

TORRENTICOLE INSECTS OF THE HIMALAYA*I. TWO NEW SPECIES OF EPHEMERIDA****By B. K. Kaul and O. P. Dubey***CSIR Research Fellows, School of Entomology,**St. John's College, Agra, India*

ABSTRACT. Two new species of Ephemera, viz., *Baetis longistylis* and *B. lahoulensis* are described from torrential streams of N. W. Himalaya. The type specimens are retained in the School of Entomology, Agra.

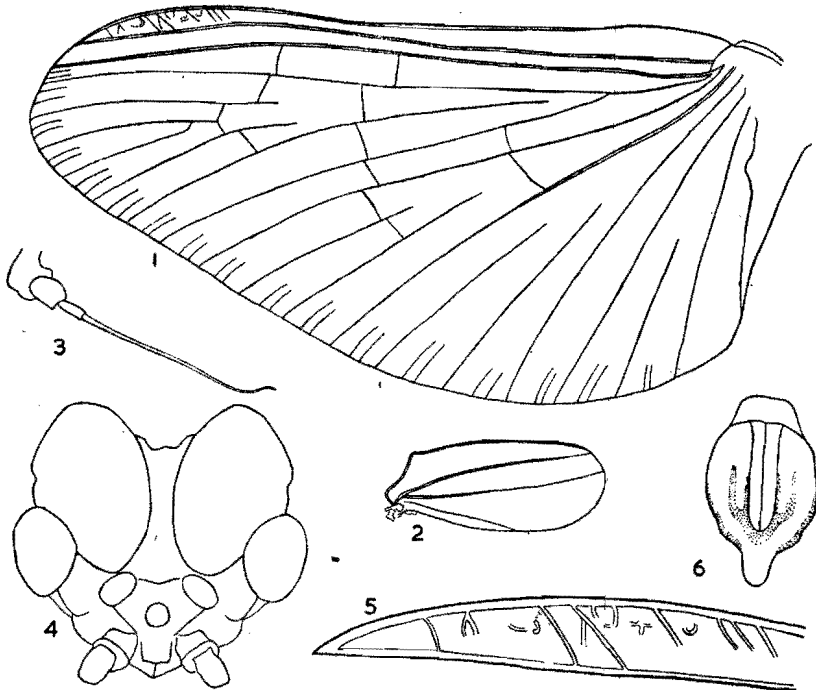
1. *Baetis longistylis*, sp. nov.

Male imago : Length, excluding cerci and terminal filament, 10 mm ; general colour brown ; head and thorax dark brown. Head (Fig. 4) viewed in front subtriangular, height to width in the ratio of 3 : 4 ; turban eyes yellowish, viewed from above peg-shaped or oval, length to height in the ratio of 2 : 1, ventral eyes greyish-black, half the dorsal eye ; ocelli white. Antennae (Fig. 3) basally dark brown, terminal segment yellowish-brown ; length of antenna to head length 7 : 9 ; four segmented ; the first segment stout, about one and a half times as thick as long ; second segment stout, a little longer than thick and more slender than the first and about twice as long as the first ; third segment slender, equal to the second, almost three times its own thickness ; terminal segment nearly nine times as long as the preceding. Thorax (Fig. 6) dark brown, with two irregular white lateral streaks meeting posteriorly the fainter median streaks on either side of the submedian groove ; the anterior one-third of the median groove white ; scutellum almost black. Fore wing (Fig. 1) 10 mm long and 5 mm wide ; hyaline, with venation brown ; stigmatic area (Fig. 5) with 3 complete cross-veins and indications of 9 more or less complete and anastomosing cross-veins ; intercalary veins paired. Hind wing (Fig. 2) 3 mm long and 1 mm wide, hyaline, with costal process subacute, veins brown, three longitudinal veins, the first and second parallel, third vein reaching wing margin in the middle of wing ; cross-veins absent. Fore legs (Fig. 39) brown ; tibia a little less than twice the femur, tarsi about one and one-fifth tibia, first and second tarsal segments subequal, third a little less than half the second, fourth a little less than half the third ; middle and hind legs yellowish-brown ; middle femur (Fig. 32, 37) moderately stout, tibia slender, about one and one-fourth the femur, tarsus half the tibia, first and second tarsal segments

*Contribution No. 173 from the School of Entomology ; CSIR-sponsored scheme of research on Torrential Stream Insects of the Himalaya under Prof. M. S. Mani.

