

With The Author's Compliment

S. Rashid Ali
27/5/75

Certain Mayfly Nymphs (Order; Ephemeroptera) of Azad Kashmir and Swat

SYED RASHID ALI

Zoology Department, Gordon College,
Rawalpindi.

Systematic account.

The key which follows is for the families:

1. Gills of the first abdominal segment situated on the venter.....
Oligoneuriidae.
Gills of the first abdominal segment dorsal or first abdominal segment without gills2
2. Gills always absent from the second abdominal segment, sometimes absent from third also.... *Ephemerellidae*.
Gills present on abdominal segments 1-73
3. Head flattened dorsoventrally, hypognathous, eyes dorsal, labrum mostly or completely concealed under projecting anterior margin of head*Ecdyonuridae*

Family :—*Oligoneuriidae*.

Oligoneura kashmirensis sp. nov.

(Plates I & II)

Length of the body 20 m.m., outer caudal filaments 9.5 m.m. and median 7 m.m., general colour of the body dark brown, covered with minute spines, lateral margins of abdominal tergites and form spine like projections.

Head (Fig. 1) semielliptical, arched from above to sides, frontal margin of abdomen rounded, posterolateral margins projected outwards behind eyes, along anterior margin a row of very long bristles present.

Mayfly nymphs form the food of many fishes, very little is known about the mayflies of Pakistan. The first attempt was made by the author on the taxonomy of this group. The author (1967) described *Ephemera soanensis*, *Baetis macani*, *Baetis meeheani*, *Cloeon gilliesi*, *Caenis kimminsi*, *Ecdyonurus islamabadensis*, and *Choroterpes qadrii** as new species. Later on the author (1970) described *Eatonia khyberensis*, *Heptagenia hazaraensis*, *Ephemera striatus* and *Cloeon karachiensis* as new species and *Eatonia* as a new genus.

The author in this paper described the nymphs of the following new species:—

Oligoneura kashmirensis, *Ephemerella swatensis* and *Rhithrogena basiri*. As far as the author is aware the genus *Oligoneura* was not recorded from occupied Kashmir, India and Nepal.

METHODS

Surber one square foot sampler and dip net was used for the collection of mayfly nymphs, nymphs were preserved in formalin. Temporary glycerine mounts were used for the study. For permanent mounts, specimens were treated with 10 per cent KOH (cold) solution for varying length of time depending upon the size and after usual process of dehydration and clearing mounted in canada balsam, mouth parts, legs, and gills were dissected in clove oil. Sketches were drawn with the help of Camera lucida.

*Revised list is given at the end.

Antennae short with minute setae along joints, first 2 joints largest. Labrum (Fig. 9) somewhat triangular much broad, covered dorsally with long hairs. Mandibles (Figs. 10-13) well chitinised, blackish along canines and molar areas, outer and inner canines with 4 teeth in each case; prosthema with bristles; left mandible thicker and shorter. Maxillae (Fig. 14) with 2 jointed maxillary palps, first joint small, second very large, covered with long hairs; the fibrils of maxillary bristles also present; gills arise from stipes and pass backwards up to prothoracic sternum. Labium (Fig. 15) with 2 jointed labial palps, 2nd joint longer; glossae and paraglossae well developed, glossae somewhat cordate, spines along margin of labial palps, bristles on labial palps, glossae and paraglossae; hair-like structures arise from the posterior

