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FURTHER ADDITION TO *DROSOPHILA* FAUNA OF DARJEELING, INDIA

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Taxonomic account of four new species namely *D. maryensis*, *D. setitarsa*, *D. novazonata* and *D. para zonata* belonging to subgenus *Drosophila* of the genus *Drosophila* is provided.

(Key words : new *Drosophila* species)

Darjeeling, a hill station in West Bengal, is situated at an elevation of 2123 metres above sea level. Until recently very little has been known about the drosophilid fauna of this region. DUDA (1923) described a new species, *D. bipectinata* from Darjeeling. JHA, MISRA & SINGH (1971) recorded seven common species from this region: *D. melanogaster*, *D. ananassae*, *D. bipectinata*, *D. malerkotliana*, *D. kikkawai*, *D. busckii* and *D. quadrilineata* (= *Chaetodrosophilella quadrilineata*). GUPTA & SINGH (1977) recorded four species, of them *D. kurseongensis* and *D. neoelegans* were described as new, while *D. trilutea* and *D. lucipennis* recorded for the first time from India. Recently DWIVEDI (1979) described two more new species, *D. guptai* and *D. ramamensis* from areas near Darjeeling.

This paper embodies the results of a recent survey made at two different places namely Kurseong (30 km towards south from Darjeeling; alt. 1475 m) and Ramam (75 km towards north from Darjeeling; alt. 2520 m) in Darjeeling district.

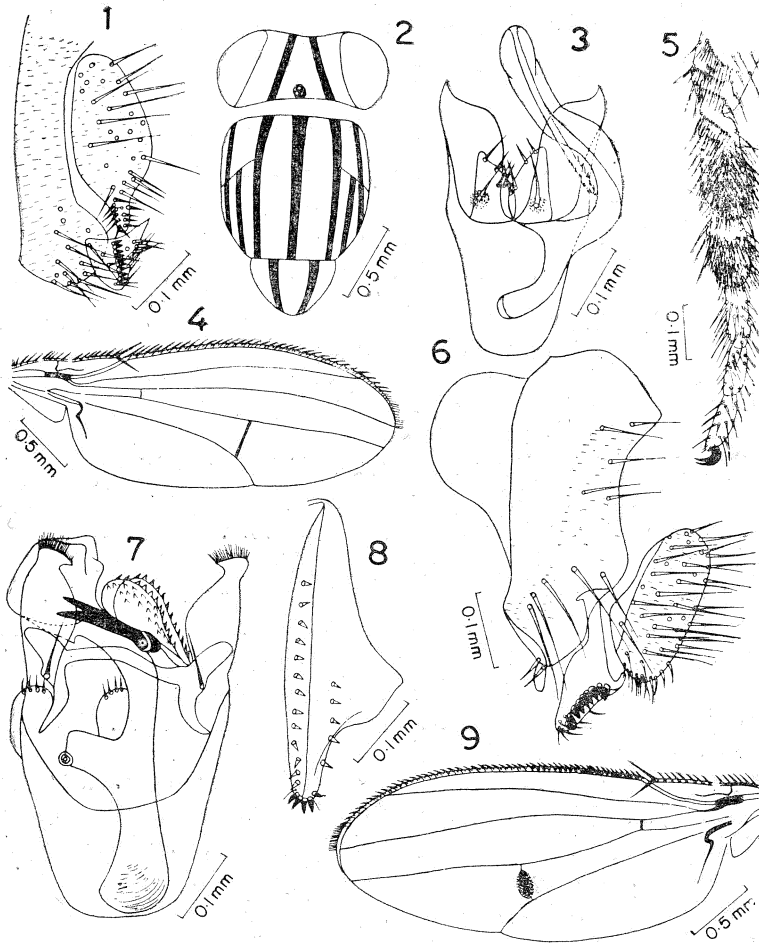
1. *Drosophila (Drosophila) maryensis* sp. nov.

Male: Arista with 5 branches above 2 below in addition to terminal fork. Antennae with second segment brown; third segment

pale. Frons yellow, ocellar triangle with two dark brown longitudinal stripes. Orbitals in ratio 6:4:6. Vibrissa large, arising from a dark brown spot; second oral bristle thin, about half length of vibrissa. Palpus dark brown, with one prominent apical bristle. Carina pale yellow and high. Face brown. Cheek yellowish, greatest width of cheek 1/7 greatest diameter of eye. Eyes bright red.

