Additions to the *Drosophila* Fauna of New Guinea

BY

D. ANGUS

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by

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ADDITIONS TO THE DROSOPHILA
FAUNA OF NEW GUINEA*

Introduction

Most of the descriptions of the Drosophilidae of the Australian region were made by systematists relying on morphological characters (de Meijere, 1908, 1911, 1914, 1915, 1916, 1918, 1924; Duda, 1923, 1924a, 1924b, 1926a, 1926b, 1929, 1936; and Malloch, 1923, 1924, 1925, 1927). Recent descriptions have been made by geneticists primarily interested in the genetics and cytogenetics of natural populations of the region and in speciation (Mather, 1955, 1960, 1961; Clark, 1957; Mather & Dobzhansky, 1961; Angus, 1964; Ayala, 1965; Bock, 1966).

By virtue of improved techniques of description, e.g. details of internal organs, external genitalia, and chromosome configuration (Okada, 1956), many of the original species may be profitably redescribed. Since the emphasis has shifted from morphological differences to reproductive isolation as the criterion for recognizing a new species, the older descriptions can be regarded as preliminary and may in fact represent groups of sibling species. This has been shown to be the case in *D. serrata* (Dobzhansky & Mather, 1961; Ayala, 1965). A further instance of a sibling species is presented here.

*Arising out of a thesis for the degree of Doctor of Philosophy at the University of Queensland.

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**Type material**

Holotype and allotype of each species here described as new have been deposited as pinned material in the Australian Museum, Sydney. Paratype material: British Museum; U.S. National Museum; Division of Entomology, C.S.I.R.O., Canberra, A.C.T.; Queensland Museum; School of Public Health and Tropical Medicine, University of Sydney.

**Techniques**

The techniques used were similar to those described by Angus, 1964. Hybridization techniques were similar to those described by Mather, 1964. Ten pairs of tested virgin flies were mated in culture vials and changed weekly for four weeks, after which a sample of females was examined for the presence of sperm. Each culture was checked for larvae one week after the parents were removed.

The stocks started from females inseminated in the wild were *D. pseudotetrachaeta*, Brown River, 19. xi. 1964, *D. nigrilineata*, Bulolo, 26. viii. 1964.

**Genus DROSOPHILA** Fallén, 1823

*Drosophila* Fallén, 1823, Geomyzides Sveciae, 4.

**Subgenus CHAETODROSOPHILELLA** Duda, 1923

*Chaetodrosophilella* Sturtevant, 1927, Philipp. J.Sci., 32: 367

Species group QUADRILINEATA sp.gr.nov.

(Table 1)

Large, orange-yellow species with conspicuous black longitudinal stripes on head and thorax. Fore femur armed. Acrostichal hairs irregular, reduced to little more than 2 rows. Long axis of eye oblique. Anterior (lower) reclinate orbital bristle minute. Eggs, 2-4 filaments. Aedeagus with heavily sclerotized black serrations on posterior margin.

**D. NIGRILINEATA** sp. nov.

(Figs. 1, 2A, 3)

*General.* Large, slender, yellowish-brown. Longitudinal, broad black stripes on head, mesonotum, mesopleuron, and scutellum. Fore femur armed. Ocellar bristles reduced.


*Body length.* ♂ 3.2 mm, ♀ 3.5 mm.


*Thorax ♂ and ♀.* Yellowish-brown with 6 broad, longitudinal black stripes, 4 on mesonotum and 1 on each mesopleuron. Acrostichal hairs, reduced in number, irregular, at least in 2 rows. Two pairs of dorsocentrals. Anterior dorsocentrals half way between transverse suture and scutellum. Scutellum yellow with 4 broad, longitudinal black stripes (Fig. 1A). Anterior scutellar bristles convergent. Sterno-index 0.5. Apical and preapical bristles on first and second tibia. No sex combs. Row of about 11 spines on posteromedial border of fore femur.
### TABLE 1