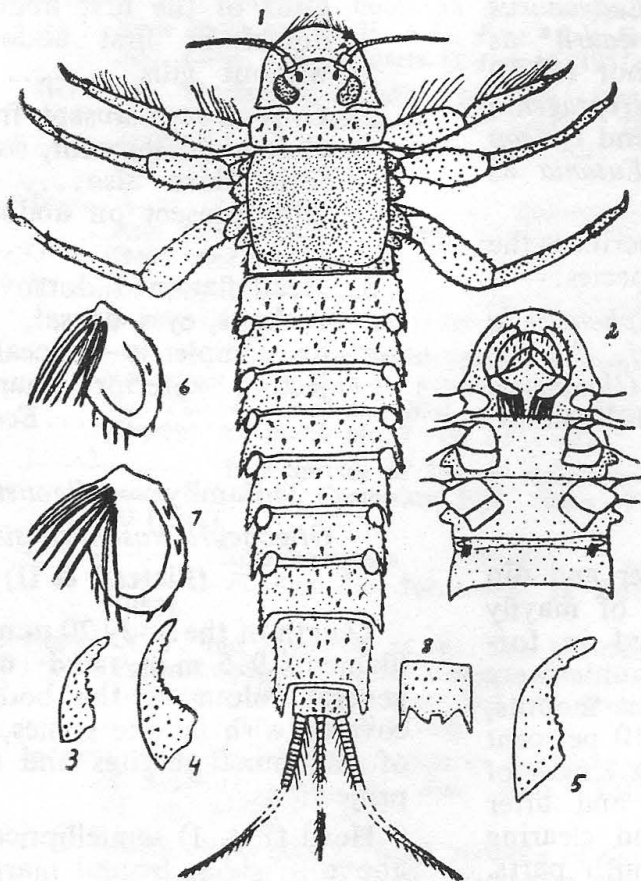


Plate I, Figs. 1-8. *Oligoneura kashmirensis*.
Fig. 1, dorsal view of the nymph. Fig. 2, ventral view of the nymph (head and thorax). Fig. 3, fore tarsal claw. Fig. 4, mid tarsal claw. Fig. 5, hind tarsal claw. Fig. 6, 1st gill. Fig. 7, 3rd gill. Fig. 8, 9th sternum.

margin of the first labial palp. Hypopharynx (Fig. 16) broadly cordate, hair present on lateral lobes.

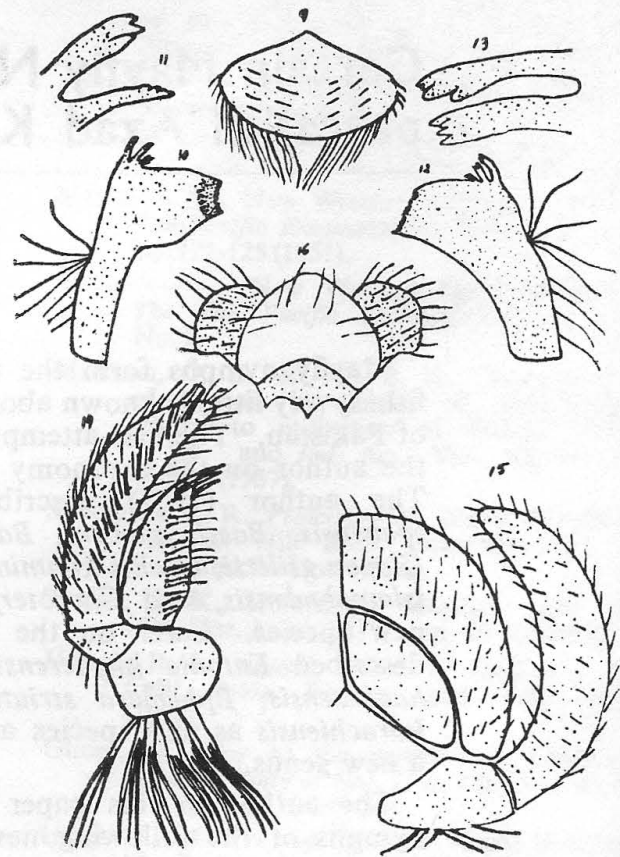


Plate II, Figs. 9-16, *Oligoneura kashmirensis*.
Fig. 9, labrum. Fig. 10, left mandible. Fig. 11, canine area. Fig. 12, right mandible. Fig. 13, canine area. Fig. 14, left maxilla. Fig. 15, labium. Fig. 16, hypopharynx.

Pronotum (Fig. 1) broader than head, rounded along lateral margins sternite narrow, meso and meta thoracic terga each with a pair of lateral lobe-like expansions, tergites covered with wing pads, which are dark brown in colour. Foreleg smallest, tibia expanded, inner side of the femur and tibia with long hair, tarsal claw smallest; tibiae and tarsi of middle and hind legs slender; hair present at the proximal and of femora towards ventral side and spines all over the surface; longer spines towards the distal ends of tibia and ventral surface of tarsi of middle and hind legs. Tarsal claws of all legs with 6 blunt teeth. The ratio, femur : tibia : tarsus, forelegs, 2.5 : 2.7 : .7, middle leg, 3 : 2.7 : 1.3, hind leg 3.5 : 3 : 1.3.

