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highest regard.



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Indian species of Drosophilidae, exclusive of the genus *Drosophila*

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SYNOPSIS

An account is given of five species representing four genera of the family Drosophilidae, one of which is described as new and two are new records from India. The Indian species of Drosophilidae (excluding *Drosophila* species) are listed and a key to the genera is provided.

Recent studies on the systematics of drosophilids in the subcontinent of India have made remarkable progress; however, a vast area of great ecological interest still awaits exploration. Unfortunately, these studies in India have so far been concentrated on the species of *Drosophila* and insufficient attention has been given to other genera of Drosophilidae. Only ten species representing six genera, exclusive of the genus *Drosophila*, have been recorded from India (Malloch, 1924; Parshad & Duggal, 1965; Gupta, 1970; Jha, Mishra & Singh, 1971; Sreerama Reddy & Krishnamurthy, 1971; Godbole & Vaidya, 1972)¹. This paper gives the results of a recent survey made at, and around, Varanasi.

List of Indian Drosophilidae (excluding *Drosophila* species)

- | | |
|---|---|
| <i>Scaptomyza</i> Hardy | <i>Chaetodrosophilella</i> Duda |
| <i>graminum</i> (Fallén, 1823) | <i>quadrilineata</i> (de Meijere, 1911) |
| <i>pallida</i> (Zetterstedt, 1847) | <i>Mycodrosophila</i> Oldenberg |
| <i>Leucophenga</i> Mik | <i>gratiosa</i> (de Meijere, 1911) (new record) |
| <i>albicincta</i> de Meijere, 1908 | <i>Zaprionus</i> Coquillett |
| <i>flavicosta</i> Duda, 1926 | <i>indiana</i> Gupta, 1970 |
| <i>guttiventris</i> (de Meijere, 1911) | <i>paravittiger</i> Godbole & Vaidya, 1972 |
| <i>subpollinosa</i> de Meijere, 1914 (new record) | <i>Gitonides</i> Knab |
| <i>Paraleucophenga</i> Hendel | <i>perspicax</i> Knab, 1914 |
| <i>invicta</i> (Walker, 1857) | <i>Cacoxenus</i> Loew |
| | <i>punctatus</i> Duda, 1924 ² |

¹ A recent paper (Bächli, 1973) published after the preparation of this paper, includes an additional genus, *Lissocephala* Malloch, and two further species.

² This species was reported from Varanasi by Gupta (1970), however it may have to be considered a synonym of *Gitonides perspicax* (Professor M.R. Wheeler, pers. comm.) and has therefore been omitted from the key.

Hypselothyrea de Meijere
varanasiensis sp. n.

Lissocephala Malloch
sabroskyi Wheeler & Takada, 1964

Methods of collection

Unlike *Drosophila* species, members of other genera of Drosophilidae are rarely, or only occasionally, attracted towards fermenting fruits. Collecting by net or aspirator over natural feeding sites, such as decaying fruits and leaves, wild grasses and cultivated vegetation, was therefore used to capture these species and to study their ecology.

Key to Indian genera of Drosophilidae

- | | | |
|---|--|------------------------------------|
| 1 | Distal costal break normal, costa not forming a blackened lappet..... | 2 |
| - | Distal costal break deeply incised, costa forming a blackened lappet | |
| | | Mycodrosophila ¹ |
| 2 | Small cuneiform bristles on second and third tarsae present..... | Zaprionus |
| - | Small cuneiform bristles on second and third tarsae absent..... | 3 |
| 3 | Only one sternopleural bristle present and postvertical bristles absent | |
| | | Hypselothyrea |
| - | Normally three sternopleural bristles, and postvertical bristles present..... | 4 |
| 4 | Arista bare or pubescent..... | Gitonides |
| - | Arista plumose, with long branches..... | 5 |
| 5 | Two pairs of dorsocentral bristles usually present..... | 6 |
| - | More than two pairs of dorsocentral bristles usually present..... | Chaetodrosophilella |
| 6 | Acrostichal hairs in 2-4 rows. Ventral branches on apical half of arista only.
Body somewhat slender..... | Scaptomyza |
| - | Acrostichal hairs in 4 or more rows. (At least one ventral branch on basal
half of arista.) Body not slender..... | 7 |
| 7 | All three orbital bristles strong. Posterior reclinate typically nearer to inner
vertical than to proclinate..... | 8 |
| - | All three orbital bristles not strong. Posterior reclinate nearer proclinate than
to inner vertical..... | Drosophila ¹ |
| 8 | Third costal section with thorn-like spines..... | Leucophenga |
| - | Third costal section without thorn-like spines..... | Paraleucophenga |

Scaptomyza Hardy

Scaptomyza Hardy, 1849, *Hist. Berwicksh. Nat. Club* 2 : 361. Type-species: *Drosophila graminum* Fallén; Europe.

