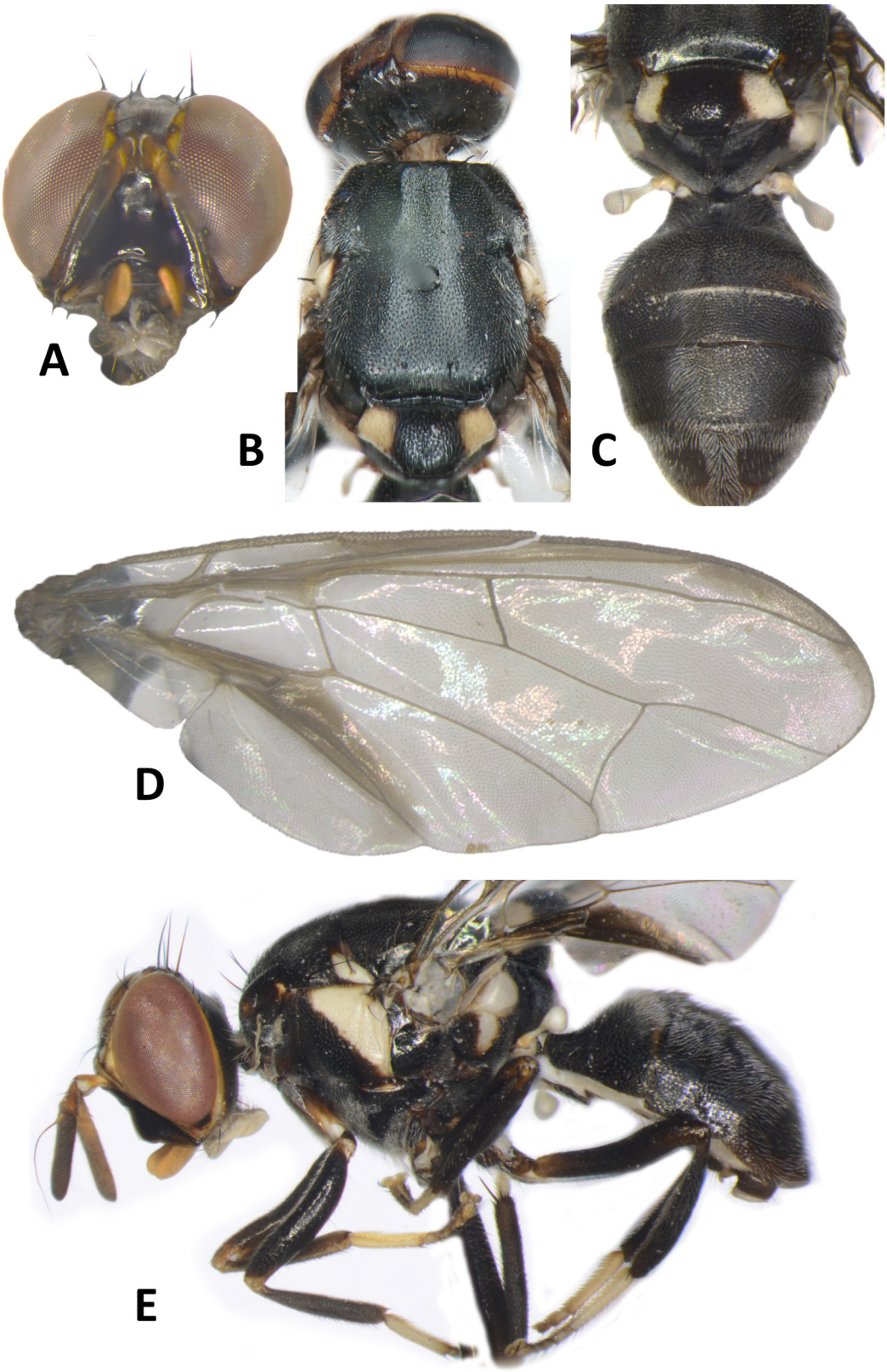


Figure 48. *Bactrocera* (*Bactrocera*) *morula* Drew, male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view.

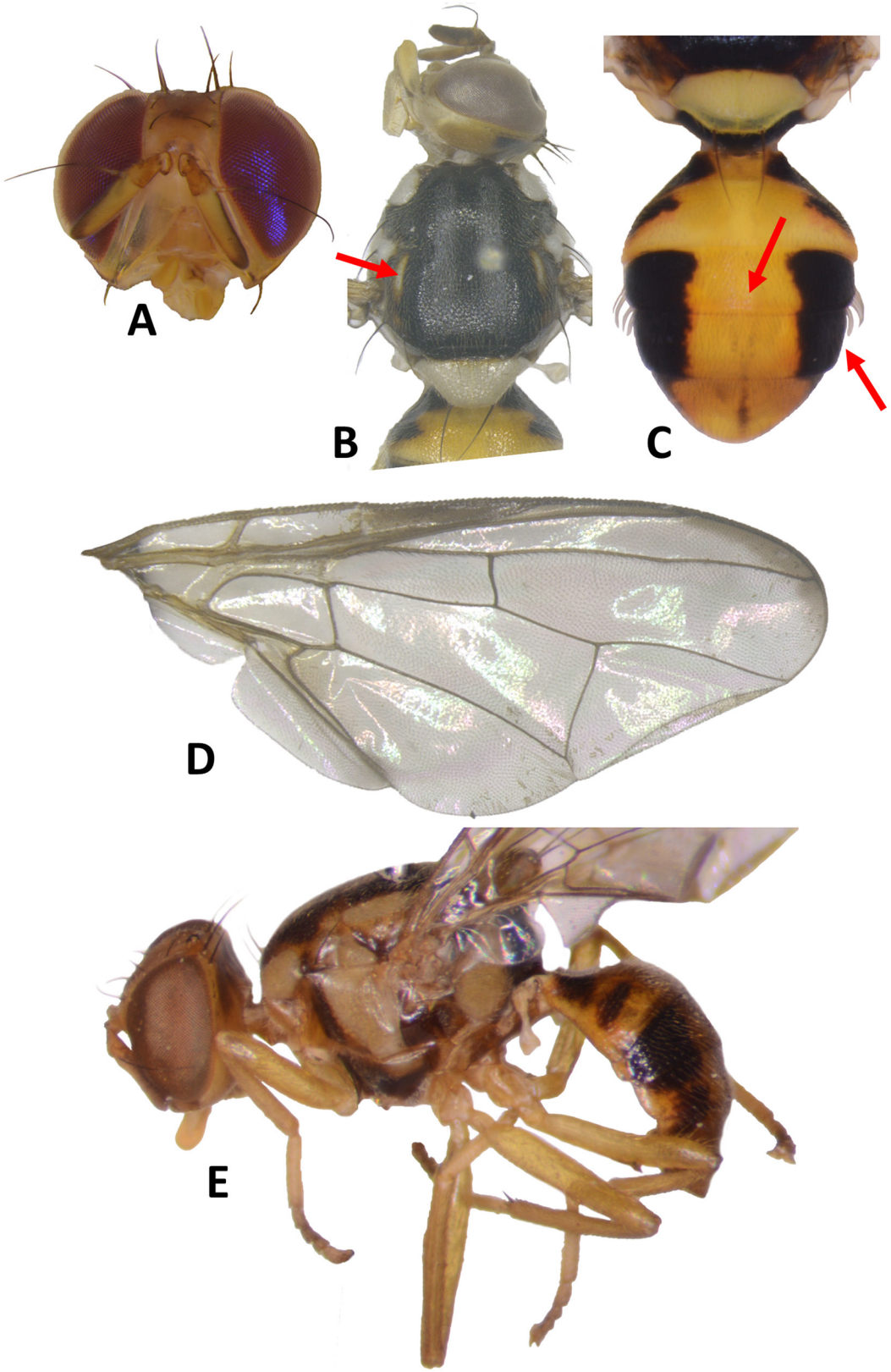


Figure 49. *Bactrocera* (*Bactrocera*) *mucronis* (Drew), male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view.

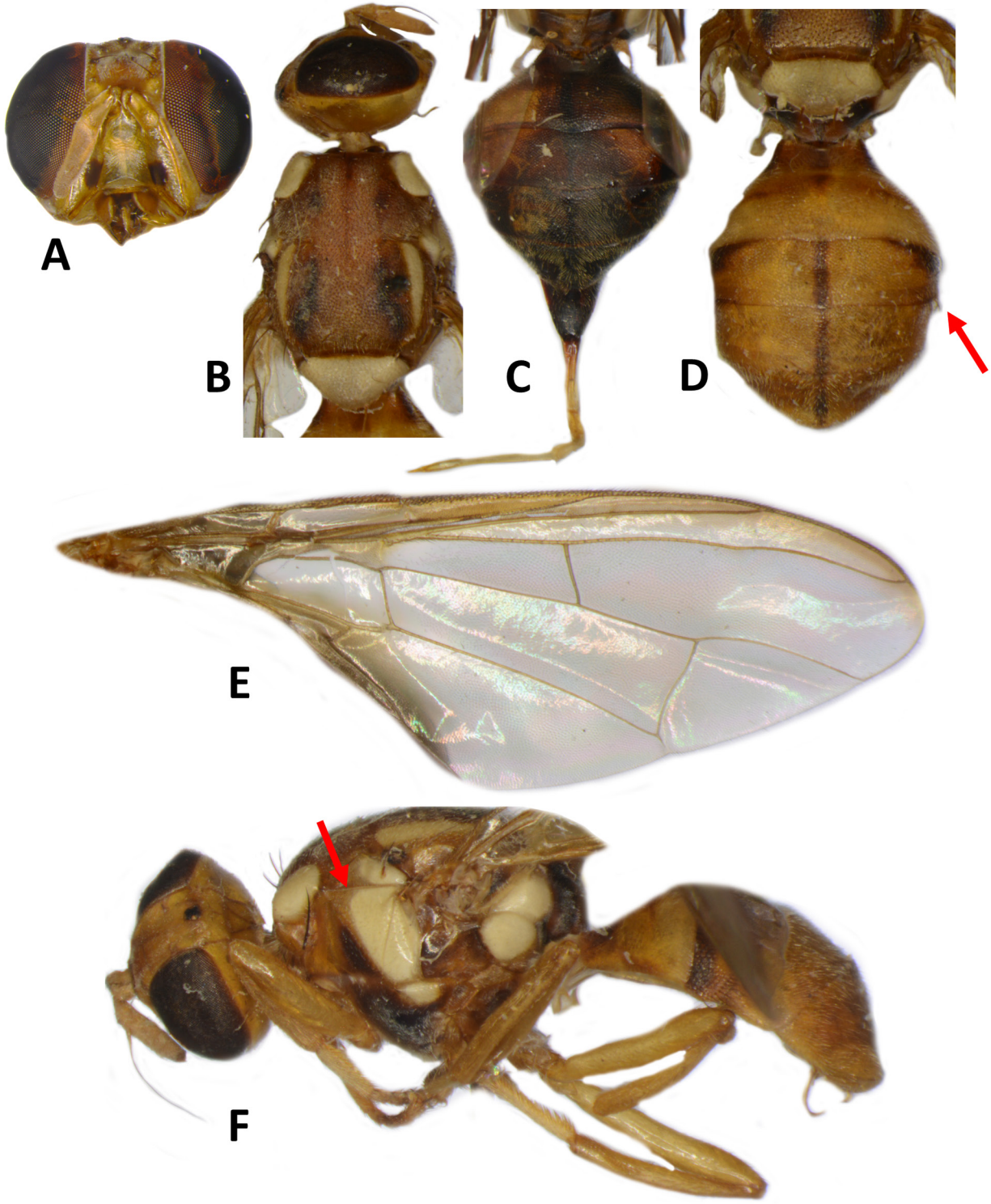


Figure 50. *Bactrocera* (*Bactrocera*) *naucleae* Drew and Romig. **A)** Head. **B)** Head and scutum. **C)** Abdomen, female. **D)** Abdomen, male. **E)** Wing. **F)** Lateral view, male.

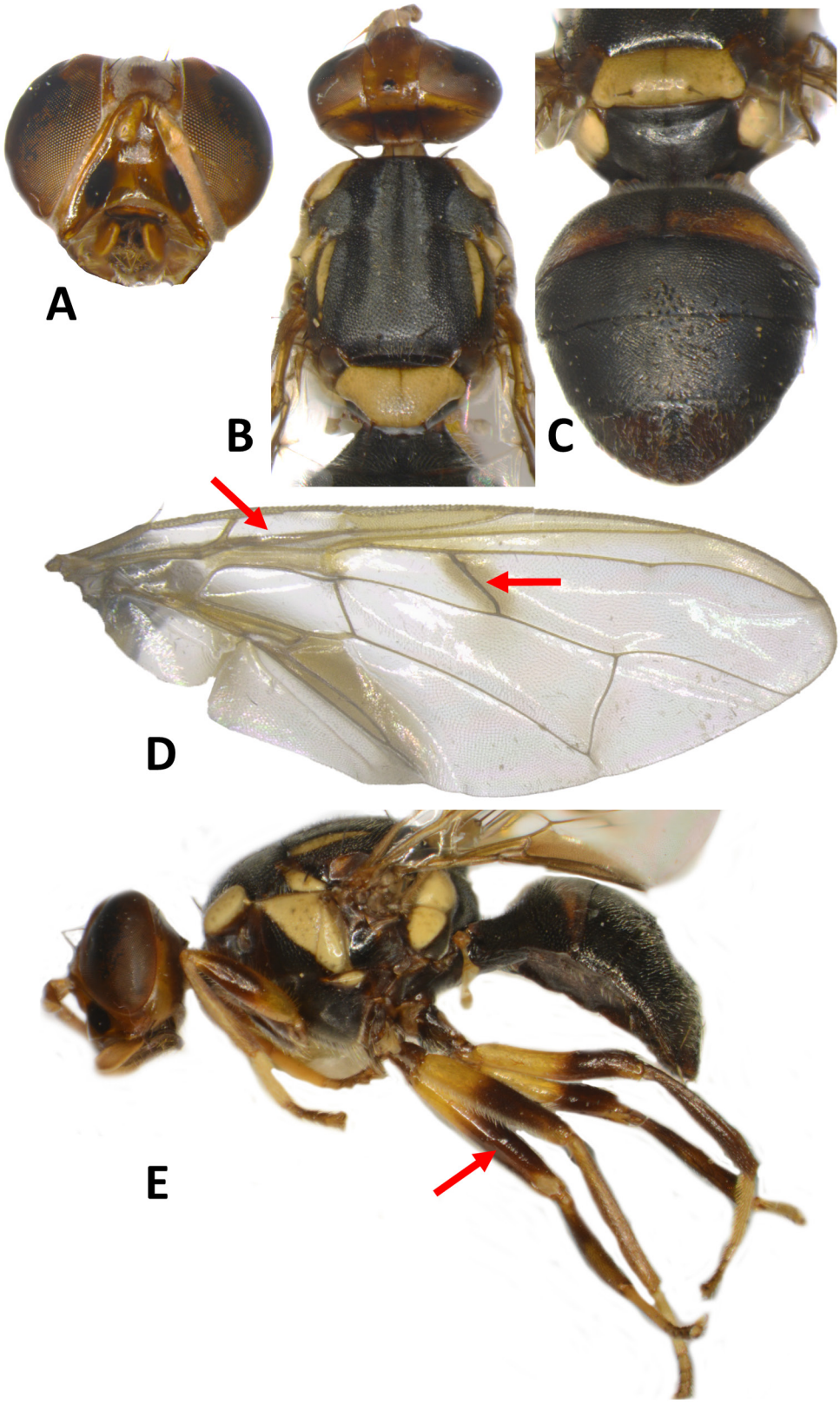


Figure 51. *Bactrocera* (*Bactrocera*) *neonigrita* Drew, male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view.

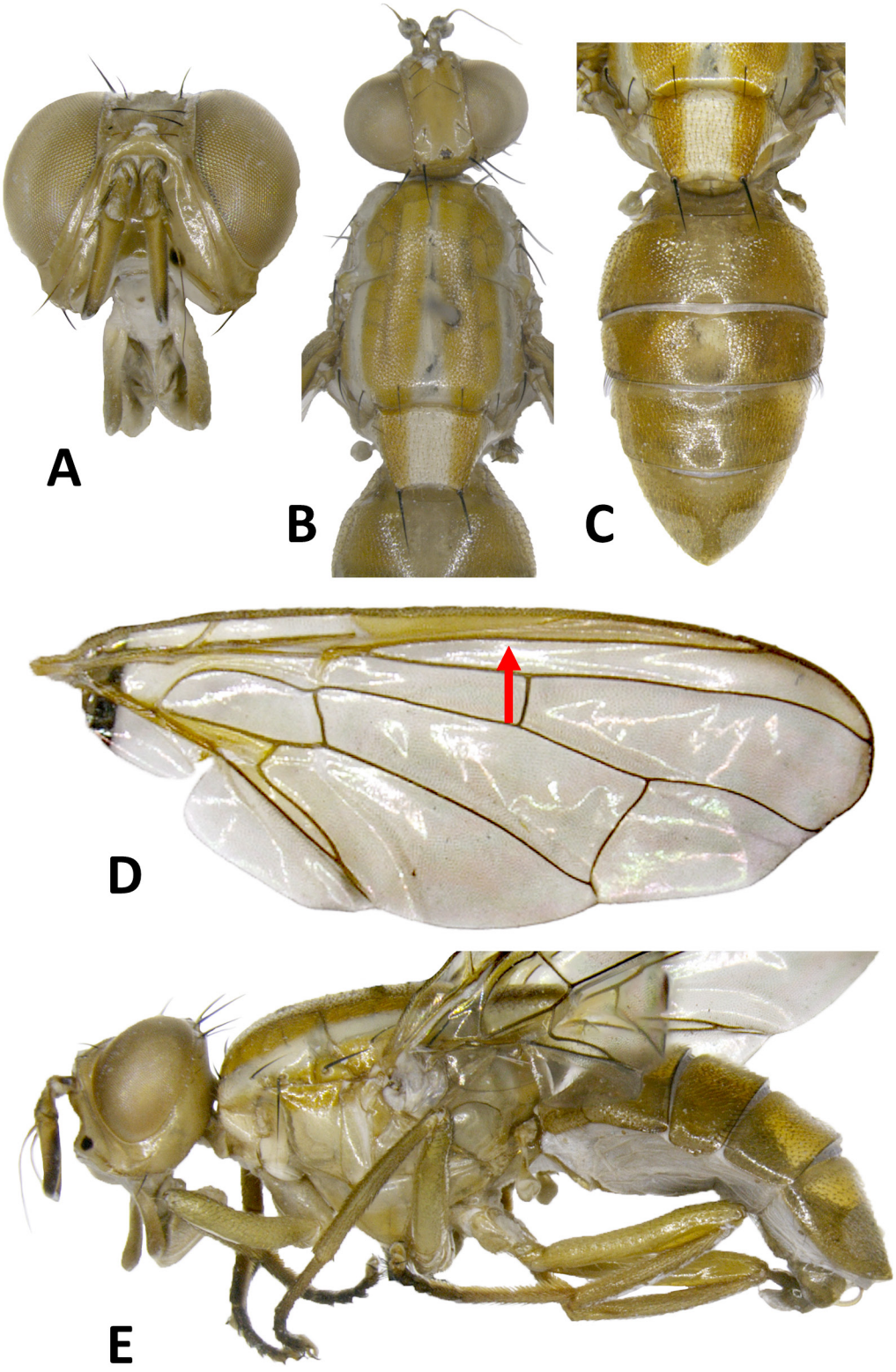


Figure 52. *Bactrocera* (*Notodacus*) *neoxanthodes* Drew and Romig, male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view.

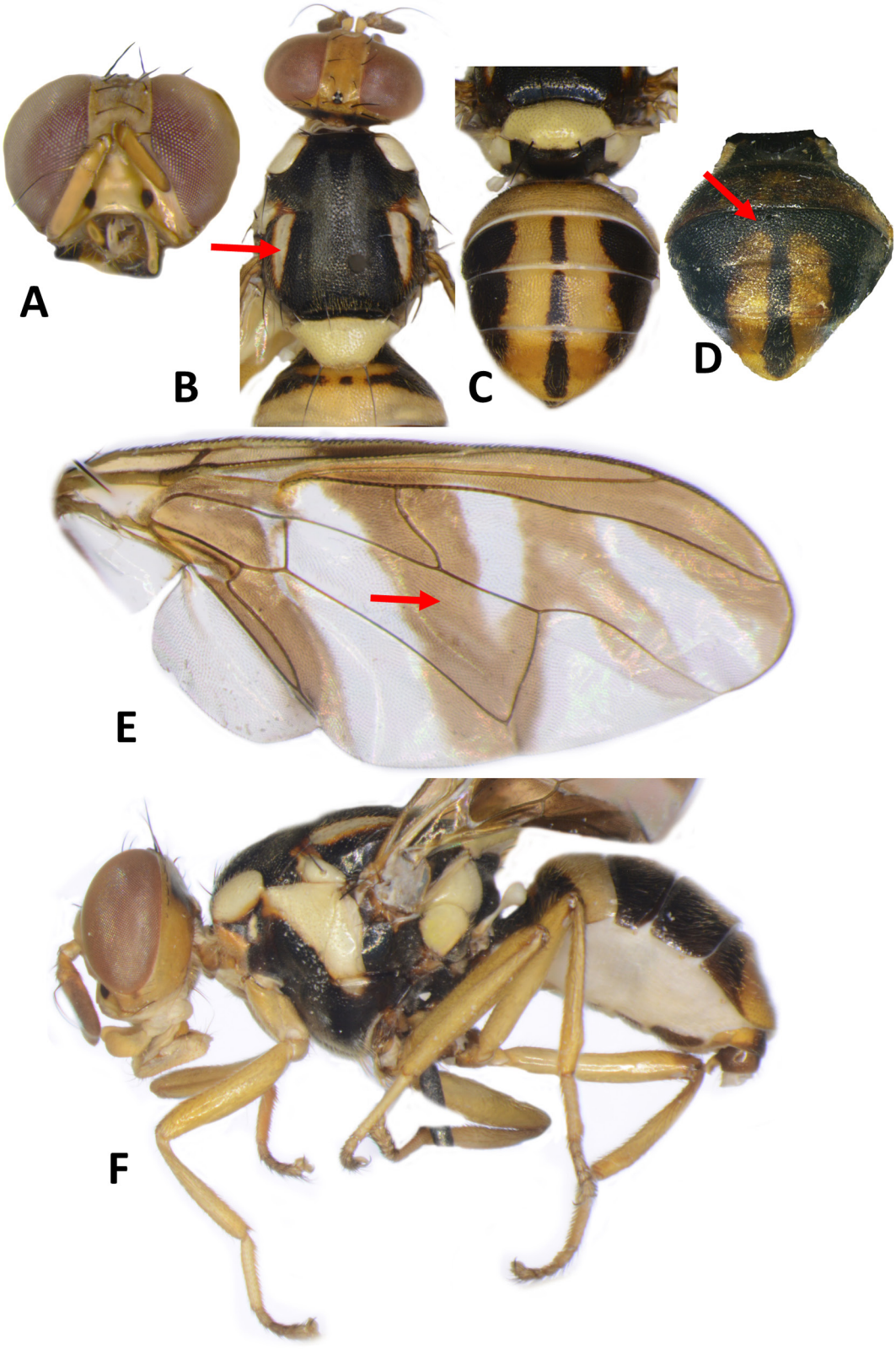


Figure 53. *Bactrocera* (*Bactrocera*) *nigresentis* (Drew), male. **A)** Head. **B)** Head and scutum. **C–D)** Abdomen, typical form and rare variant. **E)** Wing. **F)** Lateral view.

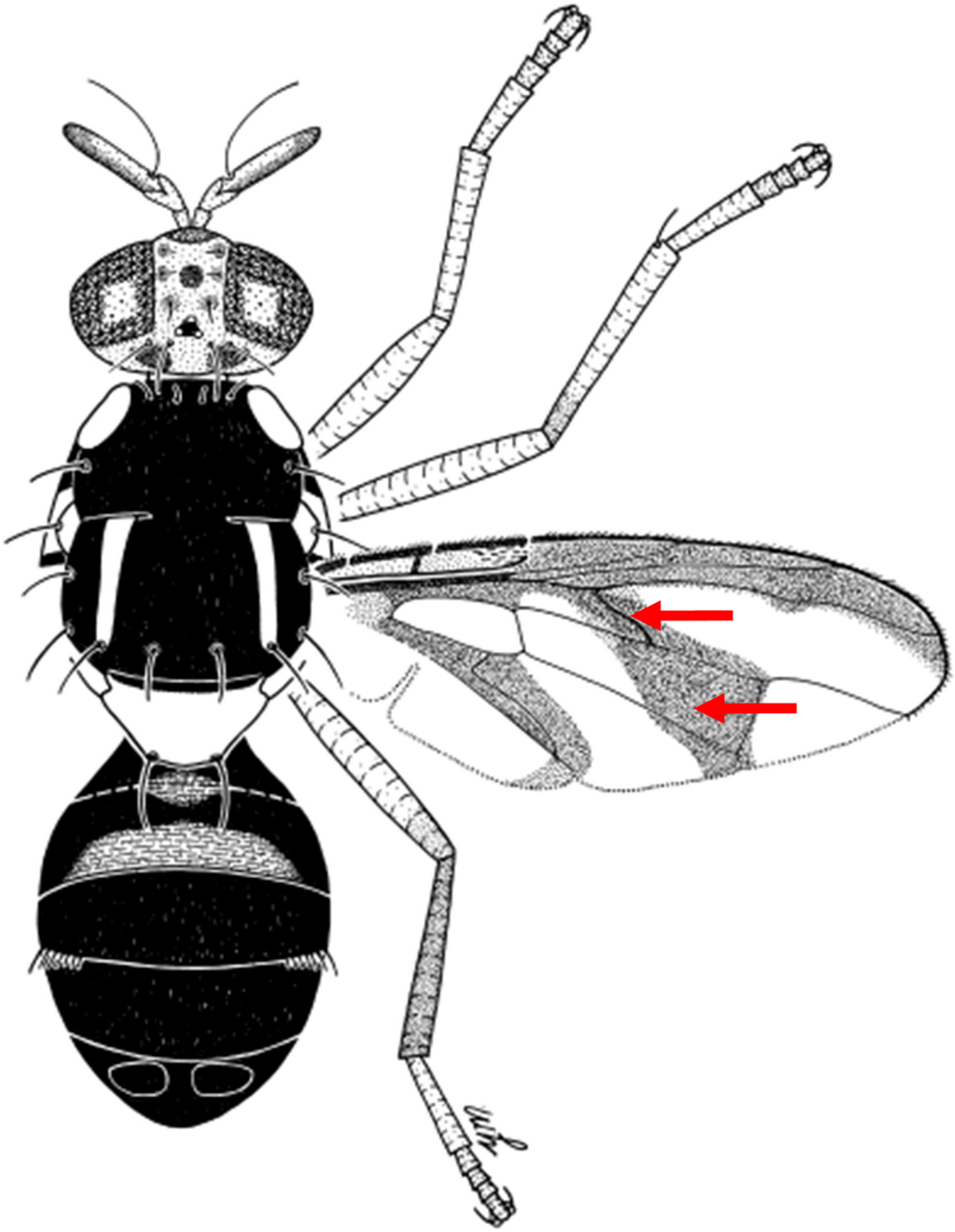


Figure 54. *Bactrocera* (*Bactrocera*) *obliquivenosa* Drew and Romig, male (from Drew and Romig 2001).

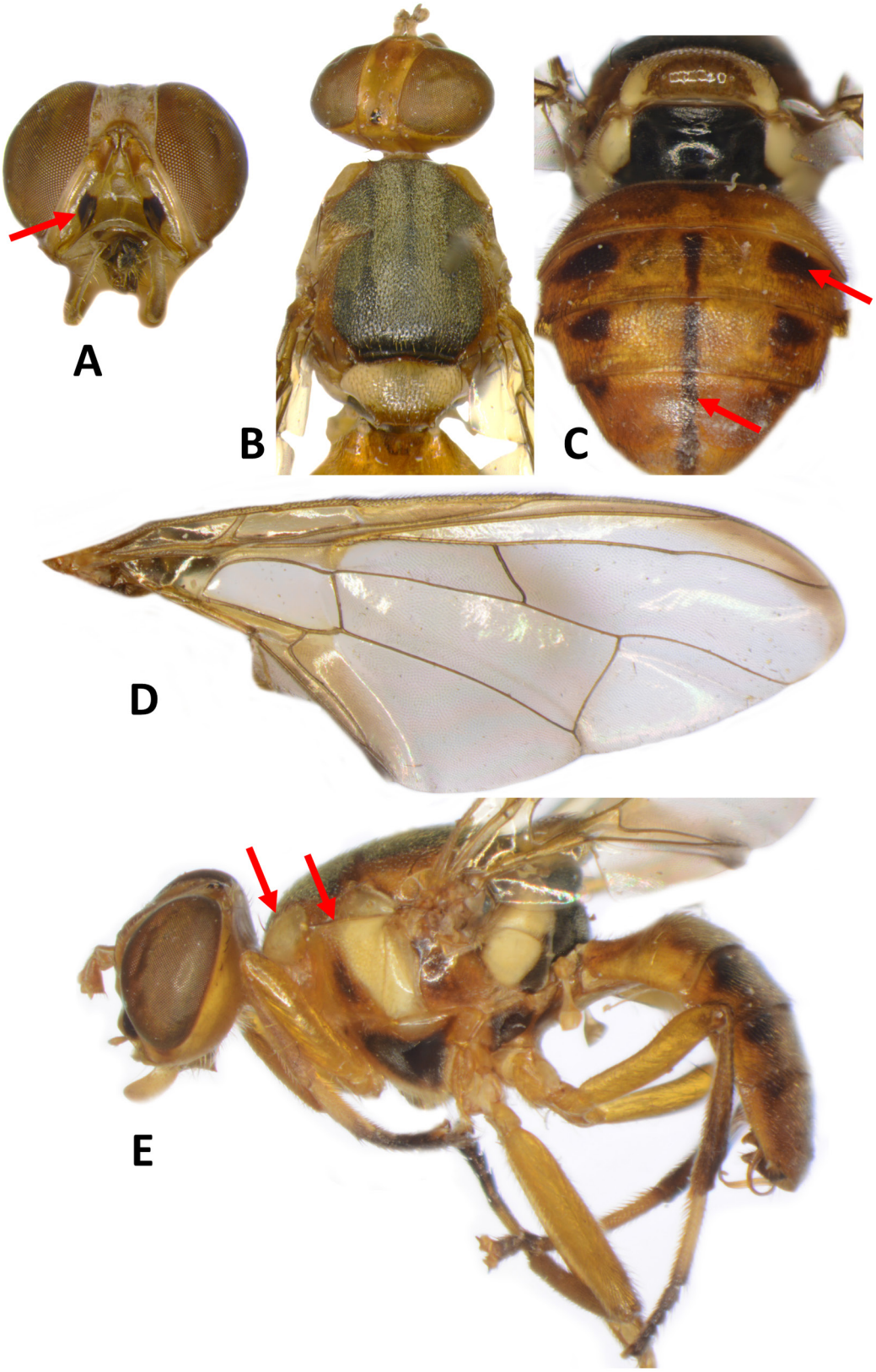


Figure 55. *Bactrocera* (*Bactrocera*) *obscura* (Malloch), male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view.

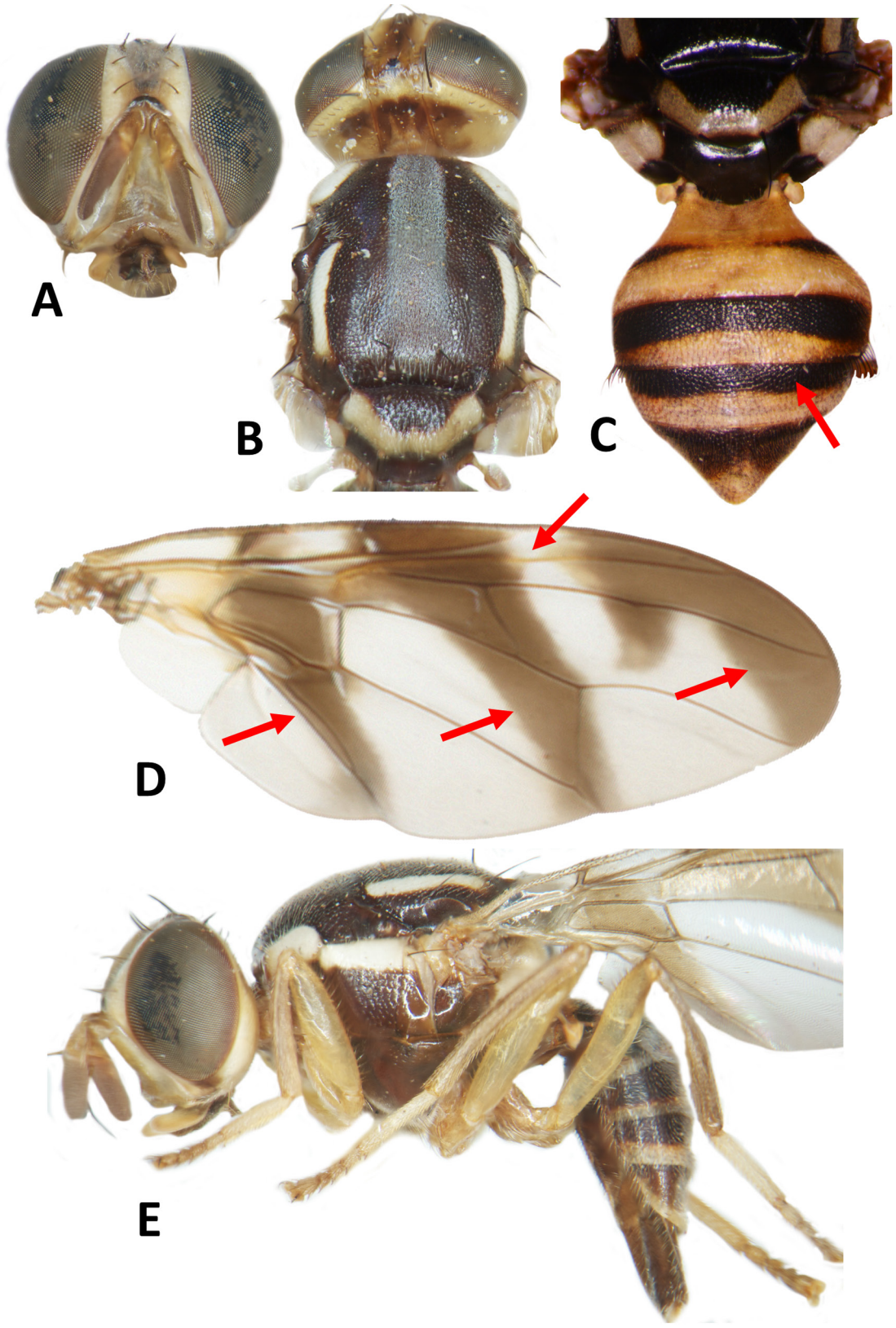


Figure 56. *Bactrocera* (*Bactrocera*) *ochrosiae* (Malloch). **A)** Head. **B)** Head and scutum. **C)** Abdomen, male. **D)** Wing. **E)** Lateral view, female.

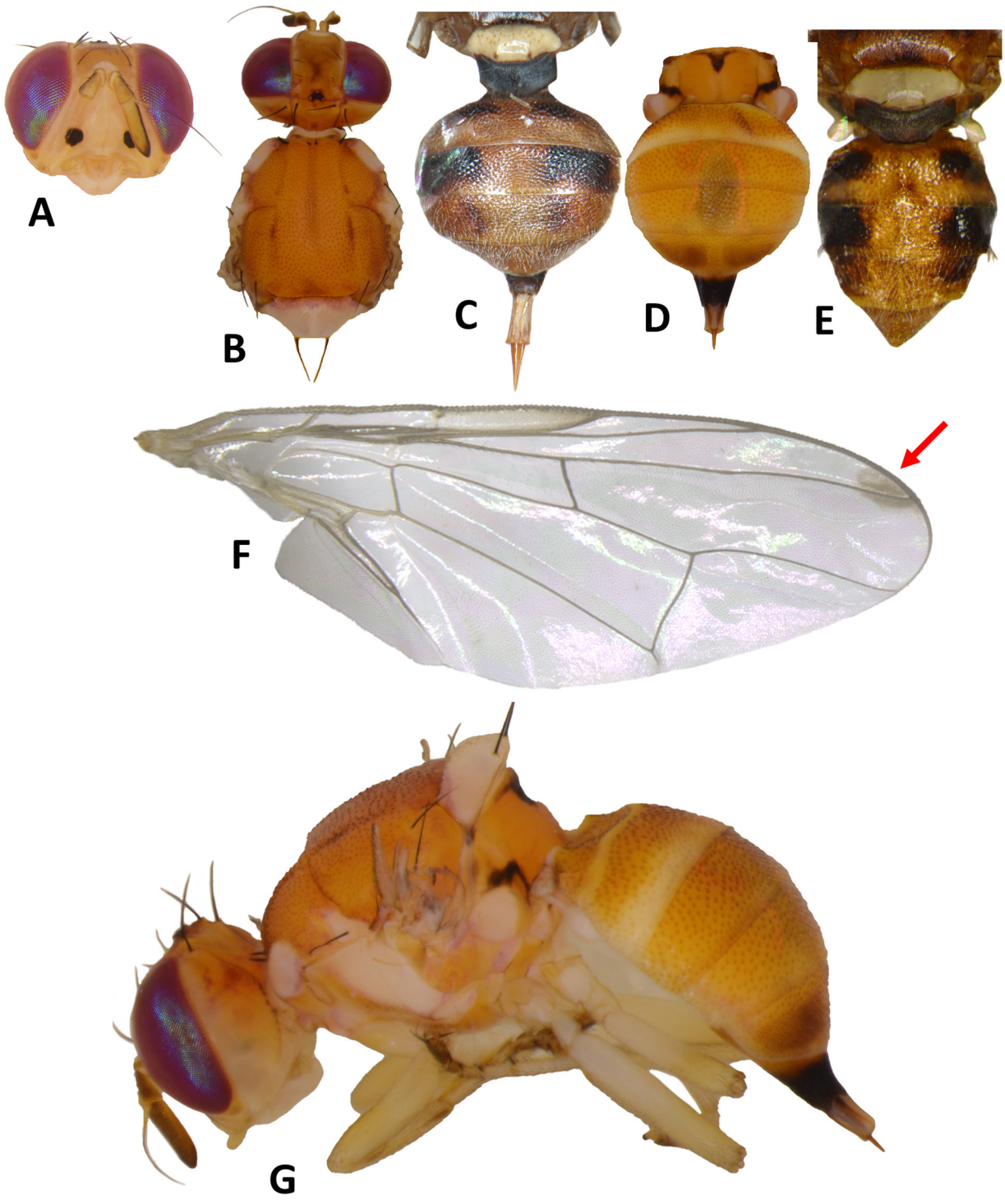


Figure 57. *Bactrocera* (*Daculus*) *oleae* (Rossi). **A)** Head. **B)** Head and scutum. **C–D)** Abdomen, female. **E)** Abdomen, male. **F)** Wing. **G)** Lateral view, female.

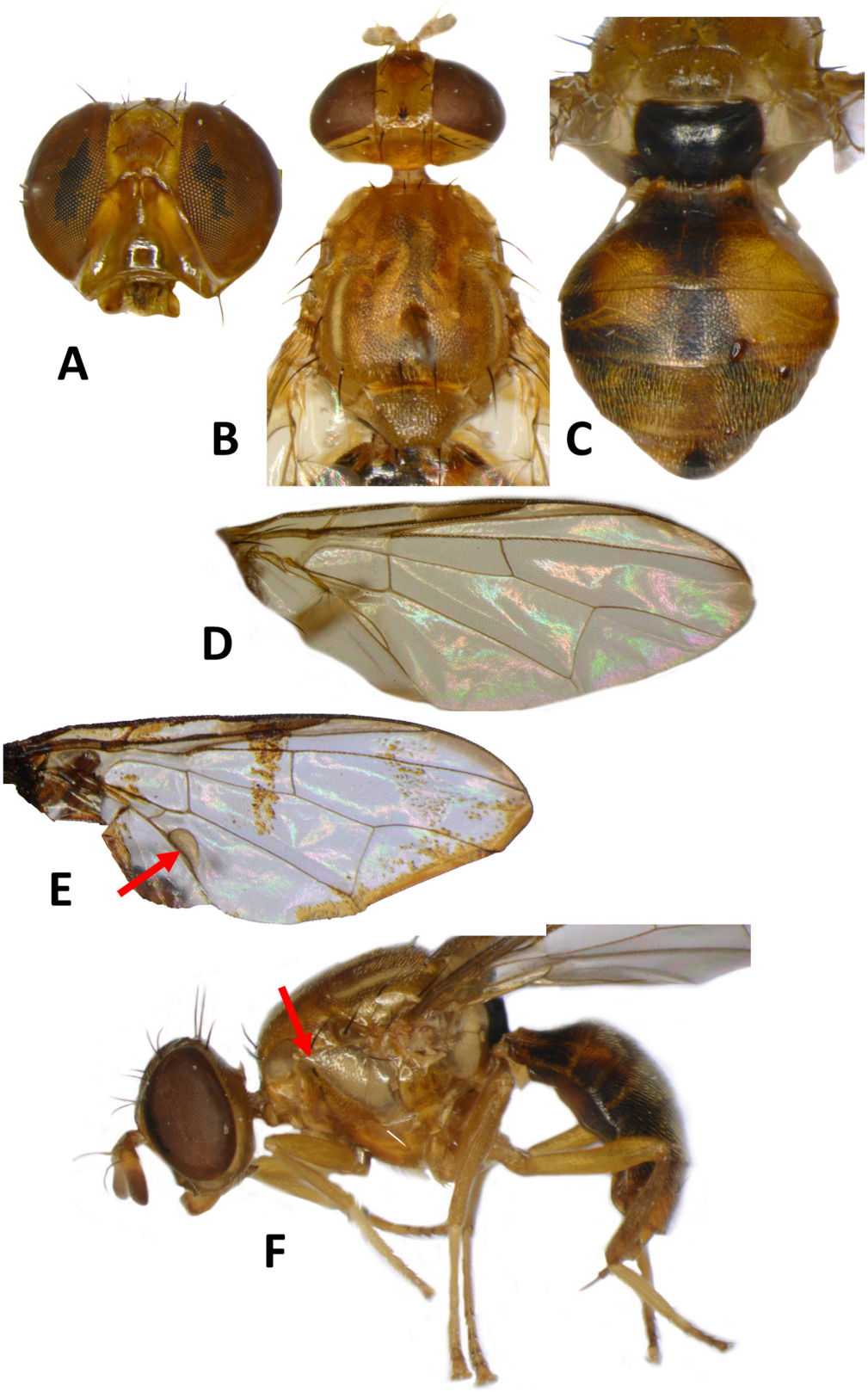


Figure 58. *Bactrocera* (*Bulladacus*) *pacificae* Drew and Romig. **A)** Head. **B)** Head and scutum. **C)** Abdomen, male. **D)** Wing, female. **E)** Wing, male. **F)** Lateral view, female.

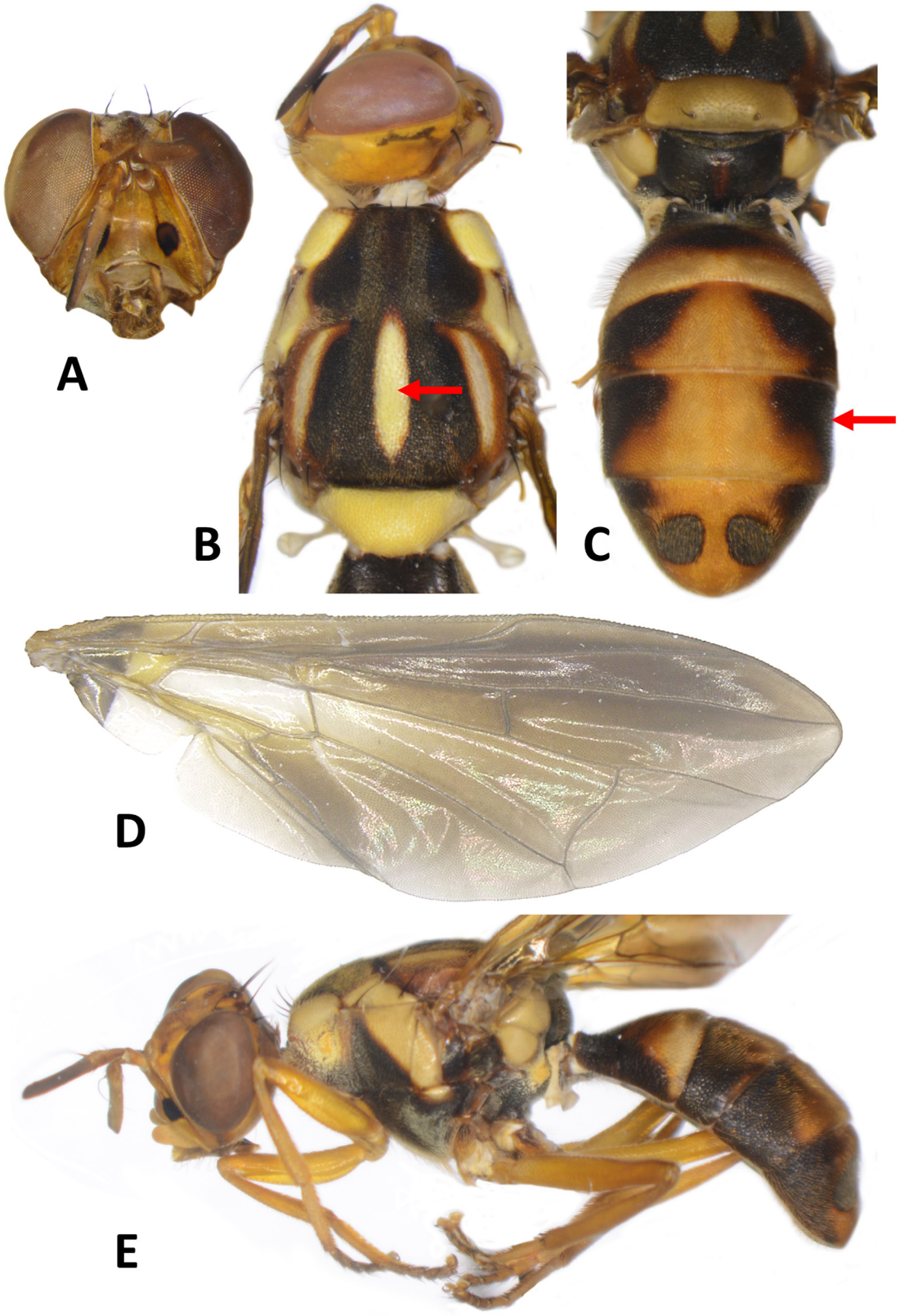


Figure 59. *Bactrocera* (*Tetradacus*) *pagdeni* (Malloch), male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view.

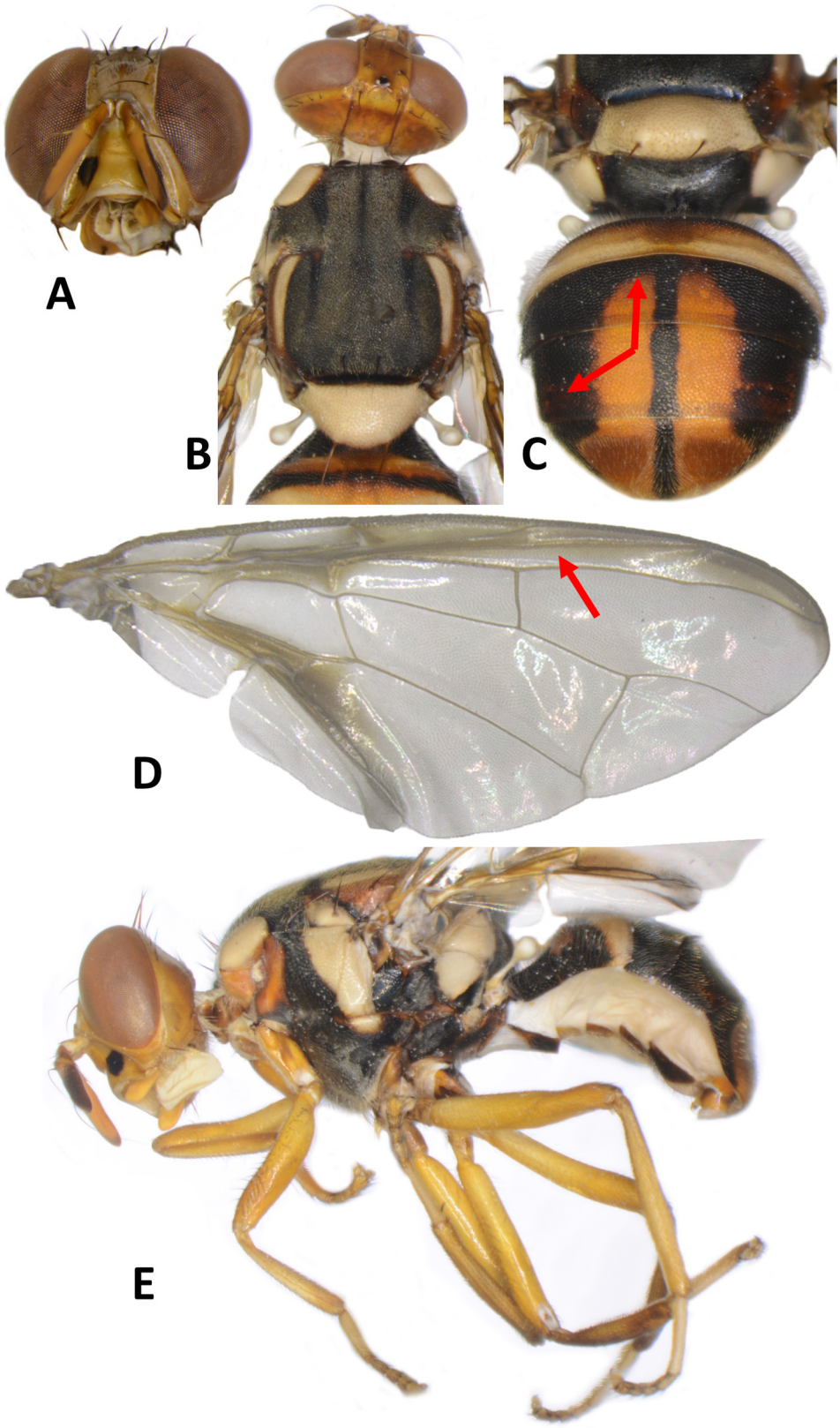


Figure 60. *Bactrocera* (*Bactrocera*) *parafroggatti* (Drew and Romig), male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view.

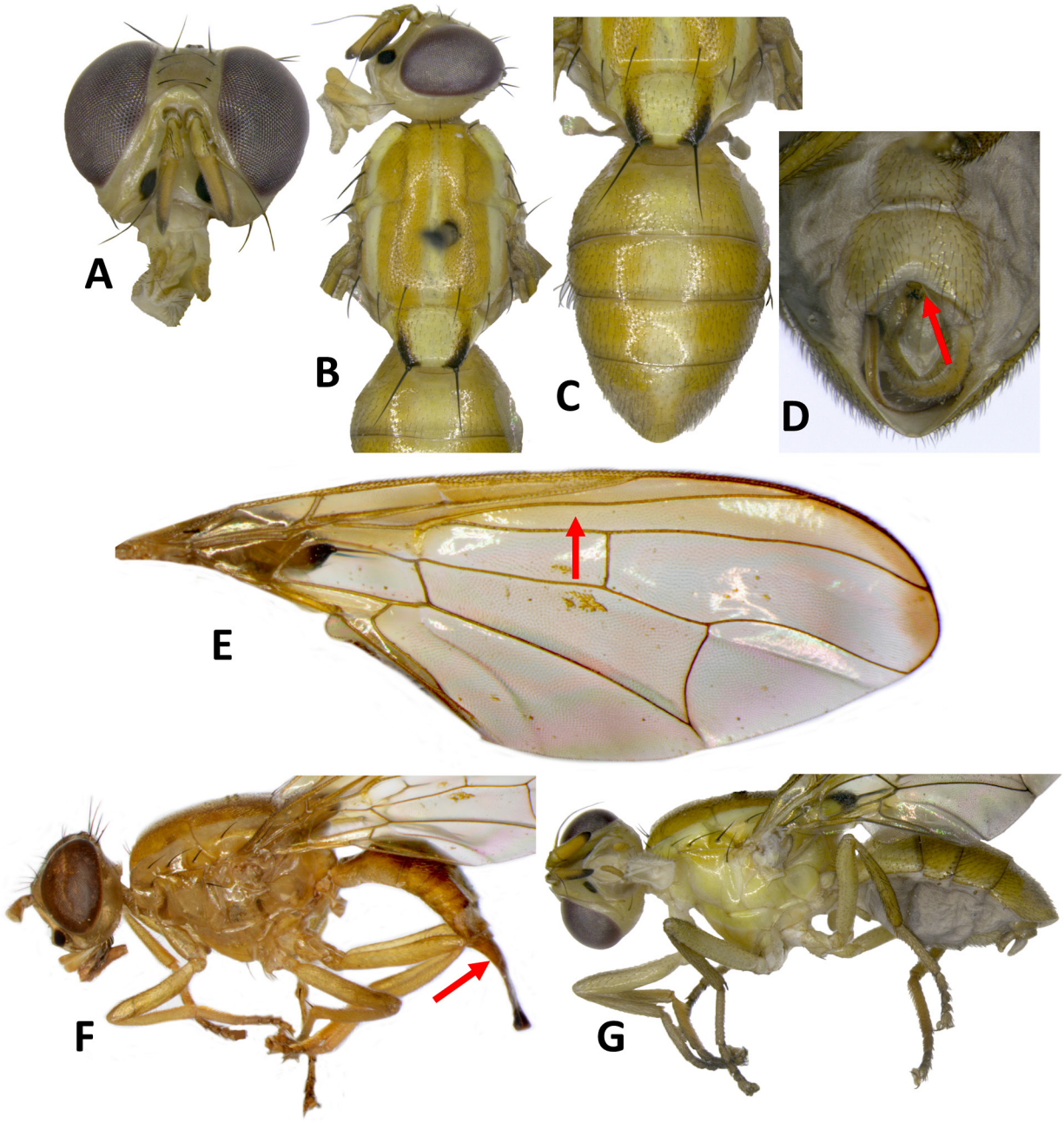


Figure 61. *Bactrocera* (*Notodacus*) *paraxanthodes* Drew and Hancock. **A)** Head. **B)** Head and scutum. **C)** Abdomen, male. **D)** Abdomen apex of male, ventral view. **E)** Wing. **F)** Lateral view, female. **G)** Lateral view, male.