Abdominal terga have well developed lateral expansions which are pointed and directed backwards, 9th pair of lateral expansions completely opposite the head; 9th sternum (Fig. 8) longest with a wide notch in the middle. Gills (Fig. 6 & 7) present from 1-7, last gill smallest 8 m.m. in length, ventral in position, rest dorsal, lamina subrotund a tuft of fibrils at its point of attachment, all dorsal gills equal in size. Median caudal with long hairs on both sides and lateral filaments on the inner side.

Locality:—The Punch River Channels, Kotli (Azad Kashmir), collected by the author, April 14, 1969.

Remarks:—Eaton described the nymphs of *Oligoneura rehenana* (Pict.), in which he did not find the lobe like expansions of meso and metathoracic terga as found in *Oligoneura kashmirensis*: labrum somewhat rectangular, teeth on tarsal claws not mentioned.

Family:—*Ephemerellidae*.

Ephemerella swatensis sp. nov.

(Plates III & IV)

Length of body 10 m.m., caudal filaments 9.5 m.m., colour of the body dark reddish brown, legs and caudal filament light brown. Body broadest at mesothorax.

Head (Fig. 17) quadrangular, frontal margin rounded, antennae with prominent joints, from the junctions of which minute setae arise, at the base of each antenna a tubercle present; eyes lateral. Labrum (Fig. 24) wider than long slightly notched in the middle of anterior margin, covered with thick coat of bristles, along anterolateral margin long bristles present. Mandibles (Figs. 25-28) short and robust, well chitinised in left mandible outer and inner canines, each with 4 teeth, right mandible with 3 teeth on each canine, left prosthema thicker, brushy in both mandibles, Maxillae (Figs. 29, 30) broad, maxillary palps much shorter than galea-lacinia, 3 jointed, 3rd joint rudimentary; hairs on 1st and second joints, and on galea-lacinia; 2 pointed teeth on inner apical margin; a row of long bristles

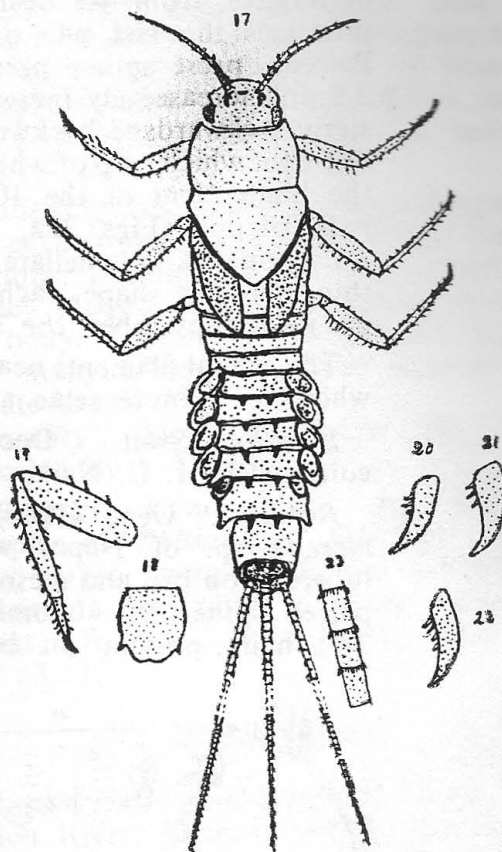


Plate III, Figs. 17-23, *Ephemerella swatensis*.

Fig. 17, dorsal view of the nymph. Fig. 18, 9th sternum. Fig. 19, leg. Fig. 20, fore tarsal claw. Fig. 21, mid tarsal claw. Fig. 22, hind tarsal claw. Fig. 23, caudal filament showing setae.

on inner margin, hair on anterior end of galea lacinia and on stipes. Labium (Fig. 31) broad; glossae small, paraglossae large, both covered with bristles, labial palps short and 3 jointed covered with bristles, last joint very small. Median lobe (Fig. 32) of hypopharynx round, lateral lobes expanded.

