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An illustrated key to fruit flies (Diptera: Tephritidae) from Peninsular India and the Andaman and Nicobar Islands

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Abstract

An illustrated key and a checklist are provided for 126 species of fruit flies under 46 genera in four subfamilies namely Dacinae, Phytalmiinae, Tephritinae and Trypetinae. Among these, *Acroceratitis striata* (Froggatt), *Rhochmopterum venustum* (de Meijere) and *Themara yunnana* Zia are new records for India. *Bactrocera yercaudiae* Drew is placed as a synonymn of *Bactrocera digressa* Radhakrishnan.

Key words: Oriental Tephritidae, Dacinae, Phytalmiinae,Tephritinae, Trypetinae, India

Introduction

With about 4,500 species, fruit flies (Tephritidae) represent one of the largest families of Diptera. This family can be distinguished from all other families of Diptera by the combination of well developed mesoclinate frontal setae and subcostal vein bent sharply anteriorly at right angle before the apex, weakened or evanescent beyond the bend. In addition, the costa has three breaks viz., costal, humeral and subcostal (Hardy, 1973, 1974), vein R_1 dorsally with setulae; wing usually with colour pattern; cell bcu usually with an acute extension (White and Elson–Harris, 1992). As per the taxonomic classification by Korneyev (1999) Tephritidae comprises about 500 genera under six subfamilies namely Blepharoneurinae, Dacinae, Phytalmiinae, Tachiniscinae, Tephritinae and Trypetinae. Among the species reported worldwide, 325 species of fruit flies are known to occur in the Indian subcontinent, of which 243 in 79 genera are from India alone under four subfamilies, namely Dacinae, Phytalmiinae, Tephritinae and Trypetinae (White and Elson-Harris, 1992; Agarwal and Sueyoshi, 2005). Bezzi (1913, 1915, 1916), Senior-White (1921, 1922, 1924), Munro (1935, 1938, 1939), Perkins (1938), Hering (1938, 1941, 1956), Hardy (1971), Kapoor (1971, 1993), Kapoor *et al*. (1980), White and Hancock (1997) and Hancock and Drew (2004, 2005) studied the tephritid fauna of the Indian subcontinent. Drew and Raghu (2002) reported 21 species of dacines from the Western Ghats, of which eight were new to science. Although the economically important species account for only about 5% of all tephritid species, they are a driving force for various tephritid studies, including taxonomic ones (Freidberg, 2006). Accurate identification of fruit flies is essential in order to regulate the entry of pest species to a pest free zone, where they can flourish due to lack of regulating factors. Taxonomic keys are of paramount importance in the identification of the species during such circumstances. There is no comprehensive key to identify the fruit flies of India other than Kapoor (1993) which needs to be updated taking into account the revisions, new records (Dohm *et al*., 2008; Hancock, 2007a, 2007b, 2010, 2011; Hancock and Drew, 2004, 2005; Korneyev, 1999, Korneyev, 2006) and subsequent additions of several species (Drew *et al*., 1998; Drew *et al*., 2005; Drew and Raghu, 2001). As a first step towards that, we provide a key and an updated checklist for all the species of fruit flies which are reported from peninsular India (Kerala, Tamil Nadu, Andhra Pradesh, Karnataka, Maharashtra, Orissa and Madhya Pradesh) and also Andaman and Nicobar Islands.

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Material and Methods

Fruit flies collected by S.R. and K.J.D. (the first author) and deposited at University of Agricultural Sciences, Bangalore (UASB); specimens deposited at National Bureau of Agriculturally Important Insects, Bangalore (NBAII) [*Acroceratitis striata* (Froggatt), *Bactrocera digressa* Radhakrishnan, *Dacus crabroniformis* (Bezzi)] and National Pusa Collection (NPC), Indian Agricultural Research Institute, New Delhi (IARI) [*Adrama austeni* Hendel, *Anoplomus cassandra* (Osten Sacken) and *Craspedoxantha octopunctata* Bezzi] were examined for this study. The key was prepared based on specimens collected in south India, mainly in Kerala, Karnataka, Maharashtra and Tamil Nadu, along with a few species from Andaman and Nicobar Islands. These were examined for external morphology as well as genital characters. To ensure the easy identification of the species, illustrations of the diagnostic characters were made using a stereozoom microscope, Leica MZ12 with a drawing tube attachment. Photographs of different parts at several focal depths were taken using Leica DFC 425 and Olympus E330 mounted on Leica M205C and Olympus BX41, respectively and combined into a single image using Image stacking software, Combine ZP (Anonymous, 2011). Collection methods included trapping using male lures, host plant rearing and sweep netting. For the sake of collection of fruit flies which infest bamboo, chopped, tender bamboo shoots were used to lure the flies. Species reported from peninsular India, but not in our collection, are included by referring to the original as well as the redescription of the species, to make the key more comprehensive. In order to facilitate easy identification, diagnostic characters which are used in the key are depicted in figures 1-3. Terminology adopted here is of McAlpine, (1981) and White *et al*., (1999). Singular form is used for all paired organs and setae in the key (Example: Single scutellar seta means 1 pair of scutellar setae).

Results

The checklist and keys for the four subfamilies and 126 species reported from peninsular India (Kerala, Tamil Nadu, Andhra Pradesh, Karnataka, Maharashtra, Orissa and Madhya Pradesh including Andaman and Nicobar Islands) are provided here.

I. Checklist of Tephritidae from peninsular India and the Andaman & Nicobar islands

(***** All localities in India from where the species has been recorded.)

Species	**Collected from***
Family Tephritidae Latreille, 1804	
Subfamily Dacinae	
Tribe Dacini	
Bactrocera Macquart, 1835	
(*Bactrocera*) Macquart, 1835	
affinis (Hardy, 1954)	Karnataka, Tamil Nadu
albistrigata (de Meijere, 1911)	Andaman and Nicobar Islands
amarambalensis Drew, 2002	Kerala
andamanensis (Kapoor, 1971)	Andaman and Nicobar Islands
apicofuscans White & Tsuruta, 2001	Karnataka, Kerala
apiconigroscutella Drew, 2002	Karnataka
carambolae Drew & Hancock, 1994	Andaman and Nicobar Islands
caryeae (Kapoor, 1971)	Karnataka, Kerala, Tamil Nadu
correcta (Bezzi, 1916)	Bihar, Gujarat, Haryana, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Punjab, Tamil Nadu
digressa Radhakrishnan, 1999	Karnataka, Tamil Nadu

digressa Radhakrishnan, 1999	Karnataka, Tamil Nadu
dorsalis (Hendel, 1912)	Andhra Pradesh, Assam, Bihar, Delhi, Himachal Pradesh, Jammu and Kashmir, Manipur, Orissa, Rajasthan, Sikkim, Gujarat, Haryana, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Punjab, Tamil Nadu, Uttar Pradesh, West Bengal
fastigiata Tsuruta & White, 2001	Karnataka, Kerala
latifrons (Hendel, 1915)	Bihar, Karnataka, Tamil Nadu, West Bengal
limbifera (Bezzi, 1919)	Andaman and Nicobar Islands
melastomatos Drew & Hancock, 1994	Andaman and Nicobar Islands
merapiensis Drew & Hancock, 1994	Andaman and Nicobar Islands, Karnataka, Kerala
neoarecae Drew, 2002	Kerala
neonigrotibialis Drew, 2002	Kerala
nigrofemoralis White & Tsuruta, 2001	Karnataka, Kerala, Tamil Nadu
paraosbeckiae Drew, 2002	Kerala
paraverbascifoliae Drew, 2002	Kerala
penecorrecta Drew, 2002	Kerala
pseudoversicolor Drew, 2002	Kerala
verbascifoilae Drew & Hancock, 1994	Karnataka, Kerala, Tamil Nadu
versicolor (Bezzi, 1916)	Bihar, Karnataka, Kerala, Tamil Nadu
vishnu Drew & Hancock, 1994	Karnataka, Kerala, Maharashtra, Tamil Nadu
zonata (Saunders, 1841)	Andhra Pradesh, Assam, Bihar, Delhi, Gujarat, Haryana, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Punjab, Tamil Nadu, Uttaranchal, Uttar Pradesh, West Bengal
(*Bulladacus*) Drew and Hancock, 1995	
mcgregori (Bezzi, 1919)	Andaman and Nicobar Islands
(*Gymnodacus*) Munro, 1938	
calophylli (Perkins & May, 1949)	Andaman and Nicobar Islands
(*Hemigymnodacus*) Hardy, 1973	
diversa (Coquillett, 1904)	Andhra Pradesh, Bihar, Himachal Pradesh, Karnataka, Maharashtra, Meghalaya, Punjab, Tamil Nadu, Uttar Pradesh, Uttaranchal, West Bengal
(*Javadacus*) Hardy, 1983	
pallescentis (Hardy, 1955)	Karnataka, Uttaranchal
scutellaria (Bezzi, 1916)	Karnataka, Kerala
trilineata (Hardy, 1955)	Karnataka, Kerala, Tamil Nadu
(*Paratridacus*) Shiraki, 1933	
expandens (Walker, 1859)	Andaman Islands
garciniae Bezzi, 1913	Karnataka
(*Parazeugodacus*) Shiraki, 1933	
bipustulata (Bezzi, 1913)	Karnataka
(*Sinodacus*) Zia, 1936	
binoyi Drew, 2002	Kerala, Karnataka, Tamil Nadu

watersi (Hardy, 1954)	Karnataka, Tamil Nadu
(*Zeugodacus*) Hendel, 1927	
caudata (Fabricius, 1805)	Assam, Bihar, Karnataka, Kerala, Meghalaya, Sikkim, Uttaranchal, West Bengal
cucurbitae (Coquillett, 1899)	Widespread , throughout India
duplicata (Bezzi, 1916)	Karnataka, Madhya Pradesh, Maharashtra
gavisa (Munro, 1935)	Karnataka, Kerala, Orissa, Tamil Nadu
incisa (Walker, 1860)	Andaman and Nicobar Islands
scutellaris (Bezzi, 1913)	Arunachal Pradesh, Bihar, Himachal Pradesh, Karnataka, Meghalaya, Uttaranchal, West Bengal
tau (Walker, 1849)	Andaman and Nicobar Islands, Arunachal Pradesh, Bihar, Haryana, Himachal Pradesh, Jammu and Kashmir, Karnataka, Kerala, Maharashtra, Meghalaya, Punjab, Sikkim, Tamil Nadu, Uttaranchal, West Bengal
zahadi Mahmood, 1999	Karnataka, Kerala, Tamil Nadu, Uttar Pradesh
Dacus Fabricius, 1805	
(*Callantra*) Walker, 1860	
crabroniformis (Bezzi, 1914)	Karnataka, Tamil Nadu
discophorus (Hering, 1956)	Himachal Pradesh, Karnataka, Kerala, Maharashtra
insulosus Drew & Hancock, 1998	Andaman and Nicobar Islands
longicornis Wiedemann, 1830	Bihar, Karnataka
nummularius (Bezzi, 1916)	Karnataka
ramanii Drew & Hancock, 1998	Karnataka, Kerala, Tamil Nadu
(*Didacus*) Collart, 1935	
ciliatus Loew, 1862	Bihar, Chandigarh, Delhi, Gujarat, Himachal Pradesh, Karnataka, Maharashtra, Punjab, Tamil Nadu, Uttar Pradesh
(*Leptoxyda*) Macquart, 1835	
persicus (Hendel, 1927)	Andhra Pradesh, Delhi, Gujarat, Karnataka, Maharashtra, Orissa, Tamil Nadu, Uttar Pradesh
Tribe Gastrozonini	
Acroceratitis Hendel, 1913	
bimacula Hardy, 1973	Andaman and Nicobar Islands
distincta (Zia, 1964)	Karnataka, Northeast India
striata (Froggatt, 1909)	Karnataka (New record for India)
tenmalaica Hancock & Drew, 1999	Kerala
tomentosa Hardy, 1973	Karnataka, Chandigarh
Anoplomus Bezzi, 1913	
cassandra (Osten Sacken, 1882)	Arunachal Pradesh, Jharkhand, Karnataka, Sikkim, Uttaranchal, West Bengal
Chaetellipsis Bezzi, 1913	
paradoxa Bezzi, 1913	Arunachal Pradesh, Jharkhand, Karnataka, West Bengal
Dietheria Hardy, 1973	
fasciata Hardy, 1973	Karnataka, Tamil Nadu

Galbifascia Hardy, 1973	
soalia (Séguy, 1948) (=*sexpunctata* Hardy, 1973)	Kerala
Gastrozona Bezzi, 1913	
fasciventris (Macquart, 1843)	Arunachal Pradesh, Bihar, Karnataka, Kerala, Maharashtra
parviseta Hardy, 1973	Karnataka
soror (Schiner, 1868)	Assam, Karnataka
Phaeospilodes Hering, 1939	
bambusae Hering, 1940	Tamil Nadu
Taeniostola Bezzi, 1913	
vittigera Bezzi, 1913	Assam, Mizoram, Karnataka
Xanthorrachis Bezzi, 1913	
annandelei Bezzi, 1913	Arunachal Pradesh, Kerala
Subfamily Phytalmiinae	
Tribe Acanthonevrini	
Acanthonevra Macquart, 1843	
hemileina Hering, 1939	Arunachal Pradesh, Tamil Nadu
imparata Hering, 1951	Kerala, Karnataka
inermis Hering, 1951	Kerala, Tamil Nadu
Diarrhegma Bezzi, 1913	
modestum (Fabricius, 1805)	Karnataka, Tamil Nadu, West Bengal,
Felderimyia Hendel, 1914	
fuscipennis, Hendel, 1914	Karnataka
Rioxa Walker, 1856	
sexmaculata (van der Wulp, 1880)	Arunachal Pradesh, Karnataka, West Bengal
Themara Walker, 1856	
yunnana Zia,1963	Karnataka (New record for India)
Subfamily Trypetinae	
Tribe Adramini	
Adrama Walker, 1859	
austeni Hendel, 1912	Himachal Pradesh, Karnataka, Sikkim, Tamil Nadu
determinata (Walker, 1856)	Nicobar Islands
Coelotrypes Bezzi,1924	
luteifasciatus (Senior-White, 1922)	Kerala,Tamil Nadu
Euphranta Loew, 1862	
cassiae (Munro, 1938)	Bihar, Karnataka, Maharashtra, Uttaranchal
macularis (Wiedemann, 1830)	Nicobar Islands, Tamil Nadu, Karnataka, West Bengal
notabilis (van der Wulp, 1880)	Kerala
Tribe Carpomyini	
Carpomya Costa, 1854	
vesuviana Costa, 1854	Andhra Pradesh, Bihar, Delhi, Gujarat, Haryana, Jammu and Kashmir, Karnataka, Madhya Pradesh, Maharashtra, Punjab, Tamil Nadu, Uttar Pradesh, West Bengal