Arista plumose, with 1-2 ventral branches; acrostichal hairs in 2-4 rows, prescutellars not differentiated; somewhat slender species.

Scaptomyza pallida (Zetterstedt)

Drosophila pallida Zetterstedt, 1847, *Dipt. Scandinaviae* 6 : 2571.

General features as described by Wheeler & Takada (1964). Periphallid and phallic organs as described and figured by Gupta (1970).

¹ Depending upon interpretation *Lissocephala* Malloch will run out at this point.

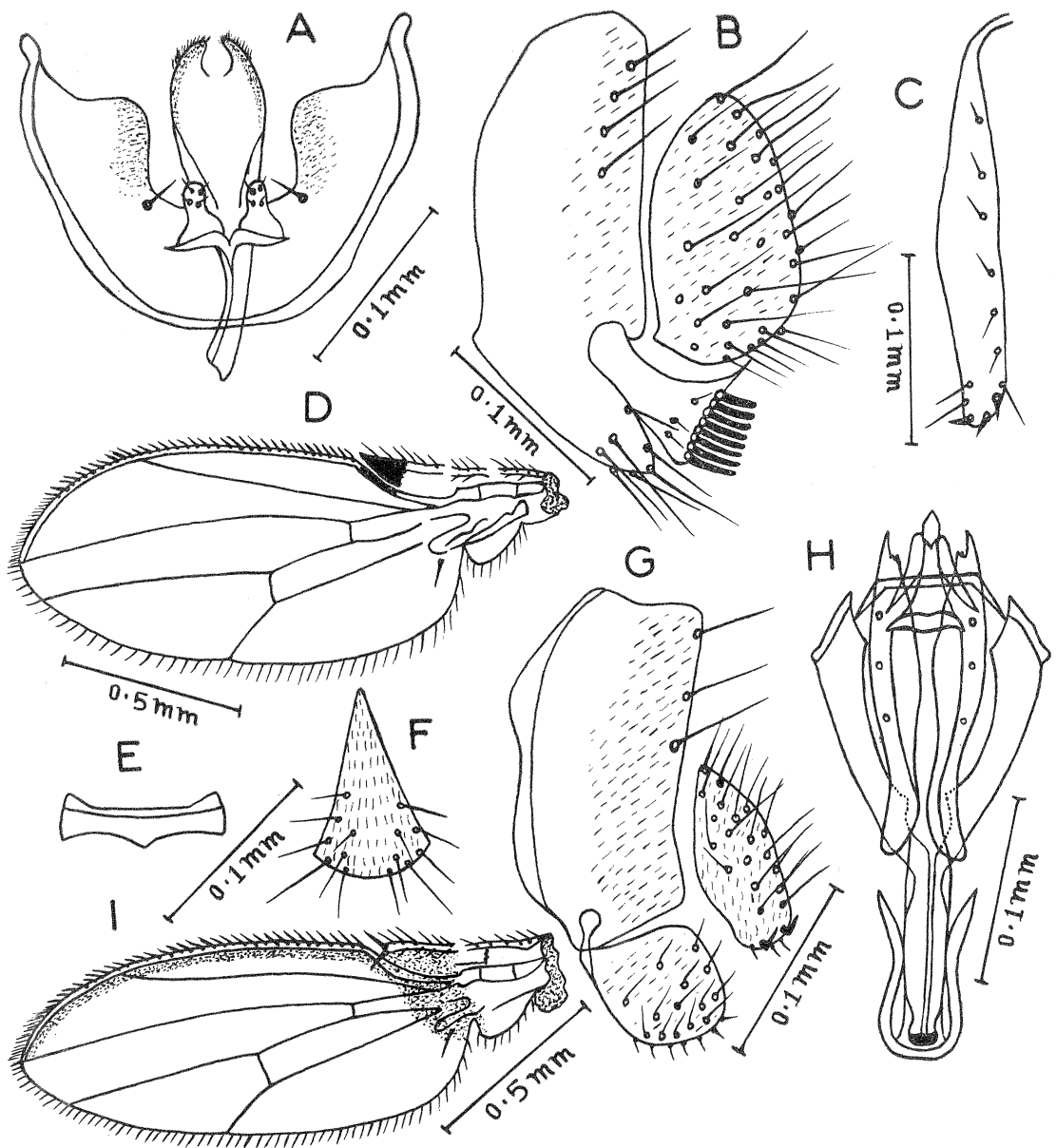


Fig. 1. (A-D) *Mycodrosophila gratiosa* (de Meijere): (A) phallic organs, (B) periphallalic organs; (C) egg-guide; (D) wing. (E-I). *Leucophenga subpollinosa* de Meijere: (E) decasternum; (F) egg-guide; (G) periphallalic organs; (H) phallic organs; (I) wing.

Habitat. A large number of specimens were collected by net sweeping over both wild and cultivated vegetation.

Distribution. Worldwide.

Leucophenga Mik

Leucophenga Mik, 1886, *Wien. ent. Ztg.* **5** : 317. Type-species: *Drosophila maculata* Dufour; Europe.

Arista plumose, with numerous branches; acrostichal hairs in numerous rows; pre-scutellars well differentiated; all three orbital bristles strong; posterior reclinate arising nearer to inner vertical than to proclinate; third costal section with thorn-like spines.

Leucophenga guttiventris (de Meijere)

Drosophila guttiventris de Meijere, 1911, *Tijdschr. Ent.* **54** : 414.

Leucophenga guttiventris, Sturtevant, 1921, *Publ. Carnegie Inst.* **301** : 131.

General features as described by Okada (1956) and Gupta (1970).

Periphallic and phallic organs as described and figured by Okada (1956) and Gupta (1970).

Habitat. This species was very rarely seen and was represented by very few individuals which showed some attraction towards fermenting fruit.

Distribution. Java, Formosa, Japan, Fiji, Africa, Nepal and India.