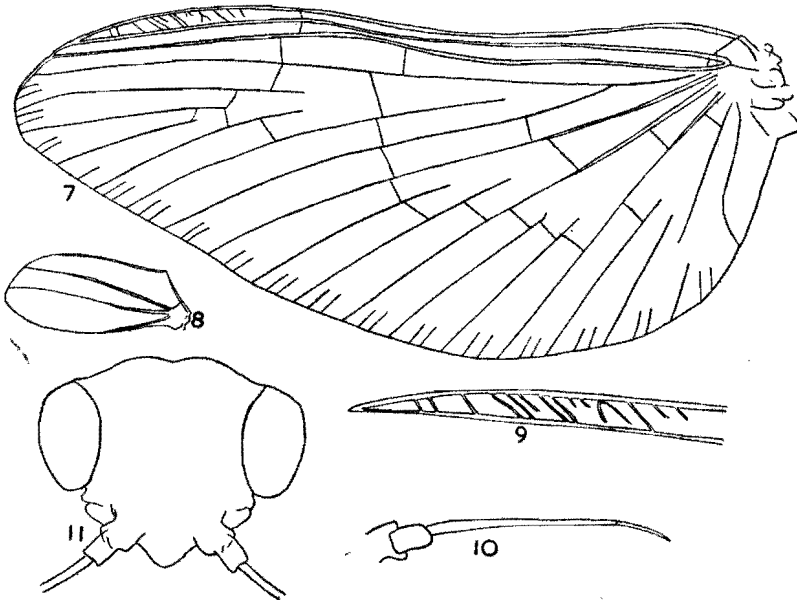
subequal, third about one-third the fourth, the fourth segment slightly longer than first; hind femur (Fig. 33, 38) equal to the middle femur, tibia about one and one-fourth the femur, tarsus about half the tibia, first and fourth tarsal segments sub-equal, segment a little shorter than first, third half the first. Abdomen about three-fourths the body, yellowish-brown, terminal filament yellowish-brown. Gonostyles (Fig. 21) brown; basal segment slightly longer than wide, wider apically than basally; second segment wider than long, about half the first, slender, width a little more than twice the length; the third segment long, two and a half times longer than the first and second combined, stouter basally than apically, with a short obtuse tubercle subbasally; fourth segment oval, twice as long as thick and one-sixth the third segment.

Female imago: Length, excluding cerci and filament, 10.5 mm; general colour of body yellowish-brown. Head (Fig. 11) viewed in front broadly oval, width to height in the ratio of 10 : 7.5; turban eyes absent; ventral eyes black, broadly oval, interocular space five times the ocular diameter; ocelli greyish-white. Antennae (Fig. 10) yellowish-brown; antennal length to head length in the ratio of 11 : 7.5; four segmented; the first segment stout, about twice as long as thick; second segment cylindrical, twice the first and about twice as long as thick; third segment more slender, about four and a



Figs. 1-6. *Baetis longistylis*, sp. nov. ♂ : 1, fore wing; 2, hind wing; 3, antenna; 4, head; 5, stigmatic area; 6, thorax.

