



Taxonomic accounts of new species of Drosophilidae (Insecta: Diptera) of Kumaon region, India

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ABSTRACT: Taxonomic account of one new species, *Hirtodrosophila hexaspina* and new distribution records of three other species, *Amiota biprotrusa*, *Drosophila bizonata* and *Hirtodrosophila quadrivittata* are given. Taxonomic relationship of the new species within the group is also discussed.
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KEYWORDS: new species, Drosophilidae, Diptera, Kumaon, India

The Indian Drosophilid fauna has been studied extensively in recent years and most areas have been collected fairly extensively (Gupta, 1969, 1970, 1971, 1972; Gupta and Ray-Chaudhuri, 1970a,c; Gupta and Singh, 1977, 1979; Singh and Gupta, 1977a,b; Sing and Gupta, 1981; De and Gupta, 1996a,b; Reddy and Krishnamurthy, 1968, 1970).

The Kumaon region, a hilly area is located at an elevation of about 1938 metres (6000 feet) from the sea level on the northeast periphery of the state of Uttaranchal. It includes six border districts of the state viz. Nainital, Almora, Pithoragarh, Bageshwar, Champawat and Udham Singh Nagar. The area is characterized by having dense evergreen coniferous forest with medium to very steep slopes and extremely moist condition due to heavy rainfall. Despite its remarkable physiography, the state remained unexplored for its Drosophilid fauna until now. It is only recently some collection have been undertaken in this region which have yielded interesting results on Drosophilid fauna of this region (Singh and Bhatt, 1988; Singh and Negi, 1989, 1992, 1995; Singh and Dash, 1993, 1998; Singh and Fartyal, 2002; Singh *et al.*, 2000). This paper deals with the description of one new species and three new records of Drosophilidae from this region.

The flies were collected at several collection stations. Several different methods were employed to collect Drosophilidae, like (i) Sweeping through undergrowth or above debris on the forest floor; (ii) sweeping above rotting native fruits and artificially

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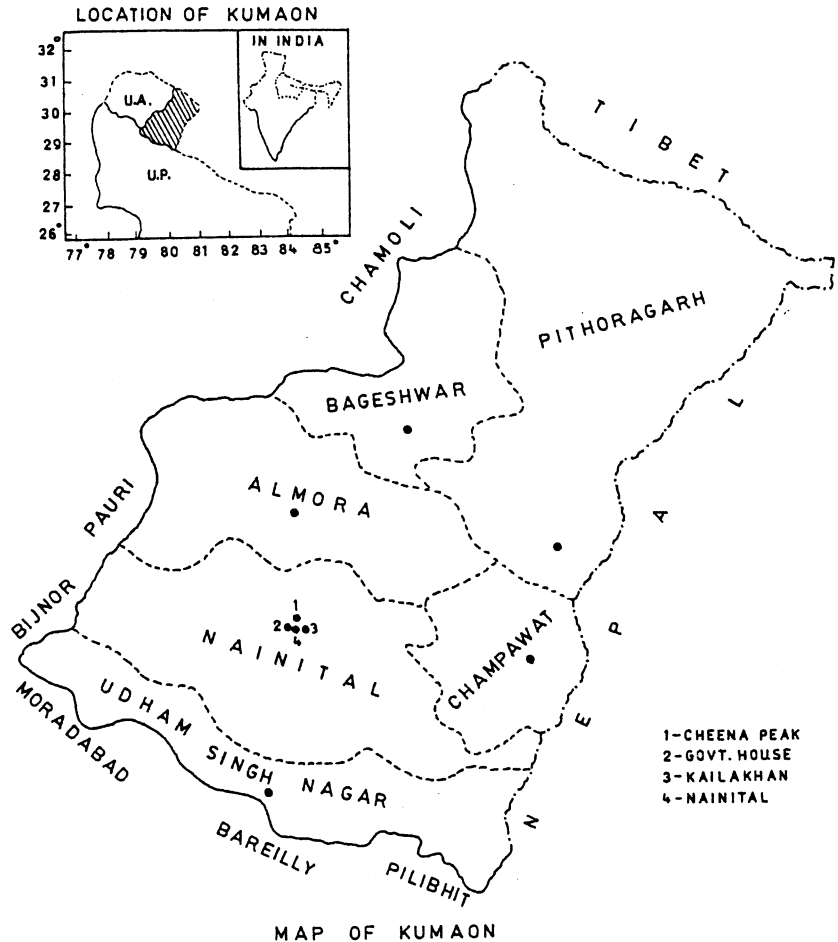


FIGURE 1. Map of Kumaon region showing collection localities.

yeasted fruit baits; and (iii) from fungi growing on decaying logs. Fig. 1 shows collection localities.