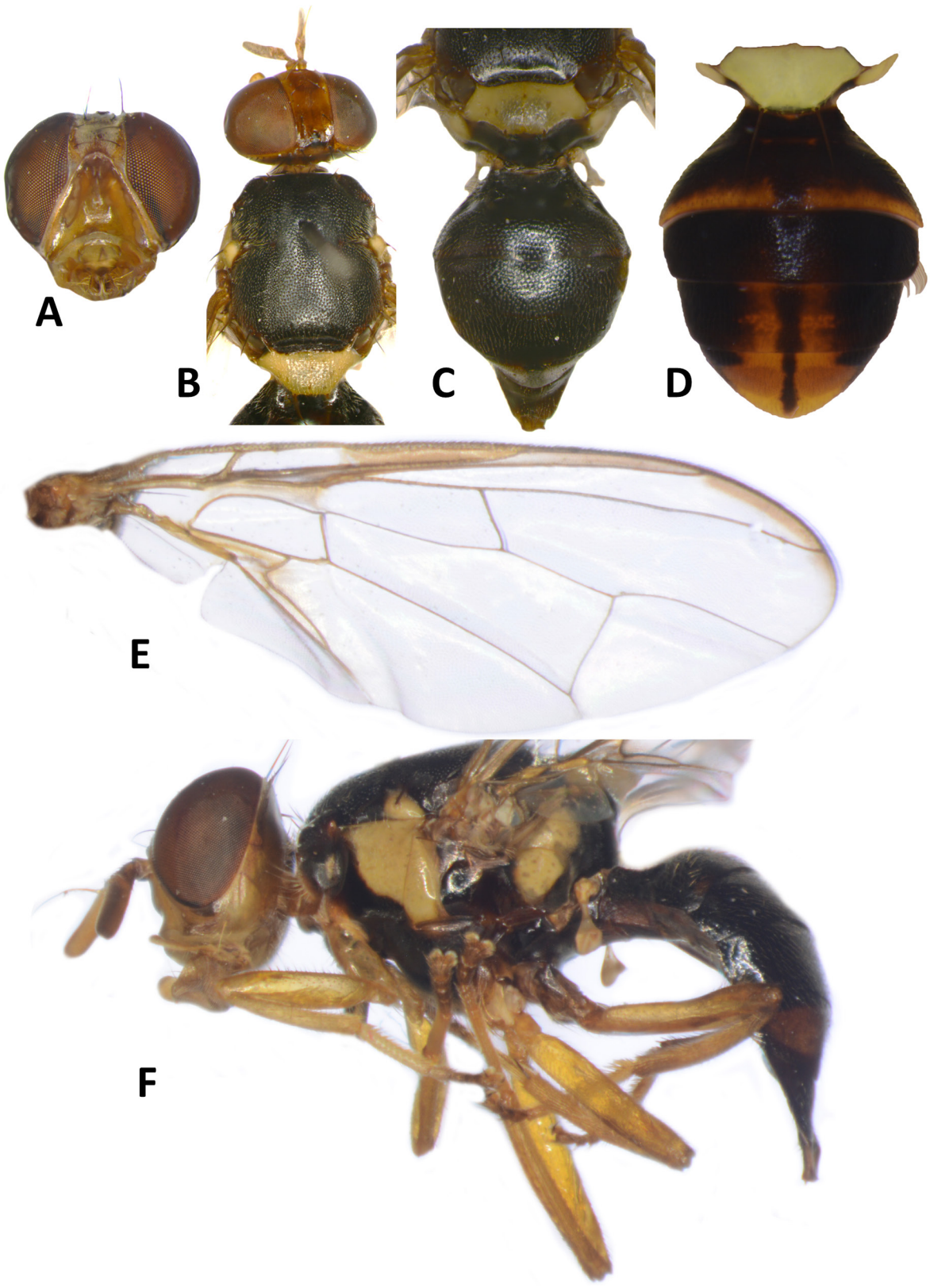


Figure 62. *Bactrocera* (*Bactrocera*) *passiflorae* (Froggatt). **A)** Head. **B)** Head and scutum. **C)** Abdomen, female. Typical black abdomen. **D)** Abdomen, male. Variant with pale markings from Wallis Island. **E)** Wing. **F)** Lateral view, female.

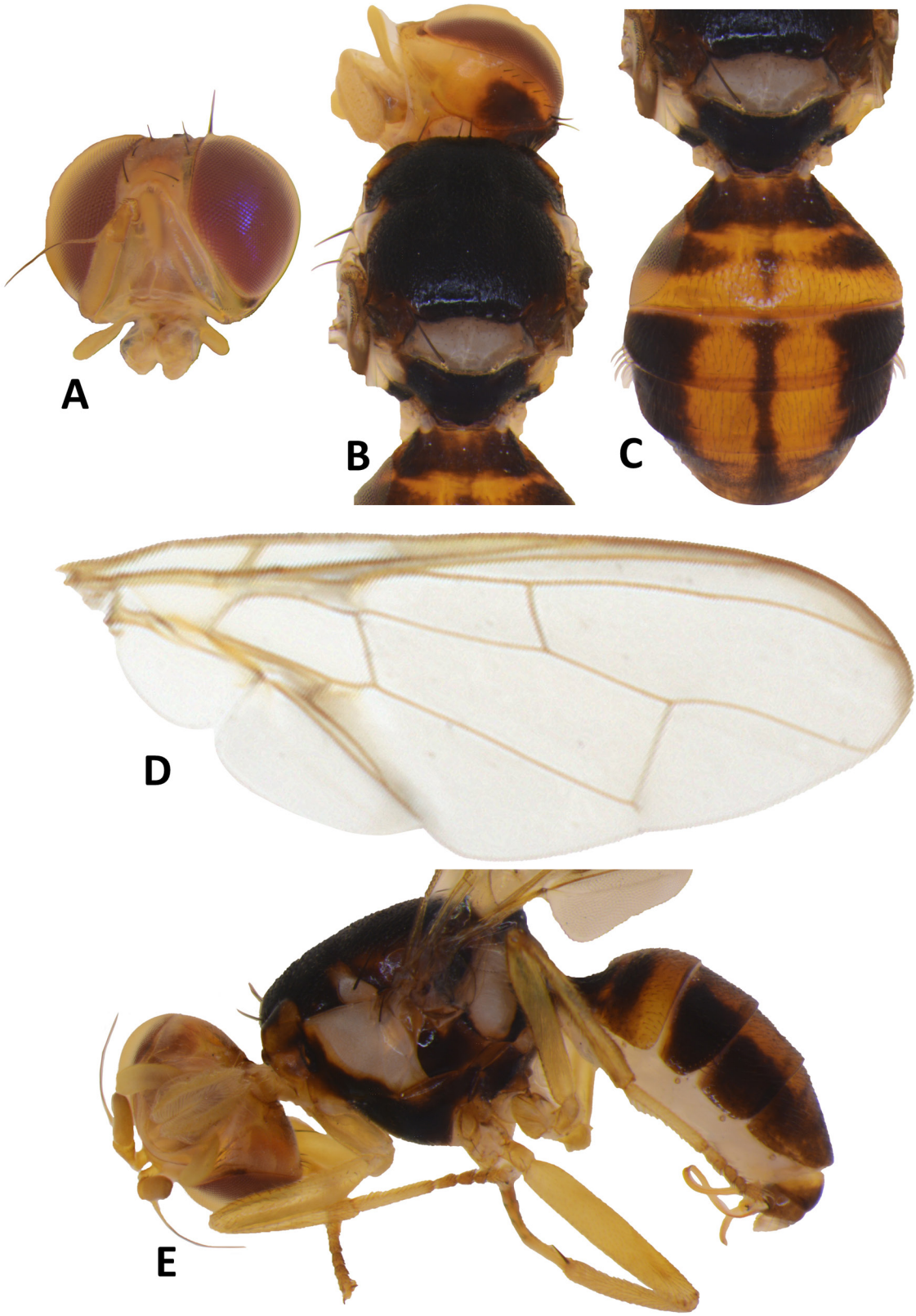


Figure 63. *Bactrocera* (*Bactrocera*) *passiflorae* (Froggatt) (species near), from Tokelau, male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view.

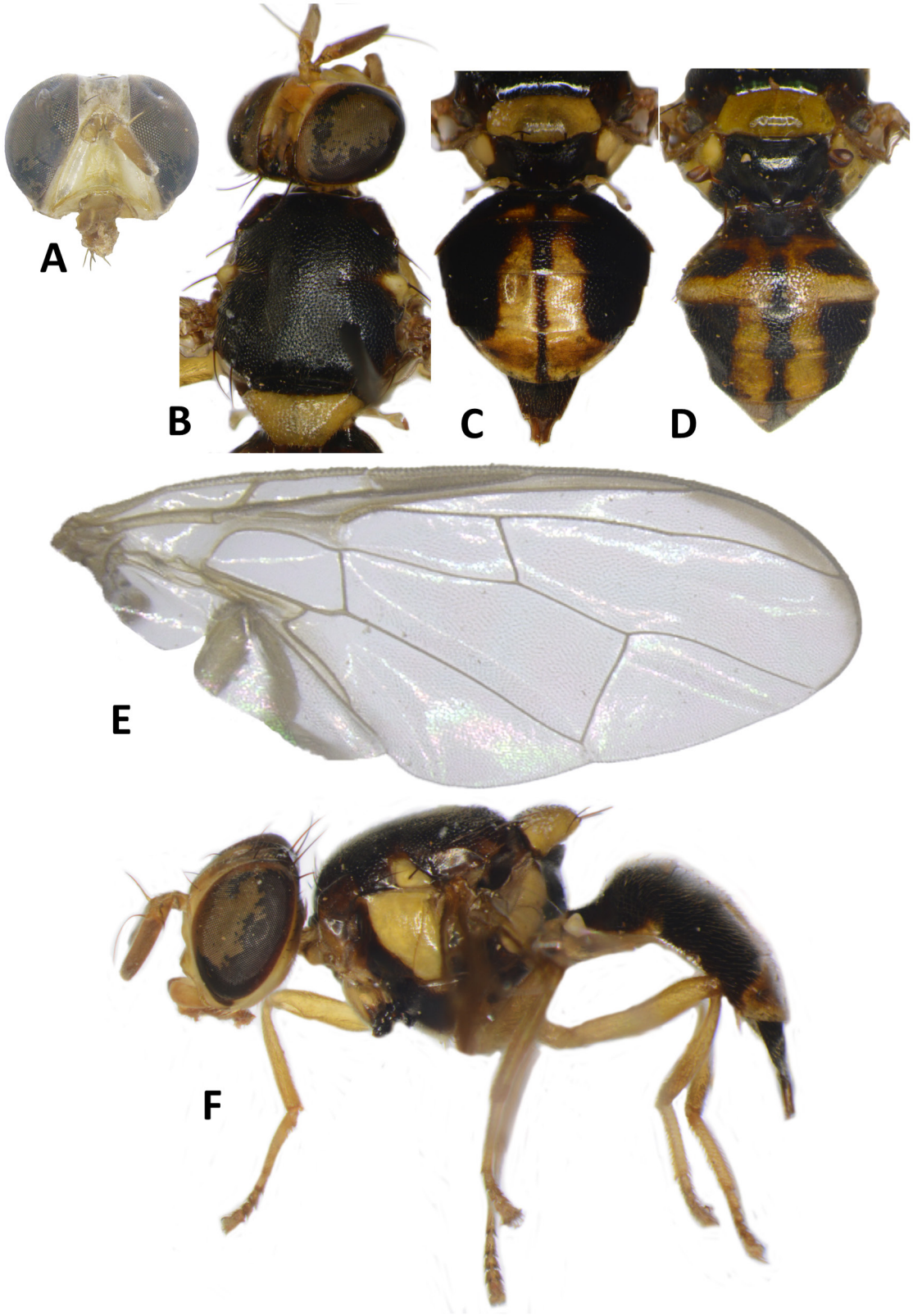


Figure 64. *Bactrocera* (*Bactrocera*) *passiflorae* (Froggatt) (species near), from Fiji. **A)** Head. **B)** Head and scutum. **C)** Abdomen, female. **D)** Abdomen, male. **E)** Wing. **F)** Lateral view, female.

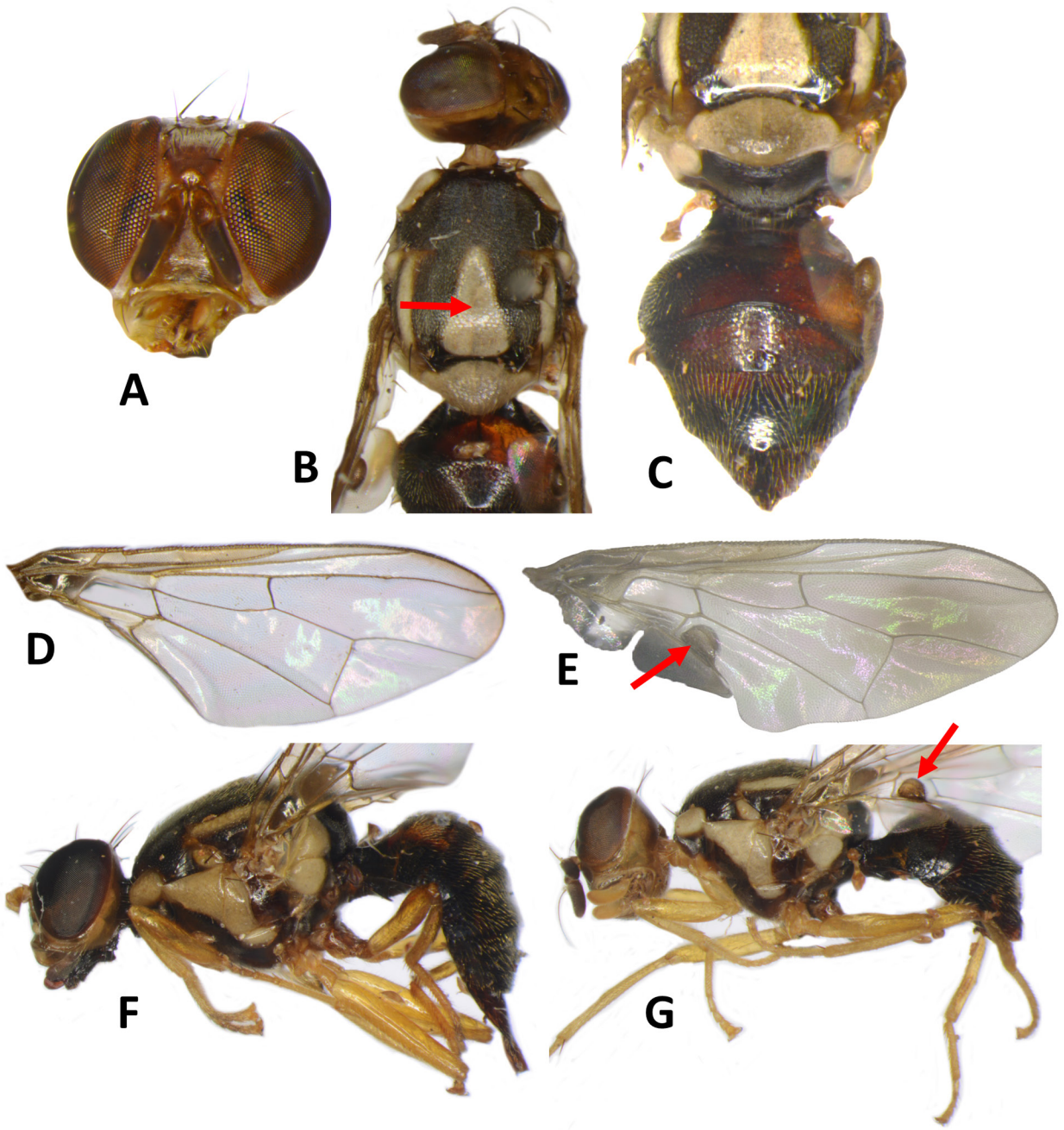


Figure 65. *Bactrocera* (*Bulladacus*) *penefurva* Drew. **A)** Head. **B)** Head and scutum. **C)** Abdomen, male. **D)** Wing, female. **E)** Wing, male. **F)** Lateral view, female. **G)** Lateral view, male.

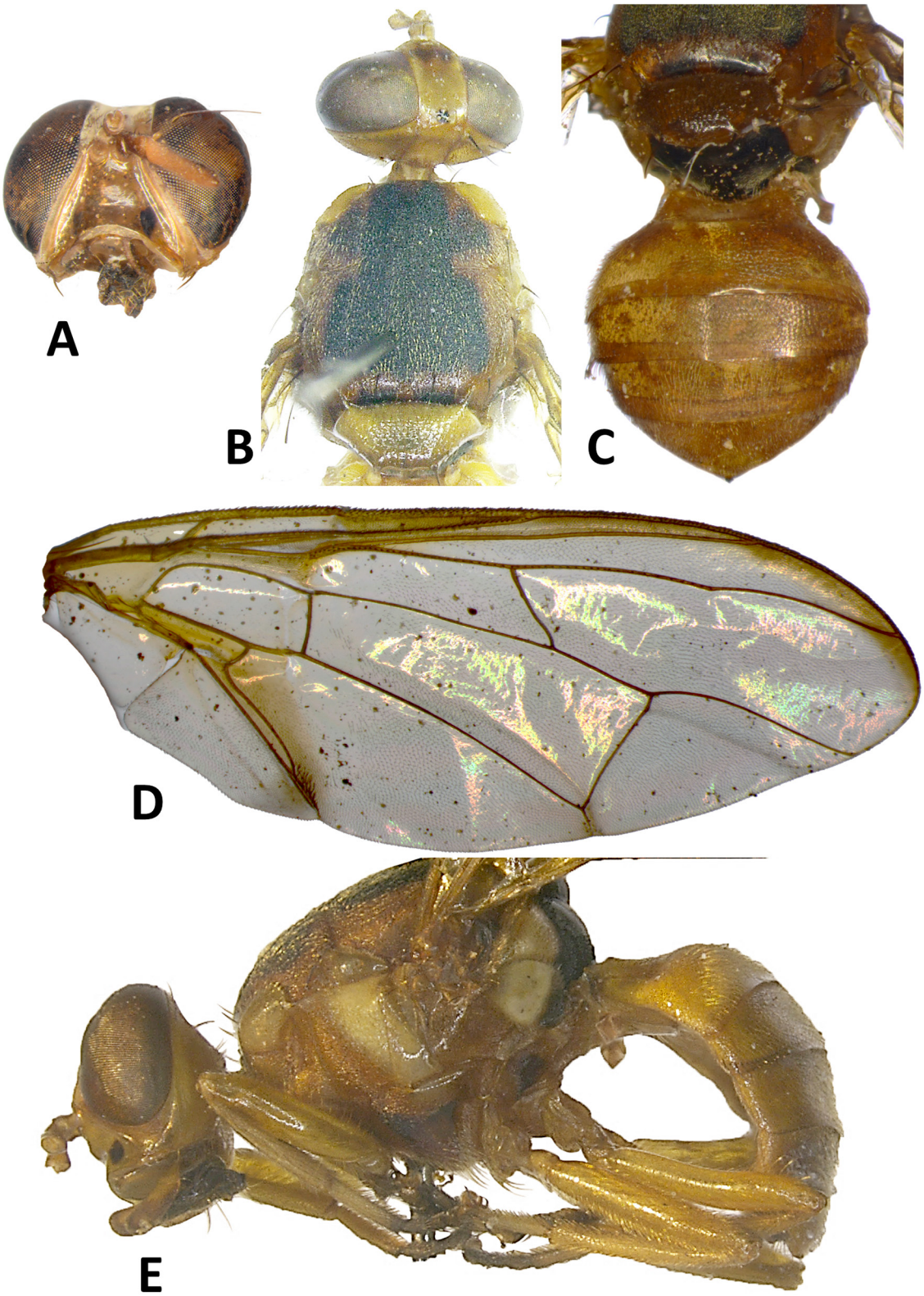


Figure 66. *Bactrocera* (*Bactrocera*) *peneobscura* Drew and Romig, male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view.

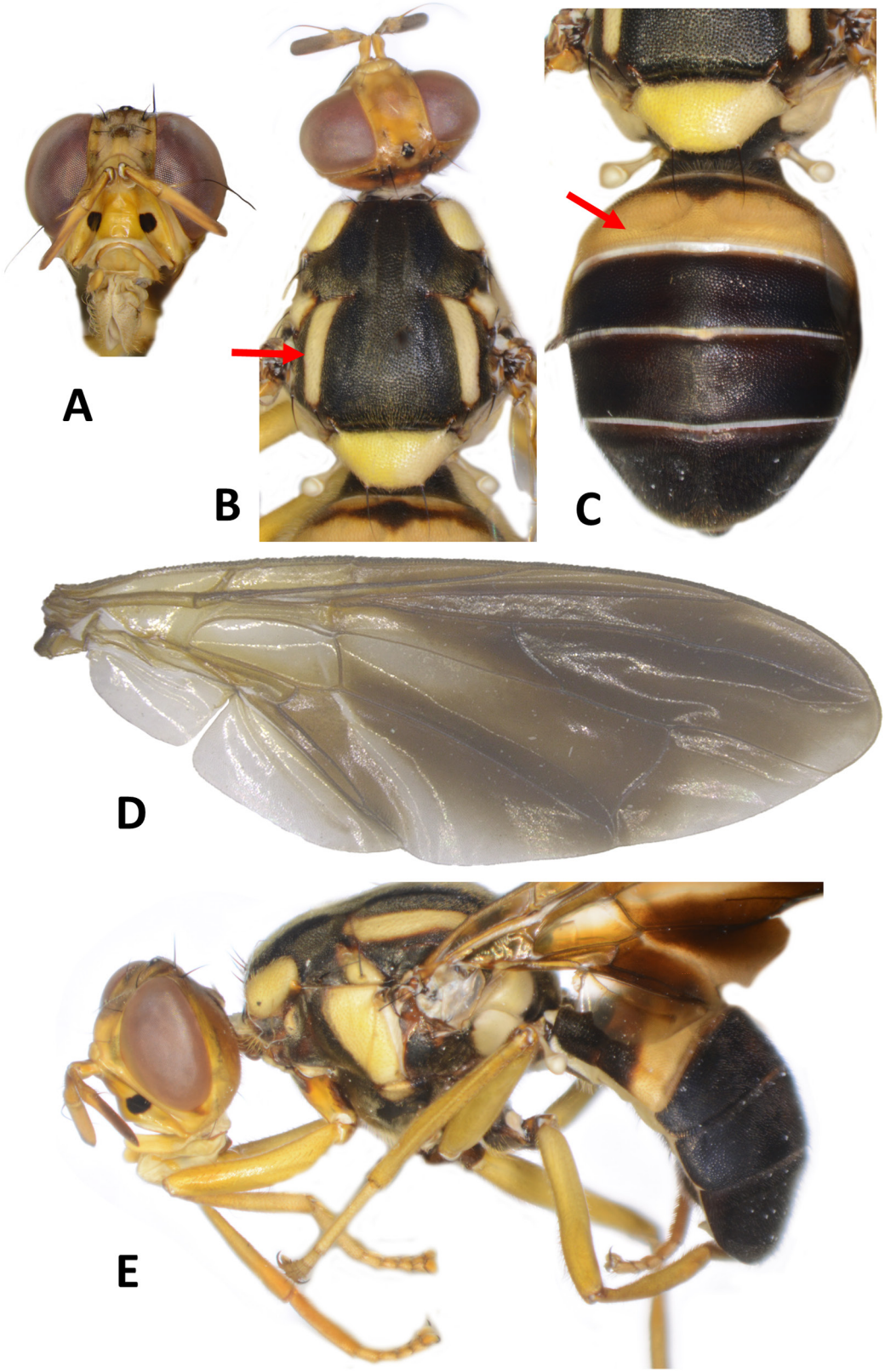


Figure 67. *Bactrocera* (*Bactrocera*) *pepisalae* (Drew), male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view.

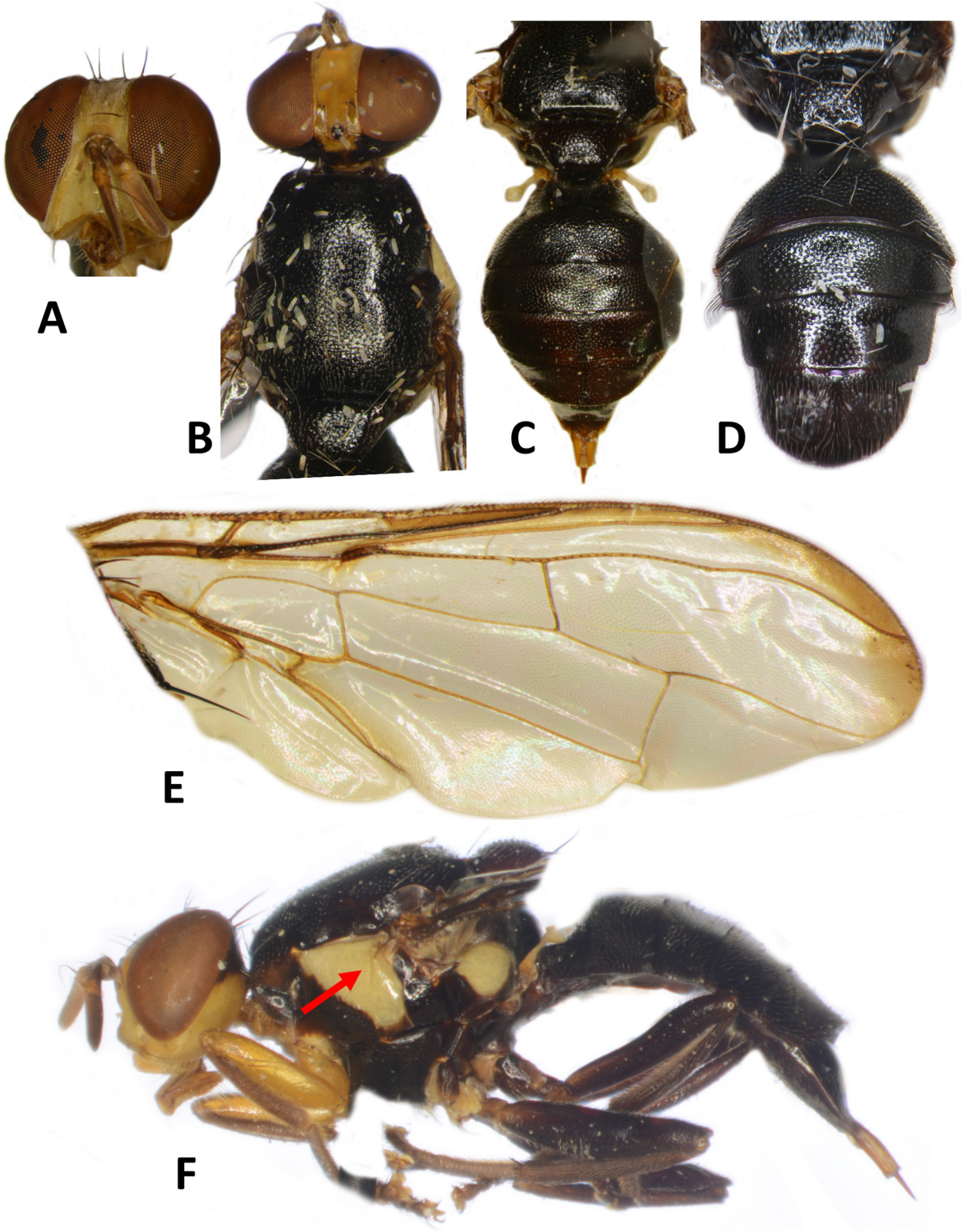


Figure 68. *Bactrocera* (*Bactrocera*) *perfusca* (Aubertin). **A)** Head. **B)** Head and scutum. **C)** Abdomen, female. **D)** Abdomen, male. **E)** Wing. **F)** Lateral view, female.

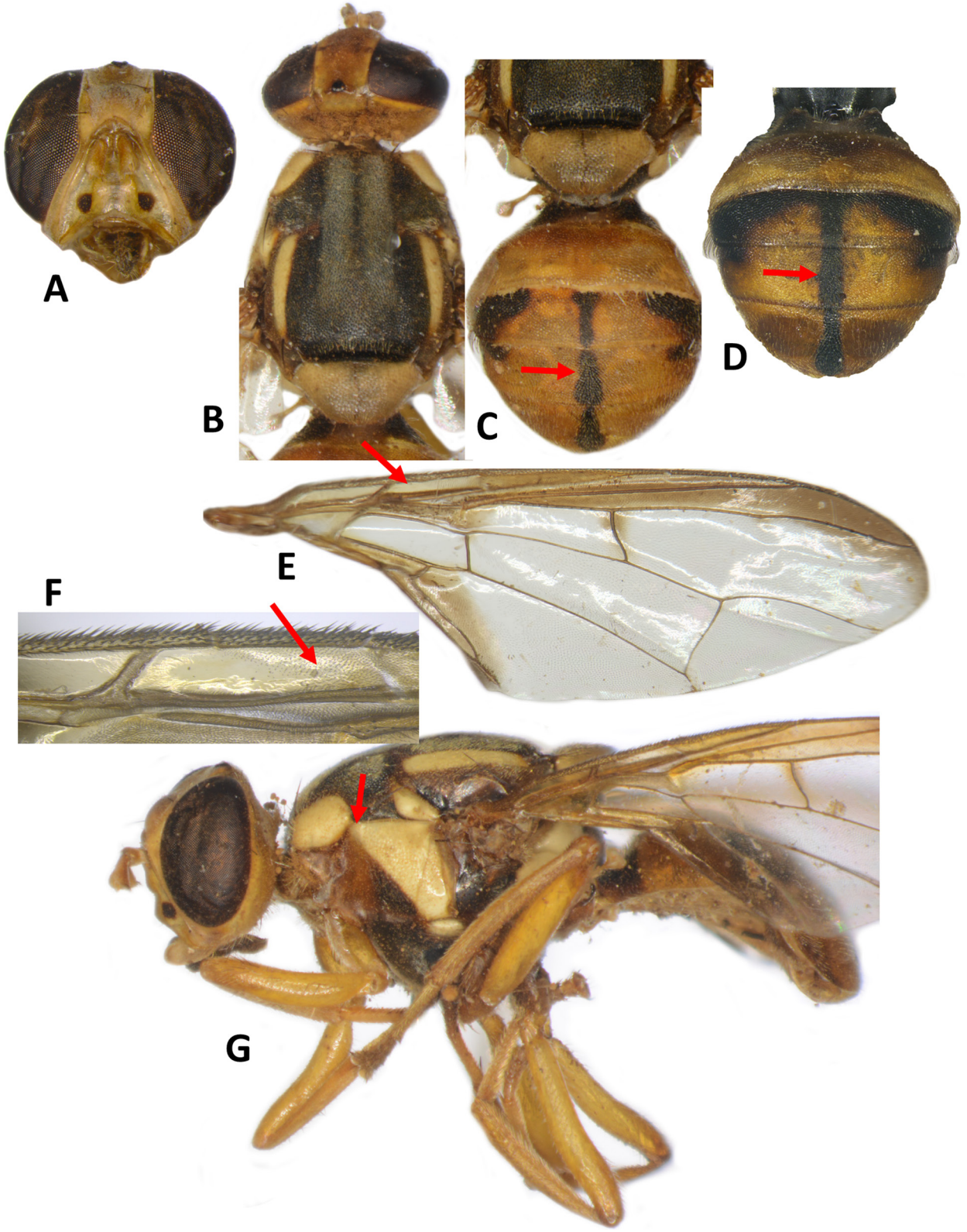


Figure 69. *Bactrocera* (*Bactrocera*) *phaea* (Drew), male. **A)** Head. **B)** Head and scutum. **C–D)** Abdomen. **E)** Wing. **F)** Wing, basal costal and costal cells. **G)** Lateral view.

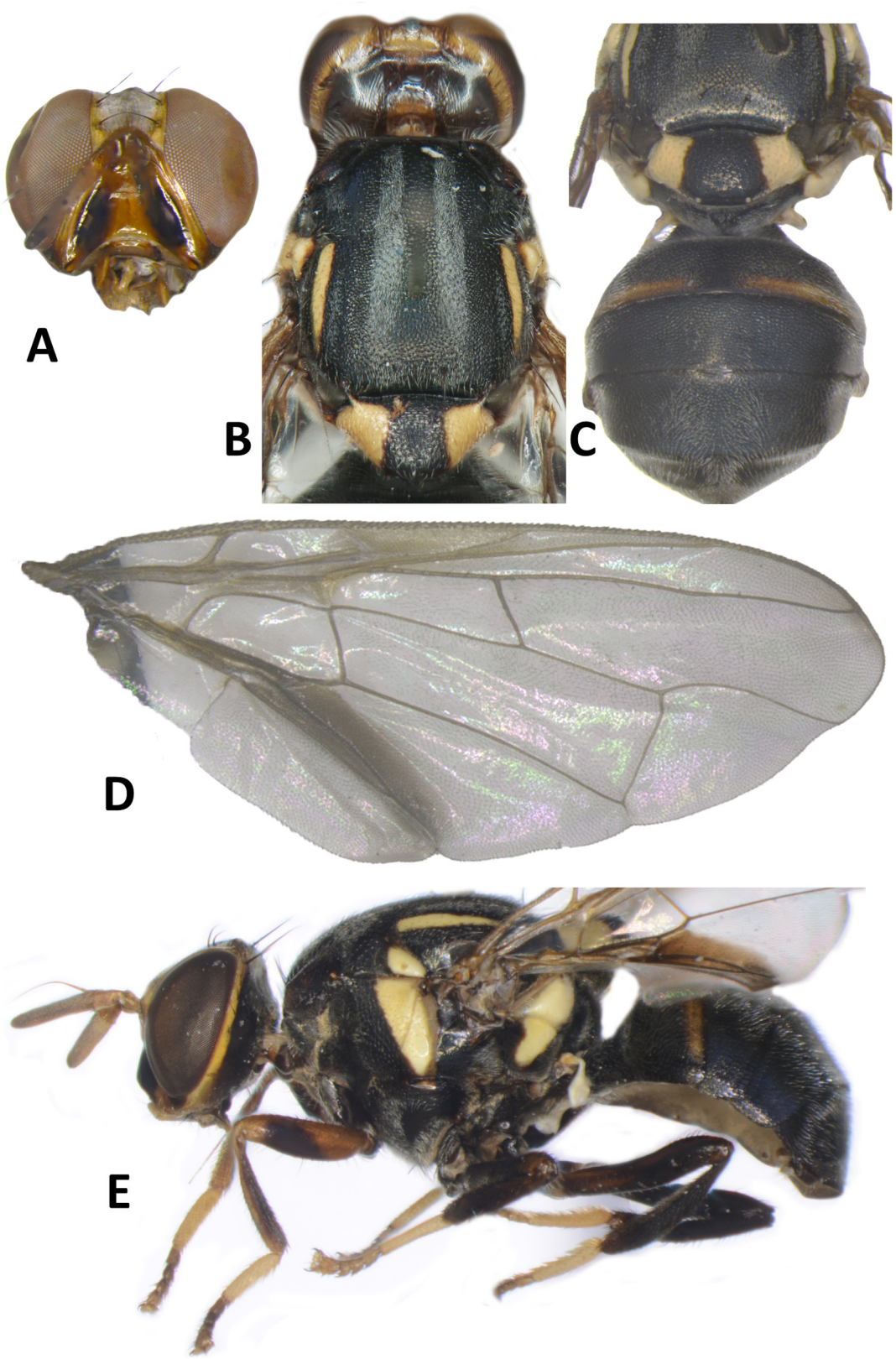


Figure 70. *Bactrocera* (*Bactrocera*) *picea* (Drew), male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view.

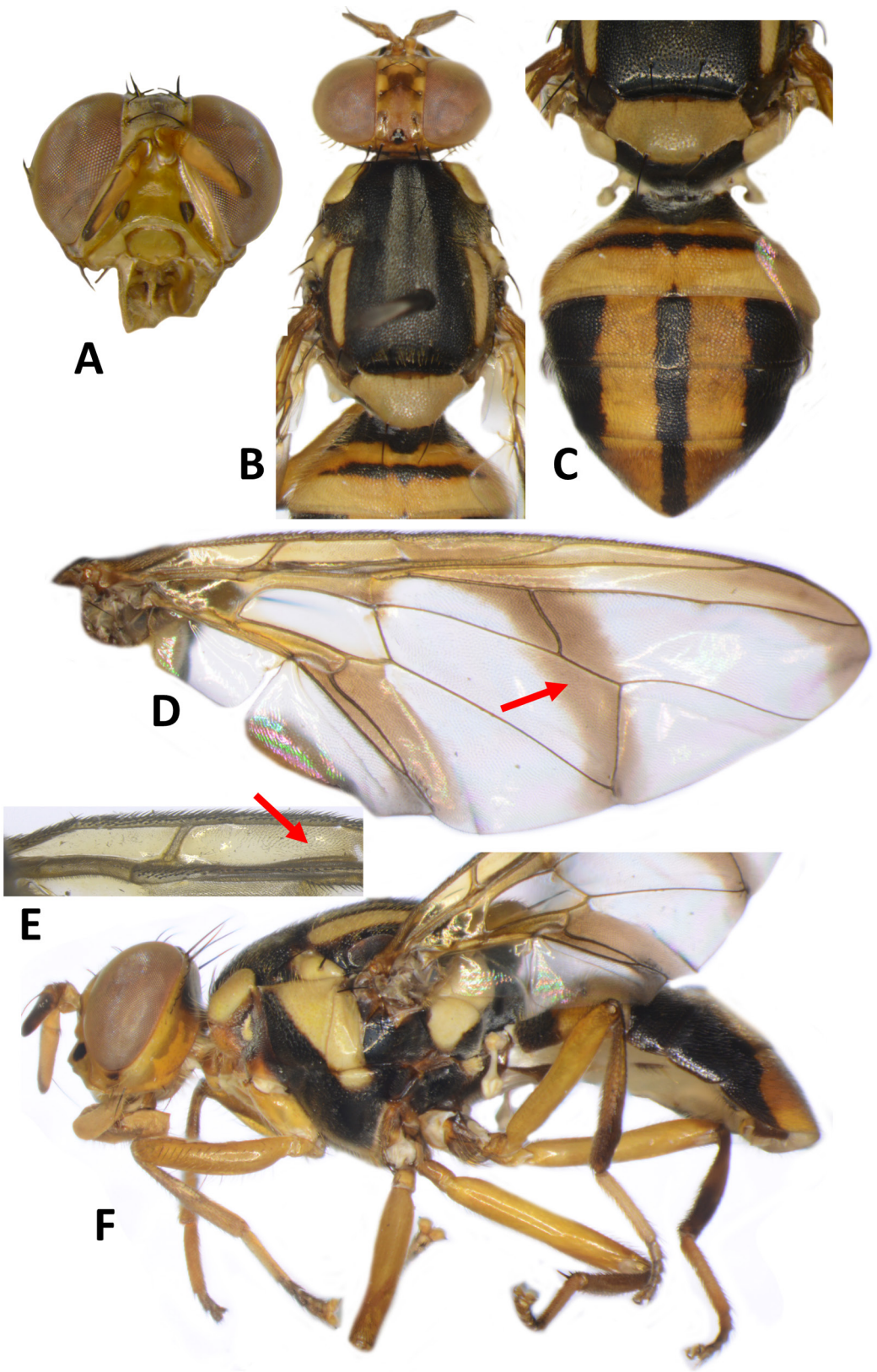


Figure 71. *Bactrocera* (*Bactrocera*) *pseudodistincta* (Drew), male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Wing, basal costal and costal cells. **F)** Lateral view.

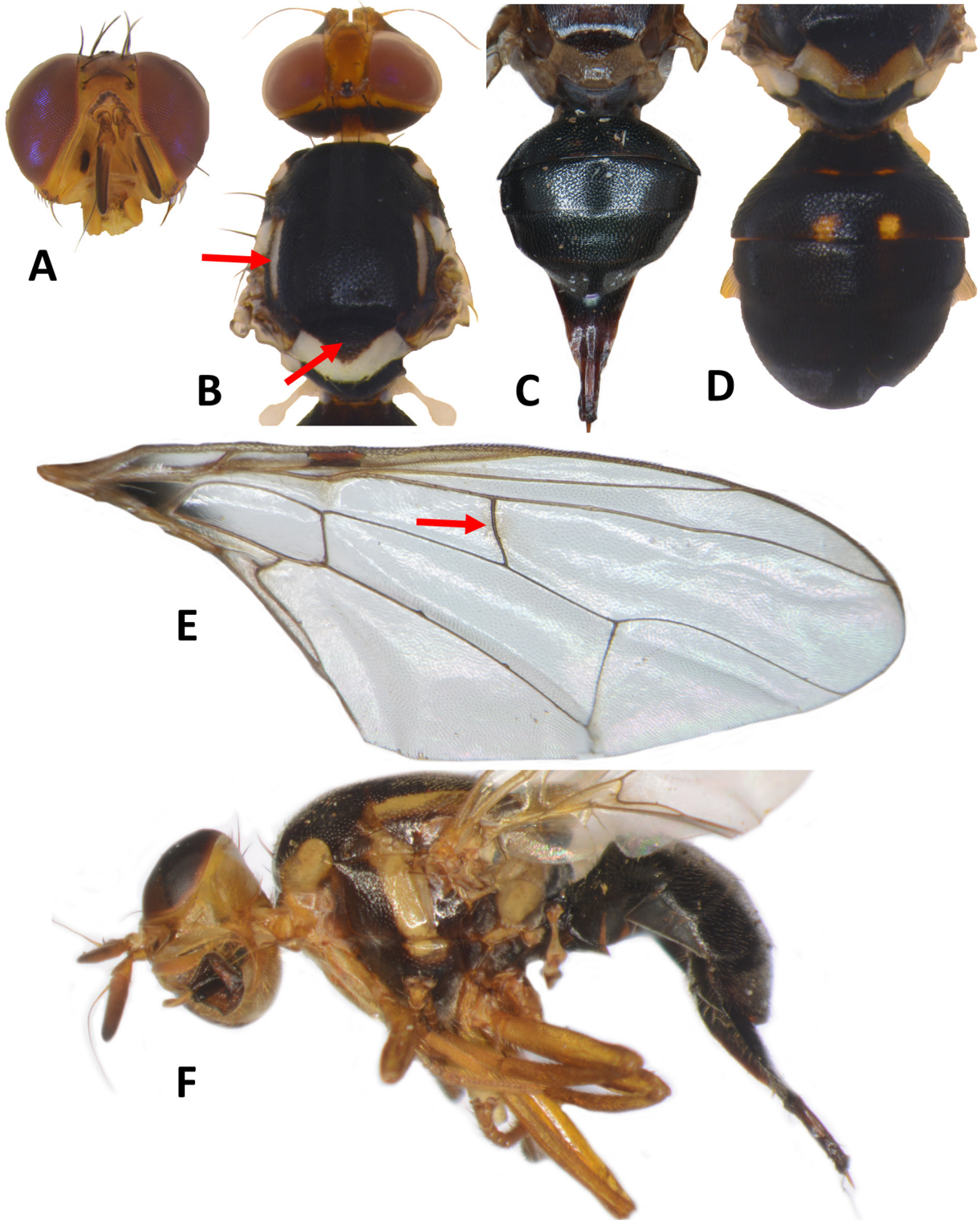


Figure 72. *Bactrocera* (*Bactrocera*) *psidii* (Froggatt). **A)** Head. **B)** Head and scutum. **C)** Abdomen, female. **D)** Abdomen, male. **E)** Wing. **F)** Lateral view, female.

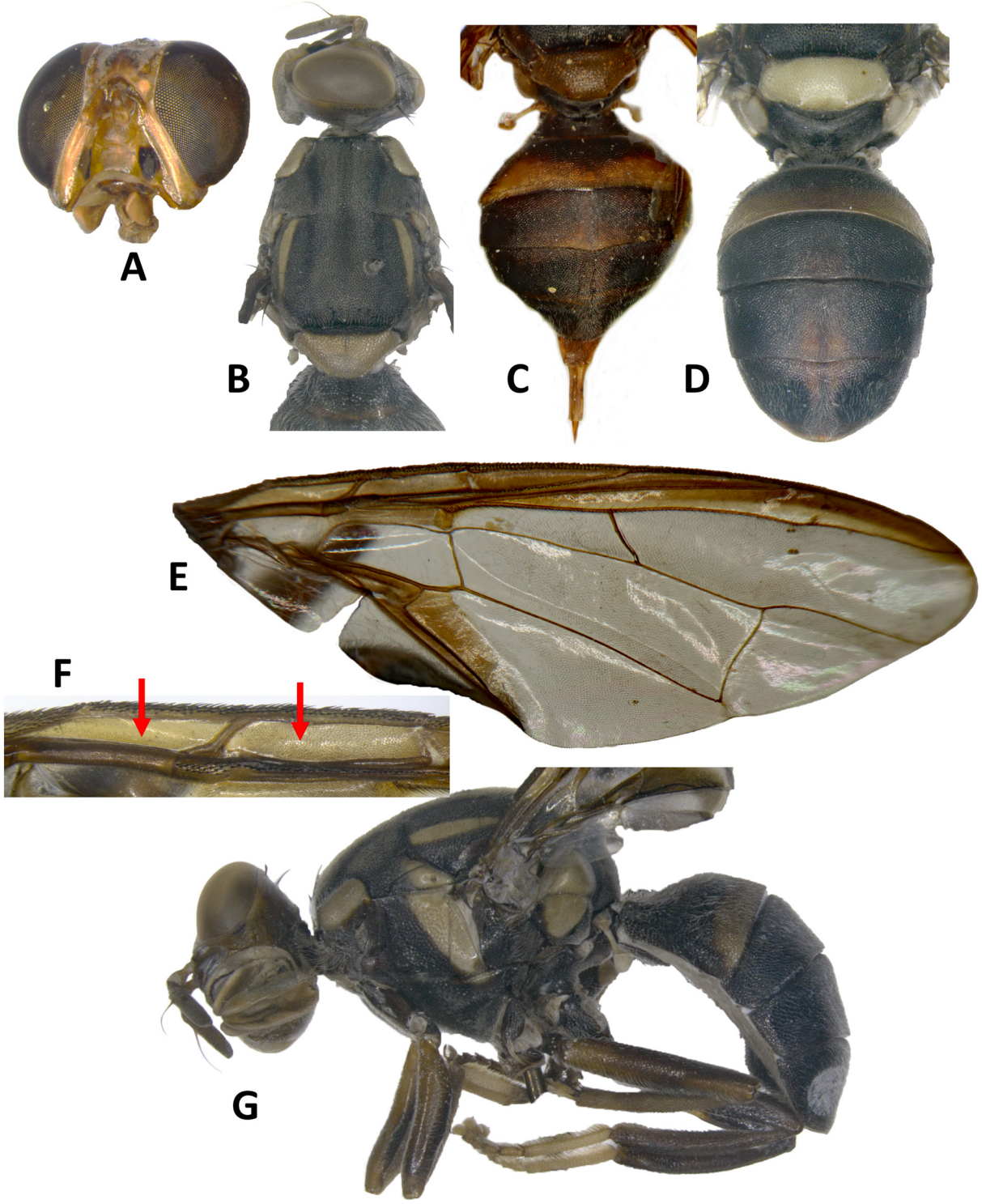


Figure 73. *Bactrocera* (*Bactrocera*) *quadrisetosa* (Bezzi). **A)** Head. **B)** Head and scutum. **C)** Abdomen, female. **D)** Abdomen, male. **E)** Wing. **F)** Wing, basal costal and costal cells. **G)** Lateral view, male.

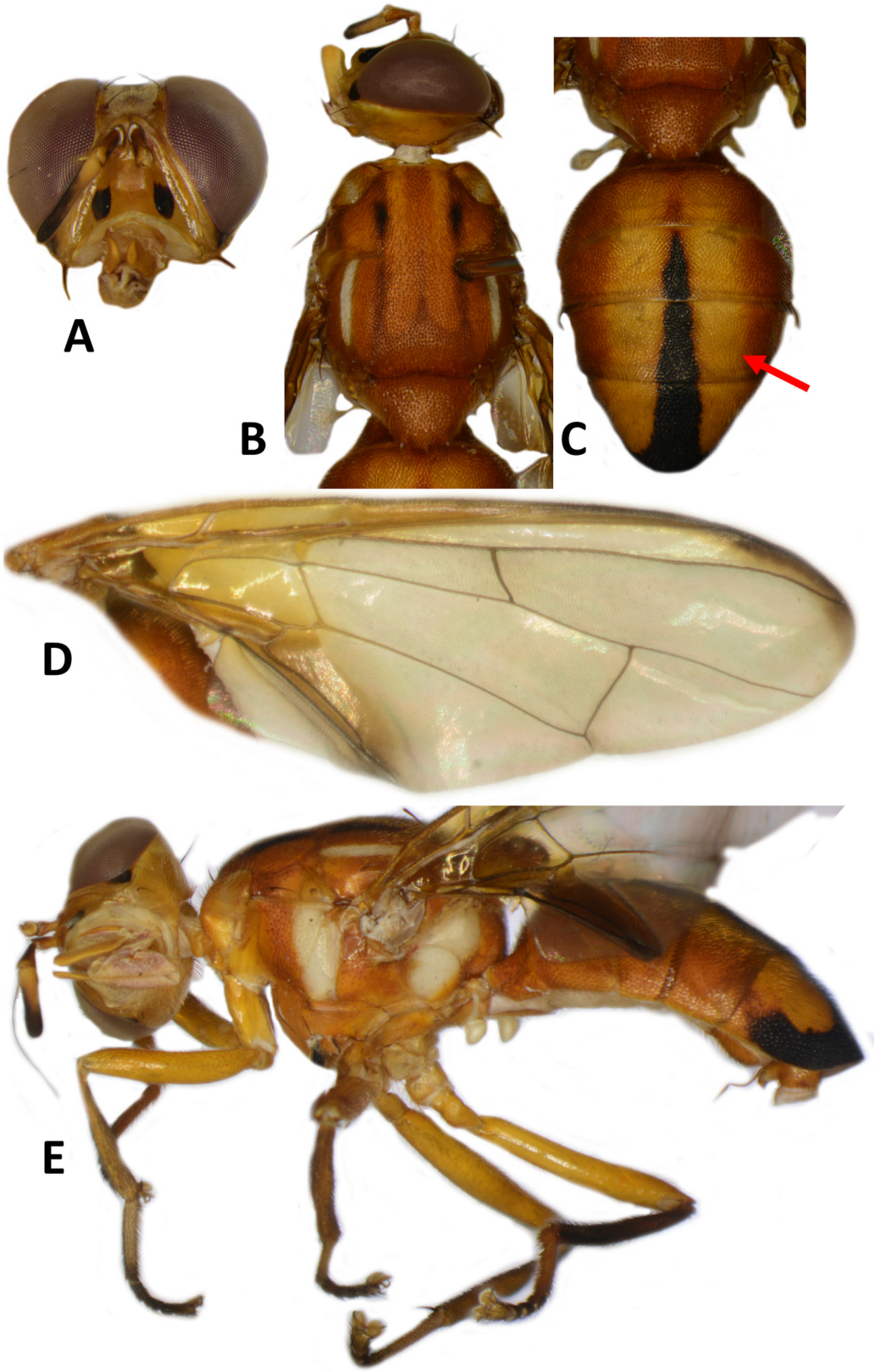


Figure 74. *Bactrocera* (*Bactrocera*) *quasienochra* leblanc and Doorenweerd, male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view.