half times the second ; terminal segment one-third the preceding. Thorax brown, with two irregular, longitudinal, lateral white and relatively wide streaks meeting posteriorly the fainter submedian streaks on either side of the median grooves ; the anterior one-third of the median grooves white ; scutellum dark brown. Fore wings (Fig. 7) 11 mm long and 5 mm wide, hyaline, venation brown, stigmatic area (Fig. 9) with 8 complete and 6 incomplete cross-veins ; intercalary veins paired. Hind wings (Fig. 8) 2.4 mm long, a little less than two and a half times as long as wide, hyaline, with the costal process subacute ; veins brown, 3 longitudinal veins, the first vein parallel to the second, third vein reaching margin almost in the middle of wing ; cross-veins absent. Legs (Figs. 26-28, 46-48) yellow ; fore femur (Figs. 26, 48) stout ; fore tibia slender, one and one-fourth the femur ; fore tarsus about half the tibia ; the first, second and fourth tarsal segments subequal, tarsal segment about two-thirds the second ; middle femur (Figs. 27, 47) stout ; middle tibia slender and about one and one-fourth the femur ; middle tarsus about half the tibia ; first tarsal segment twice the second, third segment about half the second, fourth segment three times the preceding ; hind tibia one and one-fourth the hind femur (Figs. 28, 46) ; tarsus about half the tibia ; first and second tarsal segments subequal, third about half the second, fourth segment three times the third. Abdomen about two-thirds the body, yellowish-brown, terminal filament one and a half times the body, yellowish-brown ; ovipositor yellowish, two-segmented, the first segment wider than long, wider basally than apically ; the segment oval, nearly one-third the first.

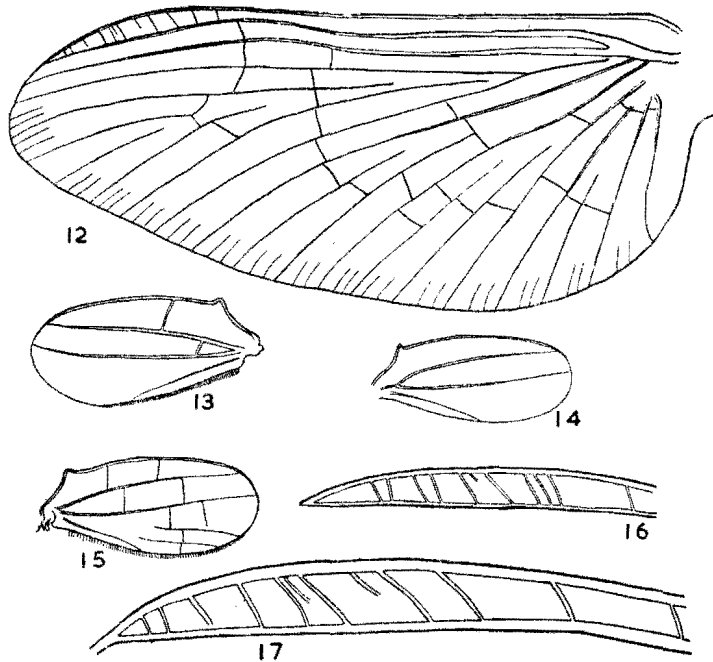


Figs. 7-11. *Baetis longistylis*, sp. nov. ♀ : 7, fore wing ; 8, hind wing ; 9, stigmatic area ; 10, antenna ; 11, head.

Holotype ♂, Coll. No. 801, J.L. Nayyar, 5.vi.1961; *allotype* ♀, Coll. No. 826, Santokh Singh, 10.vi.1961, in spirit; *paratypes* ♂♂, ♀♀, Coll. Nos. 598, 744, 664, 826 and 663, in spirit and mounted on slides, Northwest Himalaya: Gramphu, 3507 m above mean sea-level, northern slope of the Pir Panjal Range, 150 m north of the right bank of the R. Chandra, near turbid glacial torrent, Coll. J. L. Nayyar, Santokh Singh and S. K. Tandon.

Other material examined: Several ♂♂, Chhatru, Coll. No. 694, S. K. Tandon, 13.vi.1961; Khoksar, S. K. Tandon, 1.vi.1961, Coll. Nos. 676; Chhatru, Santokh Singh, 13.vi.1961, Coll. Nos. 853, 849; ♀♀, Sarkund Glacial Lake, Santokh Singh and J. L. Nayyar, 1961, Coll. No. 877; Khoksar, Santokh Singh, 8.vi.1961, Coll. No. 789.

