

A Proposal of Establishing Tribes for the Family Drosophilidae with Key to Tribes and Genera (Diptera)

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ABSTRACT—Subdivision into tribes of the family Drosophilidae is attempted. Establishment of two tribes, Steganini and Leucophengini, for the subfamily Steganinae and five tribes, Microdrosophilini, Hypselethyrini, Colocasiomyini, Dettopsomyini and Drosophilini, for Drosophilinae is proposed.

INTRODUCTION

By the end of 1984, 62 genera of the family Drosophilidae were recorded by Wheeler [1], including one fossil and five ungrouped into subfamilies. Since then, one genus, *Thyreocephala*, was added by myself [2], which was, however, synonymized with *Mulgravea* Bock by myself [3], and two fossil genera, *Miomyia* and *Protochymomyza*, by Grimaldi [4]. The genus *Drosophilella* Duda was recently synonymized with *Colocasiomyia* de Meijere by myself [5]. The genera *Atele-drosophila* Hardy and *Nudidrosophila* Hardy were treated as distinct genera according to Wheeler [6], although they were synonymized with *Drosophila* s. str. by Kaneshiro [7] because their females are not distinguishable from the latter.

To recognize tribe, a subordinate category of family or subfamily, is a general rule especially in large families of insects. No explicit subdivision of the family Drosophilidae has, however, been attempted before the present proposal, although an implicit subdivision into "Drosophiloids" and "Scaptomyzoids (as Scaptoids)" was made for endemic Hawaiian Drosophilidae by Throckmorton [8]. The inference that drosophilid taxonomy is highly developed might be accepted mostly at the level below species group.

METHODS

The descriptions of the tribes with diagnoses of

involving genera are given by a form of key. For establishing the tribes and constructing the key, following fourteen diagnostic characters (n=14: A-N) each divided into two states (0: presumed plesiomorph; 1, presumed apomorph) are taken into consideration, supplemented by some additional special characters.

Eye bare (A=0) or piled (a=1).

Arista plumose (B=0) or bare or pubescent (b=1).

Ocellars inside (C=0) or outside (c=1) ocellar triangle.

Postverticals present (D=0) or absent (d=1).

Carina undeveloped (E=0) or developed (e=1).

Anterior reclinate orbital large (F=0) or fine (f=1).

Posterior reclinate orbital nearer to inner vertical than to proclinate (G=0) or nearer to proclinate than to inner vertical (g=1).

Prescutellars developed (H=0) or absent (h=1).

Anterior dorsocentral nearer to scutellum than to suture (I=0) or nearer to suture than to scutellum (i=1).

Acrostichal hairs in more than 8 rows (J=0) or 8 or less than 8 rows (j=1).

Lateral scutellars convergent or parallel (K=0) or divergent (k=1).

Second costal break shallow (L=0) or deep (l=1).

Second costal lappet small (M=0) or large (m=1).

Discal and second basal cells separated (N=0)

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TABLE 1. n(characters) × t(taxa) matrix

Taxa Genus	Characters													
	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Steganinae														
1. Steganini														
† Electrophortica	0	0	0	0	0	0	0	0	0	1	1	0	0	0
Soederbomia	NC	0	NC	NC	0	0	0	0	0	0	NC	0	0	0
Pyrgometopa	NC	0	NC	NC	0	NC	0	NC	NC	NC	NC	0	0	0
Eostegana	0	0	0	0	1	0	0	0	0	0	1	0	0	0
Stegana	0	0	0	0	1	0	0	0	0	0	1	0	0	0
Amiota	0	0	0	0	1	0	0	0	0	0	1	0	0	0
Crincosia	0	1	1	1	0	0	0	0	0	0	1	0	0	0
Apenthecia	0	1	0	0	0	1	0	0	0	0	1	0	0	0
Mayagueza	0	1	0	0	0	0	0	0	0	0	1	0	0	0
Cacoxenus	0	1	0	0	1	0	0	0	0	0	1	0	0	0
Gitona	0	1	0	0	1	0	0	0	0	1	1	0	0	0
2. Leucophengini														2
Acletoxenus	0	1	NC	0	1	0	0	0	0	0	0	0	0	1
Luzonimyia	0	1	1	0	1	0	0	0	0	0	1	0	0	1
Leucophenga	0	0	0	0	1	0	0	0	0	0	1	0	0	1
Paraleucophenga	0	0	0	0	1	0	0	0	0	0	1	0	0	1
Pseudiasata	0	1	1	0	0	0	0	0	0	0	0	0	0	1
Trachyleucophenga	NC	0	NC	0	0	0	0	0	NC	NC	NC	0	0	1
Pararhinoleucophenga	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Rhinoleucophenga	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Drosophilinae														
1. Microdrosophilini														
Microdrosophila	1	0	0	0	0	1	1	1	1	1	1	1	0	1
2. Hypselothyriini														19-20
Hypselothyrea	1	0	0	1	1	1	1	1	1	1	0	0	0	1
Tambourella	0	0	0	1	0	1	1	1	1	1	0	0	0	1
Sphaerogastrella	0	0	0	1	0	1	1	1	1	1	1	0	0	1
Liodrosophila	0	0	0	0	1	1	1	1	1	1	1	0	0	1
Lissocephala	1	0	0	0	1	1	1	1	1	1	1	0	0	1
Mulgravea	1	0	0	0	0	1	1	1	1	1	1	0	0	1
Paraliodrosophila	1	0	NC	NC	0	NC	1	NC	NC	1	0	0	0	1

