

Bulletin of the Museum of Comparative Zoölogy
AT HARVARD COLLEGE.
VOL. LXXIII.

CLASSIFICATION OF INSECTS

*A Key to the Known Families of Insects and Other
Terrestrial Arthropods*

BY

CHARLES T. BRUES

*Associate Professor of Entomology, Harvard University
Associate Curator of Insects, Museum of Comparative Zoölogy*

AND

A. L. MELANDER

*Professor of Biology, College of the City of New York
Head, Department of Biology, City College of New York*

CAMBRIDGE, MASS., U. S. A.
PRINTED FOR THE MUSEUM
AT HARVARD COLLEGE

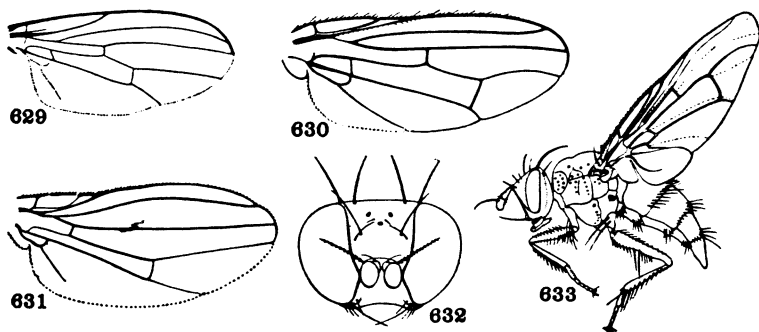
1932

TN 9
312

- (*Pterocálla* (Fig. 623), *Callopístria*, *Dasymetôpa*, *Myénis*, *Pseudotephritis*, *Stylophthalmÿia*) . . **PTEROCÁLLIDÆ**
 Third antennal joint with sharpened apex; antennal grooves distinct; subcostal cell not large. 97
97. Propleural and usually sternopleural bristles absent, three supra-alar bristles; mouth-opening very large, clypeus large, proboscis heavy, palpi broad. A large group, mainly tropical. (Including *CEPHALÍIDÆ*) **PLATYSTOMÁTIDÆ**
- a. Upper occiput usually convex; abdomen stalked, elongate; basal cells of wing diminutive; sternopleurals usually present; ant-like species. (*Myrmecomÿia*, *Delphínia*, *Myrmecothêa*, *Trítôxa*) **MYRMECOMÿIINÆ**
 Upper occiput never convex; abdomen not ant-like, if elongate no sternopleurals present; basal cells not small. b
- b. Epistome convexly projecting above oral margin. (*Tráphera*, *Lûle*, *Piara*, *Xíria*) **TRAPHERINÆ**
 Epistome not convexly projecting. c
- c. Abdomen slender, much longer than wide, usually compressed; third antennal joint much longer than wide, arista not long-plumose, the distal part bare; at most one weak fronto-orbital bristle. (*Stenopterina*, *Antineûra*, *Duomÿia*, *Elassogáster*, *Lamprophthálma*, *Xenáspis*) **STENOPTERINÆ**
 Abdomen usually elliptical or short-oval, if slender either the arista is feathered to apex, or antennæ shorter, or two fronto-orbitals present d
- d. Abdomen spindle-shaped, broadest at middle, or beyond middle. (*Rivéllia*, *Cleitâmia*, *Ídana*, *Laglaisia*) **RIVELLIINÆ**
 Abdomen broadly oval, widest before middle, or very small and narrowly joined to thorax. (*Platÿstoma*, *Achias*, *Euprosôpia*, *Lamprogáster*, *Loxoneûra*, *Naûpoda*, *Peltacanthina*, *Scholástes*) **PLATYSTOMATINÆ**
- Propleural and sternopleural bristles present, four supra-alar bristles, anterior dorsocentral bristle present; mouthparts less developed, cheeks broad. (*Órtalis*, *Anacámpta*, *Hérina*, *Dorÿcera*, *Melièria* (= *Ceróxys*), *Tétanops*, *Tephronôta*). (Including *DORYCÉRIDÆ*) **ORTALÍDIDÆ**
98. Discal cell complete, anterior crossvein near middle of wing, costa extending only to third vein (R_5), second vein (R_3) long, ending near tip of wing; vibrissæ absent. Europe, America, Ceylon. (*Períscelis*, *Cÿamops*, *Marbênia*, *Neoscùtops*, *Podôcera*, *Sphyroperíscelis* (Fig. 629), *Scùtops*) . . **PERISCÉLIDÆ**
 Discal cell entirely wanting, anterior crossvein located near base