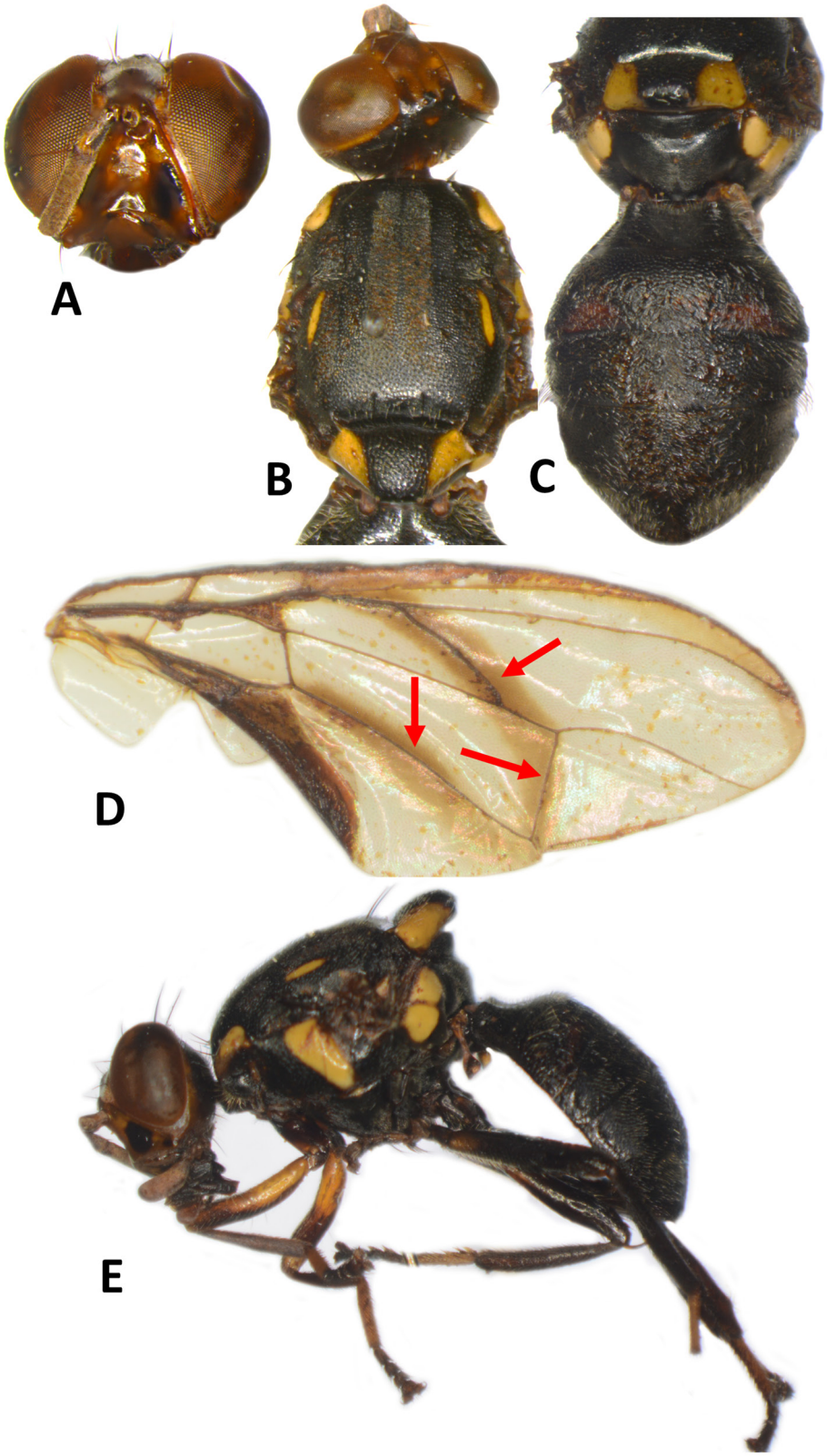


Figure 75. *Bactrocera* (*Bactrocera*) *reclinata* Drew, male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view.

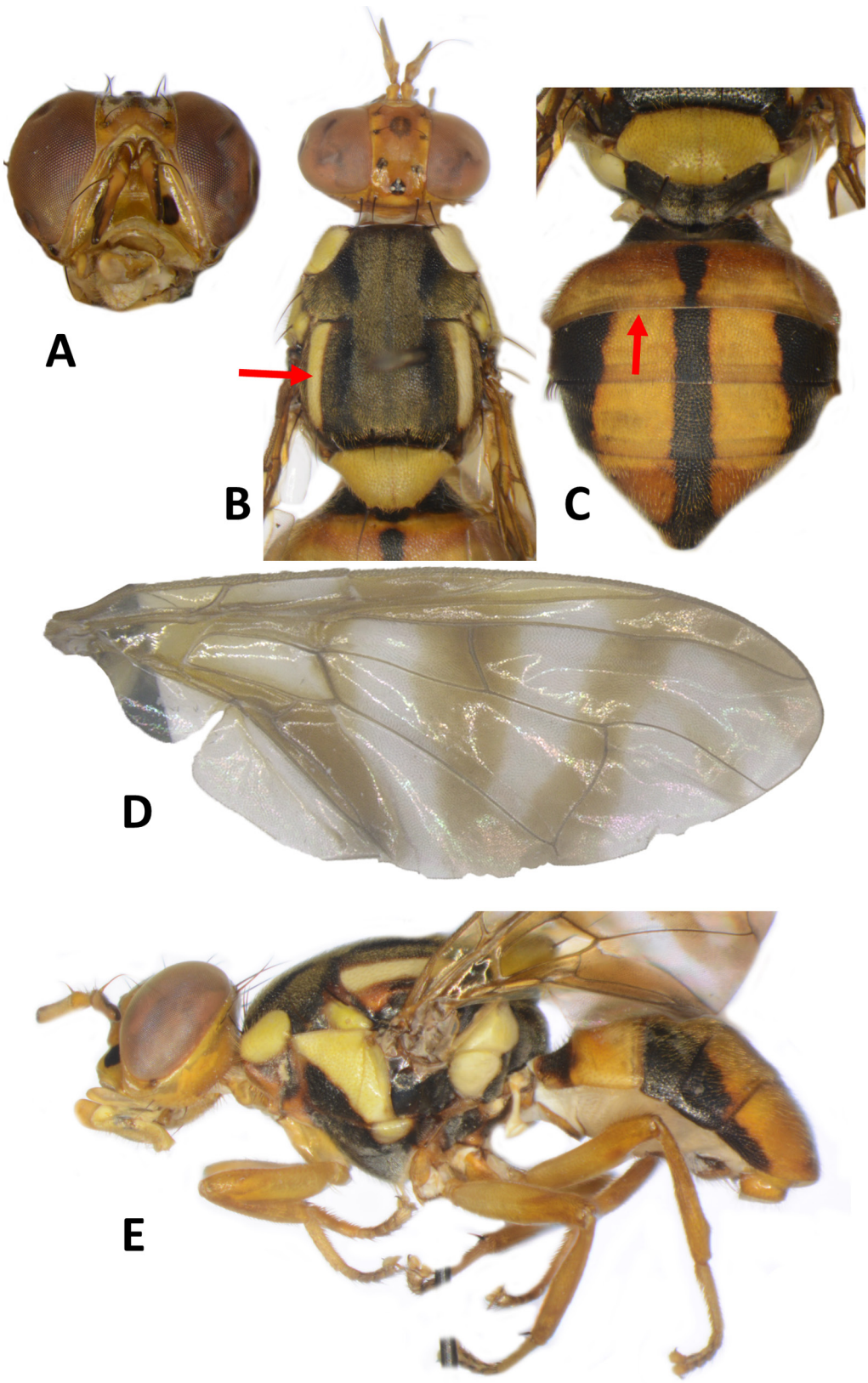


Figure 76. *Bactrocera* (*Bactrocera*) *redunca* (Drew), male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view.

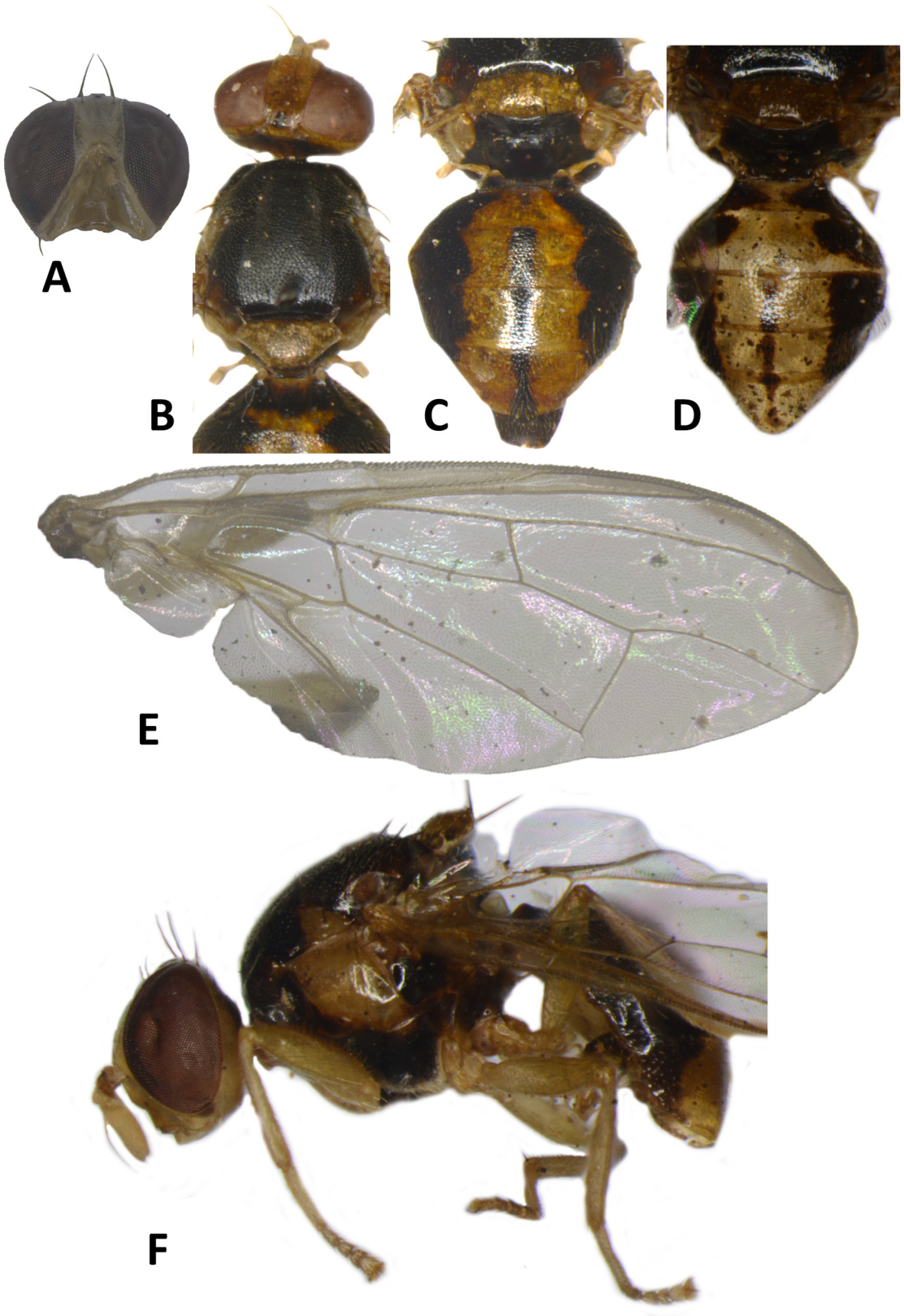


Figure 77. *Bactrocera* (*Bactrocera*) *samoae* Drew. **A)** Head. **B)** Head and scutum. **C)** Abdomen, female. **D)** Abdomen, male. **E)** Wing. **F)** Lateral view, male.

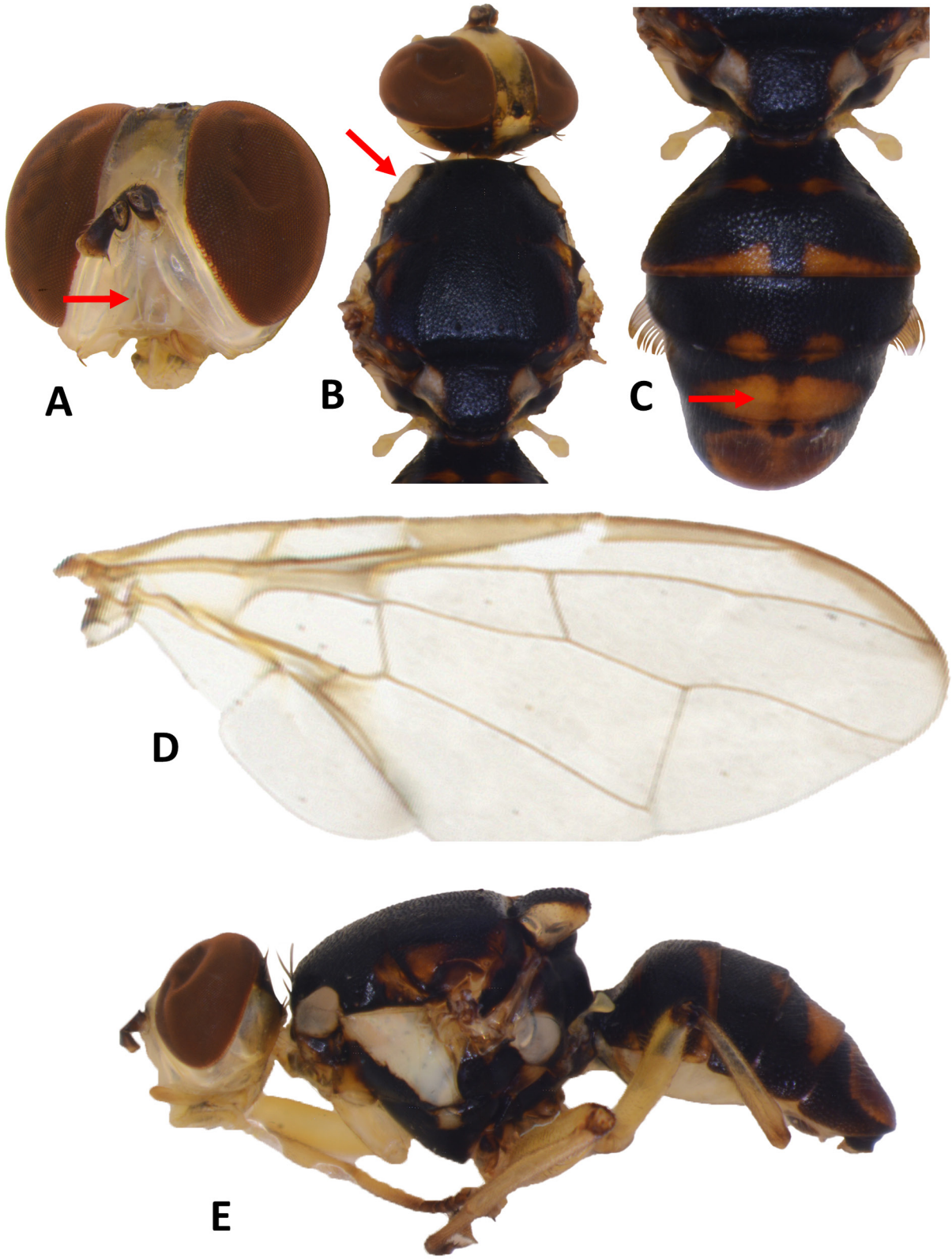


Figure 78. *Bactrocera* (*Bactrocera*) *setinervis* (Malloch), male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view.

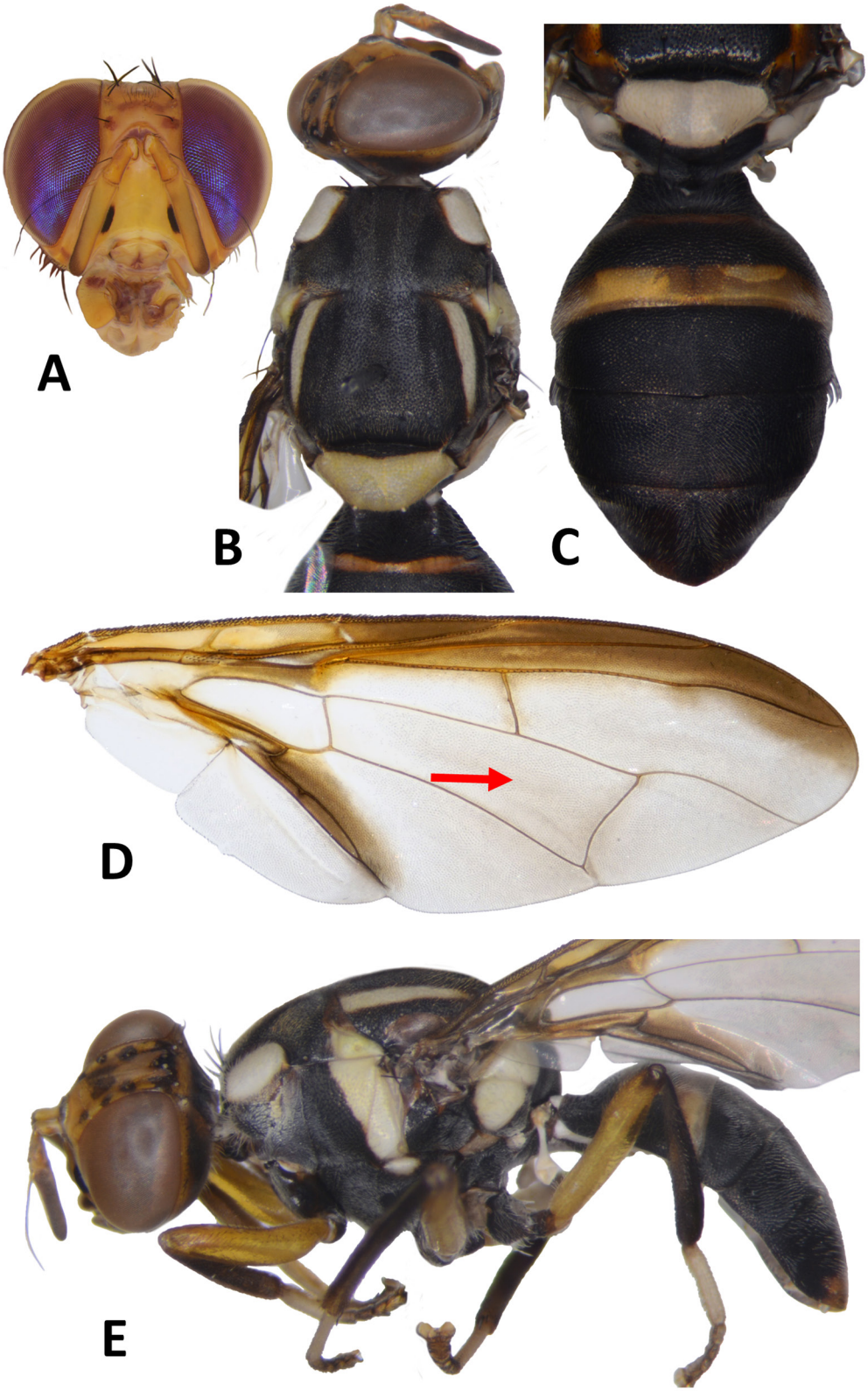


Figure 79. *Bactrocera* (*Bactrocera*) *simulata* (Malloch), male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view.

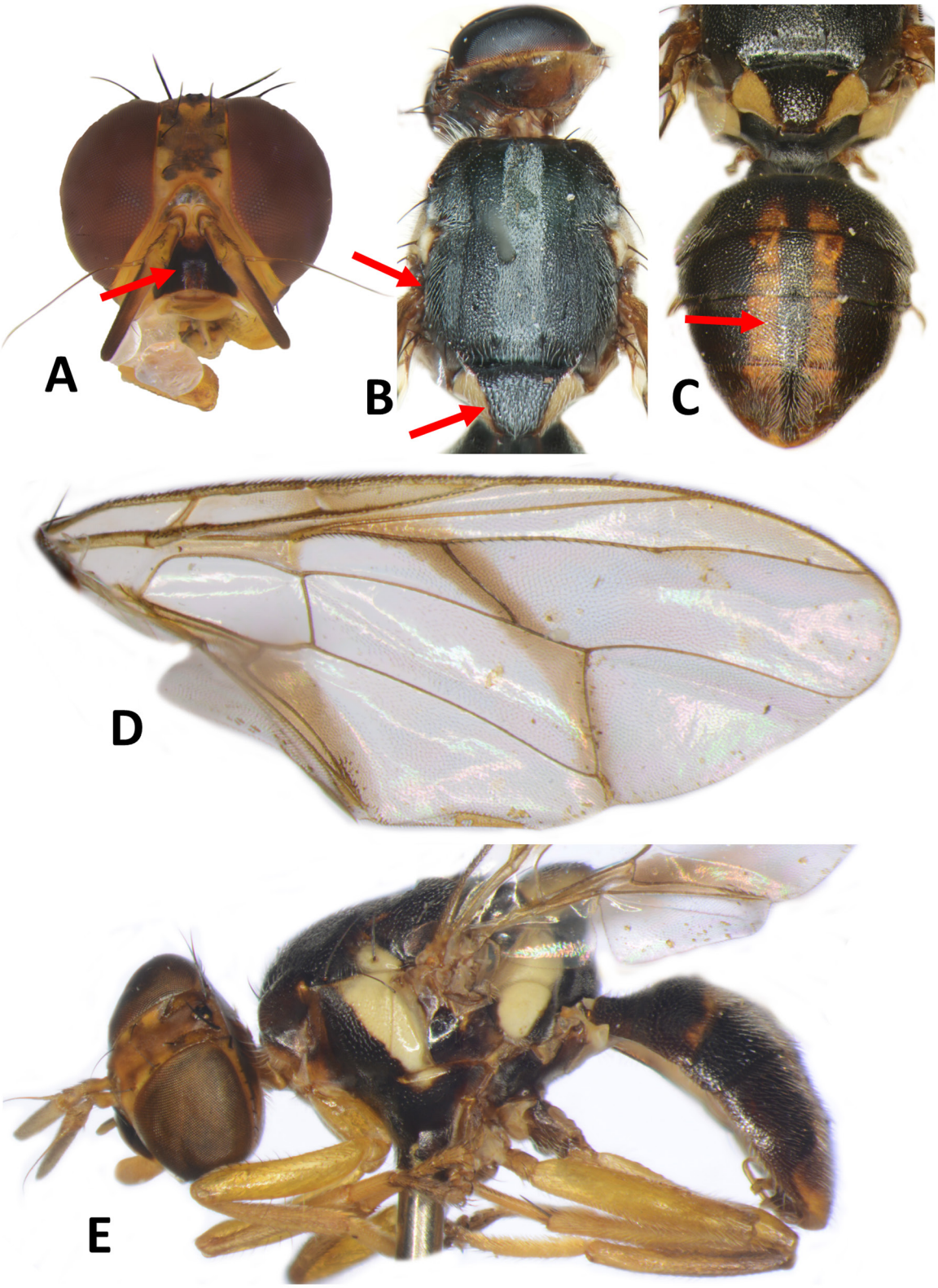


Figure 80. *Bactrocera* (*Bactrocera*) *trilineola* Drew, male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view.

Figure 81. *Bactrocera* (*Bactrocera*) *trilineola* Drew. Intraspecific variation in abdomen coloration.

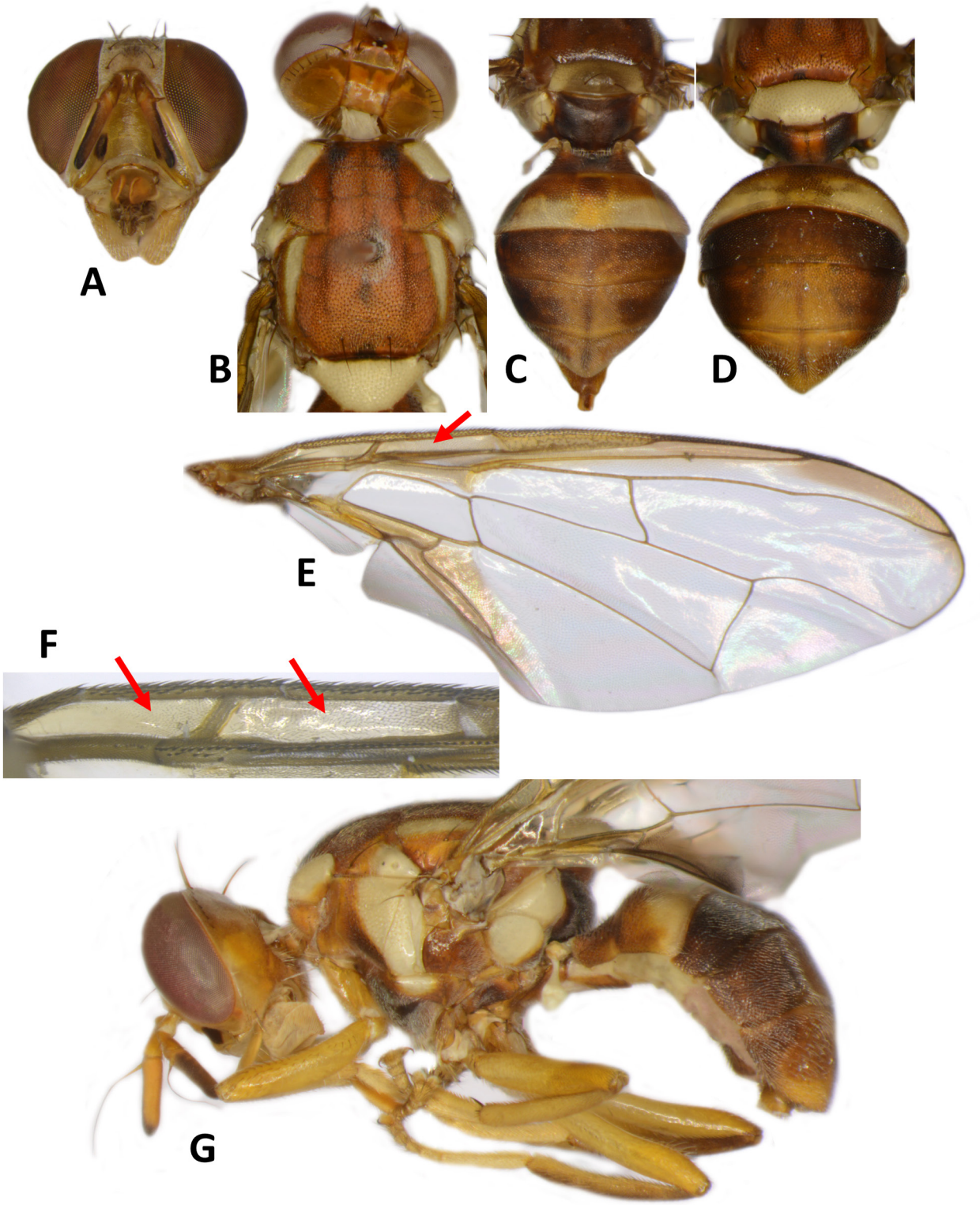


Figure 82. *Bactrocera* (*Bactrocera*) *tryoni* (Froggatt). **A)** Head. **B)** Head and scutum. **C)** Abdomen, female. **D)** Abdomen, male. **E)** Wing. **F)** Wing, basal costal and costal cells. **G)** Lateral view, male.

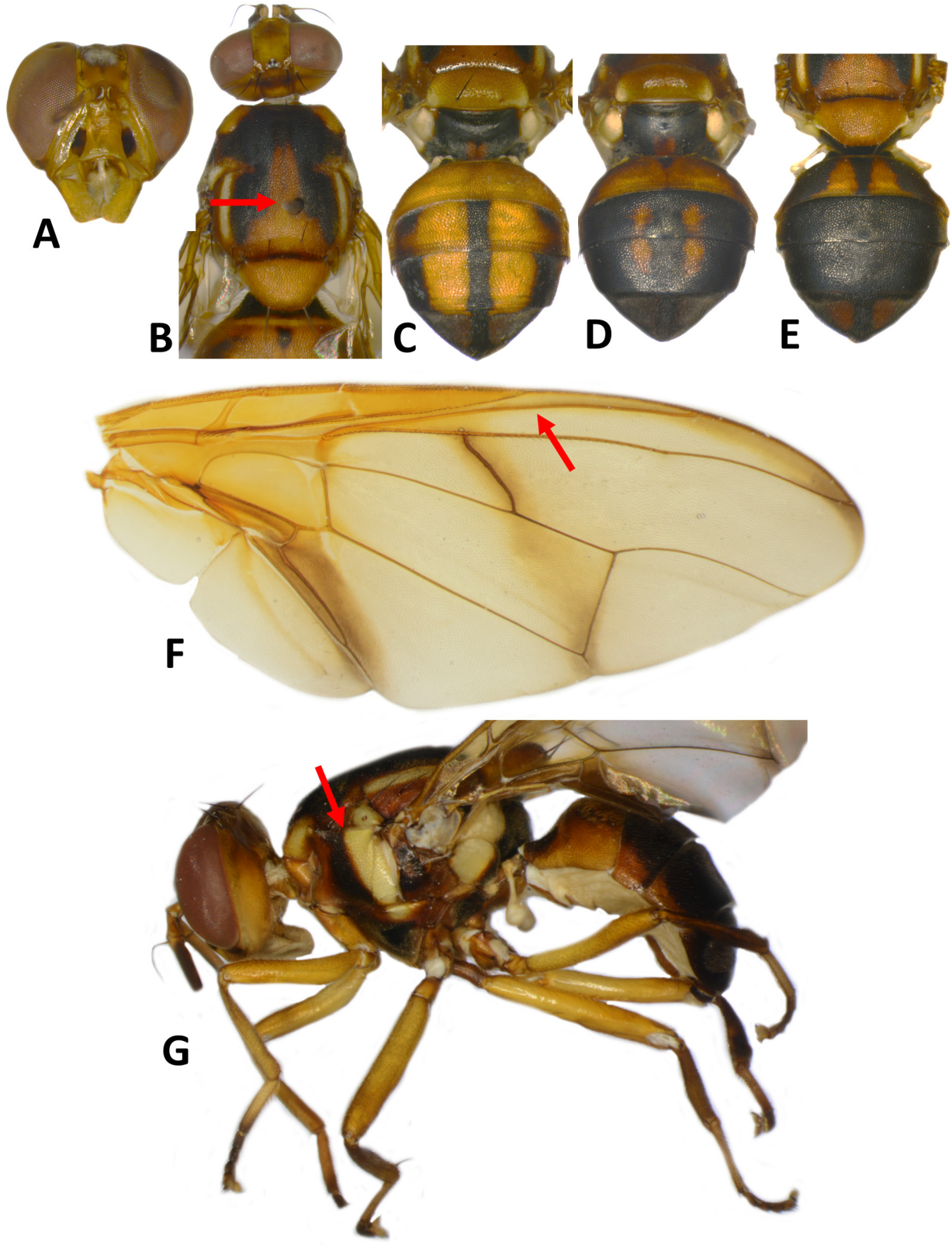


Figure 83. *Bactrocera* (*Bactrocera*) *tsatsiai* Leblanc and Doorenweerd, male. **A)** Head. **B)** Head and scutum. **C–E)** Abdomen. **F)** Wing. **G)** Lateral view.

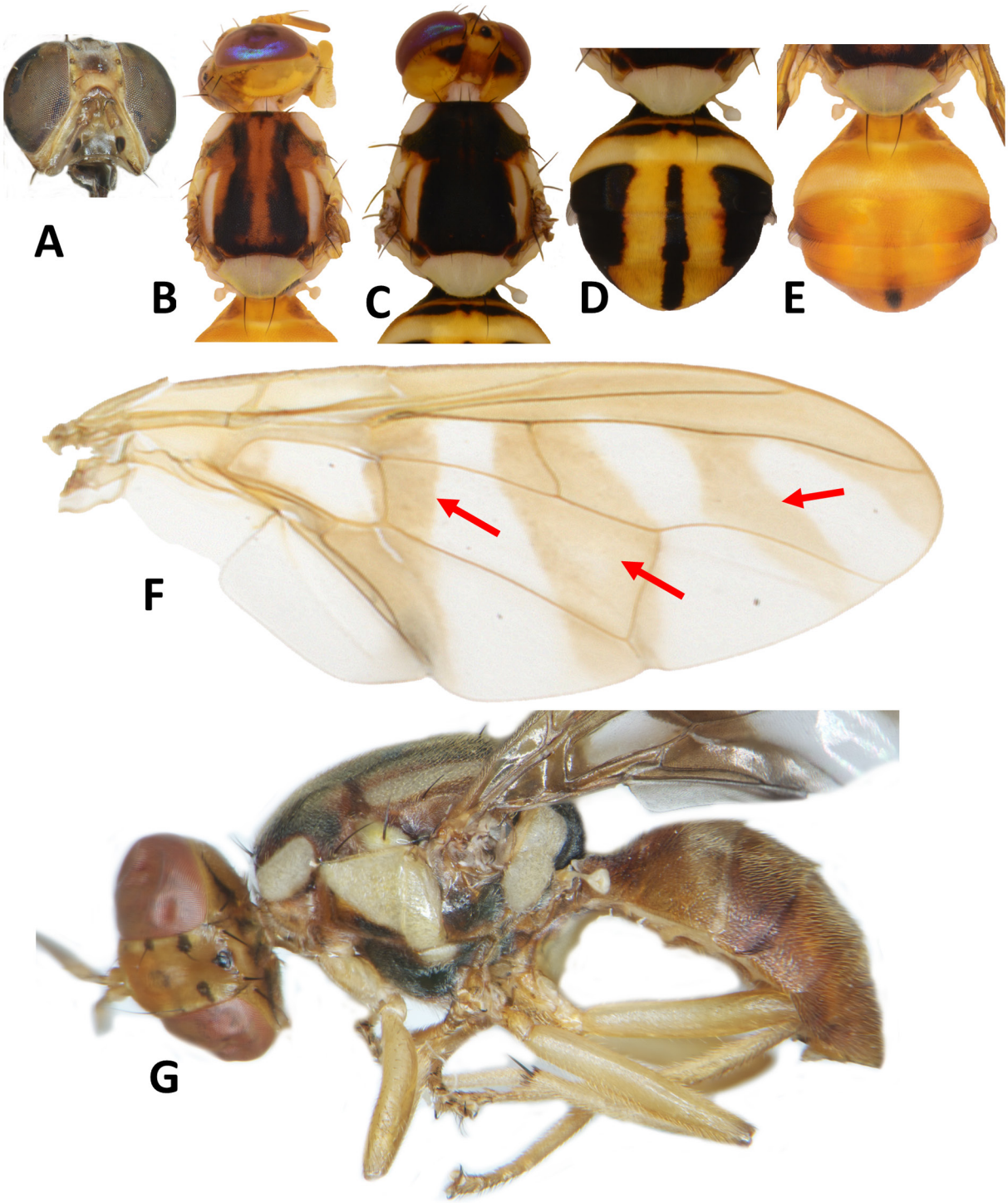


Figure 84. *Bactrocera* (*Bactrocera*) *umbrosa* (Fabricius), male. **A)** Head. **B–C)** Head and scutum. **D–E)** Abdomen. **F)** Wing. **G)** Lateral view.

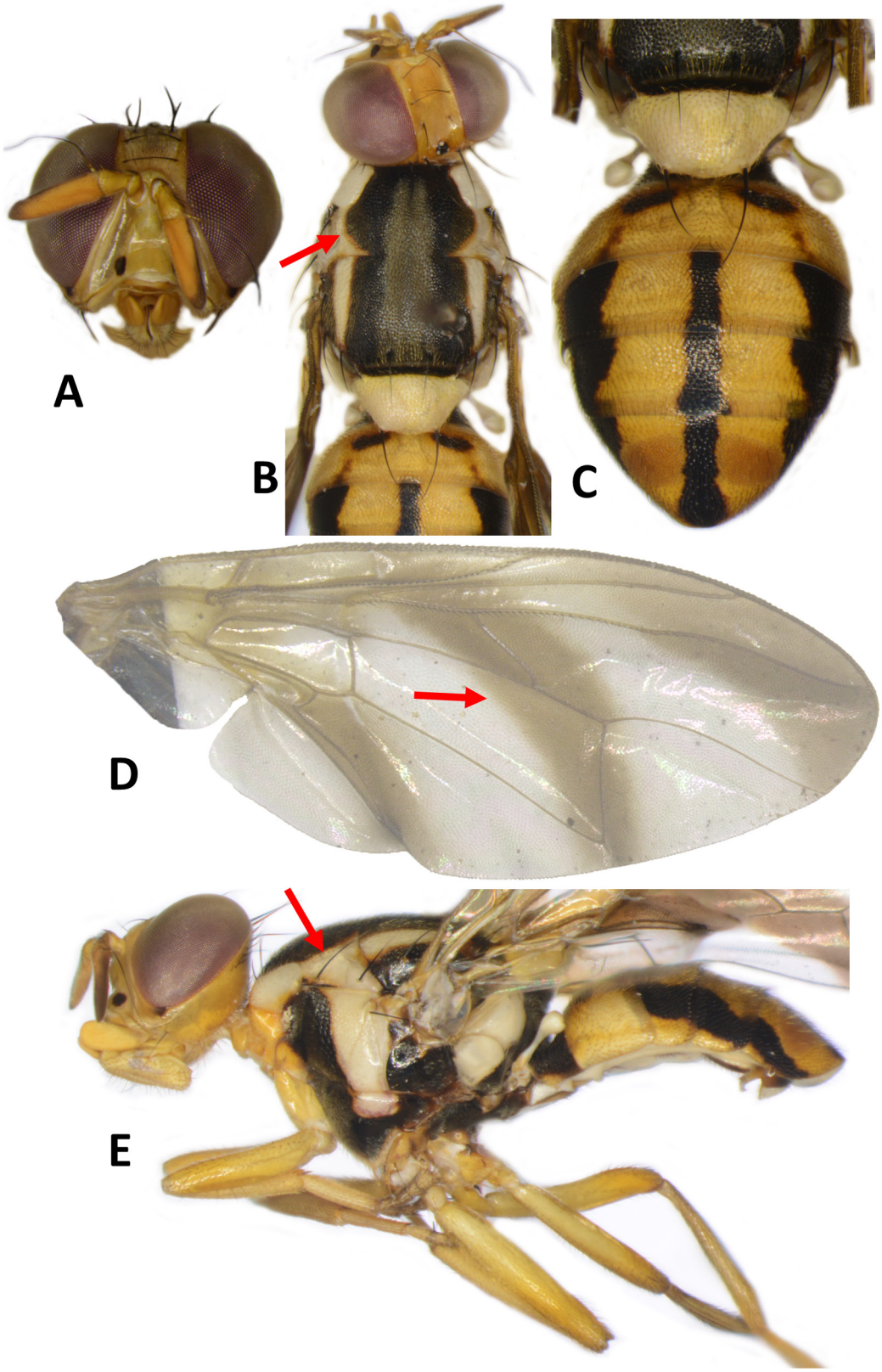


Figure 85. *Bactrocera* (*Bactrocera*) *unifasciata* (Malloch), male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view.

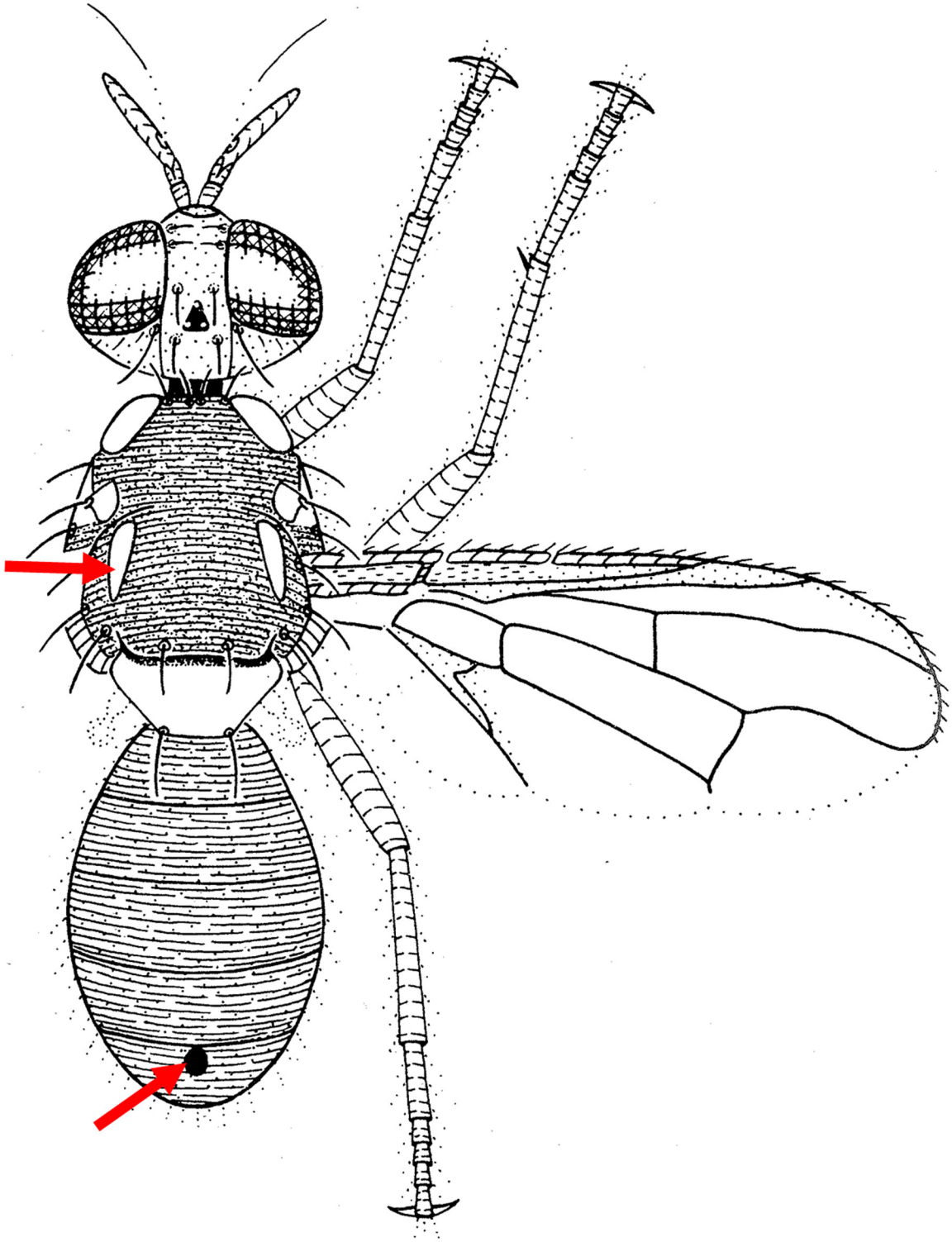


Figure 86. *Bactrocera* (*Bulladacus*) *unipunctata* (Malloch), male (from Drew 1989).

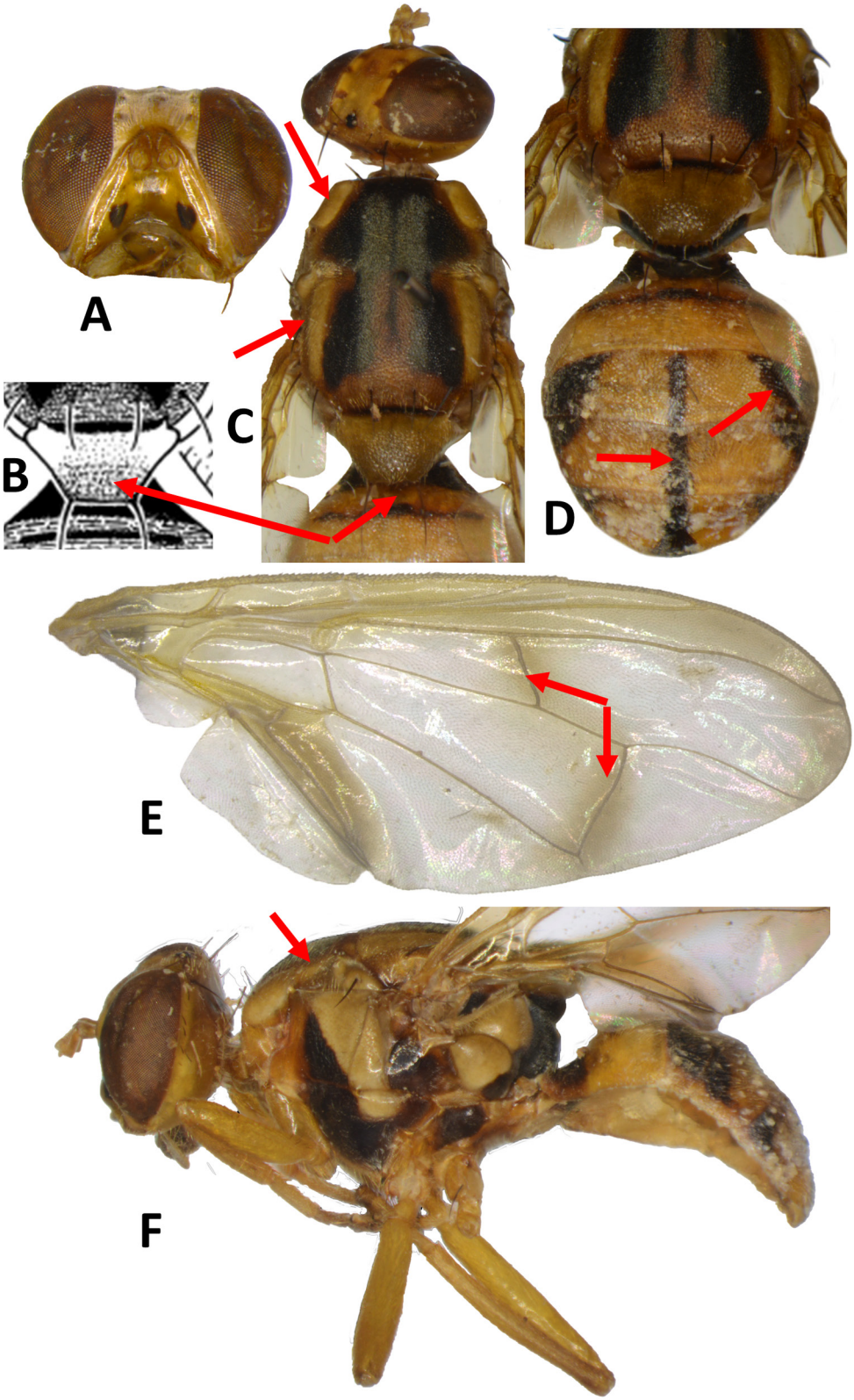


Figure 87. *Bactrocera* (*Bactrocera*) *unitaeniola* Drew and Romig, male. **A)** Head. **B)** Scutellum (from Drew and Romig 2001). **C)** Head and scutum. Scutellum apical spot faded on photo. **D)** Abdomen. **E)** Wing. **F)** Lateral view.

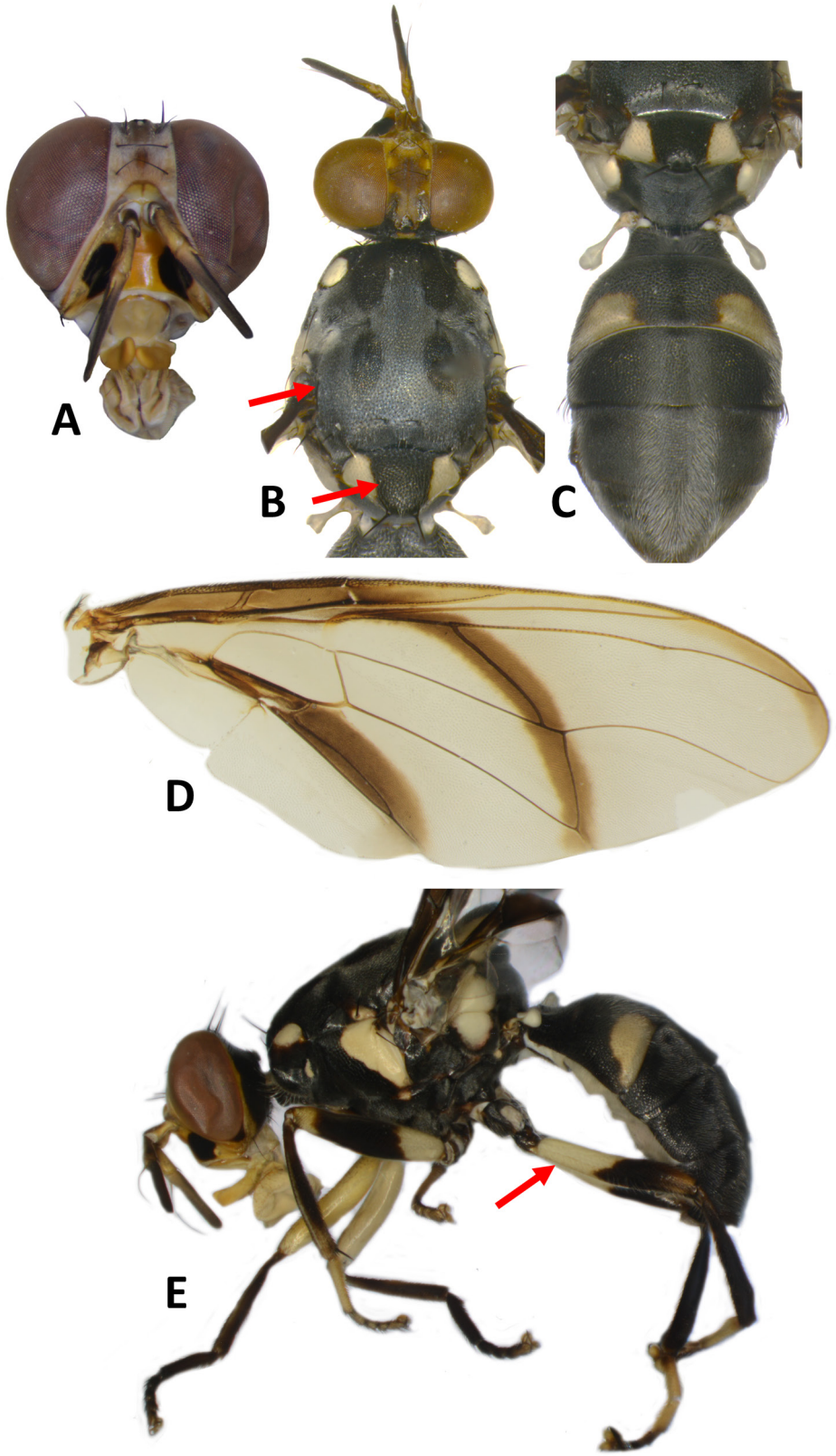


Figure 88. *Bactrocera* (*Bactrocera*) *vargasi* Leblanc and Doorenweerd, male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view.

