

✓ TWO NEW SPECIES OF *DROSOPHILA* (*MELANOGASTER* SPECIES GROUP) (DIPTERA : DROSOPHILIDAE)

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ABSTRACT. Two species, *D. giriensis* and *D. gundensis*, members of *takahashii* and *montium* subgroups respectively, belonging to *melanogaster* species group collected from Western Ghats, are described. Their taxonomic status and relationships are discussed.

Recent collection trips undertaken to investigate the *Drosophila* fauna of Bababudangiri and Kemmangundi Hill ranges of Western Ghats have yielded two new species belonging to *melanogaster* species group of the subgenus *Sophophora*. One of them is named as *D. giriensis* (*takahashii* subgroup) and the other as *D. gundensis* (*montium* subgroup). The descriptions of these new species and their taxonomic relationships are presented here.

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1. *Drosophila giriensis*, sp. nov. (Figs. 1-7)

*takahashii* subgroup

*Male and female* : Males pale brown (abdomen apically black); females darker brown. Mean body length, males 2.33 mm (range 2.26-2.40 mm), females 2.79 mm (range 2.73-2.86 mm).

*Head*, ♂ and ♀ : Arista with 7 branches (4/3) including forked. Front pale white in male, light brown in female. Antenna light yellow. Cheek with 2 medium sized vibrissae along with a number of smaller ones. Palpi pale yellow. Carina narrow. Eyes orange red. Anterior orbitals same size as that of posterior orbitals, middle one half the size of the anterior. Inner and outer verticals are of the same size and reclinate. Ocellar triangle small, brownish with two long ocellar bristles.

*Thorax*, ♂ and ♀ : Pale brown. Acrostichal hairs in 8 rows, regularly placed. Anterior dorsocentrals three-fourths the posterior. Scutellum medium brown. Anterior scutellars parallel. Posterior scutellars crossed. Anterior and posterior sternopleurals are large and are of the same size. Middle sternopleurals small. Prescutellars absent.

*Wings*, ♂ and ♀ : Female wings clear. Male wings slightly dusky with yellow tint. Mean length of the wing in males 1.93 mm (range 1.86 to 2.00 mm), females 2.35 mm (range 2.33 to 2.40 mm). Halteres small, yellowish.

Wing indices calculated as per the formulae of Okada (1956):

	<i>Costal index</i> 2nd Costal Section 3rd Costal Section	<i>4V index</i> 4th Section of IV Vein 3rd Section of IV Vein	<i>4C index</i> 3rd Costal Section/ 3rd Section of IV Vein	<i>5X index</i> Last Section of V Vein/ Posterior Cross Vein
Female	2.65 (2.60—2.72)	2.29 (2.21—2.38)	1.07 (1.06—1.08)	2.06 (2.00—2.20)
Male	2.43 (2.35—2.50)	2.07 (1.93—2.15)	1.07 (1.00—1.16)	2.15 (2.00—2.25)

*Legs.* (Fig. 1): Preapical bristles on all tibiae; apicals on first and second tibiae. Sex-comb of male in transverse rows of stout black teeth 3-4 metatarsal rows of (from above down) 0-1, 1-4, 2-5 and 2-7 teeth; 3 rows on the second tarsal segment of (from above down) 1-3, 2-4 and 2-4 teeth.

*Abdomen.* ♂ and ♀: Tergites of female yellowish with thin apical bands. The first three tergites of male with broad apical bands medially and narrow laterally. The remaining three tergites are shiny black. The intensity of the pigmentation of the apical bands shows a gradual increase from anterior to posterior.

*Periphallic organs* (Fig. 2): Epandrium (Genital arch) is broad laterally and narrow dorsally. Surstylus (Primary clasper) with a prominent ventrolateral comb of about 9 long black teeth and 1-2 black short teeth dorso-laterally in addition to 7-8 medial bristles. Cerci (Anal plate) free from Epandrium, small, roughly triangular with numerous bristles, longer above, shorter below.

*Phallic organs* (Fig. 3): Dark brown. Aedeagus slender, apically broadened into a round structure, not ornamented, slightly notched. Anterior gonopophysis (anterior parameres) large, crescentic, apically pointed and black, subapically with a few tiny lateral sensilla. Posterior gonopophyses (posterior parameres) long and light yellow. Basal branches of the posterior gonopophyses are short, basally broad, sclerotized, non-serrate and apically pointed. Novasternum with lateral conical expansions bearing sensilla and a pair of submedian spines on caudal margin.