**Species collection data—*quadrilineata* group**

<table>
<thead>
<tr>
<th><strong>D. quadrilineata</strong></th>
<th><strong>LOCATION</strong></th>
<th><strong>SPECIMENS</strong></th>
<th><strong>COLLECTOR</strong></th>
<th><strong>AUTHORITY</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Semarang, Java</td>
<td>1</td>
<td>Jacobsen</td>
<td>de Meijere, 1911</td>
</tr>
<tr>
<td></td>
<td>Mt. Maquiling, Philippines</td>
<td>1</td>
<td>Baker</td>
<td>Sturtevant, 1927</td>
</tr>
<tr>
<td></td>
<td>Annam, Vietnam</td>
<td>2</td>
<td>Biró</td>
<td>Duda, 1923</td>
</tr>
<tr>
<td></td>
<td>Agrihan, Nth. Marianas</td>
<td>1</td>
<td>Borror &amp; Holder</td>
<td>Wheeler &amp; Takada, 1964</td>
</tr>
<tr>
<td></td>
<td>Guam, Sth. Marianas</td>
<td>5</td>
<td>Krauss</td>
<td>Wheeler &amp; Takada, 1964</td>
</tr>
<tr>
<td></td>
<td>Solomon Is. Admiralty Is.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Guam, Sth. Marianas</td>
<td>abundant</td>
<td>Bohart &amp; Gressitt</td>
<td>Wheeler &amp; Takada, 1964</td>
</tr>
<tr>
<td><strong>D. circumdata</strong></td>
<td>Fort de Kock, Sumatra</td>
<td>1</td>
<td>Jacobsen</td>
<td>Duda, 1926</td>
</tr>
<tr>
<td><strong>D. tetrachaeta</strong></td>
<td>Bulolo, New Guinea</td>
<td>3</td>
<td>Angus &amp; Khan</td>
<td>author</td>
</tr>
<tr>
<td></td>
<td>Feb. 1964</td>
<td>44</td>
<td>Angus</td>
<td>author</td>
</tr>
<tr>
<td></td>
<td>Aug. 1964</td>
<td>121</td>
<td>Angus</td>
<td>author</td>
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<tr>
<td></td>
<td>Aug. 1965</td>
<td>112</td>
<td>Angus</td>
<td>author</td>
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<tr>
<td></td>
<td>Bisianumu, Papua</td>
<td>May 1964</td>
<td>3</td>
<td>Mather</td>
</tr>
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<td></td>
<td>July 1964</td>
<td>44</td>
<td>Mather</td>
<td>author</td>
</tr>
<tr>
<td></td>
<td>Sept. 1964</td>
<td>14</td>
<td>Khan</td>
<td>author</td>
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<tr>
<td></td>
<td>Nov. 1964</td>
<td>15</td>
<td>Angus</td>
<td>author</td>
</tr>
<tr>
<td></td>
<td>Jan. 1965</td>
<td>38</td>
<td>Khan</td>
<td>author</td>
</tr>
<tr>
<td></td>
<td>May 1965</td>
<td>4</td>
<td>Mather</td>
<td>author</td>
</tr>
<tr>
<td></td>
<td>May 1966</td>
<td>3</td>
<td>Mather</td>
<td>author</td>
</tr>
<tr>
<td></td>
<td>Brown River, Papua</td>
<td>July 1964</td>
<td>1</td>
<td>Mather</td>
</tr>
<tr>
<td></td>
<td>Sept. 1964</td>
<td>7</td>
<td>Khan</td>
<td>author</td>
</tr>
<tr>
<td></td>
<td>Nov. 1964</td>
<td>27</td>
<td>Angus</td>
<td>author</td>
</tr>
<tr>
<td></td>
<td>Jan. 1965</td>
<td>3</td>
<td>Khan</td>
<td>author</td>
</tr>
<tr>
<td></td>
<td>Mt. Austin, Guadalcanal</td>
<td>Feb. 1966</td>
<td>3</td>
<td>Angus</td>
</tr>
<tr>
<td></td>
<td>Madang, New Guinea</td>
<td>July 1966</td>
<td>23</td>
<td>Baimai</td>
</tr>
<tr>
<td><strong>D. pseudo-tetrachaeta</strong></td>
<td>Brown River, Papua</td>
<td>Sept. 1964</td>
<td>1</td>
<td>Khan</td>
</tr>
<tr>
<td></td>
<td>Nov. 1964</td>
<td>1</td>
<td>Angus</td>
<td>author</td>
</tr>
<tr>
<td><strong>D. nigrilineata</strong></td>
<td>Bulolo, New Guinea</td>
<td>Aug. 1964</td>
<td>40</td>
<td>Angus</td>
</tr>
<tr>
<td></td>
<td>Aug. 1965</td>
<td>29</td>
<td>Angus</td>
<td>author</td>
</tr>
<tr>
<td></td>
<td>Bisianumu, Papua</td>
<td>Nov. 1964</td>
<td>2</td>
<td>Angus</td>
</tr>
</tbody>
</table>
FIG. 1.—D. nigrilineata. A, head and thorax; B, periphallic organs, lateral view; C, aedeagus, lateral view; D, phallic organs; E, egg guides.
Fig. 2.—Larval brain, metaphase plate chromosomes. A, *D. nigrilineata*; B, *D. pseudotetrachaeta*
Wings ♂ and ♀. Transparent. Costal index 2.4, fourth vein index 1.3, 5X index 0.94, 4C index 0.85. Third costal section bristled on basal $\frac{1}{4}$. Length ♂ 3.2 mm, ♀ 3.3 mm.

