Few rare black fly species (Diptera: Simuliidae) of the subgenus *Simulium* Latreille (*s. str.*) from the Darjeeling Area, India

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ABSTRACT

One new species, *viz.*, *Simulium* (*Simulium*) *singtamense* and two apparently new but unnamed species of the nominate subgenus are described and illustrated, thus bringing the number of species from seven to ten in the Darjeeling area of India. A key to the species is appended herewith.

INTRODUCTION

While surveying the simuliid fauna in the Darjeeling area of India, the material relevant for this paper was obtained only from Singtam (altitude ca 750 m) in a small stream on 23 May 1971. Previous to this presentation seven species of the subgenus *Simulium* *s. str.* (Subfamily Simuliinae, tribe Simuliini and genus *Simulium* Latreille *s.l.*) have been described and recorded from this area by Brunetti (1911), Puri (1932 a, b, c, d and 1933) and Datta (1974 a and b). We report here three species of the subgenus, of which one is new and the other two apparently previously unknown and are left unnamed because of lack of sufficient material. The subgeneric definition of these species is after Crosskey (1969).

The type-specimens will in due course be deposited in the National Zoological Collection of the Zoological Survey of India, Calcutta.

SYSTEMATIC ACCOUNT

*Simulium* (*Simulium*) *singtamense*, sp. nov.

*Pupa*—Body-length about 5.0 mm. Dorsum of head and thorax with moderately distributed tubercles. Head trichomes 3 pairs; 1 pair ventro-laterally and 2 pairs antero-laterally, simple, long and thin. Thoracic trichomes 7 pairs; 2 pairs on either side of mid-dorsal line, 3 pairs antero-

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laterally, 1 pair postero-laterally and 1 pair ventro-laterally; all simple, long and thin. Gill (figure 1) about 2.20 mm long, 6-filamented, arranged in following manner: upper and lower pairs of filaments with petioles, one at obtuse angle to other; outer filament of upper pair thicker; upper filaments directed upwards and forwards, and then bending downwards; inner filament of lower pair directed downwards and forwards, while outer filament directed sharply downwards and ultimately forwards; middle pair directly arising from main stem extended in between upper and lower pairs; thickness of filaments gradually decreasing; texture of filaments reticular (figure 2).

**Abdomen:** Tergum 1 (figure 3) with 2 setae on each side; tergum 2 with a row of 4 setae and 2 accessory setae on each side; terga 3 and 4 each with 4 branched hooks and 2 setae on each side; terga 5 and 6 bare; terga 7 and 8 each with about 14 and 16 spines respectively. Sternum 3 with a few setae on each side; sternum 4 with a simple seta externally and a branched filamentous hook internally near posterior margin and a few setae laterally on each side; sternum 5 with a pair of branched hooks, close together, on each side near posterior margin; sterna 6 and 7 each with same number of hooks on each side but widely spaced. A pair of small tail-hooks present. Cocoon (figure 4) with a very short neck, fairly strongly woven, with a strong anterior margin.

**Larva**—Length about 6.0–6.5 mm. Head with brownish cephalic apotome (figure 7), having positive head-spots. Antenna (figure 8) apparently 5-segmented because of a secondary annulation; apex at same level of cephalic fan stem; penultimate segment brownish, while other segments yellowish. Cephalic fan with about 35 filaments. Postgenal cleft (figure 9) elongate-subcordate, narrow postgenal bridge. Hypostomium (figure 9) with 9 rather blunt apical teeth; corner and median teeth moderately prominent; approximately 5 hypostomial setae on each side, lying subparallel to lateral margins. Tip of mandible (figure 10) with two mandibular serrations; first three comb-teeth evenly decreasing in size. Thoracic cuticle bare and abdominal cuticle with broom-shaped setae above rectal opening. Respiratory histoblast (figure 11) with six filaments as in pupa. Rectal “gills” compound. Anal sclerite (figure 12) having incomplete anterior arms united with incomplete posterior arms individually. Ventral papillae absent.

**Male and Female**—Unknown.

**Material examined**—Holotype pupa (on slide), INDIA: Singtam, Darjeeling, Coll. R. K. Dey, A. K. Paul and T. K. Pal. Paratypes: 5 pupae and 4 larvae (on slides and in alcohol), same data as above.

**Occurrence**—Larvae and pupae taken from undersurfaces of leaves exposed to sun.
Figures 1–6. *Simulium* (*Simulium*) *singtamense*, sp. nov. Pupa: Fig. 1. Gill (right side); Fig. 2. Texture of Gill filaments; Fig. 3. Abdomen showing terga (left half) and sterna (right half) with setae, hooks and spines; Fig. 4. Cocoon (lateral view). *Simulium* sp. nr *novolineatum* Puri. Pupa: Fig. 5, Gill (right side); Fig. 6. Abdomen showing terga (left half) and sterna (right half) with setae, hooks and spines.

Discussion—*Simulium* (*Simulium*) *singtamense*, sp. nov. resembles *Simulium* (*Simulium*) *griseifrons* Brunetti, described from the western Himalaya, especially in the arrangement of the pupal gill filaments, but *griseifrons* differs in having branched trichomes and peculiar upwardly directed opening of the cocoon due to a ventral lip, including certain other characters (Puri 1932 c). Moreover, the broom-shaped setae on the larval abdomen are a distinctive character of this new species. It appears that this species runs...
also to *Simulium* (*Himalayum*) *indicum* Becher (Lewis 1973) in some respects including the form of the cocoon and the setose abdominal cuticle of the larva, but *indicum* has many specialized characters for which Lewis (1973) has placed it in the subgenus *Himalayum* Lewis. However, the new species is provisionally accommodated in the subgenus *Simulium* Latreille on the basis of the pupal abdominal onchotaxy.