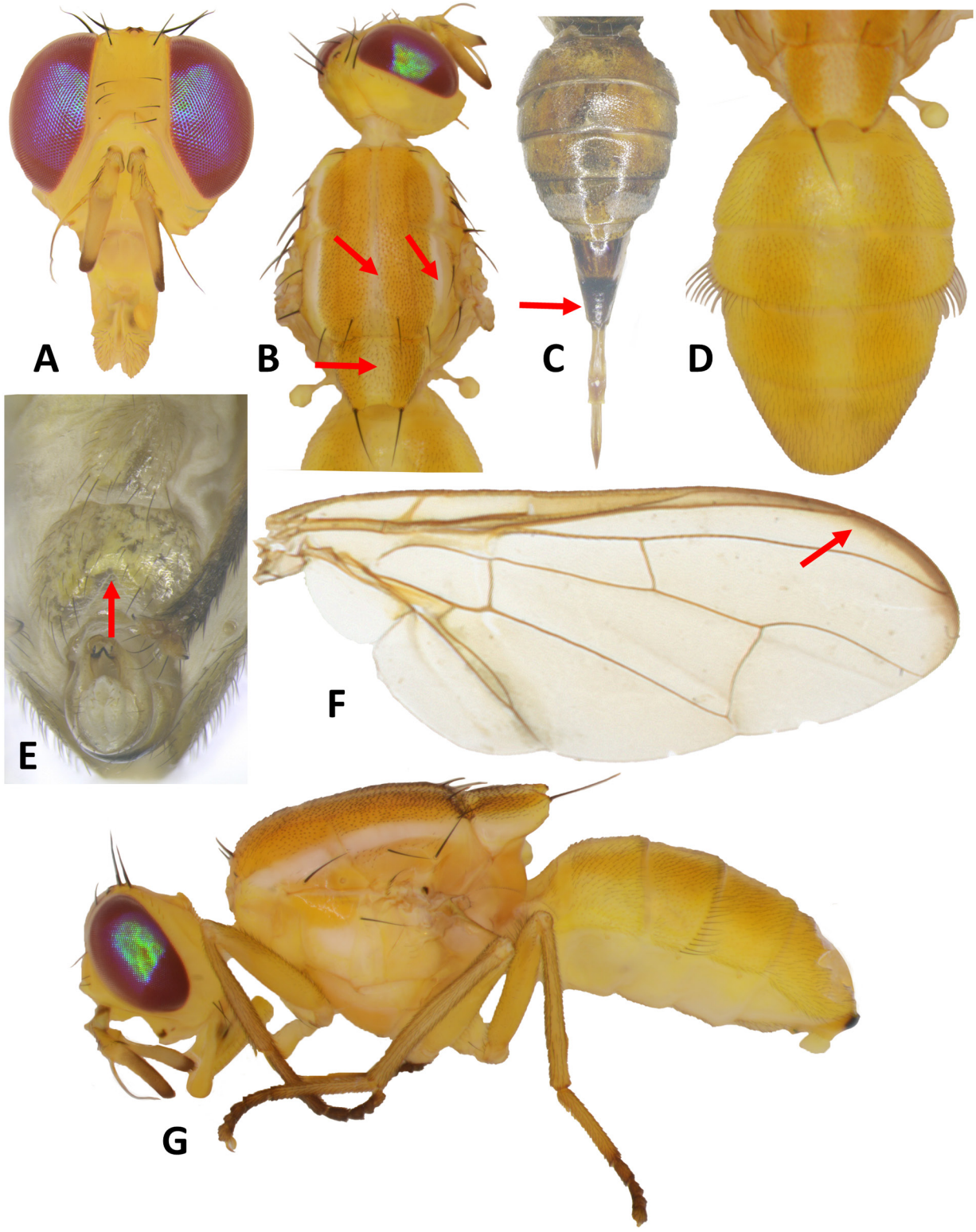


Figure 89. *Bactrocera* (*Notodacus*) *xanthodes* (Broun). **A)** Head. **B)** Head and scutum. **C)** Abdomen, female. **D)** Abdomen, male. **E)** Abdomen apex of male, ventral view. **F)** Wing. **G)** Lateral view.

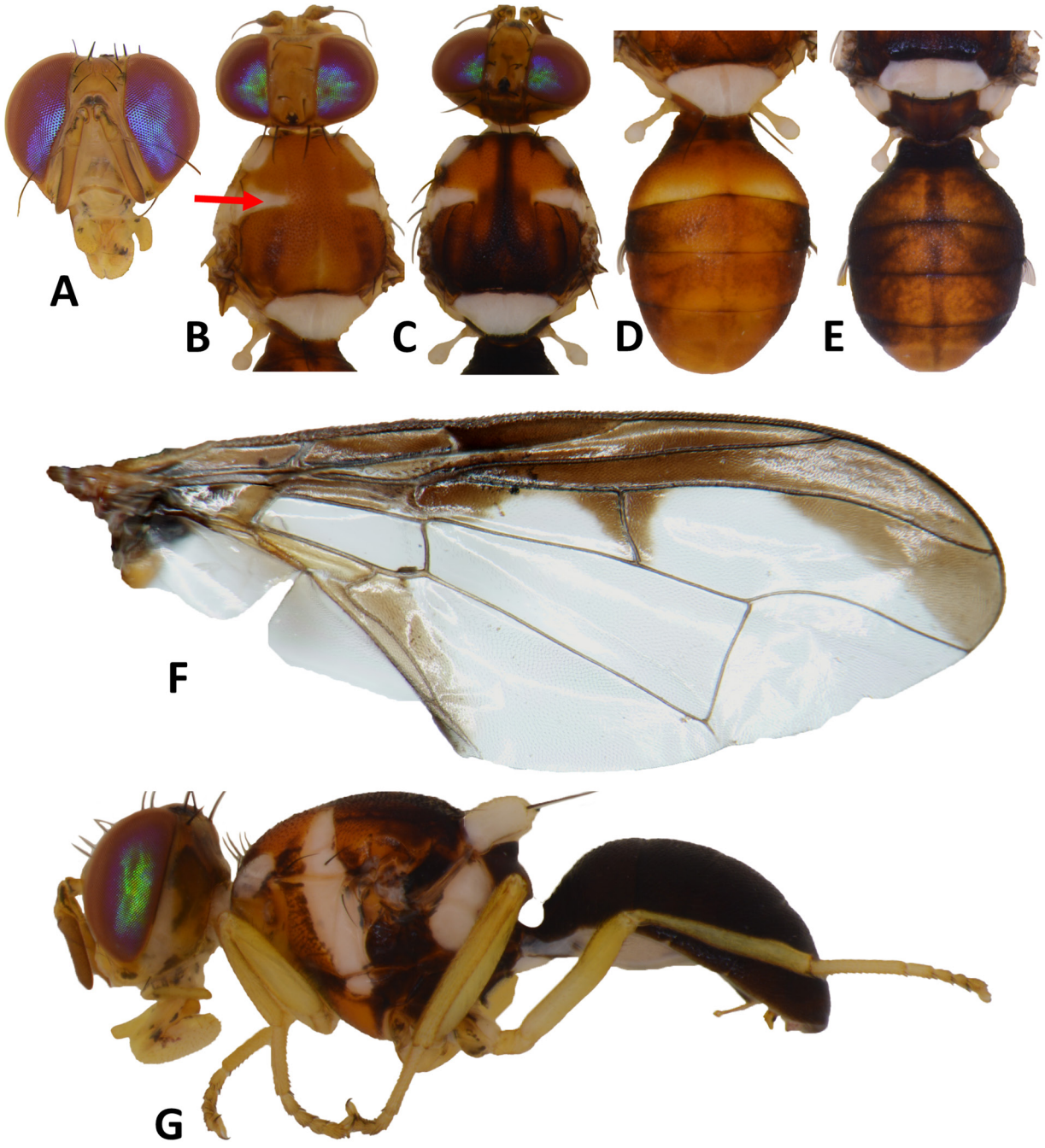


Figure 90. *Dacus* (*Neodacus*) *aneuvittatus* (Drew), male. **A)** Head. **B–C)** Head and scutum. **D–E)** Abdomen. **F)** Wing. **G)** Lateral view.

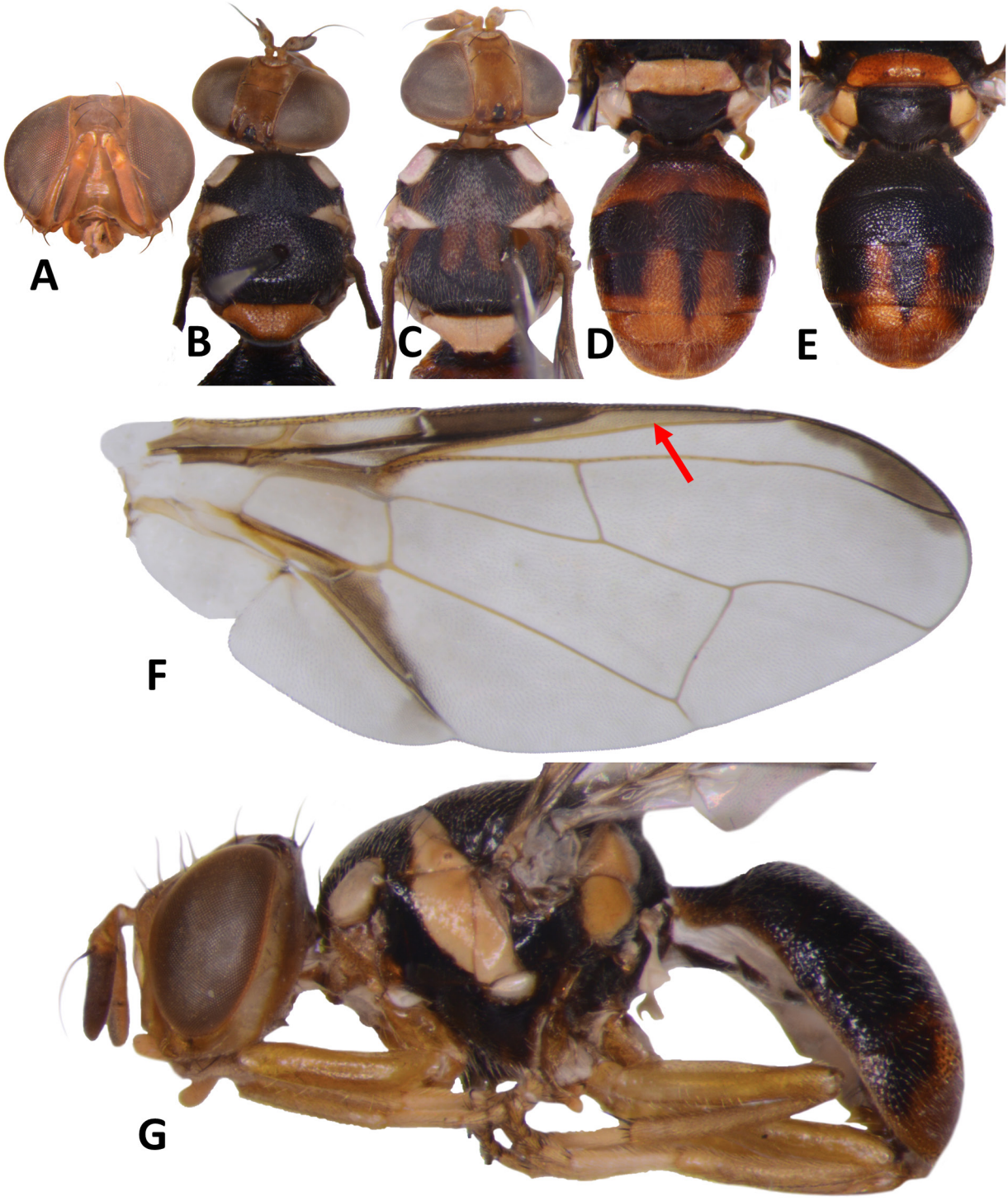


Figure 91. *Dacus* (*Neodacus*) *perpusillus* Drew, male. **A)** Head. **B–C)** Head and scutum. **D–E)** Abdomen. **F)** Wing. **G)** Lateral view.

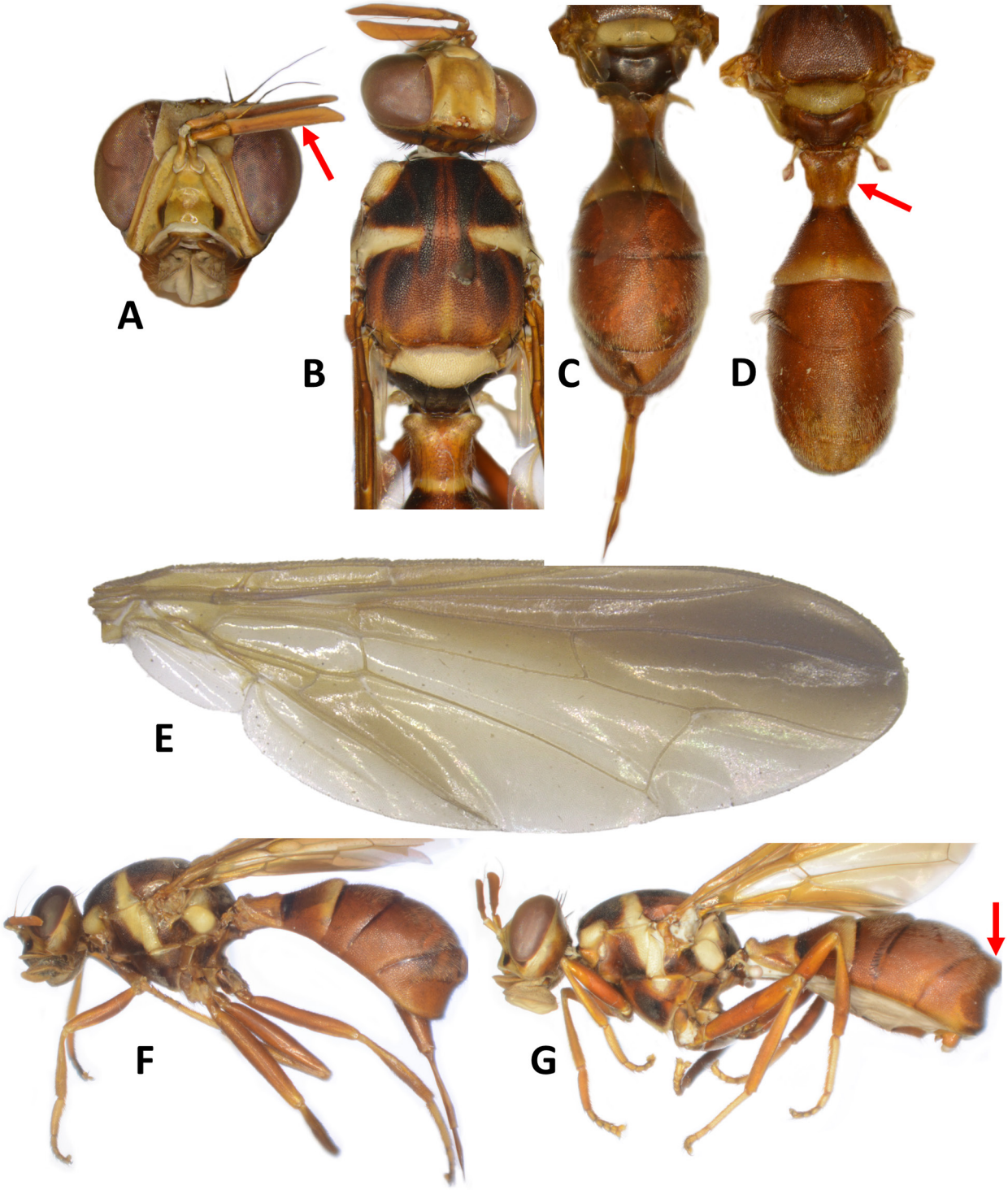


Figure 92. *Dacus* (*Callantra*) *solomonensis* (Malloch). **A)** Head. **B)** Head and scutum. **C)** Abdomen, female. **D)** Abdomen, male. **E)** Wing. **F)** Lateral view, female. **G)** Lateral view, male.

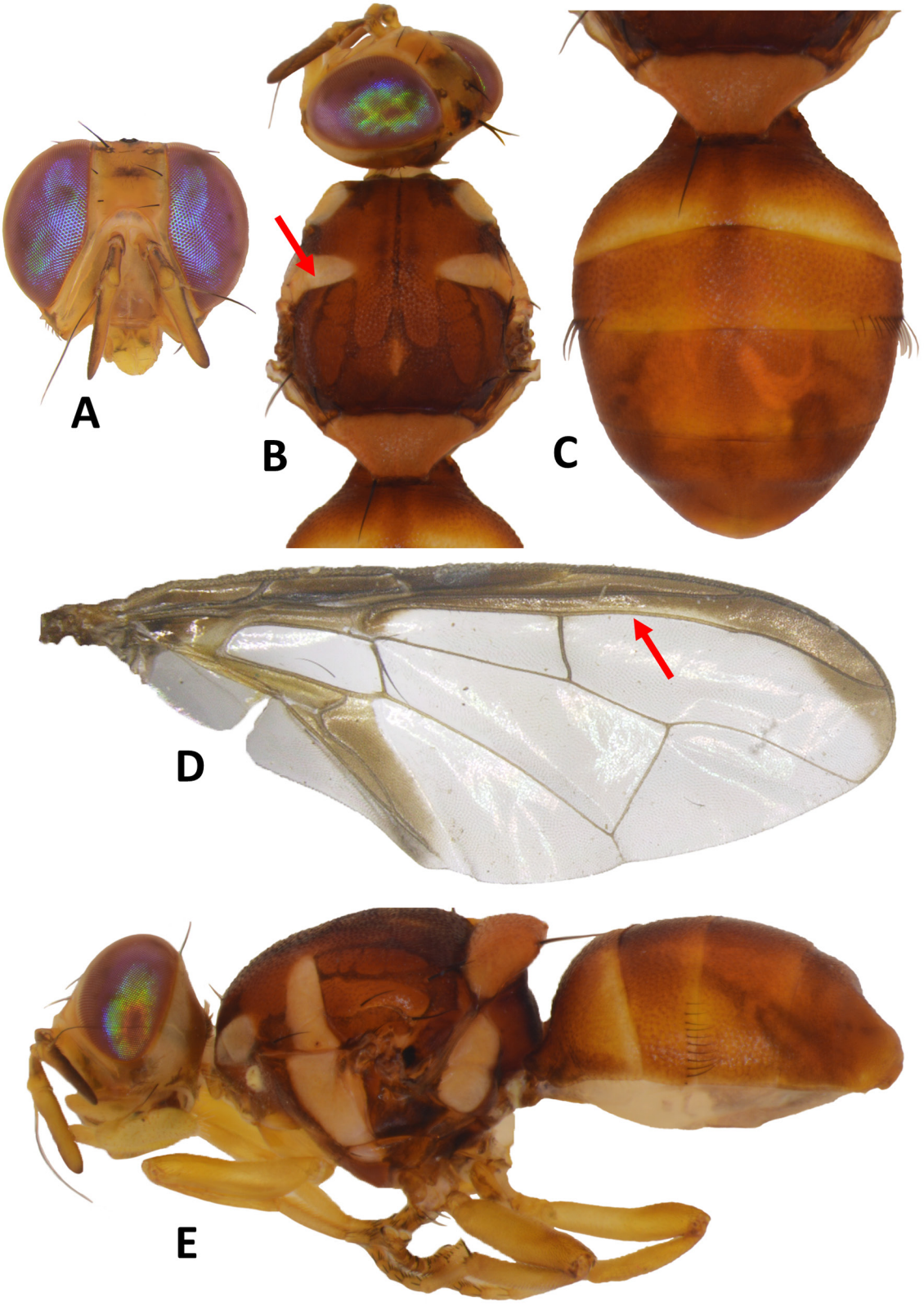


Figure 93. *Dacus* (*Neodacus*) *taui* Drew and Romig, male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view.

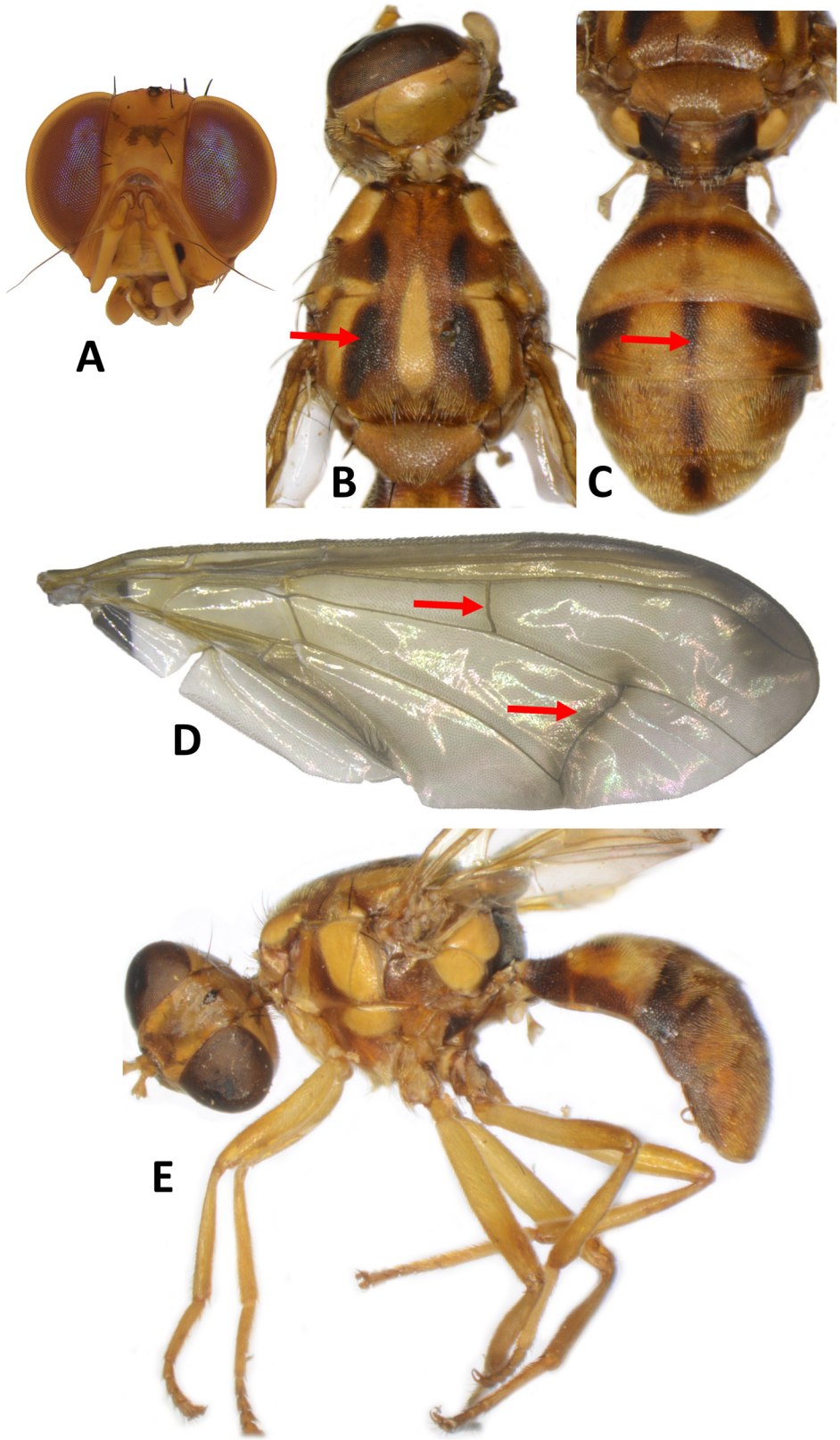


Figure 94. *Zeugodacus* (*Javadacus*) *abdoangustus* (Drew), male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view.

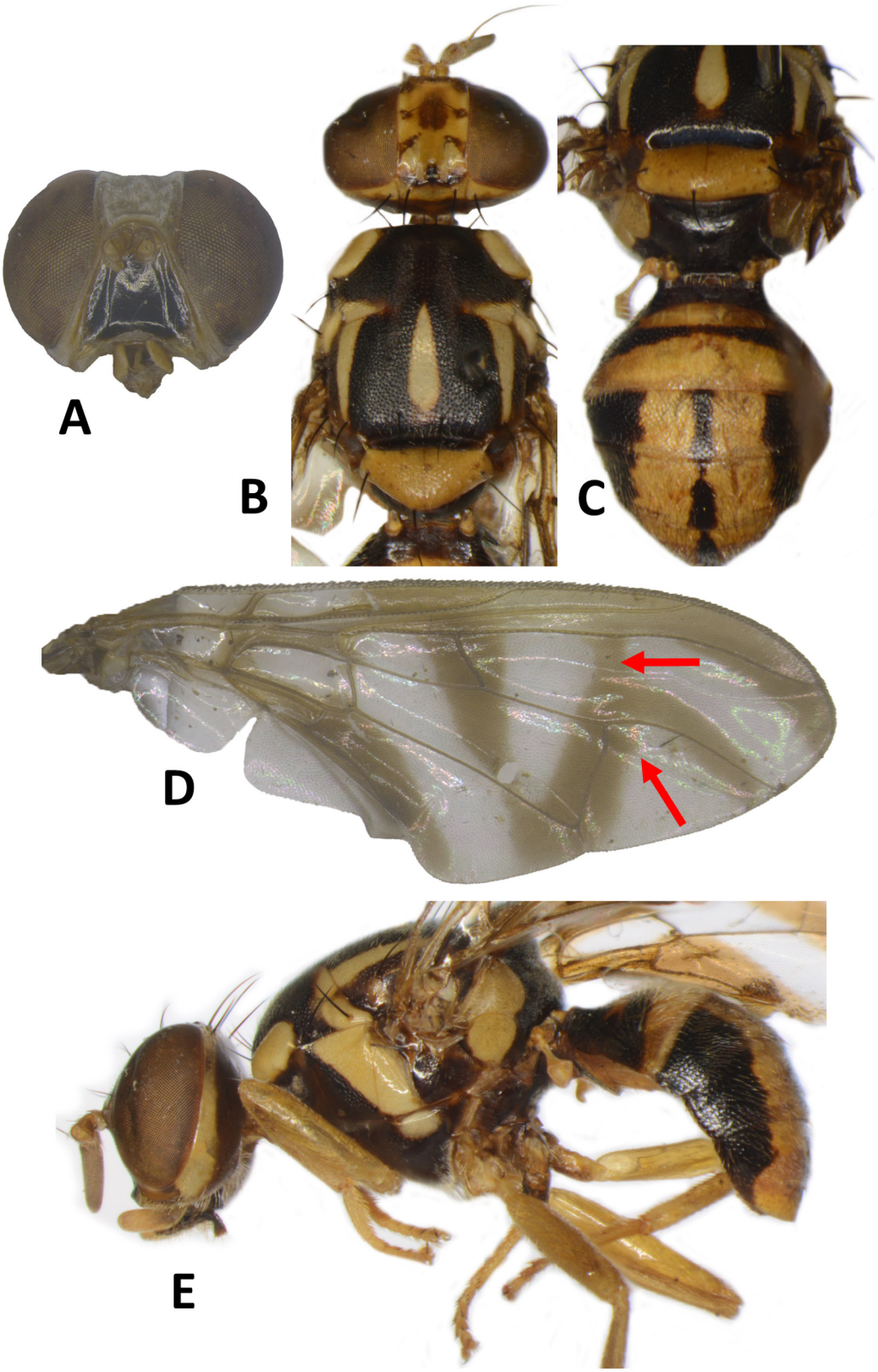


Figure 95. *Zeugodacus* (*Zeugodacus*) *amoenus* (Drew), male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view.

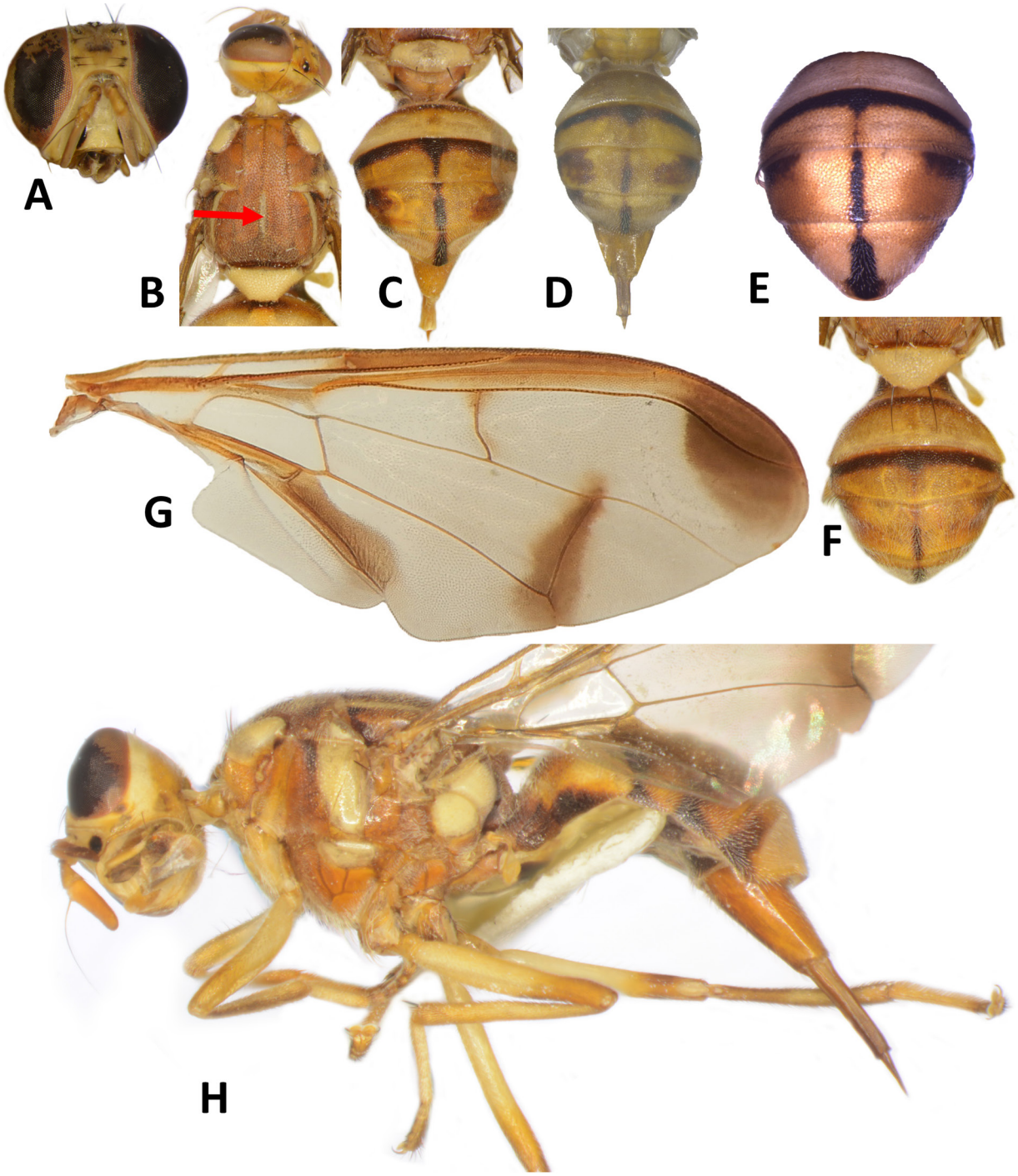


Figure 96. *Zeugodacus* (*Javadacus*) *cucurbitae* (Coquillett). **A)** Head. **B)** Head and scutum. **C–D)** Abdomen, female. **E–F)** Abdomen, male. **G)** Wing. **H)** Lateral view, female.

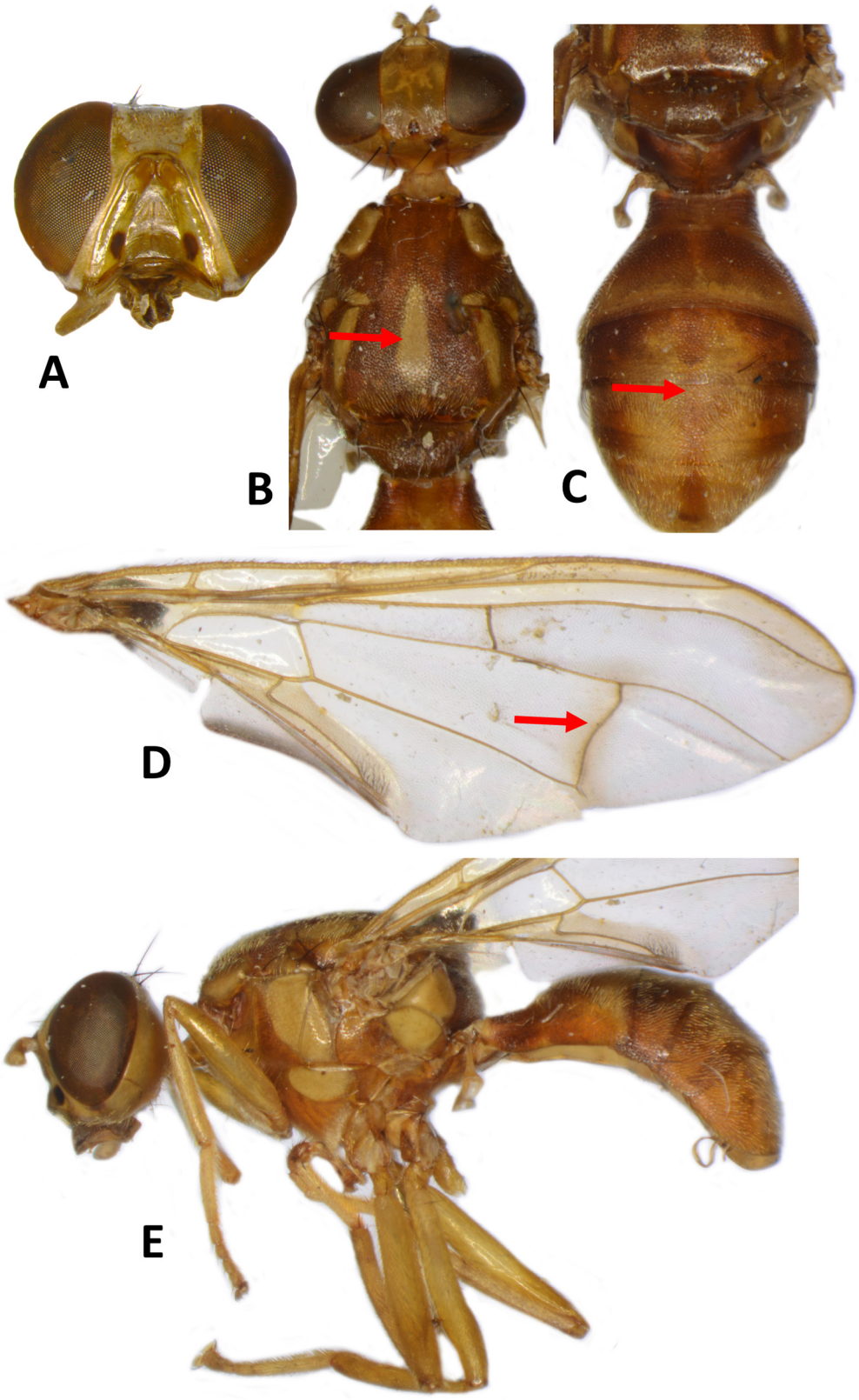


Figure 97. *Zeugodacus* (*Javadacus*) *fuscipennulus* (Drew and Romig), male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view.

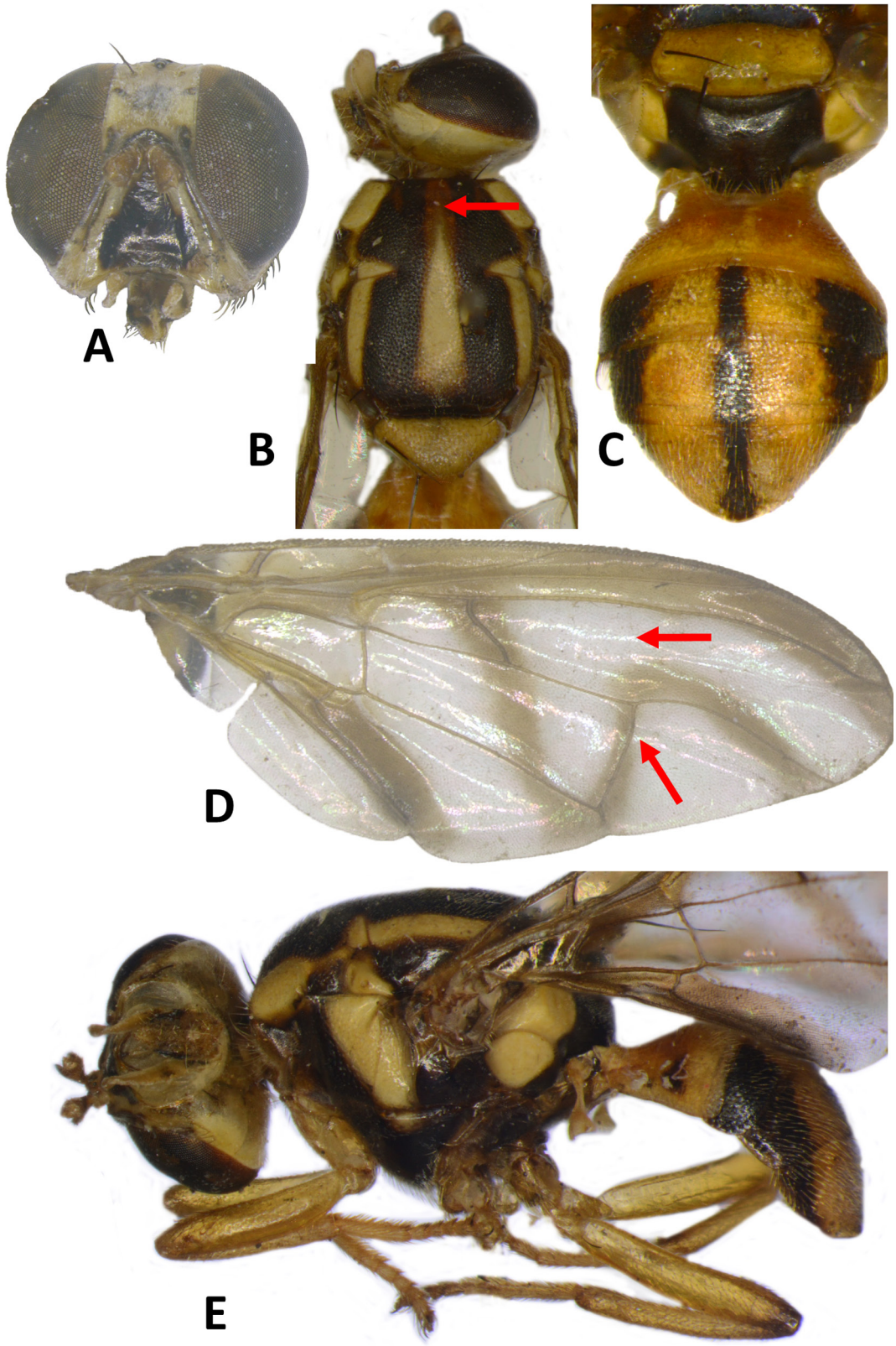


Figure 98. *Zeugodacus* (*Zeugodacus*) *gracilis* (Drew), male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view.

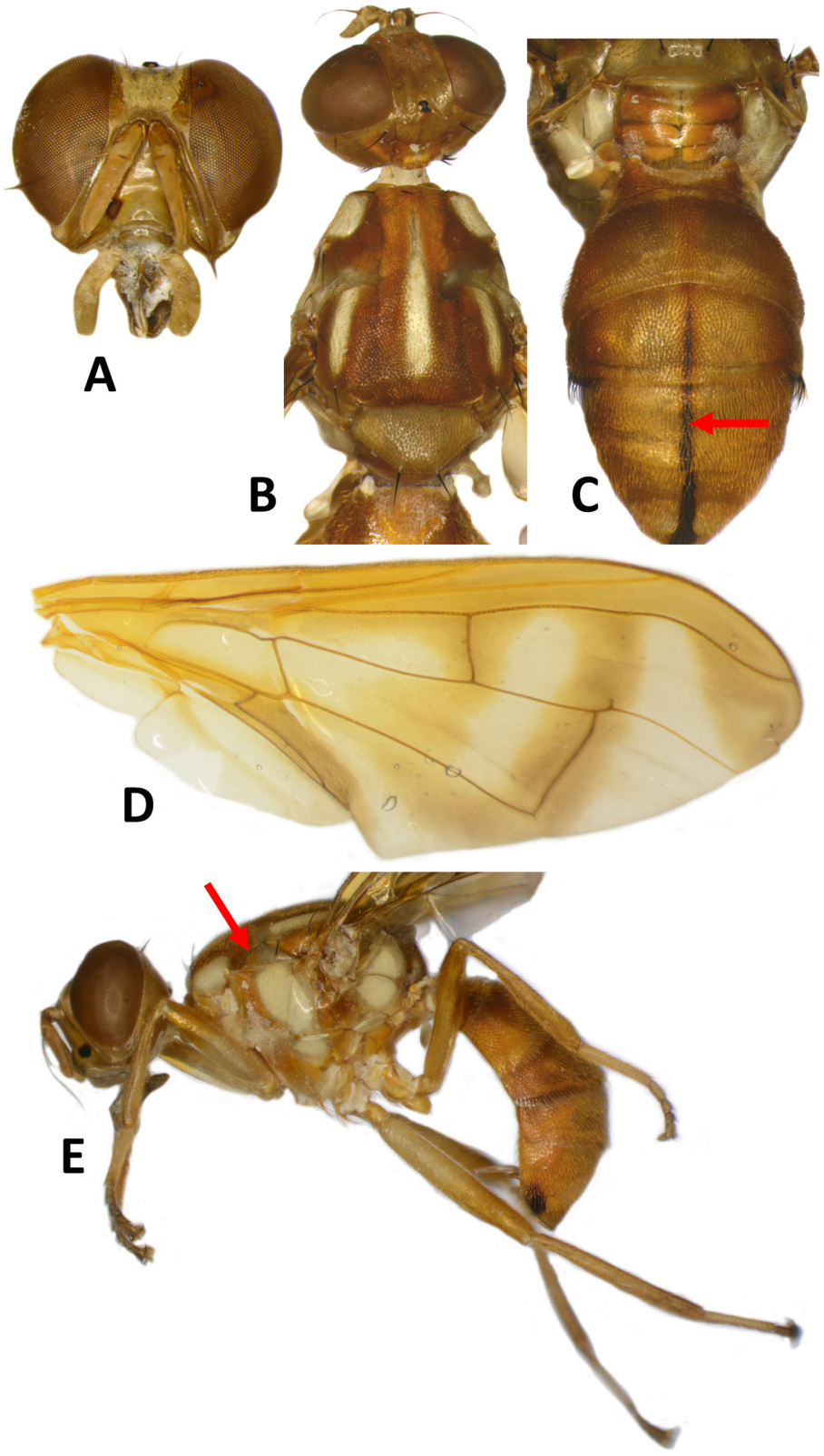


Figure 99. *Zeugodacus* (*Javadacus*) *hamaceki* (Drew and Romig), male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view.

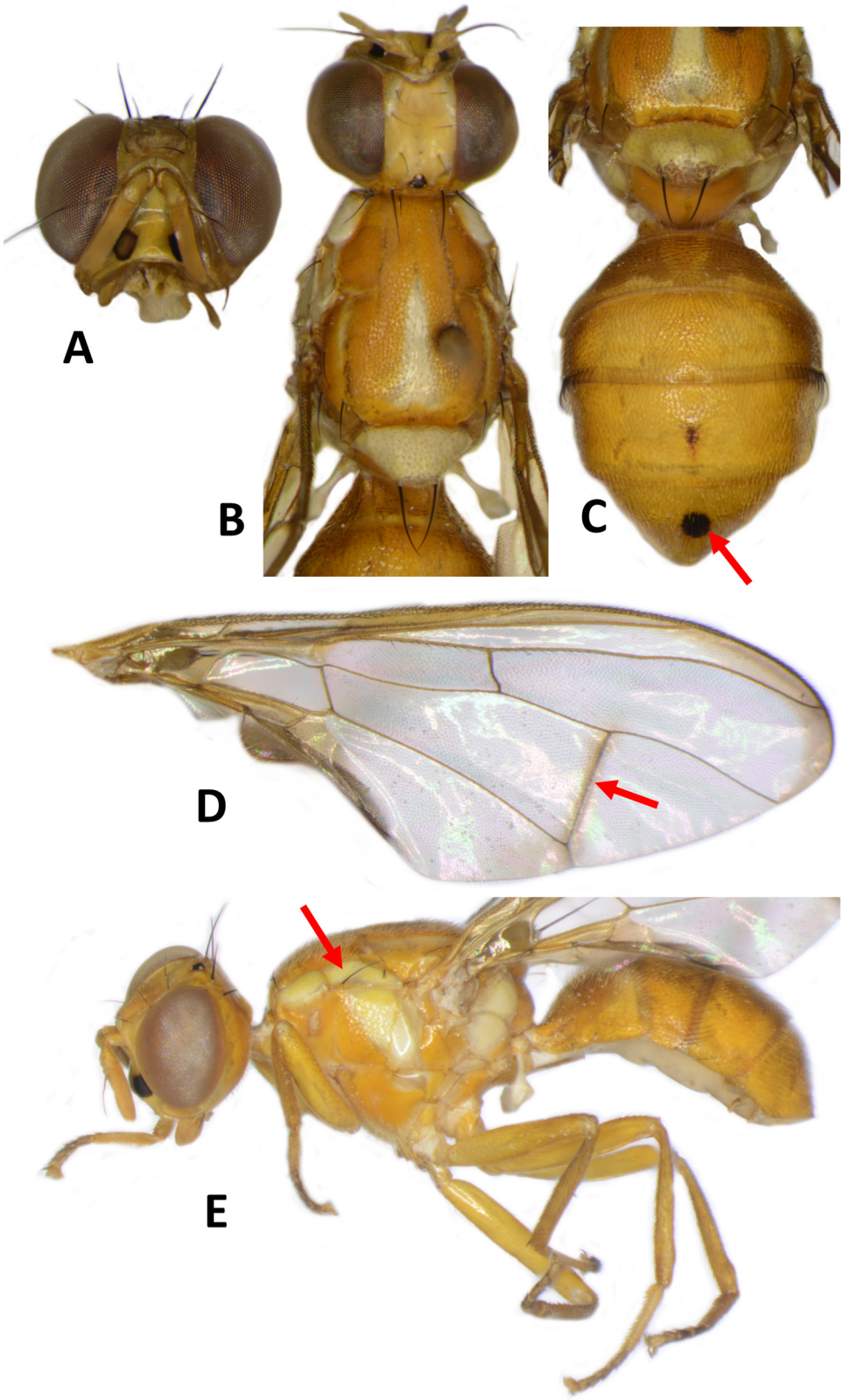


Figure 100. *Zeugodacus* (*Zeugodacus*) *univittatus* (Drew), male. **A)** Head. **B)** Head and scutum. **C)** Abdomen. **D)** Wing. **E)** Lateral view.

Annotated Checklist of the Dacine Fruit Fly Species of Oceania

***Bactrocera* (*Bulladacus*) *aenigmatica* (Malloch, 1931)**
Figure 6

Distribution. Samoa (Savai'i).

Male lure. No known lure.

Host plants. Record in Samoa: MELIACEAE: *Aglaia samoensis*.

***Bactrocera* (*Bactrocera*) *aithogaster* Drew, 1989**
Figure 7

Distribution. Solomon Islands (Guadalcanal).

Male lure. No known lure.

Host plants. No known host.

***Bactrocera* (*Bactrocera*) *allodistincta* Leblanc and Doorenweerd, 2021**
Figure 8

Distribution. Solomon Islands (Guadalcanal).

Male lure. Cue-lure.

Host plants. No known host.

***Bactrocera* (*Bactrocera*) *anomala* (Drew, 1971)**
Figure 9

Distribution. Vanuatu (Torres Islands, Banks Islands, Santo, Malekula, Ambae, Maewo, Ambrym, Epi-Paama-Tongoa, Efate, Erromanga).

Male lure. Cue-lure.

Host plants. Record in Vanuatu: SAPOTACEAE: *Planchonella grayana*.

Biology. Monthly trapping data illustrated on Figure 101.

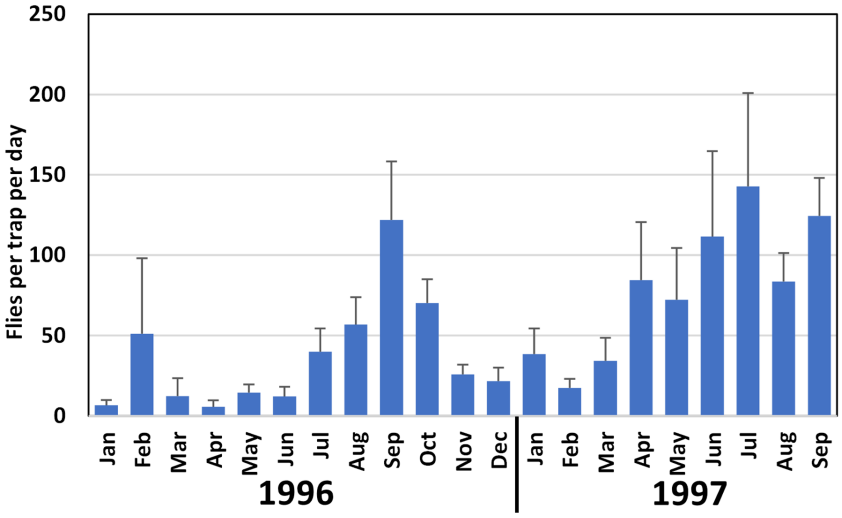


Figure 101. Mean (±SE) daily captures of *Bactrocera anomala* (Drew) in cue-lure traps maintained in Vanuatu (Efate Island) between January 1996 and September 1997, based on seven trapping sites (n = 123, mean FTD = 61.25).

Bactrocera (*Bactrocera*) *aterrima* (Drew, 1972)

Figure 10

Distribution. Papua New Guinea (New Britain, New Ireland, Bougainville). Solomon Islands (Shortland Group, Choiseul, Kolombangara, Isabel, Guadalcanal).

Male lure. Cue-lure.

Host plants. No known host.

Bactrocera (*Bactrocera*) *atra* (Malloch, 1938)

Figure 11

Distribution. French Polynesia (Austral Islands: Raivavae).

Male lure. Cue-lure.

Host plants. No known host.

Bactrocera (*Bactrocera*) *atrabifasciata* Drew and Romig, 2001

Figure 12

Distribution. Solomon Islands (Shortland Group, Gizo, Isabel, Florida, Guadalcanal).

Male lure. Cue-lure.

Host plants. No known host.

Bactrocera (*Bactrocera*) *bancroftii* (Tryon, 1927)

Figure 13

Distribution. Indonesia (West Timor). Australia (Queensland). Papua New Guinea (mainland). Solomon Islands (Guadalcanal).

Male lure. Methyl eugenol (weak attraction).

Host plants. Category D minor pest bred from mulberry in Australia (Vargas et al. 2015). Bred from *Maclura cochinchinensis* (Lour.) Corner and *Morus nigra* L. (Moraceae) in Australia (Hancock et al. 2000). Records in Papua New Guinea: EUPHORBIACEAE: *Pimelodendron amboinicum*. RUBIACEAE: *Nauclea orientalis*, *Neolamarckia cadamba*.

Notes. The Solomon Islands record is based on a single specimen collected in 1995 from a methyl eugenol trap in Dodo Creek (Guadalcanal) (Drew and Romig 2001).

Bactrocera (*Bactrocera*) *biarcuata* (Walker, 1865)

Figure 14

Distribution. Papua New Guinea (mainland, Bougainville). Solomon Islands (Shortland Group, Choiseul, Gizo, Kolombangara, New Georgia, Isabel, Russell, Florida, Guadalcanal, San Cristobal).

Male lure. Methyl eugenol.

Host plants. No known host.

Bactrocera (*Neozeugodacus*) *buinensis* Drew, 1989

Figure 15

Distribution. Papua New Guinea (Bougainville). Solomon Islands (Choiseul, Kolombangara, Guadalcanal, San Cristobal).

Male lure. Cue-lure.

Host plants. No known host.

Bactrocera (*Bactrocera*) *caledoniensis* Drew, 1989

Figure 16

Distribution. New Caledonia (mainland, Maré, Lifou).

Male lure. Cue-lure.

Host plants. CONVOLVULACEAE: *Distimake tuberosus*. GENTIANACEAE: *Fagraea berteroana*. RHIZOPHORACEAE: *Crossostylis multiflora*.

Biology. Rarely collected on the mainland, but abundant on Loyalty Islands (Amice and Sales 1997a). Monthly trapping data illustrated on Figure 102.

Notes. This species is a member of the *B. frauenfeldi* complex.

Bactrocera (*Calodacus*) *calophylli* (Perkins and May, 1949)

Figure 17

Distribution. India (Andaman Island). Thailand. Peninsular Malaysia. Singapore. Australia (Queensland). Papua New Guinea (mainland). Solomon Islands (Guadalcanal). Vanuatu (Santo). Palau.

Male lure. No known lure.

Host plants. Records in Palau, Solomon Islands and Vanuatu: CALOPHYLLACEAE: *Calophyllum inophyllum*, *C. peekelii*.

Bactrocera (*Bactrocera*) *confluens* (Drew, 1971)

(= *Bactrocera honiarae* Drew, 1989)

Figure 18

Distribution. Papua New Guinea (Bougainville). Solomon Islands (Choiseul, Kolombangara, Florida, Guadalcanal, Malaita).

Male lure. Methyl eugenol.

Host plants. No known host.