Pronotum (Fig. 17) wider than head, lateral margins slightly convex, dorsum arched. No tubercles on pro, meso and metathorax. Mesothorax is arched dorsally and enlarged laterally. Wing pads present; legs (Figs. 19) with tubercles and spines, hind leg longest, tarsal claws of fore and mid legs, each with 3 teeth, that of the hind leg with 4. The ratio, femur: tibia: tarsus is, foreleg, 1.5 : 1.7 : .7 midleg 1.7 : 2.7 : .7 and hind leg, 2 : 2.5 : .7.

Abdomen (Fig. 17) slightly convex beneath somewhat arched above lateral extensions

of tergites, from 4-9 bearing posterolateral processes the last pair directed backwards. Paired dorsal spines present on segments 2-9 and successively increased 9th (Fig. 18) sternum prolonged backwards into a tongue-like structure the tip of which extends beyond the hinder end of the 10th tergum. Five pairs of gills (Figs. 33a, 33b) present from 3-7 segments, bilamellate, anterior lamella thin, ovoid in shape, each posterior lamella cut into many lobes, the 7th gill smallest.

The caudal filaments nearly equal in length whorls of minute setae along the joints.

Locality. Swat, December 22, 1966, collected by I. U. Naik.

Remarks. Ueno (1965) described *Ephemera* sp. of Nepal which consists of tubercles on pro and meso thoracic tergites: paired spines on abdominal tergites from 3-9; hairs present on both sides of the

median caudal filament and inner side of out ones. The above mentioned characters not present in *Ephemera swatensis*.

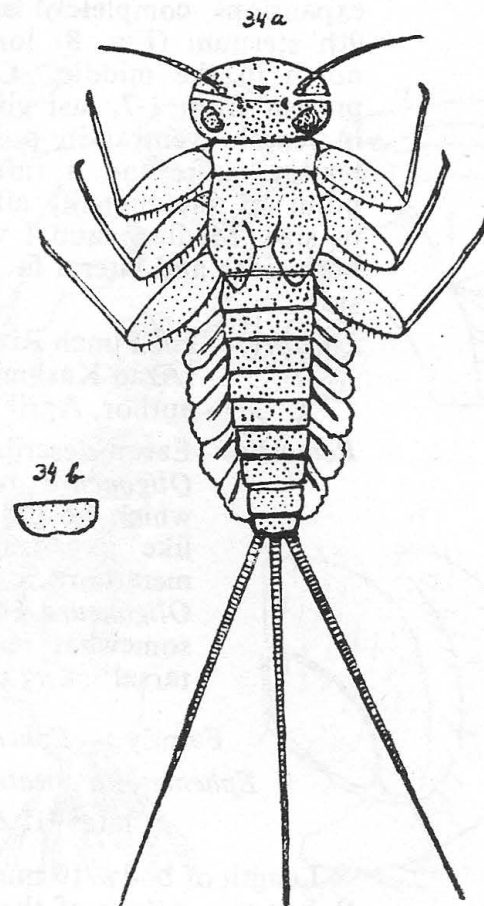


Plate V, Figs. 34a, 34b, *Rhithrogena basiri*.
Fig. 34a, dorsal view of the nymph. Fig. 34b, 9th sternum.

Family :—*Ecdyonuridae*.

Rhithrogena basiri, sp. nov.

(Plates V & VI)

Length of the body 10 m.m., caudal filaments 11 m.m. Body rusty brown, Ventral side pale.

Head (Fig. 3) flattened, wider than long, eyes large and dorsal, antennae short. Labrum (Fig. 35) small, much wide, slightly, notched in mid anterior margin, bristles along anterior margin, longer bristles along lateral sides.

