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A Survey of the Distribution of Mayflies (Ephemero- ptera) in Finland.

L. TIENSUU.

HELSINKI 1939

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In our country, which is cut up by watercourses, the order of mayflies is fairly rich in species, and many species occur in suitable places in uncommonly abundant numbers of individuals. Their importance in the economy of nature is thus very great here, in the first place because they form a noticeable part of the nourishment of the fishes. Therefore this group is important also from a human point of view, and the fauna of Finland deserves to be thoroughly analyzed. No satisfactory faunistic description can yet be made based on what is known through material collected and observations made up to date. This paper is principally intended to give an account of the distribution of these insects in our country as far as it is known for the time being.

The first one who here devoted his attention to the study of mayflies, was Prof. J. A. PALMÉN. He treated their morphology in his studies »Zur Morphologie des Tracheensystems» (1877) and »Über paarige Ausführungsgänge der Geschlechtsorgane bei Insekten» (1884). In the beginning of our century, J. E. ABO began to collect mayflies and also sent part of his material to the most prominent specialist of the group at the time, A. E. EATON, to be determined. He published in Finnish a survey of the species of our country (ABO 1910), which contained a fairly large presentation of their morphology and biology (partly founded on his own observations), directions for their collection and rearing, keys to the genera and species, and numerous illustrations. J. A. LESTAGE (1924) has written a short report of it in French. Before ABO found time to publish a larger work, that he had planned, he was killed by an accident in

1928. The results of his studies were, none the less, published in the form of a small handbook (ARO 1928). In it are given as an addition to the former study also complete descriptions of the species and the distribution of the species in Finland. Later the author of this paper published two studies of our mayflies (TS 1935 and 1937 b) and made up a list of them for the *Enumeratio Insectorum Fenniae* (IV. Ordines minores, p. 5—6), issued in 1935.

During the last two decenniums the interest in mayflies has been very lively in Europe. Studies concerning them and even many works having the character of handbooks have appeared in almost every country. Only BENGTTSSON's and SCHOENEMUND's publications with their splendid illustrations need to be mentioned as most useful for our conditions.

The knowledge of our mayfly-fauna has lately increased to such an extent, that 56 species are now known from Finland, while ARO (1928) mentioned only 31 species.

A rather reliable picture of the distribution of many of our species can already be attained, and as this surely has its special interest, a chorological classification of our mayfly-fauna is here presented.

1. Species widely distributed in Central and North Europe.

<i>Ephemera vulgata</i> L.	<i>Centroptilum diaphanum</i> MÜLL.
» <i>danica</i> MÜLL.	<i>Cloëon inscriptum</i> BGTN.
<i>Heptagenia fuscogrisea</i> RETZ.	» <i>rufulum</i> MÜLL.
» <i>sulphurea</i> MÜLL.	» <i>simile</i> ETN.
<i>Siphurella linnaeana</i> ETN.	» <i>praetextum</i> BGTN.
<i>Siphonurus aestivalis</i> ETN.	<i>Paraleptophlebia cincta</i> RETZ
<i>Baëtis niger</i> L.	<i>Leptophlebia marginata</i> L.
» <i>muticus</i> L.	» <i>vespertina</i> L.
» <i>scambus</i> ETN.	<i>Habrophlebia lauta</i> McLACHL.
» <i>gemellus</i> ETN.	<i>Ephemerella ignita</i> PODA
» <i>bioculatus</i> L.	

2. Central European species, that in South-Finland reach the northern boundary of their distribution.

<i>Ecdyonurus venosus</i> FABR.	<i>Centroptilum tenellum</i> ALB.
<i>Baëtis venustulus</i> ETN.	<i>Cloëon dipterum</i> (L.) BGTN.
» <i>rhodani</i> PICT.	<i>Paraleptophlebia submarginata</i> STEPH.

3. Species occurring in the northern parts of Fennoscandia and in the mountains of Central Europe.

Ameletus inopinatus ETN.
Baëtis vernalis CURT.

Baëtis tenax ETN.

4. Fennoscandic species.

Heptagenia dalecarlica BGTN.
Arthroplea congener BGTN.¹
Metretopus borealis ETN.
Siphonurus zetterstedti BGTN.
Baëtis pusillus BGTN.

Baëtis wallengreni BGTN.
Procloëon bifidum BGTN.²
Paraleptophlebia strandi ETN.
Chitonophora mucronata BGTN.
Caenis nivea BGTN.

5. North-Fennoscandic species.

Metretopus alter BGTN.
Parameletus chelifera BGTN.³
» *minor* BGTN.
Ameletus alpinus BGTN.

Baëtis subalpinus BGTN.
Acentrella lapponica BGTN.
Paraleptophlebia tumida BGTN.
Chitonophora aurivillii BGTN.

6. Species, found only in Finland.

Polymitarcys ladogensis TIENS.
Baëtis saliens n.sp.
Eurylophella karelica TIENS.

Melanamelatus brunnescens TIENS.
Caenis horaria fennica ARO
» *undosa* n.sp.

BENGTSSON has described several species of the genera *Baëtis* and *Caenis* from Sweden, that have not been found elsewhere. It is probable, that some of them will be found later also in Finland.