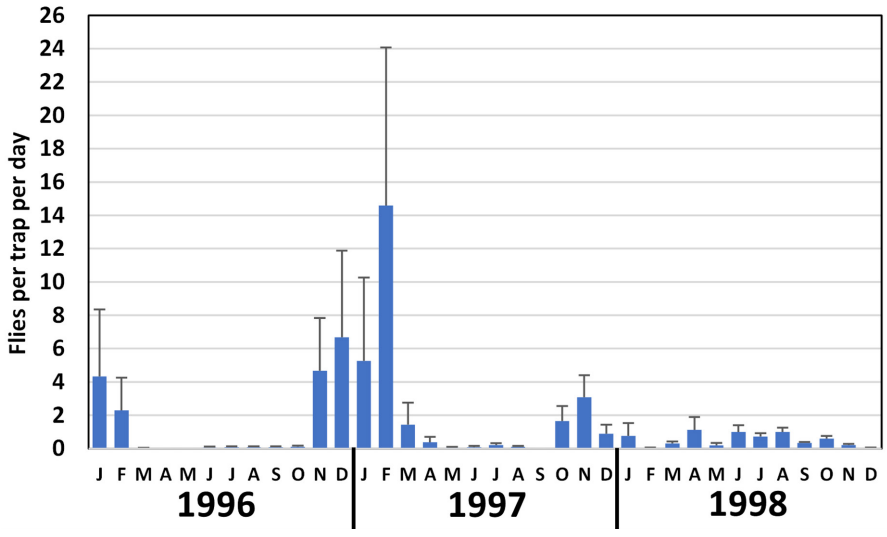


Figure 102. Mean (±SE) daily captures of *Bactrocera caledoniensis* Drew in cue-lure traps maintained in New Caledonia (Maré and Lifou Islands) between January 1996 and December 1998, based on six trapping sites (n = 216, mean FTD = 1.46).

Bactrocera (*Bactrocera*) *curvipennis* (Froggatt, 1909)

Figure 19

Distribution (Fig. 103). New Caledonia (mainland, Maré, Lifou).

Male lure. Cue-lure, isoeugenol. Isoeugenol is a more potent attractant than cue-lure for that species, which is also attracted to a lesser extent to dihydroeugenol (Royer et al. 2019a).

Host plants. Category B polyphagous fruit pest (Vargas et al. 2015) bred from 42 host species in 20 families. ANACARDIACEAE: *Anacardium occidentale*, *Mangifera indica*. ANNONACEAE: *Annona reticulata*, *A. squamosa*. APOCYNACEAE: *Cascabela thevetia*, *Ochrosia elliptica*. CALOPHYLLACEAE: *Calophyllum inophyllum*. CARICACEAE: *Carica papaya*. COMBRETACEAE: *Terminalia catappa*. CONVOLVULACEAE: *Distimake tuberosus*. EBENACEAE: *Diospyros macrocarpa*. LOGANIACEAE: *Neuburgia novocaledonica*. MALPIGHIACEAE: *Malpighia glabra*. MORACEAE: *Ficus pancheriana*, *Morus alba*. MYRTACEAE: *Eugenia uniflora*, *Psidium acutangulum*, *P. cattleianum*, *P. guajava*, *Syzygium jambos*, *S. malaccense*. OLACACEAE: *Ximenia americana*. OXALIDACEAE: *Averrhoa carambola*. PASSIFLORACEAE: *Passiflora foetida*. RHAMNACEAE: *Ziziphus jujuba*. ROSACEAE: *Eriobotrya japonica*, *Fragaria vesca*, *Prunus domestica*, *P. persica*, *P. simonii*. RUBIACEAE: *Coffea arabica*, *Coffea* sp., *Guettarda speciosa*. RUTACEAE: *Casimiroa edulis*, *Citrus japonica, C.* × *latifolia*, *C. maxima*, *C. paradisi*, *C. reticulata*, *Citrus sinensis*. SOLANACEAE: *Capsicum annuum*, *Solanum lycopersicum*.

Edible hosts common names. Acerola, cashew, coffee, common guava, custard apple, grapefruit, jujube, kumquat, loquat, Malay-apple, mango, nectarine, orange, papaya, peach, plum, pomelo, rose-apple, starfruit, strawberry, strawberry guava, sugar-apple, Surinam cherry, sweet pepper, Tahitian lime, tangerine, tomato, tropical almond, white mulberry, white sapote, wild watermelon, yellow plum.

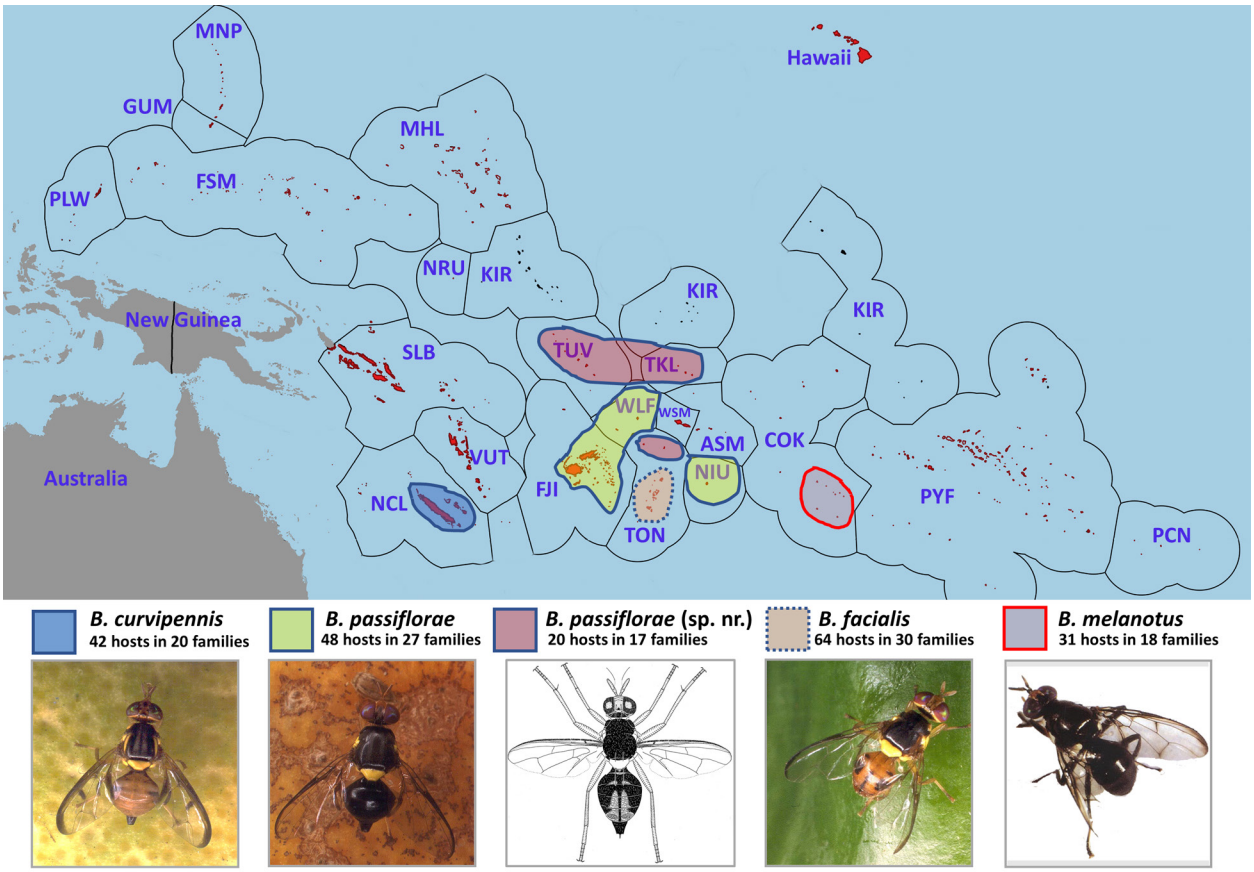


Figure 103. Distribution of polyphagous pest fruit flies in Oceania: *Bactrocera curvipennis* (Froggatt), *B. passiflorae* (Froggatt), *B. passiflorae* (species near), *B. facialis* (Coquillett), and *B. melanotus* (Coquillett). Photos by Steve Wilson and Gerald McCormak (*B. melanotus*). Drawing of *B.* sp. nr. *passiflorae* from Drew and Hancock (1995).

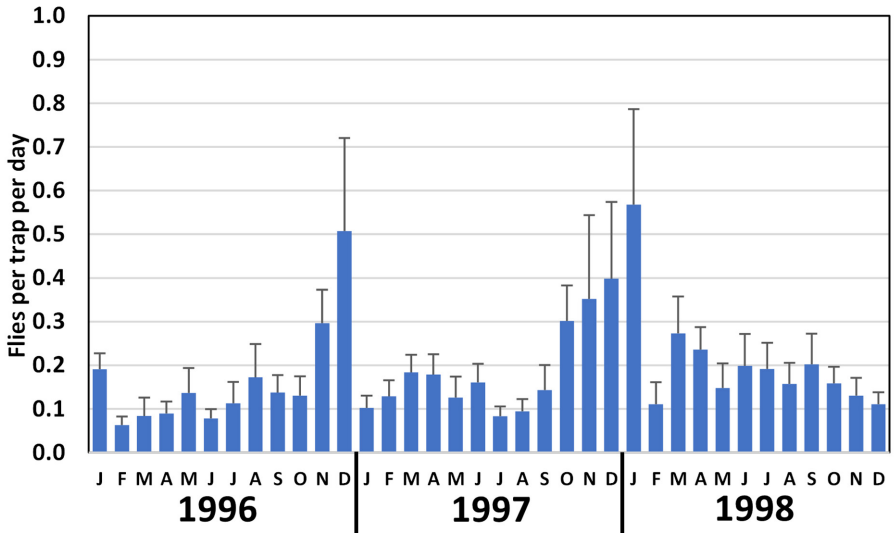


Figure 104. Mean (±SE) daily captures of *Bactrocera curvipennis* (Froggatt) in cue-lure traps maintained in New Caledonia (Mainland) between January 1996 and December 1998, based on 20 trapping sites (n = 720, mean FTD = 0.19).

Biology. Adults mate in the morning, just after dawn, which is unique among all Dacinae (Mille 2010). Under laboratory conditions, eggs hatch after 2.25 days and larval development takes about nine days (Mille 2010). Formerly the dominant species in New Caledonia, abundant throughout the year around Nouméa (Cochereau 1970), it became uncommon after the introduction of *B. tryoni* (Amice and Sales 1997a). Monthly trapping data illustrated on Figure 104 and in Cochereau (1970).

Notes. Heat tolerance of immature stages investigated in New Caledonia by Sales et al. (1997).

Bactrocera (*Bactrocera*) *decumana* (Drew, 1972)

Figure 20

Distribution. Papua New Guinea (Bougainville). Solomon Islands (Shortland Group, Choiseul, Vella Lavella, Gizo, Kolombangara, Isabel, Russell, Florida, Guadalcanal, Malaita, San Cristobal).

Male lure. Cue-lure.

Host plants. Record in Solomon Islands: SAPOTACEAE: *Burckella* sp.

Bactrocera (*Bactrocera*) *distincta* (Malloch, 1931)

Figure 21

Distribution (Fig. 105). Fiji (Viti Levu, Vanua Levu, Lau Group, Rotuma). Futuna. Tonga (Tongatapu Group, Ha'apai Group, Vava'u Group, Niuas Group). Samoa (Savai'i, Manono, Upolu). American Samoa.

Male lure. Cue-lure

Host plants. Category C oligophagous fruit pest (Vargas et al. 2015) bred from eight host species in three families. Records in Fiji, Samoa, and Tonga: MYRTACEAE: *Eugenia brasiliensis*. RUTACEAE: *Citrus maxima*. SAPOTACEAE: *Burckella richii*, *Chrysophyllum cainito*, *Manilkara zapota*, *Planchonella costata*, *P. membranacea*, *Pouteria caimito*.

Edible hosts common names. Abiu, Brazil cherry, pomelo, sapodilla, star-apple.

Biology. Adults mate at dusk (Allwood 1997). Monthly trapping data illustrated on Figures 106 and 107, and also published in Litsinger et al. (1991).

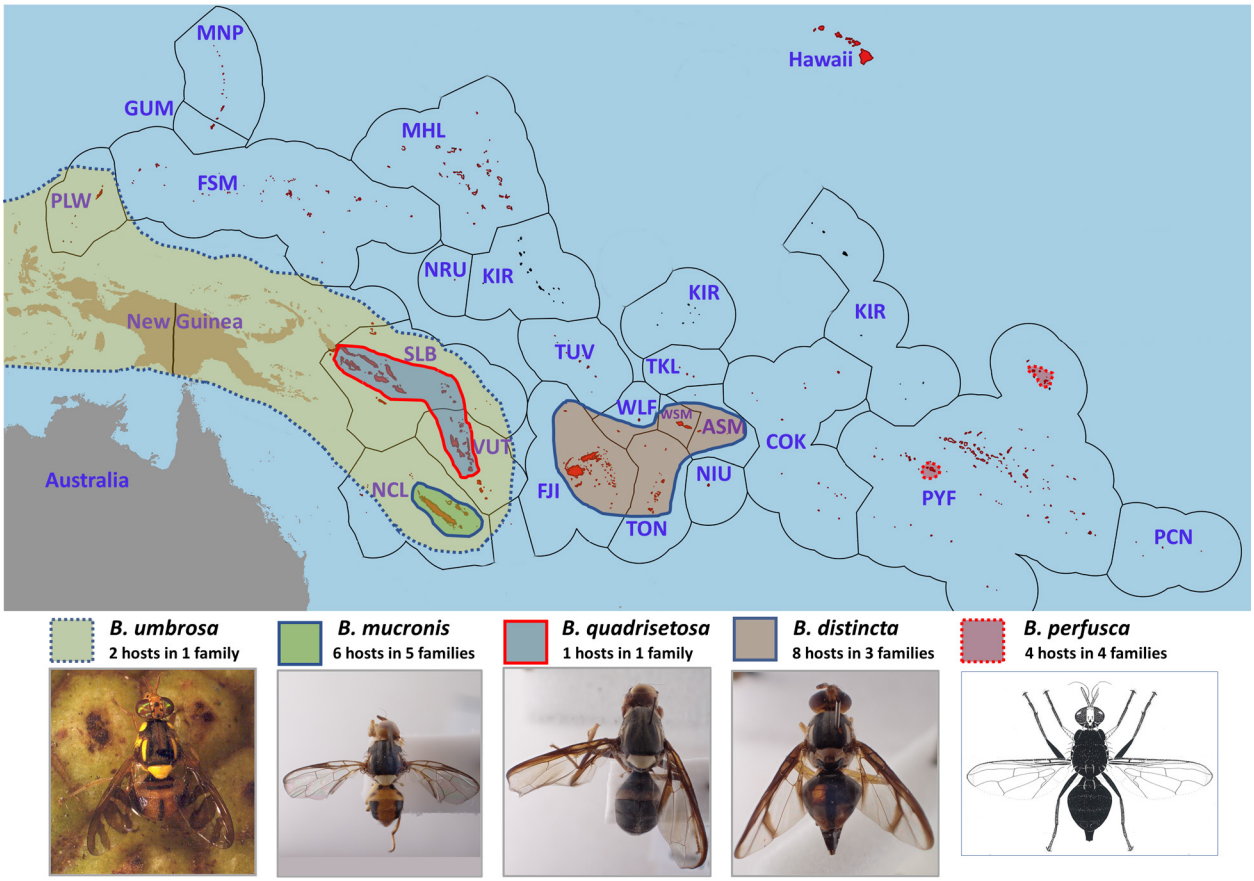


Figure 105. Distribution of oligophagous pest fruit flies in Oceania: *Bactrocera umbrosa* (Fabricius), *B. mucronis* (Drew), *B. quadrisetosa* (Bezzi), *B. distincta* (Malloch), and *B. perfusca* (Aubertin). Photo of *B. umbrosa* by Steve Wilson. Drawing of *B. perfusca* from Drew (1989).

Bactrocera (*Bactrocera*) *dorsalis* (Hendel, 1912)

Oriental fruit fly

(= *Musca ferruginea* Fabricius, 1794, *Chaetodacus ferrugineus* var. *okinawanus* Shiraki, 1933, *Dacus semifemoralis* Tseng, Chen and Chu, 1992, *Dacus yilanensis* Tseng, Chen and Chu, 1992, *Bactrocera papayae* Drew and Hancock, 1994, *Bactrocera philippinensis* Drew and Hancock, 1994, *Bactrocera invadens* Drew, Tsuruta and White, 2005, *Bactrocera variabilis* Lin and Wang, 2011)

Figures 22–24

Distribution (Fig. 108). Widespread throughout tropical Asia, from Pakistan to Taiwan and south to Indonesia and mainland New Guinea (introduced). Introduced to Africa and various islands in the Indian and Pacific Oceans (see map in Vargas et al. 2015). Cook Islands (Rarotonga, Aitutaki; detected 2013, eradicated 2014). French Polynesia (Austral Islands, Society Islands, Tuamotu-Gambier Islands, Marquesas; detected 1996). Hawaii (all islands; detected 1945). Palau (detected 1996). Guam and Northern Mariana Islands (detected 1935, eradicated 1965). Nauru (detected 1992, eradicated 1999).

Male lure. Methyl eugenol, zingerone, methyl-isoeugenol (Royer et al. 2018). Very weak attraction to isoeugenol and dihydroeugenol (Royer et al. 2018).

Host plants. Highly polyphagous category A fruit pest (Vargas et al. 2015) with reliable published records for 500 host taxa in 219 genera and 81 families (Allwood et al. 1999; Liquido et al. 2021). Records in French Polynesia, Nauru, Northern Mariana Islands, Palau, and Papua New Guinea: ANACARDIACEAE: *Anacardium occidentale*, *Mangifera indica*, *Spondias dulcis*. ANNONACEAE: *Annona muricata*, *A. reticulata*, *Cananga odorata*, *Rollinia*

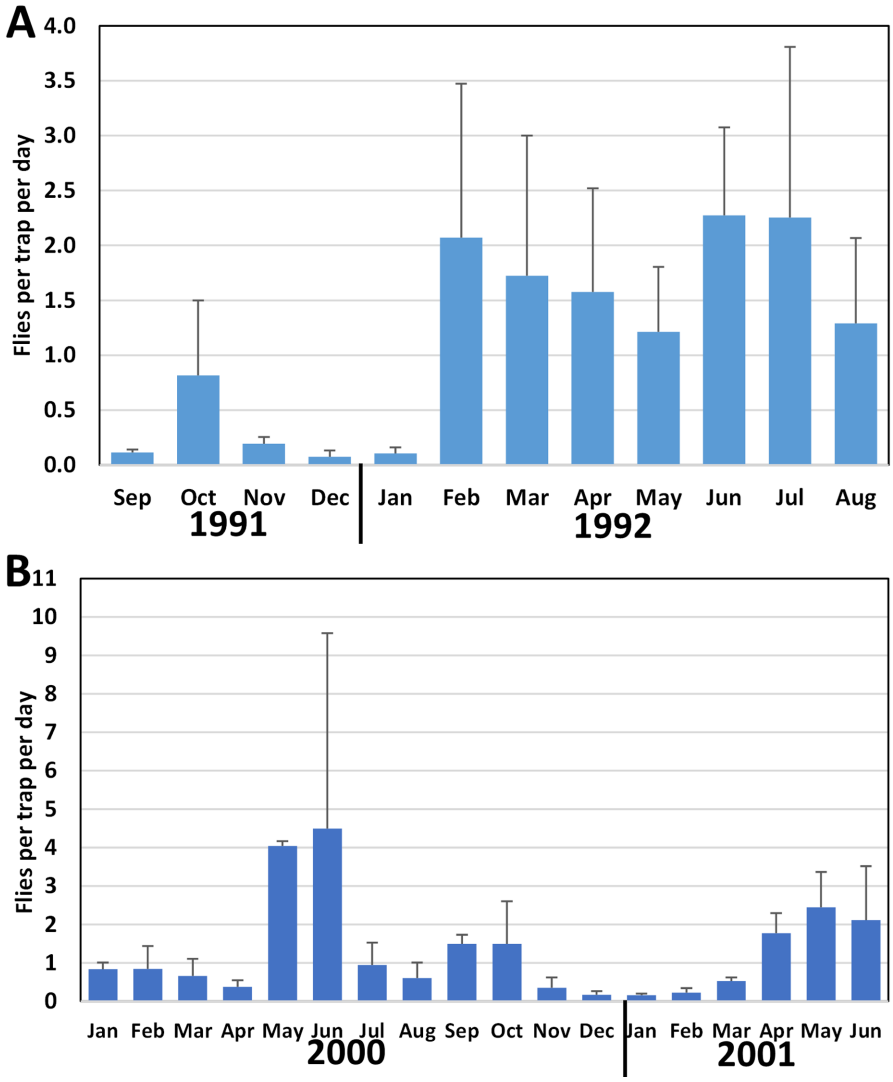


Figure 106. Mean (±SE) daily captures of *Bactrocera distincta* (Malloch) in cue-lure traps maintained: **A)** in Fiji (Viti Levu, Vanua Levu) between September 1991 and August 1992, based on seven trapping sites (n = 81, mean FTD = 1.18), and **B)** in Samoa (Upolu Island) between January 2000 and June 2001, based on seven trapping sites (n = 123, mean FTD = 1.28).

sp. APOCYNACEAE: *Ochrosia* sp. BURSERACEAE: *Canarium vulgare*. CALOPHYLLACEAE: *Calophyllum inophyllum*. CARICACEAE: *Carica papaya*. CLUSIACEAE: *Garcinia* × *mangostana*. COMBRETACEAE: *Terminalia catappa*. FABACEAE: *Inocarpus fagifer*. LAURACEAE: *Persea americana*. LECYTHIDACEAE: *Barringtonia edulis*. MORACEAE: *Artocarpus altilis*. MUSACEAE: *Musa* × *paradisiaca*, *M. troglodytarum*, *Musa* sp. MYRTACEAE: *Eugenia uniflora*, *Psidium cattleianum*, *P. guajava*, *Syzygium jambos*, *S. malaccense*. OXALIDACEAE: *Averrhoa carambola*. PASSIFLORACEAE: *Passiflora edulis, P. laurifolia*, *P. quadrangularis*. RUTACEAE: *Citrus aurantiifolia, C. aurantium*, *C.* × *latifolia*, *C. maxima*, *C.* × *microcarpa*, *C. reticulata*, *C. sinensis*, *C. trifoliata*. SAPINDACEAE: *Litchi chinensis*, *Nephelium lappaceum*, *Pometia pinnata*. SAPOTACEAE: *Chrysophyllum cainito*, *Pouteria caimito*. SOLANACEAE: *Capsicum annuum*, *C. frutescens*, *Solanum lycopersicum*.

Edible hosts common names (records in French Polynesia, Nauru, Northern Mariana Islands, Palau, and Papua New Guinea). Abiu, avocado, banana, breadfruit, calamondin, cashew, chilli pepper, common guava, custard apple, fe'i banana, giant granadilla, Jew plum, lime, lychee, Malay-apple, mango, mangosteen, orange, Pacific

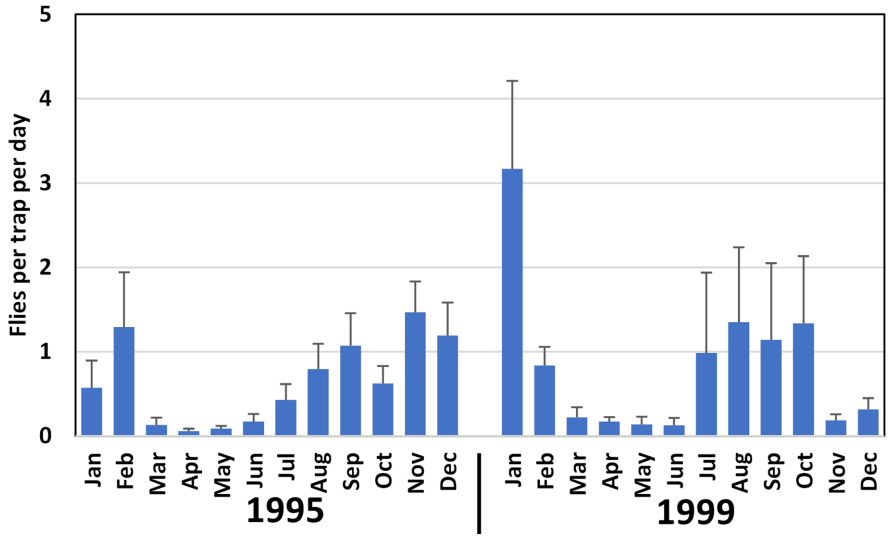


Figure 107. Mean (±SE) daily captures of *Bactrocera distincta* (Malloch) in cue-lure traps maintained in Tonga (Tongatapu and Vava'u Islands) between January and December 1995 and 1999, based on 14 trapping sites (n = 185, mean FTD = 0.73).

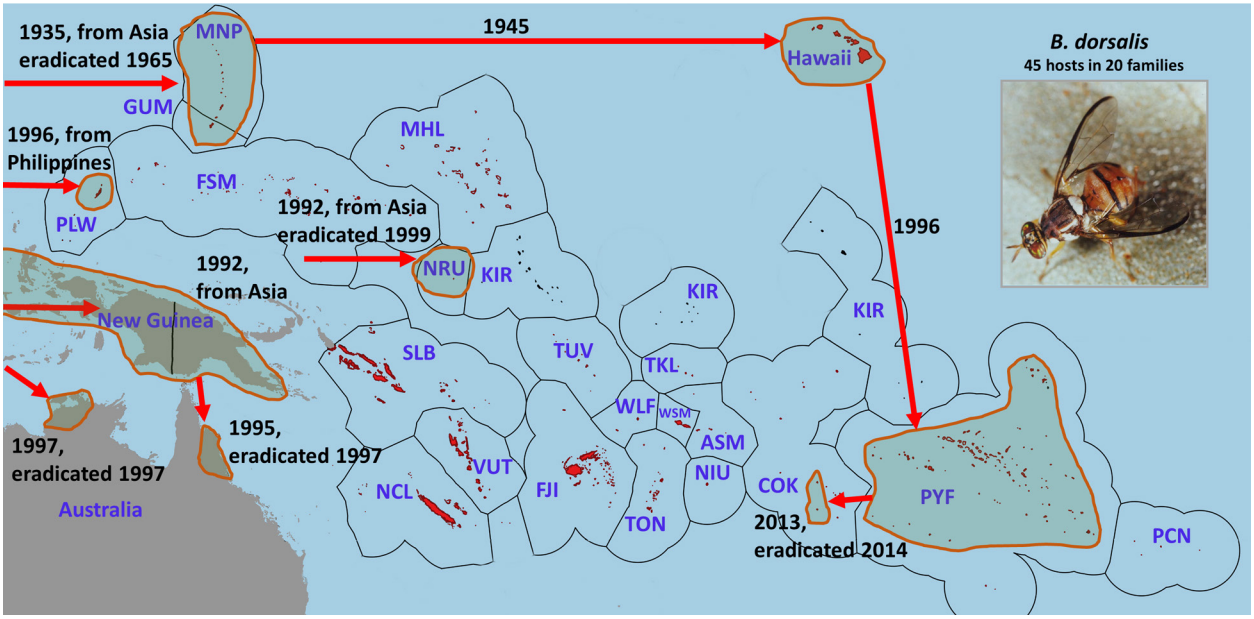


Figure 108. Distribution and invasion and eradication history of *Bactrocera dorsalis* (Hendel) in Oceania. Photo from USDA-ARS.

lychee, papaya, pomelo, purple granadilla, rambutan, rose-apple, sour orange, soursop, star-apple, starfruit, strawberry guava, Surinam cherry, sweet pepper, Tahitian chestnut, Tahitian lime, tangerine, tomato, trifoliate orange, tropical almond, yellow granadilla.

Biology. Adults mate at dusk, starting 11 days after emergence (Arakaki et al. 1984). In Hawaii, at 24°C, eggs hatch in 1.8 days, larval development takes 7.9 days and the pupal stage lasts 12.6 days (Vargas et al. 1996). Monthly trapping data published in Leblanc et al. (2014) and illustrated on Figure 109. The parasitoids *Fopius arisanus* (Sonan) and *Diachasminorpha longicaudata* (Ashmead) were introduced to Hawaii in 1948 to control

B. dorsalis. Both parasitoids were introduced to French Polynesia in 2003 to control the same target pest (Vargas et al. 2007, 2012a, 2012b; Leblanc et al. 2013b). *Fopius arisanus* was also bred from *B. dorsalis* and *B. frauenfeldi* in Palau, believed to have been introduced several decades earlier to control *B. frauenfeldi* (Leblanc et al. 2015).

Notes. Heat tolerance of immature stages studied in Hawaii (Jang 1986, 1991).

This species' presence in Palau was confirmed by R.A.I. Drew in 1996, who originally identified it as *B. dorsalis* (Leblanc 1997). He later rectified the determination as *B. philippinensis* Drew and Hancock and *B. occipitalis* (Bezzi), both members of the *B. dorsalis* complex, based on specimens bred from host fruit in Palau in 2001 (SPC, 2001). A decade later, Drew re-examined the reared specimens and further rectified the identification as *B. papayae* Drew and Hancock (Leblanc et al. 2012; Drew and Romig 2013). The species identity in Palau reverted to *B. dorsalis* again, consequent to the designation of *B. papayae* as junior synonym of *B. dorsalis* (Schutze et al. 2015), and the absence of *B. occipitalis* was confirmed by more recent trapping surveys and host fruit rearing in Palau (Leblanc et al. 2015). Although not all taxonomists agree with the broader species concept of *B. dorsalis* and regard the introduced Palau and New Guinea populations as *B. papayae* (e.g., Drew and Romig 2016, 2022), divergent views on species identity will not affect the approach used in controlling this severe fruit pest (Vargas et al., 2015).

Oriental fruit fly was eradicated by male annihilation from the Marianas Islands in 1965 (Steiner et al. 1965a, 1965b, 1970) and Nauru in 2000 (Allwood et al. 2002). Unsuccessful eradication attempts in French Polynesia were followed by the introduction in 2003 of the parasitoid *Fopius arisanus* (Sonan) (Hymenoptera: Braconidae) from Hawaii, which notably reduced the overall population (Vargas et al. 2007, 2012a, 2012b; Leblanc et al. 2013b). It was detected and promptly eradicated from the Cook Islands (Rarotonga and Aitutaki) in 2013 (Vargas et al. 2014).

Bactrocera (*Bactrocera*) *ebenea* (Drew, 1971)

Figure 25

Distribution. New Caledonia (mainland, Maré, Lifou).

Male lure. Methyl eugenol.

Host plants. No known hosts.

Biology. Rarely collected on the mainland, but abundant on the Loyalty Islands (Amice and Sales 1997a). Monthly trapping data illustrated on Figure 110.

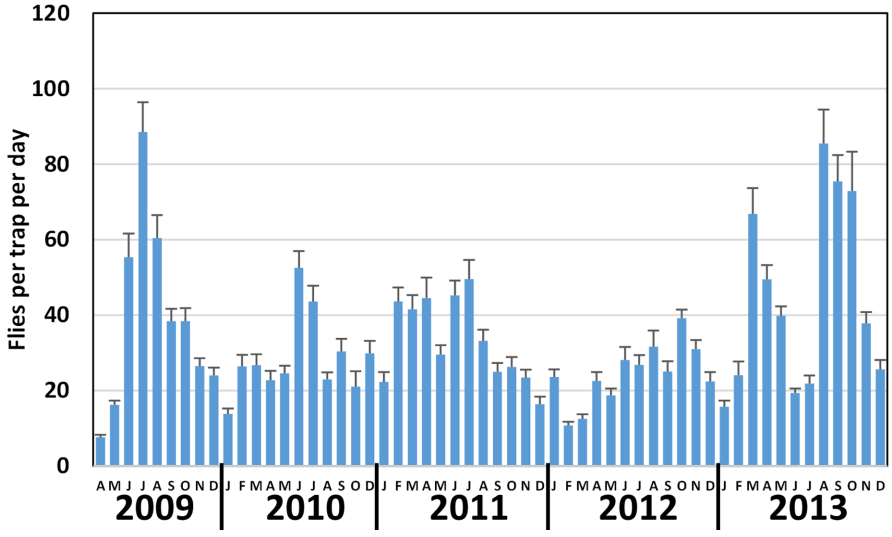


Figure 109. Mean (±SE) daily captures of *Bactrocera dorsalis* (Hendel) in methyl eugenol traps maintained in Hawaii (Oahu Island) between April 2009 and December 2013, based on 359 trapping sites (n = 19,148, mean FTD = 33.88). Previously published in Leblanc et al. (2014).

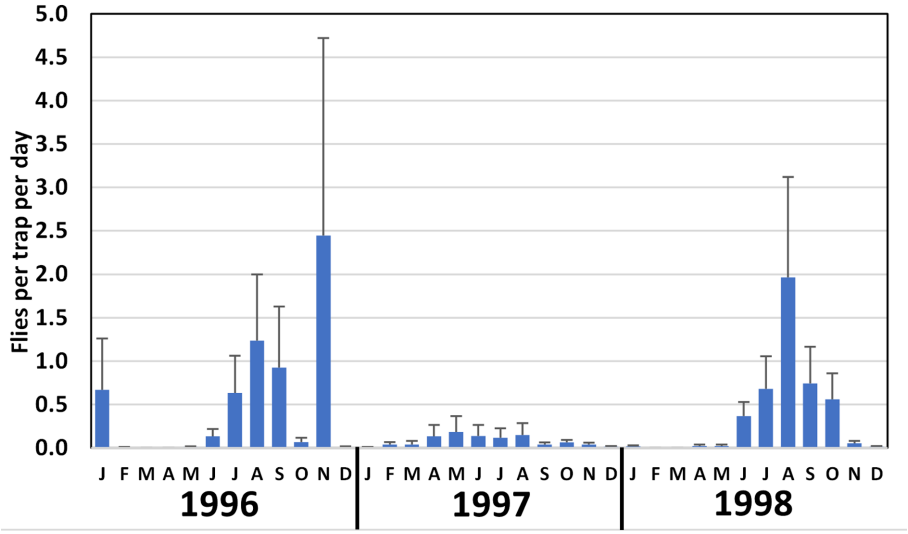


Figure 110. Mean (±SE) daily captures of *Bactrocera ebenea* Drew in methyl eugenol traps maintained in New Caledonia (Mainland, Maré, Lifou) between January 1996 and December 1998, based on 12 trapping sites (n = 432, mean FTD = 0.32).

Bactrocera (*Bactrocera*) *enochra* (Drew, 1972)

Figure 26

Distribution. PNG (mainland, New Britain, Bougainville). Solomon Islands (Shortland Group, Gizo, Kolombangara, Isabel, Guadalcanal).

Male lure. Cue-lure.

Host plants. Record in Papua New Guinea: STEMONURACEAE: *Medusanthera laxiflora*.

Bactrocera (*Bactrocera*) *epicharis* (Hardy, 1970)

Figure 27

Distribution. Indonesia (Moluccas). Papua New Guinea (Mussau Island). Solomon Islands (Shortland Group, Choiseul, Kolombangara, Isabel, Florida, Guadalcanal, Malaita).

Male lure. Cue-lure.

Host plants. No known hosts.

Bactrocera (*Bactrocera*) *facialis* (Coquillett, 1910)

(= *Dacus virgatus* Coquillett 1910, **NEW SYNONYM**; *Dacus tongensis* Froggatt, 1910)

Figure 28

Distribution (Fig. 103). Tonga (Tongatapu Group, Ha'apai Group, Vava'u Group).

Male lure. Cue-lure.

Host plants. Category B polyphagous fruit pest (Vargas et al. 2015) bred from 64 host species in 30 families. ANACARDIACEAE: *Anacardium occidentale*, *Mangifera indica*, *Pleiogynium timoriense*. ANNONACEAE: *Annona muricata*, *Artabotrys hexapetalus*, *Cananga odorata*. APOCYNACEAE: *Alyxia bracteolosa*, *A. stellata*, *Cerbera manghas*, *Melodinus vitiensis*, *Ochrosia oppositifolia*, *Tabernaemontana pandacaqui*. ASPARAGACEAE: *Dracaena angustifolia*. BORAGINACEAE: *Cordia subcordata*. CALOPHYLLACEAE: *Calophyllum inophyllum*. CARDIOPTERIDACEAE: *Citronella samoensis*. CARICACEAE: *Carica papaya*. CHRYSOBALANACEAE: *Atuna racemosa*. COMBRETACEAE: *Terminalia catappa*, *T. litoralis*. EBENACEAE: *Diospyros samoensis*. FABACEAE: *Inocarpus fagifer*. HERNANDIACEAE: *Hernandia nymphaeifolia*. LAURACEAE: *Persea americana*. LECYTHIDACEAE:

Barringtonia asiatica. MALVACEAE: *Grewia prunifolia*. MELIACEAE: *Aglaia saltatorum*, *Vavaea amicorum*. MORACEAE: *Artocarpus altilis*. MUSACEAE: *Musa* x *paradisiaca*. MYRTACEAE: *Eugenia uniflora*, *Psidium guajava*, *Syzygium corynocarpum*, *S. jambos*, *S. malaccense*, *S. neurocalyx*, *S. richii*. PASSIFLORACEAE: *Passiflora edulis*, *P. foetida*, *P. ligularis*, *P. quadrangularis*. ROSACEAE: *Prunus persica*. RUBIACEAE: *Gardenia taitensis*, *Guettarda speciosa*. RUTACEAE: *Citrus aurantium*, *C. limon*, *C. maxima*, *C. paradisi*, *C. reticulata*, *C. sinensis*, *Micromelum minutum*. SALICACEAE: *Xylosma orbiculata*. SANTALACEAE: *Santalum yasi*. SAPINDACEAE: *Elattostachys apetala, Pometia pinnata*. SAPOTACEAE: *Chrysophyllum cainito*, *Manilkara zapota*, *Planchonella membranacea*. SOLANACEAE: *Capsicum annuum*, *C. frutescens*, *Solanum lycopersicum*, *S. mauritianum*, *S. melongena*. THYMELAEACEAE: *Phaleria disperma*.

Edible hosts common names. Avocado, banana, breadfruit, cashew, chilli pepper, common guava, eggplant, giant granadilla, grapefruit, lemon, Malay-apple, mango, orange, Pacific lychee, papaya, peach, pomelo, purple granadilla, rose-apple, sapodilla, sour orange, soursop, star-apple, Surinam cherry, sweet granadilla, sweet pepper, Tahitian chestnut, tangerine, tomato, tropical almond, wild watermelon.

Biology. Adults mate at dusk (Allwood 1997). At 26°C, egg hatch starts after 46 hours, and most eggs hatch between 51 and 60 hours. Larval development takes 7 to 9 days and pupal period is 12 to 13 days (Nemeye 1995). Adults are common in both village and forest habitats (Leweniqila et al. 1997b). Monthly trapping data illustrated on Figure 111, in Litsinger et al. (1991) and in Leweniqila et al. (1997b). This species is parasitized by *Fopius arisanus* and *Psyttalia fijiensis* (Fullaway) in Tonga (Heimoana et al. 1997; Vargas et al. 2012a).

Notes. Heat tolerance of immature stages studied in Tonga (Foliaki and Armstrong 1997). *Dacus virgatus* Coquillett 1910, was considered a junior synonym of *B. psidii* by Malloch (1931), but is actually a synonym of *B. facialis*, based on a careful examination of the holotype of *D. virgatus*, deposited at the Smithsonian Institution, by Allen Norrbom.

Bactrocera (*Bactrocera*) *frauenfeldi* (Schiner, 1868)

Mango fruit fly

Figures 29, 30

Distribution (Fig. 112). Indonesia (Moluccas, West Papua). Australia (Queensland; detected 1974). Papua New Guinea (mainland, New Britain, New Ireland, Manus, Bougainville). Solomon Islands (Shortland Group, Choiseul, Vella Lavella, Gizo, Kolombangara, New Georgia, Isabel, Russell, Florida, Guadalcanal, Malaita, San Cristobal, Rennell and Bellona, Santa Cruz, Reef Islands). Palau. Federated States of Micronesia (widespread).

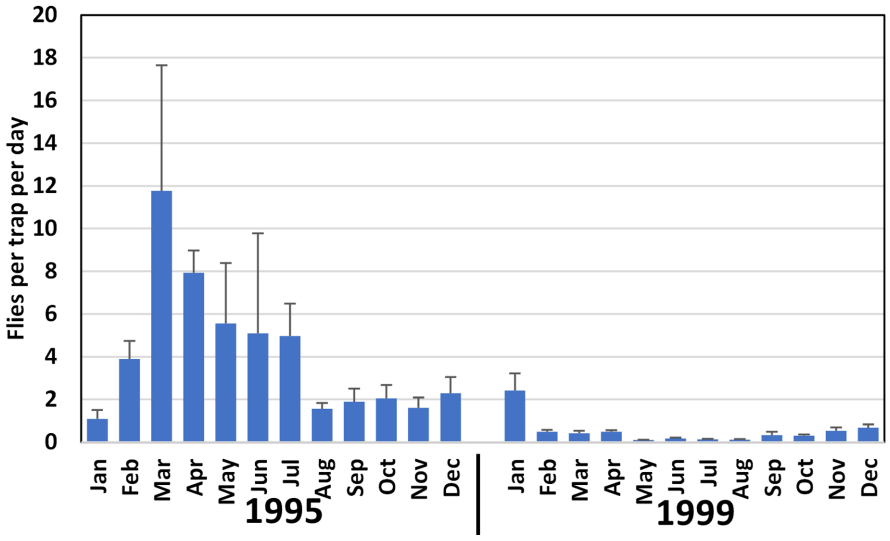


Figure 111. Mean (±SE) daily captures of *Bactrocera facialis* (Coquillett) in cue-lure traps maintained in Tonga (Tongatapu Island) between January and December 1995 and 1999, based on 10 trapping sites (n = 144, mean FTD = 1.42).

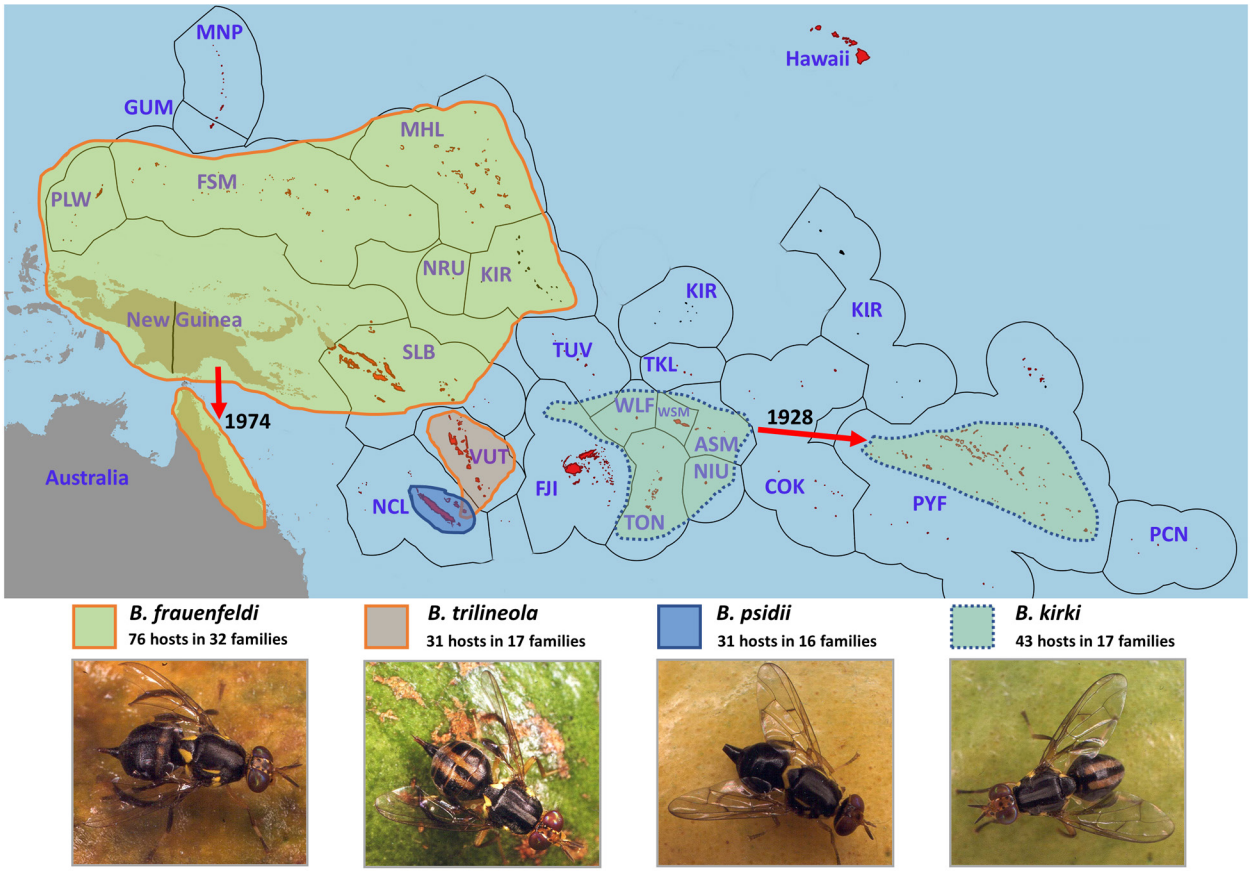


Figure 112. Distribution and invasion history of polyphagous pest fruit flies in the *Bactrocera frauenfeldi* complex in Oceania: *Bactrocera frauenfeldi* (Schiner), *B. trilineola* Drew, *B. psidii* (Froggatt), and *B. kirki* (Froggatt). Photos from Steve Wilson.

Marshall Islands (widespread). Kiribati (Gilbert Islands). Nauru. The frequently quoted record from Sapian, based on a specimen collected in 1946 (Hardy and Adachi 1956), is likely erroneous or an accidental introduction that failed to establish. This species was never detected in the Mariana Islands in subsequent years (Leblanc 1997).

Male lure. Cue-lure, zingerone.

Host plants. Category B polyphagous fruit pest (Vargas et al. 2015) bred from 100 hosts in 35 families throughout its range. Records in Federated Federated States of Micronesia, Kiribati, Nauru, Palau, Papua New Guinea, and Solomon Islands: ANACARDIACEAE: *Anacardium occidentale*, *Dracontomelon dao*, *Mangifera indica*, *M. minor*, *Spondias dulcis*. ANNONACEAE: *Annona muricata*, *A. reticulata*, *A. squamosa*, *Cananga odorata*. APOCYNACEAE: *Cerbera manghas*, *Ochrosia oppositifolia*. ARECACEAE: *Areca catechu*. AURACARIACEAE: *Agathis* sp. CALOPHYLLACEAE: *Calophyllum inophyllum*, *C. peekelii*, *Mammea odorata*. CARICACEAE: *Carica papaya*. CELASTRACEAE: *Celastrus* sp. CLUSIACEAE: *Garcinia* x *mangostana*, *G. xanthochymus*. COMBRETACEAE: *Terminalia carolinensis*, *T. catappa*, *T. kaernbacchii*, *T. samoensis*, *T. whitmorei*. EBENACEAE: *Diospyros ebenum*, *D. nigra*. FABACEAE: *Inocarpus fagifer*. GOODENIACEAE: *Scaevola taccada*. HERNANDIACEAE: *Hernandia* sp. LAURACEAE: *Persea americana*. LECYTHIDACEAE: *Barringtonia calyptrocalyx*, *B. edulis*. MALPIGHIACEAE: *Malpighia glabra*. MALVACEAE: *Heritiera* sp. MELASTOMATACEAE: *Melastoma malabathricum*. MELIACEAE: *Sandoricum koetjape*. MORACEAE: *Artocarpus altilis*, *A. heterophyllus*, *A. mariannensis*, *Broussonetia papyrifera*, *Ficus glandifera*, *Ficus* sp. MUSACEAE: *Musa* x *paradisiaca*. MYRTACEAE: *Eugenia uniflora*, *Psidium cattleianum*, *P. guajava*, *Syzygium aqueum*, *S.* cf. *pachycladum*, *S. jambos*, *S. malaccense*, *S. samarangense*, *S. trivene*. OXALIDACEAE: *Averrhoa carambola*. PASSIFLORACEAE: *Passiflora edulis*. PHYLLANTHACEAE:

Baccaurea papuana, *Baccaurea* sp. RUBIACEAE: *Guettarda speciosa*, *Nauclea* sp., *Neolamarckia cadamba*. RUTACEAE: *Citrus aurantium*, *C. japonica*, *C. maxima*, *C.* × *microcarpa, C. paradisi*, *C. reticulata*, *C. sinensis*, *Clymenia polyandra*. SAPINDACEAE: *Pometia pinnata*. SAPOTACEAE: *Burckella obovata*, *Chrysophyllum cainito*, *Manilkara zapota*, *Pouteria caimito*, *P. campechiana*. SOLANACEAE: *Capsicum frutescens*. THYMELAEACEAE: *Phaleria macrocarpa*.

Edible hosts common names. Abiu, acerola, avocado, banana, betel nut, black sapote, breadfruit, calamondin, canistel, cashew, common guava, custard apple, grapefruit, jackfruit, Jew plum, kumquat, Malay-apple, mango, mangosteen, Marianas breadfruit, okari nut, orange, Pacific lychee, papaya, pomelo, purple granadilla, rose-apple, sapodilla, sour orange, soursop, star-apple, starfruit, strawberry guava, sugar-apple, Surinam cherry, Tahitian chestnut, tangerine, tropical almond, water apple, watery rose-apple.

Biology. Adults mate during the day (Allwood 1997). Rate of development was studied on papaya-based diet, at 26° C, by Leblanc and Hollingsworth (1997). One female can lay an average of at least 25 eggs in 24 hours. Egg incubation lasts about two days. Almost all larvae go through the first instar between 48 and 72 hours after egg laying. Between 96 and 108 hours, over 90% have reached the second instar in Micronesia (FSM) (68 and 80 hours in Solomon Islands). Third instars appear 120 hours after egg laying and nearly 90% have reached this stage by 192 hours in FSM, but appeared (92 hours) and matured (128 hours) earlier in the Solomon Islands. By 204 hours, mature larvae start to exit the diet to pupate and the largest numbers of larvae have exited at 252 hours. Larval development and pupal stage duration is 11 days.

This species is very common in village situations, even on remote atolls, where host trees abound, and is much less common in rainforest. Monthly trapping data are illustrated on Figures 113 and 114, and were previously published in Leblanc and Allwood (1997) and Vagalo et al. (1997). This species is particularly abundant on Pohnpei and Kosrae Islands (Federated States of Micronesia), sustained by the high rainfall and abundant host fruit availability throughout the year (Fig. 113) (Leblanc and Allwood 1997). Although ubiquitous in the wet tropics, it is unlikely to become a pest outside tropical zones that have even wet hot climates throughout the year (Royer et al. 2015).

The parasitoids *Fopius arisanus* and *Diachasmimorpha longicaudata* were introduced and released in 1997 on Pohnpei and Kosrae Islands, respectively, in an attempt to reduce the very large populations of *B. frauenfeldi* to manageable levels (Vargas et al. 2012). Host suitability was demonstrated for both parasitoids in laboratory tests and *F. arisanus* was recovered in host fruit surveys in subsequent years. It is not known whether either parasitoid has become permanently established.

Notes. Attempts to eradicate this species from Nauru between 1998 and 2001, using male annihilation and limited protein bait sprays, were unsuccessful (Allwood et al. 2002).

This species is the main member of the *B. frauenfeldi* complex, which also includes *B. caledoniensis*, *B. parafrauenfeldi* Drew, *B. trilineola* and the phylogenetically closely related *B. kirki* and *B. psidii* (Doorenweerd et al. 2022).

Bactrocera (*Bactrocera*) *froggatti* (Bezzi, 1928)

Figure 31

Distribution. Papua New Guinea (Bougainville). Solomon Islands (Shortland Group, Choiseul, Vella Lavella, Gizo, Kolombangara, New Georgia, Isabel, Russell, Florida, Guadalcanal, Malaita, San Cristobal, Rennell and Bellona).

Male lure. Methyl eugenol.

Host plants. No known hosts.

Biology. Monthly trapping data are illustrated on Figure 115.

Bactrocera (*Parazeugodacus*) *fulvifacies* (Perkins, 1939)

Figure 32

Distribution. New Caledonia (mainland, Maré, Lifou).

Male lure. Zingerone (strong attractant) and cue-lure (weak attractant) (Royer et al. 2019a).

Host plants. OLEACEAE: *Olea paniculata*.