*Egg guide* (Fig. 4): Brown, with about 14 teeth and a subterminal hair.

*Internal characters*: Testes light yellow brown with 3 coils; Paragonia large; Ejaculatory bulb globular (Fig. 5). Spermathecae bell shaped; snuff coloured; paraovaria ovoid; ventral receptacle tightly coiled (Fig. 6). Malpighian tubules two pairs and free.

*Egg filaments* (Fig. 7): 2 long slender filaments, slightly flattened in apical quarter.

*Pupae*: Anterior spiracles with about 8 branches.

*Chromosomes*: Somatic metaphase of the female neuroblast cells reveal two pairs of V shaped chromosomes, a pair of rods and a pair of dots, while

in male one of the rods is replaced by a J-shaped chromosome. The salivary gland nuclei reveal five long arms radiating from the chromocenter.

The species can be cultured only for one generation that too from a naturally obtained gravid females. The progenies obtained were very few and the same have been used for analysis of wing indices and other internal characters.

*Holotype* ♂, INDIA : KARNATAKA : Western Ghats : Bababudangiri Hills, 9. ix. 1976, Coll. H. S. Prakash and G. Sreerama Reddy. Deposited in the Museum of Department of Zoology, Manasa Gangotri, University of Mysore, Mysore. *Allotype* ♀, data as above. *Paratypes* : 10 ♂♂ and 10 ♀♀. INDIA : KARNATAKA : Western Ghats : Bababudangiri Hills, Coll. H.S. Prakash and G. Sreerama Reddy. Deposited in the Department of Biology, Tokyo Metropolitan University, Setagaya-Ku, Tokyo, Japan and some will be deposited in Z.S.I., Calcutta and I.A.R.I., New Delhi.

*Distribution* : India : Karnataka.

*Relationship and Remarks* : The nature of the banding pattern of abdominal tergites, eggs with two filaments, presence of posterior pair of malpighian tubules which are free and the type of puparia warrant its inclusion in the subgenus *Sophophora*. The characters like yellowish or dull dusky colour with shiny black abdomen distally, presence of sex-comb, periphallallic organs with well developed epandrium, surstylus with teeth (setigerous claspers), phallic organs with anterior and posterior gonopophyses, long coiled ventral receptacle, spiral testes and non skipping larvae qualify its inclusion in the *melanogaster* species group (Bock and Wheeler, 1972). Further, the sex-comb in short tranverse rows of rounded black teeth on the first 2 tarsal segments, periphallallic organs with a surstylus possessing a ventrolateral comb of long rounded black teeth and a few black teeth dorsolaterally, phallic organs with large anterior and posterior gonopophyses, the anterior being apically black and pointed, and posterior having smaller basal branches and the presence of large closely placed submedian spines on the caudal margin of novasternum permits its inclusion in the *takahashii* subgroup (Bock and Wheeler, 1972).

Okada (personal communication, 1977) has pointed out that the new species *Drosophila giriensis* is near to *Drosophila paralutea*. The new species resemble *D. paralutea* in the presence of ventrolateral comb of the surstylus, slightly notched aedeagus and in having apically pointed and black anterior gonopophyses. However, the two species differ in certain characters such as the number of sex-comb rows and teeth on the metatarsus and second tarsal segment as well as in the shape of the cerci. Further, the new species *D. giriensis*, differs from *D. paralutea* in having short non-serrate basal branches of the posterior gonopophyses, in possession of only 1-2 black teeth dorsolaterally in the surstylus and in the presence of sensilla only on the lateral side of novasternum. Thus, the characters found in this species are unique and not found together in any of the known species of *takahashii* subgroup. Therefore, it deserves the status of a new species in the *takahashii* subgroup.

The specific name of *D. giriensis* is coined to denote the place, Bababudangiri Hills, from where it was collected for the first time.

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2. *Drosophila gundensis*, sp. nov. (Figs. 8-13)*montium sulzer*

*Male and female:* Male and female dark yellow (abdomen of male apically black). Mean body length, males 2.43 mm (range 2.36-2.54 mm), females 2.72 mm (range 2.57-2.81 mm).

*Head, ♂ and ♀:* Arista with 7 branches (3/4) including forked. Antenna yellowish brown. Cheek with 3 stiff vibrissae, of which one is longer. Palpi yellowish with a single stiff bristle. Face light brown. Carina narrow. Anterior orbitals longer. posterior orbitals three-fourths the size of the anterior, mid orbitals small. Inner verticals longer, outer verticals small and three-fourths the inner. Ocellar triangle broad and shiny with two long ocellar bristles.