This species has a superficial resemblance to *Baetis chandra* Kapur and Kriplani*, from which it is readily distinguished by the absence of the intercalary veins in the hind wing, different arrangement of the cross-veins in the stigmatic area of the fore wing, in the mesonotal markings uniting behind and the greatly elongated third segment of the gonostyles of the male.

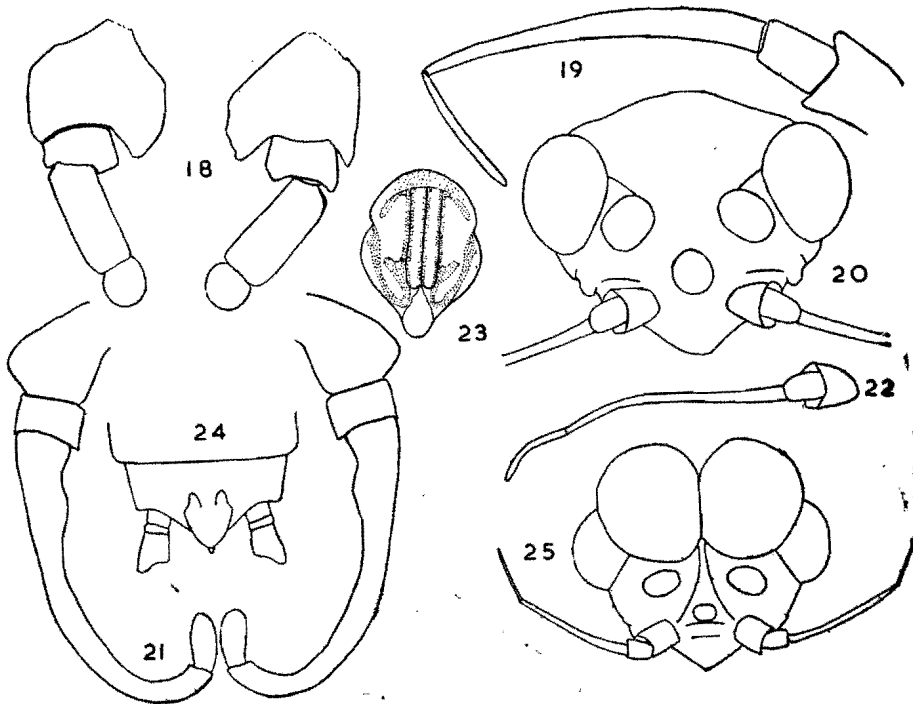


Figs. 12-17. *Baetis lahaulensis*, sp. nov. ♂ ♀: 12, ♂ fore wing; 13, ♂ hind wing; 14, ♂ hind wing; 15, ♀ hind wing; 16, ♀ stigmatic area; 17, ♂ stigmatic area.

*Kapur, A. P. and M. B. Kriplani, 1963, *Rec. Indian Mus.*, 59 : 189.