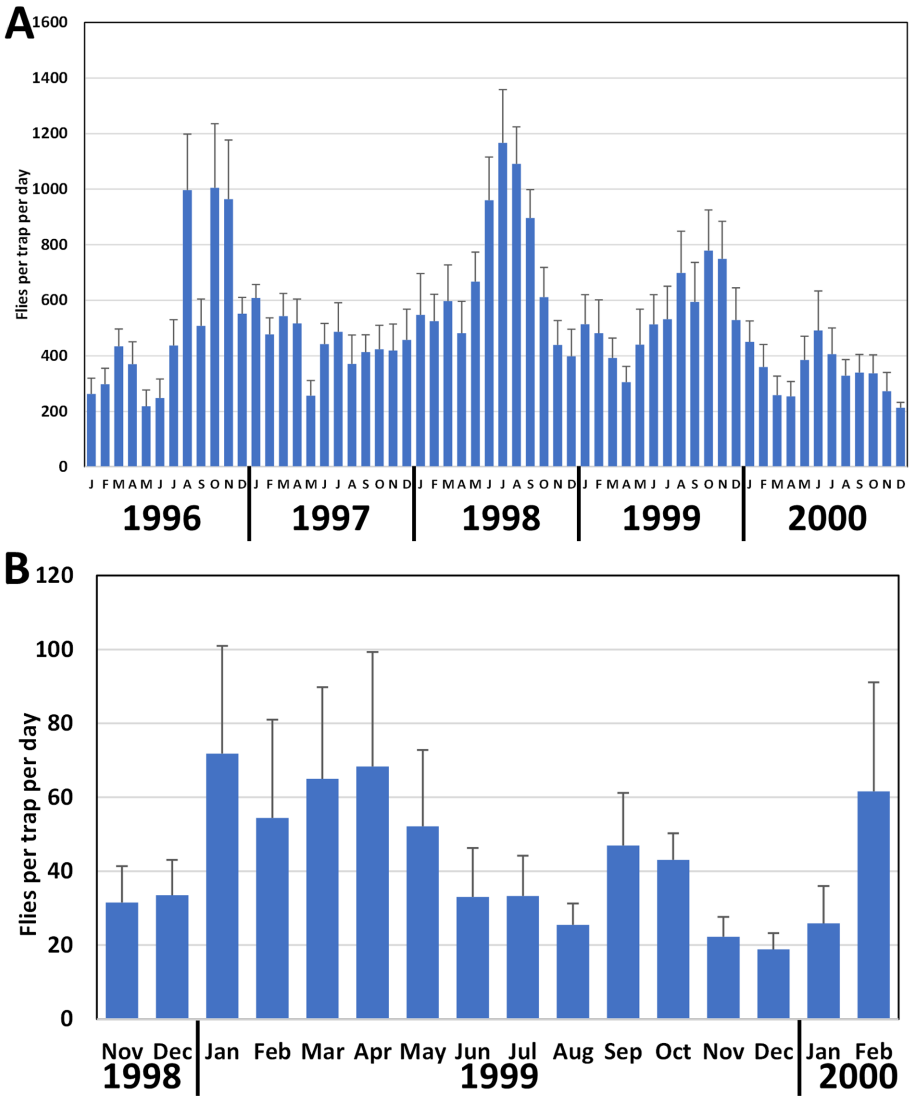


Figure 113. Mean (±SE) daily captures of *Bactrocera frauenfeldi* (Schiner) in cue-lure traps maintained: **A)** in the Federated States of Micronesia (Pohnpei Island) between January 1996 and December 2000, based on eight trapping sites (n = 475, mean FTD = 512.74), and **B)** in Papua New Guinea between November 1998 and February 2000, based on seven trapping sites (n = 108, mean FTD = 42.77).

Bactrocera (*Bactrocera*) *furvescens* Drew, 1989

Figure 33

Distribution. Papua New Guinea (mainland). Solomon Islands (Guadalcanal).

Male lure. Cue-lure.

Host plants. No known hosts.

Notes. The Solomon Islands record of this species, otherwise known only from Papua New Guinea, is based on a single specimen collected in 1971 in Honiara (Guadalcanal).

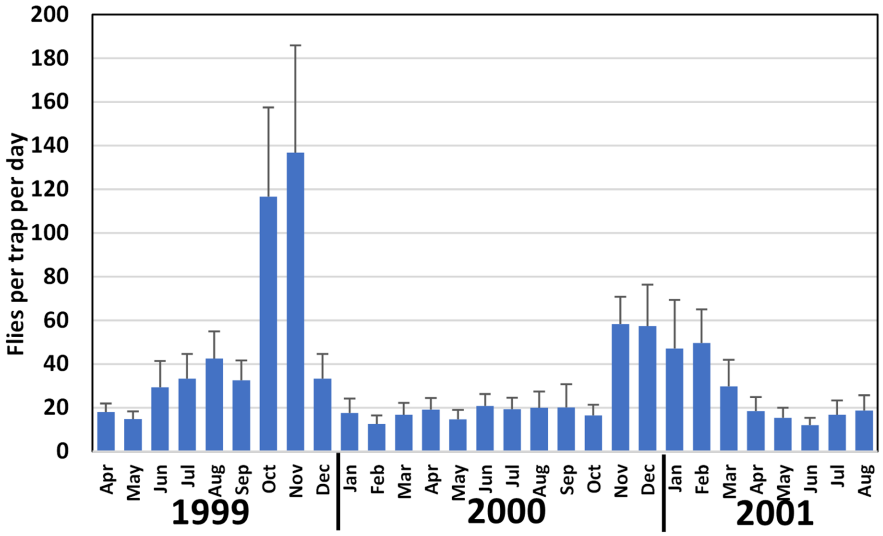


Figure 114. Mean (±SE) daily captures of *Bactrocera frauenfeldi* (Schiner) in cue-lure traps maintained in the Solomon Islands (Guadalcanal Island) between April 1999 and August 2001, based on 11 trapping sites (n = 253, mean FTD = 32.45).

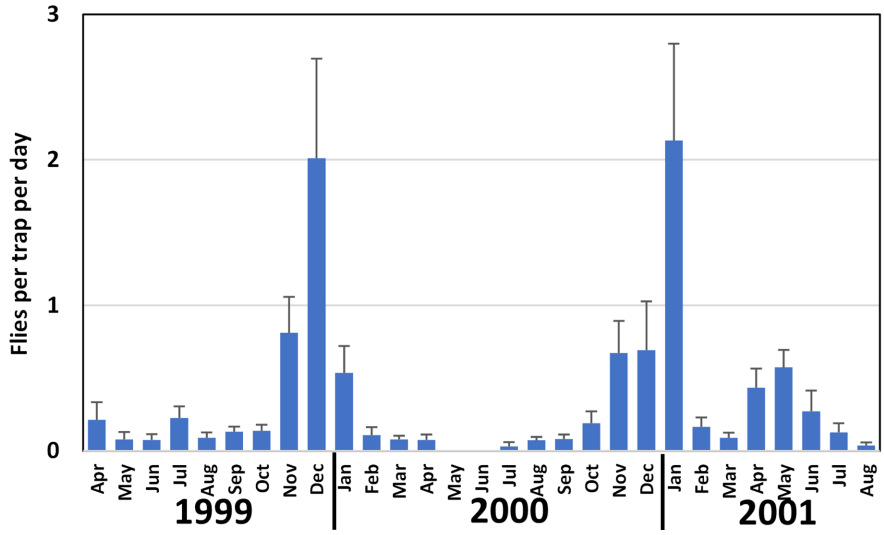


Figure 115. Mean (±SE) daily captures of *Bactrocera froggatti* (Bezzi) in methyl eugenol traps maintained in the Solomon Islands (Guadalcanal Island) between April 1999 and August 2001, based on 10 trapping sites (n = 230, mean FTD = 0.37).

***Bactrocera* (*Bactrocera*) *geminosimulata* Leblanc and Doorenweerd, 2021**
Figure 34

Distribution. Solomon Islands (Guadalcanal).

Male lure. Cue-lure.

Host plants. No known hosts.

Notes. This species is nearly identical to *B. simulata* (Fig. 79) in appearance (Leblanc et al. 2021). It is however genetically distinct and distinguished by a subtle but consistent difference in the extent of wing infuscation (Leblanc et al. 2021).

Bactrocera (*Bulladacus*) *gnetum* Drew and Hancock, 1995

Figure 35

Distribution. Fiji (Vanua Levu).

Male lure. No known lure.

Host plants. GNETACEAE: *Gnetum gnemon*.

Bactrocera (*Bactrocera*) *grandistylus* Drew and Hancock, 1995

Figure 36

Distribution. New Caledonia (Maré).

Male lure. No known lure.

Host plants. EBENACEAE: *Diospyros fasciculosa*.

Bactrocera (*Calodacus*) *hastigerina* (Hardy, 1954)

Figure 37

Distribution. Papua New Guinea (New Britain). Solomon Islands (Guadalcanal).

Male lure. No known lure.

Host plants. Category D minor pest (Vargas et al. 2015). Host plant in Papua New Guinea and Solomon Islands: ANACARDIACEAE: *Spondias dulcis*.

Edible host common name: Jew plum.

Bactrocera (*Bactrocera*) *hollingsworthi* Drew and Romig, 2001

Figure 38

Distribution. Solomon Islands (Kolombangara, Santa Cruz).

Male lure. Cue-lure.

Host plants. No known hosts.

Notes. In their original description, Drew and Romig (2001) refer to specimens from Santa Cruz Island with postpronotal lobes yellow and anteriorly black, and with irregularly shaped sublateral markings on the abdomen (Fig. 38C). Fresh specimens I collected in Kolombangara in 2018 have black postpronotal lobes and extensive black lateral markings on the abdomen (Fig. 38-D). Until fresh specimens from Santa Cruz are available for molecular comparison, I tentatively assigned the Kolombangara specimens as a variant of *B. hollingsworthi*, rather than describe them as a new species (Leblanc et al. 2021).

Bactrocera (*Bactrocera*) *kirki* (Froggatt, 1910)

Figure 39

Distribution (Fig. 112). Fiji (Rotuma). Futuna. Wallis. Samoa (Savai'i, Manono, Upolu). American Samoa. Tonga (Tongatapu Group, Ha'apai Group, Vava'u Group, Niuas Group). Niue. French Polynesia (Austral Islands, Society Islands, Tuamotu-Gambier Islands; detected 1928).

Male lure. Cue-lure.

Host plants. Category B polyphagous fruit pest (Vargas et al. 2015) bred from 43 host species in 17 families. Host plants in French Polynesia, Samoa and Tonga: ANACARDIACEAE: *Anacardium occidentale*, *Mangifera indica*, *Pleiogynium timoriense*, *Spondias dulcis*, *S. mombin*. ANNONACEAE: *Annona muricata*, *A. reticulata*. APOCYNACEAE: *Ochrosia oppositifolia*. CARICACEAE: *Carica papaya*. COMBRETACEAE: *Terminalia catappa*, *T. litoralis*. ELAEOCARPACEAE: *Elaeocarpus tonganus*. FABACEAE: *Inocarpus fagifer*. LAURACEAE: *Persea americana*. MELIACEAE: *Cedrela odorata*, *Eugenia brasiliensis*, *E. uniflora*, *Psidium cattleianum*, *P. guajava*, *Syzygium aqueum*, *S. corynocarpum*, *S. dealatum*, *S. gracilipes*, *S. jambos*, *S. malaccense*, *S. neurocalyx*, *S.*

richii. OXALIDACEAE: *Averrhoa carambola*. PASSIFLORACEAE: *Passiflora edulis*, *P. quadrangularis*. ROSACEAE: *Eriobotrya japonica*, *Prunus persica*. RUBIACEAE: *Morinda citrifolia*. RUTACEAE: *Citrus maxima*, *C. reticulata*, *C. sinensis*, *Micromelum minutum*. SAPINDACEAE: *Pometia pinnata*. SAPOTACEAE: *Pouteria caimito*. SOLANACEAE: *Capsicum annuum*, *C. frutescens*, *Solanum lycopersicum*, *S. melongena*.

Edible hosts common names. Abiu, avocado, Brazil cherry, cashew, chilli pepper, common guava, custard apple, eggplant, giant granadilla, hog-plum, Jew plum, loquat, Malay-apple, mango, noni, orange, Pacific lychee, papaya, peach, pomelo, purple granadilla, rose-apple, soursop, starfruit, strawberry guava, Surinam cherry, sweet pepper, Tahitian chestnut, tangerine, tomato, tropical almond, watery rose-apple.

Biology. Adults mate late morning to early afternoon, when light intensity is highest (Allwood 1997). Monthly trapping data illustrated on Figure 116, and in Litsinger et al. (1991). This species is parasitized by *Fopius arisanus* in Tonga and Samoa and *Pstyttalia fijiensis* in Tonga (Heimoana et al. 1997; Vargas et al. 2012a).

Notes. Heat tolerance of immature stages investigated in Samoa (Tunupopo et al. 2019).

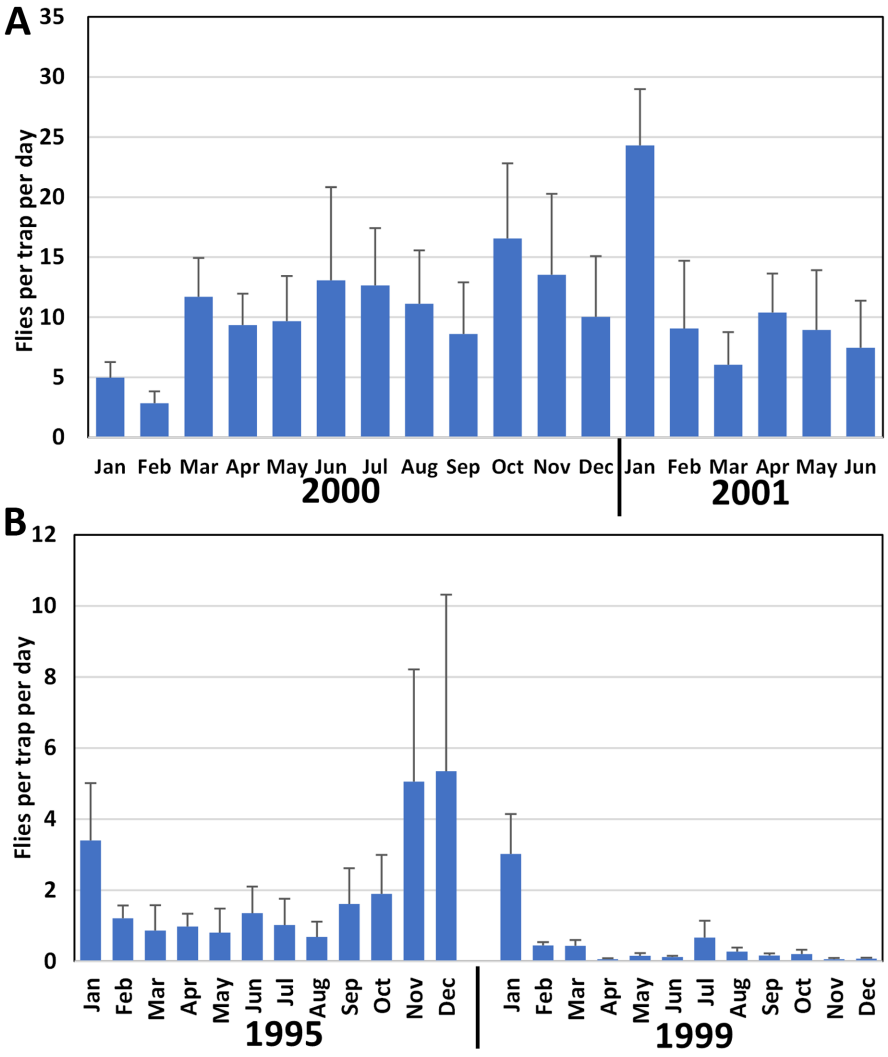


Figure 116. Mean (±SE) daily captures of *Bactrocera kirki* (Froggatt) in cue-lure traps maintained: **A)** in Samoa (Upolu Island) between January 2000 and June 2001, based on 13 trapping sites (n = 225, mean FTD = 10.64), and **B)** in Tonga (Tongatapu and Vava'u Islands) between January and December 1995 and 1999, based on 10 trapping sites (n = 149, mean FTD = 1.91).

Bactrocera (*Parazeugodacus*) *kolombangarae* Leblanc and Doorenweerd, 2021

Figure 40

Distribution. Solomon Islands (Kolombangara, Guadalcanal).

Male lure. Zingerone.

Host plants. No known hosts.

Bactrocera (*Bactrocera*) *latifrons* (Hendel, 1915)

Solanum fruit fly

(= *Dacus amoyensis* Froggatt, 1909, *Chaetodacus antennalis* Shiraki, 1933)

Figure 41

Distribution. Widespread in tropical Asia, from India to Taiwan, and south to Sulawesi. Introduced to Hawaii (detected 1983) and Africa (Drew and Romig 2013; Vargas et al. 2015).

Male lure. Latilure (alpha-ionol and cade oil) (McQuate and Peck 2001).

Host plants. Category A fruit pest (Vargas et al. 2015) recorded from 59 host taxa in 25 genera and 13 families (Allwood et al. 1999; McQuate and Liquido 2016). The family Solanaceae contains the major host species and *B. latifrons* is a significant pest of *Capsicum* and *Solanum* species (Drew and Romig 2013).

Biology. Adults mate at dusk (Jackson and Long 1997). In Hawaii, at 24°C, eggs hatch in 3.2 days, larval development takes 9.0 days and pupal stage lasts 13.0 days (Vargas et al. 1996).

Notes. Variants of this species, with extensive dark coloration on the abdomen and bases of femora, have been characterized and illustrated in Doorenweerd and Leblanc (2018). The trilobed aculeus (Fig. 98 in Drew and Romig 2013) is characteristic. Heat tolerance of immature stages was studied in Hawaii (Jang et al. 1999).

Bactrocera (*Bactrocera*) *longicornis* Macquart, 1835

Figure 42

Distribution. Papua New Guinea (New Britain). Solomon Islands (Ghaghe Island, in Isabel Province).

Male lure. Cue-lure.

Host plants. No known hosts.

Notes. This was the first species to be described from Oceania, the earliest use of the generic name *Bactrocera*, published by Macquart (1835), and the second dacine fly species described, preceded only by the description of *Musca oleae* Rossi, 1790 (now known as *Bacrocera oleae*). This historic species description is reproduced on Figure 2.

Former New Ireland and Bougainville records of *B. longicornis* actually are of *B. denigrata* (Drew, 1971), declared a junior synonym of *B. longicornis* by Hardy (1976) and reinstated as a valid species by Drew and Romig (2022), based on the examination of specimens collected in East New Britain by the author of this publication, among which the one on Figure 42. The differences between the two species are outlined in Drew and Romig (2022). No additional specimens of *B. longicornis* have been collected in the Solomon Islands, other than Macquart's original holotype.

Bactrocera (*Bactrocera*) *luteola* (Malloch, 1931)

(= *Dacus incertus* Malloch, 1938)

Figure 43

Distribution. French Polynesia (Bora Bora, Hao, Makatea, Rangiroa, Tetiaroa).

Male lure. No known lure.

Host plants. RUBIACEAE: *Guettarda speciosa*.

Bactrocera (*Bactrocera*) *melanogaster* Drew, 1989

Figure 44

Distribution. Papua New Guinea (Bougainville). Solomon Islands (Shortland Group, Choiseul, Vella Lavella, Gizo, Kolombangara, New Georgia, Isabel, Russell, Florida, Guadalcanal).

Male lure. Methyl eugenol.

Host plants. No known hosts.

Bactrocera (*Bactrocera*) *melanotus* (Coquillett, 1910)

(= *Dacus rarotongae*, Froggatt, 1910)
Figure 45

Distribution (Fig. 103). Cook Islands (Rarotonga, Mangaia, Mauke, Mitiaro, Atiu, Aitutaki).

Male lure. Cue-lure.

Host plants. Category B polyphagous fruit pest (Vargas et al. 2015) bred from 31 host species in 18 families. ANACARDIACEAE: *Mangifera indica.* ANNONACEAE: *Annona cherimola*, *A. squamosa.* ARALIACEAE: *Meryta pauciflora*. CALOPHYLLACEAE: *Calophyllum inophyllum*. CARICACEAE: *Carica papaya*. COMBRETACEAE: *Terminalia catappa*. FABACEAE: *Inocarpus fagifer*. GENTIANACEAE: *Fagraea berteroana*. LAURACEAE: *Persea americana*. MELASTOMATACEAE: *Melastoma* sp. MORACEAE: *Artocarpus altilis*, *A. heterophyllus*. MYRTACEAE: *Eugenia uniflora*, *Psidium cattleianum*, *P. guajava*, *Syzygium cumini*, *S. jambos*. OXALIDACEAE: *Averrhoa carambola*. ROSACEAE: *Eriobotrya japonica*. RUBIACEAE: *Coffea arabica*, *Guettarda speciosa*, *Morinda citrifolia*. RUTACEAE: *Citrus maxima*, *C. paradisi*, *C. reticulata*, *C. sinensis*. SAPOTACEAE: *Manilkara zapota*. SOLANACEAE: *Solanum lycopersicum*, *S. mauritianum*, *S. melongena*.

Edible hosts common names. Avocado, breadfruit, cherimoya, coffee, common guava, eggplant, grapefruit, jackfruit, Java plum, loquat, mango, noni, orange, papaya, pomelo, rose-apple, sapodilla, starfruit, strawberry guava, sugar-apple, Surinam cherry, Tahitian chestnut, tangerine, tomato, tropical almond.

Biology. Adults mate between late morning and early afternoon, with increasing light intensity (Allwood 1997). Rate of development was studied by Kassim (1993). At 27°C in papaya, egg hatch starts after 36 hours, 79% of larvae have reached second instar by 72 hours, 88% reached third instar by 120 hours, larval popping starts by 156 hours, and 88% have exited host by 168 hours. Adult longevity is 30 weeks under lab conditions. Oviposition starts after three weeks and peaks during weeks 6 to 9, and a female lays 318 eggs over 126 days. This species is more common inland than in coastal areas, unlike *B. xanthodes*, and population peaks occur in the cooler months of June and July (Leweniqila et al. 1997b; Purea et al. 1997). Monthly trapping data illustrated on Figure 117, and published in Leweniqila et al. (1997b). It is parasitized by *Fopius arisanus* in the Cook Islands (Vargas et al. 2012a).

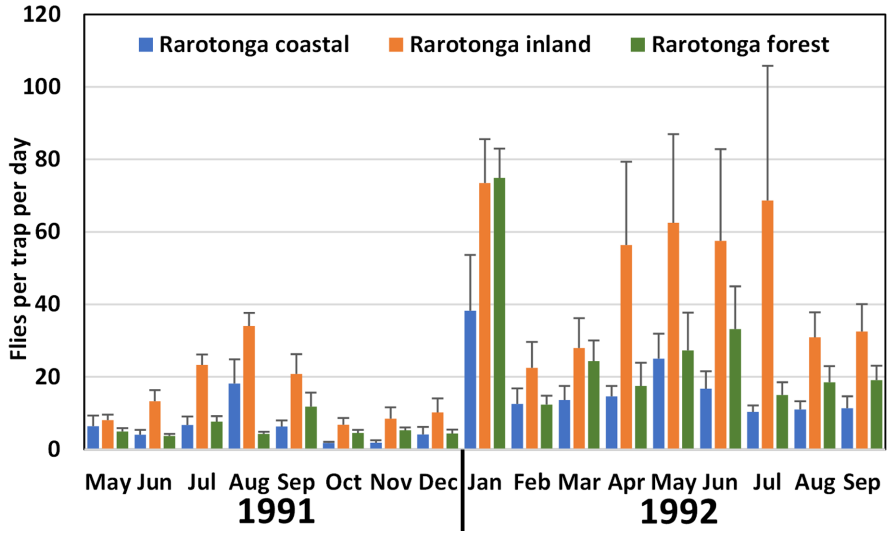


Figure 117. Mean (±SE) daily captures of *Bactrocera melanotus* (Coquillett) in cue-lure traps maintained in coastal, inland and forest trapping sites on Rarotonga Island (Cook Islands) between May 1991 and September 1992, based on 18 trapping sites (n = 306, mean FTD = 20.55).

Notes. Heat tolerance was studied in Cook Islands. Late eggs, near hatching time, are the most heat tolerant of all the species and development stages studied in the Pacific (Waddell et al. 1997a, 1997b).

Bactrocera (*Bactrocera*) *minuta* (Drew, 1971)

Figure 46

Distribution. Solomon Islands (Santa Cruz). Vanuatu (Torres Islands, Banks Islands, Santo, Malekula, Ambae, Maewo, Pentecost, Ambrym, Epi-Paama-Tongoa, Efate, Erromanga, Tanna, Aneityum).

Male lure. Cue-lure.

Host plants. Host records in Vanuatu: APOCYNACEAE: *Cerbera manghas*, *C. odollam*. MORACEAE: *Antiaris toxicaria*.

Biology. Adults mate at dusk (Allwood 1997). Monthly trapping data illustrated on Figure 118.

Bactrocera (*Bactrocera*) *moluccensis* (Perkins, 1939)

Figure 47

Distribution. Indonesia (Java, Sulawesi, Bali, Lombok, Moluccas). Papua New Guinea (mainland, New Britain, New Ireland, Bougainville). Solomon Islands (Shortland Group, Choiseul, Vella Lavella, Gizo, Kolombangara, New Georgia, Isabel, Russell, Florida, Guadalcanal, Malaita, San Cristobal, Rennell and Bellona, Santa Cruz).

Male lure. Cue-lure, zingerone (weak attraction) (Royer et al. 2018).

Host plants. Category C pest (Vargas et al. 2015). Host record in Papua New Guinea and Solomon Islands: FABACEAE: *Inocarpus fagifer*.

Edible host common name: Tahitian chestnut.

Biology. Contrary to other species that consume the outer fleshy part of Tahitian chestnut, *B. moluccensis* larvae damage the entire fruit, including the inner nut (Leblanc et al. 2001a). Monthly trapping data illustrated on Figure 119.

Bactrocera (*Bactrocera*) *morula* Drew, 1989

Figure 48

Distribution. Papua New Guinea (New Britain). Solomon Islands (Gizo, Guadalcanal, San Cristobal).

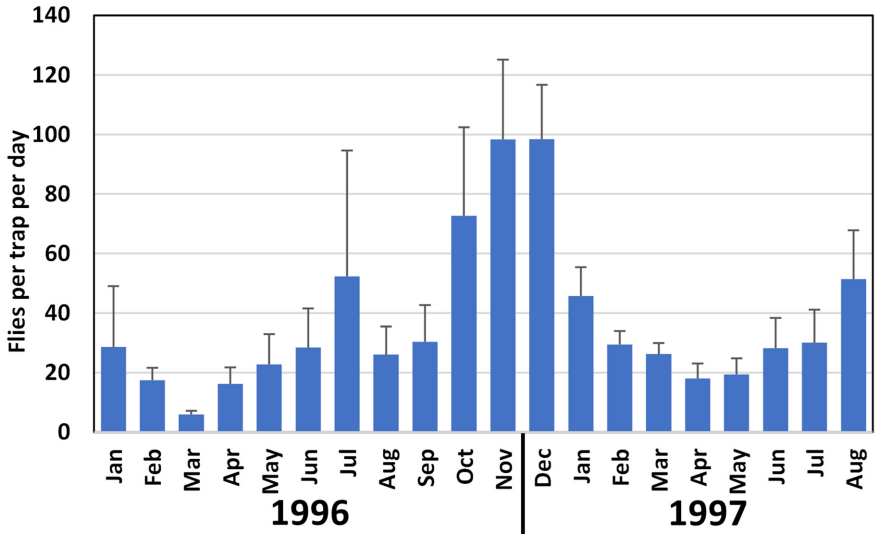


Figure 118. Mean (±SE) daily captures of *Bactrocera minuta* (Drew) in cue-lure traps maintained in Vanuatu (Efate Island) between January 1996 and August 1997, based on 10 trapping sites (n = 179, mean FTD = 46.64).

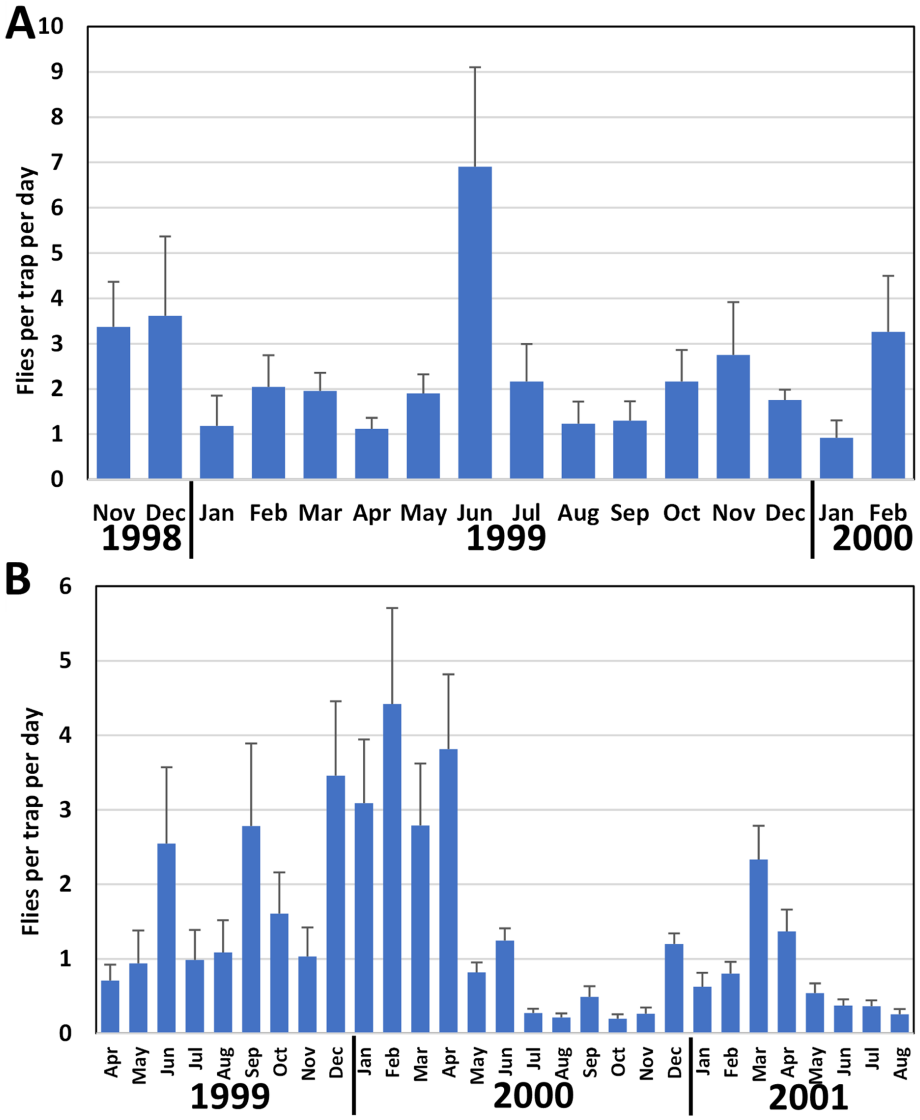


Figure 119. Mean (±SE) daily captures of *Bactrocera moluccensis* (Perkins) in cue-lure traps maintained: **A)** in Papua New Guinea between November 1998 and February 2000, based on five trapping sites (n = 80, mean FTD = 2.35), and **B)** in the Solomon Islands (Guadalcanal Island) between April 1999 and August 2001, based on 11 trapping sites (n = 253, mean FTD = 1.50).

Male lure. Cue-lure.

Host plants. No known hosts.

Bactrocera (*Bactrocera*) *mucronis* (Drew, 1971)

Figure 49

Distribution (Fig. 105). New Caledonia (mainland, Maré, Lifou).

Male lure. Cue-lure.

Host plants. Category D minor pest (Vargas et al. 2015). ANNONACEAE: *Annona reticulata*. APOCYNACEAE: *Cascabela thevetia*, *Cerbera manghas*. COMBRETACEAE: *Terminalia catappa*. EUPHORBIACEAE: *Fontainea pancheri*. MYRTACEAE: *Psidium guajava*.

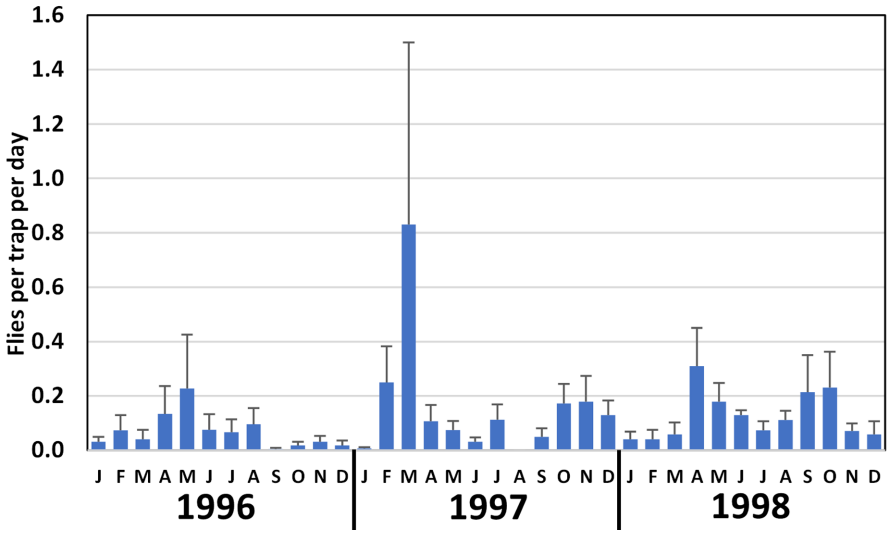


Figure 120. Mean (±SE) daily captures of *Bactrocera mucronis* (Drew) in cue-lure traps maintained in New Caledonia (Mainland, Maré, Lifou) between January 1996 and December 1998, based on eight trapping sites (n = 288, mean FTD = 0.12).

Edible hosts common names. Common guava, custard apple, tropical almond.

Biology. Monthly trapping data illustrated on Figure 120.

Bactrocera (*Bactrocera*) *naucleae* Drew and Romig, 2001

Figure 50

Distribution. Solomon Islands (Choiseul, Isabel, Guadalcanal).

Male lure. Methyl eugenol.

Host plants. RUBIACEAE: *Nauclea* sp.

Bactrocera (*Bactrocera*) *neonigrita* Drew, 1989

Figure 51

Distribution. Papua New Guinea (mainland, New Britain, New Ireland, Bougainville). Solomon Islands (Shortland Group).

Male lure. Methyl eugenol.

Host plants. No known hosts.

Bactrocera (*Notodacus*) *neoxanthodes* Drew and Romig, 2001

Figure 52

Distribution (Fig. 121). Vanuatu (Torres Islands, Santo, Efate).

Male lure. Isoeugenol, dihydroeugenol (**NEW LURE RECORDS**). Isoeugenol is the most attractive of the two lures.

Host plants. LECYTHIDACEAE: *Barringtonia edulis*. PASSIFLORACEAE: *Passiflora suberosa*.

Notes. This species is a non-pest member species of the *Bactrocera xanthodes* complex (Drew et al. 1997). Drew (1989) originally recorded it as *B. xanthodes* in Vanuatu. Based on its unusual host record, Waterhouse (1993) suspected it might be a separate species, later confirmed by Hoeben et al. (1996) and Drew et al. (1997), who initially included it under *B. paraxanthodes* (Drew and Hancock 1995), and later described it as *B. neoxanthodes* (Drew and Romig 2001).

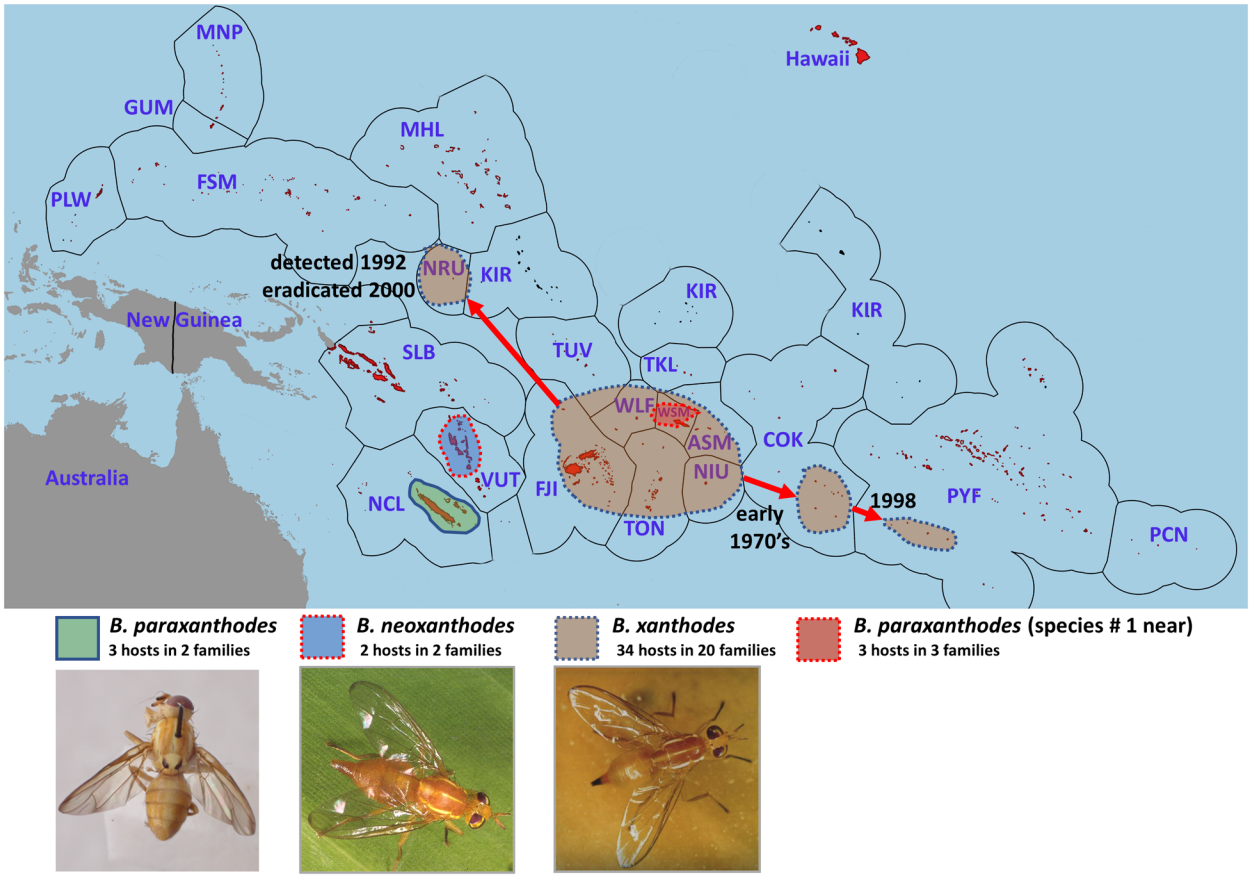


Figure 121. Distribution and invasion and eradication history of fruit flies in the *Bactrocera xanthodes* complex in Oceania: *Bactrocera paraxanthodes* Drew and Hancock, *B. neoxanthodes* Drew and Romig, *B. xanthodes* (Broun), and undescribed species near *B. paraxanthodes* in Samoa. Photos of *B. neoxanthodes* and *B. xanthodes* by Steve Wilson.

Bactrocera (*Bactrocera*) *nigrescentis* (Drew, 1971)

Figure 53

Distribution. Papua New Guinea (mainland, New Britain, New Ireland, Manus, Bougainville). Solomon Islands (Choiseul, Vella Lavella, Gizo, Kolombangara, New Georgia, Isabel, Florida, Guadalcanal, Rennell and Bellona, Santa Cruz).

Male lure. Cue-lure.

Host plants. No known hosts.

Bactrocera (*Bactrocera*) *obliquivenosa* Drew and Romig, 2001

Figure 54

Distribution. Solomon Islands (Kolombangara).

Male lure. Methyl eugenol.

Host plants. No known hosts.

Notes. This species is known only from its holotype.

Bactrocera (*Bactrocera*) *obscura* (Malloch, 1931)

Figure 55

Distribution. Fiji (Rotuma Island only). Futuna. Wallis. Samoa (Savai'i, Manono, Upolu). American Samoa. Tonga (Tongatapu Group, Vava'u Group, Niuas Group). Niue.

Male lure. Cue-lure.

Host plants. No known hosts. Adults were bred from an unidentified fruit in Fiji.

Biology. Monthly trapping data illustrated on Figure 122.

Bactrocera (*Bactrocera*) *ochrosiae* (Malloch, 1942)

Figure 56

Distribution. Guam. Northern Mariana Islands. Hawaii (Molokai; dubious record).

Male lure. Cue-lure.

Host plants. APOCYNACEAE: *Ochrosia mariannensis*, *Ochrosia* sp. MELIACEAE: *Aglaia mariannensis*. MYRTACEAE: *Eugenia uniflora.* OLACACEAE: *Ximenia americana*.

Edible hosts common names. Surinam cherry, yellow plum.

Notes. Three specimens in the University of Hawaii Insect Museum, reportedly collected by John Kjargaard on Molokai Island (Hawaii) in 1972 (Anonymous 1993), were examined by the author and confirmed to belong to this species. I treat this record as highly dubious because specimens were never collected in cue-lure traps in subsequent years. Further, Hardy (1989a) referred to these specimens as "Three specimens of an apparently new species ... collected in the early 1970's by John Kjargaard, recently turned up in a pill box in the collecting bag loaned to Mr. Kjargaard by Dr. Mitchell many years ago." It is plausible, and more likely in my opinion, that samples from the Mariana Islands may have been misplaced in the bag or pill box during those years.

Bactrocera (*Daculus*) *oleae* (Rossi, 1790)

Olive fruit fly

Figure 57

Distribution. Continental Africa. Réunion. Southern Europe, Middle East. Pakistan. India. California (detected 1998). Hawaii (Hawaii Island, Maui; detected 2019).

Male lure. No known lure.

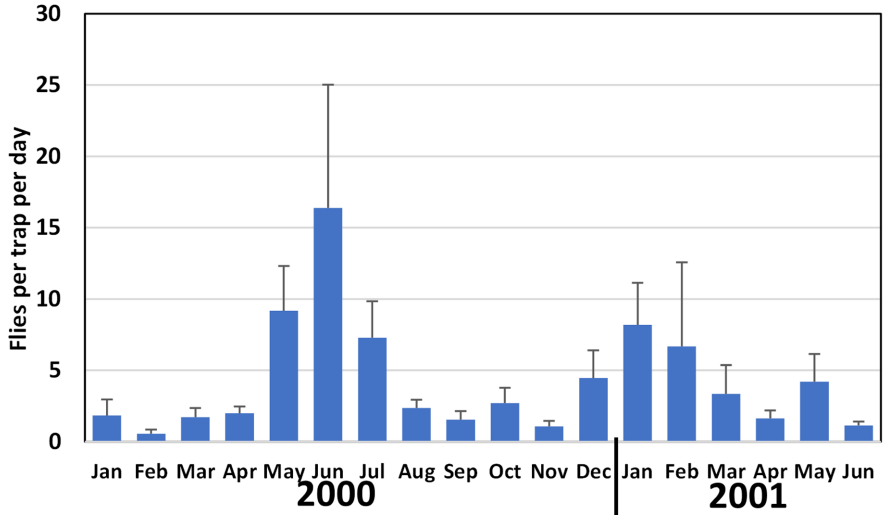


Figure 122. Mean (±SE) daily captures of *Bactrocera obscura* (Malloch) in cue-lure traps maintained in Samoa (Upolu Island) between January 2000 and June 2001, based on 9 trapping sites (n = 154, mean FTD = 4.10).

Host plants. Category A destructive pest of olive fruits (Vargas et al. 2015). OLEACEAE: *Olea* spp.

Biology. Adults mate at dusk (Ahmad et al. 2018). In California, females live at most six months, laying as many as 500 eggs (Rice 2000). Eggs hatch in two to three days, larval development takes about 20 days and pupal stage duration in fruit takes 8–10 days (Rice 2000).

Bactrocera (*Bulladacus*) *pacificae* Drew and Romig, 2001

Figure 58

Distribution. Solomon Islands (Guadalcanal, Santa Cruz).

Male lure. No known lure.

Host plants. GNETACEAE: *Gnetum gnemon*.

Bactrocera (*Tetradacus*) *pagdeni* (Malloch, 1939)

Figure 59

Distribution. Solomon Islands (Kolombangara, Florida, Guadalcanal).

Male lure. Zingerone.

Host plants. No known host.

Notes. This species was only known by its holotype (Drew and Romig 2001) and one specimen at the Bishop Museum (Honolulu, Hawaii), until large numbers were collected with the deployment of zingerone-baited traps (Hancock and Drew 2018a, Leblanc et al. 2021).

Bactrocera (*Bactrocera*) *parafroggatti* Drew and Romig, 2001

Figure 60

Distribution. Solomon Islands (Choiseul, Kolombangara, New Georgia, Isabel, Florida, Guadalcanal, San Cristobal, Rennell and Bellona).

Male lure. Methyl eugenol.

Host plants. No known host.

Bactrocera (*Notodacus*) *paraxanthodes* Drew and Hancock, 1995

Figure 61

Distribution (Fig. 121). New Caledonia (mainland, Maré, Lifou).

Male lure. Weakly attracted to methyl eugenol. Dihydroeugenol may prove to be a more potent attractant when tested on the Loyalty Islands, where *B. paraxanthodes* is most common. That lure attracted one specimen on the mainland (Royer et al. 2019a), and many specimens of *B. neoxanthodes* in Vanuatu **(new lure record)**.

Host plants. APOCYNACEAE: *Vincetoxicum biglandulosum* (dubious record ?). ARALIACEAE: *Meryta* sp., *Plerandra gabriellae.*

Notes. This species is a non-pest member species of the *Bactrocera xanthodes* complex (Drew et al. 1997). The *Tylophora* host record was doubted by Hancock and Drew (2017a).

Bactrocera (*Notodacus*) new species # 1 near *paraxanthodes*

Distribution (Fig. 121). Samoa (Savai'i).

Male lure. No known lure.

Host plants. ARALIACEAE: *Meryta* sp. CALOPHYLLACEAE: *Mammea glauca.* MORACEAE: *Ficus* sp.

Notes. This species is an undescribed non-pest member species of the *Bactrocera xanthodes* complex (Drew et al. 1997). Originally treated as Samoan populations of *B. paraxanthodes* (Drew and Hancock 1995), it was subsequently referred to as *B.* sp. n. No. 1 (near *paraxanthodes*) in Drew et al. (1997) and Hancock and Drew (2017a).

Bactrocera (*Bactrocera*) *passiflorae* (Froggatt, 1910)

Fijian fruit fly

Figure 62

Distribution (Fig. 103). Fiji (Viti Levu, Vanua Levu, Taveuni, Lau Group). Futuna. Wallis. Niue.

Male lure. Cue-lure.

Host plants. Category B polyphagous fruit pest (Vargas et al. 2015) bred from 48 host species in 27 families. Records in Fiji: ANACARDIACEAE: *Anacardium occidentale*, *Mangifera indica*. ANNONACEAE: *Annona muricata*, *A. reticulata*, *Cananga odorata*. APOCYNACEAE: *Cascabela thevetia*, *Cerbera manghas*, *Ochrosia oppositifolia*. BIGNONIACEAE: *Pyrostegia venusta*. CALOPHYLLACEAE: *Calophyllum inophyllum*. CHRYSOBALANACEAE: *Chrysobalanus icaco*. CLUSIACEAE: *Garcinia* x *mangostana*. COMBRETACEAE: *Terminalia catappa*, *T. litoralis*. ELAEOCARPACEAE: *Elaeocarpus angustifolius*. FABACEAE: *Inocarpus fagifer*. LAURACEAE: *Persea americana*. LECYTHIDACEAE: *Barringtonia edulis*. LOGANIACEAE: *Neuburgia corynocarpa*. LYTHRACEAE: *Punica granatum*. MALVACEAE: *Theobroma cacao*. MELIACEAE: *Aglaia basiphylla*. MORACEAE: *Artocarpus altilis*, *A. heterophyllus*. MYRTACEAE: *Psidium cattleianum*, *P. guajava*, *Syzygium jambos*, *S. malaccense*, *S. coarctatum*. OXALIDACEAE: *Averrhoa carambola*. PASSIFLORACEAE: *Passiflora edulis, P. quadrangularis*. RUBIACEAE: *Coffea liberica*, *Guettarda speciosa*. RUTACEAE: *Citrus aurantium, C. japonica, C. limon, C. maxima, C. paradisi, C. reticulata, C. sinensis*. SANTALACEAE: *Santalum yasi*. SAPINDACEAE: *Pometia pinnata*. SAPOTACEAE: *Chrysophyllum cainito*, *Manilkara zapota*, *Planchonella chartacea*. SIMAROURACEAE: *Amaroria soulameoides*. SOLANACEAE: *Capsicum frutescens*.

Edible hosts common names. Avocado, breadfruit, cashew, chilli pepper, cocoa, cocoplum, coffee, common guava, custard apple, giant granadilla, giant lau lau, grapefruit, jackfruit, kumquat, lemon, Malay-apple, mango, mangosteen, orange, Pacific lychee, pomegranate, pomelo, purple granadilla, rose-apple, sapodilla, sour orange, soursop, star-apple, starfruit, strawberry guava, Tahitian chestnut, tangerine, tropical almond.

Biology. Adults mate at dusk (Allwood et al. 1997). Rate of development studied in laboratory by Leweniqila et al. (1997a). Egg hatch begins at 36 hours and is complete by 48 hours. Pupation occurs 192-240 hours after egg laying in papaya-based diet, i.e., pupation begins at day 8 and adult eclosion begins at day 20 after oviposition. Larval development slightly longer when reared on zucchini-based diet (Leweniqila et al. 1997a). This species is present both in forest and orchard habitats, with more pronounced seasonality in forest, with peak in Feb-May, and less clear seasonal trends in orchards (Leweniqila et al. 1997b). Monthly trapping data illustrated on Figure 123 and

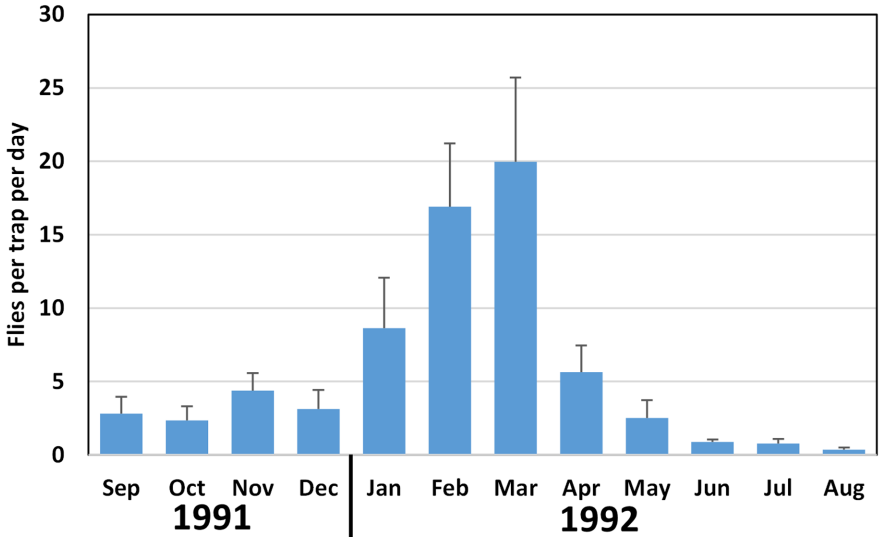


Figure 123. Mean (±SE) daily captures of *Bactrocera passiflorae* (Froggatt) in cue-lure traps maintained in Fiji (Viti Levu, Vanua Levu) between September 1991 and August 1992, based on eight trapping sites (n = 91, mean FTD = 5.85).

published in Tora Vueti et al. (1997c). This species is parasitized by *Fopius arisanus* and *Diachasmimorpha longicaudata* in Fiji (Vargas et al. 2012a).

Notes. Specimens in Fiji have uniformly black abdomen, while populations in Tonga (Niuas group), Tuvalu and Tokelau have extensive pale markings on the abdomen (Fig. 63) and have been treated as a likely new species close to *B. passiflorae* by Drew and Hancock (1995). Specimens collected by the author on Wallis in 2019, traditionally recognized as *B. passiflorae* on Wallis and Futuna, have moderate pale markings on the abdomen (Fig. 62d). Extensive sampling throughout the range of these populations and molecular characterizations are required to resolve the status of this species, and its relationship with *B. samoae*. Heat tolerance of immature stages investigated in Fiji (Tora Vueti et al. 1997b).

Bactrocera (*Bactrocera*) species near *passiflorae* (sensu Drew, 1995)

Figures 63–64

Distribution (Fig. 103). Tonga (Niuas Group). Tuvalu. Tokelau.

Male lure. Cue-lure.