Genus *Hirtodrosophila* Duda

Hirtodrosophila Duda 1923, *Mus. Nat. Hungarici Ann.* 22:41. Type species: *Drosophila latifrontata* Fronta-Pessoa, Taiwan.

The subgenus *Hirtodrosophila* Duda have recently been elevated to generic rank by A. D. Grimaldi, 1990, *Bull. Ann. Mus. Nat. Hist.* 197: 1-139 (Bächli, 1998).

First flagellomere relatively large, with prolonged marginal hairs; subvibrissal setae small; Carina, if present, not broadened below; prescutellars absent; propleural setae absent; anterior and middle katepisternals usually very fine and small, anterior

reclinate orbital setae usually very fine. Over 100 species have been described in this genus and several species sub groups and species groups have been established.

Hirtodrosophila hexaspina sp. nov.

Average length of the body: 3.80 mm (♂).

Head, ♂

Arista with about three upper and one lower branches in addition to terminal bifurcation. Antenna with pedicel and flagellomere grayish brown. Frons including the ocellar triangle dark brownish black. Orbitals in the ratio of 5 : 4 : 6. Facial carina light brown and flat, with one prominent apical and one small ventral setae. Vibrissa very long and prominent; subvibrissal setae minute. Gena yellowish brown and greatest width of gena 0.16 greatest diameter of eye. Eyes bright red.

Thorax, ♂

Acrostichal setulae in about 8 regular rows. scutellum brown and scutellum uniformly brownish black. Basal scutellars slightly parallel and apical convergent; prescutellars absent. Mid katepisternals very fine and small; fore katepisternals moderate and hind very long and prominent. Sterno-index 0.67 legs pale yellow. Preapicals on hind tibia; apicals on mid tibia.

Wings, ♂ (Fig. 2D)

Veins brown. R-m and dm-cu crossveins clear. R_{2+3} slightly curved at costal margin. C_1 setulae two, unequal; C_3 fringe 0.33. Average wing vein indices: C-index 2.00; 4V-index 1.67; 4C-index 1.00; 5X-index 0.07. Halter stem and knob light brown.

Abdomen, ♂ (Fig. 2C)

Abdoiminal tergites brownish black. 2nd tergite medially interrupted with two lateral black spots; 3rd and 4th tergite with two lateral yellow spots 5th and 6th tergite black with two lateral yellow patches.

Periphallic organs (Fig. 2B)

Epandrium bow shaped with about four large setae in the upper part. Surstylus small, fused to epandrium with about 10–11 large setae. Cercus large, pubescent, oval and separated from epandrium with about 19–20 large setae.

Phallic organs (Fig. 2A)

Aedeagus large and pointed at the tip. Apodeme shorter than aedeagus: Parameters large, apically fused to hypandrium and serrated. Gonopod absent. Hypandrium somewhat quadrate, distally tapering with one pair of long paramedian margin and six dark brown teeth on the distal margin.