*Simulium* sp. nr *novolineatum* Puri

*Pupa*—Body-length about 4.0 mm. Dorsum of head and thorax with profuse oblong tubercles. Head trichomes 3 pairs; 1 pair ventro-laterally

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Figures 7–12. *Simulium* (*Simulium*) *singtamense* sp. nov. Larva. Fig. 7. Cephalic apotome with a portion of gena; Fig. 8. Antenna (right side); Fig. 9. Portion of head (ventral view) showing hypostomium and postgenal cleft; Fig. 10. Tip of mandible; Fig. 11. Respiratory histoblast; Fig. 12. Anal sclerite.
and 2 pairs antero-laterally, simple, short and thin. Thoracic trichomes 5 pairs; 2 pairs on either side of median line and 3 pairs on antero-lateral part, branched, large and thick. Gill (figure 5) about 1.5 mm long, 8-filamented, arranged in pairs. Abdomen: Tergum 1 (figure 6) bare; tergum 2 with a row of 4 setae and 2 small accessory setae on each side; terga 3 and 4 each with 4 branched hooks and a few setae on each side; terga 5, 6 and 7 bare; tergum 8 with about 10 spines. Sternum 4 with a row of 2 setae, one being thicker and a seta on each side; sternum 5 with a pair of branched hooks, close together, on each side near posterior margin; sterna 6 and 7

Figures 13–18. *Simulium* sp. nr *grisescens* Brunetti. Larva. Fig. 13. Cephalic apotome with a portion of gena; Fig. 14. Antenna (right side); Fig. 15. Portion of head (ventral view) showing hypostomium and postgenal cleft; Fig. 16. Tip of mandible; Fig. 17. Respiratory histoblast; Fig. 18. Anal sclerite.
each with same number of hooks on each side but widely spaced. Tail-hooks absent. Cocoon with a very short neck, fairly strongly woven, with a strong anterior margin; antero-lateral apertures small, due to obliteration by fibres.


Occurrence—Pupa taken on a decaying leaf exposed to sun.

Discussion—This pupal specimen very closely resembles that of *Simulium* (Simulium) novolineatum Puri (Puri 1932c), described from Marianbarie, Bengal Terai, and is now related to the said species for this reason. The pupa of *novolineatum*, having no strongly chitinized seta on the fourth sternum and no trace of neck of the cocoon distinguishes this pupal specimen.

*Simulium* sp. nr grisescens Brunetti

Larva.—Length about 5·0 mm. Head with brownish cephalic apotome (figure 13), having dark infuscation and spots not clearly positive. Antenna (figure 14) apparently 5-segmented because of a secondary annulation; apex slightly extending beyond cephalic fan stem; penultimate segment darker. Cephalic fan with about 45 filaments. Postgenal cleft (figure 15) mitre-shaped, very much longer than postgenal bridge, latter with a pale area medially. Hypostomium (figure 15) with usual 9 apical teeth; corner and median teeth moderately prominent; approximately 5 hypostomial setae on each side, lying subparallel to lateral margins. Tip of mandible (figure 16) with two mandibular serrations; first three comb-teeth evenly decreasing in size. Thoracic and abdominal cuticle bare. Respiratory histoblast (figure 17) with 10 filaments. Rectal “gills” with secondary lobules. Anal sclerite (figure 18) having incomplete anterior arms united with incomplete posterior arms individually. Ventral papillae absent.


Occurrence—Larva taken on a decaying leaf.

Discussion—This larval specimen has ten gill filaments in the respiratory histoblast as in the larva of *Simulium* (Simulium) grisescens Brunetti, described from this area (Datta 1974 a). Since the larval stage of no other species but *grisescens* of “the striatum series” of Puri (1932d) is known, this larval specimen is provisionally related to *grisescens* in the understanding of gill characters despite certain differences including the presence of dark infuscation on the cephalic apotome and a secondary annulation of the antenna.

Key to Species of the Subgenus Simulium from the Darjeeling Area

Since the species are best identified with the help of pupal features, this key is based on this stage only. *Simulium* sp. nr grisescens Brunetti reported
here is known only from the larval stage which can easily be differentiated from that of any known species of the area by means of dark infuscation on the cephalic apotome and a secondary annulation of the antenna. This key is, however, modified after Datta (1974 a) with a view to accommodating all the species of the subgenus so far known from the area.

1. Gill filaments 6
   Gill filaments more than 6

2. Petiole of upper pair of filaments at an obtuse angle to that of lower pair; cocoon with a trace of neck
   singtamense sp. nov.
   Petioles either at a right angle or at an acute angle; cocoon without neck

3. Gill filaments of middle pair arising from petiole of upper pair of filaments
   Gill filaments of middle pair arising beside base of petiole of upper pair of filaments

4. Both cephalic and thoracic trichomes simple
   Both cephalic and thoracic trichomes branched
   rufibasis Brunetti

5. Cocoon with two large antero-lateral apertures
   Cocoon without such apertures
   biforaminiferum Datta
   ramosum Puri

6. Lower pair of filaments without a petiole; outer filament of upper pair stoutest of all
   nigrifacies Datta
   Lower pair of filaments with a short petiole; outer filament of upper pair not as above
   himalayense Puri

7. Gill filaments 8; cocoon with two antero-lateral apertures
   Gill filaments 10; cocoon with irregular inter-spaces anteriorly
   grisescens Brunetti

8. Dorsum of head and thorax with profuse tubercles; cocoon with a trace of neck; presence of strongly chitinized seta on sternum
   nr novolineatum Puri
   Dorsum of head and thorax with widely scattered tubercles; cocoon without neck; absence of strongly chitinized seta on sternum
   dentatum Puri

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