2. *Baetis lahaulensis*, sp. nov

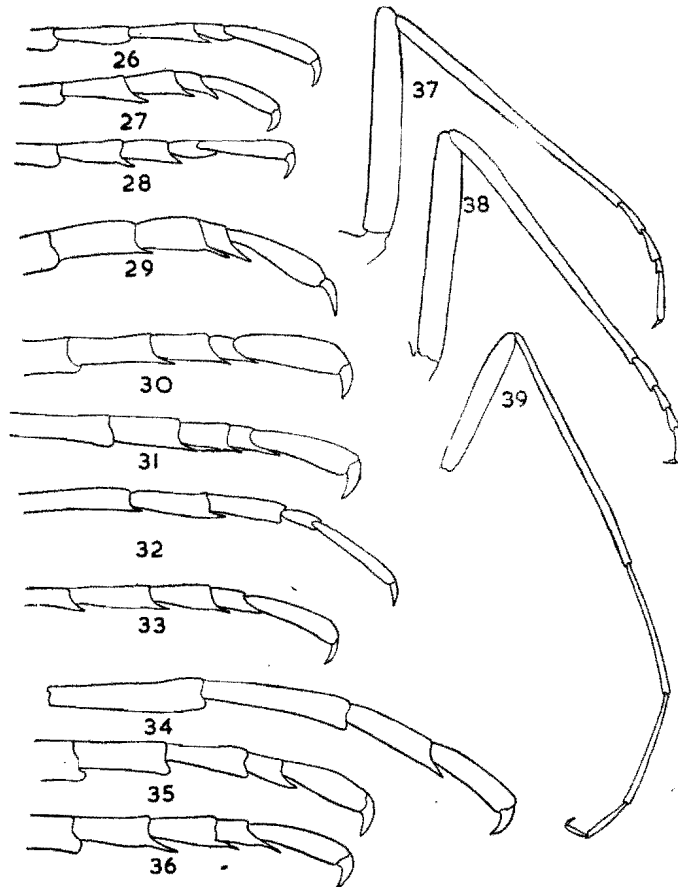
Male imago: Length, excluding cerci and terminal filament, 11 mm; general colour of body brown; head and thorax darker brown. Head (Fig. 25) subtriangular, height to width in the ratio of 9 : 10; turban eyes yellowish, oval; ventral eyes black, nearly half the length of the dorsal eyes; ocelli white. Antennae (Fig. 19) yellow, except for the yellowish-brown base, about one and one-sixth longer than head; first antennal segment slightly longer than thick; second segment cylindrical, slightly longer and somewhat more slender than the first; third segment nearly five times the second; fourth segment about two-fifths



Figs. 18-25. *Baetis lahaulensis*, sp. nov. ♂ ♀ (18-20; 22-25); *Baetis longistylis*, sp. nov. ♂ (21). 18, ♂ gonostyle; 19, ♂ antenna; 20, ♀ head; 21, ♂ gonostyle; 22, ♀ antenna; 23, ♀ thorax; 24 ovipositor; 25, ♂ head.

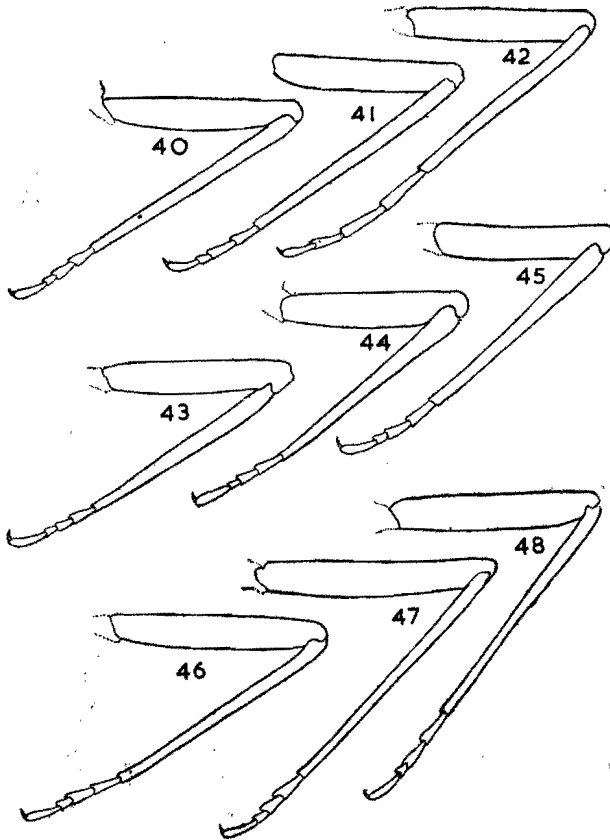
the third and about twice the second. Thorax dark brown, mesonotum with three narrow, longitudinal wide streaks in the middle, connected with an obscure short lateral stripe; scutellum yellowish-brown. Fore wing (Fig. 12) 11 mm long and 5 mm wide, hyaline; venation brown; stigmatic area (Fig. 17) with 10 complete and indications of 2 incomplete cross-veins; intercalary veins paired. Hind wing (Figs. 13, 14) 3 mm long and 1 mm wide, hyaline, with the costal