The distribution-area of many Fennoscandic species probably also stretches further eastwards, and among them may be Eurasiatic and even circumarctic species. For the present one cannot, however,

¹ Found once also in England (BENGTSSON 1930 b, p. 27). Moreover ARO (1928, p. 52) claims to have got 1 ♂ in Switzerland, near the station of Göschen from the bank of a brook 2. VIII. 1908. To this statement one must take a doubtful attitude. The specimen is not among his material, and it is possible that he did not even preserve it.

² Also known from Russia.

³ Also known from Northern Ural.

plan any classification on this ground, as the knowledge of the mayfly-fauna of the regions behind our eastern frontier is insufficient.

I omit here the discussion of ecological circumstances, but further on in connection with some species I shall mention phenological data etc. I have previously (Ts 1935) presented a flying-period table and various ecological data of species from Laatokan Karjala, which are not repeated in this study. About the other species from South- and Central-Finland it must be mentioned, that of their occurrence in the imaginal stage, as a rule, only scattered dates, concentrated about the middle of the summer are known. The imaginal season of the North-Fennoscandic species falls between the end of June and the beginning of August, owing to the short summer of Lapland.

Besides my own material I have had a chance to study the following collections:

1. The collection of the Entomological Museum of Helsinki University, which, owing to the kindness of Custos Dr. R. FREY, has been at my disposal. The following persons have given abundant mayfly-material to this collection: Lector J. E. ARO, Dr. R. FREY, Prof. K. M. LEVANDER, Prof. W. M. LINNANIEMI, Prof. A. LUTHER, Prof. U. SAALAS, Dr. A. J. SILTALA and Director Y. VUORENTAUS; some ten other collectors have given fewer specimens.

2. The collection of Turku University, which Dr. K. J. VALLE gave to me to determine, and which he himself for the most part has collected in Petsamo.

3. The collection of Viipuri Finnish Real-school, in alcohol, collected by J. E. ARO.

4. The collection of »Viipurin Luonnon Ystävät», in alcohol, collected by J. E. ARO.

5. Dr. H. KLINGSTEDT's private collection, dried specimens.

6. Amanuens W. HELLÉN's private collection, dried specimens.

I express my sincerest thanks to those, who have aided me by lending me material.

In the following systematical survey, I fulfill the demand, which has been repeated more and more often in the faunistic literature of later times, that all the localities of each species must be recounted instead of contenting oneself with mentioning only the provinces. The method, indeed, takes much space, but it is advantageous in

so far, that the drawing of distribution-maps in later investigations is greatly facilitated and the knowledge of the localities is preserved, although the specimens become dust after having been long enough in the collections. In addition, a list of places of this kind is some kind of a guide for collectors, on the basis of which they can make supplementary observations.

Species that have not been previously reported from Finland, are marked with an asterisk. Records from the Fennoscandic region beyond the eastern frontier of Finland are mentioned in brackets.

A b b r e v i a t i o n s :

ARO = J. E. ARO	LMI = W. M. LINNANIEMI	SLA = A. J. SILTALA
FR = R. FREY	LR = A. LUTHER	TS = L. TIENSUU
HN = W. HELLÉN	MLL = J. E. MONTELL	VLE = K. J. VALLE
KST = H. KLINGSTEDT	PN = J. A. PALMÉN	VS = Y. VUORENTAUS
KRS = R. KROGERUS	Ss = U. SAALAS	WDT = F. W. WOLDSTEDT
LVR = K. M. LEVANDER	JSG = J. SAHLBERG	

Polymitaercys ladogensis TIENS.

Kk: Terijoki (Ts). — LK: Salmi (Ts).

I have previously given a detailed account of the occurrence of this species in Salmi at the shores of Laatokka (Ts 1935, p. 8—12). In the summer 1938 I also observed it swarming at the seashore in the farthest end of the Gulf of Finland at Terijoki. The saltness of the water is minimal there, so that also other mayflies are able to live in the shallow beach waters, such as *Heptagenia sulphurea* MÜLL., *Ephemerella ignita* PODA and *Caenis* sp. *Polymitaercys*-swarms were seen during the time 27. VII.—1. VIII. They appeared after twilight had set in, driven by the wind along the shore from the southeast, except on the 28. VII, when the wind blew from the land and drove the swarms out to sea. I found also then on the surface of the water females, that had layed their eggs and were at the point of death. 30. VII. the number of swarmers was very great, probably millions. As it grew dark, a weak breeze began to blow from the sea, driving the swarms to the beach. The next morning I saw ever so many carcasses everywhere on the beach region. Especially in the depressions of the sands were actually heaps of them.

Ephemera danica MÜLL.

EK: Jääski, brook of Ahtiala (ARO) 3. VIII. 1917; Antrea Karilahti (ARO) 26. VI. 1923. — LK: Sortavala (SLA); Rytty, brook of Pyörölampi (Ts) 24. VI. 1931, 1 ♀. — Ks: Kuusamo (MLL) 3 ♂; Kolvankijoki (ARO) 16. VII. 1899, 1 ♀; Salla Vuorijärvi (Krs) VII. 1937, 6 ♀. — [AK: Petroskoi (GÜNTHER), 2 ♂, 1 subimago].

ARO determined his specimens as *E. lineata* ETN. (ARO 1928, p. 32). Most the specimens in our collections are on pins, preserving thus the color figures. The alcohol specimens are rather badly faded, but even from them it can be ascertained that ARO's determination was wrong. The appearance of *E. lineata* in our country would also be less credible, as it has not either been found anywhere else north of Central Europe. *E. danica* has also in Scandinavia spread all the way to Lapland.