Leucophenga subpollinosa de Meijere

Leucophenga subpollinosa de Meijere, 1914, *Tijdschr. Ent.* **57** : 263.

General features as described by Wheeler & Takada (1964) and Okada (1966). Wings (fig. 1I) with a diagonal black stripe near base; costa also black. C-index 2.0; 4V-index 1.9; 4C-index 1.23; 5X-index 1.75. Two equal bristles at the apex of first costal section; heavy bristles on about basal eight-ninths of third costal section. Periphallic organs (fig. 1G). Genital arch broad, truncate below; upper margin with about three bristles; heel and toe considerably rectangular. Clasper as broad as long, tip rounded, with about 21-25 setae. Anal plate fusiform, basally with two stout bristles. Decasternum pale yellow, narrow and elongated plate (fig. 1E). Phallic organs (fig. 1H). Aedeagus slender, rod-shaped. Anterior parameres elongate, medianly with sensilla. Posterior parameres triangular. Ventral fragma narrow, proximal half rod shaped.

Egg-guide (fig. 1F). Lobe pale yellow narrowly tapering proximally and broadened distally, setigerous and with several long setae at lower half.

This species was mainly seen during rainy season.

Distribution. Java, Sumatra, Vietnam, Formosa, Japan, Africa, Micronesia, Nepal and India (new record).

Mycodrosophila Oldenberg

Mycodrosophila Oldenberg, 1914, *Arch. Naturgesch.* **A80** (2) : 4. Type-species: *Amiota poecilogastra* Loew; Europe.

Arista plumose, with one, rarely two ventral branches; no prescutellar and dorsocentral bristles; distal costal break deeply incised, costa forming a blackened lappet.

✓ *Mycodrosophila gratiosa* (de Meijere)

Drosophila gratiosa de Meijere, 1911, *Tijdschr. Ent.* 54 : 404.

Mycodrosophila gratiosa, Sturtevant, 1918, *Bull. Am. Mus. nat. Hist.* 38 : 442.

General features as described by Wheeler & Takada (1964).