Tribe Callistomyiini	
Callistomyia Bezzi, 1913	
pavonina Bezzi, 1913	Assam, Orissa, Sikkim, Uttaranchal, West Bengal
Tribe Trypetini	
Chenacidiella Shiraki, 1968	
bangaloriensis Kapoor & Agarwal, 1978	Karnataka
Philophylla Rondani, 1870	
fossata (Fabricius, 1805)	Assam, Karnataka, Kerala
indica Hancock & Drew, 1994	Karnataka
Subfamily Tephritinae	
Tribe Cecidocharini	
Procecidochares Hendel, 1914	
utilis Stone, 1947	Tamil Nadu
Cecidochares Bezzi,1910	
connexa (Macquart, 1848)	Karnataka
Tribe Dithrycini	
Platensina Enderlein, 1911	
acrostacta (Wiedemann, 1824)	Bihar, Jharkhand, Karnataka, Kerala, Meghalaya, Orissa, Rajasthan, Sikkim, Tamil Nadu, West Bengal
fulvifacies Hering, 1941	Maharashtra
tetrica Hering, 1939	Tamil Nadu
zodiacalis (Bezzi, 1913)	Bihar, Karnataka, West Bengal
Tribe Pliomelaenini	
Elaphromyia Bigot, 1859	
pterocallaeformis (Bezzi, 1913)	Assam, Himachal Pradesh, Karnataka, Madhya Pradesh, Meghalaya, Uttaranchal, West Bengal
Pliomelaena Bezzi, 1918	
zonogastra (Bezzi, 1913)	Assam, Bihar, Himachal Pradesh, Karnataka, Nicobar Islands, Orissa, Punjab, Uttaranchal, Uttar Pradesh
Sundaresta Hering, 1953	
malaisei (Hering, 1938)	Karnataka, Tamil Nadu
Tribe Schistopterini	
Calloptera Freidberg, 2002	
asteria (Hendel, 1915)	Karnataka, Delhi
Perirhithrum Bezzi, 1920	
longiseta (Hering, 1939)	Tamil Nadu
Rhabdochaeta de Meijere, 1904	
gladifera Hering, 1941	Karnataka, Maharashtra
pulchella de Meijere, 1904	Arunachal Pradesh, Himachal Pradesh, Karnataka
Rhochmopterum Speiser, 1910	
venustum (de Meijere, 1914)	Karnataka (New record for India)
Tribe Tephrellini	
Metasphaenisca Hendel, 1914	
nigricans (Wiedemann,1830)	Kerala, Tamil Nadu
reinhardi (Wiedemann, 1824)	Bihar, Himachal Pradesh, Karnataka, West Bengal

Pristaciura Hendel, 1927	
incisa (Bezzi, 1913)	Himachal Pradesh, Karnataka, Meghalaya, Uttaranchal
monochaeta (Bezzi, 1913)	Bihar, Himachal Pradesh, Jammu and Kashmir, Orissa, Uttaranchal, West Bengal
Sphaeniscus Becker, 1908	
quadrincisus (Wiedemann, 1824)	Andaman Islands, Karnataka, Maharashtra, Meghalaya, Orissa, West Bengal
Tephraciura Hering, 1941	
basimacula (Bezzi, 1924)	Lakshadweep Islands, Tamil Nadu
pachmarica Agarwal & Kapoor,1988	Madhya Pradesh
Tribe Tephritini	
Campiglossa group of genera	
Campiglossa Rondani, 1870	
deserta (Hering, 1939)	Karnataka
gemma (Hering, 1939)	Karnataka, Tamil Nadu
Dioxyna Frey, 1954	
sororcula (Wiedemann, 1830)	Andhra Pradesh, Assam, Bihar, Chandigarh, Haryana, Himachal Pradesh, Jammu and Kashmir, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Orissa, Punjab, Tamil Nadu, Uttar Pradesh, Uttaranchal, West Bengal
Scedella Munro, 1957	
spiloptera (Bezzi, 1913)	Bihar, Himachal Pradesh, Jharkhand, Karnataka, Madhya Pradesh, Uttar Pradesh, Uttaranchal, West Bengal
Spathulina group of genera	
Spathulina Rondani, 1856	
acroleuca (Schiner, 1868)	Bihar, Himachal Pradesh, Karnataka, Madhya Pradesh, Punjab, Rajasthan , West Bengal
Sphenella group of genera	
Sphenella Robineau-Desvoidy, 1830	
sinensis Schiner, 1868	Himachal Pradesh, Karnataka, Orissa, Tamil Nadu, Uttaranchal
Tephritis group of genera	
Acanthiophilus Becker, 1908	
helianthi (Rossi, 1790)	Andhra Pradesh, Bihar, Delhi, Haryana, Himachal Pradesh, Jammu and Kashmir, Karnataka, Madhya Pradesh, Maharashtra, Punjab, Rajasthan, Uttar Pradesh
lugubris Hering, 1939	Tamil Nadu
Actinoptera Rondani,1871	
brahma Schiner,1868	Tamil Nadu
Trupanea Schrank, 1795	
amoena (Frauenfeld, 1857)	Bihar, Jharkhand, Meghalaya, Punjab, Uttar Pradesh, West Bengal
asteria (Schiner, 1868)	Bihar, Jharkhand, Karnataka, Tamil Nadu
aucta Bezzi,1913	Orissa
inaequabilis Hering, 1942	Karnataka, Punjab, Uttar Pradesh
keralaensis Agarwal, Grewal, Gupta & Sharma, 1989	Kerala

proavita Hering, 1939	Tamil Nadu
stellata (Fuesslin,1775)	Delhi, Madhya Pradesh, Maharashtra, Uttar Pradesh
Craspedoxantha Bezzi, 1913	
indica Zak-ur-Rab, 1960	Madhya Pradesh, Uttar Pradesh, Karnataka
octopunctata Bezzi, 1913	Delhi, Maharashtra, Uttar Pradesh

II. Key to subfamilies of Tephritidae

1. Scutum without scapular seta, dorsocentral seta usually placed anterior to postsutural supra-alar seta/anterior supra-alar seta (Figs 36–39) . . . . . **Tephritinae [**Section VI]
-. Scutum with scapular seta, dorsocentral seta present or absent, if present then aligned with (Figs 30, 31, 35) or posterior to postsutural supra-alar seta/anterior supra-alar seta (Figs 32–34) 2

2. Dorsocentral seta usually absent (Figs 20–29), wing predominantly hyaline with a costal band and narrow anal streak (Figs 59–77), if dorsocentral seta present, then aligned with postsutural supra-alar seta (Fig. 30), wing variously marked with longitudinal and transverse bands (Figs 78–86); scutellar setae one or two; females with two spermathecae. . . . . **Dacinae** [Section III]
-. Dorsocentral seta present, scutellar setae range from two to five, females usually with three spermathecae 3

3. Three to five scutellar setae (Figs 31–34); wing (Figs 87–90) predominantly dark with hyaline spots and wedges; tip of aculeus (Fig. 55) tactile with long bristles [associated with dead and decaying plant material] . . . . . **Phytalmiinae (Acanthonevrini)** [Section IV]
-. Two scutellar setae (Fig. 35); wing predominantly hyaline with various dark markings (Figs 91–95), if entirely dark brown, last abdominal segments with elongate setae; tip of aculeus pointed and of piercing type (Fig. 58) . . . . . **Trypetinae** [Section V]

III. Key to tribes of Dacinae

1. Wing with cell bm deeper than cell bcu, extension of cell bcu usually very long (Figs 59–77), predominantly hyaline with costal band (dark band along costal margin extending from cell sc to wing apex) and anal streak; dorsocentral seta absent (Figs 20-29); first flagellomere without distinctly raised dorsoapical point, arista bare (Figs 4–11) . . . . . **Dacini** [Section III (A)]
-. Wing with cell bm as deep as cell bcu, extension of cell bcu short, wing variously marked with longitudinal and transverse bands (Figs 78–86); dorsocentral seta present (Fig. 30); first flagellomere usually with distinctly raised dorsoapical point, arista plumose (Figs 12, 13) . . . . . **Gastrozonini** [Section III (B)]

III (A). Key to genera and species of Tribe Dacini

1. Abdominal tergites separate (tergites overlapping in lateral view) (Figs 47–49, 53) . . . . . ***Bactrocera* Macquart**....2
-. Abdominal tergites fused (tergites not overlapping in lateral view) (Figs 50, 51, 54) . . . . . ***Dacus* Fabricius**...49

2. Wing with well developed bulla (swelling adjacent to cell bcu) above vein Cu_2; first flagellomere truncate at apex . . . . . ***B.* (*Bulladacus*) *mcgregori* (Bezzi)**
-. Wing without bulla above vein Cu_2; first flagellomere not truncate at apex 3

3. Anterior supra-alar seta present (Figs 23, 26, 27) 4
-. Anterior supra-alar seta absent (Figs 24, 25) 45

4. Acrostichal seta absent (Fig. 22) 5
-. Acrostichal seta present (Fig. 20) 9

5. Scutum black, devoid of lateral and medial postsutural vitta (Fig. 22) . . . . . ***B.* (*Sinodacus*) *binoyi* Drew**
-. Scutum reddish-brown, lateral postsutural vitta present, medial postsutural vitta present or absent 6

6. Medial postsutural vitta present; costal band confluent (from cell sc to wing apex) with R_{4+5} and expanded into a prominent apical spot (Fig. 73) . . . . . ***B.* (*S.*) *watersi* (Hardy)**
-. Medial postsutural vitta absent; wing markings variable 7

7. Basal cells (bc and c) fuscous, costal band almost confluent with R_{4+5} slightly widening towards apex . . . . . .

. . . . . ***B.* (*Bactrocera*) *apicofuscans* White and Tsuruta**

-. Basal cells (bc and c) clear; costal band overlapping R_{2+3} throughout its entire length but not confluent with R_{4+5} 8

8. Wing with costal band broadened towards apex (Fig. 61); males attracted to cue lure . . . . . ***B.* (*B.*) *andamanensis* Kapoor**
-. Wing with costal band either of uniform width or with a narrow section distal to the apex of R_{2+3} before expanding into a spot (Fig. 59); males attracted to methyl eugenol. . . . . ***B.* (*B.*) *affinis* (Hardy)**

9. Scutum without medial postsutural vitta (Figs 20–23). 10
-. Scutum with medial postsutural vitta (Figs 26,27) 39

10. Wing with costal band from cell sc to wing apex (Figs 62, 64) or narrowed after vein R_{2+3} (Figs 66–67) or discontnuous before expanding slightly towards apex (Fig. 65) 11
-. Wing without costal band (Figs 60, 63) 15

11. Costal band discontinuous beyond vein R_{2+3} with a break or very narrowly continuous before expanding towards apex 12
-. Costal band of almost unifom width atmost with an apical expansion (Figs 68–74) 16

12. Two scutellar (1 apical, 1 basal) setae; face with two transverse lines (Fig. 9); wing with costal band narrowly continuous beyond R_{2+3} (Fig. 67) . . . . . ***B.* (*Zeugodacus*) *duplicata* (Bezzi)**
-. Single scutellar (apical) seta; face with either black spots or single transverse line (Figs 4, 5) 13

13. Face with two distinct black spots (Fig. 4); scutum reddish-brown . . . . . ***B.* (*B.*) *zonata* (Saunders)**
-. Face with spots coalesce to form transverse line (Fig. 5); scutum black 14

14. Abdominal tergites III-V orange brown, tergites IV and V with narrow dark lateral margins; scutellum with a narrow black basal band . . . . . ***B.* (*B.*) *correcta* (Bezzi)**
-. Abdominal tergites III-V mostly black; scutellum with a broad black basal band. . . . . ***B.* (*B.*) *penecorrecta* Drew**

15. Scutellum yellow with a broad triangular basal black band (Fig. 44); wing with an olique band starting from pterostigma running through R-M, DM-Cu ending at posterior margin (Fig. 60) . . . . . ***B.* (*B.*) *albistrigata* (Meijere)**
-. Scutellum yellow with a medial black band dividing it into two yellow patches (Fig. 45); wing hyaline without oblique band (Fig. 63). . . . . ***B.* (*Parazeugodacus*) *bipustulata* (Bezzi)**

16. Fore, mid and hindfemur yellow (Fig. 43) 17
-. All or atleast forefemur with fuscous markings (Fig. 42). 26

17. Scutum predominantly reddish-brown or brown 18
-. Scutum predominantly black. 22

18. Scutum with dark fuscous markings or mottled due to the attachment of muscles 19
-. Scutum uniformly coloured,without fuscous markings 21

19. Costal band confluent with R_{4+5}, slightly overlapping towards apex; tip of aculeus trilobate . . . . . ***B.* (*Paratridacus*) *expandens* (Walker)**
-. Costal band confluent with R_{2+3} or slightly overlapping R_{2+3}; aculeus tip pointed 20

20. Costal band confluent with R_{2+3} (Fig. 62); lateral postsutural vitta uniform in width and reaches intra alar seta (Fig. 20); males attracted to methyl eugenol. . . . . ***B.* (*B.*) *dorsalis* (Hendel)**[1]
-. Costal band overlapping R_{2+3}; lateral postsutural vitta narrowed posteriorly and ends before intra alar seta; males attracted to cue lure . . . . . ***B.* (*B.*) *paraosbeckiae* Drew**

21. Scutellum with an apical black spot (Fig. 46); costal band of uniform width . . . . . ***B.* (*B.*) *versicolor* (Bezzi)**
-. Scutellum without apical black spot; costal band expanded towards the apex (Fig. 61). . . . . ***B.* (*B.*) *andamanensis* (Kapoor)**

22. Cell bcu with short extension, costal band confluent with R_{4+5}; males without pecten on abdominal tergum III . . . . . ***B.* (*Gymnodacus*) *calophylli* (Perkins & May)**
-. Cell bcu with long extension, costal confluent with or slightly overlapping R_{2+3}; pecten present 23

23. Scutum, pleural areas black, lateral postsutural vitta narrowed posteriorly (Fig. 21); abdominal tergum III entirely dark fuscous to black; males attracted to cue lure . . . . . ***B.* (*B.*) *merapiensis* Drew and Hancock**

[1] Fruit flies running to *B.dorsalis* in couplet 20 may match African *B. invadens*, but further research is required to fully understand how to recognise these species.