Ephemera vulgata L.

A: Jomala (M. WEURLANDER); Geta (POPPIUS). — V: Turku; Eriksberg (INGELIUS); Lohja (LR); Karjalohja (HN, LMI). — U: Nurmijärvi (K. E. KIVIRIKKO); Pyhäjärvi (Krs); Tuusula (SLA); Porvoo (P. SUOMALAINEN). — Räisälä (HN); Viipuri (LMI); Jääski (ARO); Antrea (MLL). — Kk: Vammeljoki (SLA); Rautu (JSG); Valkjärvi (INGELIUS); Muolaa (ARO); Kivennapa (SLA). — St: Kärkkö (HN); Kokemäki (ARO). — EH: Nastola (SLA); Sysmä (ARO); Kuhmoinen and Padasjoki (EHNBERG); Hattula (v. ESSEN). — ES: Kangasniemi (SUNDMAN). — LK: Sortavala (SLA, Ts); Lumivaara; Harlu; Impilahti; Salmi (Ts); Valamo (CHYDENIUS). — EP: Ylistaro (A. NORDMAN). — PH: Viitasaari Kempalanjoki; Muurujärvi; Sumiainen; Keitele; Konginkangas (LR); Laukaa (WDT); Rautalampi (KST). — PS: Kuopio (ARO); Joroinen (HINTIKKA); Suonenjoki (KST). — PK: Liperi (ARO); Eno (WDT). — KP: Kokkola (HELLSTRÖM). — Kh: Suomussalmi (HN). — PP: Kemi (LMI); Kuhmo (VLE). — Ks: Kuusamo (FR, HN, JSG). — KemL: Muonio (MLL). — EhL: Ounasjärvi (E. SUOMALAINEN). — InL: Inari (POPPIUS). — PsL: Nautsijoki (VLE); Petsamo (STORÅ). — [AK: Petroskoi (INBERG)].

Spread over the whole country. Occurs both in lake- and river-waters, and is very abundant in some places. Swarming has been observed during the time 7. VI—16. VIII.

Ecdyonurus flavomaculatus ARO.

EH: Sysmä Suopelto, at the shore of Päijänne (ARO) 6. VIII. 1902, 1 ♂ 2 ♀ — PH: Rautalampi Kahkosaari (KST) 7. VIII. 1928, 1 ♂ 9 ♀. — PS: Kuopio Väinölänniemi Kallavesi (Lvr), VIII. 1894, 1 nymph.

I assume, that the above mentioned fullgrown nymph belongs to this species, which is also indicated by its small size (length 7 mm). It is possible, that the species is identical with *E. joernensis* BERN., (BENGTSSON 1917, p. 193—194), as BENGTSSON's descriptions of both adults and nymph well fit our specimens. I do not, anyway venture to put forth the identity as quite sure, as BENGTSSON has neither published any illustrations nor mentioned anything about the structure of the forceps, which is very characteristic. I here present drawings of the forceps and of the terminal segments of ♀ (according to ARO) and of the mouth parts and tracheal gills of the nymph (fig. 1—6).

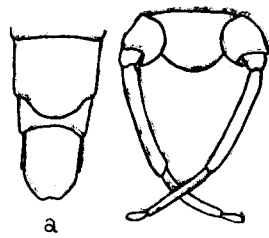


Fig. 1. *Ecdyonurus flavomaculatus* ARO. ♀: ventral view of terminal segments of abdomen (a) and forceps of ♂ (according to ARO).

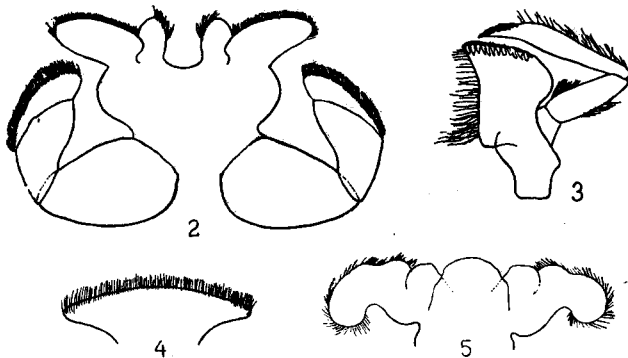


Fig. 2—5. *Ecdyonurus flavomaculatus* ARO, nymph.-2. labium, 3. maxilla, 4. labrum, 5. maxillulae and hypopharynx (Orig.).

**Ecdyonurus venosus* FABR.

St: Nakkila Lammaistenkoski (ARO) 22. VI. 1906, 1 nymph. — EH: Sismä Suopelto, at the shore of Päijänne (ARO) 12. VIII. 1902, 1 ♂ 1 ♀.

The specimens are completely faded, but with the aid of SCHOENEMUND's (1930, fig. 29, 30, 144, 145) figures I have been able to determine them.

Heptagenia fuscogrisea RETZ. (*Ecdyurus convergens* ARO).