Wings (fig. 1D) hyaline; costa forming broad lappet, black. C-index 1.38; 4V-index 2.5; 4C-index 1.7; 5X-index 2.0. Two equal bristles at the apex of first costal section; heavy bristles on about basal two-thirds of third costal section. Periphallic organs (fig. 1B). Genital arch dark brown, tubular below; upper half with about four bristles, toe with 7-8 bristles, heel prominent. Clasper with about 8-9 black teeth arranged in a straight row. Anal plate yellow, somewhat broadened below, with about 35-40 bristles. Phallic organs (fig. 1A). Aedeagus broad and straight, with tip rounded and grooved. Anterior parameres small, with sensilla. Posterior parameres obscure. Novasternum with a pair of small submedian spines. Ventral fragma broader than long.

Egg-guide (fig. 1C). Lobe narrow, oblong, with 12-14 marginal bristles, apical three bristles being tooth-like, basal isthmus short.

Habitat. A number of individuals were collected, from a decaying tree trunk.

Distribution. Indonesia, Fiji, Samoa, Solomon Island, Micronesia and India (new record).

Hypselothyrea de Meijere

Hypselothyrea de Meijere, 1906, *Annls hist.-nat. Mus. natn. hung.* 4 : 193. Type-species:

Hypselothyrea dimidiata de Meijere; New Guinea.

Anterior reclinate orbital very much reduced or absent; postvertical bristles absent; only one sternopleural bristle present.

✓ *Hypselothyrea varanasiensis* sp. n.*Male*

Arista with about 5-6 dorsal and two ventral branches in addition to the terminal fork. Antenna light brown; third segment a little darker. Frons, including ocellar triangle, brown. Proclinate orbital bristle subequal to posterior reclinate orbital. Postvertical bristles absent. Carina brownish, narrow and ridged. Face light brown; clypeus dark brown. Cheek brown, greatest width of cheek from the base of oral bristle to eye about one-thirteenth greatest diameter of eye. Palpi light brown, with one prominent apical seta. Second oral bristle not differentiated. Eyes dark red.

Acrostichal hairs regular, in two rows. Anterior scutellars strongly convergent. Distance from anterior dorsocentral to posterior dorsocentral about half distance between two anterior dorsocentrals. Mesonotum and scutellum reddish brown to dark brown. Thoracic pleura brownish. Only one sternopleural bristle prominent. Legs reddish brown.

Wings (fig. 2F) dusky, elongated and with a distinct brownish stripe running posteriorly from humeral cross-vein. C-index 0.8; 4V-index 1.68; 4C-index 1.9; 5X-index 1.5. One bristle at the apex of first costal section; heavy bristles on about basal four-fifths of third costal section. Halteres yellow.

Abdomen considerably narrower basally; abdominal tergites (except first to third) dark brown.