- of wing, costa extending to fourth vein, second vein very short, ending close to first vein; vibrissæ present. (See couplet 125). (**Astia** (= *Astèia*) (Fig. 645) **Liomyza**, **Sigaloéssa** (= *Crepidohamma*), **Stenómicra**) **ASTIIDÆ**
99. Typically heavy-bodied flies (Fig. 633), with broad, five-segmented abdomen and with rows of bristles on thorax, abdomen and legs (*Anthophasia* with tergites fused and apical bristles alone present on abdomen); second antennal joint as long as third or longer, arista bare; vibrissæ present; third vein close to second and ending much before wing-tip, costa stopping before tip of wing, first and third veins bristly above at least at base, subcosta distinct, obliquely ascending at tip, anal cell prolonged into a sharp point. Bright-colored flies, 7-18 mm. in length, with banded wings, resembling stout tachinids. (**Tachinisca** (Fig. 633), Peru, Bolivia; **Anthophàsia** (= *Tachinastrus*), **Tachiniscidia**, ethiop.) **TACHINISCIDÆ**
- Not large, heavy-bodied, or very bristly flies. 100
100. Legs long and slender, thorax large, prothorax neck-like, abdomen long and clavate, the basal segment as long as remainder of abdomen; first posterior cell not narrowed; one or no fronto-orbital bristle, no postvertical, propleural, sternopleural or dorsocentral bristles, two scutellars; arista long-plumose; cheeks often produced as lateral processes. Indomalayan. (**Phytálmia** (= *Elaphomyia*), **Angítula**, **Angitulòides**, **Ato-pónathus**, **Giraffomyia**, **Phytalmòdes** (Fig. 627, 628), **Terastiomýia**) **PHYTALMIDÆ**
- Legs not unduly long and slender, prothorax not neck-like, body not suggestive of the Neriidæ. 101
101. Costa broken only at end of subcosta (Fig. 639) 102
- Costa broken near humeral crossvein in addition to the subcostal break (Fig. 658), rarely (*Acartophthalmus*, couplet 129), the costa broken only at humeral crossvein. 126
102. Subcosta complete, ending in costa, usually independent of first radial vein (Fig. 630); second basal and anal cells complete (except Aulacogastridæ, couplet 106 (Fig. 631), with second basal and anal cells confluent) 103
- Subcosta incomplete or vestigial, the apical portion represented as a fold, not ending independently in the costa (Fig. 646) . . 115
103. Vibrissæ present at the vibrissal angle (Fig. 635) 104
- Vibrissæ absent, only peristomial hairs or setæ; no preapical tibial bristle 112

104. Cheek-plates continuing on the front, bearing inclinate lower fronto-orbital bristles (Fig. 594); tibiæ in addition to preapical and apical bristles usually with other bristles; metanotal suture continuous; anal crossvein straight or weakly curved, the tip of the anal cell angulate. (See couplet 68). . **CORDYLÛRIDÆ**
 Cheek-plates not continuing on the front, lower fronto-orbitals therefore not present; mesonotal cross-suture interrupted in the middle. 105



Figs. 629-633. **Periscelidæ, Neottiophilidæ, Aulacogastridæ, Tachiniscidæ**

629. **Sphyroperiscelis**, wing. Periscelidæ.
 630. **Neottiophilum**, wing. Neottiophilidæ.
 631. **Aulacogaster**, wing. Aulacogastridæ.
 632. **Aulacogaster**, head from front. Aulacogastridæ.
 633. **Tachinisca** (Kertész) Tachiniscidæ.