U: Tikkurila Vantaa (LVR); Tuusula (ARO), the type, ♂; Järvenpää (LVR). — EK: Viipuri (SLA); Antrea (ARO). — Kk: Kivennapa; Uusikirkko (SLA)

— St: Pori (ARO); Nakkila Kokemäenjoki (ARO). — EH: Sysmä (HN). — LK: Valamo (CHYDENIUS); Harlu (Ts); Sortavala (SLA, Ts). — EP: Ylistaro (A. NORDMAN). — PH: Rautalampi (KST). — PS: Kuopio Räämäjärvi; Piela-vesi (ARO). — PK: Liperi (ARO); Ilomantsi; Eno (WDT). — Kn: Suomussalmi (HN); Kajaani (ARO). — PP: Oulu Merikoski (Vs); Pudasjärvi (? leg.); Tornio (FR). — Ks: Paanajärvi (O. NORDQUIST). — KemL: Rovaniemi (HN); Muonio (HÄK. LINDBERG). — EnL: Enontekiö (E. SUOMALAINEN). — InL: Ivalo (HN). — PsL: Nautsi; Haukilampi (VLE); Petsamo (STORÅ). — [IPom: Suma (ENVALD). — VL: Lussmjaur (PN). — MrL: Voroninsk (PN)].

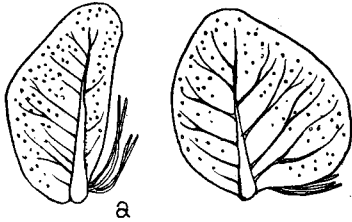


Fig. 6. First (a) and fourth tracheal branchia of *Ecdyonurus flavomaculatus* ARO, nymph (Orig.).

The adults appear in South- and Central Finland during the first half of June. At the shores of the larger lakes sporadic specimens are still met with in the first days of July. In Petsamo the last flight observation was made on 23. VII (VLE). — ARO's (1928, p. 64, fig. 80) figure »gill-leaf of *Ecdyonurus convergens*-nymph» belongs to the species *Heptagenia sulphurea* MÜLL.

In his first paper is the same figure with the right explanation (ARO 1910, fig. 18). When examining with a microscope ♂-individuals preserved in alcohol, I have observed, that some of them have their penis-lobes turned towards one another, the penis thus being in the position pictured by ARO (1928, p. 54, fig. 60). By pressing lightly on the cover glass one gets them to return to their normal position, so that also these specimens are known as *H. fuscogrisea*.

Heptagenia sulphurea MÜLL.

A: Quaruforsen (WEURLANDER). — V: Lohja (LR). — U: Tikkurila Vantaa (LVR). — EK: Viipuri Monrepo (SLA). — Kk: Terijoki (KST, Ts); Kivennapa (KRS, SLA); Sakkola (HN); Muolaa (ARO); Johannes; Kuolemajärvi and Uusikirkko (SLA). — St: Noormarkun joki (J. L. LYDECKEN); Nakkila; Kokemäki; Pori (ARO). — EH: Heinola Jyrängön koski (A. SALLMÉN); Sääksmäki (HN); Sysmä (ARO). — LK: Lumivaara Tervunjoki (Ts); Sortavala Hotinjoki; Rytty; Ristoja (Ts); Kirjavalahki (SLA); Salmi Uuksunjoki and Tulemajoki (Ts). — EP: Ylistaro (A. NORDMAN). — PH: Laukaa (WDT); Rautalampi Kuningassaari and Sarviniemi (KST). — PS: Kuopio and Tuovilanlahti (ARO); Maaninkajärvi (LVR); Keuvonkoski Kiurujoki (A. RUOTSALAINEN). — KP: Kokkola (HELLSTRÖM). — Kn: Sotkamo Sapsojärvi (LR); Kajaani (NORDMAN); Suomussalmi and Hyrynsalmi (HN). — PP: Oulu (Vs); Tornio (HÄK.

LINDBERG); Tervola (O. SIITONEN). — Ks: Kuusamo (HN). — KemL: Muonio Jeerijoki (LMI); Sodankylä (EURÉN); Rovaniemi (HN, VLE). — [«Car. ross.» (INBERG)].

Spread almost over the whole country, wanting only in the three most northern provinces. Adults have been taken during the time 25. V—22. VIII. — I have got in Sortavala amongst normal light tar-brown individuals, some females, that were wholly pallid yellow. The hue of the nymphs also varies somewhat, probably depending on the quality of the bottom and the water. ARO (1910, p. 21) relates that almost black nymphs of this species, when brought into an aquarium, acquire the green color of the water plants or the brown color of the bottom.

Heptagenia dalecarlica BGTN.

Kk: Pyhäjärvi (JSc). — LK: Käkisalmi (Lvr); Sortavala and Salmi (Ts). — PH: Rautalampi Vaajasaari (Kst). — PS: Suonenjoki Jänissaari (Kst). — PK: Juuka (Wdr). — Kn: Utajärvi Vaala (LMI). — PP: Kemi (LMI); Ii (Fr). — Ks: Kuusamo (HN). — KemL: Muonio (MLL); Jeerijoki (LMI). — EnL: Enontekiö (JSc). — InL: Nuorgam (HN); Inari (POPPIUS); Utsjoki (Ss, JSc, HN). — PsL: Petsamo (HN). — [ÄK: Petroskoi (GÜNTHER). — KerK: Kouta (SUNDMAN). — ImL: Kannanlahti (Fr). — PoL: Ponoï (Fr, MLL). — MRL: Voroninsk (PN)].

The localities, known up to date, lie in North-, Central- and East-Finland. Flying period 9. VI—16. VIII.