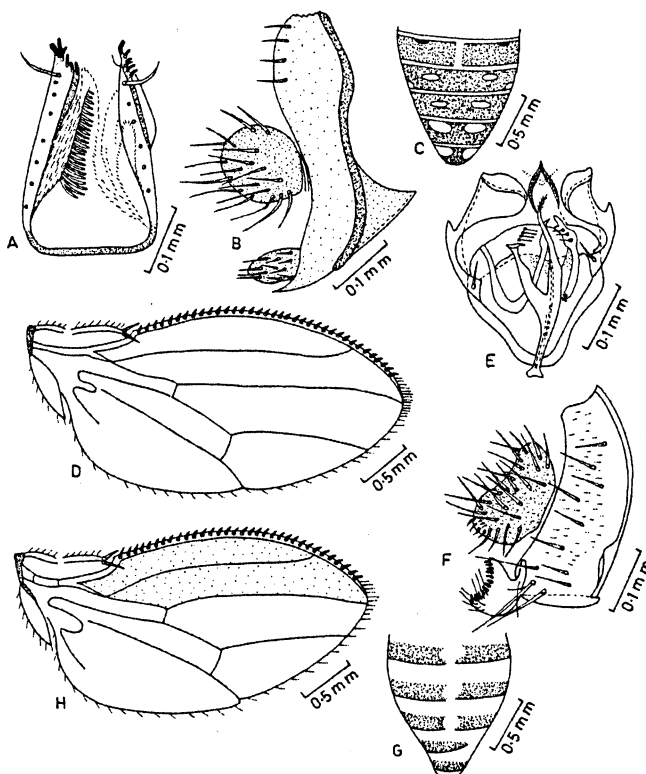


FIGURE 2. A–D: *Hirtodrosophila hexaspina* sp. No., A-phallic organs; B-periphallallic organs; C-abdomen (σ); D-wing. E–H: *Hirtodrosophila quadrivittata*, E-phallic organs; F-periphallallic organs; G-abdomen (σ); H-wing.

Holotype, σ

India: Uttaranchal, Kumaon, Nainital district, Cheena peak, 10. IX. 1997. Cool. Fartyal and Singh by net sweeping on wild flowers. Deposited in the Department of Zoology, Kumaon University, Nainital.

Paratypes 2 σ

Same data as holotype. Deposited in the Department of Zoology, Kumaon University, Nainital and the Institute of Low Temperature Science, Hokkaido University, Sapporo, Japan.

Distribution

Nainital, India.

Relationship

This species belongs to *hirticornis* species group where it resembles *Drosophila hirticornis* in the structure of periphallallic organs but clearly differs from it in other structural details.

Key characters

Hirtodrosophila hexaspina sp. nov. can be differentiated from other species of the genus *Hirtodrosophila* by having R_{2+3} slightly curved at costal margin; 3rd, 4th, 5th and 6th abdominal tergites in male with two lateral yellow patches; surstylus small, fused to epandrium with about 10–11 large setae and hypandrium somewhat quadrate with 6 dark brown teeth on distal margin.

Hirtodrosophila quadrivittata Okada

Hirtodrosophila quadrivittata Okada, 1956. 'Systematic study of Drosophilidae and Allied families of Japan'. Gihodo Co., Tokyo, Japan. pp 183.

Body length, ♂

Male 2.20 mm ($n = 1$).

Head, ♂

Arista with about 3 upper and 1 lower branches in addition to terminal bifurcation. Antenna with pedicel and flagellomere dark grayish brown. Frons including ocellar triangle dark brown. Orbital in the ratio of 5 : 4 : 5. Facial carina light brown. Palpus light grayish yellow, flattened, usually with 1 short and one prominent seta at the apex. Clypeus brownish yellow. Vibrissa prominent and subvibrissal setae minute. Gena yellow brown, greatest width of gena 0.15 the greatest diameter of eye. Eye dark red.

Thorax, ♂

Acrostichal setulae in about 8 regular rows. Scutum and scutellum dark brownish black. Basal scutellar setae slightly divergent and apical crossing each other. Sterno-index 0.60. Hind katepisternals very long. Legs brown, preapicals present only on mid tibia; apicals on mid tibia. For 1st tarsomere as long as 2 succeeding tarsomeres together; mid and hind 1st tarsomere as long as 3 succeeding together.

Wing, ♂ (Fig. 2H)

Wing slightly fuscous. Veins grayish yellow; r-m and dm-cu crossveins clear. R_{2+3} slightly curved at the tip; R_{4+5} and M distally slightly convergent. C_1 setulae two equal; C_3 fringe 0.43. Average wing vein indices: C-index 2.00, 4V-index .89, 4C-index 1.11, 5X-index 1.78. Halter stem and knob light yellow.