*Thorax, ♂ and ♀:* Light brown. Acrostichal hairs in 8 rows, regularly placed. Anterior dorsocentrals three-fourths the posterior. Scutellum dark brown. Anterior scutellars convergent, posterior scutellars crossed. Anterior sternopleurals three-fourths the posterior, middle sternopleurals small and less chitinized. Prescutellars absent.

*Wings, ♂ and ♀:* Transparent. Mean length of the wing in males 2.14 mm (range 2.06-2.36 mm), and that of females 2.24 mm (range 2.18-2.33 mm). Halteres yellow.

*Wings indices:*

	<i>Costal index</i>	<i>4V index</i>	<i>4C index</i>	<i>5X index</i>
Female	2.72	2.29	1.08	1.90
	2.50—2.85	2.15—2.38	1.00—1.23	1.80—2.20
Male	2.90	2.45	1.10	2.03
	2.78—3.00	2.35—2.64	1.00—1.45	1.80—2.20

*Legs (Fig. 8):* Preapical bristles on all tibiae; apicals only on first and second tibiae. First and second tarsal segments of the fore legs in male carry each a sex-comb consisting of 3-7 short and stout longitudinal teeth in the first and 0-3 similar teeth in the second.

*Abdomen, ♂ and ♀:* Tergites of female yellowish with thin apical black bands. First three tergites of male with faint apical black bands; remainder of male abdomen shiny black.

*Periphallie organs (Fig. 9):* Epandrium (Genital arch) broad dorsally and laterally; black upto the level of secondary surstylus (secondary clasper) and brownish below. Primary and secondary surstylus present. Primary surstylus with 11-13 short irregularly arranged pointed teeth and 4-6 short bristles. Secondary surstylus continuous with cerci (anal plate) and carries 2 very large curved black median teeth above and 1 smaller teeth below in addition to a row of 5 dark stumpy teeth along the ventral and lateral borders becoming more and more chitinized and shorter towards the lateral borders. Quite often asymmetrical arrangement of the curved black median teeth is observed with 2

on the left side and 3 on the right side and vice versa. Cerci brownish yellow with 16-20 bristles.

*Phallic organs* (Fig. 10) : Aedeagus yellow, long and broad; apically pointed with lateral expansions just above the base. The tip of the aedeagus is bare, while hirsute laterally. Anterior gonopophyses (anterior parameres) are small with a few apical sensilla. Posterior gonopophyses (Posterior parameres) are large, club-shaped and ornamented throughout with tiny spherules. Caudal margin of novasternum with a pointed median lobe bearing a pair of closely placed submedian spines.

*Egg guide* (Fig. 11) : Brown with about 16 teeth and a subterminal hair.

*Internal characters* : Testes yellow, with 3 coils. Paragonia transparent and relatively small. Ejaculatory bulb globular (Fig. 12). Spermathecae small, ventral receptacle tightly coiled. Paraovaria small. Malpighian tubules two pairs and free.

*Egg filaments* (Fig. 13) : 2 long slender filaments, slightly flattened apically.

*Pupae* : Anterior spiracle with 7-12 branches.

The species can be cultured only for one generation from a naturally inseminated females. The progenies obtained have been used for the analysis of wing indices and other morphological characters.

*Holotype* ♂, India : Karnataka : Western Ghats : Kemmangundi Hills, 9. ix. 1976, Coll. H.S. Prakash and G. Sreerama Reddy. Deposited in the Museum of Department of Zoology, Manasa Gangotri, University of Mysore, Mysore. *Allotype* ♀, same data as above. *Paratypes* : 10 ♂♂ and 10 ♀♀, India : Karnataka : Western Ghats : Kemmangundi Hills, Coll. H.S. Prakash and G. Sreerama Reddy. Deposited in the Department of Biology, Tokyo Metropolitan University Setagaya-Ku, Tokyo, Japan, and some will be deposited in Z.S.I., Calcutta and I.A.R.I., New Delhi.

*Distribution* : India : Karnataka.