Arthroplea congener BGTN. (*Cinygma mirabilis* ARO).

U: Vihti, from pools at the shore of Kirjava (ARO) 21. V. 1903, nymphs. — EK: Jääski Ahtialanpuro (ARO) 12. VII. 1917, nymphs; Jääski Sopero Liisniitty (VLE). — St: Kokemäki, from the river (ARO), nymphs. — EH: Sysmä Nuoramoisjärvi (ARO), 1 ♂. — LK: Sortavala Myllykylä (SLA) 9—20. VI. 1902, nymphs; Kuorejoki (SLA) 16. VI. 1902, nymphs; Rytty (Ts); Impilahti (Ts). — PS: Tuovilanlahti (ARO). — KP: Veteli (E. NESSLING). — PP: Tornio (Fr.), nymphs. — Ks: Salla (Fr), 2 ♂; Vuorijärvi (Krs), 1 ♂. — InL: Inari Kietsimäjoki (Ss), 1 nymph. — PsL: Haukilampi (PULKKINEN), 20 ♂. — [ÄK: Juustjärvi (JSc). — MrL: Varsina (NYBERG)].

Flight observations from the time 14. VI—21. VII. — In ARO's figure of the genitalia of the male (ARO 1910, fig. 27 and 1928, fig. 57), the fifth joint of forceps is wanting, the joints 4—5 evidently being conceived as one. The synonymics of the species has been dealt with by LESTAGE (1924, p. 34—35) and BENGTSOON (1930 b

p. 27). — ARO, who reared nymphs in an aquarium, relates about its mode of living as follows (ARO 1910, p. 22—23): »The nymph, that is thickly covered with rust, living in water containing rust, loses this protecting coloration in the aquarium and becomes pitch black, shining, and it is then difficult to distinguish it from the black twig, on which it is sitting. It collects food in its mouth in a very remarkable way. Its maxillary palpi are 2-jointed and uncommonly long, and the terminal joint has two thick rows of long bristles. These peculiar maxillary palpi the insect uses in the way, that it tosses that bowed joint backwards, over its back and jerks it from there obliquely upwards back to the front of the labial palpi. At the same time, of course, all the water in the way strains through the bristles of the maxillary palpi, while, on the other hand, the algae etc. catch in them. Then the animal draws the maxillary palpi between the drooping and outspread, longhaired labial palpi, whereat the food caught in the former, is now held by the latter, and the maxillary palpi return to their catching trip. The labial palpi are in the same manner cleaned by the outer and inner lobes of the labium, and first by the united action of these and the maxillae the grains of sand and other worthless stuff are removed, while the actual foodstuffs are carried between the mandibles. Sitting under stones, trees etc. so near the bottom, that the outspread maxillary palpi just touch the bottom lightly, the animal can collect in its mouthparts all the organisms within its reach and make a couple of shallow depressions in the bottom. Then it moves to another place and here continues its catching in the same manner, until it has collected all the food that there is there. Larger *Cladocera*, *Copepoda* etc., that are too large, are carefully removed, but the small and soft animals and the algae are utilized for nourishment. And when the bristles of the maxillary palpi for some reason or other have got into disorder, mixed up with one another etc., the nymph cleanses them and sets them right, drawing them slowly through between the palpi and the outer lobes of the labium.»

Metretopus borealis ETN. (*norvegicus* ETN).

U: Helsinki (Coll. HELLMAN). — EK: Vehkataipale (ARO). — LK: Lumivaara and Salmi (Ts). — PH: Keitele Sumiainen (LR); Rautalampi Vaajasaaari (KST). — PS: Tuovilanlahti (ARO). — Ks: Kuusamo Mutkatunturi (KRS). — KemL: Sodankylä Tähtelä, at the shore of Kitinen (VLE). — InL: Inari (ITKONEN, JSc); Utsjoki (Ss). — PsL: Pummanki Karhujärvi; Hauki-

lampi; Salmijärvi; Nautsi (VLE). — [TL: Nuortijärvi (ENVALD). MR: Voroninsk (PN)].

Adults have been taken during the time 23. VI—16. VIII. — The synonymics has been made clear by BREKKE (1938, p. 57—58). — ARO (1910, p. 21—22) pictures his observations on nymphs as follows: »The nymphs, that have on their body silvery, glimmering spots, exactly like the sandy bottom containing mica, where they live, lose these spots after coming to live on a bottom without mica grains. The claw of the fore leg of the nymph is scooplike and comb-edged, and with it the nymph hauls mud and sand from the bottom in front of its mouth, where the labial palpi chose the suitable stuffs to be carried between the mandibles and maxillae, while the sand grains etc. are shoved aside. In this way in front of the nymph there will be a perpetual lively motion of sand grains etc., and among them shining mica particles, that reveal the abode of this nymph, which otherwise is very difficult to discern.»

**Metretopus alter* BGTN.

InL: Utsjoki Outakoski (Ss) 3. VIII. 1905, 1 ♂.

Previously known only from Norway, Raavand, where 5 specimens were found, on the ground of which BENGTSOON (1930 a, p. 18) described the species.