process acute ; venation brown, longitudinal veins, 3, the first and second longitudinal veins parallel, third vein reaching margin almost in the middle of wing without cross-veins. Legs (Figs. 34-36, 40-42) yellowish-brown ; fore femur (Figs. 34, 42) moderately stout, tibia slender about one and one-fourth the femur, tarsus three-fourths the tibia ; first tarsal segment a little longer than the second, third and fourth segments subequal ; middle femur (Figs. 35, 41) equal to fore femur ; tibia slender, about one and one-fourth the femur ; tarsus two-fifths the tibia ; first tarsal segment almost equal to the second, third nearly half the second and the fourth segment about twice the third ; hind femur (Figs. 36, 40) similar



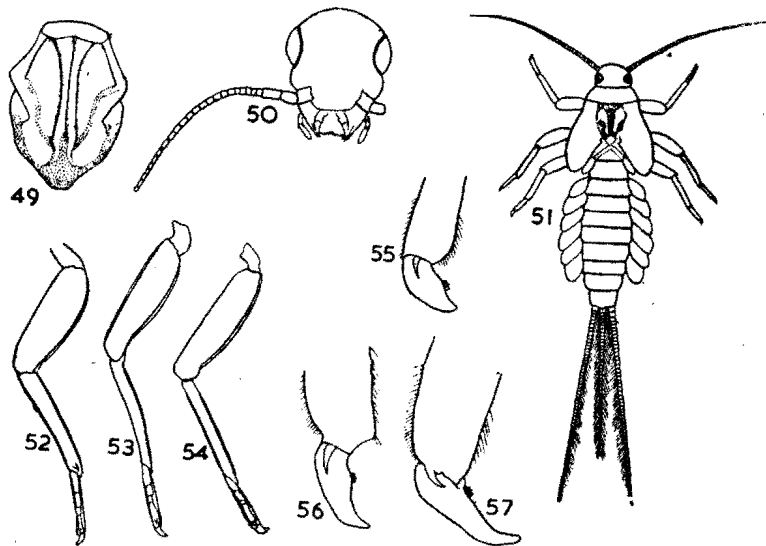
Figs. 26-39. *Baetis longistylis*, sp. nov. ♂ ♀ (26-28 ; 32-33 ; 37-39) ; *Baetis lahaulensis*, sp. nov. ♀ ♂ (29-31 ; 34-36). 26, ♀ fore leg ; 27, ♀ middle leg ; 28, ♀, hind leg ; 29, ♀ fore leg ; 30, ♀ middle leg ; 31, ♀ hind leg ; 32, ♂ middle leg ; 33, ♂ hind leg ; 34, ♂ fore leg ; 35, ♂ middle leg ; 36, ♂ hind leg ; 37, ♂ middle leg ; 38, ♂ hind leg ; 39, ♂ fore leg.

and equal to the fore femur ; tibia slender, nearly one and one-fourth the femur ; tarsus two-fifths the tibia, first tarsal segment almost equal to the second ; third segment shortest, nearly half the second ; fourth segment thrice the third. Abdomen a little more than half the body, yellowish-brown, terminal filament yellowish-brown. Gonostyles (Fig 18) yellowish-brown ; basal segment slightly wider than long ; wider apically than basally ; second segment nearly twice as wide as long, about one-third first ; third segment moderately slender, three times the second and nearly equal to the first ; fourth segment globose, nearly one-third the third segment.



Figs. 40-48. *Baetis lahaulensis*, sp. nov. ♂ ♀ (40-45); *Baetis longistylis* ♀ (46-48). 40, ♂ hind leg; 41, ♂ middle leg; 42, ♂ fore leg; 43, ♀ leg; 44, ♀ middle leg; 45, ♀ fore leg; 46, ♀ hind leg; 47, ♀ middle leg; 48, ♀ fore leg.