Acrostichal hairs regular, in 6 rows. Anterior scutellars convergent; posterior scutellars crossed. Anterior dorsocentral about 3/4 length of posterior dorsocentral; distance from anterior dorsocentral to posterior dorsocentral about half distance between first two dorsocentrals. Mesonotum shining yellow, with 7 longitudinal dark brown stripes; inner stripe of outer pair on either side interrupted at suture. Scutellum with two dark brown stripes (Fig. 2). Thoracic pleura shining yellow, with 3 dark brown stripes. Sterno-index 0.78. Legs yellow, forefemora with 10-11 small spinules; preapicals on all three tibiae; apicals on first and second tibiae.

Wings (Fig. 4): clear, posterior cross vein slightly fuscous. Indices: C-index 4.0; 4V-index 1.43; 4C-index 0.58; 5x-index 1.0. Two setae at the apex of first costal section; heavy setae on about basal 1/3 of



Figs. 1—4, *Drosophila maryensis* sp. nov.: 1—periphallic organs; 2—male head and thorax, dorsal aspect; 3—phallic organs; 4—male wing. Figs. 5—9, *Drosophila setitarsa* sp. nov.: 5—male foreleg; 6—periphallic organs; 7—phallic organs; 8—egg-guide; 9—male wing.

third costal section. Haltere's knob yellow, dorsal surface of stalk dark brown.

Abdomen shining yellow, tergites with narrow apical dark bands interrupted medially and laterally.

Length of male body (2 males): 3.34 mm.

Periphallic organs (Fig. 1): Epandrium yellow, pubescent, narrow and broadly rounded below, upper portion of epandrium bare; lower portion with 14 setae. Surstylus

triangular, with 10 black teeth arranged in a straight row; 3–4 discal setae, and with 8–9 setae scattered on outer margin. Cerci large, narrowly projected ventrally, pubescent, with 26 long setae dorsally and 13 short stout setae ventrally.

Phallic organs (Fig. 3): Aedeagus yellow, large, curved, apically swollen, with 10–12 serrations mediolaterally, basal apodeme small, about 1/3 as long as aedeagus; small vertical rod developed. Anterior gono-

pophyses conical, with 4 sensilla. Posterior gonopophyses obscure. Caudal margin of novasternum with a pair of large submedian spines. Ventral fragma nearly quadrate.

Holotype ♂, INDIA: WEST BENGAL; St Mary's Hill, Kurseong, Darjeeling district. June-July 1976 (Gupta & Dwivedi).

Paratypes: 2 ♂♂, same locality and collectors as holotype. Deposited in the Department of Zoology, Banaras Hindu University, Varanasi, India.

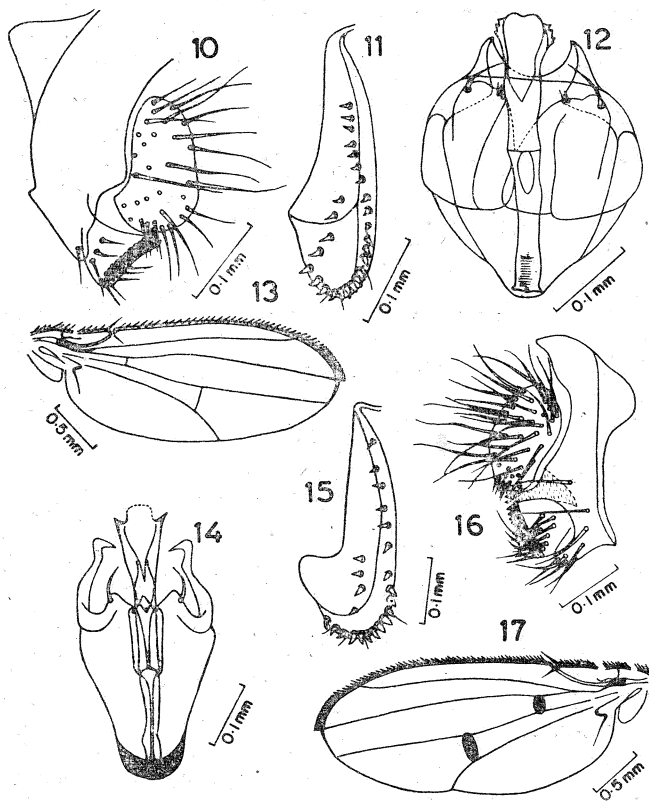
Distribution: India.

Remarks: A row of short spinnules on the inner surface of forefemur suggests its inclusion in the *immigrans* group. It closely

resembles *D. annulipes* Duda in having striped mesonotum, but distinctly differs from it in having legs without darker bands, cerci narrowly projected ventrally, and aedeagus with 10-12 serrations mediolaterally.