**Siphonurus zetterstedti* BGTN.

Kk: Isthm.car. (APPELBERG). — St: Nakkila Kokemäenjoki (ARO). — LK: Jaakkima (MLL); Valamo (CHYDENIUS); Sortavala (Ts). — PS: Kuopio; Tuovilanlahti (ARO). — Ks: Salla (FR). — KemL: Muonio (MLL, SLA). — EnL: Enontekiö Näkkälä (A. B. NYMAN); Ounastunturi; Hetta (Ss). — InL: Inari (POPPIUS); Utsjoki Outakoski (Ss). — PsL: Pummanki (LMT); Haukilampi; Nautsijoki; Parkkina (VLE). — [VL: Lusmjaur (PN). — MrL: Gavrilovo (HN)].

Adults have been taken in South- and Central Finland during the time 22. VI—19. VII, in Lapland 4. VII—4. VIII. — All the informations about the species *S. lacustris* ETN. occurring in Finland (ARO 1910 and 1928; TS 1935) refer to *S. zetterstedti*. The former has consequently to be excluded from our lists. I have made preparations of the penis of several specimens from different parts of our country and ascertained, that they are accordant with BENGTSOON's (1930 b, p. 12, fig. 14) figure of the latter species.

Siphonurus aestivalis ETN.

LK: Sortavala Tuokslahti Hotinjoki (SLA) 27. VI. 1902, nymphs; Kuorejoki (SLA) 14. VI. 1902, 1 subimago; Rytty and Lohioja (Ts). — PK: Ilomantsi (WDT). — PP: Oulu, from the river (Vs), nymphs. — Ks: Salla (FR) 4. VII. 1936, 2 ♂; Salla Vuorijärvi (Krs) VII. 1936, 3 ♂. — KemL: Muonio (MLL). — EnL: Ounastunturi (Ss) 10. VII. 1905, nymphs. — InL: Inarinjoki (Ss) 19. VII. 1905, nymphs; Utsjoki Outakoski (Ss) 1—5. VIII. 1905, nymphs. — [MrL: Voroninsk (PN)].

This species, the distribution area of which stretches from the Mediterranean countries and Asia Minor to the coasts of the Arctic Ocean, has up to date been found only in the eastern and northern provinces of our country. Adults are found from the middle of June to the end of July. In Sortavala the species lives, among other places, in a quite small forest brook, into which cold spring-waters enter. There I have collected nymphs as late as 22. VII, which in an aquarium developed into adults within two days.

Siphurella linnaeana ETN.

V: Karjalohja (HN). — U: Espoo (ARO). — EK: Jääski (ARO); Rättijärvi (LMI); Karilahti (ARO); Seiskari (HN). — Kk: Muolaa (HN); Valkjärvi (INGELIUS); Uusikirkko Vammeljoki; Kuokkala; Kuolemajärvi; Kivennapa (SLA). — St: Heinoo Prihti (ARO); Kokemäki (ARO). — EH: Sysmä (ARO). — ES: Lappee (SLA). — LK: Jaakkima (JSc); Sortavala (SLA, Ts); Janaslahti (Kst); Lumivaara; Harlu (Ts). — EP: Ylistaro (A. NORDMAN). — PH: Keitele Iitsalo (LR); Keuruu (HN). — PS: Kuopio (ARO, FR); Iisalmi (JSc); Suonenjoki (Kst). — PK: Liperi (ARO). — KP: Kokkola (HELLSTRÖM). — Kn: Kajaani (ARO). — PP: Tervola (O. SIITONEN); Oulu (Vs); Ylitornio (LMI). — Ks: Kuusamo (Krs). — KemL: Kemijärvi (A. L. BACKMAN); Sodankylä (SUNDMAN). — EnL: Kalmakaltio (Ss). — InL: Utsjoki Niittyvuopio (Ss); Inari (A. B. NYMAN). — PsL: Haukilampi (PULKKINEN, VLE); Nautsi (VLE). — [KerK: Kouta (SUNDMAN). — TL: Nuortijärvi (ENVALD). — MrL: Voroninsk (PN)].

Lives both in lake- and in river-waters. Observations of the occurrence of adults are from the time 10. VI—18. VIII.

Parameletus chelifer BGTN. (*Palmenia fennica* ARO).

PP: Oulu (HOUGBERG, Vs); Kemi (A. B. NYMAN); Tornio (FR). — KemL: Kittilä (Ss); Pallastunturi (E. KANGAS); Muonio (MLL); Rovaniemi, brook of Luomavaara (LMI); Kittilä Alakylä (A. B. NYMAN). — EnL: Enontekiö Kalmakaltio (Ss); Karesuanto Muotkavuoma (FR). — InL: Ivalo (A. NORD-

MAN). — PsL: Petsamo (HN); Pummanki; Nautsijoki; Salmijärvi (VLE). — [VL: Kuzomen (HN). — MrL: Voronje (PN)].

LESTAGE (1924, p. 35—36) and BENGTSOON (1930 b, p. 14—15) have discussed the synonymics of the species. — Flying individuals have been observed all the summer, 20. V—16. VIII.

**Parameletus minor* BGTN.

PP: Pudasjärvi (ENVALD); Kemijärvi (T. H. JÄRVI), 4 fullgrown nymphs from the stomach of a salmon. — KemL: Turtola (BERGROTH). — [ImL: Jokostroff (ENVALD)].

Ameletus inopinatus ETN.