TABLE 1. (continued)

Taxa Genus	Characters													
	A	B	C	D	E	F	G	H	I	J	K	L	M	N
3. Colocasiomyini														
Calodrosophila	1	0 ³¹	1	0	1	1	1	1	0 ³¹	1	0	0	0	1
Colocasiomyia	1	1	1	0	1 ³⁰	1 ³⁰	1	1	1	1	0 ³⁰	0	0	1
Nesiodrosophila	1	0	1	0	0	0	1	1	1	1	1	0	0	1
Jeannelopsis	1	0	1	0	0	0	1	1	1	1	1	0	0	1
4. Dettopsomyini			21										21-2	
Mycodrosophila	0 ³³	0	0	0	0	1	1	1	0	1	1	1	1	1
Styloptera	1	0	1 ³⁴	0	0	0	1	1	1	1	1	0	1	1
Dettopsomyia	1	0	0	0	1 ³⁵	1	1	1	1 ³⁵	1	1	1	1	1
Paramycodrosophila	1	0	0	0	0	1	1	1	0	1	1	1	1	1
5. Drosophilini												22	22	
Dicladochaeta	NC	1	NC	0	NC	1	1	NC	1	1	NC	0	0	1
Baeodrosophila	1	1 ³⁷	1	0	0	1	1	0	0	1	1	0	0	1
Sphyrnoceps	NC	0	NC	NC	0	1	1	1	NC	1	NC	0	0	1
Cladochaeta	0	0	0	0	0	1	1	1	0	1	0	0	0	1
† Miomyia	0 ⁴¹	0	0	NC	0	1	1	1	0	NC	NC	0	0	1
Diathoneura	1	0	0	0 ⁴³	0	1	1	1	1	1	0	0	0	1
Neotanygastrella	1	0	0	1	0 ³⁹	1	1	1	0	1	1	0	0	1
Ateledrosophila	1	0	NC	0	1	1	1	1	0	1	1	0	0	1
Nudidrosophila	1	0	1	0	0	0	0	0	0	1	1	0	0	1
Zygothrica	1	0	0	0	1	1	1	1	0	1	0 ⁴⁶	0	0	1
Collessia	1	0	0	0	1	1	1	1	0	1	1	0	0	1
Phorticella	1	0	0	0	1	1 ³⁶	1	1	0	1	1	0	0	1
Grimshawomyia	1	0	0	0	0 ⁴⁹	0	1	1	1 ⁴⁹	1	1	0	0	1
Celidosoma	NC	0	0	0	1	0	1	1	0	1	NC	0	0	1
† Protochymomyza	0	0	0	0	1	0	1	1	0	1	1 ⁵²	0	0	1
Chymomyza	0 ⁵¹	0	0	0	1	0	1	1	0 ⁵¹	1	0	0	0	1
Titanochaeta	1	0	0	0	1 ⁵⁰	0	1	1	1	1	1	0	0	1
Balara	0	0	0	0	0	0	1	0 ⁵³	0	0	0	0	0	1
Samoaia	1	0	0	0	0	0	1	1	1	1	1	0	0	1
Scaptomyza	1	0	0	0	0	0	1	1	1 ⁵⁴	1	1	0	0	1
Marquesia	NC	0	NC	0	0	0	1	1	0	1	NC	0	0	1
Neorhynoleucophenga	0 ⁵⁷	0	NC	0	0	0	1	1	NC	1	NC	0	1	1