Mandibles (Figs. 36-39) slender especially in basal half, only one canine, inner and outer margins crenate, minute hair at the bases of canines, prostheca short and

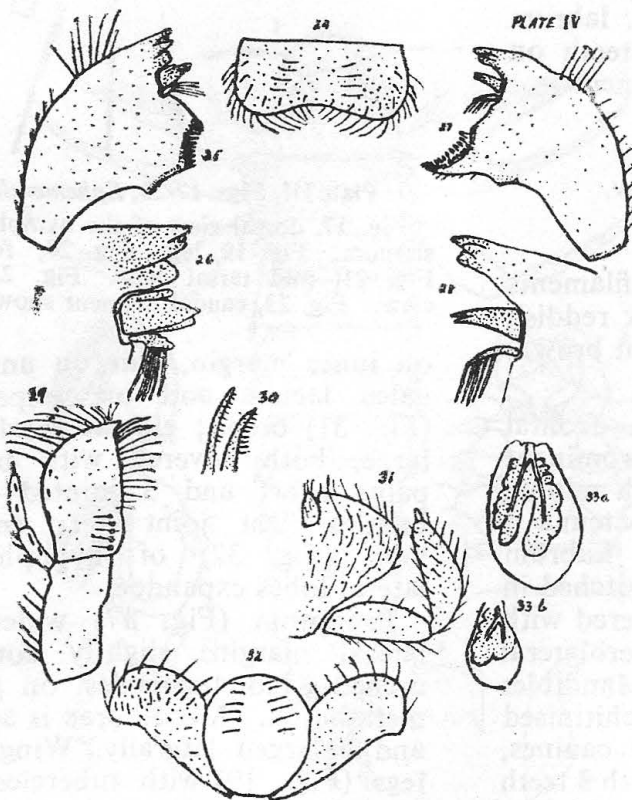


Plate IV, Figs. 24-33, *Ephemera swatensis*.

Fig. 24, labrum. Fig. 25, left mandible. Fig. 26, canine area and prostheca. Fig. 27, right mandible. Fig. 28, canine area and prostheca. Fig. 29, left maxilla. Fig. 30, maxillary teeth. Fig. 31, labium. Fig. 32, hypopharynx. Fig. 33a, 2nd gill. Fig. 33b, last gill.

thick, with a row of spines, posterior to prostheca longer spines present. Maxillae (Fig. 40) stout, maxillary palps dilated, distal joint twice as long as the proximal, clavate, series of pectinate spines, upper margin of galea-lacinia terminates into three prominent teeth; inner margin of galea-lacinia with 2 rows of bristles, outer with a row of pectinate spines; glossae longer than paraglossae (Fig. 41) slightly divergent at the tip, bearing a series of spines. Labial palp much broad, proximal end elongated, oval, distal short and broad, outer apical margin beset with curved spines, and long hairs.

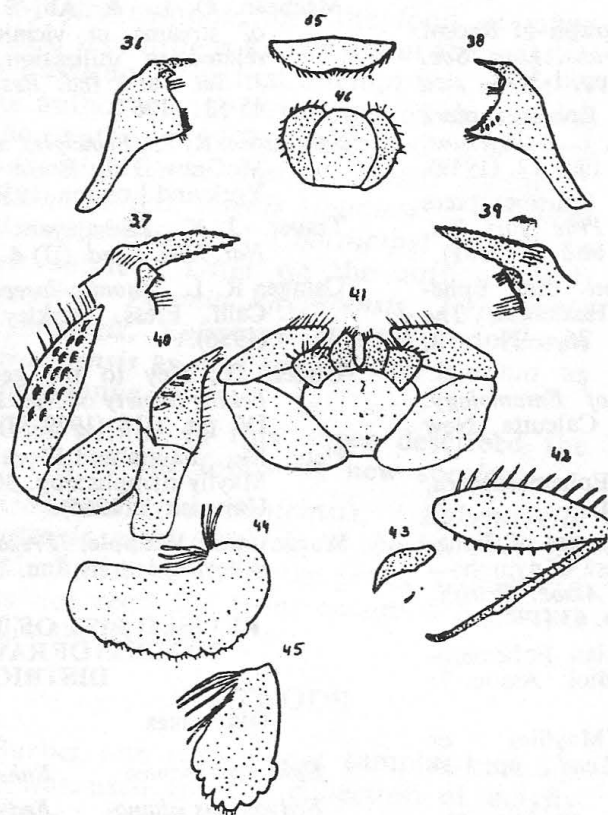


Plate VI, Figs. 35-46, *Rhithrogena basiri*.