Abdomen, ♂ (Fig. 2G)

Abdominal tergites pale yellow with dark brownish black bands. 2nd, 3rd and 4th tergites medially widely interrupted; 5th tergite slightly incomplete on the side and 6th tergite completely black.

Periphallic organ (Fig. 2F)

Epandrium brown, pubescent, narrow above and broad below with about 8–9 short and 2 long setae on the lateral margin. Surstylus fused with the epandrium with about 11–12 prenisetae arranged on outer concave row and about 7–8 short setae. Cercus triangular, separated from epandrium, pubescent with about 21–23 long setae and 6–7 short black prenisetae.

Phallic organs (Fig. 2E)

Aedeagus pointed at the tip and swollen of the base. Parameters large, curved and more or less triangular with about 3–4 sensilla. Gonopod long slender, gently curved outward and posteriorly fused to each other. Aedeagal apodeme shorter than aedeagus. Hypandrium triangular with 1 short paramedian spine.

Specimens examined

India: Uttaranchal, Nainital district, Govt. House, 2, ♂, 18. VII, 1999. Coll. Fartyal and Singh.

Distribution

Japan, Korea, China, Russia (Far east), India (new record).

Amiota biprotrusa Chen and Toda

Amiota biprotrusa Chen and Toda, 1998, *Entomological Science*, **1(3)**: 403–407.

Body length, ♂ Male 5.00 mm. ($n = 2$).

Head, ♂

Arista with 6 upper and 3 lower branches in addition to terminal bifurcation. Antenna with pedicel dark brown and flagellomere brown. Frons including the ocellar triangle yellow brown. Orbitals in the ratio of 11 : 10 : 11. Palps somewhat triangular, yellowish brown with one prominent subapical and 2–3 lateral setae. Clypeus orange yellow. Facial carina light brown. Gena light brown and greatest width of gena 0.2 greatest diameter of eye. Eye red.

Thorax ♂

Acrostichal setulae in about 8 regular rows. Scutum brownish black and scutellum brown, Basal scutellar setae divergent and apicals convergent and crossing each other. Sterno-index 0.87. Legs yellow, tibiae with 3 dark brown rings Preapicals on all three tibiae and apical on 1st and 2nd tibiae only.

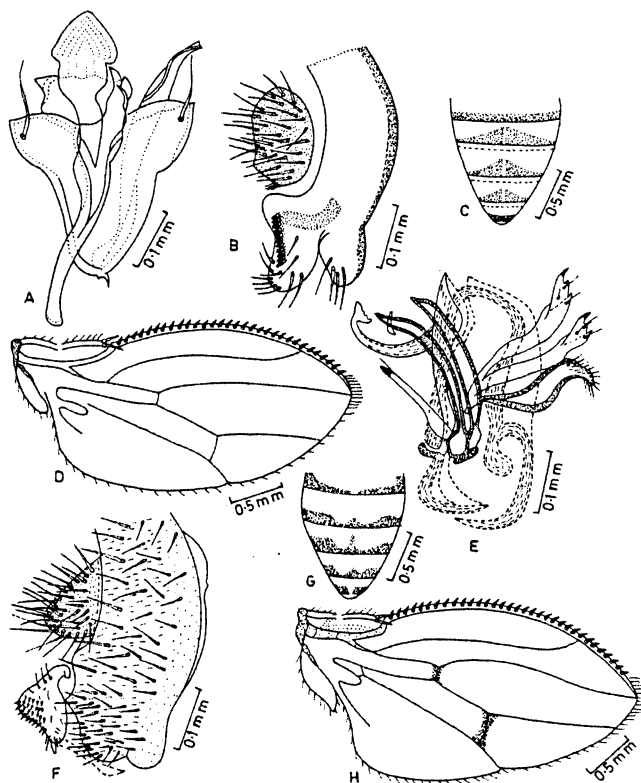


FIGURE 3. A–D: *Drosophila bizonata* A-phallic organs; B-peripheral organs; C-abdomen (σ^7); D-wing. E–H: *Amiota biprotrusa*, E-phallic organs; F-peripheral organs; G-abdomen (σ^7); H-wing.