TABLE 1. (continued)

Taxa	Characters														
Genus	A	B	C	D	E	F	G	H	I	J	K	L	M	N	
Zaprionus	1	0	0	0	0	0	0	1	0	1	0	0	0	1	
Drosophila	1	0	0	0	0	0	1	1	0	1	0	0	0	1	
Ungrouped genera															
Apachrochaeta	0	0	NC	0	0	NC	1	NC	0	NC	NC	0	0	1	
Laccodrosophila	1	0	NC	0	0	0	0	0	0	NC	NC	0	0	1	
Pseudocacoxenus	NC	1	NC	NC	0	NC	NC	0	1	NC	NC	0	0	1	
Zapriothrica	NC	1	0	0	NC	1	1	1	0	NC	NC	0	0	1	

0, Presumed plesiomorph; 1, presumed apomorph; NC, no comparison; †, fossil genus; numerical figure intercepting a longitudinal line, order of key couplet.

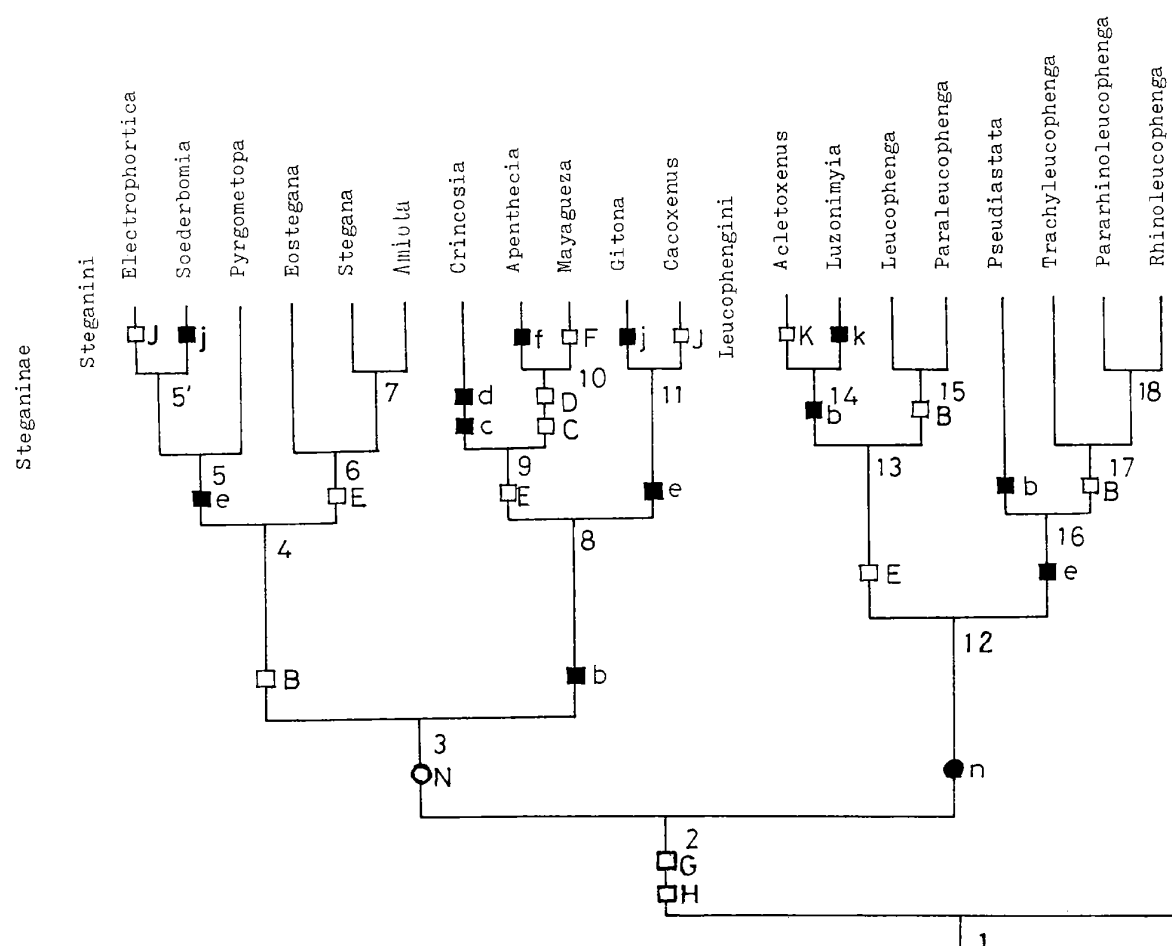
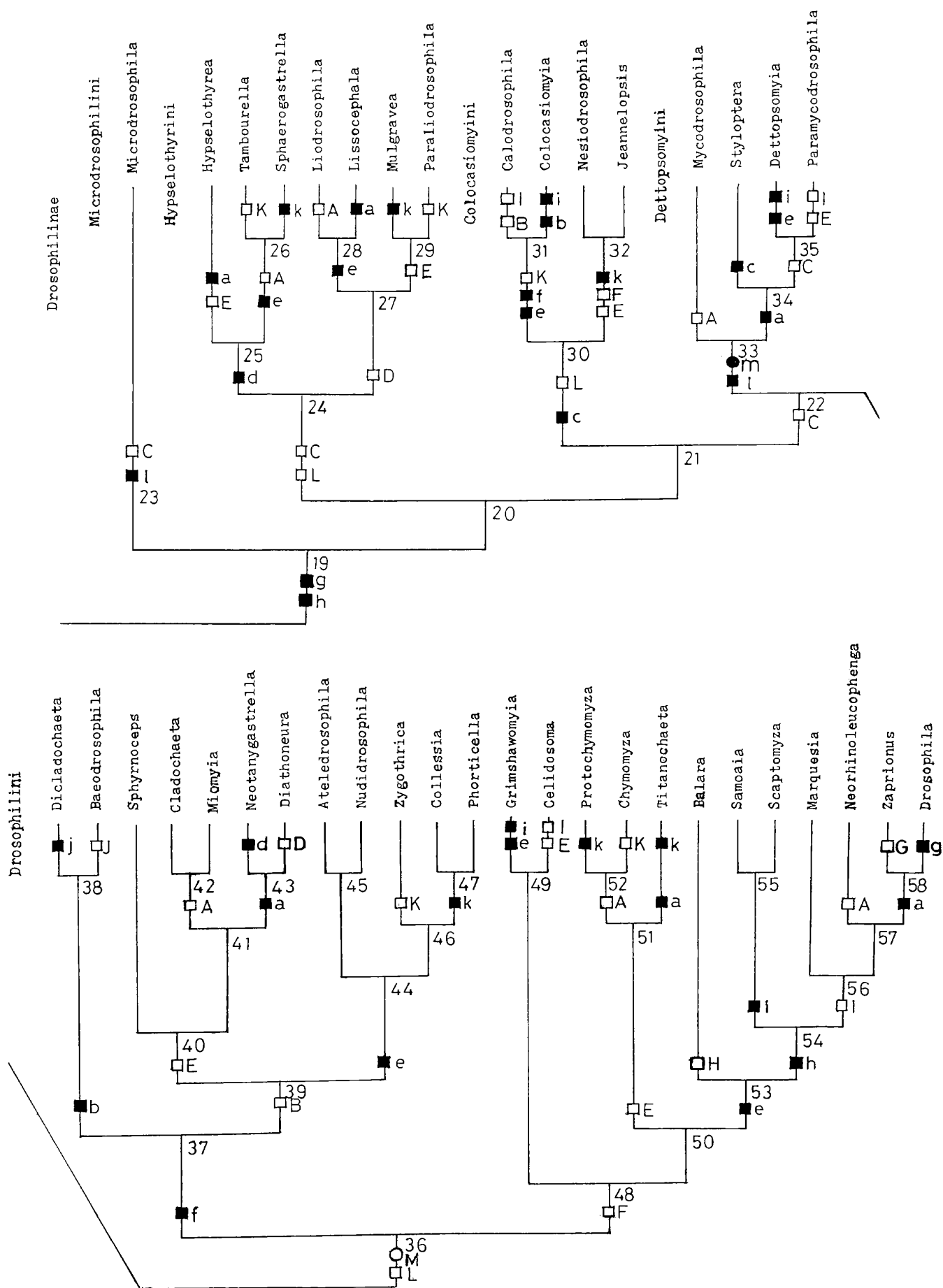


FIG. 1. Diagrams to show the key to tribes and genera of the family Drosophilidae. Alphabetical signs: Presumed plesiomorphous (large letters) and apomorphous states (small letters) of diagnostic characters; open and solid circles: plesiomorphs and apomorphs, respectively, appearing only once in the key; open and solid squares: plesiomorphs and apomorphs, respectively, repeatedly appearing in the key; numerical figures at the branching points of diagrams: orders of key couplets.