Periphallic organs (Fig. 1B). Genital arch yellow, broad, incised at insertion of clasper; undermargin with a bare fist-like process directed mesad; upper portion bare; lower tip hirsute and bearing about 8 setae. Clasper broad, triangular, with a straight row of about 9 teeth and 12 marginal bristles. Anal plate broad, yellow, bearing about 50 stout bristles evenly distributed, irregular central portion hirsute, rear angle poorly developed. Decasternum membranous.

Phallic organs. Aedeagus yellow, straight. Apically expanded, bilobed, finely serrate with about 10 heavily sclerotized, black, comb-like serrations on the posterolateral margins (Fig. 1C). Anterior paramere articulated with aedeagus, bearing 2 minute sensillae, Ventral fragma quadrate, rounded ventrally, fused with novasternum (Fig. 1D). Phallic formula (after Okada, 1956) abCdEfg,HklMN. Divergency index 8. Phallosomal index 1.2.

Egg guides. Yellow, pointed, with about 13 marginal and 4 discal teeth and 3 subterminal hairs. One stout subterminal bristle on the medial margin. Basal isthmus about $\frac{1}{4}$ length of lobe (Fig. 1E).

Internal structures ♂ and ♀. Intestinal coiling index 3. Rectal index 1.5. Malpighian tubules, 2 anterior free, common trunk 0.3 total length; 2 posterior fused, common trunk 0.6 total length; ratio of anterior and posterior 5:3.

Internal genitalia ♂. Testis with one internal and 1½ external creamy coils. Vas deferens straight. Sperm pump with a pair of caecae 17 times as long as bulb.
TABLE 2

**Morphological comparisons between D. nigrilineata and D. circumdata as described by Duda 1926a**

<table>
<thead>
<tr>
<th>CHARACTER</th>
<th>D. nigrilineata</th>
<th>D. circumdata</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carina</td>
<td>flat</td>
<td>strong</td>
</tr>
<tr>
<td>Orbital ratio procline anterior</td>
<td>1</td>
<td>&gt; 1</td>
</tr>
<tr>
<td>Forehead</td>
<td>yellow</td>
<td>orange</td>
</tr>
<tr>
<td>Ocelli</td>
<td>brown</td>
<td>red</td>
</tr>
<tr>
<td>Direction of greatest diameter of eye</td>
<td>obliquely downwards</td>
<td>parallel with forehead</td>
</tr>
<tr>
<td>Vibrissae</td>
<td>strong</td>
<td>weak</td>
</tr>
<tr>
<td>Second oral bristle</td>
<td>strong</td>
<td>only 2 rows</td>
</tr>
<tr>
<td>Mesonotum</td>
<td>yellowish-brown</td>
<td>orange</td>
</tr>
<tr>
<td>Acrostichal hairs</td>
<td>at least 2 rows</td>
<td>orange</td>
</tr>
<tr>
<td>Abdomen</td>
<td>yellow</td>
<td>clouded</td>
</tr>
<tr>
<td>Wings</td>
<td>clear</td>
<td>not bent towards costal</td>
</tr>
<tr>
<td>Terminal part of second longitudiinal vein</td>
<td>bent towards costal</td>
<td>weak and short</td>
</tr>
<tr>
<td>Costal vein</td>
<td>strong</td>
<td>weak</td>
</tr>
<tr>
<td>Body length ♀</td>
<td>3.5 mm</td>
<td>3.0 mm</td>
</tr>
</tbody>
</table>

**Internal genitalia ♀.** Ventral receptacle in several loose folds. Spermathecae hemispherical, yellow, lightly sclerotized.