-. Scutum brownish to black, with area behind and beneath lateral postsutural vittae brown, lateral postsutural vitta of uniform width (Fig. 20); abdominal tergum III never completely dark fuscous or black; males attracted to methyl eugenol. 24

24. Costal band slightly overlapping vein R_{2+3} (Fig. 68) . . . . . ***B.* (*B.*) *verbascifoliae* Drew and Hancock**
-. Costal band confluent with vein R_{2+3} (Fig. 62) 25

25. Costal band not widening from the apex of R_{2+3} to extremity of wing (Fig. 62); abominal tergites III-V reddish with a prominent T shaped mark . . . . . ***B.* (*B.*) *dorsalis* Hendel**
-. Costal band widening gradually from the apex of R_{2+3} to extremity of wing; abdominal tergites with dark markings on lateral regions . . . . . ***B.* (*B.*) *paraverbascifoliae* Drew & Hancock**

26. Costal band overlapping R_{4+5} through out its full length (Fig. 70); males without pecten; aculeus tip trunctae with blunt tip and lateral expansions a little before the apex . . . . . ***B.* (*Paratridacus*) *garciniae* Bezzi**
-. Costal band not overlapping R_{4+5}; pecten present; aculeus variable 27

27. Face with a single or two transverse black bands connecting the lateral spots . . . . . ***B.* (*Z.*) *incisa* Walker**
-. Face with two separate black spots 28

28. Scutellum with an apical black spot. . . . . ***B.* (*B.*) *apiconigroscutella* Drew**
-. Scutellum without an apical black spot. 29

29. Face entirely black (Fig. 7) . . . . . ***B.* (*B.*) *nigrofemoralis* White & Tsuruta**
-. Face with two black spots (Fig. 4) 30

30. Lateral postsutural vitta ending at anterior supra-alar seta (Fig. 23) . . . . . ***B.* (*B.*) *neonigrotibialis* Drew**
-. Lateral postsutural vitta extending beyond anterior supra-alar seta 31

31. All femora with preapical dark spots (Fig. 42) (spots may be on various surfaces). 32
-. Only forefemur/only midfemur/fore and hindfemur with preapical dark spots 34

32. Anepisternal stripe broad almost reaching postpronotal lobe (Fig. 40); aculeus tip trilobed; males are not attracted to any lures (breeds on *Solanum* spp.) . . . . . ***B.* (*B.*) *latifrons* (Hendel)**
-. Anepisternal stripe not broad and not reaching postpronotal lobe; aculeus tip not trilobed. 33

33. Costal band narrow, confluent with R_{2+3} . . . . . ***B.* (*B.*) *caryeae* (Kapoor)**
-. Costal band broad, confluent with R_{4+5} (Fig. 69). . . . . ***B.* (*B.*) *limbifera* (Bezzi)**

34. Midfemur with preapical dark spot. . . . . ***B.* (*B.*) *pseudoversicolor* Drew**
-. Midfemur yellow without any preapical dark spot 35

35. Only forefemur with preapical dark spot 36
-. Fore and hindfemur with preapical dark spots . . . . . ***B.* (*B.*) *neoarecae* Drew**

36. Costal band broadened towards apex and ends near the middle of cell r_{4+5} (Fig. 64) (not recorded from mainland but from Andaman and Nicobar Islands). 37
-. Costal band of uniform width 38

37. Abdomen with a prominent T shaped mark (Fig. 47). . . . . ***B.* (*B.*) *carambolae* Drew & Hancock**
-. Abdomen with diffused dark colour pattern (Fig. 48). . . . . ***B.* (*B.*) *melastomatos* Drew & Hancock**

38. Postpronotal lobe yellow; males respond to cue lure . . . . . ***B.* (*B.*) *vishnu* Drew & Hancock**
-. Postpronotal lobe with dark red brown anteromedial corners; males respond to methyl eugenol . . . . . ***B.* (*B.*) *amarambalensis* Drew**

39. Scutellum with an apical black spot . . . . . ***B.* (*Z.*) *scutellaris* Bezzi**
-. Scutellum without an apical balck spot. 40

40. Costal band confluent with R_{2+3} (Fig. 74) 41
-. Costal band overlapping R_{2+3} (Figs 71, 72) 44

41. Wing with costal band expanded to an apical spot (Fig. 74). . . . . ***B.* (*Z.*) *zahadi* Mahmood**
-. Wing with costal band of almost uniform width, not expanded to an apical spot 42

42. Anepisternal stripe inverted L shaped (Fig. 41), lateral postsutural vitta extending beyond intra-alar seta (Fig. 27) ..... ***B.* (*Z.*) *gavisa* (Munro)**
-. Anepisternal stripe not inverted L shaped, lateral postsutural vitta not extending beyond intra-alar seta 43

43. Scutum with medial postsutural vitta broadened basally and narrowed apically (Fig. 26); face with a black line across mouth opening or spots coalesce to form a line; males with pecten on abdominal tergum III ..... ***B.* (*Z.*) *caudata* (Fabricius)**
-. Scutum with medial postsutural vitta narrowed at both ends; face with a transverse line in females and fulvous in males; pecten absent (Fig. 49) ..... ***B.* (*Hemigymnodacus*) *diversa* (Coquillett)**

44. Wing with radial-medial band and subapical band (Fig. 71) ..... ***B.* (*Z.*) *cucurbitae* (Coquillett)**
-. Wing without radial-medial band and subapical band (Fig. 72) ..... ***B.* (*Z.*) *tau* (Walker)**

45. Acrostichal seta absent; tip of aculeus bifid in females (Fig. 56); costal band slightly overlapping R_{2+3}. ..... ***B.* (*B.*) *digressa* Radhakrishnan**
-. Acrostichal seta present; tip of aculeus variable 46

46. Scutum with medial postsutural vitta (Figs 24, 25); face either fully fulvous (Fig. 8) or with dark markings towards the lower facial margin (Fig. 6), but never complete spots 47
-. Scutum without medial postsutural vitta; face fulvous with two distinct black spots (Fig. 4) 48

47. Scutellum yellow with an apical black spot, notopleuron black (Fig. 24); face fulvous with black markings in lower facial margin (Fig. 6). ..... ***B.* (*Javadacus*) *scutellaria* (Bezzi)**
-. Scutellum without apical spot, notopleuron yellow (Fig. 25); face fulvous without any markings (Fig. 8). ..... ***B.* (*J.*) *trilineata* (Hardy)**

48. Lateral postsutural vitta broad extending beyond intra-alar seta ..... ***B.* (*J.*) *pallescentis* (Hardy)**
-. Lateral postsutural vitta narrow, ends before post-alar seta ..... ***B.* (*B.*) *fastigiata* Tsuruta and White**

49. Pedicel+first flagellomere not longer than ptilinal suture (Fig. 10); wing with narrow costal band; scutum without anterior supra-alar seta and acrostichal seta (Figs 28, 29) 50
-. Pedicel+first flagellomere longer than ptilinal suture (Fig. 11); wing with broad costal band (Figs 75-77); scutum with anterior supra-alar seta but without acrostichal seta 51

50. Scutum without lateral and medial postsutural vitta (Fig. 28); males with pecten on abdominal tergum III ..... ***Dacus* (*Didacus*) *ciliatus* Loew**
-. Scutum with both medial and lateral postsutural vittae (Fig. 29); males without pecten on abdominal tergum III ..... ***D.* (*Leptoxyda*) *persicus* (Hendel)**

51. Reddish brown species; face with black spots 52
-. Black species with entirely black face (Fig. 11) 56

52. Wing with costal band conluent with R_{4+5} expanded into a large apical spot (Fig. 75) 53
-. Wing with costal band overlapping R_{4+5} without apical spot (Fig. 77) 55

53. Abdomen without a median longitudinal dark band ..... ***D.* (*Callantra*) *sphaeroidalis* (Bezzi)**
-. Abdomen with a medial longitudinal dark band (Fig. 51) 54

54. Anepisternal stripe broad reaching anterior notopleural seta, medial vitta always present. ..... ***D.* (*C.*) *nummularius* Bezzi**
-. Anepisternal stripe narrow not reaching anterior notopleural seta, medial vitta often absent ..... ***D.* (*C.*) *discophorus* (Hering)**

55. Anatergite yellow, wing without anal streak ..... ***D.* (*C.*) *insulosus* Drew and Hancock**
-. Anatergite fuscous, wing with a pale anal streak (Fig. 77) ..... ***D.* (*C.*) *longicornis* Wiedemann**

56. Costal band broad, dark brown with a sinuate hind margin extending along R-M crossvein (Fig. 76) ..... ***D.* (*C.*) *ramanii* Drew and Hancock**
-. Costal band without a sinuate hind margin along R-M crossvein ..... ***D.* (*C.*) *crabroniformis* Bezzi**

III (B). Key to genera and species of Tribe Gastrozonini

1. Green (in life) or fulvous in general appearance; wing hyaline with longitudinal yellowish bands, no transverse bands 2
-. Body colour variable, wing hyaline with longitudinal and transverse bands or brown with hyaline spots (Figs 78-86) 3

2. Head quadrate, as high as long; males with second abdominal tergum enlarged but not expanded over the sides of tergum III; scutellum fulvous with 4-6 spots. . . . . ***Galbifascia soalia* (Séguy)(=*sexpunctata* Hardy)**
-. Head distinctly higher than long; scutum with two black spots, scutellum with four black spots; males with second abdominal tergum enlarged and expanded over sides of tergum III . . . . . ***Xanthorrachis annandelei* Bezzi**

3. Postpronotal seta absent; scutellum with three marginal black spots; wing with black band crossing obliquely at level of R-M crossvein and continuous to costa and upper apex of cell r_{4+5}, (Fig. 80). . . . . ***Anoplomus cassandra* (Osten Sacken)**
-. Postpronotal seta present (Fig. 30); scutellum and wing pattern variable 4

4. Scutum reddish-brown with broad yellow prescutellar area (Fig. 30); wing with radial-medial band extending to costal and apical margin, subapical band present (Fig. 83) . . . . . ***Gastrozona parviseta* Hardy**
-. Scutal colour variable without a broad yellow prescutellar area; wing pattern variable 5

5. Ocellar seta vestigial or lacking; wing with a broad longitudinal band covering one-fourth of the anterior margin and atleast two transverse bands (Fig. 81) . . . . . ***Chaetellipsis paradoxa* Bezzi**
-. Ocellar seta as long as or longer than orbital seta (Figs 12, 13); wing pattern different from above 6

6. One scutellar seta (basal) and one frontal seta; wing with three transverse bands and apical portion black (Fig. 86). . . . . ***Dietheria fasciata* Hardy**
- Two scutellar setae (apical and basal); 2 frontal setae; wing markings variable 7

7. First flagellomere not pointed dorsoapically (Fig. 12) 8
-. First flagellomere pointed dorsoapically (Fig. 13) 10

8. Wing with brown transverse bands parallel, that through DM-Cu continuous from posterior margin to anterior margin (Fig. 85) . . . . . ***Taeniostola vittigera* Bezzi**
-. Wing with brown to yellow bands converging, that through DM-Cu isolated or weakly connected to subapical band (Figs 82, 84) 9

9. Wing with posterior apical band across vein M joined with costal band and free from subapical band along crossvein DM-Cu (Fig. 82); tip of aculeus as in fig. 57 . . . . . ***Gastrozona fasciventris* (Macquart)**
-. Wing with posterior apical band across vein M free from costal band and weakly united with subapical band along crossvein DM-Cu (Fig. 84) . . . . . ***Gastrozona soror* (Schiner)**

10. Wing brown with indistinct yellowish patches and hyaline indentations, without transverse hyaline bands and spots at the base of cell r_{4+5}; scutellum yellow with a small apical black spot . . . . . ***Phaeospilodes bambusae* Hering**
-. Wing yellow or yellow and brown with transverse bands (Figs 78, 79), bands sometimes diffused at apical half; scutellum yellow with broad black markings or spots.... . . . . ***Acroceratitis* Hendel**...11

11. Wing with complete costal band or interrupted by a hyaline band (Fig. 78, 79); scutellum fully black or with apical two third black 12
-. Wing with diffused wing pattern towards apex; scutellum predominantly yellow with apical black spots 14

12. Costal band not entire, interrupted at the apex of cell sc (Fig.79) . . . . . ***Acroceratitis tomentosa* Hardy**
-. Costal band entire not interrupted at the apex of cell sc (Fig.78) 13

13. Postpronotal lobe with a median black spot; abdominal tergum III yellow to pale brown not black (Fig. 52); wing as in fig 78. . . . . ***Acroceratitis striata* (Froggatt)**
-. Postpronotal lobe without a median black spot; abdominal tergum III black. . . . ***Acroceratitis tenmalaica* Hancock and Drew**

14. Scutellum with three black spots, median one extending half of the width, scutum with three faint, fuscous, longitudinal bands, prescutellar area not white or fulvous . . . . . ***Acroceratitis bimacula* Hardy**
-. Scutellum with indistinct black spots, prescutellar area fulvous . . . . . ***Acroceratitis distincta* (Zia)**

IV. Key to genera and species of Phytalmiinae (Tribe Acanthonevrini)

1. Scutum entirely black except white medial vitta extending from scapular seta to apex of scutellum and anepisternal stripe; wing entirely black with narrow posterior hyaline margin; abdomen and legs entirely black . ***Felderimyia fuscipennis* Hendel**
-. Scutum not entirely black; wing variable 2

2. Scutum predominantly dark brown with yellow triangular patch from dorsocentral seta to posterior margin (Fig. 31); scutellum yellow; mid tibia with two subequal spurs . . . . . ***Diarrhegma modestum* (Fabricius)**

-. Scutum reddish brown or fulvous with black or brown longitudinal vittae (Figs 32–34); scutellum not completely yellow; mid tibia with single spur 3

3. Scutum with two longitudinal brown vittae extending upto the apex of scutellum (Fig. 32); wing predominantly dark brown with hyaline spots in apical and subapical margin (Fig. 88). . . . . ***Rioxa sexmaculata* (van der Wulp)**
-. Scutal characters and wing markings variable 4