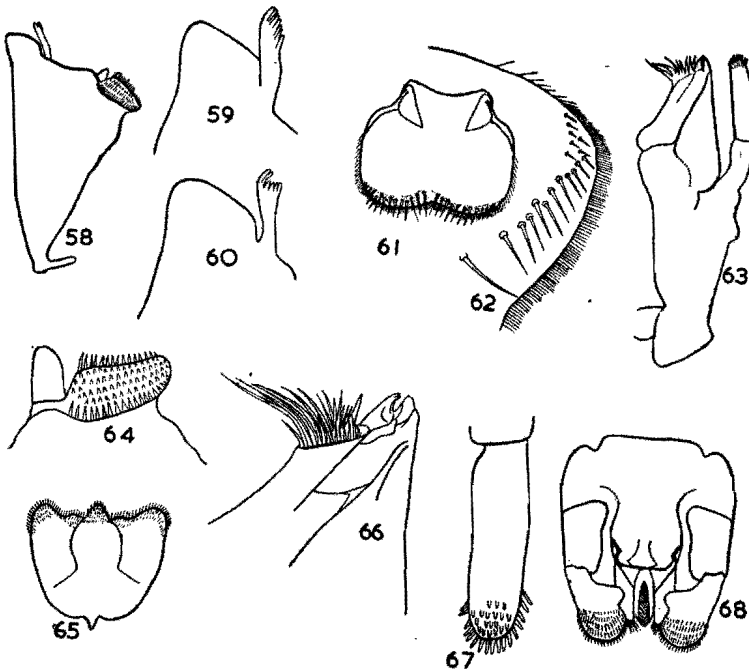
Female imago: Length, excluding filament and cerci, 10 mm; general colour of body pale yellowish-brown; head and thorax brown. Head (Fig. 20) viewed in front subtriangular, height to width in the ratio of 7:9; turban eyes absent; ventral eyes black, rounded, separated above from each other by a distance about two and a half times their own diameter; ocelli white. Antennae (Fig. 22) yellowish-brown, antennal length to head length in the ratio of 7:6; four segmented; first segment stout, about three-fourths as long as thick, second segment stout, about one and a half times longer than thick, more slender than the first and also slightly longer, terminal segment five times the preceding. Thorax (Fig. 23) brown; mesonotum with three narrow longitudinal white streaks in the middle, connected with an obscure short lateral marking posteriorly and the tip meeting the lateral stripes, these latter curved outwards in front for a short distance. Legs (Figs. 29-31, 43-55) yellowish-brown; fore wing (Fig. 16) 11 mm long and 5 mm wide hyaline, venation brown; stigmatic area with 10 complete and indications of one incomplete cross-veins; intercalary veins paired. Hind wing (Fig. 15) three times as long as wide, hyaline, costal process acute, venation brown, with three longitudinal veins, the first and second longitudinal veins parallel, the third vein reaching margin in the middle of wing; cross-veins as in figure. Legs (Figs. 23-41, 43-45) yellowish-brown; fore femur (Figs.



Figs. 49-57. *Baetis lahaulensis*, sp. nov. larva: 49, thorax; 50, head; 51, larva; 52, fore leg; 53, middle leg; 54, hind leg; 55, claw fore leg; 56, claw middle leg; 57, claw hind leg.

29, 45) moderately stout ; tibia slender, about one and one-fourth the femur ; tarsus about half the tibia ; first and second tarsal segments subequal ; third segment almost half the second ; fourth segment slightly longer than the second and third combined ; middle tibia (Figs. 30, 44) about one and one-fourth the femur ; second tarsal segment about three-fourths the first ; third segment about half the second ; fourth segment a little longer than the second and third combined ; hind leg (Figs. 31, 43) similar to the middle leg. Abdomen slightly longer than half the body, yellowish-brown, terminal filament twice the body. Ovipositor (Fig. 24) yellowish-brown, two-segmented, the first segment as long as wide, wider basally than apically ; the second segment oval, nearly one-sixth the first.