*Relationships and Remarks* : The presence of coiled ventral receptacle, posterior pair of malpighian tubules which are free, eggs with 2 blunt filaments, the nature of puparia and the pattern of abdominal pigmentation warrant its inclusion in the subgenus *Sophophora*. The characters like yellowish abdomen which is distally black in males, presence of sex-comb, peripheral organs with well developed epandrium, cerci and a pair of surstylus with teeth (setigerous claspers), phallic organs with anterior and posterior gonopophyses, long coiled ventral receptacle, spiral testes and non-skipping larvae qualify its inclusion in the *melanogaster* species group (Bock and Wheeler, 1972). Further, the presence of yellowish abdominal tergites with distinct apical bands, the nature of secondary surstylus with curved black median teeth and laterally hirsute aedeagus with a bare tip warrants its inclusion in the *montium* subgroup (Bock and Wheeler, 1972).

Okada (personal communication, 1977) has pointed out that the new species is near to *D. rufa*, but it is different from it. The new species differs from

*D. rufa* not only in the pattern and the number of teeth in the sex-comb but also in the number and arrangement of teeth in the primary surstylus. Further, the sex-comb of this new species being considerably smaller than the usual row of teeth, extending the length of the first two tarsal segments is unlike that of other members of the *montium* subgroup and is somewhat similar to *D. nikananu* which is exceptional within the *montium* subgroup. Thus, the nature of sex-comb, the arrangement of short black teeth along the ventral and lateral borders of secondary surstylus, irregular arrangement of teeth in the primary surstylus and the presence of laterally hirsute aedeagus with a bare tip are unique to this species and are not found together in any known species of the *montium* subgroup. Therefore it deserves the status of a new species in the *montium* subgroup.

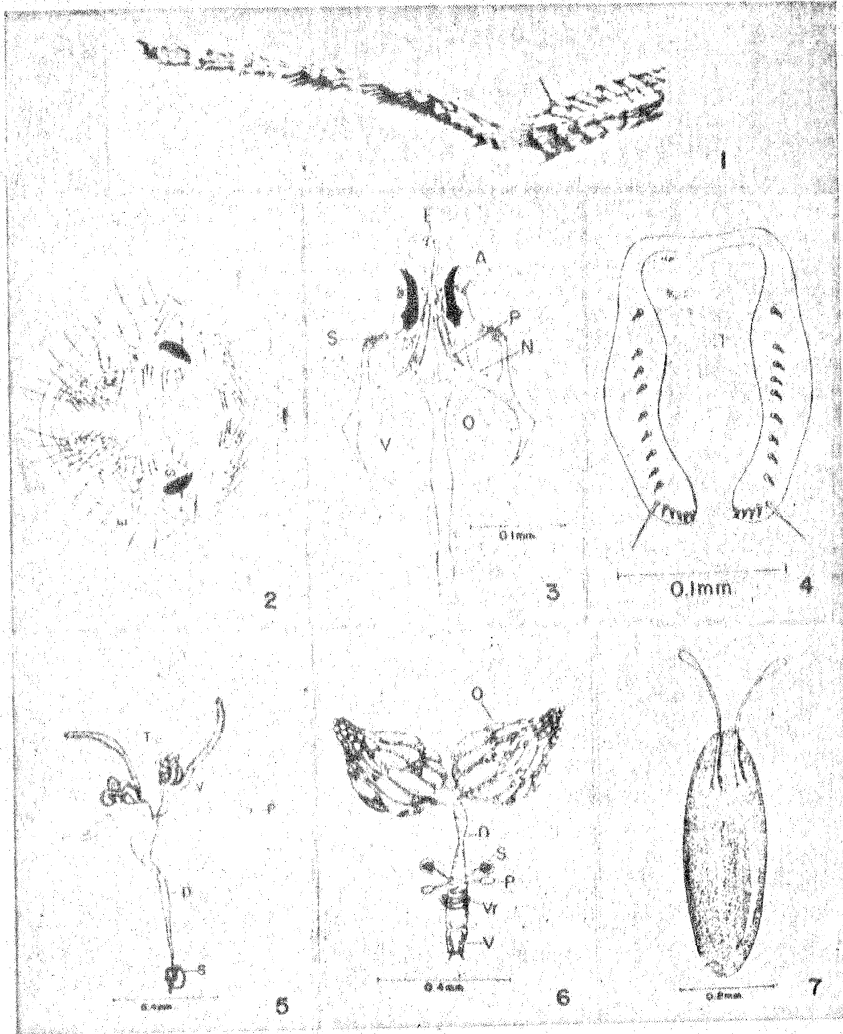
*D. gundensis* is named after the locality, Kemmangundi Hills, where it was collected for the first time.