4. Wing with vein M and straight portion of Cu_1 setose above (Figs 89, 90); males with frons wider than long (Fig. 15), scutum with five longitudinal brown vittae and scutellum black (Fig. 34), vein R_{2+3} strongly undulate (Fig. 90); females with frons as long as wide (Fig. 14), scutum with four longitudinal vittae and scutellum dark basally and laterally (Fig. 33), vein R_{2+3} not strongly undulate (Fig. 89) . . . . . ***Themara yunnana* Zia**
-. Wing with vein M and straight portion of Cu_1 not setose above. 5

5. Wing pattern dimidiate, dark brown anteriorly except hyaline margin of cell c, cell sc and hyaline spot in cell r_1 just beyond vein R_{2+3} and, with posterior third greyish hyaline . . . . . ***Acanthonevra hemileina* Hering**
-. Wing predominantly dark with hyaline wedges or indentations along anterior and posterior margins 6

6. Wing without a hyaline spot in cell br; hyaline band from cell sc ends at vein R_{2+3} (Fig. 87) . . ***Acanthonevra imparata* Hering**
-. Wing with hyaline spot in cell br and r_{4+5}, hyaline band from cell sc ends at R_1 . . . . . ***Acanthonevra inermis* Hering**

V. Key to genera and species of Trypetinae

1. Wing with a broad apical black spot (covering whole of cell m, one fourth of cell dm, three fourth of cell r_{4+5}, apical portion of r_{2+3}) and a C shaped band from anterior to posterior margin through crossvein R-M; face with a black prominent spot medially . . . . . ***Callistomyia pavonina* Bezzi**
-. Wing markings and facial spots variable. 2

2. Postpronotal seta absent . . . . . ***Adrama* Walker**...3
-. Postpronotal seta present. 4

3. Upper part of head with a short black vitta down each side of upper orbit to orbital seta; wing with brown band from anterior margin over crossvein R-M ending at M (Fig. 91),outer vertical seta lacking . . . . . ***Adrama austeni* Hendel**
-. Upper portion of head rufous except for a comparatively small black mark over occiput and ocellar triangle; brown band over crossvein R-M extending to atleast middle of cell dm, outer vertical seta present. . . . . ***Adrama determinata* Walker**

4. Ocellar seta lacking, if present less than half of orbital seta 5
-. Ocellar seta as long as or longer than orbital seta 9

5. Ocellar seta small and rudimentary; scutum fulvous with black spots laterally; scutellum with four black spots (Fig. 35) . . . . . ***Carpomya vesuviana* Costa**
-. Ocellar seta absent; scutal colour variable, anatergite with fine erect hairs 6

6. Face with a distinct black spot; wing with dark pterostigma, costal band with a break just beyond cell sc, gradually widens to end near the middle of cell dm, subapical band present . . . . . ***Coelotrypes luteifasciatus* (Senior-White)**
-. Face either fulvous or with apical portion dark fuscous and fulvous basally; wing pattern variable. 7

7. Face entirely fulvous; basal one fourth of wing hyaline and rest fuscous with hyaline apex, two anterior hyaline patches from costa to vein R_{4+5} and a posterior hyaline patch . . . . . ***Euphranta notabilis* (van der Wulp)**
-. Face fulvous basally and fuscous apically; wing markings variable... 8

8. Acrostichal seta absent; wing with a large brown mark towards the apex covering crossveins R-M and DM-Cu (Fig. 92); legs dark brown to black . . . . . ***Euphranta macularis* (Wiedemann)**
-. Acrostichal seta present, a brown mark over wing apex narrowing to a streak along cross vein DM-Cu to posterior margin; legs yellow (Fig. 93). . . . . ***Euphranta cassiae* (Munro)**

9. Wing broader, dark brown with a longitudinal hyaline band in cell r_1 and a hyaline spot towards the apex of cell r_{2+3}, posterior hyaline band starts from the apex of vein A_1+Cu_2 ending at vein M . . . . ***Chenacidiella bangaloriensis* Kapoor and Agarwal**
-. Wing with apical portion hyaline; dark brown basal portion (Fig.94, 95); body black and shining. 10

10. Wing with posterior apical band from R_{4+5} to M absent (Fig. 94). . . . . ***Philophylla indica* Hancock and Drew**
-. Wing with isolated posterior apical band from R_{4+5} to M present (Fig. 95) . . . . . ***Philophylla fossata* (Fabricius)**

VI. Key to genera and species of Tephritinae

1. Scutum shining black (Figs 37, 39); wing predominantly black with hyaline wedges (Figs 100, 101, 105, 106, 112). 2
-. Scutum grey pollinose or fulvous, not black (Fig. 36, 38); wing variable 10

2. Scutellum highly convex (Fig. 37). 3
-. Scutellum not highly convex (Fig. 39) 4

3. Wing with broad transverse hyaline band from anterior to posterior margin distal of crossveins (Fig. 101); single orbital seta (introduced for weed biocontrol). . . . . ***Procecidochares utilis* Stone**
-. Wing without a broad transverse hyaline band distal of cross veins (Fig. 100); two orbital setae (introduced for weed biocontrol) . . . . . ***Cecidochares connexa* (Walker)**

4. One scutellar seta (basal); wing with brown basal area (Fig. 106). 5
-. Two scutellar setae (1apical, 1 basal); wing with hyaline base and hyaline wedges on both the margins (Figs 105, 112) 8

5. Wing with hyaline spots in cell r_{4+5} and dm (Fig. 106) 6
-. Wing without hyaline spots in cell r_{4+5} and dm 7

6. All head setae black and narrow . . . . . ***Pristaciura monochaeta* (Bezzi)**
-. Postocular setae flattened and whitish . . . . . ***Pristaciura incisa* (Bezzi)**

7. Hyaline wedges in cell r_1 ends at vein R_{4+5}, the proximal hyaline wedge in cell cu_1 ends at vein Cu_{1a} . . . . . ***Tephraciura pachmarica* Agarwal and Kapoor**
-. Distal hyaline wedge in cell r_1 ends at vein M, distal hyaline wedge in cell cu_1 crosses Cu_1 to reach cell dm . . . . . ***Tephraciura basimacula* (Bezzi)**

8. Frons with two frontal and orbital setae; wing with one anterior and three posterior hyaline wedges, anal lobe partly hyaline (Fig. 112). . . . . ***Sphaeniscus quadrincisus* (Wiedemann)**
-. Frons with three frontal setae and two orbital setae; wing with two anterior and posterior hyaline wedges, anal lobe fully hyaline 9

9. Wing with single hyaline wedge in cell cu_1. . . . . ***Metasphaenisca nigricans* (Wiedemann)**
-. Wing with two hyaline wedges in cell cu_1 (Fig. 105) . . . . . ***Metasphaenisca reinhardi* (Wiedemann)**

10. Wing with a deep cleft in costal margin (Figs 114–116). 11
-. Wing without a deep cleft 15

11. Bases of antennae widely separated, frontal seta situated opposite to orbital seta; wing dark brown, broader than long, almost circular in shape with numerous hyaline semi-circular wedges along the margin . . . . . ***Perirhithrum longiseta* (Hering)**
-. Wing normal in shape, with a dark central area and radiating rays (Figs 114–116) 12

12. Vein M strongly curved beyond crossvein DM-Cu (Figs 114, 115) 13
-. Vein M slightly curved beyond crossvein DM-Cu, vein R_{4+5} curved upward sharply, cell r_{4+5} expanded towards apex (Fig. 116) . . . . . ***Rhochmopterum venustum* (de Meijere)**

13. Wing with radiating rays whitish in the middle (Fig. 115) . . . . . ***Rhabdochaeta pulchella* de Meijere**
-. Radiating rays are completely brownish to black... 14

14. Rays are dark brown, ray in cell r_{4+5} run parallel to vein R_{4+5} and curve upwards to reach anterior margin. . . . . ***Rhabdochaeta gladifera* (Hering)**
-. Rays light brown, ray in cell r_{4+5} straight and of uniform width (Fig. 114). . . . . ***Calloptera asteria* (Hendel)**

15. Wing dark brown with hyaline spots (Figs 98, 99, 111) or hyaline with black markings (Figs 103, 110, 113) but without stellate pattern towards apex 16
-. Wing hyaline basally with a stellate pattern towards the apex (Fig. 118). 23

16. Two frontal setae 17
-. Three frontal setae. 29

17. Wing dark brown with numerous hyaline spots (Figs 98, 99, 111). 18
-. Wing predominantly hyaline with numerous black markings or transverse bands (Figs 103, 110, 113) 21

18. Single scutellar seta (basal) 19
-. Two scutellar setae (basal and apical) 20

19. Abdomen shining black; wing dark brown with hyaline indentations, apex of the wing hyaline with a small marking at the extremity of vein R_{4+5} (Fig. 111) . . . . . ***Spathulina acroleuca* (Schiner)**
-. Adomen not shining black; wing brown with numerous hyaline spots . . . . . ***Actinoptera brahma* Schiner**

20. Posterior region of wing more hyaline with few dark patches or spots, cell r_{4+5} with an apical hyaline spot (Fig. 99) . . . . . ***Campiglossa gemma* (Hering)**
-. Posterior region of wing brown with numerous hyaline spots, cell r_{4+5} without an apical hyaline spot (Fig. 98). . . . . ***Campiglossa deserta* (Hering)**

21. Wing with transverse band running through R-M and DM-Cu, apex of wing dark brown (Fig. 113). . . . . ***Sphenella sinensis* Schiner**
-. Wing without transvere bands (Figs 103, 110) 22

22. Two scutellar setae; proboscis fleshy and short, head as high as long (Fig. 18); wing as in fig. 110. . . . . ***Scedella spiloptera* (Bezzi)**
-. One scutellar seta; proboscis elongate, head longer than high (Fig. 19); wing as in fig. 103. . . . . ***Dioxyna sororcula* (Wiedemann)**

23. Wing with a dark brown band from pterostigma to posterior margin of the wing runing through cell br and dm. . . . . ***Trupanea aucta* Bezzi**
-. Wing without such band 24

24. Apical portion of cell r_{4+5} not hyaline, dark brown band extends upto apex of cell r_{4+5} . . . . . ***Trupanea proavita* Hering**
-. Apical portion of cell r_{4+5} hyaline.. 25

25. Cell r_{4+5} with an apical fork, the anterior arm braces vein R_{2+3} and posterior arm R_{4+5} (Fig. 118). . . . . ***Trupanea inaequabilis* Hering**
-. Cell r_{4+5} without an apical fork. 26

26. The ray from cell r_{4+5} absent, if present ends at vein M 27
-. The ray from cell r_{4+5} crosses the vein M and reach medial cell 28

27. Wing with an oblique band starting from the base of crossvein R-M reaching pterostigma . . . . . ***Trupanea amoena* (Frauenfeld)**
-. Wing without such band, ray from cell r_{4+5} absent in males, but present in females which ends at vein M. . . . . ***Trupanea stellata* (Fuesslin)**

28. The ray from cell r_{4+5} crosses the vein M and end at posterior margin . . . . . ***Trupanea asteria* (Schiner)**
-. The ray from cell r_{4+5} crosses the vein M but not reaching posterior margin . . . . . ***Trupanea keralaensis* Agarwal, Grewal, Gupta and Sharma**

29. Scutum fulvous with four large round, shiny black spots around the insertions of dorsocentral and acrostichal setae (Fig. 38); wing with black spots along yellow costal band (Fig. 102) 30
-. Scutum grey pollinose with or without black spots (Fig. 36); wing predominantly dark brown with numerous hyaline spots and indentations or hyaline with black markings but never with continuous costal band. 31

30. Wing with yellow band along vein A_1+Cu_2 extending to posterior margin . . . . . ***Craspedoxantha octopunctata* Bezzi**
-. Wing with yellow band along vein A_1+Cu_2 restricted to cell bcu not extending to posterior margin (Fig. 102)... . . . . .***Craspedoxantha indica* Zaka-ur-Rab**

31. Wing mostly hyaline with indistinct markings; first flagellomere pointed at the apex. 32
-. Wing not hyaline, predominantly brown or black with numerous hyaline spots 33

32. Pterostigma not prominent, wing with dark bands and spots towards the apex (Fig. 96). . . . . ***Acanthiophilus helianthi* Rossi**
-. Pterostigma prominent and dark, wing with anterior half dark brown, with small hyaline spots (Fig. 97) . . . . . ***Acanthiophilus lugubris* Hering**

33. Wing elongate, parallel sided, predominantly brown with numerous small hyaline spots (Fig. 104) . . . . . ***Elaphromyia pterocallaeformis* (Bezzi)**
-. Wing normal in shape, mostly brown with hyaline wedges on both margins. 34

34. Gena setose (Fig. 17); wing as in fig. 109. . . . . ***Pliomelaena zonogastra* (Bezzi)**
-. Gena finely setose (Fig. 16) 35

35. Posterior orbital seta white and not convergent; wing with numerous hyaline spots in the dark field and marginal hyaline spots in cell r_{2+3} (Fig. 117). . . . . ***Sundaresta malaisei* (Hering)**
-. Posterior orbital seta black and convergent; wing variable. 36

36. Cell r_1 with hyaline indentations extending up to cell r_{2+3} (Figs 107, 108) 37
-. Cell r_1 without hyaline indentations, but with at least a single hyaline spot in cell r_{2+3} 38

37. One scutellar seta; cell r_{2+3} with hyaline markings (Fig. 108). . . . . ***Platensina zodiacalis* (Bezzi)**
-. Two scutellar setae; cell r_{2+3} without any hyaline markings (Fig. 107). . . . . ***Platensina acrostacta* (Wiedemann)**

38. Face yellow; cell r_1 with hyaline spots along wing margin. . . . . ***Platensina tetrica* Hering**
-. Face brownish yellow; no hyaline spots along wing margin . . . . . ***Platensina fulvifacies* Hering**

VII. Notes on *Bactrocera* (*Bactrocera*) *digressa* Radhakrishnan and *Bactrocera* (*Daculus*) *yercaudiae* Drew

Bactrocera (*Bactrocera*) *digressa* Radhakrishnan

Bactrocera (*Bactrocera*) *digressa* Radhakrishnan, 1999. Rec.Zool.Surv.India, 97(4):1. Holotype ♀. India (Tamil Nadu: Salem dist., Shevroy Hills, Semmanathan) (ZSI) [not examined]
Bactrocera (*Daculus*) *yercaudiae* Drew, 2002. Raffles Bull.Zool., 50(2): 346. Holotype ♂. India (Tamil Nadu: Yercaud, 15 Km from Yercaud) (BMNH) [not examined]; **syn.nov.**

Material examined
INDIA: Karnataka: 11 ♂, Bangalore, 916m, 10.vii.1989, S. Ramani; 2 ♂, same data except 11.vii.1989; 1 ♂, same data except 4.ii.1989; 2 ♂, same data except 3.vii.1988, G. Bhat; 3 ♂, Bangalore, Hessaraghatta, 916m, 14.iii.1987, G. Bhat; 3 ♂ same data except 23.i.1988; 2 ♂ same data except 9.vii.1988; 2 ♂, 1♀, Bangalore, GKVK, 4.ii.2008, David, K. J.; 1 ♂, same data except 20.i.2008; 1 ♂, same data except 8.vi.2008, Sudha, M.; 1 ♂, Gouribidanur, 29.vi.2009, Praveen; 1 ♂, Mandya, 24-30.vii.1989, Gubbaiah; 2 ♂, Tamil Nadu, Yercaud, 3.vii.1992, S. Ramani (UASB); 2 ♀, Karnataka, Gowribidanur, Kolar, 23.vii.07, Naveen Kumar (NBAII).