Wing, σ^7 (Fig. 3H)

Hyaline. Veins dark grayish brown, r-m and dm-cu crossveins clouded. C_1 setulae two, equal; C_3 fringe 0.69. Average wing vein indices; C-index 2.40; 4V-index 2.85; 4C-index 1.54; 5X-index 0.70. Halter stem and knob light brown.

Abdomen, σ^7 (Fig. 3G)

Abdominal tergites yellow with black abdominal bands. 2nd abdominal tergite with black abdominal band interrupted in the middle, 3rd, 4th and 5th abdominal bands projected in the middle and 6th abdominal band interrupted in the middle.

Peripheral organs (Fig. 3F)

Epandrium broad above and below, highly pubescent with numerous setae. Surstylus triangular, separated from epandrium with about 25–26 prenisetae. Cercus triangular, pubescent and separated from the epandrium with about 35–40 long setae.

Phallic organs (Fig. 3E)

Aedeagus long and pointed at the tip with numerous sensilla. Parameters large and leaf like, serrated at the tip with 3 sensilla. Gonopods fused forming large median lobe. Aedeagal apodeme very short. Hypandrium narrow, curved and pubescent.

Specimens examined

India: Uttaranchal, Kumaon, Nainital district, Government House, Nainital, 2 ♂, 18. VII. 1999, Coll. Fartyal and Singh.

Distribution

China, Myanmar, India (new record).

Drosophila bizonata Kikkawa and Peng

Drosophila bizonata Kikkawa and Peng, 1938, *Jap. J. Zool.*, 7: 532; *Drosophila (Drosophila) bizonata* Wheeler, 1949, *Univ. Texas Publ.*, (4920): 190; Okada, 1955, *Kontyu, Tokyo*, 23: 98; 1956; *Syst. Study Droso.*, 135.

Body length, ♂

Male 2.40 mm ($n = 2$).

Head, ♂

Arista with about 6 upper and 2 lower branches in addition to terminal bifurcation. Antenna with pedicel and flagellomere light brown. Frons including the ocellar triangle brown. Orbitals in the ratio of 4 : 6 : 5. Facial carina dark brown. Palpus yellow, with one apical and three ventral setae. Vibrissa prominent and subvibrissal setae half the length of vibrissa. Gena dark brown, greatest width of gena 0.16 the greatest diameter of eye. Eye dark red.

Thorax, ♂

Acrostichal setulae in about 6 regular rows. Scutum and scutellum dark brown. Apical scutellar setae upright and basal parallel; apical scutellars as long as basal, Sterno-index 0.6. Legs yellow; preapicals on all tibiae; apicals on mid tibiae.

Wings, ♂ (Fig. 3D)

Clear. Crossveins r-m and dm-cu clear. C_1 setulae two, equal; C_3 fringe 0.29. Average wing vein indices: C-index 3.00; 4V-index 1.83; 4C-index 0.83; 5X-index 1.78. Halter stem and knob light brown.

Abdomen, ♂ (Fig. 3C)

Abdominal tergites yellow with dark apical bands. 1st and 2nd abdominal bands complete; 3rd, 4th and 5th abdominal bands interrupted in the middle; 6th abdominal tergite completely black.

Periphallic organs (Fig. 3B)

Epandrium broad above and below; upper portion bare and lower portion with about four setae. Surstylus large and fused with epandrium with about 11–12 prenisetae arranged in a straight row and 10–11 long setae on caudo ventral margin. Cercus large, pubescent, separated from epandrium with about 27–28 long setae.

Phallic organs (Fig. 3A)

Aedeagus long and arrow shaped. Parameres large and leaf like, ventrally fused with hypandrium. Gonopod fused, horizontally flattened forming broad distal bow. Hypandrial apodeme triangular and notched. Apodeme longer than aedeagus. Hypandrium oval, Caudal margin with a pair of long paramedian spines.

Specimens examined

India: Uttaranchal, Kumaon, Nainital district, Kailakhan, 2♂, 27. VII. 1998. Coll. Fartyal and Singh by sweeping.

Distribution

Japan, Korea, Ryukyu's Nepal, Myanmar, Pyin Oo Lwin, Mandalay, Rangoon, India (new record).

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