2. ***Drosophila (Drosophila) setitarsa* sp. nov.**

Male and female: Arista with 4-5 branches above and 2 below in addition to terminal fork. Antennae with second segment brown; third segment slightly darker. Frons including ocellar triangle yellowish brown. Orbitals in ratio 9:4:12. Second oral seta thin, about 2/3 length of vibrissa. Palpus pale yellow, with one apical and 1-2 marginal setae. Carina narrow and high. Face yellowish brown. Cheek pale, greatest



Figs. 10-13, *Drosophila novazonata* sp. nov.: 10-periphallallic organs; 11-egg-guide; 12-phallic organs; 13-male wing. Figs. 14-17, *Drosophila parazonata* sp. nov.: 14-phallic organs; 15-egg-guide; 16-periphallallic organs; 17-male wing.

width of cheek $1/6$ greatest diameter of eye. Clypeus brown. Eyes dark red.

Acrostichal hairs regular, in 6 rows. Anterior scutellars parallel; posterior scutellars crossed. Anterior dorsocentral $5/7$ length of posterior dorsocentral; distance from anterior dorsocentral to posterior dorsocentral about $1/3$ distance between first two dorsocentrals. Mesonotum yellowish brown, scutellum slightly darker. Thoracic pleura pale, middle sternopleural bristle as long as anterior sternopleural. Sterno-index 0.56. Legs yellow, inner surface of forefemora with a row of 8-9 short stout spinules; fore metatarsal and second tarsal segments of male with dense cluster of fine setae (Fig. 5). Preapicals on all three tibiae; apicals on first and second tibiae.

Wings (Fig. 9); clear, posterior cross veins clouded. Indices: C-index 3.55; 4V-index 1.27; 4C-index 0.6; 5X-index 1.23. Two equal setae at the apex of first costal section; heavy setae on basal half of third costal section. Halteres yellow.

Abdominal tergites shining yellow, with medially interrupted narrow dark bands.

Length of male body (2 males): 3.27 mm.

Length of female body (2 females): 3.9 mm.

Periphallic organs (Fig. 6): Epandrium pale yellow, broad, pubescent, narrowing ventrally like a tubular process at toe and with 2 fine setae, upper portion with 5 small setae; lower portion with 5 long black setae. Surstylus large, distally broadened, with 7 stout black and 2 yellowish teeth arranged in a concave row, and with 6-7 fine setae along outer margin. Cerci oval, pubescent, with 33 long setae and a few short setae ventrally.

Phallic organs (Fig. 7): Aedeagus yellowish brown, robust, apically broadened, sub-

apically with paired flap like structures bearing several small conical projections, and a pair of large, stout spines, basal apodeme of aedeagus somewhat compressed laterally, with small vertical rod. Anterior gonopophyses large, with 4 apical sensilla. Caudal margin of novasternum with a pair of long submedian spines. Ventral fragma broad.

Egg-guide (Fig. 8): Lobe pale yellow, narrowing at tip, with 18 marginal and 5 yellowish brown discal teeth. Basal isthmus narrow and short.

Holotype ♂, INDIA : WEST BENGAL; St. Mary's Hill, Kurseong, Dargeeling district, June-July 1976 (GUPTA & DWIVEDI). **Paratypes**: 2♂♂, 3♀♀, same locality and collectors as holotype. Deposited in the Department of Zoology, Banaras Hindu University, Varanasi, India.

Distribution: India.

Remarks: This species also possesses a row of spinules on the inner surface of forefemur, characteristic of the *immigrans* group. It is closely allied to *D. obscuricornis* (de Meijere) in having foremetatarsal segment with dense cluster of fine hairs, but differs from it in having unstriped mesonotum, posterior crossvein largely fuscous and surstylus with 9 stout teeth instead of 4-5 long bristles as in *D. obscuricornis*.

3. *Drosophila (Drosophila) novazonata* sp. nov.

Male and female: Arista with 4 branches above and 2 below in addition to terminal fork. Antennae with second segment brown; third segment large, reddish brown. Frons including ocellar triangle dark brown. Orbitals in ratio 6:4:9. Second oral seta subequal to vibrissa. Palpus yellowish

brown, with one apical and 2 subapical bristles. Carina dark brown, narrow and high. Face and cheek dark brown, greatest width of cheek 1/5 greatest diameter of eye. Clypeus brown. Eyes bright red.

Acrostichal hairs regular, in 6 rows. Anterior scutellars parallel; posterior scutellars crossed. Anterior dorsocentral 2/3 length of posterior dorsocentral; distance from anterior dorso-central to posterior dorsocentral about half distance between first two dorsocentrals. Mesonotum and scutellum unicolorous, yellowish brown. Thoracic pleura brown. Sterno-index 0.57. Legs yellowish brown, preapicals on all three tibiae; apicals on first and second tibiae.

Wings (Fig. 13): clear. Indices: C-index 3.16; 4V-index 1.49; 4C-index 0.71; 5X-index 1.43. Two unequal setae at the apex of first costal section; heavy setae on about basal 2/5 of third costal section. Haltere whitish yellow.