Radhakrishnan (1999) described *Bactrocera digressa* based on two females collected from Salem district, Tamil Nadu. The diagnostic characters of the species are reddish brown scutum, bifid aculeus tip, absence of acrostichal and anterior supra-alar setae. Later, Drew and Raghu (2002) described *Bactrocera* (*Daculus*) *yercaudiae* based on males collected from Yercaud, Tamil Nadu and Bangalore which responded to cue lure. Perusal of original description of the two species showed complete congruence of characters except costal band, which was mentioned as confluent with vein R_{2+3} in *Bactrocera digressa* and slightly overlapping R_{2+3} in *B. yercaudiae*. Material mentioned above which were keyed out as *Bactrocera yercaudiae* were examined to confirm the identity. Examination of aculeus tip of the females revealed that it has a bifid aculeus and all the characters are in concordance with that of *B. digressa* except for a slightly overlapping costal band which might have been overlooked by Radhakrishnan (1999) because it is very faint beyond vein R_{2+3}. Hence we propose *B. yercaudiae* as a junior synonymn of *B. digressa*. Since all the Asian species in subgenus *Daculus* are aberrant *Bactrocera* s.str. and true *Daculus* are African, *B. digressa* is retained in subgenus *Bactrocera* (Copeland *et al*., 2004). As per ICZN rules, *Bactrocera digressa* Radhakrishnan is the valid name. Three females have been reared from fruits of *Alangium lamarkii* collected from Yercaud, Tamil Nadu and are deposited in BMNH (Ian M. White, pers. comm.)

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vision of reprints of their publications and other relevant literature; Dr. J. Poorani (National Bureau of Agriculturally Important Insects, Bangalore) and Mr. S. K .Singh (Indian Agricultural Research Institute, New Delhi) for the images of fruit flies deposited in respective institutes. This research was financed by the Indian Council of Agricultural Research (ICAR), New Delhi under the Network Project on Insect Biosystematics.

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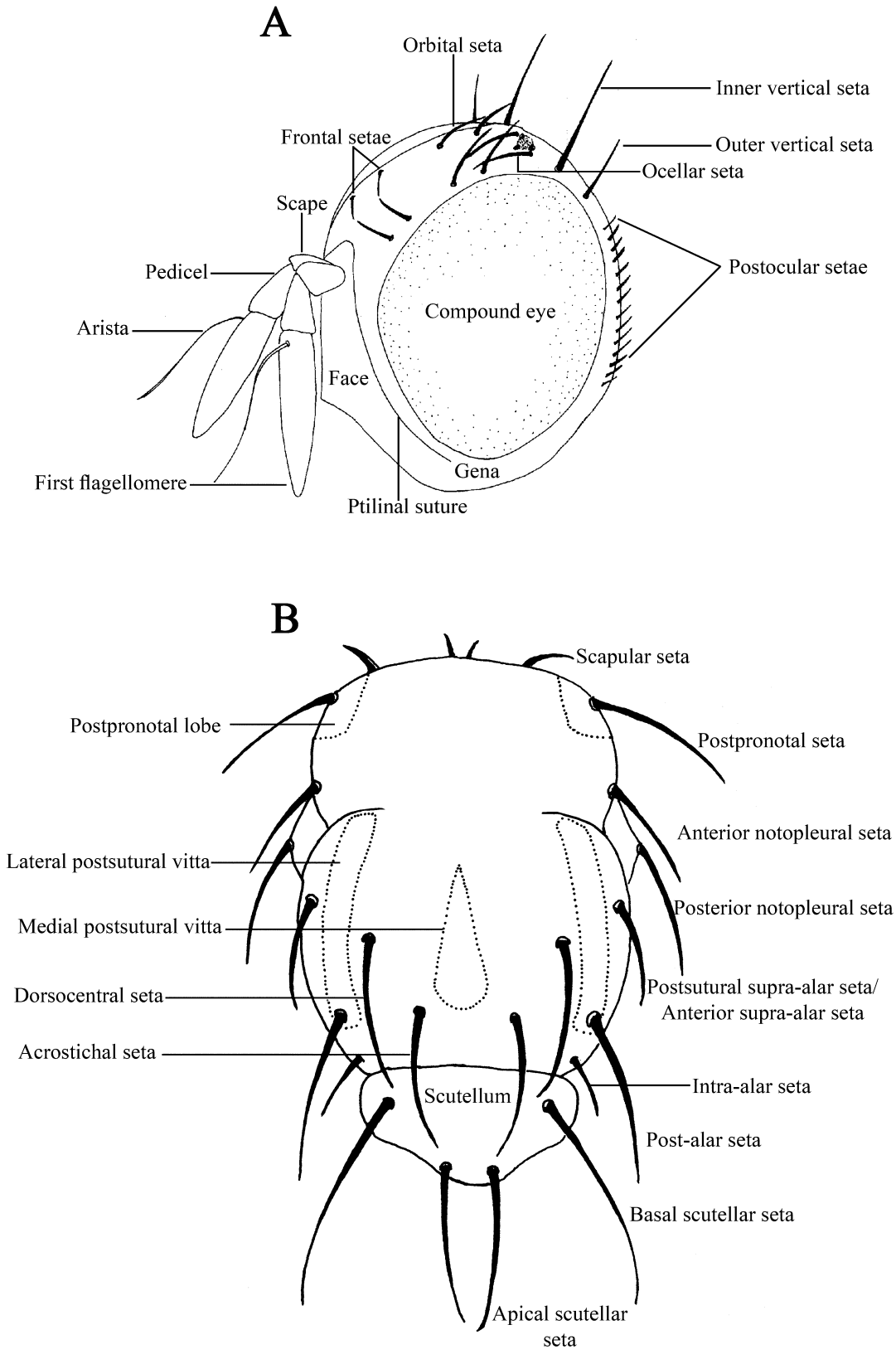