Tribes for the Family Drosophilidae

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or confluent ($n=1$).

From the $n \times t$ matrix (Table 1), a key is constructed by means of "even dichotomous diagram method" [9]. The result is expressed also by key diagrams (Fig. 1), which may enable one to find the relationships of the tribes more easily.

Samples of some genera unknown to me were borrowed from various investigators and institutions: Dr. Ben Brugge, University of Amsterdam (*Colocasiomyia*). Dr. Don Colles, C.S.I.R.O., Canberra (*Luzonimyia*, *Crincosia*, *Balara*), Dr. K. Y. Kaneshiro, University of Hawaii (*Grimshawomyia*, *Titanochaeta*, *Samoaia*), and Dr. D. A. Grimaldi, American Museum of Natural History, New York (*Cladochaeta*, *Diathoneura*).

RESULTS

Family Drosophilidae

1. Posterior reclinate orbital nearer to inner vertical than to proclinate (G); prescutellars developed (H); tibiae and tarsi of mid and hind legs with dense rows of short bristles.Subfamily Steganinae.2.
- Posterior reclinate orbital nearer to proclinate than to inner vertical (g, excl. *Zaprionus* s. str.); prescutellars usually absent (h); tibiae and tarsi of mid and hind legs without dense rows of short bristles.Subfamily Drosophilinae.19.

Subfamily Steganinae

2. Discal and second basal cells separated (N).....Tribe 1. Steganini.3.
- Discal and second basal cells confluent (n).....Tribe 2. Leucophengini12.

Tribe 1. Steganini Okada, n.

Type genus: *Stegana* Meigen

3. Arista usually plumose (B).....4.
- Arista usually bare or pubescent (b).8.
4. Carina developed (e).5.
- Carina undeveloped (E).6.
5. Dorsocentrals in 2 pairs; R_{2+3} much waved; frons caudally protruded.
- Genus *Pyrgometopa* Kertész
- Dorsocentrals in 1 pair; R_{2+3} not waved;

- frons caudally not protruded.....5'.
- 5'. Acrostichal hairs in 8 or less than 8 rows (j).
- Genus *Soederbomia* Hendel
- Acrostichal hairs in more than 8 rows (J).
- Genus *Electrophortica* Hendel
6. Ac-index less than 4.0; wing maculated.
- Genus *Eostegana* Hendel
- Ac-index more than 4.0; wing not maculated7.
7. Mid tibia usually with stout bristles above.
- Genus *Stegana* Meigen
- Mid tibia without stout bristles above.
- Genus *Amiota* Loew
8. Carina undeveloped (E).9.
- Carina developed (e).11.
9. Ocellars outside ocellar triangle (c); postverticals absent (d).Genus *Crincosia* Bock
- Ocellars inside ocellar triangle (C); postverticals present (D).10.
10. Anterior reclinate orbital fine (f).
- Genus *Apenthecia* Tsacas
- Anterior reclinate orbital large (F).....
- Genus *Mayagueza* Wheeler
11. Acrostichal hairs in 8 or less than 8 rows (j).
- Genus *Gitona* Meigen
- Acrostichal hairs in more than 8 rows (J).
- Genus *Cacoxenus* Loew

Tribe 2. Leucophengini Okada, n.

Type genus: *Leucophenga* Mik

12. Carina undeveloped (E).13.
- Carina developed (e).16.
13. Arista pubescent (b).14.
- Arista plumose (B).....15.
14. Lateral scutellars divergent or parallel (K); ocellae absent.
- Genus *Acletoxenus* Frauenfeld
- Lateral scutellars convergent (k); ocellars present, though minute.
- Genus *Luzonimyia* Malloch
15. Excessive small scutellars absent.
- Genus *Leucophenga* Mik
- Excessive small scutellars usually presentGenus *Paraleucophenga* Hendel
16. Arista pubescent (b).....
- Genus *Pseudastata* Coquillett
- Arista plumose (B).....17.