**Egg filaments.** Two, expanded and flattened at tips.

**Pupae.** Anterior spiracles with about 22 branches, posterior spiracles divergent, 0.08 body length. Pupal stalk length/body length ratio about 0.15.

**Chromosomes.** Larval brain shows 5 pairs of rods, 1 pair of dot chromosomes (Fig. 2A). The salivary gland figures show 5 long arms and a short arm embedded in heterochromatin (Fig. 3).

**Relationships.** D. nigrilineata shares many features in common with D. quadrilineata de Meijere (1911) and D. tetrachaeta Angus (1964), but differs from these in body shape, chaetotaxy, and egg filaments. It also closely resembles D. circumdata as described by Duda (1926a). The type locality, and only record, of D. circumdata is Fort de Kock, Sumatra. The differences between D. nigrilineata and D. circumdata are listed in Table 2. These differences from Duda's description indicate that D. nigrilineata is not D. circumdata. Until D. circumdata is better known, the relationships to D. nigrilineata cannot be resolved.

**Distribution.** Bulolo, New Guinea, 40 specimens, 26. viii. 1964, 29 specimens, 16. viii. 1965; Bisianumu, Papua, 1 male, 1 female, 18. xi. 1964.

**DROSOPHILA PSEUDOTETRACHAETA sp. nov.**

(Figs. 2B, 4)

**General.** Yellowish-brown, 4 dorsocentral bristles, fore femur armed. Longitudinal broad black stripes on head, mesonotum, mesopleuron, and scutellum.

**Cultures—Type source.** Brown River, New Guinea, 19. xi. 1964, from one female inseminated in the wild. Can be maintained in culture on cornmeal agar.

**Body length.** ♂ 2.6 mm, ♀ 2.8 mm.

**Head ♂ and ♀.** Arista with 12 branches. Antennae reddish-brown. Front with 3 broad, longitudinal black stripes. Ocelli reddish-brown. Orbital bristles in ratio of
about 10:2:5. First two oral bristles well-developed, subequal, third oral not enlarged. Greatest width of cheek \(\frac{1}{2}\) greatest diameter of eye. Eye color 2F12 Mandarin R. Carina broad and flat.

**Thorax \(\delta\) and \(\varphi\).** Yellowish-brown with 6 longitudinal black stripes, 2 medial to dorsocentrals, on each side 1 immediately medial to alars and passing through the presuturals, and 1 on each mesopleuron in line with the wing. Acrostichal hairs reduced in number, irregular except for 2 rows of about 10 hairs which are twice normal length. Dorsocentrals—4 pairs, 1 pair presutural. Scutellum yellowish-brown with 4 broad, longitudinal black stripes. Anterior scutellar bristles convergent. Sterno-index 0.5. Halteres yellowish-brown. No sex combs. Row of about 8 spines on posterior medial border of fore femur. Apical and preapical bristles on first and second tibia.

**Wings \(\delta\) and \(\varphi\).** Transparent. Costal index 2.0, fourth vein index 1.3, 5X index 1.1, 4C index 1.0. Third costal section bristled on basal \(\frac{1}{2}\). Length \(\delta\) 2.4 mm, \(\varphi\) 2.8 mm.

**Periphallic organs.** Genital arch anterior margin hirsute, under margin directed ventrad. Ten bristles on toe, posterior margins fused with anal plate. Anal plate yellow, oval, with about 40 bristles evenly distributed, irregular central portion hirsute, rear angle poorly developed. Claspers with a straight row of 6–8 teeth (mode 7) and about 10 marginal bristles. Decasternum membranous.

**Phallic organs.** Aedeagus yellow, straight. Apically expanded, bilobed, finely serrate, with about 10 heavily sclerotized comb-like black serrations on postero-
lateral margin. Anterior parameres articulated with aedeagus, with 3 minute apical sensillae. Ventral fragma shield-shaped, rounded ventrally, fused with novasternum. Phallic formula abCdEfgHIklMN. Phallosomal index 1.0. Divergency index 8.

_Egg guides._ Yellow, pointed, with about 14 marginal and 4 discal teeth, several subterminal hairs, of which one medial is very stout. Basal isthmus about \( \frac{1}{2} \) length of lobe.

**Internal structure** \( \delta \) and \( \varphi \). Intestinal coiling index 3. Rectal index 2.0. Malpighian tubules, 2 anterior free, common trunk 0.2 total length; 2 posterior fused, common trunk 0.2 total length; ratio of anterior and posterior 1:1.