FIGURE 1. A, Head; B, Thorax (dorsal view) of Tephritidae

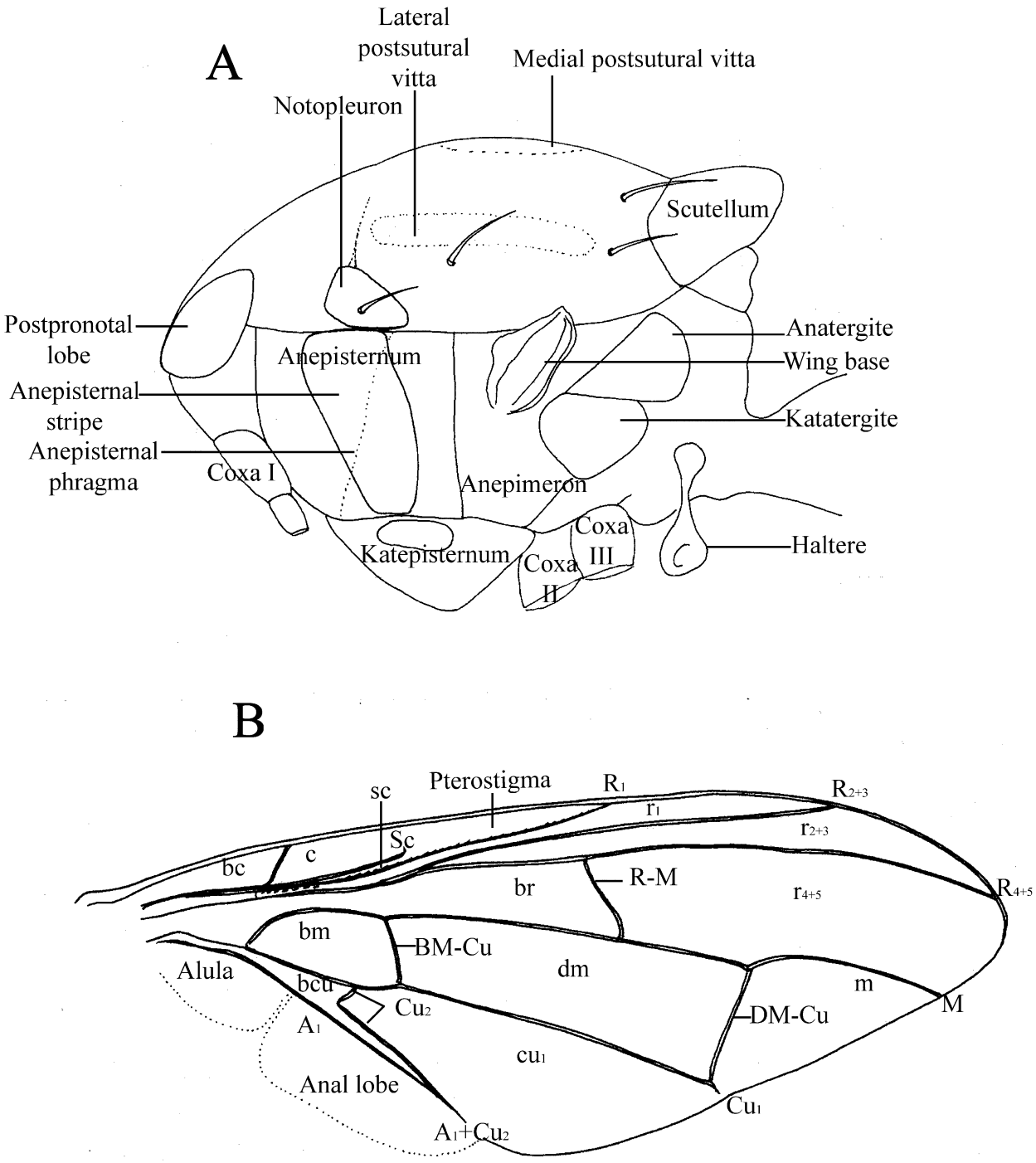


FIGURE 2. A, Thorax (lateral view); B, Wing of Tephritidae

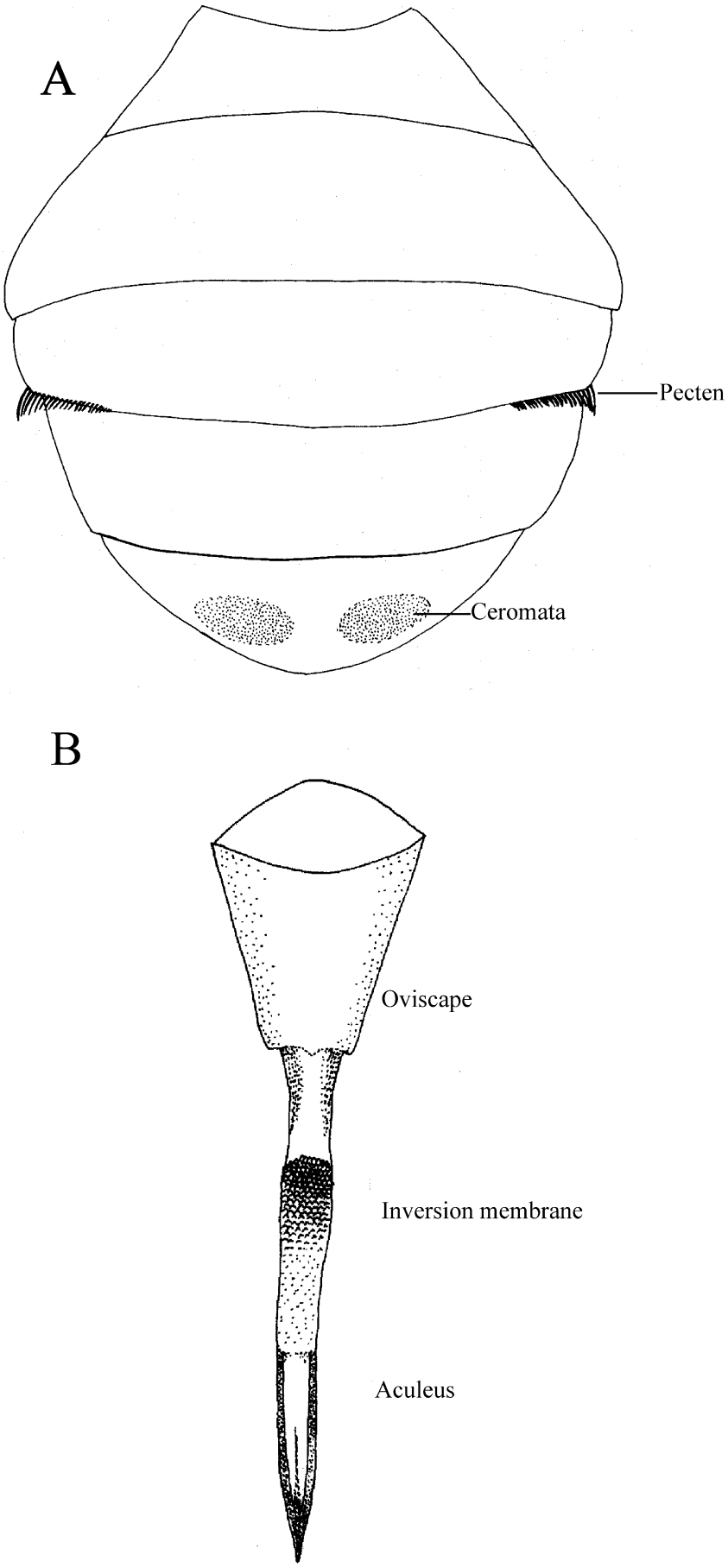
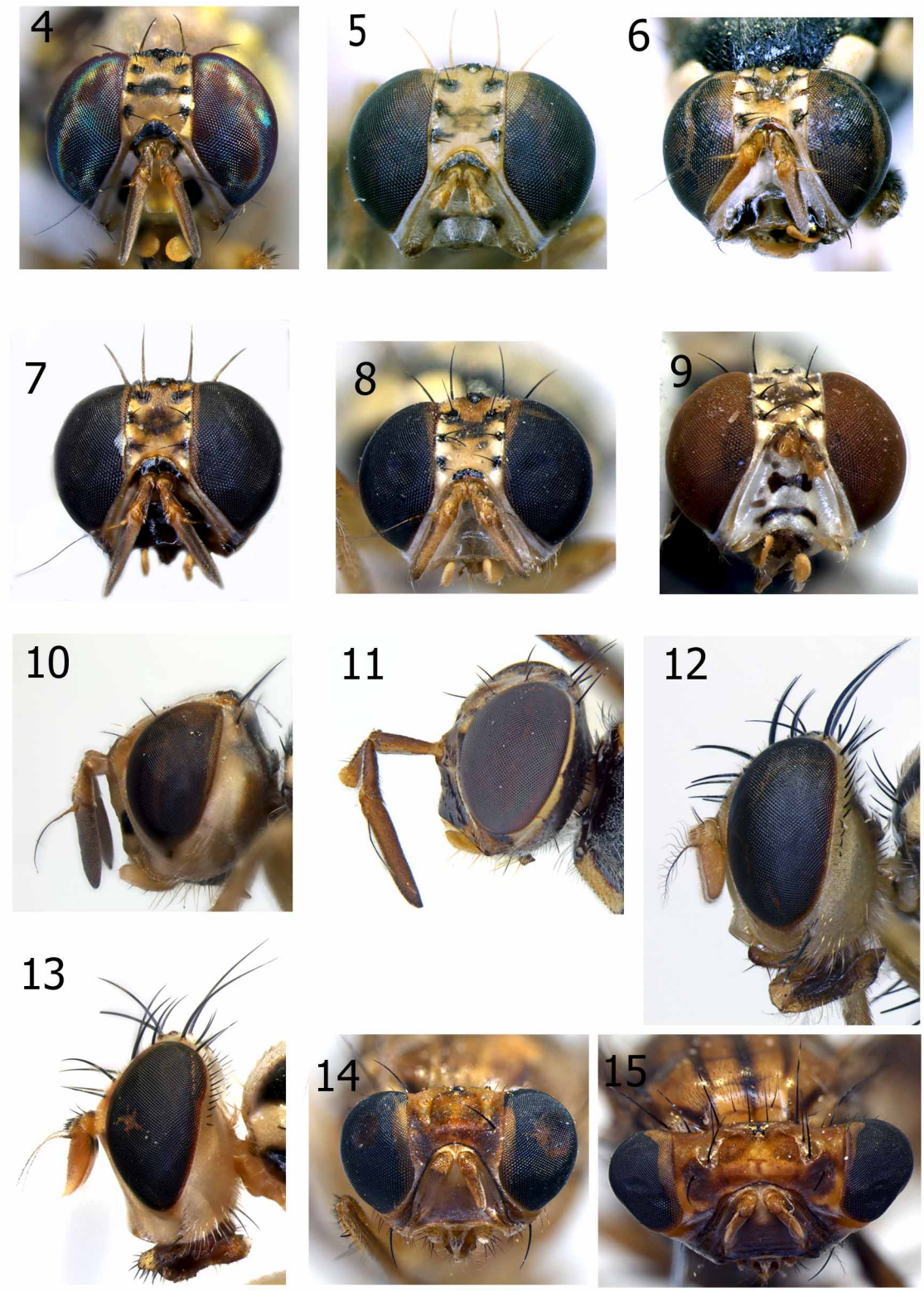
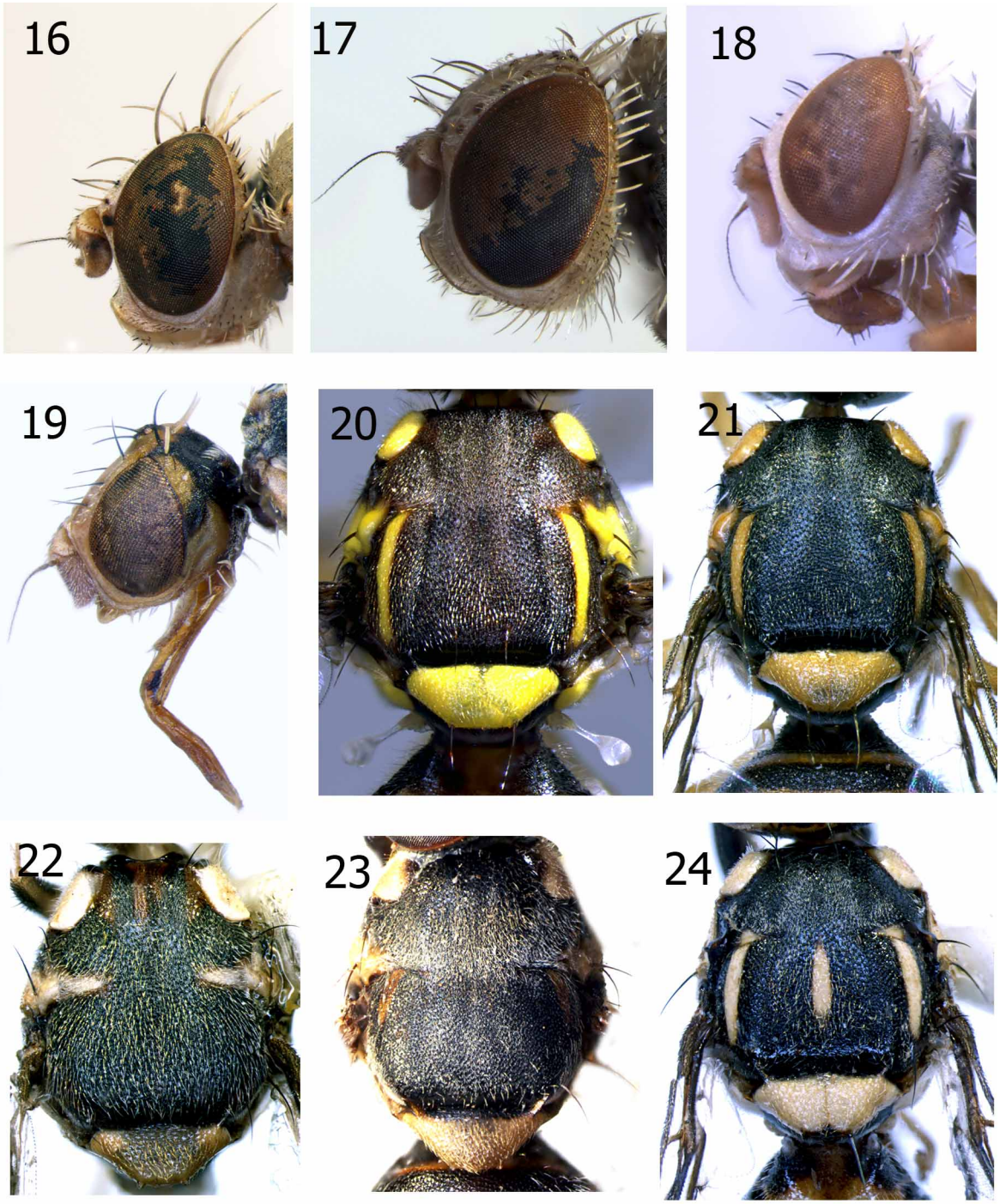


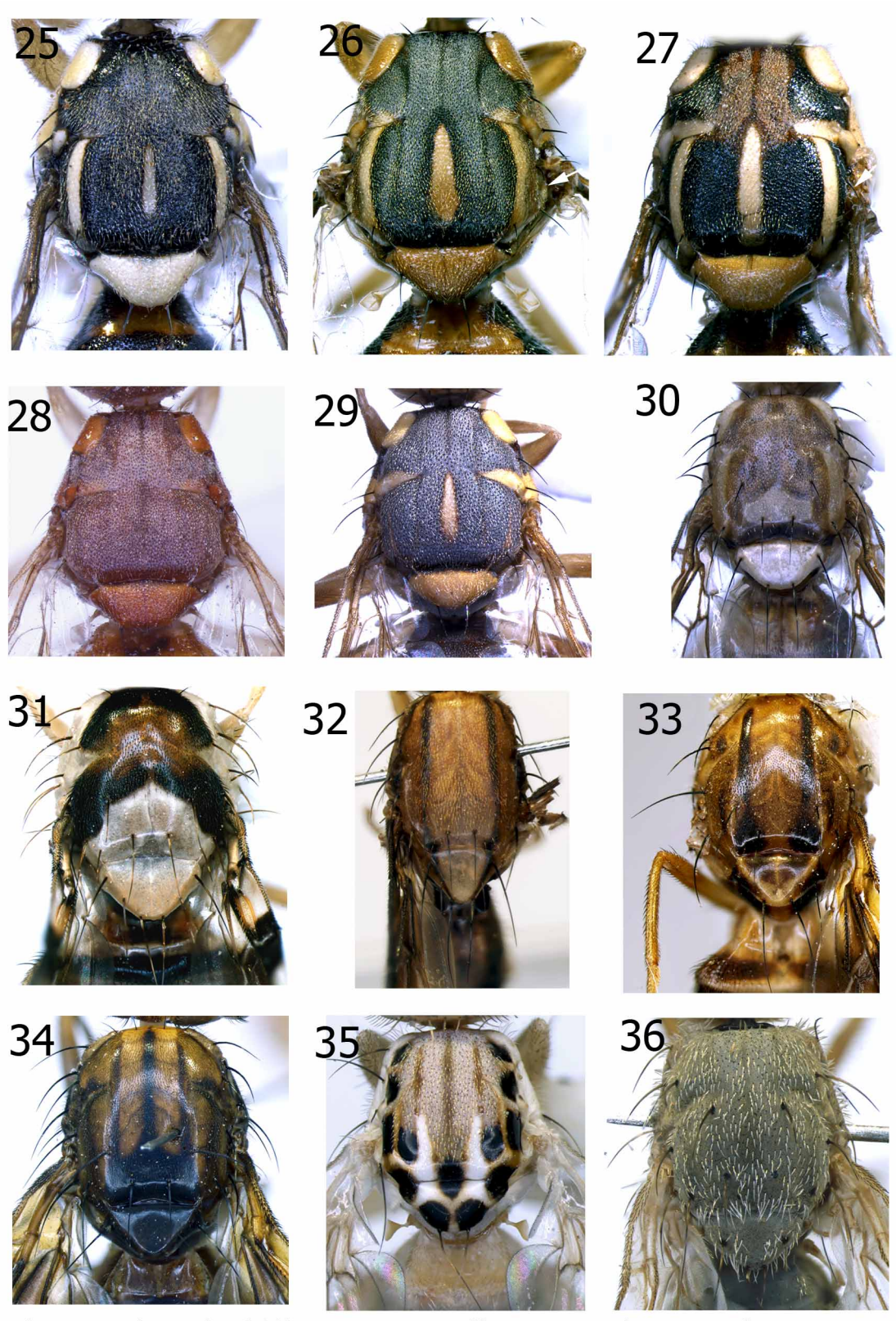
FIGURE 3. A, Abdomen (male); B, Ovipositor of Tephritidae



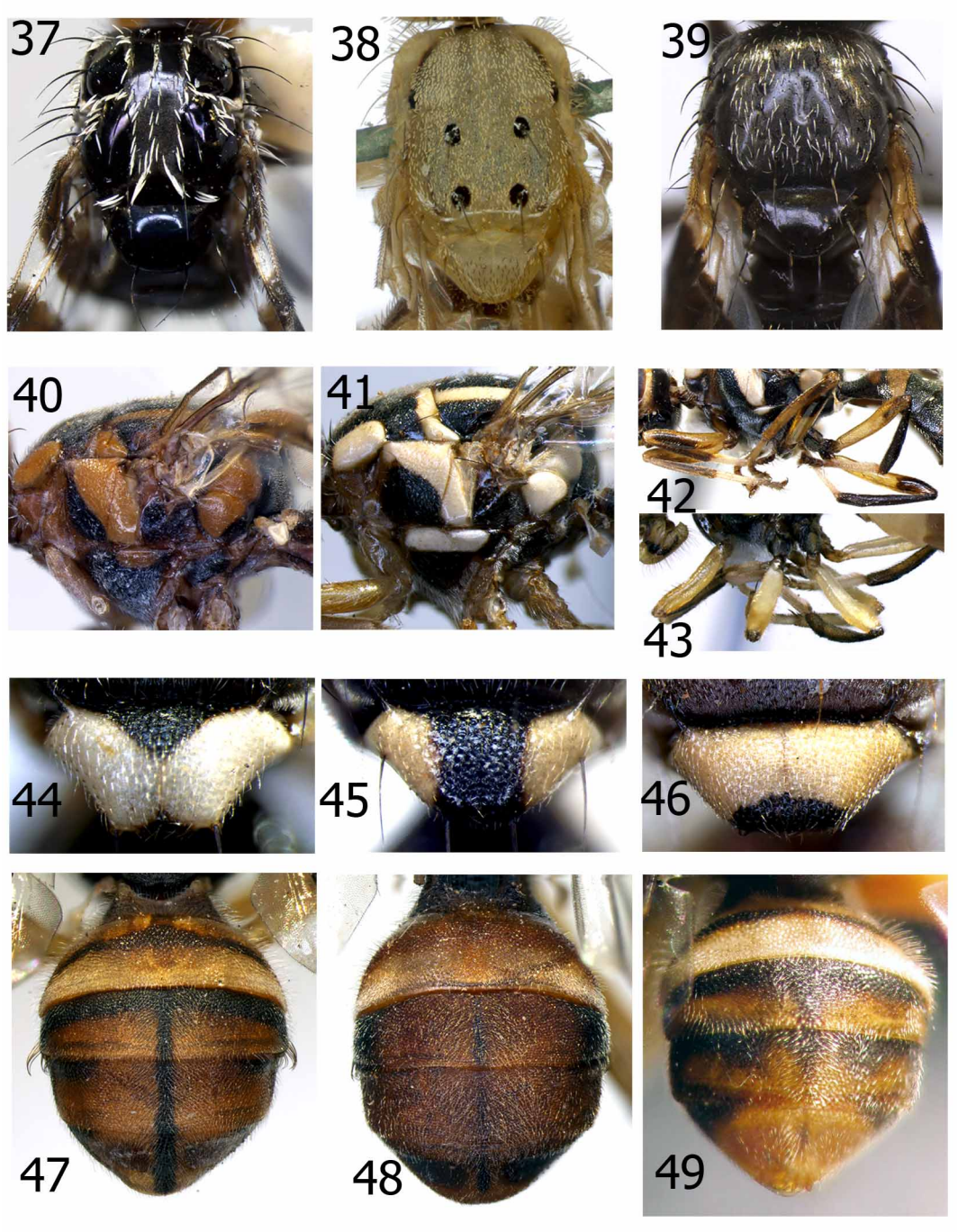
FIGURES 4-15. Heads of Tephritidae: 4, *Bactrocera dorsalis*; 5, *B. correcta*; 6, *B. scutellaria*; 7, *B. nigrofemoralis*; 8, *B. trilineata*; 9, *B. duplicata*; 10, *Dacus ciliatus*; 11, *Dacus crabroniformis*; 12, *Gastrozona fasciventris*; 13, *Acroceratitis tomentosa*; 14, *Themara yunnana* female; 15, *Themara yunnana* male.