105. Postvertical (postocellar) bristles divergent (Fig. 634), parallel or wanting. 106
 Postvertical (occipital) bristles convergent or cruciate (Fig. 637); foremost fronto-orbital bristle reclinate; costa often setose. . 110
106. Second basal and discal cells confluent, anterior crossvein located before middle of cell, costa thin but not broken near humeral crossvein; no postvertical bristles; a graded series of oral bristles in addition to the vibrissæ; tibiæ without preapical bristles. (**Aulacogaster** (Fig. 631, 632), holarc.).

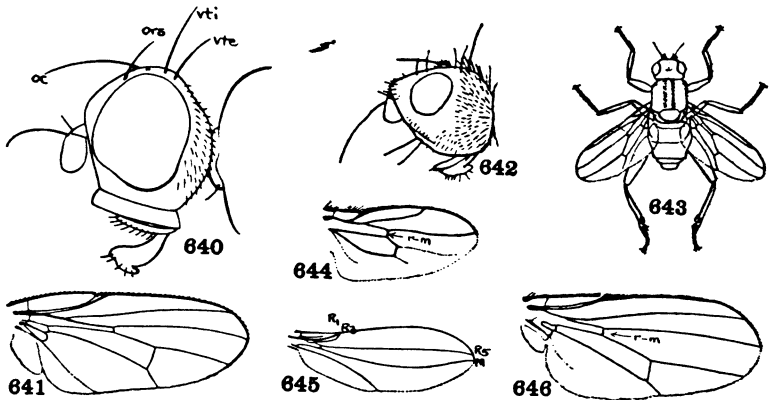
AULACOGÁSTRIDÆ

- Second basal and discal cells separated. 107

Cosmopolitan, dung flies. (**Bórborus** (= *Cýpsela*), **Scatóphora** (= *Olina*), **Sphærocera** (Fig. 643)). (**CYPSÉLIDÆ**, **SPHÆROCÉRIDÆ**) **BORBÓRIDÆ**

Hind metatarsi not short and thick 117

117. Postvertical bristles converging, presutural dorsocentral bristle present, fronto-orbital bristles directed outward, interfrontal cross-bristles usually present, one sternopleural bristle. (If



Figs. 640-646. **Pallopteridæ**, **Lonchæidæ**, **Thyreophoridæ**, **Borboridæ**, **Leptoceratidæ**, **Astiidæ**, **Canaceidæ**

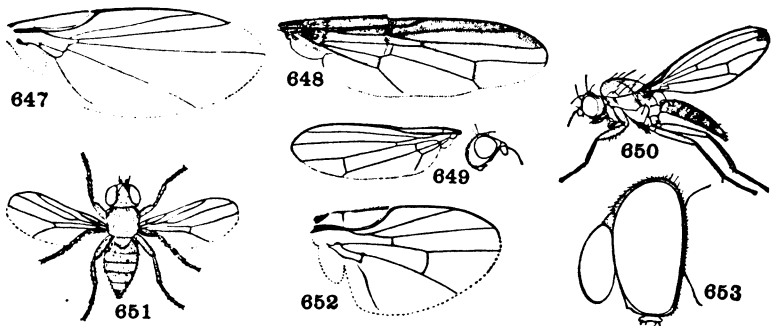
640. **Palloptera**, head from side. **Pallopteridæ**.
 641. **Lonchæa**, wing. **Lonchæidæ**.
 642. **Thyreophora**, head in profile view. **Thyreophoridæ**.
 643. **Sphærocera**, dorsal aspect (Howard) **Borboridæ**.
 644. **Leptocera**, wing (Spuler) **Leptoceratidæ**.
 645. **Astia**, wing. **Astiidæ**.
 646. **Canace**, wing. **Canaceidæ**.

preapical tibial bristles are present see **Trichoscelidæ**, couplet 111). Seashore species. (**Téthina** (= *Rhinoëssa*), **Neopelomýia**, **Pelomýia**) **TETHÍNIDÆ**

Postvertical bristles diverging or absent, if (**Anthomyzidæ**, couplet 123) converging then presutural dorsocentral bristles are not developed and the two prominent fronto-orbital bristles are reclinate 118

118. Preapical tibial bristles present; postocellar bristles diverging; two reclinate and one inclinate fronto-orbital bristle present;

simplex, Asparagus miner), **Cerodónta**, **Domomýza**, **Lirio-
mýza**, **Napomýza** (*N. chrysánthemi*, Chrysanthemum leaf-
miner), **Phytomýza** (Fig. 647) **AGROMÝZIDÆ**
Postvertical (occipital) bristles converging, rarely absent; base of
female genitalia retractile; basal joint of arista longer than
broad. (**Anthomýza**, **Anagnôta**, **Ischnomýia**, **Mume-
tôpia**, **Paranthomýza**, **Stiphrosôma**).