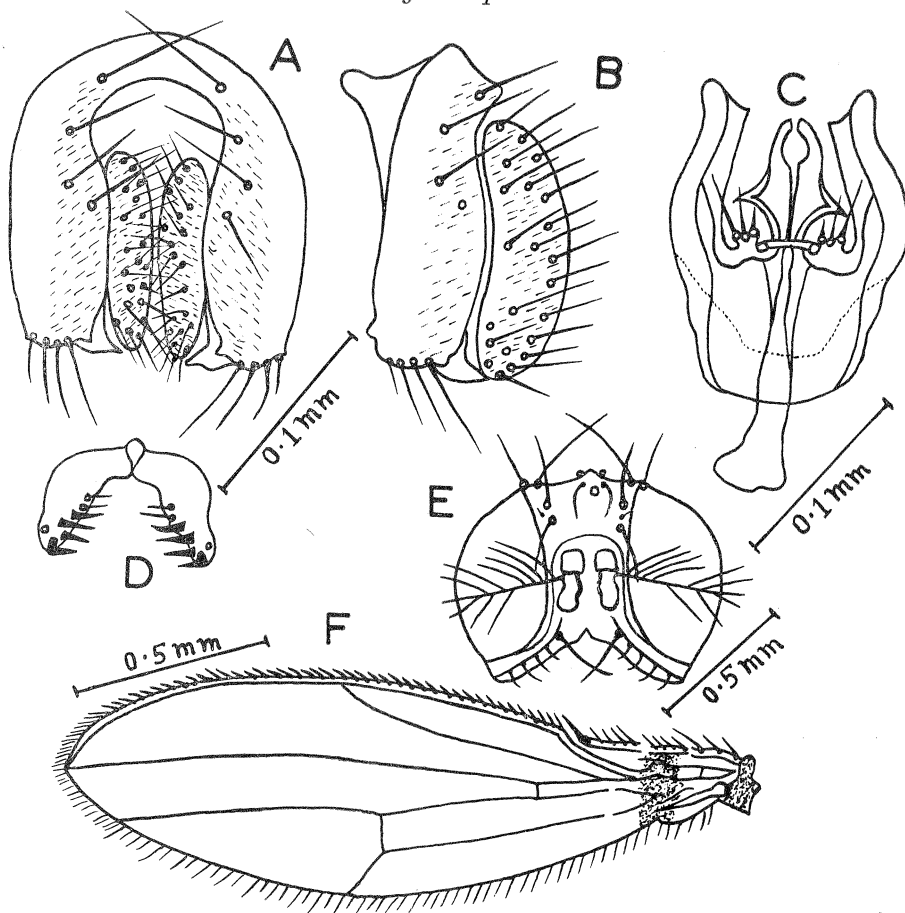


Fig. 2. *Hypselothyrea varanasiensis* sp. n.: (A, B) periphallic organs; (C) phallic organs; (D) claspers; (E) head; (F) wing.

Periphallic organs (fig. 2A, B, D). Genital arch brown, somewhat broadened below; upper margin with about 4-5 bristles, toe rounded, with four bristles. Clasper with about six stout teeth, upper two being bristle-like. Anal plate elongated, with about 25 bristles.

Phallic organs (fig. 2C). Aedeagus bifid, with spine-like projections laterally. Parameres obscure. Novasternum with large processes and three subequal pairs of submedian spines. Ventral fragma nearly quadrate.

Length of body (average of four), 2.2 mm.

Holotype ♂, INDIA: Botanical Garden, B.H.U., Varanasi district, Uttar Pradesh, ix. 1972 (Gupta). *Paratypes*: 3 ♂, same data as holotype. In the Department of Zoology, Banaras Hindu University, Varanasi, India, and Department of Biology, Tokyo Metropolitan University, Setagaya-Ku, Tokyo, Japan.

Habitat. The few males of this species were collected by net-sweeping on wild vegetation only.

This species is somewhat similar to *Hypselothyrea breviscutellata* Duda (1928) especi-

ally in wing pattern, but differs in having two pairs of dorsocentral bristles (only one pair in *breviscutellata*).

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Book notices

Insect population ecology. An analytical approach. By G.C.Varley, G.R.Gradwell and M.P.Hassell. Pp. X + 212, text illust. Oxford: Blackwell Scientific Publications, 1973. £2.75

This book is written mainly for university students and research workers. The objective is to give the biologist a more critical approach to the interpretation of population figures than will be found in most current texts of general ecology. The body of the text comprises nine chapters each dealing with a major aspect of the subject, and each chapter is provided with a synopsis of and an introduction to its contents. Each reference in the comprehensive list on pages 179-91 is cross-referenced to the section where it is mentioned.

For each chapter a series of experiments and exercises are provided, with their answers. A glossary and definition of symbols and general index complete the work.

Biological control by natural enemies. By Paul DeBach. Pp. [xii] + 323, 37 text figures, 7 tabs. 8vo. Cambridge: University Press, 1974. £5.50.

The author of this work is Professor of Biological Control and Associate Director of the International Centre for Biological Control at the University of California at Riverside. The volume traces the historical background of biological control and examines in detail some of the best known examples of the discovery abroad of new natural enemies and their importation into the United States and elsewhere to achieve successful biological control.

The effect of pesticides in disrupting the efficiency of natural enemies and their damage to the environment are discussed. The author concludes that the achievement of complete control by natural enemies is the ideal goal but the expansion of this approach must be based on increased bio-ecological research. This is a long term objective and in the meantime the application of ecological knowledge and technology to the present pesticides dilemma could lead rapidly to a considerable reduction in their use, with consequent benefit to the environment.

A comprehensive list of some 180 references and a general index complete the work.