Host plants. Category C polyphagous fruit pest (Vargas et al. 2015) bred from 20 host species in 17 families. Records in Tonga: ANACARDIACEAE: *Anacardium occidentale*, *Mangifera indica*. ANNONACEAE: *Cananga odorata*. APOCYNACEAE: *Ochrosia oppositifolia*. CALOPHYLLACEAE: *Calophyllum inophyllum*. CARICACEAE: *Carica papaya*. COMBRETACEAE: *Terminalia catappa*, *T. litoralis.* FABACEAE: *Inocarpus fagifer*. HERNANDIACEAE: *Hernandia nymphaeifolia*. LAURACEAE: *Persea americana*. MALVACEAE: *Theobroma cacao*. MYRTACEAE: *Psidium guajava*. PASSIFLORACEAE: *Passiflora quadrangularis*. RUBIACEAE: *Guettarda speciosa*. RUTACEAE: *Citrus reticulata*, *C. sinensis*. SAPINDACEAE: *Pometia pinnata*. SOLANACEAE: *Solanum melongena*. THYMELAEACEAE: *Phaleria disperma*.

Edible hosts common names. Avocado, cashew, cocoa, common guava, eggplant, giant granadilla, mango, orange, Pacific lychee, papaya, Tahitian chestnut, tangerine, tropical almond.

Notes. Another similar-looking undescribed species (Fig. 64) was bred from *Ochrosia oppositifolia* and drawn to cue-lure in the northern interior of Viti Levu (Fiji) (Tora Vueti et al. 1997a). These two species are also virtually indistinguishable from *Bactrocera samoae* (Fig. 77), a species not attracted to male lures and only bred from non-economic hosts in Samoa.

Bactrocera (*Bulladacus*) *penefurva* Drew, 1989

Figure 65

Distribution. Papua New Guinea (mainland). Solomon Islands (Guadalcanal).

Male lure. No known lure.

Host plants. Records in Papua New Guinea and Solomon Islands: COMBRETACEAE: *Terminalia catappa*, *T. kaernbacchii*. GNETACEAE: *Gnetum gnemon*.

Edible hosts common names. Okari nut, tropical almond.

Bactrocera (*Bactrocera*) *peneobscura* Drew and Romig, 2001

Figure 66

Distribution. Vanuatu (Efate, Aneityum).

Male lure. Cue-lure.

Host plants. No known host.

Bactrocera (*Bactrocera*) *pepisalae* (Froggatt, 1910)

Figure 67

Distribution. Papua New Guinea (Bougainville). Solomon Islands (Shortland Group, Choiseul, Vella Lavella, Kolombangara, New Georgia, Isabel, Russell, Florida, Guadalcanal, Malaita, San Cristobal).

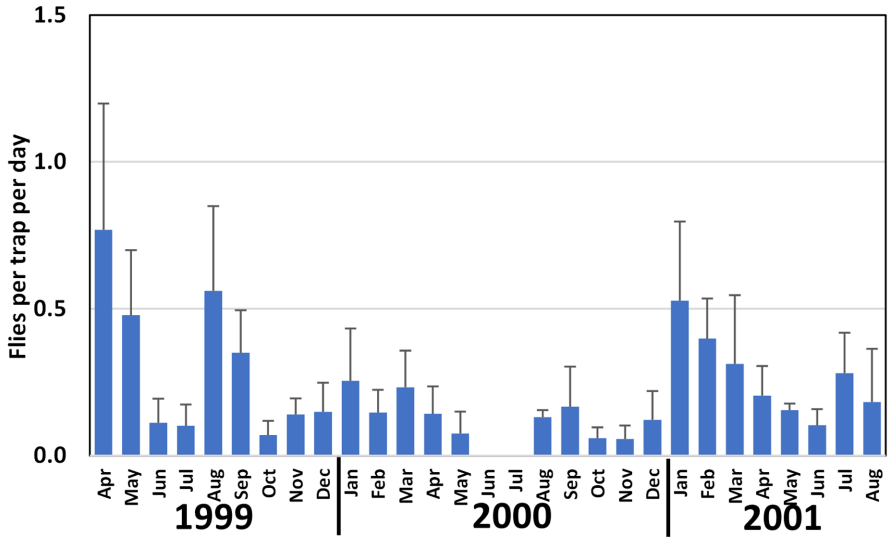


Figure 124. Mean (±SE) daily captures of *Bactrocera pepisalae* (Drew) in methyl eugenol traps maintained in the Solomon Islands (Guadalcanal Island) between April 1999 and August 2001, based on six trapping sites (n = 137, mean FTD = 0.23).

Male lure. Methyl eugenol.

Host plants. No known host.

Biology. Monthly trapping data illustrated on Figure 124.

Bactrocera (*Bactrocera*) *perfusca* (Aubertin, 1929)

Figure 68

Distribution (Fig. 105). French Polynesia (Tahiti, Hiva Oa, Nuku Hiva, Ua Huka).

Male lure. No known lure.

Host plants. Category D minor pest (Vargas et al. 2015). ANACARDIACEAE: *Mangifera indica*. COMBRETACEAE: *Terminalia catappa*. MYRTACEAE: *Syzygium jambos*. SANTALACEAE: *Santalum* sp.

Edible hosts common names. Mango, rose-apple, tropical almond.

Bactrocera (*Bactrocera*) *phaea* (Drew, 1971)

Figure 69

Distribution. Papua New Guinea (mainland, New Britain, New Ireland (Lihir Island only), Manus). Solomon Islands (Isabel, Florida, Guadalcanal).

Male lure. Cue-lure.

Host plants. Record in Solomon Islands: ZINGIBERACEAE: *Alpinia purpurata*.

Bactrocera (*Bactrocera*) *picea* (Drew, 1972)

Figure 70

Distribution. Papua New Guinea (Bougainville). Solomon Islands (Shortland Group, Choiseul, Vella Lavella, Gizo, Kolombangara, New Georgia, Isabel, Russell, Florida, Guadalcanal, Malaita).

Male lure. Methyl eugenol.

Host plants. No known host.

Bactrocera (*Bactrocera*) *pseudodistincta* (Drew, 1971)

Figure 71

Distribution. Indonesia (Moluccas). Papua New Guinea (mainland, New Britain, New Ireland). Solomon Islands (Choiseul, Kolombangara, Isabel, Florida, Guadalcanal, Malaita, San Cristobal, Rennell and Bellona, Santa Cruz).

Male lure. Cue-lure.

Host plants. No known host.

Bactrocera (*Bactrocera*) *psidii* (Froggatt, 1899)

South Sea guava fruit fly

(= *Dacus ornatissimus* Froggatt, 1909)

Figure 72

Distribution (Fig. 112). New Caledonia (mainland, Maré, Lifou).

Male lure. Cue-lure.

Host plants. Category B polyphagous fruit pest (Vargas et al. 2015) bred from 31 host species in 16 families. ANACARDIACEAE: *Anacardium occidentale*, *Mangifera indica*. ANNONACEAE: *Annona muricata*, *A. reticulata*, *A. squamosa*. APOCYNACEAE: *Cascabela thevetia*, *Cerbera manghas*. CARICACEAE: *Carica papaya*. COMBRETACEAE: *Terminalia catappa*. EBENACEAE: *Diospyros kaki*, *D. macrocarpa*, *D. mespiliformis*. EUPHORBIACEAE: *Aleurites moluccanus*. LYTHRACEAE: *Punica granatum*. MALPIGHIACEAE: *Malpighia glabra*. MORACEAE: *Ficus* sp., *Morus alba*. MYRTACEAE: *Eugenia uniflora*, *Psidium acutangulum*, *P. cattleianum*, *P. guajava*, *Syzygium jambos*, *S. malaccense*. OXALIDACEAE: *Averrhoa carambola*. PASSIFLORACEAE: *Passiflora quadrangularis*. ROSACEAE: *Fragaria vesca*, *Prunus domestica*, *P. persica*, *P. simonii*. RUTACEAE: *Citrus maxima*. VITACEAE: *Vitis vinifera*.

Edible hosts common names. Acerola, cashew, common guava, custard apple, giant granadilla, Japanese persimmon, Malay-apple, mango, nectarine, papaya, peach, plum, pomegranate, pomelo, rose-apple, soursop, starfruit, strawberry, strawberry guava, sugar-apple, Surinam cherry, tropical almond, white mulberry, wine grape.

Biology. Adults mate during the day (Mille 2010). Under laboratory conditions, eggs hatch after 2.25 days, larval development takes about 10 days and pupal stage lasts nine days (Mille 2010). This species is most commonly trapped in rural areas and rainforest, rather than in village and suburban environments, unlike *B. tryoni* and *B. curvipennis* (Amice and Sales 1997a). Monthly trapping data illustrated on Figure 125.

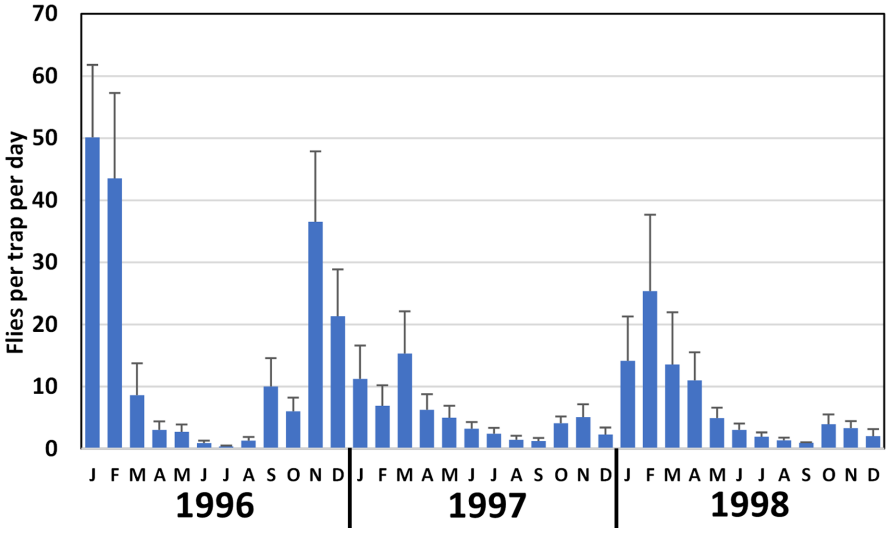


Figure 125. Mean (±SE) daily captures of *Bactrocera psidii* (Froggatt) in cue-lure traps maintained in New Caledonia (Mainland) between January 1996 and December 1998, based on 13 trapping sites (n = 444, mean FTD = 9.24).

Notes. Heat tolerance of immature stages was investigated in New Caledonia (Sales et al. 1997a). *Dacus virgatus* Coquillett 1910, designated as a junior synonym of *B. psidii* by Malloch (1931), is actually a synonym of *B. facialis*.

Bactrocera (*Bactrocera*) *quadrisetosa* (Bezzi, 1928)

(= *Dacus varipes* Malloch, 1939)
Figure 73

Distribution (Fig. 105). Solomon Islands (New Georgia, Florida, Guadalcanal, Santa Cruz). Vanuatu (Torres Islands, Banks Islands, Santo, Epi-Paama-Tongoa, Efate).

Male lure. Dihydroeugenol, isoeugenol. **NEW LURE RECORDS.** These are new lure records from surveys carried out by Christian Mille in Vanuatu in 2019.

Host plants. Category D minor pest (Vargas et al. 2015). Host record in Solomon Islands and Vanuatu: SAPINDACEAE: *Pometia pinnata*.

Edible host common name: Pacific lychee.

Biology. Adults mate at dusk (Allwood 1997).

Bactrocera (*Bactrocera*) *quasienochra* Leblanc and Doorenweerd, 2021

Figure 74

Distribution. Solomon Islands (Guadalcanal).

Male lure. Cue-lure.

Host plants. No known host.

Bactrocera (*Bactrocera*) *reclinata* Drew, 1989

Figure 75

Distribution. Papua New Guinea (Bougainville). Solomon Islands (Guadalcanal).

Male lure. Methyl eugenol.

Host plants. No known host.

Notes. The Solomon Islands record is based on a single male collected in a methyl eugenol trap in Honiara (Guadalcanal).

Bactrocera (*Bactrocera*) *redunca* (Drew, 1971)

Figure 76

Distribution. Papua New Guinea (mainland, New Britain, Bougainville). Solomon Islands (Shortland Group, Choiseul, Kolombangara, Isabel, Russell, Florida, Guadalcanal, Malaita, San Cristobal, Santa Cruz). Vanuatu (Torres Islands, Banks Islands, Santo, Malekula, Ambae, Ambrym, Epi-Paama-Tongoa, Efate). New Caledonia (Maré; **NEW COUNTRY RECORD**).

Male lure. Cue-lure.

Host plants. Record in Vanuatu: MENISPERMACEAE: *Pycnarrhena ozantha*.

Biology. Monthly trapping data illustrated on Figure 126.

Notes. The new country record from New Caledonia is based on the collection of five specimens in cue-lure traps on Maré Island, in March 2019.

Bactrocera (*Bactrocera*) *samoae* Drew, 1989

Figure 77

Distribution. Samoa (Savai'i, Upolu).

Male lure. No known lure.

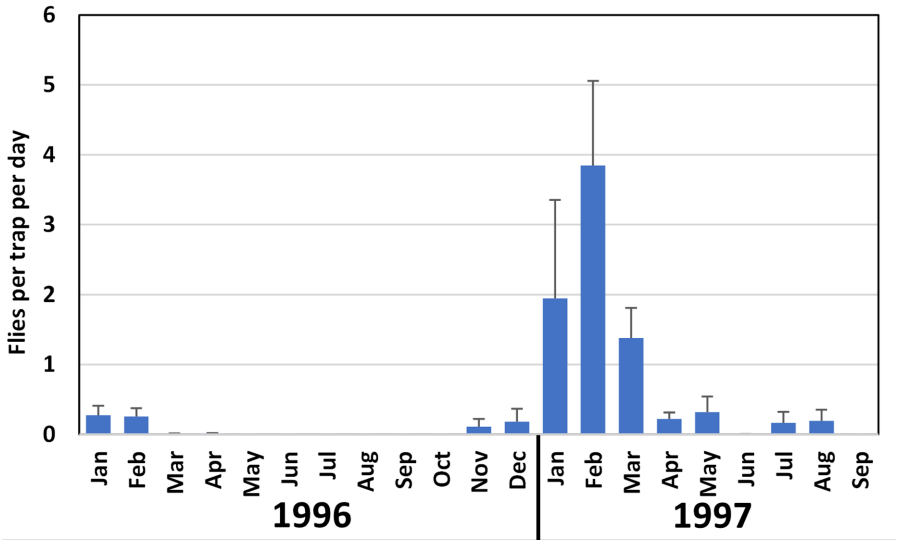


Figure 126. Mean (±SE) daily captures of *Bactrocera redunca* (Drew) in cue-lure traps maintained in Vanuatu (Efate Island) between January 1996 and September 1997, based on 10 trapping sites (n = 179, mean FTD = 0.48).

Host plants. ANNONACEAE: *Cananga odorata*. APOCYNACEAE: *Cerbera odollam*, *Ochrosia oppositifolia*. ARALIACEAE: *Polyscias* sp. CALOPHYLLACEAE: *Calophyllum inophyllum*. COMBRETACEAE: *Terminalia catappa*. EBENACEAE: *Diospyros foliosa*. GENTIANACEAE: *Fagraea berteroana*. RUBIACEAE: *Guettarda speciosa*. RUTACEAE: *Micromelum minutum*, *Murraya paniculata*.

Edible host common name: Tropical almond.

Notes. This species, not attracted to male lures, is virtually indistinguishable from two other cue-lure-attracted species referred to as *Bactrocera* species near *passiflorae* (Fig. 63, 64).

Bactrocera (*Bactrocera*) *setinervis* (Malloch, 1938)

Figure 78

Distribution. Pitcairn Group (Henderson Island, Pitcairn Island).

Male lure. No known lure.

Host plants. No known host.

Bactrocera (*Bactrocera*) *simulata* (Malloch, 1939)

Figure 79

Distribution. Papua New Guinea (Bougainville). Solomon Islands (Shortland Group, Choiseul, Vella Lavella, Gizo, Kolombangara, New Georgia, Isabel, Russell, Florida, Guadalcanal, Malaita, San Cristobal, Rennell and Bellona, Santa Cruz). Vanuatu (Santo, Malekula, Ambae, Ambrym, Epi-Paama-Tongoa, Efate).

Male lure. Cue-lure.

Host plants. Record in Solomon Islands: CUCURBITACEAE: *Coccinia grandis*.

Edible host common name: Ivy gourd.

Biology. Monthly trapping data illustrated on Figure 127.

Notes. This species is nearly identical to *B. geminosimulata* (Fig. 34) (Leblanc et al. 2021). They are genetically distinct and distinguished by a subtle but consistent difference in wing infuscation (Leblanc et al. 2021).

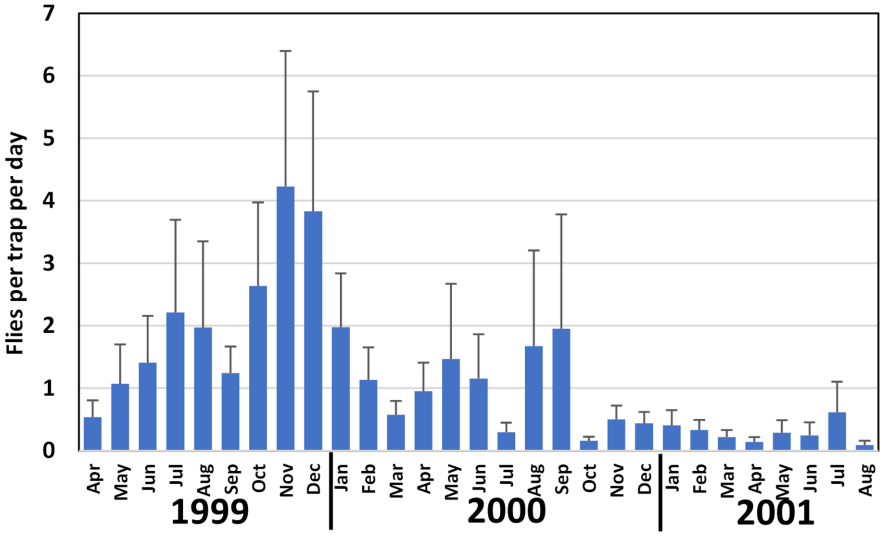


Figure 127. Mean (±SE) daily captures of *Bactrocera simulata* (Malloch) in cue-lure traps maintained in the Solomon Islands (Guadalcanal Island) between April 1999 and August 2001, based on 10 trapping sites (n = 224, mean FTD = 1.19).

Bactrocera (*Bactrocera*) *trilineola* Drew, 1989

Vanuatu fruit fly

(= *Dacus triseriatus* Drew, 1971, *Bactrocera distotriseriata* Hardy, 1989b)

Figures 80, 81

Distribution (Fig. 112). New Caledonia (Maré, Lifou). Vanuatu (Torres Islands, Banks Islands, Santo, Malekula, Ambae, Maewo, Pentecost, Ambrym, Epi-Paama-Tongoa, Efate, Erromanga, Tanna, Aneityum).

Male lure. Cue-lure.

Host plants. Category B polyphagous fruit pest (Vargas et al. 2015) bred in Vanuatu from 31 host species in 17 families. ANACARDIACEAE: *Anacardium occidentale*, *Mangifera indica*, *Semecarpus vitiensis*, *Spondias dulcis*. ANNONACEAE: *Annona muricata*. APOCYNACEAE: *Ochrosia oppositifolia*. CARICACEAE: *Carica papaya*. COMBRETACEAE: *Terminalia catappa*, *T. sepicana*. FABACEAE: *Inocarpus fagifer*. LAURACEAE: *Persea americana*. MELIACEAE: *Dysoxylum gaudichaudianum*. MORACEAE: *Artocarpus altilis*, *Ficus aspera*. MUSACEAE: *Musa* sp. MYRTACEAE: *Eugenia uniflora*, *Psidium guajava*, *Syzygium clusiifolium*, *S. jambos*, *S. malaccense*. OXALIDACEAE: *Averrhoa carambola*. RUBIACEAE: *Guettarda speciosa*. RUTACEAE: *Citrus japonica*, *C. limon*, *C. maxima*, *C. reticulata*, *C. sinensis*. SANTALACEAE: *Santalum austrocaledonicum*. SAPINDACEAE: *Pometia pinnata*. SAPOTACEAE: *Burckella obovata*, *Planchonella grayana*.

Edible hosts common names. Avocado, banana, breadfruit, cashew, common guava, Jew plum, kumquat, lemon, Malay-apple, mango, orange, Pacific lychee, papaya, pomelo, rose-apple, soursop, starfruit, Surinam cherry, Tahitian chestnut, tangerine, tropical almond.

Biology. Adults start mating 11 days after emergence, and mate between late morning and early afternoon at the peak of light intensity (Allwood 1997). The life cycle is completed in approximately 21–22 days at 25 °C on artificial diet (Allwood et al. 1997). Populations peak in January–February and April–May, which coincides with the fruiting seasons of mangoes and guavas, respectively (Allwood et al. 1997). Monthly trapping data illustrated on Figure 128.

Notes. This species was detected in New Caledonia, on Maré Island in 1993 and Lifou Island in 2000 (Mille 2008). Species identity was further confirmed by genetic analysis on specimens collected by the author on Maré in 2019 (Doorenweerd et al. 2022). This species is a member of the *B. frauenfeldi* complex.

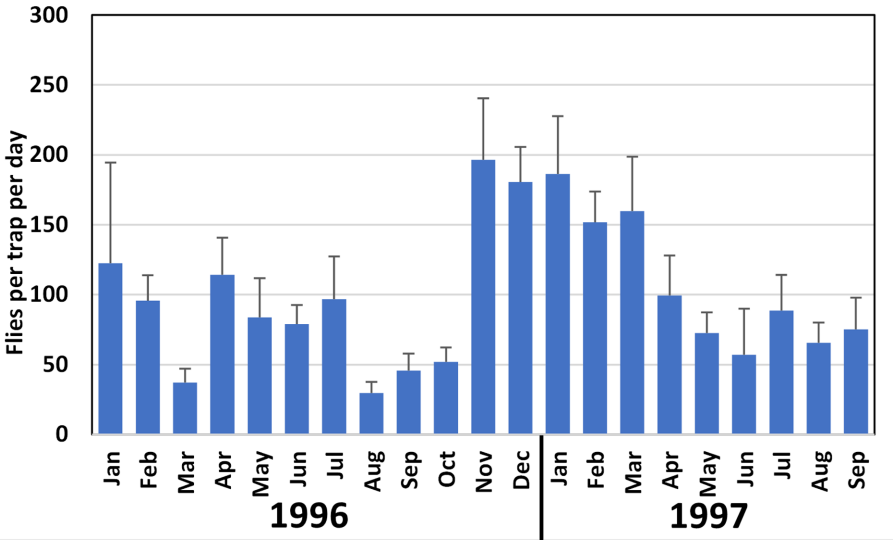


Figure 128. Mean (±SE) daily captures of *Bactrocera trilineola* Drew in cue-lure traps maintained in Vanuatu (Efate Island) between January 1996 and September 1997, based on 10 trapping sites (n = 179, mean FTD = 101.21).

Bactrocera (*Bactrocera*) *tryoni* (Froggatt, 1897)

Queensland fruit fly

Figure 82

Distribution (Fig. 129). Australia (Queensland, New South Wales, Victoria). New Caledonia (mainland, Maré, Lifou; detected 1969). Cook Islands (Rarotonga; detected 2001, eradicated 2002). French Polynesia (Austral Islands, Society Islands, Tuamotu-Gambier Islands, Marquesas; detected 1970). Pitcairn Island (introduced).

Male lure. Cue-lure (strong attraction), zingerone (weak attraction). Also weakly attracted to anisyl acetone (Royer et al. 2019a).

Host plants. Category A polyphagous fruit pest (Vargas et al. 2015) bred from 232 host species in 49 families in Australia (Hancock et al. 2000). Records in French Polynesia and New Caledonia: ANACARDIACEAE: *Anacardium occidentale*, *Mangifera indica*, *Spondias dulcis*, *S. mombin*. ANNONACEAE: *Annona muricata*, *A. reticulata*, *A. squamosa*, *Cananga odorata*. APOCYNACEAE: *Cascabela thevetia*. BURSERACEAE: *Canarium vulgare*. CALOPHYLLACEAE: *Calophyllum inophyllum*. CARICACEAE: *Carica papaya*. COMBRETACEAE: *Terminalia catappa*. CUCURBITACEAE: *Cucurbita pepo*. EBENACEAE: *Diospyros kaki*, *D. mespiliformis*. FABACEAE: *Inocarpus fagifer*. HERNANDIACEAE: *Hernandia cordigera*. LAURACEAE: *Persea americana*. LECYTHIDACEAE: *Barringtonia asiatica*, *B. edulis*. LYTHRACEAE: *Punica granatum*. MALPIGHIACEAE: *Malpighia glabra*. MORACEAE: *Artocarpus altilis*, *A. heterophyllus*, *Ficus pancheriana*, *Morus alba*. MUSACEAE: *Musa troglodytarum*, *Musa* x *paradisiaca*. MYRTACEAE: *Eugenia uniflora*, *Psidium acutangulum*, *P. cattleianum*, *P. guajava*, *Syzygium cumini*, *S. jambos*, *S. malaccense*. OLACACEAE: *Ximenia americana*. OXALIDACEAE: *Averrhoa carambola*. PASSIFLORACEAE: *Passiflora edulis*, *P. laurifolia*, *P. quadrangularis*. RHAMNACEAE: *Ziziphus jujuba*. ROSACEAE: *Eriobotrya japonica*, *Fragaria vesca*, *Prunus domestica*, *P. persica*, *P. simonii*. RUBIACEAE: *Coffea* sp., *Morinda citrifolia*. RUTACEAE: *Casimiroa edulis*, *Citrus* × *latifolia*, *C. aurantiifolia*, *C. japonica*, *C. maxima*, *C. paradisi*, *C. reticulata*, *C. sinensis*. SAPINDACEAE: *Litchi chinensis*, *Nephelium lappaceum*, *Pometia pinnata*. SAPOTACEAE: *Chrysophyllum cainito*, *Planchonella sphaerocarpa*, *Pouteria caimito*. SOLANACEAE: *Capsicum annuum*, *Solanum lycopersicum*, *S. mauritianum*, *S. melongena*.

Edible hosts common names. Abiu, acerola, avocado, banana, breadfruit, cashew, coffee, common guava, custard apple, eggplant, fe'i banana, giant granadilla, grapefruit, hog-plum, jackfruit, Japanese persimmon, Java plum, Jew plum, jujube, kumquat, lime, loquat, lychee, Malay-apple, mango, nectarine, noni, orange, Pacific lychee,

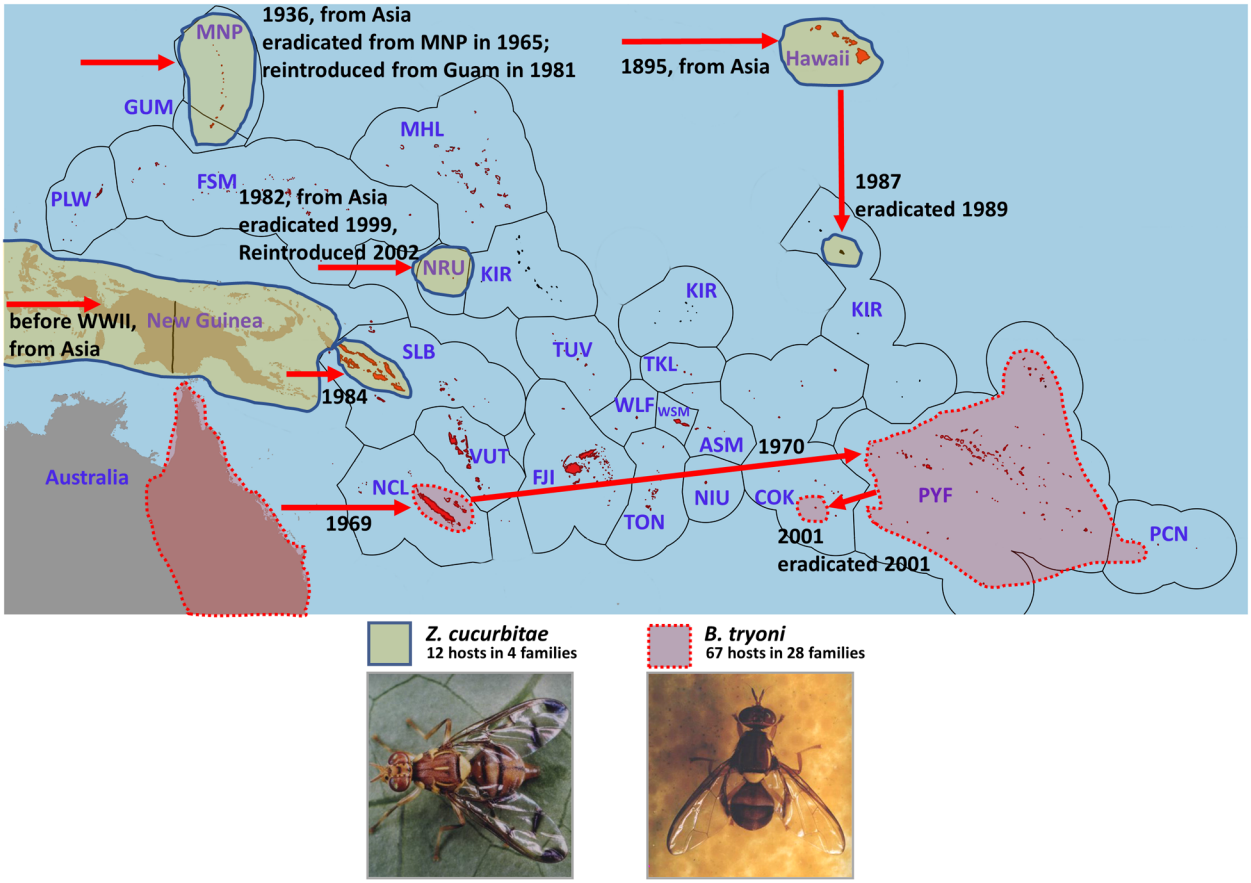


Figure 129. Distribution and invasion and eradication history of *Zeugodacus cucurbitae* (Coquillett) and *Bactrocera tryoni* (Froggatt) in Oceania. Photos by Steve Wilson.

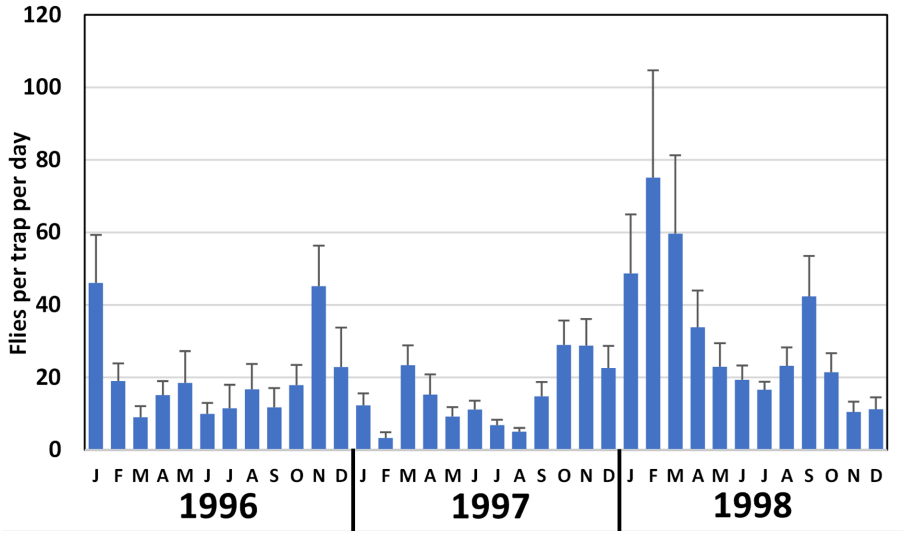


Figure 130. Mean (±SE) daily captures of *Bactrocera tryoni* (Froggatt) in cue-lure traps maintained in New Caledonia (Mainland) between January 1996 and December 1998, based on 14 trapping sites (n = 504, mean FTD = 22.46).

papaya, peach, plum, pomegranate, pomelo, purple granadilla, rambutan, rose-apple, soursop, squash, star-apple, starfruit, strawberry, strawberry guava, sugar-apple, Surinam cherry, Surinam cherry, sweet pepper, Tahitian chestnut, Tahitian lime, tangerine, tomato, tropical almond, white mulberry, white sapote, yellow granadilla, yellow plum.

Biology. Adults mate at dusk (Allwood 1997). Under laboratory conditions, eggs hatch after 1.75 days and larval development takes about nine days (Mille 2010). After its establishment in New Caledonia, *B. tryoni* displaced the native polyphagous fruit pests *B. psidii* and especially *B. curvipennis*, which formerly was the dominant species (Cochereau 1970; Amice and Sales 1997a, 1997b). *Bactrocera tryoni* is now the dominant species in urban and village and orchard areas, while *B. psidii* remains the dominant species in forest (Amice and Sales 1997a, 1997b). Monthly trapping data illustrated on Figure 130.

Notes. Heat tolerance of immature stages was investigated in New Caledonia (Sales et al. 1997). This species was promptly eradicated, with application of male annihilation, protein bait sprays and crop sanitation, after its 2001 detection in Rarotonga (Cook Islands) (Vargas et al. 2014).

Bactrocera (*Bactrocera*) *tsatsiai* Leblanc and Doorenweerd, 2021

Figure 83

Distribution. Solomon Islands (Kolombangara, Guadalcanal).

Male lure. Zingerone.

Host plants. No known host.

Bactrocera (*Bactrocera*) *umbrosa* (Fabricius, 1805)

Breadfruit fruit fly

(= *Dacus fascipennis* Wiedemann, 1819, *Bactrocera fasciatipennis* Doleschall, 1856, *Dacus conformis* Walker, 1856, *Dacus diffusus* Walker, 1860, *Dacus frenchi* Froggatt, 1909, *Bactrocera lacerata* White and Evenhuis, 1999)

Figure 84

Distribution (Fig. 105). Vietnam. Cambodia. Thailand. Philippines. Malaysia (Peninsular, East). Indonesia (Sumatra, Java, Kalimantan, Sulawesi, West Timor). Australia (Christmas Island, Torres Strait Islands). Papua New Guinea (mainland, New Britain, New Ireland, Manus, Bougainville). Solomon Islands (Shortland Group, Choiseul, Vella Lavella, Gizo, Kolombangara, New Georgia, Isabel, Russell, Florida, Guadalcanal, Malaita, San Cristobal, Rennell and Bellona, Santa Cruz, Reef Islands). Vanuatu (Torres Islands, Banks Islands, Santo, Malekula, Ambae, Maewo, Pentecost, Ambrym, Epi-Paama-Tongoa, Efate, Erromanga, Tanna, Aneityum). New Caledonia (mainland, Maré, Lifou). Palau.

Male lure. Methyl eugenol. Weak attraction to isoeugenol and methyl-isoeugenol (Royer et al. 2018).

Host plants. Category B pest (Vargas et al. 2015) of *Artocarpus* spp. Records in New Caledonia, Papua New Guinea, Solomon Islands, and Vanuatu: MORACEAE: *Artocarpus altilis*, *A. heterophyllus*.

Edible hosts common names. breadfruit, jackfruit.

Biology. Adults mate at dusk, (Allwood 1997). Occurs in very large populations in lowland areas, and populations peak in December-January in the Solomon Islands, which corresponds to the main breadfruit season (Vagalo et al. 1997). Monthly trapping data illustrated on Figures 131, 132.

Notes. The only pest dacine species known to be naturally distributed across Lydekker's line (Krosch et al. 2019).

Bactrocera (*Bactrocera*) *unifasciata* (Malloch, 1939)

Figure 85

Distribution. Solomon Islands (Kolombangara, Isabel, Guadalcanal).

Male lure. Cue-lure.

Host plants. No known host.

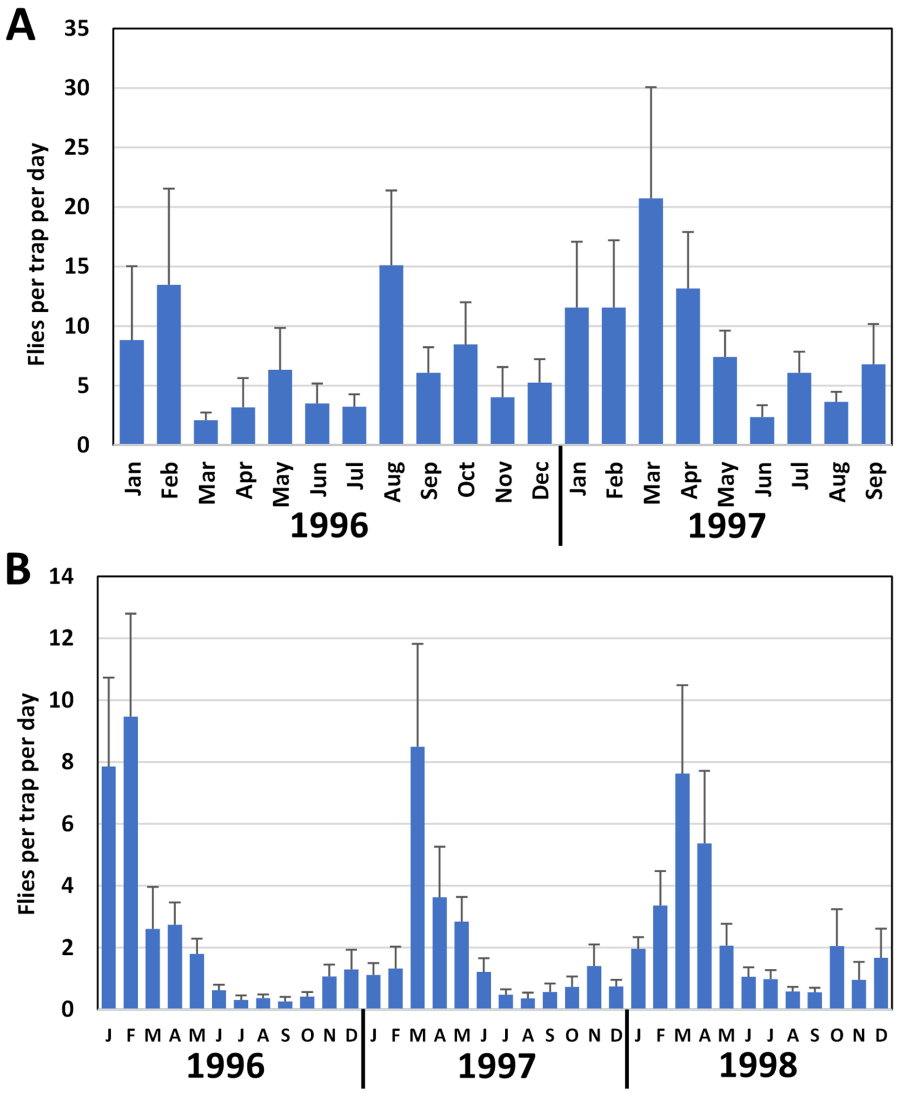


Figure 131. Mean (±SE) daily captures of *Bactrocera umbrosa* (Fabricius) in methyl eugenol traps maintained: **A)** in Vanuatu (Efate Island) between January 1996 and September 1997, based on 9 trapping sites (n = 165, mean FTD = 7.99), and **B)** in New Caledonia (Mainland) between January 1996 and December 1998, based on 9 trapping sites (n = 324, mean FTD = 2.22).

Bactrocera (*Bulladacus*) *unipunctata* (Malloch, 1939)

Figure 86

Distribution. Solomon Islands (Florida).

Male lure. No known lure.

Host plants. No known host.

Notes. This species is known only from the damaged teneral male holotype, collected nearly a century ago. Drew and Hancock (2016) tentatively reassigned it to subgenus *Bulladacus*, based on a combination of characters typical of that subgenus, but were unable to confirm the presence of a bulla on the wing.

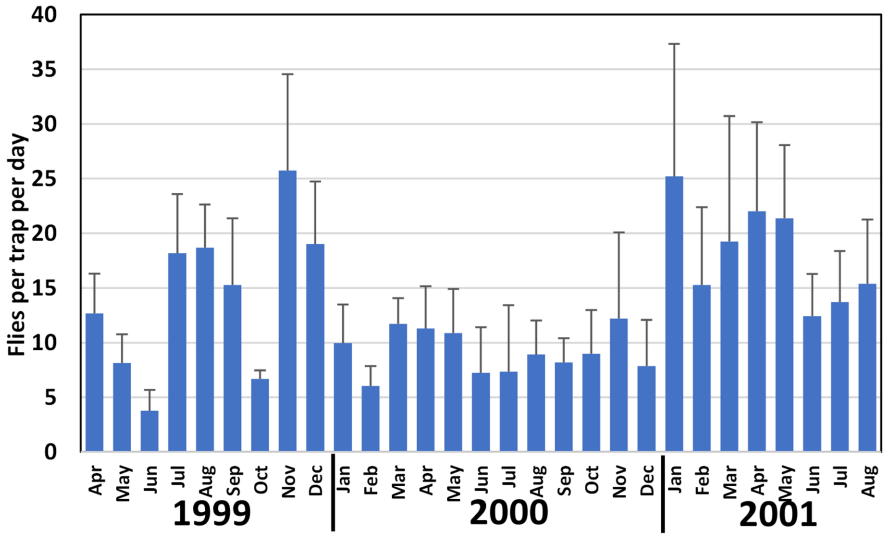


Figure 132. Mean (±SE) daily captures of *Bactrocera umbrosa* (Fabricius) in methyl eugenol traps maintained in the Solomon Islands (Guadalcanal Island) between April 1999 and August 2001, based on 10 trapping sites (n = 228, mean FTD = 13.33).

Bactrocera (*Bactrocera*) *unitaeniola* Drew and Romig, 2001

Figure 87

Distribution. Papua New Guinea (Bougainville). Solomon Islands (Choiseul, Isabel, Guadalcanal).

Male lure. Cue-lure.

Host plants. No known host.

Bactrocera (*Bactrocera*) *vargasi* Leblanc and Doorenweerd, 2021

Figure 88

Distribution. Solomon Islands (Kolombangara, Guadalcanal).

Male lure. Zingerone.

Host plants. No known host.

Bactrocera (*Notodacus*) *xanthodes* (Broun, 1905)

Pacific fruit fly

Figure 89

Distribution (Fig. 121). Fiji (Viti Levu, Vanua Levu, Lau Group, Rotuma). Futuna. Wallis. Samoa (Savai'i, Manono, Upolu). American Samoa. Tonga (Tongatapu Group, Ha'apai Group, Vava'u Group, Niuas Group). Niue. Cook Islands (Rarotonga, Mangaia, Mauke, Mitiaro, Atiu, Aitutaki; introduced early 1970's). French Polynesia (Austral Islands: Raivavae, Rimatara, Rurutu; detected 1998). Nauru (detected 1992, eradicated 2000).

Male lure. Methyl eugenol (weak attractant), methyl-isoeugenol (strong attractant: Royer et al. 2019b).

Host plants. Category B polyphagous fruit pest (Vargas et al. 2015) bred from 34 host species in 20 families. Records in American Samoa, Cook Islands, Fiji, Nauru, Samoa, Tonga, and Wallis: ANACARDIACEAE: *Mangifera indica.* ANNONACEAE: *Annona cherimola*, *A. muricata.* APOCYNACEAE: *Cerbera manghas*, *Ochrosia oppositifolia.* CALOPHYLLACEAE: *Calophyllum inophyllum.* CARICACEAE: *Carica papaya.* COMBRETACEAE: *Terminalia catappa*, *T. samoensis.* CONVOLVULACEAE: *Stictocardia tiliifolia.* CUCURBITACEAE: *Citrullus lanatus.* EBENACEAE: *Diospyros ferrea.* EUPHORBIACEAE: *Excoecaria agallocha.* FABACEAE: *Inocarpus fagifer*. LAURACEAE: *Persea americana*. LECYTHIDACEAE: *Barringtonia edulis*, *B. racemosa*, *B. seaturae*. MALVACEAE:

Theobroma cacao. MORACEAE: *Artocarpus altilis*, *A. heterophyllus*. PASSIFLORACEAE: *Passiflora edulis*, *P. ligularis*, *P. quadrangularis*. RUTACEAE: *Citrus japonica*, *C. maxima*, *C. reticulata*, *C. sinensis*. SANTALACEAE: *Santalum yasi*. SAPOTACEAE: *Burckella richii*, *Chrysophyllum cainito*, *Pouteria caimito*. SOLANACEAE: *Solanum lycopersicum*, *S. mauritianum*.

Edible hosts common names. Abiu, avocado, breadfruit, cherimoya, cocoa, giant granadilla, jackfruit, kumquat, mango, orange, papaya, pomelo, purple granadilla, soursop, star-apple, sweet granadilla, Tahitian chestnut, tangerine, tomato, tropical almond, watermelon.

Biology. Adults mate at dusk (Allwood 1997). Rate of development was studied by Kassim (1993). At 27° C in papaya, egg hatch starts after 36 hours, 40% of larvae have reached second instar by 72 hours, and 76% have reached third instar by 120 hours. Larval popping starts at 156 hours, and 67% have pupated by 168 hours. Adult longevity is 21 weeks under laboratory conditions. A female lays on average 143 eggs over 112 days, starting two weeks after emergence, with egg laying peak egg laying at weeks 9 to 12. Pacific fruit fly is commonly found in

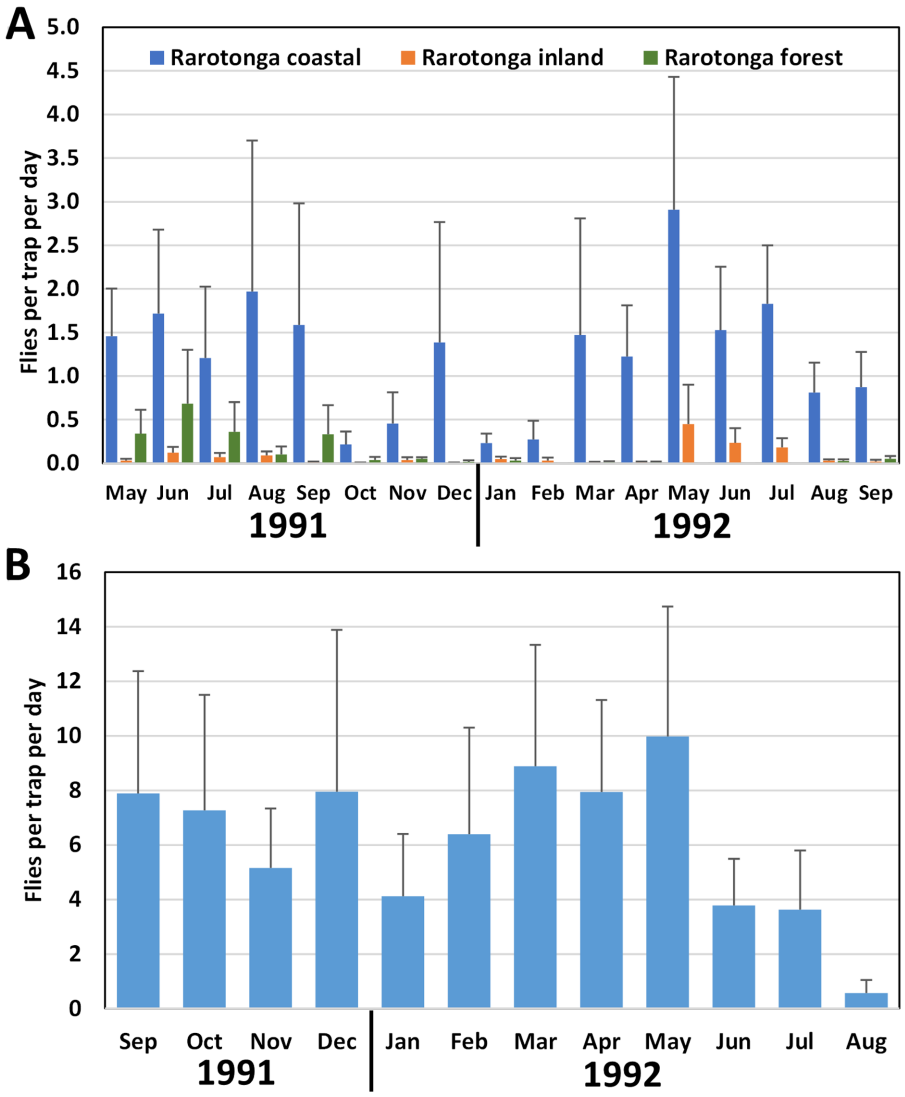


Figure 133. Mean (±SE) daily captures of *Bactrocera xanthodes* (Broun) in methyl eugenol traps maintained: **A)** In coastal, inland and forest trapping sites on Rarotonga Island (Cook Islands) between May 1991 and September 1992, based on 18 trapping sites (n = 306, mean FTD = 0.48), and **B)** in Fiji (Viti Levu, Vanua Levu) between September 1991 and August 1992, based on seven trapping sites (n = 81, mean FTD = 6.06).

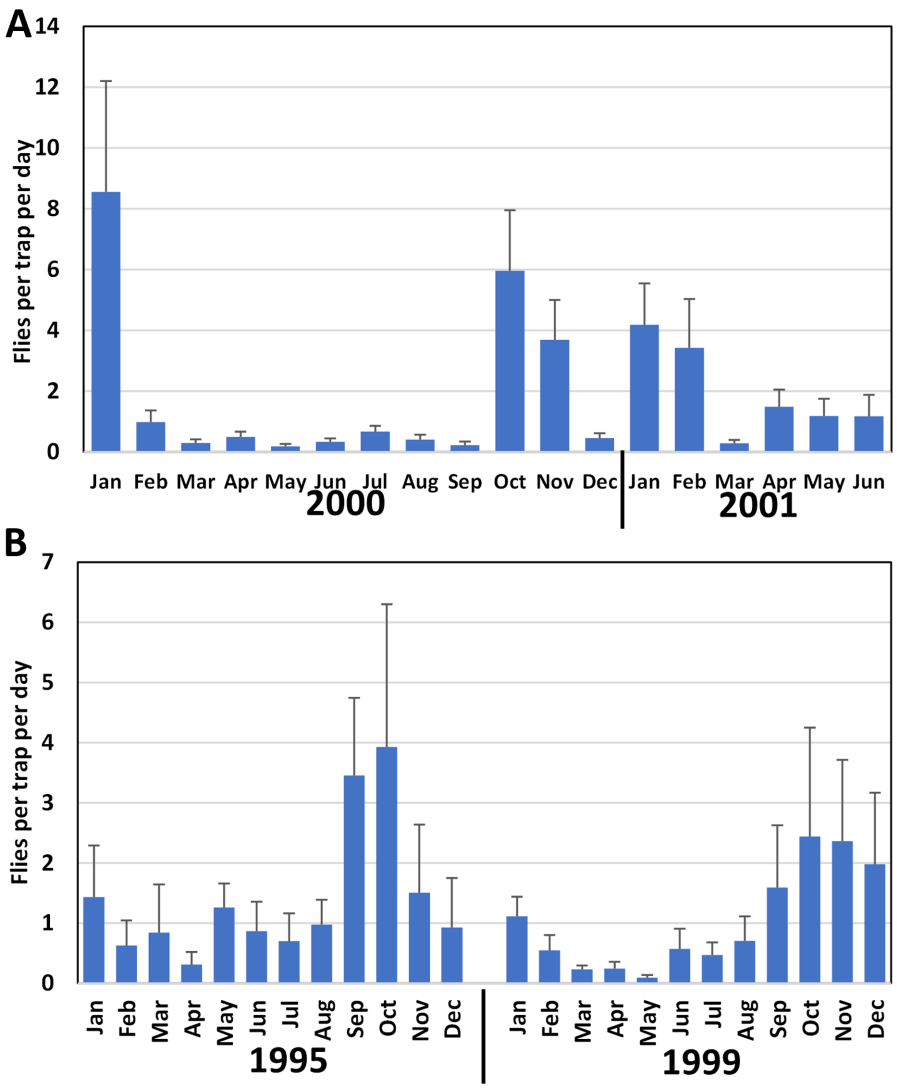


Figure 134. Mean (±SE) daily captures of *Bactrocera xanthodes* (Broun) in methyl eugenol traps maintained: **A)** in Samoa (Upolu Island) between January 2000 and June 2001, based on eight trapping sites (n = 139, mean FTD = 1.88), and **B)** in Tonga (Tongatapu and Vava'u Islands) between January and December 1995 and 1999, based on 15 trapping sites (n = 209, mean FTD = 1.13).

the village, suburban and coastal environments, where breadfruit and mango are common, and is absent in forest habitats (Leweniqila et al. 1997b). Monthly trapping data is illustrated on Figures 133, 134, and was published in Litsinger et al. (1991), Leweniqila et al. (1997b), and Tora Vueti et al. (1997c). This species is parasitized by *Fopius arisanus* in the Cook Islands, Fiji, Tonga and Samoa, and also by *Diachasmimorpha longicaudata* in Fiji (Vargas et al. 2012a).