ANTHOMÝZIDÆ

Figs. 647-653. **Agromyzidæ**, **Psilidæ**, **Opomyzidæ**, **Chloropidæ**,
Cryptochætidæ

647. **Phytomyza**, wing. Agromyzidæ.
648. **Chyliza**, wing (drawn by Cole) Psilidæ.
649. **Psila**, wing and profile of head (Cole) Psilidæ.
650. **Geomyza** (Cole) Opomyzidæ.
651. **Botanobia**, dorsal aspect (Lugger) Chloropidæ.
652. **Cryptochætum**, wing. Cryptochætidæ.
653. **Cryptochætum**, head from side. Cryptochætidæ.

124. One presutural and two or three postsutural dorsocentral bristles present; postvertical bristles minute or absent; one sternopleural bristle. (**Opomýza**, **Anomalochætata**, **Geomýza** (= *Baliôp-
tera*, not *Trichosclis*) (Fig. 650). (**GEOMÝZIDÆ**, part).

OPOMÝZIDÆ

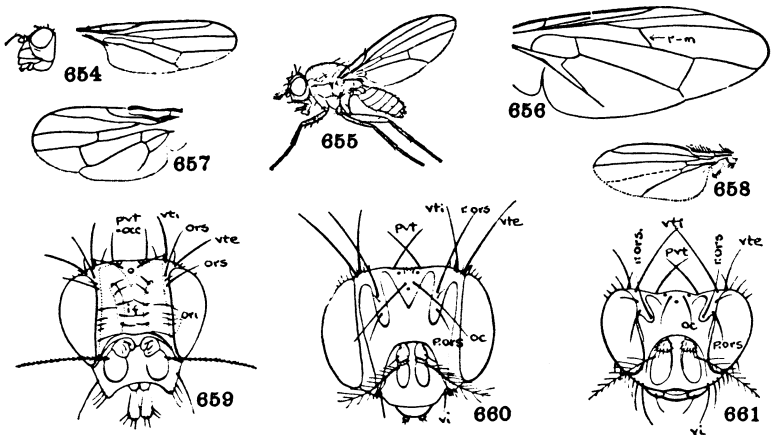
No presutural (very rarely one) and at most two postsutural
dorsocentral bristles present; postvertical bristles diverging or
absent; no sternopleural. **PSÍLIDÆ**

- a. Anal cell closed by a straight crossvein; no or one notopleural
bristle; third antennal joint elongate oval to very long. b