**Internal genitalia** \( \delta \). Testis with 1\( \frac{1}{2} \) creamy coils. Vas deferens straight. Sperm pump with a pair of caeca 15 times as long as bulb.

**Internal genitalia** \( \varphi \). Ventral receptacle short, loosely folded. Spermathecae spherical, lightly sclerotized.

_Egg filaments._ Four (2 long, tapering and 2 short; ratio 5:2).

_Pupae._ Anterior spiracles with 22 branches, posterior spiracles divergent, 0.1 body length. Pupal stalk length body length ratio about 0.2.

**Chromosomes._** Larval brain shows 5 pairs of rods and 1 pair of large dots (Fig. 2B). The salivary gland figure shows 5 long arms and a short arm embedded in heterochromatin (Fig. 4).

_Relationships._ Morphologically indistinguishable from _D. tetrachaeta_. Will not hybridize with _D. tetrachaeta_. Details of sexual isolation tests between _D. tetrachaeta _and _D. pseudotetrachaeta_ will be reported in a subsequent publication. The rare laboratory crosses produced inviable F1 pupae.


**Discussion**

The genus _Chaetodrosophilella_ Duda has as its type _D. quadrilineata_ de Meijere and combines the characters found independently in other species of _Drosophila_ of conspicuous longitudinal stirpes, more than two pairs of dorsocentral bristles, and 2–4 rows of acrostichal hairs. It can be shown that none of these features are obligatory in a species to be included in _Drosophila_. Various workers have regarded _Chaetodrosophilella_ as valid, while others consider it a synonym of _Drosophila_. It is a matter of opinion whether a combination of two or more of these features is considered sufficient to erect a genus.

Okada (1956) has introduced the following indices to _Drosophila_ taxonomy: the intestinal coiling index, the rectal index, phallosomal index, and divergency index based on a phallic formula. The divergency values have been used to demonstrate relationships between genera of _Drosophilinae_ and between subgenera of the genus _Drosophila_ (Okada, 1956; 1966).

From the table of phallic formulae (Table 3) it is not possible to separate the genus _Chaetodrosophilella_ from _Drosophila_ using a divergency index. Further it is not possible to separate the two genera on ecological grounds since both have similar habitats (Bohart & Gressitt, 1951).

Since morphological features, divergency index, and habitat are so similar, there appear at present to be no valid premises on which to separate _Chaetodrosophilella_ from _Drosophila_. It is proposed that _Chaetodrosophilella_ be regarded as a synonym of _Drosophila_. A new name must be found for _Chaetodrosophilella coei_ Okada.
Comparison of phallic formulae

<table>
<thead>
<tr>
<th>GROUP</th>
<th>PHALlic FORMULA</th>
<th>DIVERGENCY INDEX</th>
<th>AUTHORITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chaetodrosophilella coei Genus Drosophila</td>
<td>aBCdEfgHIkIMN</td>
<td>5.0</td>
<td>Okada, 1966</td>
</tr>
<tr>
<td>Japan 61 spp.</td>
<td>a'Bc'd'EfgHIk'l'm'n'</td>
<td>5.0</td>
<td>Okada, 1956</td>
</tr>
<tr>
<td>Nepal 21 spp.</td>
<td>a'Bc'd'EfgHIk'l'mN</td>
<td>6.5</td>
<td>Okada, 1966</td>
</tr>
<tr>
<td>Subgenus Drosophila</td>
<td>abcDef'g'Hiklm'n'</td>
<td>7.0</td>
<td>Okada, 1956</td>
</tr>
<tr>
<td>Japan 31 spp.</td>
<td>abcDef'g'Hiklm'n'</td>
<td>8.5</td>
<td>Okada, 1966</td>
</tr>
<tr>
<td>Nepal 8 spp.</td>
<td>abcDef'g'Hiklm'n'</td>
<td>8.0</td>
<td>Author*</td>
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<tr>
<td>Subgenus Chaetodrosophilella</td>
<td>abcDef'g'Hiklm'n'</td>
<td>8.0</td>
<td>Author**</td>
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<tr>
<td>D. quadrilineata</td>
<td>abcDef'g'Hiklm'n'</td>
<td>8.0</td>
<td>Author</td>
</tr>
<tr>
<td>D. tetrachaeta</td>
<td>abcDef'g'Hiklm'n'</td>
<td>8.0</td>
<td>Author</td>
</tr>
<tr>
<td>D. pseudotetrachaeta</td>
<td>abcDef'g'Hiklm'n'</td>
<td>8.0</td>
<td>Author</td>
</tr>
<tr>
<td>D. nigrilineata</td>
<td>abcDef'g'Hiklm'n'</td>
<td>8.0</td>
<td>Author</td>
</tr>
</tbody>
</table>

*Calculated from Wheeler & Takada, 1964, Fig 11, p. 197.
**Modified from Angus, 1964, following reexamination of material.