Fig. 35, labrum. Fig. 36, left mandible. Fig. 37, canine area and prostheca. Fig. 38, right mandible. Fig. 39, canine area and prostheca. Fig. 40, left maxilla. Fig. 41, labium. Fig. 42, leg. Fig. 43, claw. Fig. 44, 1st gill. Fig. 45, 3rd gill. Fig. 46, hypopharynx.

Pronotum short and narrower than head, round along anterior margin; legs (Figs. 42, 43) rather slender, femora much broader, outer margin with a row of stout bristles, inner with short spines and surface

covered with tubercles, tibiae bear fine bristles on inner and outer margins; tarsal claw with a large tubercle at the base and no teeth along inner margin. Ratio, femur: tibia : tarsus; foreleg 2 : 2 : .5, mid leg, 2 : 2 : .8, hind leg 2.3 : 2 : .8.

Gills (Figs. 44, 45) on abdominal segments 1-7, each consists of a lamellar and fibrillar portions, lamellae of the first largest and kidney shaped, the two meeting beneath the body. The margin of lamella incised, into many lobes which are fringed with minute setae.

Locality : Swat, December 22, 1966, collected by I. U. Naik.

Remarks: Ueno (1955) described the nymphs of *Rhithrogena* sp. from Nepal. Only inner margin of the mandibular canine crenate; ratio of femur; tibia and tarsus, foreleg 3.9 : 3.3 : 1, hind leg, 4.7 : 3 : 1.

DISCUSSION

Oligoneura kashmirensis was found in the Punch River, Kotli (Azad Kashmir) only; *Ephemerella swatensis* in the Swat River, Swat, another species was found in Wah streams; *Rhithrogena basiri* in Swat. The nymphs of *Oligoneura kashmirensis* are the largest in size than those of other genera and species of Ephemeroptera collected by the author so far. Genus *Ephemerella* was recorded by Hora (1930), Kapur and Kriplani (1961) from India, Hora (1930) recorded *Rhithrogena* from India. Ueno (1955) described the nymphs of *Ephemerella* and *Rhithrogena* from Nepal. Hora (1930) mentioned that the nymphs of *Ephemerella* and *Rhithrogena* were found in fast running streams. The author found that the above mentioned general were found in fast running streams. The author found the nymphs of *Oligoneura kashmirensis* in the guts of fishes.

ACKNOWLEDGEMENTS

The author is indebted to Mr. I. U. Naik, Assistant Director of Fisheries, Sahiwal for donating his animal collection of the Swat River to Zoology Department, Gordon College, Rawalpindi.