17. Frons punctured.
 Genus *Trachyleucophenga* Hendel
 — Frons not punctured.18.
 18. Vein M curved to R_{4+5} distally.....
 Genus *Pararhinoleucophenga* Hendel
 — Veins R_{4+5} and M divergent distally.....
 Genus *Rhinoleucophenga* Hendel

Subfamily Drosophilinae

19. Periorbit broadened anteriorly; second costal break deep (l); frons not glossy; ocellars inside ocellar triangle (C).....Tribe 1. Microdrosophilini.23.
 — Periorbit not broadened anteriorly20.
 20. Frons glossy; second costal break shallow (L); ocellars inside ocellar triangle (C).....Tribe 2. Hypselothyriini.....24.
 — Frons not glossy.....21.
 21. Ocellars outside ocellar triangle (c); second costal break shallow (L).....Tribe 3. Colocasiomyini.....30.
 — Ocellars usually inside ocellar triangle (C). ...
22.
 22. Second costal break deep (l; excl. *Styloptera*); second costal lappet usually large (m).....Tribe 4. Dettopsomyini.33.
 — Second costal break shallow (L); second costal lappet Small (M)..... Tribe 5. Drosophilini
36.

Tribe 1. Microdrosophilini Okada, n.
 Type genus: *Microdrosophila* Malloch

23. Monotypic.
 Genus *Microdrosophila* Malloch

Tribe 2. Hypselothyriini Okada, n.
 Type genus: *Hypselothyrea* de Meijere

24. Postverticals absent (d).25.
 — Postverticals present (D).27.
 25. Carina undeveloped (E); eye piled (a).
 Genus *Hypselothyrea* de Meijere
 — Carina developed (e); eye bare (A).26.
 26. Lateral scutellars convergent (K) or parallel.
 Genus *Tambourella* Wheeler
 — Lateral scutellars divergent (k).....
 Genus *Sphaerogastrella* Duda

27. Carina developed (e).28.
 — Carina undeveloped (E).29.
 28. Eye bare (A); fore femur with a row of small spicules inside. ... Genus *Liodrosophila* Duda
 — Eye piled (a); fore femur without spicules inside. Genus *Lissocephala* Malloch
 29. Lateral scutellars divergent (k).....
 Genus *Mulgravea* Bock
 — Lateral scutellars convergent (K).....
 Genus *Paraliodrosophila* Duda

Tribe 3. Colocasiomyini Okada, n.
 Type genus: *Colocasiomyia* de Meijere

30. Carina developed (e); anterior reclinate orbital fine (f); lateral scutellars convergent or parallel (K).31.
 — Carina undeveloped (E); anterior reclinate orbital large (F); lateral scutellars divergent (k).....32.
 31. Arista plumose (B); anterior dorsocentrals nearer to scutellum than to suture (I).
 Genus *Calodrosophila* Wheeler & Takada
 — Arista usually pubescent (b); anterior dorsocentrals nearer to suture than to scutellum (i). Genus *Colocasiomyia* de Meijere
 32. Wing not crispy; R_{2+3} apically gently curved to costa.....
 Genus *Nesiodrosophila* Wheeler & Takada
 — Wing crispy; R_{2+3} apically strongly curved to costa. Genus *Jeannelopsis* Ségué

Tribe 4. Dettopsomyini Okada, n.
 Type genus: *Dettopsomyia* Lamb

33. Eye bare (A); anterior dorsocentral minute or absent. Genus *Mycodrosophila* Oldenberg
 — Eye piled (a); anterior dorsocentral large. 34.
 34. Ocellars outside ocellar triangle (c); anterior reclinate orbital behind proclinate.
 Genus *Styloptera* Duda
 — Ocellars inside ocellar triangle (C); anterior reclinate orbital slightly before proclinate.35.
 35. Carina developed (e); anterior dorsocentrals nearer to suture than to scutellum (i).
 Genus *Dettopsomyia* Lamb

- Carina undeveloped (E); anterior dorsocentrals nearer to scutellum than to suture (I). Genus *Paramycodrosophila* Duda

Tribe 5. Drosophilini Okada, n.