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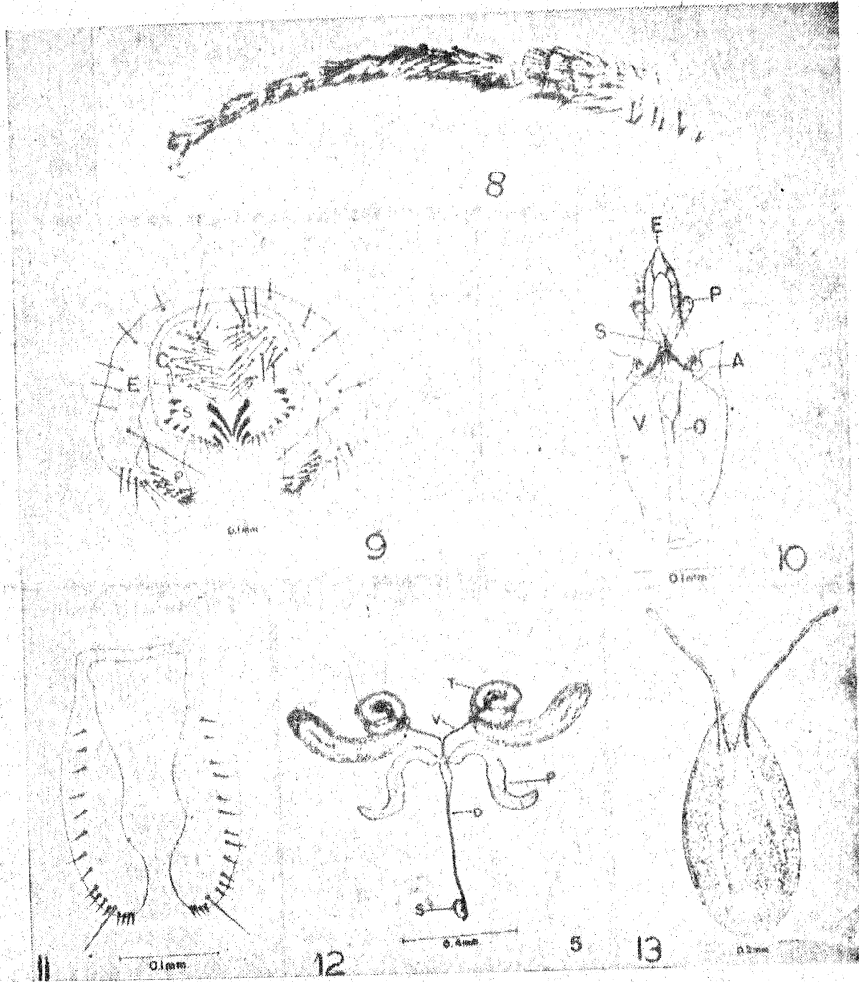
#### REFERENCES

- BOCK, I.R. and M. R. WHEELER. 1972. The *Drosophila melanogaster* species group. *Univ. Tex. Publ.* 7213: 1-102.
- OKADA, T. 1956. *Systematic study of Drosophilidae and allied families of Japan*. Gihodo Co., Ltd.





Figs. 1-7. *Drosophila giriensis*, sp. nov.: 1, Fore leg of male showing sex-combs; 2, Peripheral phallic organs: C=Cerci, E=Epandrium, S=Surstylus; 3, Phallic organs: A=Anterior gonopophyses, E=Aedeagus, N=Novasternum, O=Ejaculatory apodeme, P=Posterior gonopophyses, S=Submedian spine of novasternum, V=Ventral fragma; 4, Egg guide; 5, Male Reproductive organs: D=Anterior ejaculatory duct, P=Paragonia, S=Sperm pump, T=Testes, V=Vas deferens; 6, Female Reproductive organs: D=Oviduct, O.=Ovary, P=Paraovaria, S=Spermatheca, V=Vagina, Vr=Ventral receptacle.; 7, Egg.



Figs. 8-13. *Drosophila gundensis*, sp. nov. : 8, Fore leg of male showing sex-combs; 9, Peripheral phallic organs : C=Cerci, E=Epandrium, S=Secondary surstylus, P=Primary surstylus; 10, Phallic organs : A=Anterior gonopophyses, E=Aedeagus, O=Ejaculatory apodeme, P=Posterior gonopophyses, S=Submedian spine of novasternum, V=Ventral fragma; 11, Egg guide; 12, Male Reproductive organs: D=Anterior ejaculatory duct, P=Paragonia, S=Sperm pump, T=Testes, V=Vas deferens; 13, Egg.