REFERENCES

- Ali, S. R., The Mayfly Nymphs (Order; Ephemeroptera) of Rawalpindi Distt., *Pakistan J. Sci.*, Vol. 19, No. 3; pp. 73-86 (1967).
- . Certain Mayflies (Order; Ephemeroptera) of West Pakistan. Accepted for publication in *Pakistan J. Sci.*, Vol. 22 (3 & 4) (1970).
- Ali, S. R. & Hussain, S. I. Aquatic Organisms used as food by fishes. *J. Agriculture Pakistan*, Vol. 19, No. 4 : pp. 114-120 (1968).
- Berner, L., Mayflies of Florida. *Uni. Florida Press*, Gainesville (1950).
- Burks, B. D., The Mayflies or Ephemeroptera of Illinois. *Bull. Illinois Nat. Hist.*, 26 : 1-216 Figs. 1-395 (1953).
- Eaton, A. E., A Revisional Monograph of Recent Ephemeridae or Mayflies, *Trans. Linn. Soc. London (Zool.) London (2) 3*, pp. 1-352.
- Gillies, M. T. Notes on some Ephemeroptera Baetidae from India and S. E. Asia *Trans. Roy Ent. Soc. Lond.* 161-171, figs. 12. (1949).
- . Further notes on Ephemeroptera from India and S. E. Asia. *Proc. Roy Ent. Soc. Lond.* Vol. 26, parts 11 and 12 (1951).
- Hermana, Taxonomic. Studies on the Ephemeroptera—II. The genus *Hexieoria*. *The Midland Naturalist*, Vol. 26, No. 2, pp. 233-280 (1941).
- Imms, A. D., *A General Textbook of Entomology*. Asia Publ. House. Bombay, Calcutta, New Delhi and Madras (1963).
- Kimmins, D. E., Some new Ephemeroptera, *Ecology*, 15, pp. 348-364 (1934).
- . Key to the British species of Ephemeroptera with keys to genera of nymphs—*Sci. Pub. I. Freshwater Biol. Assoc. British Empire. Ambleside No. 7* : pp. 63 (1942).
- . New Species of Indian Ephemeroptera. *Sci. Publ. Freshwater Biol. Assoc.* 7: 40 (1942).
- . Ephemeroptera (Mayflies or Dayflies). *F. Roy. Ent. Soc. Lond.*, pp. 1-18 (1963).
- Kapur, A. P. and Kripalani M. B. The Mayflies (Ephemeroptera) from North - Western Himalayas. *Rec. Ind. Mus.* Vol. 59 (Parts 1 and 2): pp. 193-220 (1963).
- Morgan, Anna, H., A contribution to the Biology of Mayflies. *Ana. Ent. Soc. Amer.*, Vol. VI, pp. 371-413 (1963).
- T. T. Macan, Descriptions of the Nymphs of the British species of *Cloeon*. *Proclaeon* and *Centroptilum* *Ent. Mon. Mag.* 85, pp. 22-228.
- The Taxonomy of the Nymphs of the British species of the Genus *Ecdyonurus* (Ephem.) *Ent. Mon. Mag.* 85: pp. 64-70 (1949).
- . Description of some of the nymphs of British Species of the Genus *Baetis* (Ephem). *Trans. Soc. Brit. Ent.* (1950).
- . A description of the nymphs of *Baetis buceratus* with notes on and a key to the other species in the genus. *Trans. Soc. Brit. Ent.*, Vol. 12 and Part 6 (1950).
- Mayo, V. K., New Western Ephemeroptera. *The Pan-Pacific Entomologist.*, Vol. XVII, No. 3, pp. 121-125 (1951).
- . New Western Ephemeroptera III. *The Pan Pacific Entomologist*, Vol. XXIII, No. 2.
- Meehean, O. L. & Ali, S. R., Bottom Fauna of streams in vicinity of Rawalpindi as related to utilization of Fishes. *Pakistan J. Sci.* and *Ind. Res.*, Vol., 10, No. I, pp. 45-53 (1967).
- Snodgrass, R. R., *Principles of Insect Morphology*, McGraw Hill Book Company, Inc. New York and London (1936).
- Traver, J. K., Himalayan Mayflies, *Ann. Mag. Nat. Hist. Lond.* (II) 4 : pp. 49-56 (1939).
- Usinger R. L., *Aquatic Insects of California Univ. Calif. Press*. Berkley and Los Angeles (1956).
- Ulmer, G., Key to the genera of Ephemerida *Peking Society of Nat. Hist. Ull.*, Vol. 4 : Part IV, pp. 1-18 (1929-30).
- Ueno, M., Fauna and Flora of Nepal Himalayas. Mayfly nymphs: pp. 301-316. *Kyoto* (Kyoto University) (1965).
- Wards and Whipple, *Freshwater Biology*, John Wiley and Sons, Inc. New York (1959).

REVISED LIST OF THE MAYFLY
NYMPHS OF RAWALPINDI
DISTRICT

Old Names Revised Names

<i>Ephemera soanica</i>	<i>Ephemera soanensis</i>
<i>Ecdyonurus islamabadicus</i>	<i>Ecdyonurus islamabadensis</i>
<i>Baetis macanis</i>	<i>Baetis macani</i>
<i>Baetis meeheanis</i>	<i>Baetis meeheani</i>
<i>Cloeon gillican</i>	<i>Cloeon gilliesi</i>
<i>Choroterpes qadricus</i>	<i>Choroterpes qadrui</i>
<i>Caenis kimminsii</i>	<i>Caenis kimminsi</i>

Old names were published in *Pakistan Journal of Science*, Vol. 19, No. 3, May 1967; pp. 73-86.