Type genus: *Drosophila* Fallén

- 36. Anterior reclinate orbital fine (f).37.
 - Anterior reclinate orbital large (F).48.
- 37. Arista pubescent (b) or with a few branches.38.
 - Arista plumose (B).39.
- 38. Acrostichal hairs in 2 rows (j).
 - Genus *Dicladochaeta* Malloch
 - Acrostichal hairs in more than 8 rows (J).
 - ... Genus *Baeodrosophila* Wheeler & Takada
- 39. Carina undeveloped (E).40.
 - Carina developed (e).44.
- 40. Head much broader than thorax.
 - Genus *Sphyrnoceps* de Meijere
 - Head not broader than thorax.41.
- 41. Eye bare (A).42.
 - Eye piled (a).43.
- 42. Arista without lower branches.
 - Genus *Cladochaeta* Coquillett
 - Arista with 2 lower branches.
 - Genus *Miomyia* Grimaldi
- 43. Postverticals absent (d); body slender.
 - Genus *Neotanygastrella* Duda
 - Postverticals present (D); body thick.
 - Genus *Diathoneura* Duda
- 44. Arista inserted near apex of 3rd antennal joint.45.
 - Arista inserted near base of 3rd antennal joint.46.
- 45. Arista without upper branches; orbitals present.
 - Genus *Ateledrosophila* Hardy (♂)
 - Arista with upper branches; orbitals absent.
 - Genus *Nudidrosophila* Hardy (♂)
- 46. Lateral scutellars convergent or parallel (K); proboscis long.
 - Genus *Zygothrica* Wiedemann
 - Lateral scutellars divergent (k); proboscis not very long.47.
- 47. Mesoscutum without white longitudinal stripes; R_{4+5} and M divergent distally.
 - Genus *Collessia* Bock
- Mesoscutum with white longitudinal stripes; R_{4+5} and M parallel distally.
 - Genus *Phorticella* Duda
- 48. Second antennal joint protruded anteriorly below.49.
 - Second antennal joint not protruded anteriorly below.50.
- 49. Carina developed (e); anterior dorsocentrals nearer to suture than to scutellum (i); wing markings distinct.
 - Genus *Grimshawomyia* Hardy
 - Carina undeveloped (E); anterior dorsocentrals nearer to scutellum than to suture (I); wing dark brown, basally hyaline.
 - Genus *Celidosoma* Hardy
- 50. Carina undeveloped (E).51.
 - Carina developed (e).53.
- 51. Eye entirely or nearly bare (A); anterior dorsocentrals nearer to scutellum than to suture (I); anterior reclinate orbital before proclinate; arista with branches.52.
 - Eye piled (a); anterior dorsocentrals nearer to suture than to scutellum (i); lateral scutellars divergent (k); anterior reclinate orbital behind proclinate; arista without lower branches.
 - Genus *Titanochaeta* Knab
- 52. Lateral scutellars convergent (K).
 - Genus *Chymomyza* Czerny
 - Lateral scutellars divergent (k).
 - Genus *Protochymomyza* Grimaldi
- 53. Prescutellars present (H); dorsocentrals in 3 pairs.
 - Genus *Balara* Bock
 - Prescutellars usually absent (h); dorsocentrals in 2, 3, or 4 pairs.54.
- 54. Anterior dorsocentral nearer to suture than to scutellum (i).55.
 - Anterior dorsocentral nearer to scutellum than to suture (I).56.
- 55. Dorsocentrals in 3 pairs, body stout.
 - Genus *Samoaia* Malloch
 - Dorsocentrals in 2 pairs; body slender.
 - Genus *Scaptomyza* Hardy
- 56. Dorsocentrals in 4 pairs; lower margin of gena densely haired.
 - Genus *Malquessia* Malloch
 - Dorsocentrals usually in 2 pairs; lower margin of gena not densely haired.57.

57. Eye nearly bare (A).....
..... Genus *Neorhinoleucophenga* Duda
— Eye piled (a).....58.
58. Mesoscutum with white longitudinal stripes;
posterior reclinate orbital usually nearer to
inner vertical than to proclinate (G).
..... Genus *Zaprionus* Coquillett
— Mesoscutum without white longitudinal
stripes; posterior reclinate orbital nearer to
proclinate than to inner vertical (g).
..... Genus *Drosophila* Fallén

Ungrouped Genera

1. Arista plumose (B).....2.
— Arista pubescent (b).....3.
2. Eye bare (A). ... Genus *Apachrochaeta* Duda
— Eye piled (a). Genus *Laccodrosophila* Duda
3. Prescutellars present though weak (H);
anterior dorsocentral nearer to suture than to
scutellum (i). Genus *Pseudocacoxenus* Duda
— Prescutellars absent (h); anterior dor-
socentral nearer to scutellum than to suture
(I). Genus *Zapriothrica* Wheeler

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