- Anal cell closed by a curved crossvein; head spherical, third antennal joint rounded; two notopleurals, two scutellars. (**Strongylophthalmiæ**, **Chamæpsila** (*C. rødsæ*, Carrot rust fly) **STRONGYLOPHTHALMYIINÆ**)
- b. Occiput concave; metapleural callus velvety; anal cell distinctly shorter than second basal. (**Chyliza** (Fig. 648) . **CHYLIZINÆ**)
Occiput convex; metapleural callus bare; anal cell not shorter than second basal. (**Psila** (Fig. 649), **Loxócera**) **PSILINÆ**
125. Ocellar triangle large (Fig. 651); arista bare, pubescent, or heavily feathered; postvertical bristles convergent or absent; second vein (R_3) long, ending beyond middle of wing. A large, widespread family. (**OSCINIDÆ**) **CHLORÓPIDÆ**
- a. Costa reaching to tip of third vein, or a little beyond. (**Chlòrops** (= *Oscinis*), **Chlorópisca**, **Eurina**, **Ectecéphala**, **Meromýza**) .
CHLOROPINÆ
- Costa reaching to tip of fourth vein. (**Botanòbia** (= *Oscinosòma*, = *Oscinis*, auct.) (Fig. 651), **Elachíptera**, **Hippelâtes**, **Gaurax**, **Notonaùlax**) . (**OSCINOSOMINÆ**) **BOTANOBIINÆ**
- Ocellar triangle small; arista loosely feathered; postvertical (preocellar) bristles diverging; second vein very short, ending close to first vein. Few species. (See couplet 98). (**Astia** (Fig. 645), **Sigaloéssa**) **ASTIIDÆ**
126. Subcosta free from first vein, ending steeply in the costal break much before the end of the first vein (Fig. 657), anal cell angular, often drawn out into an acute point, at least first vein setulose, wings usually banded or spotted; inclinate lower fronto-orbital bristles present; no vibrissæ, but oral hairs developed; no preapical tibial bristles; seventh segment of female abdomen long and chitinized. A large family, including many species of fruit flies, many tropical. (**EURIBIIDÆ**, **TEPHRITIDÆ**, **TRYPANÈIDÆ**) **TRYPÉTIDÆ**
- a. Chætotaxy incomplete, the following bristles lacking, ocellar, inner occipital, postvertical, humeral, presutural, dorsocentral and sternopleural; second basal cell usually widened; antennæ elongate; sixth tergite of female short. b
Chætotaxy complete, preceding bristles usually present; second basal cell not widened; antennæ usually short. c
- b. Femora more or less spinose beneath; transverse suture of mesonotum complete; abdomen long, cylindrical. (**Adrâma**, **Mercanthomýia**, indoaustr.) **ADRAMINÆ**
Femora not spinose beneath; transverse suture of mesonotum in-

130. Arista lacking, antennæ inserted high on head, the apparent third joint long and leaf-like; no postvertical, orbital, vibrissal or other bristles, but body including mesopleuræ setulose; eyes large, vertical, cheeks linear; proboscis short; scutellum triangular, with sharp margin; calypteres without cilia. A small indoaustralian group, parasitic on scale insects, introduced into America. (*Cryptochætum* (= *Lestóphonus*) (Figs. 652, 653)).

CRYPTOCHÆTIDÆ



Figs. 654-661. **Ephyridiæ, Trypetidæ, Milichiidæ, Carnidæ, Drosophilidæ, Diastatidæ**

654. *Parydra*, head in side view and wing (Cole) Ephyridiæ.
 655. *Drosophila* (Cole) Drosophilidæ.
 656. *Dacus*, wing. Trypetidæ.
 657. *Eurosta*, wing (Williston) Trypetidæ.
 658. *Meoneura*, wing. Carnidæ.
 659. *Desmometopa*, head from front. Milichiidæ.
 660. *Cyrtomotum*, head from front. Diastatidæ.
 661. *Diastata*, head from front. Diastatidæ.

Arista present; fronto-orbital bristles present (*Lipochæta*, couplet 132, a, with no arista or bristles, has small antennæ); scutellum with rounded edge. 131

131. Postvertical bristles diverging; vibrissæ absent, but often oral and facial hairs variously developed; sternopleural bristles usually present. 132

133. Inflexed lower fronto-orbital bristles wanting, the lowest or the middle of the superior fronto-orbitals may be proclinate, reclinate, or directed outward. 134
 Inflexed lower fronto-orbitals present; interfrontal cruciate bristles usually present. 137
134. Second basal and anal cells lacking; no proclinate fronto-orbital bristles 135
 At least anal cell formed, anal vein present almost to margin; interfrontal cruciate bristles absent; foremost or middle fronto-orbital bristle almost always proclinate. 136
135. Hind metatarsi not short and stout; middle tibiæ not bristly; fronto-orbital bristles reclinate; only one row of acrostichals; ovipositor large, broadly oval, compressed so that the lateral margins form narrow ridges. (**Pseudopomÿza**, Eur., aberrant genus) **MILICHIIDÆ**, part
 Hind metatarsi short and thickened; middle tibiæ bristly; interfrontal cruciate bristles present, fronto-orbitals directed outward; fourth vein continued beyond discal cell only as a fold (Fig. 644). (**Leptócera** (= *Limosina*) (Fig. 644)).