Notes. Heat tolerance was studied in Fiji, Tonga, Samoa and Cook Islands (Foliaki and Armstrong 1997; Tora Vueti et al. 1997b; Waddell et al. 1997a; Tunupopo et al. 2019). It is less heat tolerant than *B. passiflorae*, *B. facialis*, *B. kirki* and *B. melanotus*. The eradication of this species in Nauru took a lot longer than initially expected, in great part due to weak attraction to methyl eugenol (Allwood et al. 2002). Methyl-isoeugenol, a more potent attractant than methyl eugenol for this species, should preferably be used for monitoring, control and eradication of *B. xanthodes* (Royer et al. 2019b).

Dacus (*Neodacus*) *aneuvittatus* (Drew, 1971)

Figure 90

Distribution. New Caledonia (mainland, Maré, Lifou).

Male lure. Zingerone (strong attractant) and cue-lure (weak attractant) (Royer et al. 2019a).

Host plants. APOCYNACEAE: *Vincetoxicum biglandulosum*.

Dacus (*Neodacus*) *perpusillus* Drew, 1971, restored combination

Figure 91

Distribution. New Caledonia (mainland, Maré, Lifou).

Male lure. Cue-lure.

Host plants. No known host.

Biology. Monthly trapping data illustrated on Figure 135.

Notes. This species was originally described as *Dacus* (*Asiadacus*) *perpusillus* Drew, 1971 and later reassigned as *Bactrocera* (*Sinodacus*) *perpusilla* (Drew) by Drew (1989). More recently, it was transferred to genus *Zeugodacus*, as *Z.* (*Sinodacus*) *perpusillus* (Drew) (DeMeyer et al. 2015; Doorenweerd et al. 2018) or treated as *Bactrocera* (*Parasinodacus*) *perpusilla* (Drew) by Hancock and Drew (2017b). A close morphological examination of fresh specimens collected by the author in New Caledonia in 2019 clearly shows that this species belongs to genus *Dacus* and subgenus *Neodacus*, as defined by Drew and Romig (2013, 2022), further confirmed by genetic data (Doorenweerd et al. 2020). I am therefore reassigning this species as *Dacus* (*Neodacus*) *perpusillus* Drew.

Dacus (*Callantra*) *solomonensis* Malloch, 1939

Figure 92

Distribution. Papua New Guinea (Bougainville). Solomon Islands (Choiseul, Kolombangara, New Georgia, Isabel, Russell, Florida, Guadalcanal, Malaita, San Cristobal).

Male lure. Cue-lure.

Host plants. Category B pest of cucurbits (Vargas et al. 2015). Records in Solomon Islands: CUCURBITACEAE: *Cucumis sativus*, *Cucurbita pepo*, *Luffa acutangula*, *L. cylindrica*, *Trichosanthes cucumerina*.

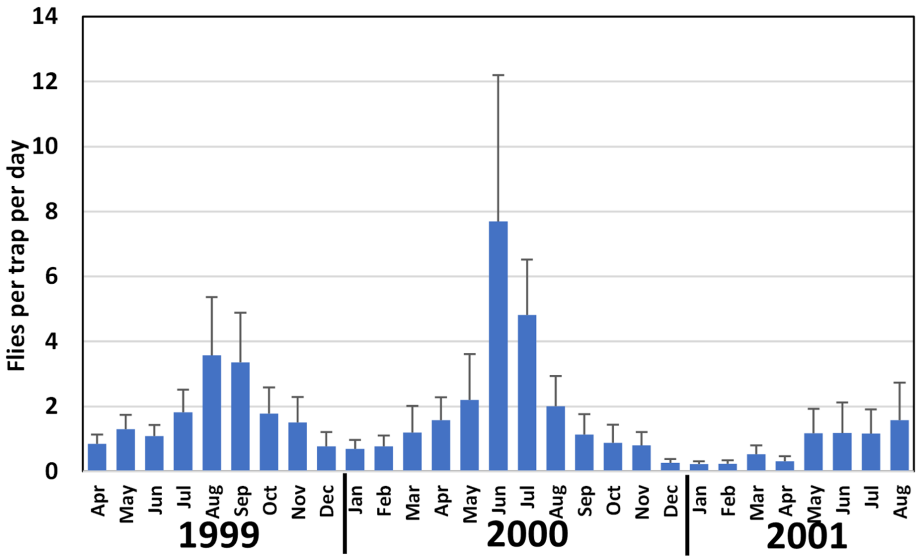


Figure 135. Mean (±SE) daily captures of *Dacus perpusillus* (Drew) in cue-lure traps maintained in New Caledonia (Mainland, Lifou) between January 1996 and December 1998, based on 17 trapping sites (n = 612, mean FTD = 0.05).

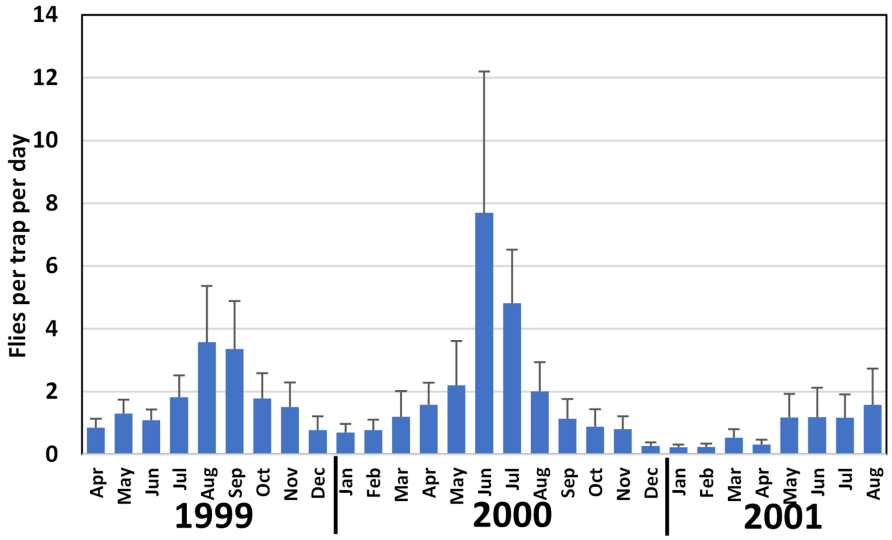


Figure 136. Mean (±SE) daily captures of *Dacus solomonensis* (Malloch) in cue-lure traps maintained in the Solomon Islands (Guadalcanal Island) between April 1999 and August 2001, based on 10 trapping sites (n = 233, mean FTD = 1.56).

Biology. At 25°C, eggs hatch after 46 hours, median larval development time is 12 days, and pupal stage duration is nine days. Adults start mating 16 days after emergence (Tsatsia and Hollingsworth 1997). Monthly trapping data illustrated on Figure 136.

Edible hosts common names. Angled luffa, cucumber, luffa, snakegourd, squash.

Dacus (*Neodacus*) *taui* Drew and Romig, 2001

Figure 93

Distribution. Vanuatu (Torres Islands, Santo, Malekula, Epi-Paama-Tongoa, Efate, Erromanga).

Male lure. Zingerone (**NEW LURE RECORD**).

Host plants. APOCYNACEAE: *Tylophora* sp.

Zeugodacus (*Javadacus*) *abdoangustus* (Drew, 1972)

Figure 94

Distribution. Papua New Guinea (Bougainville). Solomon Islands (Isabel, Guadalcanal, Malaita).

Male lure. Cue-lure.

Host plants. No known host.

Zeugodacus (*Zeugodacus*) *amoenus* (Drew, 1972)

Figure 95

Distribution. Papua New Guinea (Bougainville). Solomon Islands (Isabel).

Male lure. Cue-lure.

Host plants. No known host.

Zeugodacus (*Javadacus*) *cucurbitae* (Coquillett, 1899)

Melon fly

(= *Dacus aureus* Tseng and Chu, 1982, *Dacus yuiliensis* Tseng and Chu, 1992)

Figure 96

Distribution (Fig. 129). Widespread throughout tropical Asia, from Pakistan to Taiwan and south to New Guinea (introduced) and Solomon Islands (introduced); introduced to Africa, the Middle East, and various islands in the Indian and Pacific Oceans (see distribution map in Vargas et al. 2015). Papua New Guinea (mainland, New Britain, New Ireland, Manus, Bougainville). Solomon Islands (Shortland Group, Choiseul, Vella Lavella, Gizo, Kolombangara, New Georgia, Isabel, Russell, Guadalcanal, Malaita). Hawaii (all islands; detected 1895). Guam (detected 1936, eradicated 1965 but re-introduced from Northern Mariana Islands in 1981). Northern Mariana Islands (detected 1936). Kiribati (Christmas Island; detected 1987, eradicated 1989). Nauru (detected 1982, eradicated 1999, reintroduced 2002).

Male lure. Cue-lure. Weak attraction to zingerone, dihydroeugenol, and methyl-isoeugenol (Royer et al. 2018).

Host plants. Category A severe pest of cucurbit crops (Vargas et al. 2015), also bred from a diversity of other families, with a total of 136 host taxa in 30 families (Allwood et al. 1999; McQuate et al. 2016). Records in Guam, Nauru, Northern Mariana Islands, Papua New Guinea, and Solomon Islands: CUCURBITACEAE: *Citrullus lanatus*, *Coccinia grandis*, *Cucumis sativus*, *Cucurbita pepo*, *Luffa acutangula*, *L. cylindrica*, *Momordica charantia*, *Trichosanthes cucumerina.* FABACEAE: *Phaseolus vulgaris*, *Vigna unguiculata*. MALVACEAE: *Abelmoschus esculentus*. SOLANACEAE: *Solanum lycopersicum*.

Edible hosts common names. Angled luffa, bittergourd, common bean, cucumber, ivy gourd, luffa, okra, snakebean, snakegourd, squash, tomato, watermelon.

Biology. Adults mate at dusk (Waterhouse 1993). Rate of development was summarized by Waterhouse (1993). Female flies start laying eggs, primarily on cucurbits, 11–12 days after their emergence from pupae. Eggs are laid in batches of 1–40 eggs in young to ripe fruits, but also on flowers, buds and even leaf stalks and stems of host cucurbits. One female may lay over 1000 eggs during her life. Oviposition peaks occur in the morning and late afternoon. Eggs hatch in about 24 hours. Development time varies from 4 to 17 days (larva) and 7 to 13 days (pupa), depending on temperature and host. In the Solomon Islands, development from egg to adult takes 13 days at 29°C. In Hawaii, at 24°C, eggs hatch in 1.3 days, larval development takes 6.6 days and pupal stage lasts 10.2 days (Vargas et al. 1996). Adults are long-lived, typically up to 150 days, but as long as 240–460 days under cooler temperature. This species is uncommon in the forest. Monthly trapping data is illustrated on Figures 137, 138, and was also published in Hollingsworth et al. (1997). The parasitoid *Psyttalia fletcheri* (Silvestri) was introduced from India to Hawaii in 1916, and subsequently from Hawaii to the Mariana Islands in 1950 (Waterhouse 1993) and the Solomon Islands in 1997 (Hollingsworth 2003).

Notes. Heat tolerance was studied in Hawaii (Jang 1986). Melon fly was eradicated from the Northern Mariana Islands in 1963 through sterile insect releases (Steiner et al. 1965a), but re-introduced from Guam in 1981 (Wong et al. 1989). It was first detected in the Solomon Islands on Shortland in 1984, then Kolombangara, Choiseul and Gizo in 1985, Isabel in 1988, Malaita in 1994, and Guadalcanal in 1995, where initial attempts for eradication were unsuccessful (Waterhouse 1993; Hollingsworth et al. 1997; Vagalo et al. 1997). It was also detected on Christmas Island (Kiribati) in 1987, and eradicated through a 2-year interruption in cucurbit cultivation (Waterhouse 1993). It was easily eradicated from Nauru in 1998–1999, using male annihilation and limited protein bait spray applications, aided by a drought that had reduced host fruit availability (Allwood et al. 2002). It was, however, re-introduced to Nauru in 2002, likely aided by Air Nauru passenger flights from Guam (SPC 2002).

Zeugodacus (*Javadacus*) *fuscipennulus* (Drew and Romig, 2001)

Figure 97

Distribution. Solomon Islands (Kolombangara, New Georgia, Isabel, Guadalcanal, San Cristobal).

Male lure. Cue-lure.

Host plants. No known host.

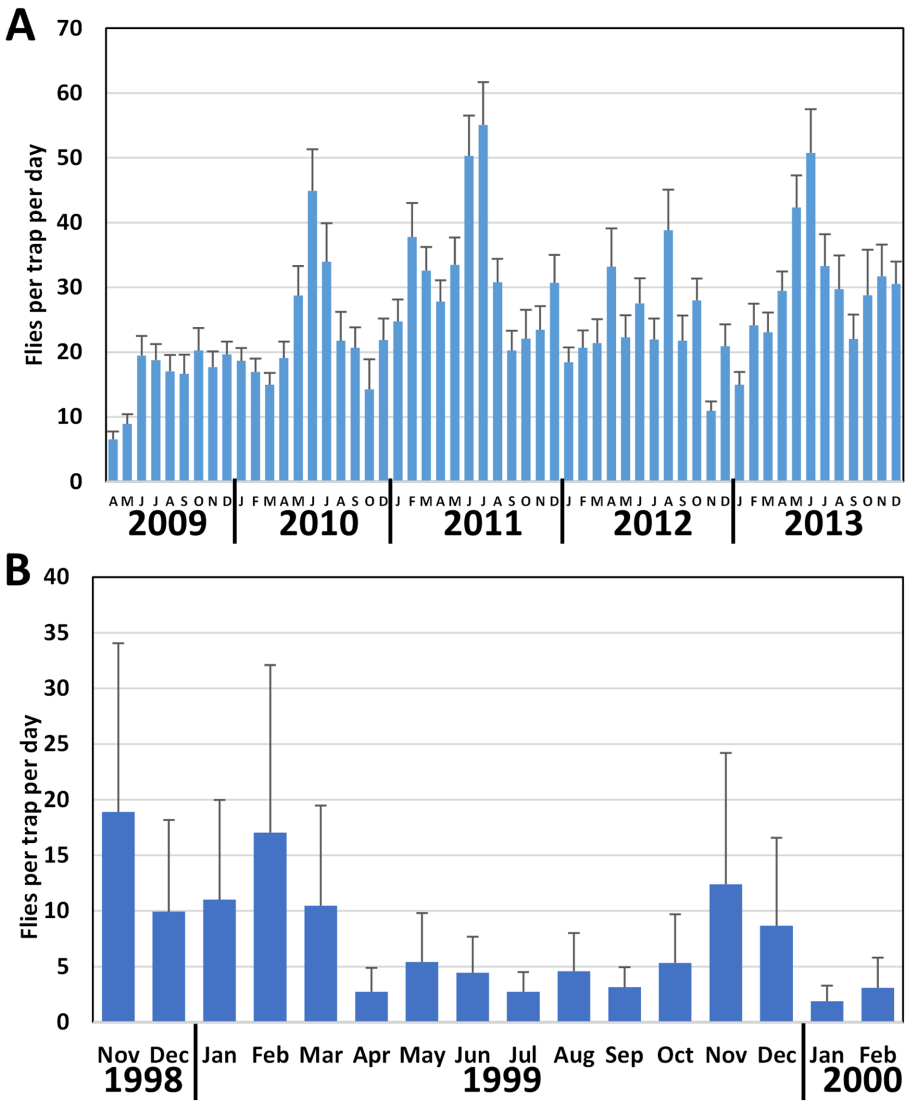


Figure 137. Mean (±SE) daily captures of *Zeugodacus cucurbitae* (Coquillett) in cue-lure traps maintained: **A)** in Hawaii (Oahu Island) between April 2009 and December 2013, based on 359 trapping sites (n = 19,148, mean FTD = 25.65) (previously published in Leblanc et al. (2014)), and **B)** in Papua New Guinea between November 1998 and February 2000, based on five trapping sites (n = 77, mean FTD = 7.74).

Zeugodacus (*Zeugodacus*) *gracilis* (Drew, 1972)

Figure 98

Distribution. Vanuatu (Malekula).

Male lure. Cue-lure.

Host plants. No known host.

Zeugodacus (*Javadacus*) *hamaceki* (Drew and Romig, 2001)

Figure 99

Distribution. Solomon Islands (Kolombangara, Isabel, Guadalcanal).

Male lure. Cue-lure.

Host plants. No known host.

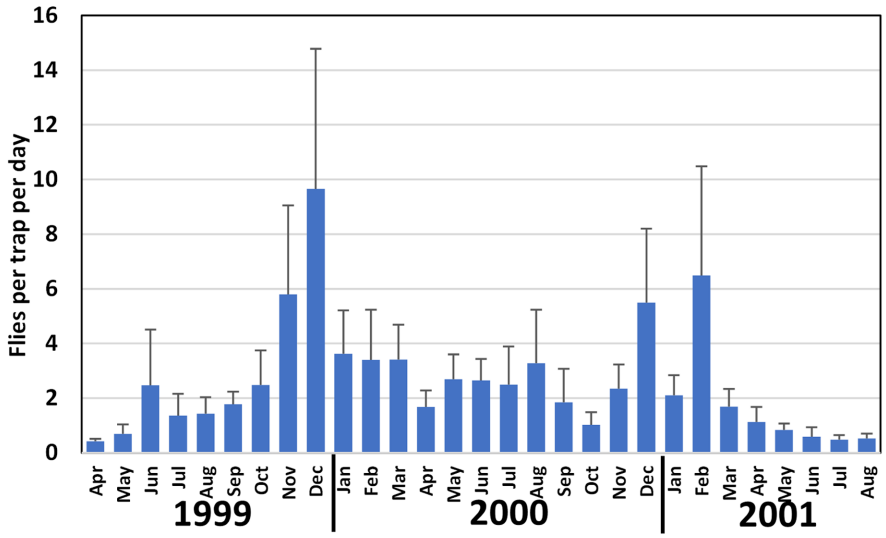


Figure 138. Mean (±SE) daily captures of *Zeugodacus cucurbitae* (Coquillett) in cue-lure traps maintained in the Solomon Islands (Guadalcanal Island) between April 1999 and August 2001, based on 9 trapping sites (n = 205, mean FTD = 2.66).

Zeugodacus (*Zeugodacus*) *univittatus* (Drew, 1972)

Figure 100

Distribution. Papua New Guinea (Bougainville). Solomon Islands (Kolombangara, Isabel, Guadalcanal, San Cristobal).

Male lure. Cue-lure.

Host plants. No known host.

Host fruits and their associated flies

ANACARDIACEAE: ***Anacardium occidentale*** L. (cashew) (edible host): *B. curvipennis, B. dorsalis, B. facialis, B. frauenfeldi, B. kirki, B. passiflorae, B. passiflorae* (sp. nr.), *B. psidii, B. trilineola, B. tryoni*. ***Dracontomelon dao*** (Blanco) Merr. and Rolfe (argus pheasant tree) (wild host): *B. frauenfeldi*. ***Mangifera indica*** L. (mango) (edible host): *B. curvipennis, B. dorsalis, B. facialis, B. frauenfeldi, B. kirki, B. melanotus, B. passiflorae, B. passiflorae* (sp. nr.), *B. perfusca, B. psidii, B. trilineola, B. tryoni, B. xanthodes*. ***Mangifera minor*** Blume (edible host): *B. frauenfeldi*. ***Pleiogynium timoriense*** (DC.) Leenh. (wild host): *B. facialis, B. kirki*. ***Semecarpus vitiensis*** (A. Gray) Engl. (wild host): *B. trilineola*. ***Spondias dulcis*** G. Forst. (jew plum) (edible host): *B. dorsalis, B. frauenfeldi, B. hastigerina, B. kirki, B. trilineola, B. tryoni*. ***Spondias mombin*** L. (hog-plum) (edible host): *B. kirki, B. tryoni*.

ANNONACEAE: ***Annona cherimola*** Mill. (cherimoya) (edible host): *B. melanotus, B. xanthodes*. ***Annona muricata*** L. (soursop) (edible host): *B. dorsalis, B. facialis, B. frauenfeldi, B. kirki, B. passiflorae, B. psidii, B. trilineola, B. tryoni, B. xanthodes*. ***Annona reticulata*** L. (custard apple) (edible host): *B. curvipennis, B. dorsalis, B. frauenfeldi, B. kirki, B. mucronis, B. passiflorae, B. psidii B. tryoni*. ***Annona* squamosa** L. (sugar-apple) (edible host): *B. curvipennis, B. frauenfeldi, B. melanotus, B. psidii, B. tryoni*. ***Artabotrys hexapetalus*** (L. f.) Bhandari (climbing ylang-ylang) (wild host): *B. facialis*. ***Cananga odorata*** (Lam.) Hook. f. and Thomson (ylang-ylang) (wild host): *B. dorsalis, B. facialis, B. frauenfeldi, B. passiflorae, B. passiflorae* (sp. nr.), *B. samoae, B. tryoni*. ***Rollinia* sp**. (edible host): *B. dorsalis*.

APOCYNACEAE: ***Alyxia bracteolosa*** Rich ex A. Gray (wild host): *B. facialis*. ***Alyxia stellata*** Roem. and Schult. (wild host): *B. facialis*. ***Cascabela thevetia*** (L.) Lippold (lucky nut) (wild host): *B. curvipennis, B. mucronis, B.*

passiflorae, B. psidii, B. tryoni. ***Cerbera manghas*** L. (sea mango) (wild host): *B. facialis, B. frauenfeldi, B. minuta, B. mucronis, B. passiflorae, B. psidii, B. xanthodes*. ***Cerbera odollam*** Gaertn. (pong-pong tree) (wild host): *B. minuta, B. samoae*. ***Melodinus vitiensis*** Rolfe (wild host): *B. facialis*. ***Ochrosia elliptica*** Labill. (wild host): *B. curvipennis*. ***Ochrosia mariannensis*** A. DC. (wild host): *B. ochrosiae*. ***Ochrosia oppositifolia*** K. Schum. (wild host): *B. facialis, B. frauenfeldi, B. kirki, B. passiflorae, B. passiflorae* (sp. nr.), *B. passiflorae* (sp. 2 nr., from Fiji), *B. samoae, B. trilineola, B. xanthodes*. ***Ochrosia* sp.** (wild host): *B. dorsalis, B. ochrosiae*. ***Tabernaemontana pandacaqui*** Lam. (banana bush) (wild host): *B. facialis*. ***Tylophora* sp.** (wild host): *D. taui*. ***Vincetoxicum biglandulosum*** (Endl.) Kuntze (wild host): *B. paraxanthodes* ?, *D. aneuvittatus*.

ARALIACEAE: ***Meryta pauciflora*** Hemsl. ex Cheeseman (wild host): *B. melanotus*. ***Meryta* sp.** (wild host): *B. paraxanthodes, B. xanthodes* (sp. 1 near). ***Polyscias* sp.** (wild host): *B. samoae*. ***Plerandra gabriellae*** (Baill.) Lowry, G. M. Plunkett and Frodin (wild host): *B. paraxanthodes*.

ARECACEAE: ***Areca catechu*** L. (betel nut) (edible host): *B. frauenfeldi*.

ASPARAGACEAE: ***Dracaena angustifolia*** (Medik.) Roxb. (wild host): *B. facialis*.

AURACARIACEAE: ***Agathis* sp.** (kauri) (wild host): *B. frauenfeldi*.

BIGNONIACEAE: ***Pyrostegia venusta*** Miers (flame vine) (wild host): *B. passiflorae*.

BORAGINACEAE: ***Cordia subcordata*** Lam. (wild host): *B. facialis*.

BURSERACEAE: ***Canarium vulgare*** Leenh. (wild host): *B. dorsalis*, *B. tryoni*.

CALOPHYLLACEAE: ***Calophyllum inophyllum*** L. (Indian laurel) (wild host): *B. calophylli, B. curvipennis, B. dorsalis, B. facialis, B. frauenfeldi, B. melanotus, B. passiflorae, B. passiflorae* (sp. nr.), *B. samoae, B. tryoni, B. xanthodes*. ***Calophyllum peekelii*** Lauterb. (wild host): *B. calophylli, B. frauenfeldi*. ***Mammea glauca*** (Merr.) Kosterm. (wild host): *B. xanthodes* (sp. 1 near). ***Mammea odorata*** (Raf.) Kosterm. (wild host): *B. frauenfeldi*.

CARDIOPTERIDACEAE: ***Citronella samoensis*** (A. Gray) R. A. Howard (wild host): *B. facialis*.

CARICACEAE: ***Carica papaya*** L. (papaya) (edible host): *B. curvipennis, B. dorsalis, B. facialis, B. frauenfeldi, B. kirki, B. melanotus, B. passiflorae* (sp. nr.), *B. psidii, B. trilineola, B. tryoni, B. xanthodes*.

CELASTRACEAE: ***Celastrus* sp.** (wild host): *B. frauenfeldi*.

CHRYSOBALANACEAE: ***Atuna racemosa*** Raf. (wild host): *B. facialis*. ***Chrysobalanus icaco*** L. (cocoplum) (edible host): *B. passiflorae*.

CLUSIACEAE: ***Garcinia mangostana*** L. (mangosteen) (edible host): *B. dorsalis, B. frauenfeldi, B. passiflorae*. ***Garcinia xanthochymus*** Hook. f. (egg tree) (wild host): *B. frauenfeldi*.

COMBRETACEAE: ***Terminalia carolinensis*** Kaneh. (wild host): *B. frauenfeldi*. ***Terminalia catappa*** L. (tropical almond) (edible host): *B. curvipennis, B. dorsalis, B. facialis, B. frauenfeldi, B. kirki, B. melanotus, B. mucronis, B. passiflorae, B. passiflorae* (sp. nr.), *B. penefurva, B. perfusca, B. psidii, B. samoae, B. trilineola, B. tryoni, B. xanthodes*. ***Terminalia kaernbacchii*** Warb. (edible host): *B. frauenfeldi, B. penefurva*. ***Terminalia litoralis*** Seem. (wild host): *B. facialis, B. kirki, B. passiflorae, B. passiflorae* (sp. nr.). ***Terminalia samoensis*** Rechinger (wild host): *B. frauenfeldi*, *B. xanthodes*. ***Terminalia sepicana*** Diels (wild host): *B. trilineola*. ***Terminalia whitmorei*** Goode (wild host): *B. frauenfeldi*.

CONVOLVULACEAE: ***Distimake tuberosus*** (L.) A. R. Simões & Staples (wild host): *B. caledoniensis*, *B. curvipennis*. ***Stictocardia tiliifolia*** (Desr.) Hallier f. (wild host): *B. xanthodes*.

CUCURBITACEAE: ***Citrullus lanatus*** (Thunb.) Matsum. and Nakai (watermelon) (edible host): *B. xanthodes, Z. cucurbitae*. ***Coccinia grandis*** (L.) Voigt (ivy gourd) (edible host): *B. simulata, Z. cucurbitae*. ***Cucumis sativus*** L. (cucumber) (edible host): *D. solomonensis, Z. cucurbitae*. ***Cucurbita pepo*** L. (pumpkin) (edible host): *B. tryoni, D. solomonensis, Z. cucurbitae*. ***Luffa acutangula*** Roxb. (angled luffa) (edible host): *D. solomonensis, Z. cucurbitae*. ***Luffa cylindrica*** M. Roem. (luffa) (edible host): *D. solomonensis, Z. cucurbitae*. ***Momordica charantia*** L. (bitter gourd) (edible host): *Z. cucurbitae*. ***Trichosanthes cucumerina*** L. (snakegourd) (edible host): *D. solomonensis, Z. cucurbitae*.

EBENACEAE: ***Diospyros ebenum*** Koenig ex Retz. (Ceylon ebony) (wild host): *B. frauenfeldi*. ***Diospyros fasciculosa*** F. Muell. (wild host): *B. grandistylus*. ***Diospyros ferrea*** (Willd.) Bakh. (wild host): *B. xanthodes*. ***Diospyros***

foliosa (Rich. ex A. Gray) (wild host): *B. samoae*. ***Diospyros kaki*** L. f. (Japanese persimmon) (edible host): *B. psidii, B. tryoni*. ***Diospyros macrocarpa*** Korth. Ex Hiern (wild host): *B. curvipennis*, *B. psidii*. ***Diospyros mespiliformis*** Hochst. ex A. DC. (jackalberry) (edible host): *B. psidii, B. tryoni*. ***Diospyros nigra*** (J. F. Gmel.) Perr. And Perr. (black sapote) (edible host): *B. frauenfeldi*. ***Diospyros samoensis*** A. Gray (wild host): *B. facialis*.

ELAEOCARPACEAE: ***Elaeocarpus angustifolius*** Blume (wild host): *B. passiflorae*. ***Elaeocarpus tonganus*** Burkill (wild host): *B. kirki*.

EUPHORBIACEAE: ***Aleurites moluccanus*** Willd. (candlenut tree) (wild host): *B. psidii*. ***Excoecaria agallocha*** L. (wild host): *B. xanthodes*. ***Fontainea pancheri*** Heckel (wild host): *B. mucronis*. ***Pimelodendron amboinicum*** Hassk. (wild host): *B. bancroftii*.

FABACEAE: ***Inocarpus fagifer*** (Parkinson ex FR. A. Zorn) Fosberg (Tahiti chestnut) (edible host): *B. dorsalis, B. facialis, B. frauenfeldi, B. kirki, B. melanotus, B. moluccensis, B. passiflorae, B. passiflorae* (sp. nr.), *B. trilineola, B. tryoni, B. xanthodes*. ***Phaseolus vulgaris*** L. (garden bean) (edible host): *Z. cucurbitae*. ***Vigna unguiculata*** (L.) Walp. (southern pea) (edible host): *Z. cucurbitae*.

GENTIANACEAE: ***Fagraea berteroana*** A. Gray ex Benth. (pua kenikeni) (wild host): *B. caledoniensis, B. melanotus, B. samoae*.

GNETACEAE: ***Gnetum gnemon*** L. (buko) (wild host): *B. gnetum, B. pacificae, B. penefurva*.

GOODENIACEAE: ***Scaevola taccada*** (Gaertn.) Roxb. (wild host): *B. frauenfeldi*.

HERNANDIACEAE: ***Hernandia cordigera*** Vieill. (wild host): *B. tryoni*. ***Hernandia nymphaeifolia*** (C. Presl) Kubitzki (wild host): *B. facialis, B. passiflorae* (sp. nr.). ***Hernandia* sp.** (wild host): *B. frauenfeldi*.

LAURACEAE: ***Persea americana*** Mill. (avocado) (edible host): *B. dorsalis, B. facialis, B. frauenfeldi, B. kirki, B. melanotus, B. passiflorae, B. passiflorae* (sp. nr.), *B. trilineola, B. tryoni, B. xanthodes.*

LECYTHIDACEAE: ***Barringtonia asiatica*** Kurz (sea poison tree) (wild host): *B. facialis, B. tryoni*. ***Barringtonia calyptrocalyx*** K. Schum. (wild host): *B. frauenfeldi*. ***Barringtonia edulis*** Seem. (pao nut) (wild host): *B. dorsalis, B. frauenfeldi, B. neoxanthodes, B. passiflorae, B. tryoni, B. xanthodes.* ***Barringtonia racemosa*** (L.) Spreng. (wild host): *B. xanthodes*. ***Barringtonia seaturae*** H. B. Guppy (wild host): *B. xanthodes*.

LOGANIACEAE: ***Neuburgia corynocarpa*** (A. Gray) Leenh. (wild host): *B. passiflorae*. ***Neuburgia novocaledonica*** (Gilg & Gilg-Ben.) J. E. Molina and Struwe (wild host): *B. curvipennis*.

LYTHRACEAE: ***Punica granatum*** L. (pomegranate) (edible host): *B. passiflorae, B. psidii, B. tryoni.*

MALPIGHIACEAE: ***Malpighia glabra*** L. (acerola) (edible host): *B. curvipennis, B. frauenfeldi, B. psidii, B. tryoni.*

MALVACEAE: ***Abelmoschus esculentus*** Moench (okra) (edible host): *Z. cucurbitae*. ***Grewia prunifolia*** A. Gray (wild host): *B. facialis*. ***Heritiera* sp.** (wild host): *B. frauenfeldi*. ***Theobroma cacao*** L. (cocoa) (edible host): *B. passiflorae, B. passiflorae* (sp. nr.), *B. xanthodes*.

MELASTOMATACEAE: ***Melastoma malabathricum*** L. (wild host): *B. frauenfeldi*. ***Melastoma* sp**. (wild host): *B. melanotus*.

MELIACEAE: ***Aglaia basiphylla*** A. Gray (wild host): *B. passiflorae*. ***Aglaia mariannensis*** Merr. (wild host): *B. ochrosiae*. ***Aglaia saltatorum*** A. C. Sm. (wild host): *B. facialis*. ***Aglaia samoensis*** A. Gray (wild host): *B. aenigmatica*. ***Cedrela odorata*** L. (Spanish cedar) (wild host): *B. kirki*. ***Dysoxylum gaudichaudianum*** Miq. (wild host): *B. trilineola*. ***Sandoricum koetjape*** Merr. (santol) (wild host): *B. frauenfeldi*. ***Vavaea amicorum*** Benth. (wild host): *B. facialis*.

MENISPERMACEAE: ***Pycnarrhena ozantha*** Diels (wild host): *B. redunca*.

MORACEAE: ***Antiaris toxicaria*** (J. F. Gmel.) Lesch. (wild host): *B. minuta*. ***Artocarpus altilis*** (Parkinson) Fosberg (breadfruit) (edible host): *B. dorsalis, B. facialis, B. frauenfeldi, B. melanotus, B. passiflorae, B. trilineola, B. tryoni, B. umbrosa, B. xanthodes.* ***Artocarpus heterophyllus*** Lam. (jackfruit) (edible host): *B. frauenfeldi, B. melanotus, B. passiflorae, B. tryoni, B. umbrosa, B. xanthodes.* ***Artocarpus mariannensis*** Trécul (Marianas breadfruit) (edible host): *B. frauenfeldi*. ***Broussonetia papyrifera*** (L.) Vent. (paper mulberry) (wild host): *B. frauenfeldi*. ***Ficus aspera*** Forster f. (wild host): *B. trilineola*. ***Ficus glandifera*** Summerh. (wild host): *B. frauenfeldi*. ***Ficus***

pancheriana Bureau (wild host): *B. curvipennis, B. tryoni*. ***Ficus* sp.** (wild host): *B. frauenfeldi, B. psidii, B. xanthodes* (sp. 1 near). ***Morus alba*** L. (white mulberry) (edible host): *B. curvipennis, B. psidii, B. tryoni*.

MUSACEAE: ***Musa x paradisiaca*** L. (banana) (edible host): *B. dorsalis, B. facialis, B. frauenfeldi, B. tryoni*. ***Musa troglodytarum*** L. (fe'I banana) (edible host): *B. dorsalis, B. tryoni*. ***Musa* sp.** (banana) (edible host): *B. dorsalis, B. trilineola*.

MYRTACEAE: ***Eugenia brasiliensis*** Lam. (Brazil cherry) (edible host): *B. distincta, B. kirki*. ***Eugenia uniflora*** L. (Surinam cherry) (edible host): *B. curvipennis, B. dorsalis, B. facialis, B. frauenfeldi, B. kirki, B. melanotus, B. ochrosiae, B. psidii, B. trilineola, B. tryoni*. ***Psidium acutangulum*** DC. (edible host): *B. curvipennis, B. psidii, B. tryoni*. ***Psidium cattleianum*** Sabine (strawberry guava) (edible host): *B. curvipennis, B. dorsalis, B. frauenfeldi, B. kirki, B. melanotus, B. passiflorae, B. psidii, B. tryoni*. ***Psidium guajava*** L. (common guava) (edible host): *B. curvipennis, B. dorsalis, B. facialis, B. frauenfeldi, B. kirki, B. melanotus, B. mucronis, B. passiflorae, B. passiflorae* (sp. nr.), *B. psidii, B. trilineola, B. tryoni*. ***Syzygium aqueum*** (Burm. f.) Alston (watery rose-apple) (edible host): *B. frauenfeldi*, *B. kirki*. ***Syzygium clusiifolium*** (A. Gray) Müll. Berol. (wild host): *B. trilineola*. ***Syzygium coarctatum*** (Blume) Byng, N. Snow and Peter G. Wilson (giant lau lau) (edible host): *B. passiflorae*. ***Syzygium corynocarpum*** (A. Gray) Müll. Berol. (wild host): *B. facialis, B. kirki*. ***Syzygium cumini*** (L.) Skeels (java plum) (edible host): *B. melanotus*, *B. tryoni*. ***Syzygium dealatum*** (Burkill) A. C. Sm. (wild host): *B. kirki*. ***Syzygium gracilipes*** (A. Gray) Merr. and L. M. Perry (wild host): *B. kirki*. ***Syzygium jambos*** (L.) Alston (rose-apple) (edible host): *B. curvipennis, B. dorsalis, B. facialis, B. frauenfeldi, B. kirki, B. melanotus, B. passiflorae, B. perfusca, B. psidii, B. trilineola, B. tryoni*. ***Syzygium malaccense*** (L.) Merr. and L. M. Perry (Malay-apple) (edible host): *B. curvipennis, B. dorsalis, B. facialis, B. frauenfeldi, B. kirki, B. passiflorae, B. psidii, B. trilineola, B. tryoni*. ***Syzygium neurocalyx*** (A. Gray) Christoph. (wild host): *B. facialis, B. kirki*. ***Syzygium*** cf. ***pachycladum*** (Lauterb. and K. Schum.) Merr. and L. M. Perry (wild host): *B. frauenfeldi*. ***Syzygium richii*** (A. Gray) Merr. and L. M. Perry (wild host): *B. facialis, B. kirki*. ***Syzygium samarangense*** (Blume) Merr. and L. M. Perry (water apple) (edible host): *B. frauenfeldi*. ***Syzygium trivene*** (Ridl.) Merr. and L. M. Perry (wild host): *B. frauenfeldi*.

OLACACEAE: ***Ximenia americana*** L. (edible host): *B. curvipennis, B. ochrosiae, B. tryoni*.

OLEACEAE: ***Olea paniculata*** R. Br. (wild host): *B. fulvifacies*.

OXALIDACEAE: ***Averrhoa carambola*** L. (starfruit) (edible host): *B. curvipennis, B. dorsalis, B. frauenfeldi, B. kirki, B. melanotus, B. passiflorae, B. psidii, B. trilineola, B. tryoni*.

PASSIFLORACEAE: ***Passiflora edulis*** Sims (purple granadilla) (edible host): *B. dorsalis, B. facialis, B. frauenfeldi, B. kirki, B. passiflorae, B. tryoni, B. xanthodes*. ***Passiflora foetida*** L. (bush passion fruit) (edible host): *B. curvipennis, B. facialis*. ***Passiflora laurifolia*** L. (yellow granadilla) (edible host): *B. dorsalis, B. tryoni*. ***Passiflora ligularis*** Juss. (sweet granadilla) (edible host): *B. facialis, B. xanthodes*. ***Passiflora quadrangularis*** L. (giant granadilla) (edible host): *B. dorsalis, B. facialis, B. kirki, B. passiflorae, B. passiflorae* (sp. nr.), *B. psidii, B. tryoni, B. xanthodes*. ***Passiflora suberosa*** L. (wild host): *B. neoxanthodes*.

PHYLLANTHACEAE: ***Baccaurea papuana*** F. M. Bailey (wild host): *B. frauenfeldi*. ***Baccaurea* sp.** (wild host): *B. frauenfeldi*.

RHAMNACEAE: ***Ziziphus jujuba*** Mill. (common jujube) (edible host): *B. curvipennis, B. tryoni*.

RHIZOPHORACEAE: ***Crossostylis multiflora*** Brongn. and Gris ex Pancher and Sebert (wild host): *B. caledoniensis*.

ROSACEAE: ***Eriobotrya japonica*** (Thunb.) Lindl. (loquat) (edible host): *B. curvipennis, B. kirki, B. melanotus, B. tryoni*. ***Fragaria vesca*** L. (wild strawberry) (edible host): *B. curvipennis, B. psidii, B. tryoni*. ***Prunus domestica*** L. (plum) (edible host): *B. curvipennis, B. psidii, B. tryoni*. ***Prunus persica*** (L.) Batsch (peach) (edible host): *B. curvipennis, B. facialis, B. kirki, B. psidii, B. tryoni*. ***Prunus simonii*** Carrière (apricot plum) (edible host): *B. curvipennis, B. psidii, B. tryoni*.

RUBIACEAE: ***Coffea arabica*** L. (arabica coffee) (edible host): *B. curvipennis, B. melanotus*. ***Coffea liberica*** W. Bull ex Hiern (liberica coffee) (edible host): *B. passiflorae*. ***Coffea* sp**. (coffee) (edible host): *B. curvipennis, B. tryoni*. ***Gardenia taitensis*** DC. (tiaré) (wild host): *B. facialis*. ***Guettarda speciosa*** L. (wild host): *B. curvipennis, B. facialis, B. frauenfeldi, B. luteola, B. melanotus, B. passiflorae, B. passiflorae* (sp. nr.), *B. samoae, B. trilineola*.

Morinda citrifolia L. (noni) (edible host): *B. kirki, B. melanotus, B. tryoni.* ***Nauclea orientalis*** L. (wild host): *B. bancroftii*. ***Nauclea* sp.** (wild host): *B. frauenfeldi, B. naucleae*. ***Neolamarckia cadamba*** (Roxb.) Bosser (wild host): *B. bancroftii*, *B. frauenfeldi*.

RUTACEAE: ***Casimiroa edulis*** La Llave (white sapote) (edible host): *B. curvipennis, B. tryoni*. ***Citrus aurantiifolia*** (Christm.) Swingle (lime) (edible host): *B. dorsalis, B. tryoni*. ***Citrus* × *aurantium*** L. (sour orange) (edible host): *B. dorsalis, B. facialis, B. frauenfeldi, B. passiflorae.* ***Citrus japonica*** Thunb. (kumquat) (edible host): *B. curvipennis, B. frauenfeldi, B. passiflorae, B. trilineola, B. tryoni, B. xanthodes.* ***Citrus* × *latifolia*** (Yu. Tanaka) Yu. Tanaka (Tahitian lime) (edible host): *B. curvipennis, B. dorsalis, B. tryoni.* ***Citrus limon*** (L.) Osbeck (lemon) (edible host): *B. facialis, B. passiflorae, B. trilineola*. ***Citrus maxima*** (Burm.) Merr. (pomelo) (edible host): *B. curvipennis, B. distincta, B. dorsalis, B. facialis, B. frauenfeldi, B. kirki, B. melanotus, B. passiflorae, B. psidii, B. trilineola, B. tryoni, B. xanthodes.* ***Citrus* × *microcarpa*** Bunge (calamansi) (edible host): *B. dorsalis, B. frauenfeldi.* ***Citrus paradisi*** Macfad. (grapefruit) (edible host): *B. curvipennis, B. facialis, B. frauenfeldi, B. melanotus, B. passiflorae, B. tryoni.* ***Citrus reticulata*** Blanco (tangerine) (edible host): *B. curvipennis, B. dorsalis, B. facialis, B. frauenfeldi, B. kirki, B. melanotus, B. passiflorae, B. passiflorae* (sp. nr.), *B. trilineola, B. tryoni, B. xanthodes.* ***Citrus sinensis*** (L.) Osbeck (orange) (edible host): *B. curvipennis, B. dorsalis, B. facialis, B. frauenfeldi, B. kirki, B. melanotus, B. passiflorae, B. passiflorae* (sp. nr.), *B. trilineola, B. tryoni, B. xanthodes.* ***Citrus trifoliata*** L. (trifoliate orange) (edible host): *B. dorsalis*. ***Clymenia polyandra*** (Tanaka) Swingle (edible host): *B. frauenfeldi*. ***Micromelum minutum*** (G. Forst.) Wight and Arn. (limeberry) (wild host): *B. facialis, B. kirki, B. samoae.* ***Murraya paniculata*** (L.) Jack (orange jessamine) (wild host): *B. samoae*.

SALICACEAE: ***Xylosma orbiculata*** (J. R. Forster and G. Forster) G. Forster (wild host): *B. facialis.*

SANTALACEAE: ***Santalum austrocaledonicum*** Vieill. (New Caledonia sandalwood) (wild host): *B. trilineola*. ***Santalum yasi*** Seem. (Fijian sandalwood) (wild host): *B. facialis, B. passiflorae, B. xanthodes.* ***Santalum* sp.** (sandalwood) (wild host): *B. perfusca*.

SAPINDACEAE: ***Pometia pinnata*** J. R. Forst. and G. Forst. (edible host): *B. dorsalis, B. facialis, B. frauenfeldi, B. kirki, B. passiflorae, B. passiflorae* (sp. nr.), *B. quadrisetosa, B. trilineola, B. tryoni*. ***Elattostachys apetala*** Radlk. (wild host): *B. facialis.* ***Litchi chinensis*** Sonn. (lychee) (edible host): *B. dorsalis, B. tryoni*. ***Nephelium lappaceum*** L. (rambutan) (edible host): *B. dorsalis, B. tryoni*.

SAPOTACEAE: ***Burckella obovata*** Pierre (wild host): *B. frauenfeldi, B. trilineola*. ***Burckella richii*** (A. Gray) H. J. Lam (wild host): *B. distincta, B. xanthodes*. ***Burckella* sp.** (wild host): *B. decumana*. ***Chrysophyllum cainito*** L. (star-apple) (edible host): *B. distincta, B. dorsalis, B. facialis, B. frauenfeldi, B. passiflorae, B. tryoni, B. xanthodes.* ***Manilkara zapota*** (L.) P. Royen (sapodilla) (edible host): *B. distincta, B. facialis, B. frauenfeldi, B. melanotus, B. passiflorae.* ***Planchonella chartacea*** H. J. Lam (wild host): *B. passiflorae*. ***Planchonella costata*** Pierre (wild host): *B. distincta*. ***Planchonella grayana*** H. St. John (wild host): *B. anomala, B. trilineola*. ***Planchonella membranacea*** H. J. Lam (wild host): *B. distincta, B. facialis*. ***Planchonella sphaerocarpa*** Dubard (wild host): *B. tryoni*. ***Pouteria caimito*** Radlk. (abiu) (edible host): *B. distincta, B. dorsalis, B. frauenfeldi, B. kirki, B. tryoni, B. xanthodes.* ***Pouteria campechiana*** (Kunth) Baehni (canistel) (edible host): *B. frauenfeldi*.

SIMABOURACEAE: ***Amaroria soulameoides*** A. Gray (wild host): *B. passiflorae*.

SOLANACEAE: ***Capsicum annuum*** L. (bell pepper) (edible host): *B. curvipennis, B. dorsalis, B. facialis, B. kirki, B. tryoni.* ***Capsicum frutescens*** L. (hot pepper) (edible host): *B. dorsalis, B. facialis, B. frauenfeldi*, *B. kirki, B. passiflorae.* ***Solanum lycopersicum*** L. (tomato) (edible host): *B. curvipennis, B. dorsalis, B. facialis, B. kirki, B. melanotus, B. tryoni, B. xanthodes, Z. cucurbitae*. ***Solanum mauritianum*** Scop. (wild host): *B. facialis, B. melanotus, B. tryoni, B. xanthodes*. ***Solanum melongena*** L. (eggplant) (edible host): *B. facialis, B. kirki, B. melanotus, B. passiflorae* (sp. nr.), *B. tryoni*.

STEMONURACEAE: ***Medusanthera laxiflora*** (Miers) R. A. Howard (wild host): *B. enochra*.

THYMELAEACEAE: ***Phaleria disperma*** Baill. (wild host): *B. facialis, B. passiflorae* (sp. nr.). ***Phaleria macrocarpa*** Boerl. (wild host): *B. frauenfeldi*.

VITACEAE: ***Vitis vinifera*** L. (wine grape) (edible host): *B. psidii.*

ZINGIBERACEAE: ***Alpinia purpurata*** (Vieill.) K. Schum. (red ginger) (wild host): *B. phaea*.

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I want to acknowledge my Pacific Islands collaborators and numerous scientists and technicians from the national governments and the Regional Fruit Fly Projects, who contributed significantly to the advancement of fruit fly entomology in Oceania (Figure 139). Without being exhaustive, I wish to mention the following specific collaborators, sorted by country, Territory or organization: **American Samoa**: Elisapeta T. Sualevai. **Cook Islands**: Patrick Arioka, Elizabeth Munro, Maja Poeschke, Mat Purea. **Commonwealth of Northern Mariana Islands**: Lee Eavy, Aubrey Moore, Jack Tenorio. **Federated States of Micronesia**: Klastyn Diopoulos, Marcelino Martin, Palikkun Tolenna, John Wichep, Jonah William. **Fiji Islands**: Apenisa Balawakula, Laisa Ralulu, Pio Bosco Tikoisuva (Jr), Losalini Leweniqila Toganivalu, Ema Tora Vueti. **French Polynesia:** Axelle Maitere, Berthe Neagle, Rudolph Putoa, Jean-Marc Tinirau, Jules Wohler [fruit fly program fully funded by the Territory government]. **Guam**: Russell Campbell. **Kiribati**: Nakabuta Teuriaria. **Marshall Islands**: Frederick Muller. **Nauru**: Warrick Harris, Andrew Pitcher, Greogory Stephens, Nelson Tamakin. **New Caledonia**: Rémy Amice, José Brinon, Sylvie Cazeres, Julien Drouin, Christian Mille, Frédéric Sales Jacques Wamejonengo [fruit fly program fully funded by the Territory government and by CIRAD]. **Niue**: Colin Etuata, Crispina F. Konelio. **Palau**: Albert Arbedul, Hilda Etpison, Fernando Sengebau. **Papua New Guinea:** Solomon Balagawai, John Bokosou, Fred Dori, Ana Kawi, Amanda Mararuai, David Putulan, Sim Sar, David Tenakanai. **Samoa**: Billy Enosa, Faalelei Tunupopo. **Solomon Islands**: Geoffrey Oliouou, Philip Taisau, Francis Tsatsia, Maclean Vagalo, Roy Vaketo. **Tokelau**: Katieli Peleti. **Tonga**: Sione Foliaki, Viliami Heimoana, Tuipulotu Langi, Siutoni Tupou. **Tuvalu**: Sam Panapa. **Vanuatu**: Linette Berukilukilu, David Tau, Timothy Tumukon. **Wallis and Futuna**: Atoloto Malau, Paino Ulutuipalelei. **FAO/AusAID/UNDP/SPC Regional Fruit Fly Projects:** Chief Technical Advisor Allan J. Allwood. United Nations Volunteers Robert Hollingsworth (Solomon Islands), Arnaud Jarlan (Solomon Islands), Abdul Kassim (Cook Islands, Vanuatu), Pontiano Nemeye (Tonga), Carol Quashie-Williams (Samoa), Barney Stephenson (Vanuatu), Graham Walker (Fiji Islands), Richard Willey (Solomon Islands). Secretariat of the Pacific Community staff Konrad Englberger (Micronesia program coordinator), Maria Borisi Karalo, Shirley Kocourek, Sada Nand Lal, Bal Narayan Swamy, Richard Vernon (database specialist), Nacanieli Waqa. **ACIAR-funded projects**: Anthony C. Clarke, Richard A.I. Drew, Marlene Elson-Harris, Eddie Hamacek, Meredith Romig.

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Figure 139. Some of the Regional Fruit Fly Project collaborators I worked with and befriended during my years residing in Oceania, and their countries of origin. I took most of these photographs between 1996 and 2002. **A)** Allan J. Allwood, Australia. **B)** Amanda Mararuai, Papua New Guinea. **C)** Philip Taisau, Solomon Islands. **D)** Atoloto Malau, Wallis. **E)** Axelle Maitere, French Polynesia. **F)** Richard A.I. Drew, Australia. **G)** Ema Tora Vueti, Fiji. **H)** Faalelei Tunupopo, Samoa. **I)** Fernando Sengebau, Palau. **J)** Jonah Williams, Federated States of Micronesia. **K)** Laisa Ralulu, Fiji. **L)** Linette Berukilukilu, Vanuatu. **M)** Losalini Leweniqila, Fiji. **N)** Marcelino Martin, Federated States of Micronesia. **O)** Maria Borisi Karalo, Fiji. **P)** Mat Purea, Cook Islands. **Q)** Nacanieli Waqa, Fiji. **R)** Nakabuta Teuraria, Kiribati. **S)** Rémy Amice, New Caledonia. **T)** Rudolph Putoa, French Polynesia. **U)** Shirley Kocourek, Fiji. **V)** Solomon Balagawi, Papua New Guinea. **W)** Sylvie Cazeres, New Caledonia. **X)** David Tenakanai, Papua New Guinea. **Y)** Timothy Tumukon, Vanuatu. **Z)** Christian Mille, New Caledonia. **AA)** Paino Ulutuipalelei, Wallis. **AB)** Sione Foliaki, Tonga. **AC)** Roger Vargas, United States. **AD)** Francis Tsatsia, Solomon Islands.

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