PP: Oulu (HOUGBERG, Vs). — Ks: Salla Vuorijärvi (Krs). — KemL: Muonio (MLL). — EnL: Enontekiö Hetta Närpistöjoki (E. SUOMALAINEN); Koltapahta (Fr). — InL: Utsjoki Onnela (A. NORDMAN); Outakoski (Ss). — PsL: Petsamo (STORÅ); Patsjoki; Haukilampi; Pummanki; Nautsijoki; Hoo-manjoki (VLE). — [ImL: Imantero (ENVALD)].

Observations of the occurrence of adults 17. VI—4. VIII. — The species, which in Finland lives only in the northern part of the country, has been found elsewhere, besides in Scandinavia, in Poland, Transsilvania, Schwarzwald, the Vosges and England (LESTAGE 1935, p. 92).

**Ameletus alpinus* BGTN.

InL: Utsjoki Outakoski Akuvaara (A. B. NYMAN) 2. VIII. 1905; nymphs. — PsL: Salmijärvi (VLE) 5. VII. 1928, 1 ♂ from a meadow at the shore.

Previously known from the mountain regions of Northern Sweden (BENGTSOON 1930 b, p. 17) and from Northern Norway (TS 1937 a, p. 45). BREKKE (1938) has in his paper about the Norwegian mayflies left this species unmentioned. He has informed me by correspondence, that he on the basis of his rich material has formed the opinion, that it is to be considered only as a variety of *A. inopinatus* ETN. He also communicates, that there are intermediate forms between these two species.

Baëtis niger L.

V: Karjalohja (JSG). — U: Tuusula Järvenpää (SLA). — St: Kokemäki Riste, the coast of Piiito (ARO). — LK: Lumivaara; Sortavaala (Ts). — PH: Jyväskylä (WDT). — Kn: Hyrynsalmi (HN). — KemL: Pelkosenniemi (FR). — EnL: Enontekiö (E. SUOMALAINEN). — InL: Ivalo (A. NORDMAN).

Flying period 8. VI—1. IX. The earliest observation of the occurring of the adults has been made as far north as in Ivalo 8. VI. 1937; as an explanation may be mentioned, that in the year in question the summer came to Lapland exceptionally early. From Southern Finland the earliest observation is 10. VI.

Baëtis muticus L.

LK: Sortavala Tuokslahti (SLA) 27. VI. 1902; Lohioja (SLA) 30. VI. 1902; Rytty and Ristoja (Ts) 9. VI—3. VIII; Impilahti Hunttila (Ts) 7. VII. 1934. — EnL: Enontekiö Koltapahta (FR) 17. VII. 1924. — InL: Utsjoki (Ss) 10—12. VIII. 1905. — PsL: Trifona (HN). [MrL: Gavrilovo (FR)].

The species has up to date been found in our country in two separate districts far from one another, viz. in Laatokan Karjala and in the most northern parts of Lapland.

Baëtis pusillus BGTN.

LK: Sortavala Rytty (Ts) 3. VIII and 27. VIII. 1934, 1 ♂ 5 ♀.

My determination is based on BENGTTSSON'S (1912 b, p. 113) description, which well fits these specimens.

**Baëtis venustulus* ETN.

St: Kokemäki Kierikka, at the river (ARO) 31. VII and 24. VIII. 1904, several ♂ and ♀.



Fig. 7. Hind wing of *Baëtis venustulus* ETN., from Finland (Orig.).

ARO already during his time determined the specimens he had found as *venustulus*. Nevertheless he perhaps was not quite sure of the species, as he did not mention it in his publications. In comparing these in alcohol preserved, faded specimens with the descriptions and figures in the literature, I have not been able to detect any structural difference of greater importance. In our specimens the projection in the fore edge of the hind wing (fig. 7) is noticeably protruding and sharp (compare SCHOENEMUND 1930, p. 42, fig. 66). Some of these specimens have lately been seen by BREKKE, and he has confirmed the determination.

Baëtis scambus ETN.

Kk: Muolaa Hotokka (Aro) 11. VII. 1921, 1 ♂. — LK: Sortavala Hotinjoki (Ts) 20. VI and 30. VI. 1934, 2 ♂ 5 ♀; Salmi Mantsinsaari (Ts) 7. VIII. 1936, 3 ♀. — PS: Suonenjoki Iisvesi (Ksr) 18. VII and 20. VII. 1929, adults. — PK: Liperi Taipale (Aro) 26. VI. 1905, adults. — Kn: Utajärvi Vaala, at the shore of Oulunjärvi (LMI) 3. VIII. 1902, 2 ♀. — KemL: Muonio (MLL). — [TL: Nuortijärvi (ENVALD). — MrL: Voroninsk (PN)].

**Baëtis subalpinus* BGTN.

PsL: Petsamo (HN), dried specimens.

Baëtis rhodani PICT.

A: Quaruforssen (M. WEURLANDER) 28. VI. 1904, 1 ♀. — U: Tikkurila (Aro) 19. V. 1901, 2 ♀. — LK: Sortavala Rytty and Ristoja (Ts) 9—16. VI.

All our observations of adults are from the beginning of the summer. Also in Central Europe the species is one of the earliest mayflies, emerging even when the water is still partly covered by ice (SCHOENEMUND 1930, p. 41). The nymphs, that I have collected in the beginning of June from brook-stones in Sortavala, are immediately distinguished on account of their larger size from other *Baëtis*-nymphs living in the same waters (*niger*, *muticus*). They also correspond with EATON's (l.c., Pl. 44) figures of the species in question down to the minutest details.