LEPTOCERÁTIDÆ

136. Subcosta complete, costa usually spinose; mesothorax raised anteriorly, mesopleuræ with bristles, sternopleural bristles present **DIASTÁTIDÆ**

- a. Proclinate fronto-orbital bristle arising in front of reclinate ones, both remote from eyes (*Apsinota* has only uppermost fronto-orbital present); arista loosely long-plumose (Fig. 660). (**Cyrtónotum** (= *Diplocéntra*) (Fig. 660), **Apsinòta**, **Parapsinòta**, **Thaumastóphila**) **CYRTONOTINÆ**

Proclinate fronto-orbital behind the foremost reclinate pair, close to eyes; arista short-plumose. (**Diástata** (= *Calopterélla*) (Fig. 661), **Euthychàta**, **Tryptochàta**) **DIASTATINÆ**

Subcosta evanescent beyond base, costa not spinose; mesopleuræ rarely bristly; proclinate fronto-orbital bristle not closer to the eyes than the reclinate ones are. A large family, mostly tropical.

DROSOPHÍLIDÆ

- a. Sternopleural bristle absent, mesopleuræ bristly; hind tibiæ without preapical bristles; anal cell apically open; metallic colored. (**Camilla**, palæarc.) **CAMILLINÆ**
 Sternopleural bristle present, no mesopleural bristles; hind tibiæ usually with preapical bristles. b

- b. Discal and second basal cells separated by a pigmented cross-vein c
 Discal and second basal cells united. (**Drosóphila** (Fig. 655) (*D. melanogáster* or *ampelóphila*, Pomace fly, the laboratory fly of experimental genetics), **Chymomyza**, **Cladochæta**, **Gíttona**, **Leucophénga**, **Diathoneùra**, neotrop.; **Liodrosóphila**, Malay, **Mycodrosóphila**, **Scaptomyza**, **Zygóthrica**).
DROSOPHILINÆ
- c. Middle tibiæ with dorsal row of bristles; eyes longest horizontally. (**Stégana**, largely neotrop.) **STEGANINÆ**
 Middle tibiæ outwardly without bristles; eyes longest vertically. (**Amiðta** (= *Phórtica*), **Orthostégana**, **Sinophthálmus**). (**PHORTICINÆ**) **AMIO TINÆ**
137. Postvertical bristles convergent; proboscis usually long and geniculate; oral hairs smaller than vibrissæ. . **MILICHIIDÆ**
- a. Costa prolonged as a pointed lappet at end of Sc, last section of fourth vein at most twice as long as preceding; calypteres with long cilia; cheeks very narrow, mesopleuræ often bristly. (**Milíchia**, **Milichiélla**, widespr.; **Phleomyia**, Am.; **Pseudomilíchia**, nearc.) **MILICHINÆ**
 Costa not prolonged as a lappet at the subcostal break, last section of fourth vein at least three times preceding; calypteres rarely with dense cilia; mesopleuræ rarely with bristles. (**Madiza**, **Phyllomyza**, holarc.; **Desmometopa** (Fig. 659), widespr.; **Aldrichiélla**, **Eusiphóna**, **Paramyia**, nearc.).
MADIZINÆ
- Postverticals parallel; proboscis short; some oral bristles as strong as the vibrissæ; ocellar triangle wide. (**Cárnus** (= *Cenchriddbia*), palæarc.; **Meoneùra** (Fig. 658) holarc., ethiop.; **Hemeromyia** (= *Paramadiza*) nearc.; **Rhodesiélla**, ethiop.). . . . **CÁRNIDÆ**

Pupipara

138. Mesonotum short, resembling the abdominal segments, no scutellum, abdomen completely sessile; eyes minute, no ocelli, antennæ set in lateral grooves; vertex without bristles; last tarsal joint broad, bearing an inflexed comb of many microscopic teeth. Small convex wingless insect, widespread, parasitic on the honey-bee. (See couplet 168). . (**Braùla** (Fig. 662), Beelouse) **BRAULIDÆ**
 Thorax distinct from abdomen, scutellum developed; head with