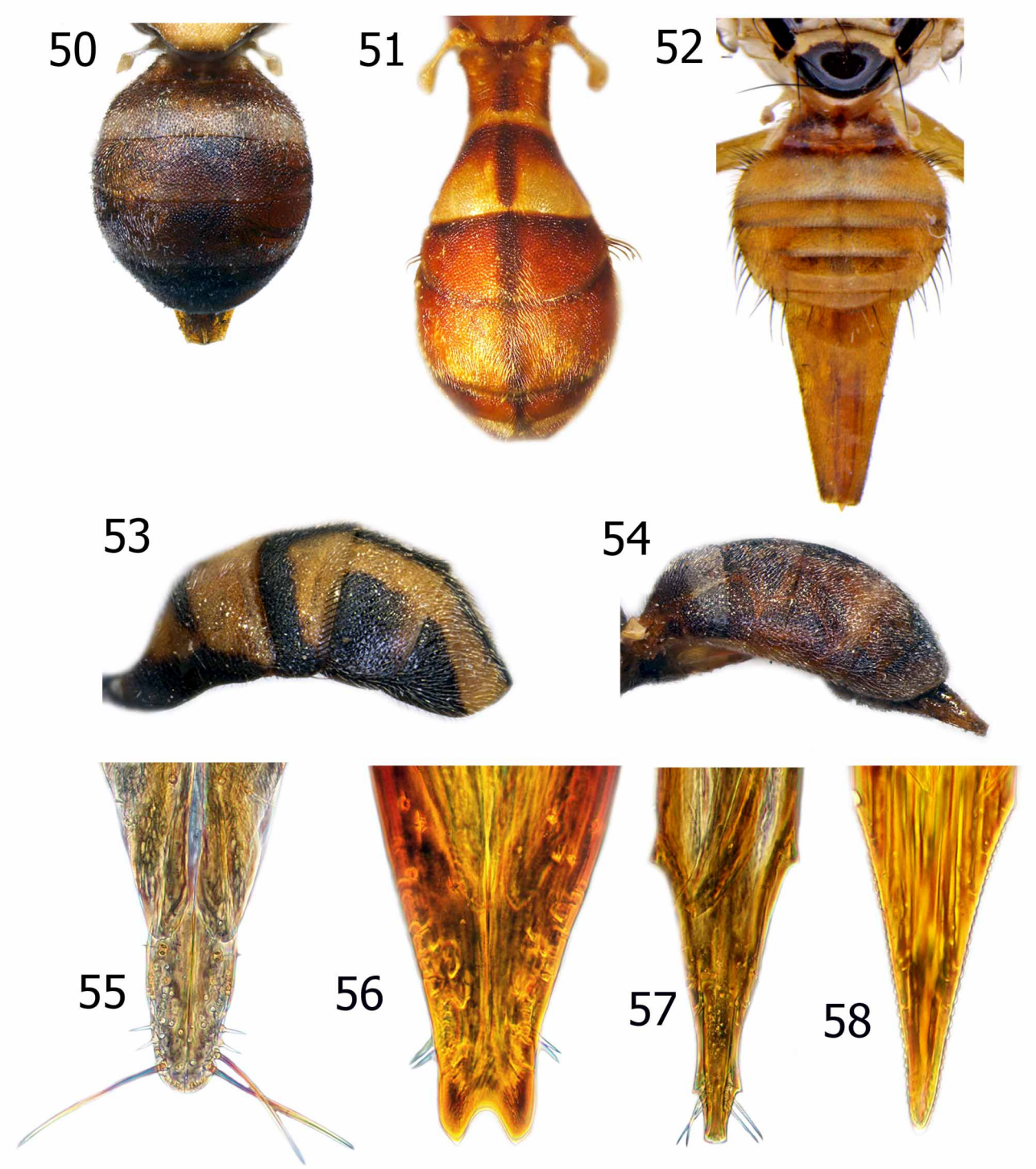
FIGURES 16-19. Heads of Tephritidae: 16, *Sundaresta malaisei*; 17, *Pliomelaena zonogastra*; 18, *Scedella spiloptera*; 19, *Dioxyna sororcula*
FIGURES 20-24. Thorax of Tephritidae: 20, *Bactrocera dorsalis*; 21, *B. merapiensis*; 22, *B. binoyi*; 23, *B. neonigrotibialis*; 24, *B. scutellaria*.



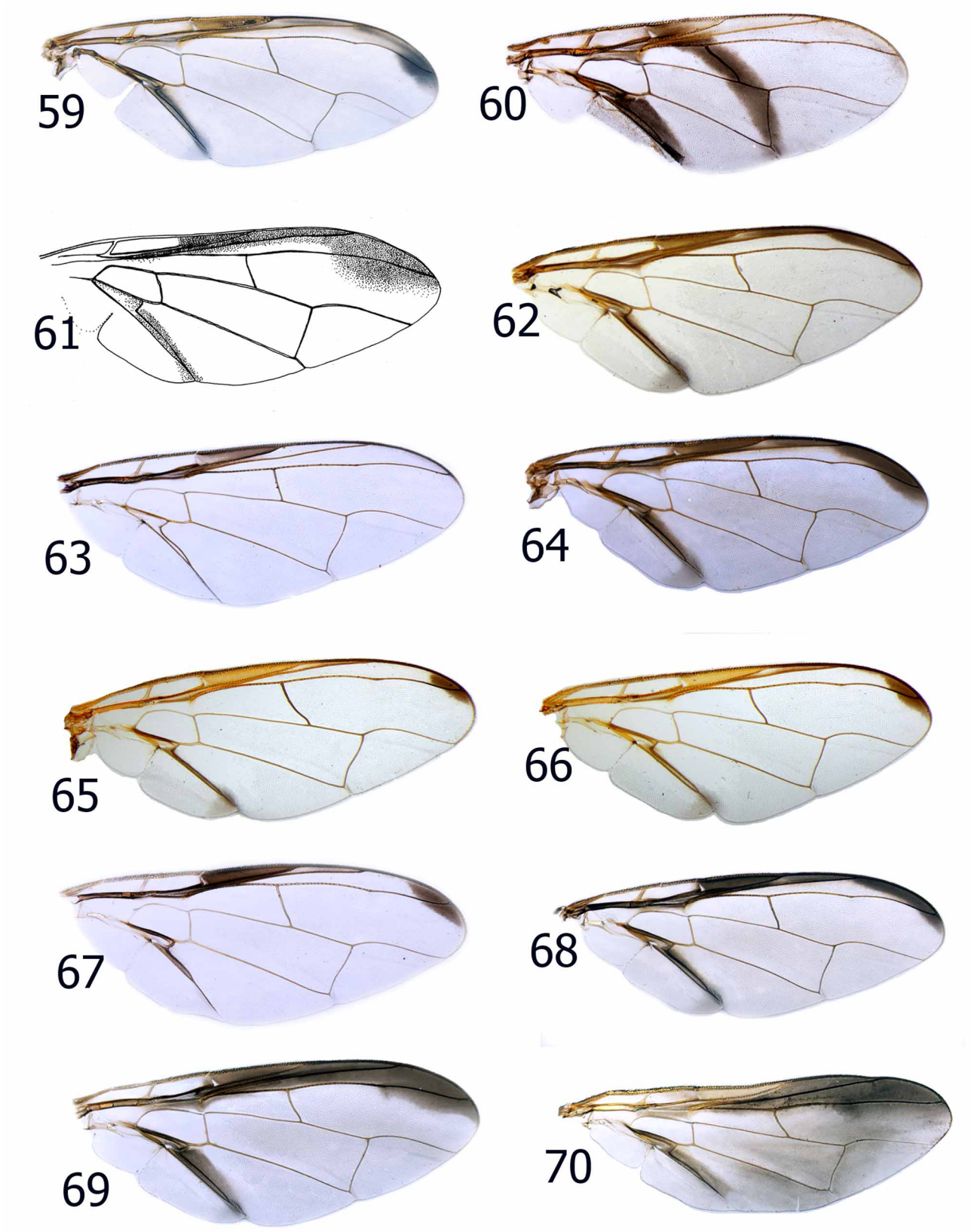
FIGURES 25-36. Thorax of Tephritidae: 25, *Bactrocera trilineata*; 26, *B. caudata*; 27, *B. gavisa*; 28, *Dacus ciliatus*; 29, *Dacus persicus*; 30, *Gastrozona parviseta*; 31, *Diarrhegma modestum*; 32, *Rioxa sexmaculata*; 33, *Themara yunnana* female; 34, *Themara yunnana* male; 35, *Carpomya vesuviana*; 36, *Acanthiophilus lugubris.*



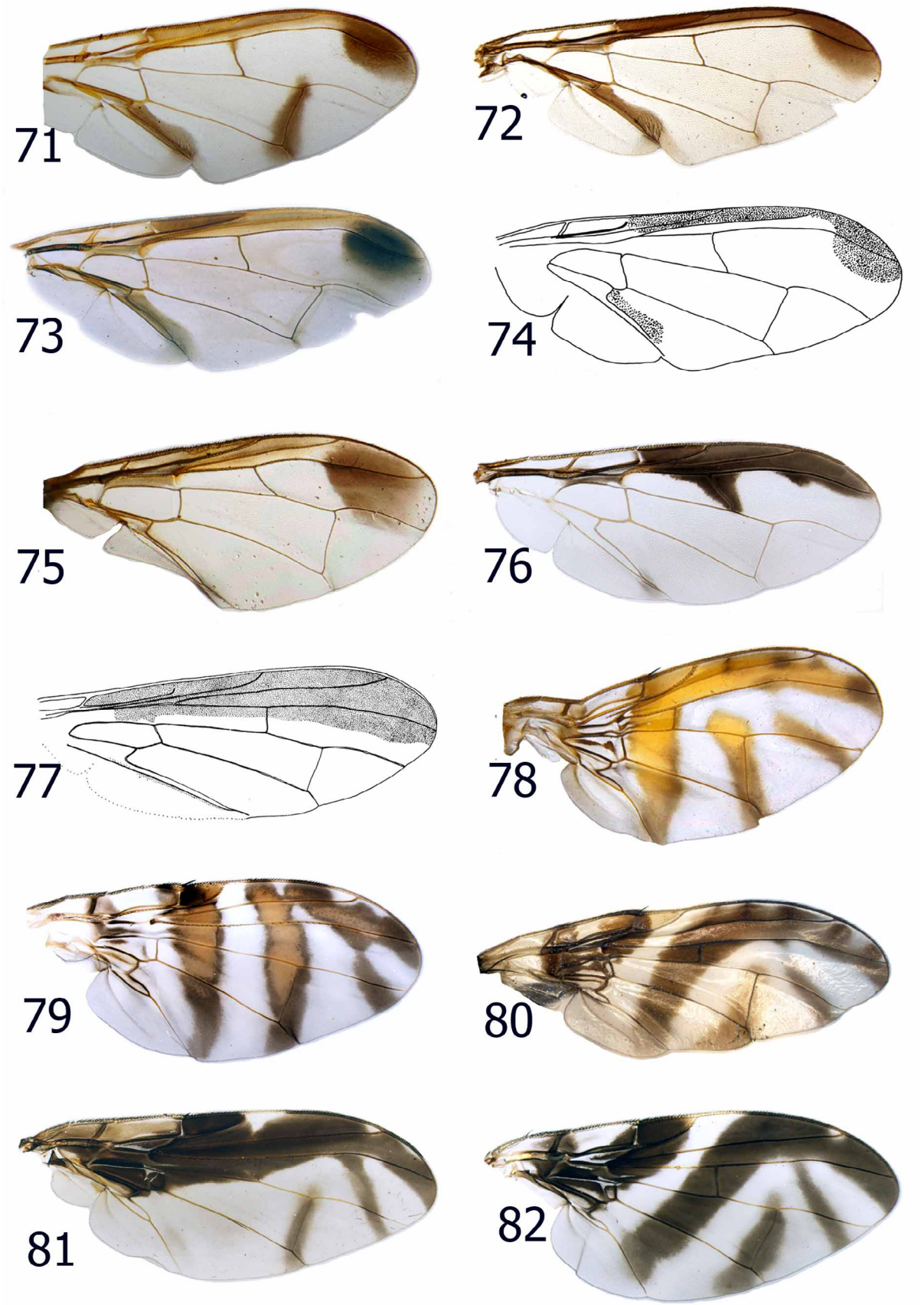
FIGURES 37-39. Thorax (dorsal view) of Tephritidae: 37, *Cecidochares connexa*; 38, *Craspedoxantha octopunctata*; 39, *Sphaeniscus quadrincisus*.
FIGURES 40-41. Thorax (lateral view) of Tephritidae: 40, *Bactrocera latifrons*; 41, *B. gavisa*.
FIGURES 42-43. Legs (femora) of Tephritidae: 42, *B. caryeae*; 43, *B. dorsalis.*
FIGURES 44-46. Scutellum of Tephritidae: 44, *B. albistrigata*; 45, *B. bipustulata*; 46, *B. versicolor.*
FIGURES 47-49. Abdomen of Tephritidae: 47, *B. carambolae*; 48, *B .melastomatos*; 49, *B. diversa*.