DROSOPHILA TRICHAETA Angus nom. nov.


Since Chaetodrosophilella is not considered to be worthy of generic rank, a new name is required as D. coei is already occupied.

There is some evidence that D. quadrilineata, D. circumdata, D. tetrachaeta, and the newly described species form a species group (see p. 32). A comparison of de Meijere’s original description of D. quadrilineata with the description of it by Wheeler & Takada (1964) and that of D. tetrachaeta by Angus (1964) shows a number of small morphological differences between the species. These are probably significant, since it can be shown that D. tetrachaeta and D. pseudotetrachaeta are biologically good species but morphologically indistinguishable. Further D. tetrachaeta and D. pseudotetrachaeta are sympatric at Brown River (Port Moresby). It has not been possible so far to collect flies from Java and Micronesia to establish the degree of genetic isolation between them.

Since Chaetodrosophilella is not considered to be worthy of generic rank, a new name is required as D. coei is already occupied.

Similarly D. circumdata and D. nigrilineata differ in a number of small points, but the degree of isolation between them is unknown.

However a study of the male genitalia of D. nigrilineata and D. tetrachaeta shows remarkable similarities despite the chaetotactic and egg differences.

It is concluded that these species form a group occupying an area in the tropics extending from 20°N to 20°S and from 100°E to 160°E.

The quadrilineata group includes species which morphologically are sufficiently different from other species to be included in a separate subgenus. This species group includes D. quadrilineata de Meij., from which it derives its name, and which is also the type species for Chaetodrosophilella Duda. However, there is no reason to exclude Chaetodrosophilella from Drosophila and Sturtevant has suggested this name for a subgenus of Drosophila. The quadrilineata species group is therefore placed in the subgenus Chaetodrosophilella.

The position of Chaetodrosophilella with respect to the other subgenera may be determined by calculating the difference value devised by Okada, which is based on
TABLE 4

Relationship of Chaetodrosophilella with other subgenera, determined by difference values

<table>
<thead>
<tr>
<th>SUBGENUS</th>
<th>Chaetodrosophilella DIFFERENCE VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hirtodrosophila</td>
<td>3.5</td>
</tr>
<tr>
<td>Pholadoris (Paradrosophila)</td>
<td>9.0</td>
</tr>
<tr>
<td>Dorsilopha</td>
<td>2.0</td>
</tr>
<tr>
<td>Sophophora</td>
<td>7.0</td>
</tr>
<tr>
<td>Drosophila</td>
<td>0.0</td>
</tr>
</tbody>
</table>

The dissimilarities between phallic formulae. Using both the phallic formulae and difference values for 5 subgenera given by Okada (1956), difference values have been calculated for Chaetodrosophilella and are listed in Table 4. From this table it is considered that Chaetodrosophilella shows closer relationships with Dorsilopha and Drosophila s. str. than with Sophophora and Pholadoris. Further, these results confirm the conclusion reached by Okada that within the genus the subgenera fall into two groups based on phallic formulae. One group consists of Hirtodrosophila, Dorsilopha, Drosophila and also includes Chaetodrosophilella.

The closest species or species group to the quadrilineata group are D. busckii Coquillet on the one hand and the immigrans group on the other. The species of the quadrilineata group resemble D. busckii in body color, black thoracic stripes and ventral receptacle; however, D. busckii is smaller in size and has no row of spines on the fore femur. Members of the quadrilineata group resemble species of the immigrans group in body size and femoral spines but differ in costal index, 2.2 in the quadrilineata group, 3.0 in the immigrans group; pupal horn index, 0.2 in the former, 0.5 in the latter; and ventral receptacle, about 4 loose folds in the former and about 25 folds in the latter.

It seems unlikely that D. trichaeta can be included in this species group because, in addition to the differences from D. quadrilineata noted by Okada (1966), the male and female external genitalia are considerably different from those of the quadrilineata species group.

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