Abdominal tergites yellowish brown; 1-4T with medially interrupted bands, the remainder tergites completely brown.

Length of male body (1 male): 3.2 mm.

Length of female body (3 females): 3.36 mm.

Periphalllic organs (Fig. 10): Epandrium brown, somewhat tapering ventrally, upper portion bare; lower portion with one seta. Cerci large, brown, with 30-33 long setae. Surstylus triangular, with 10 stout black teeth arranged in a straight row on outer margin, dorsomedially with three black setae and 5 setae ventrally.

Phallic organs (Fig. 12): Aedeagus yellowish brown, straight, apically swollen, with a few marginal serrations laterally, basal apodeme of aedeagus as long as aedeagus. Anterior gonopophyses large, each with 2

sensilla. Posterior gonopophyses forming a deeply concaved flap resembling bow. Caudal margin of novasternum with a pair of long submedian spines. Ventral fragma broad.

Egg-guide (Fig. 11): Lobe pale yellow, broadly rounded at tip, with 22 marginal and 4 discal teeth. Basal isthmus short.

Holotype ♂, INDIA: WEST BENGAL; Ramam, Darjeeling district, May 1977, Dwivedi & Gupta). **Paratypes**: 1 ♂, 6 ♀, same locality and collectors as holotype. Deposited in the Department of Zoology, Banaras Hindu University, Varanasi, India.

Distribution: India.

Ramarks: The presence of small anterior reclinate orbital, long second oral bristle and posterior gonopophyses fused to form a broad distal bow suggest its affinity to the *bizonata* group. It resembles *D. trizonata* Okada, but distinctly differs from it in having larger and darker body, surstylus with 10 stout teeth arranged in a straight row, and aedeagus apically swollen, with a few marginal serrations laterally.

4. *Drosophila (Drosophila) parazonata* sp. nov.

Male and female: Arista with 4 branches above and 2 below in addition to terminal fork. Antennae with second segment brown; third segment yellowish brown. Frons including ocellar triangle yellowish orange. Orbitals in ratio 6:2:9. Second oral seta thin, about half as long as vibrissa. Palpus yellow, with one prominent apical and 3 marginal setae. Carina yellowish brown, high and broadened below. Face and cheek orange brown, greatest width of cheek 1/5 greatest diameter of eye. Eyes dark red.

Acrostichal hairs regular, in 6 rows. Anterior scutellars divergent; posterior

scutellars crossed. Anterior dorsocentral half length of posterior dorsocentral; distance from anterior dorsocentral to posterior dorsocentral $2/3$ distance between first two dorsocentrals. Mesonotum yellowish brown, scutellum slightly darker. Thoracic pleura yellowish orange. Sterno-index 0.54. Legs pale, preapicals on all three tibiae; apicals on first and second tibiae.

Wings (Fig. 17): clear, cross veins deeply fuscous. Indices: C-index 3.21; 4V-index 1.55; 4C-index 0.74; 5X-index 1.16. Two equal setae at the apex of first costal section; heavy setae on about basal $2/5$ of third costal section. Haltere yellow.

Abdominal tergites brown to black in male, but yellowish brown in female.

Length of male body (2 males): 2.96 mm.

Length of female body (4 females): 3.58 mm.

Periphallalic organs (Fig. 16): Epandrium light brown, narrow, upper portion bare; lower portion with 8 setae. Surstylus quadrate, with 13-14 black stout teeth arranged in a slightly convex row, with 8-9 setae dorsomedially and a few setae ventrally. Cerci oval, with 32 long setae and 6-7 short setae ventrally.

Phallic organs (Fig. 14): Aedeagus yellowish brown, straight, broadened apically, with lateral sharp projections. Anterior gonopophyses small, each with an apical sensillum. Posterior gonopophyses obscure. Caudal margin of novasternum with a pair of submedian spines. Ventral fragma triangular.

Egg-guide (Fig. 15): Lobe yellow, broadly rounded at tip, upper margin prominently swollen upward, with 19 marginal

and 4 discal teeth. Basal isthmus narrow and long.

Holotype ♂, INDIA: WEST BENGAL: Ramam, Darjeeling district, May 1977 (Dwivedi & Gupta). **Paratypes**: 3♂♂, 6♀♀, same locality and collectors as holotype. Deposited in the Department of Zoology, Banaras Hindu University, Varanasi, India.

Distribution: India

Remarks: This species also possesses the characteristics of the *bizonata* group, showing great similarity to the preceding species, *D. novazonata* Gupta and Dwivedi, but differs from it in having both cross-veins largely fuscous triangular ventral fragma, aedeagus with sharp projections laterally and surstylus with 13-14 stout teeth arranged in a convex row.

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