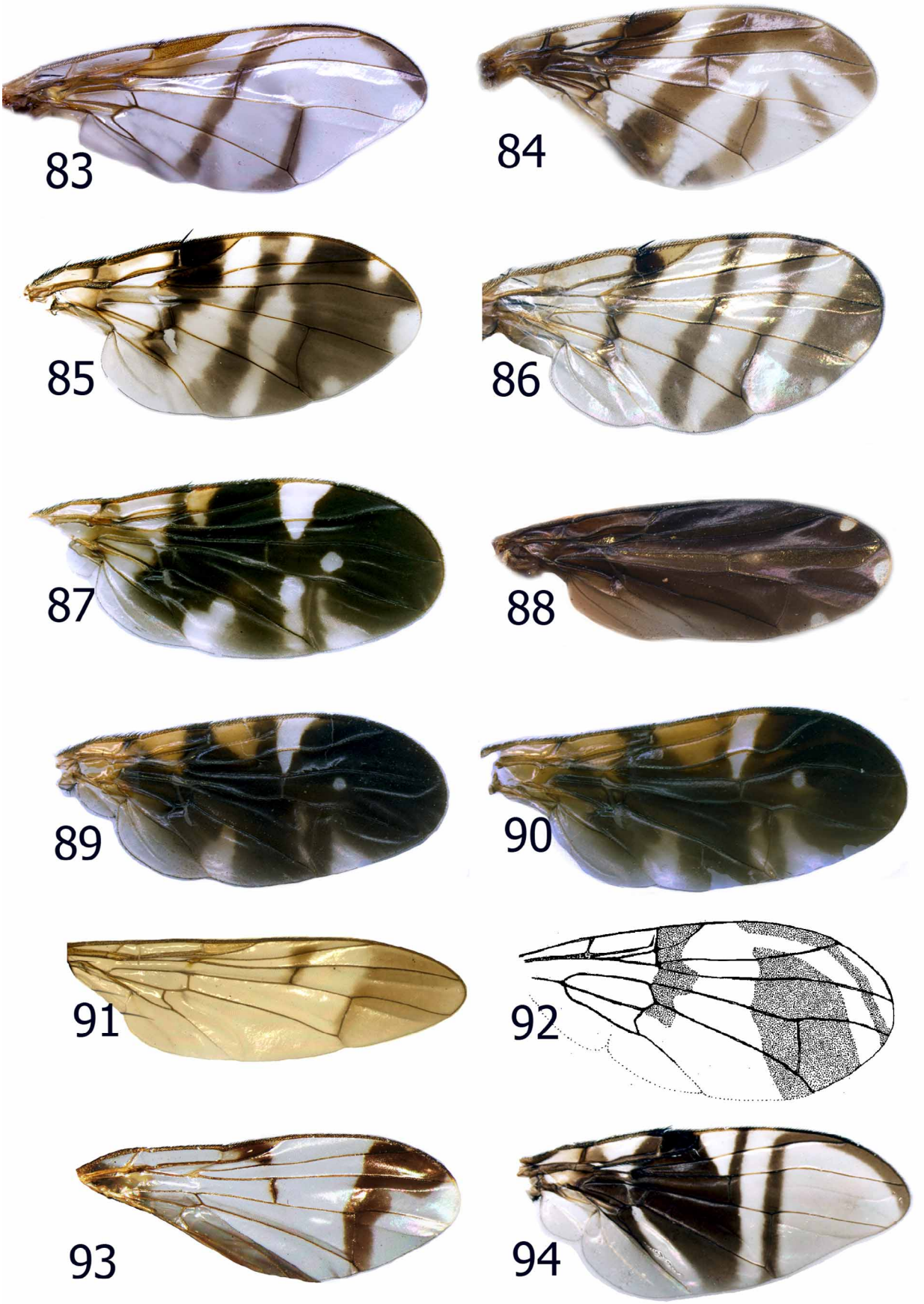
FIGURES 50-52. Abdomen of Tephritidae (dorsal view): 50, *Dacus ciliatus*; 51, *Dacus discophorus*; 52, *Acroceratitis striata*.
FIGURES 53-54. Abdomen of Tephritidae (lateral view): 53, *Bactrocera tau*; 54, *Dacus ciliatus*.
FIGURES 55-58. Aculeus tip of Tephritidae: 55, *Acanthonevra imparata*; 56, *Bactrocera digressa*; 57, *Gastrozona fasciventris*; 58, *Philophylla indica*.



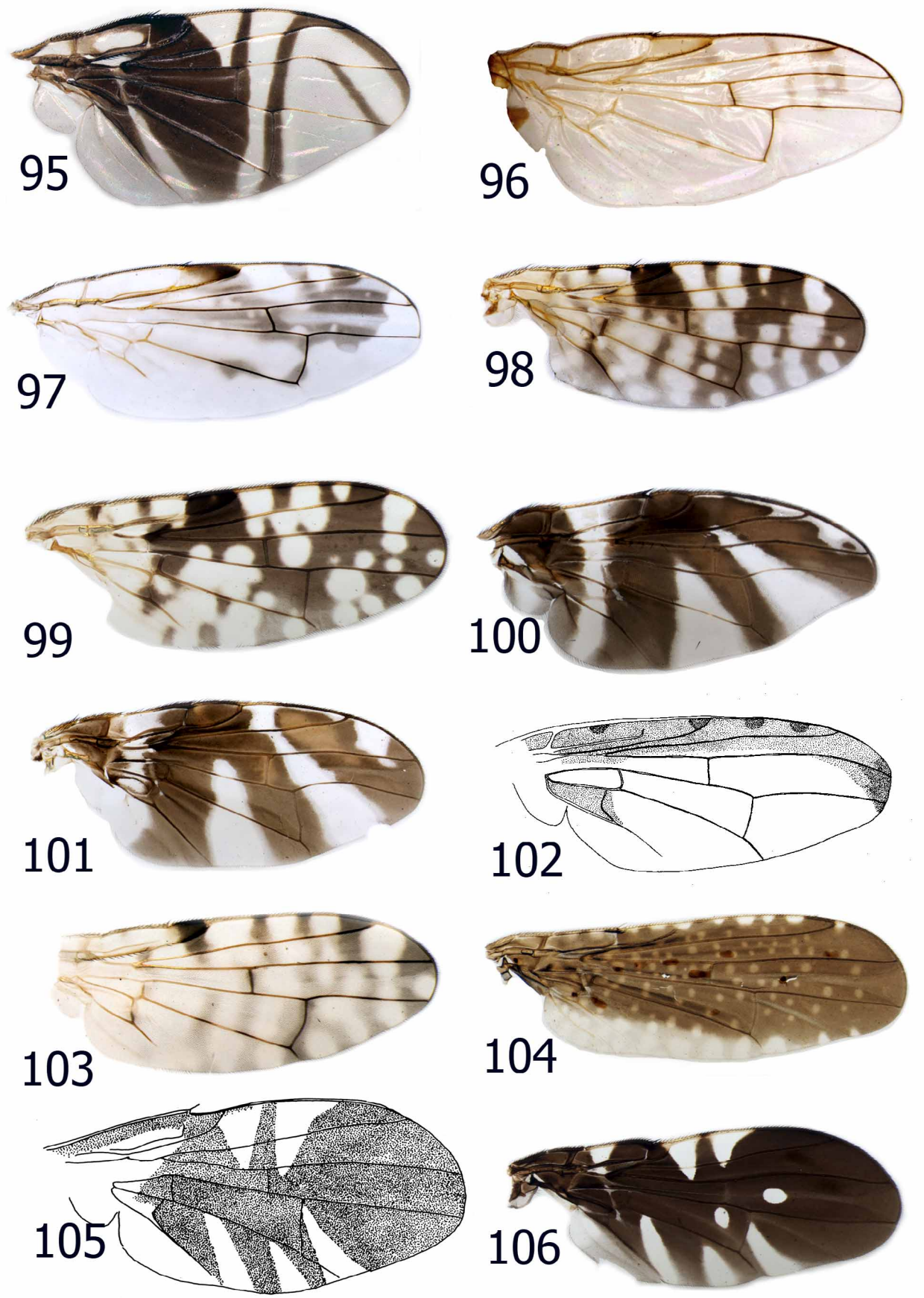
FIGURES 59-70. Wings of Tephritidae: 59, *Bactrocera affinis*; 60, *B. albistrigata*; 61, *B. andamanensis*; 62, *B. dorsalis*; 63, *B. bipustulata*; 64, *B. carambolae*; 65, *B. zonata*; 66, *B. correcta*; 67, *B. duplicata*; 68, *B. verbascifoliae*; 69, *B. limbifera*; 70, *B. garciniae.*



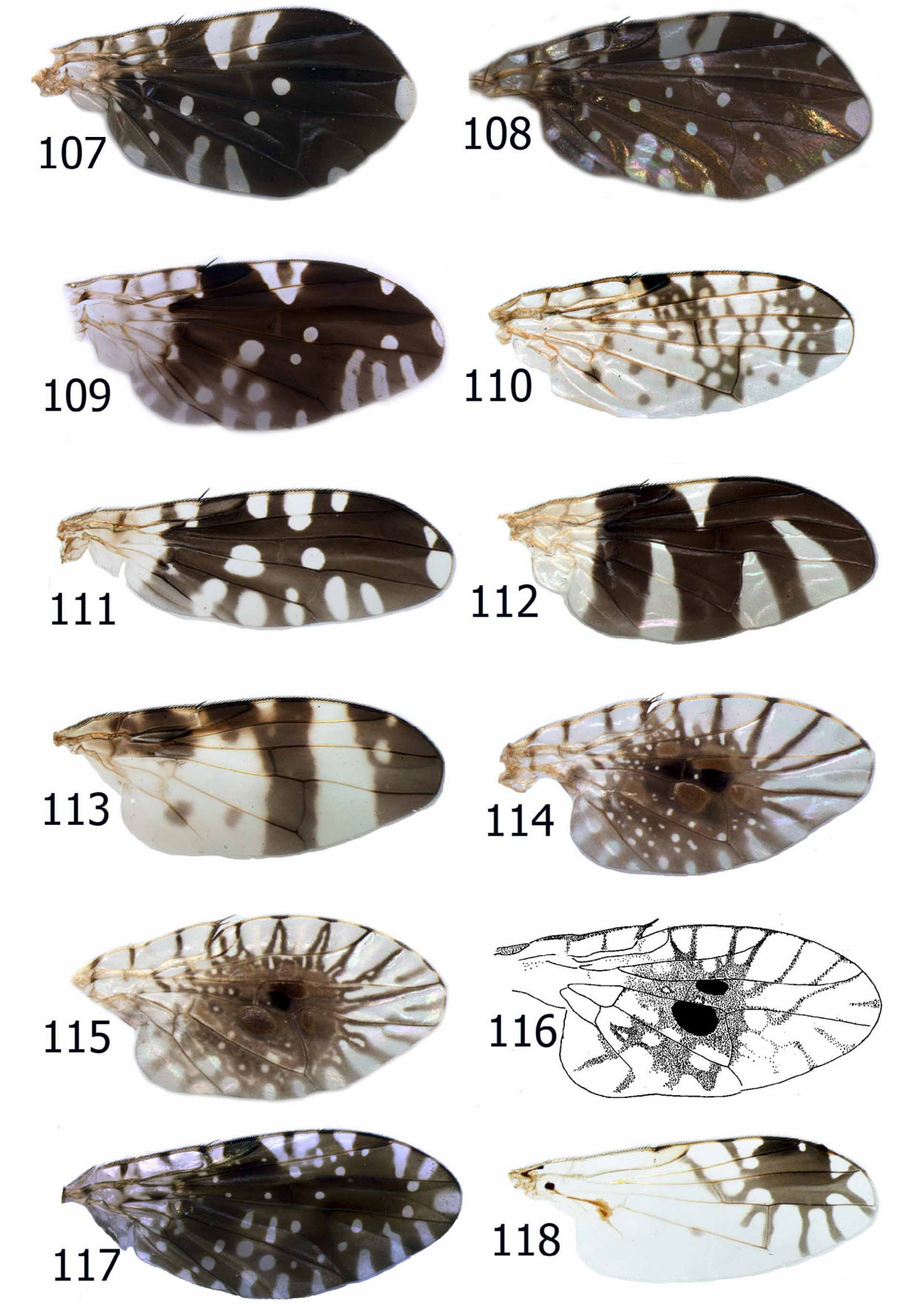
FIGURES 71-82. Wings of Tephritidae: 71, *Bactrocera cucurbitae*; 72, *B. tau*; 73, *B. watersi*; 74, *B. zahadi*; 75, *Dacus discophorus*; 76, *D. ramanii*; 77, *D. longicornis*; 78, *Acroceratitis striata*; 79, *Acroceratitis tomentosa*; 80, *Anoplomus cassandra*; 81, *Chaetellipsis paradoxa*; 82, *Gastrozona fasciventris*.



FIGURES 83-94. Wings of Tephritidae: 83, *Gastrozona parviseta*; 84, *Gastrozona soror*; 85, *Taeniostola vittigera*; 86, *Dietheria fasciata*; 87, *Acanthonevra imparata*; 88, *Rioxa sexmaculata*; 89, *Themara yunnana* (female); 90, *Themara yunnana* (male); 91, *Adrama austeni*; 92, *Euphranta macularis*; 93, *Euphranta cassiae*; 94, *Philophylla indica.*



FIGURES 95-106. Wings of Tephritidae: 95, *Philophylla fossata*; 96, *Acanthiophilus helianthi*; 97, *Acanthiophilus lugubris*; 98, *Campiglossa deserta*; 99, *Campiglossa gemma*; 100, *Cecidochares connexa*; 101, *Procecidochares utilis*; 102, *Craspedoxantha indica*; 103, *Dioxyna sororcula*; 104, *Elaphromyia pterocallaeformis*; 105, *Metasphaenisca reinhardi*; 106, *Pristaciura incisa*.



FIGURES 107-118. Wings of Tephritidae: 107, *Platensina acrostacta*; 108, *Platensina zodiacalis*; 109, *Pliomelaena zonogastra*; 110, *Scedella spiloptera*; 111, *Spathulina acroleuca*; 112, *Sphaeniscus quadrincisus*; 113, *Sphenella sinensis*; 114, *Calloptera asteria*; 115, *Rhabdochaeta pulchella*; 116, *Rhochmopterum venustum*; 117, *Sundaresta malaisei*; 118, *Trupanea inaequabilis.*