Mature larva (Fig. 51) : Length, excluding cerci, 10 mm ; cerci 8 mm long and terminal filament 5 mm long. Body brown. Head (Fig. 50) and thorax dark brown. Head viewed in front broadly oval ; dorsal surface dark brown, pale brown ventrally ; height to width in the ratio of 6 : 5 ; turban



Figs. 58-68. *Baetis lahaulensis*, sp. nov. larva : 58, mandible ; 59, left mandible (protheca portion enlarged) ; 60, right mandible (protheca portion enlarged) ; 61, labrum ; 62, labral tip enlarged ; 63, maxilla ; 64, molar surface of mandible ; 65, hypopharynx ; 66, apical part of galea-lacinia ; 67, tip of maxillary palp enlarged ; 68, labium.

eyes in male and absent in female ; ventral eyes black, rounded, height to width in the ratio of 3 : 2 and separated from each other by a space about one and a half times their own diameter. Ocelli white. Antennae setaceous, multiarticulate, yellow except for the yellowish-brown base ; first antennal segment narrowed basally ; second antennal segment slightly longer than thick ; the remaining segments reduced apically. Labrum (Fig. 61) quadrate, wider than long, with a shallow median notch on the rounded anterior margin, with a row of submarginal plumose hairs and a second marginal row and a transverse row of stouter and much longer bristles reaching to the sides and numbering 15 on each side (Fig. 62). Mandibles (Fig. 58) pyramidal ; with the canine obtuse, the outermost teeth longer at the tip of mandible ; protheca of the left mandible with 8 (Fig. 59) and of the right with 6 teeth (fig. 60) on the external margin. Maxillary palpi triarticulate, not extending beyond the tip of galea-lacinial complex (fig. 63), terminal segment (Fig. 67) nearly as long as the proximal two combined ; galea-lacinia apically with four large stout teeth (Fig. 66) and two rows of long and stout bristles apically. Paraglossa subequal to glossa (Fig. 68) outer apical margin with numerous feathered bristles, numerous fine bristles mesially on glossa, close to the outermost one, there is a large clavate spine. Labial palpi biarticulate, the first segment shorter than the terminal, which latter is with an obtuse process mesially at tip, which is also clothed with numerous spines and fine setae. Hypopharynx as in fig. 65. Thorax (Fig. 49) dark brown ; mesonotum with three narrow, longitudinal streaks in the middle, connected with an obscure short lateral marking posteriorly and at the tip meeting the lateral stripes. Legs brown ; distal ends of tarsi and claws dark brown ; the ratio of femur, tibia and tarsus are respectively in fore legs (Fig. 52) 15 : 12 : 6 ; middle legs (Fig. 53) 14 : 13 : 6 ; hind legs (Fig. 54) 14 : 12 : 6 ; fore tarsal segments in the ratio of 8 : 5 : 3 : 7 ; middle tarsal segments 8 : 4 : 3 : 8 ; hind tarsal segments 8 : 4 : 2 : 9. A row of stout spines along margin of femur, tibia and tarsus. Claws (Figs. 55-57) with 3 teeth on the inner margin. Abdomen cylindrical, dorsally dark brown and ventrally yellowish-brown ; gill lamellae 7 pairs on segment 1 to 7 ; the first lamella smallest ; terminal filament shorter than cerci, fringed with moderately long setae on both margins ; cerci setose only mesially.

Holotype ♂, Coll. No. 666 ; *allotype* ♀, Coll. No. 664 ; *paratypes* ♂♂, ♀♀, Coll. Nos. 586, 595, 596, 598, 663, 665, 665, 666, 801, 803, J. L. Nayyar and S. K. Tandon, 4-5. vi. 1961, in spirit ; No. 666, S.K. Tandon, 5. vi. 1961 on slide ; N.W. Himalaya : Gramphu, 3507 m above mean sea-level, left bank of the R. Chandra, about 150 m to the north of the stream on the north slope of the Pir Panjal Range.

Other material examined : N. W. Himalaya : Khoksar, 8.vi.1961, Coll. Nos. 796, 788, 783, 795, 787, 681, 682, 789, Santokh Singh. Khoksar, 8.vi.1961, Coll. Nos. 677, 678, 676, S.K. Tandon.

This species differs from *Baetis chandra* Kapur and Kriplani (*op. cit.*) in the 10 complete cross-veins in the stigmatic area of fore wing and in the different proportions of body and wing.