**Baëtis wallengreni* BGTN.

V: Karjalohja (Krs) 11. VI. 1934, 1 ♀. — U: Tuusula (SLA) 10. VI. 1904, 1 ♂. — PH: Jyväskylä (WDT). — PP: Utajärvi Oulunjoki (LMI) 3. VIII. 1902, 1 ♂. — KemL: Rovaniemi (HN). — EnL: Enontekiö Hetta Närpistöjoki (E. SUOMALAINEN). — InL: Utsjoki (HN). — PsL: Nautsi (LMI, VLE) 23. VI. 1928, adults. — [ImL: Umba (EDGREN) 1 ♂; Kannanlahti (JSc). — TL: Ryhpjaur (PN)].

Baëtis vernus CURT.

PP: Oulu (Vs) 17. VIII. 1909, 1 ♂. — EnL: Enontekiö Koltapahta (FR) 17. VII. 1924, 1 ♂ subimago. — PsL: Pummanki (E. KANERVO, VLE) 1—6. VIII. 1928, adults; Karhujärvi (VLE) 6. VIII. 1929, 26 ♂; Nautsijoki (VLE) 23. VI. 1928; Vaitolahti (VLE) 1. VIII. 1928. — [VL: Lujaur (PN)].

Baëtis gemellus ETN.

St: Kokemäki, from the river (ARO) 28. VII—22. VIII, abundant. — EH: Sysmä Suopelto (ARO) 21. VIII. 1902, adults, EATON det! — LK: Lumivaara; Sortavala; Impilahti; Salmi (Ts) 3. VI—1. IX. — PsL: Pummanki; Vaitolahti (HN). — [ImL: Kannanlahti (HN)].

BREKKE has seen some of our specimens and confirmed the determination.

Note. — ARO (1910, p. 29; 1928, p. 41) has also reported the species *B. melanonyx* PICT. as belonging to our fauna. The specimens thus determined by him are, however, nothing else than *gemellus*. The species *melanonyx* has in its hind wing three cross-veins (SCHOENEMUND 1930, p. 40), which fact Aro does not mention in his description of the species (ARO 1928, p. 41—42). The wings of his specimens are without cross-veins, neither do these specimens in any way differ from *gemellus*, which he also collected from the same place and at the same time as his »*melanonyctes*», and also determined correctly. The species *gemellus* both in size and hue is somewhat varying, the abdomen of the male, for instance, can be in the middle translucently white or wholly brownish. This fact has probably lead ARO to see in it two species.

Baëtis tenax ETN.

KemL: Kolari, the church-village (LMI) 4—5. VIII. 1903, 1 ♂, EATON det! — InL: Utsjoki (Ss) 10—12. VIII. 1905, adults. — PsL: Pummanki (VLE) 4. VIII. 1928, adults.

Baëtis saliens n.sp.

Male. Head brown and yellow mottled. Turbinate portion of eyes of common shape, moderately increasing in breadth towards the upper edge, their color reddish yellow, the lateral portion greenish. Thorax pale or darker brown, laterally and ventrally yellow striped. First segment of abdomen brownish, the segments 2—6 hyaline grayish, posterior segments brownish. Legs yellowish white. Setae white, sometimes tinged with reddish on the base. Wings hyaline with pale venation. Hindwing with three not branched veins, the third vein close to the margin and ending at the middle of the same or a little farther out. Normally there are no crossveins on the hindwings, but some specimens have two to four irregularly situated

crossveins. Genitalia white, with the second joint of forceps conical; the inner apical edge of the first joint blunt, projecting. The third joint at the base abruptly curved inwards, so that the inner margins of the second and third joints form a right angle. The fourth joint oval, its length $\frac{2}{3}$ of the third joint. Length of body 6.5–8 mm, forewing 6–7.5 mm, setae 13–16 mm.

Female. Eyes dark green, body pale brownish, abdomen ventrally yellowish. Legs yellowish, fore femur grayish green. Setae white. Length of body 6.5–8 mm, forewing 7–8 mm, setae 9–11 mm.

Subimago. Wholly yellow, abdomen ventrally pale yellow, thorax above faintly brownish and with brown stripes at the sides. Legs grayish green, tarsi more dark, wings gray.

Types in the Entomological Museum of Helsinki University.

Localities: EK: Antrea Karilahti (Aro). — LK: Sortavala Läppäjärvi and Liikolanjärvi (Ts).

My observations concerning the swarming are from the time 8. VI–14. IX. The species occurs in Sortavala only at lake-shores, and even most abundantly in shallow, reedy places. Judging from this the nymph lives in still water. It swarms on meadows by the shore in the evenings before sunset, during cloudy weather also earlier in the afternoon. It often appears together with *Centropilum diaphanum*, which it greatly resembles, especially in its colors, being however somewhat larger than the latter.

Previously (Ts 1935, p. 17) I considered this species as belonging to *B. bioculatus* L., regarding it as a pallid variety of the latter. It is doubtlessly nearest related to the species mentioned, differing from it by its light color and rectangular gonopods. Its occurrence solely at stagnant waters also indicates, that a distinct species must be in question. All other European *Baëtis*-species live, as far as I know, in running water, and most of them can live only in rapid places.

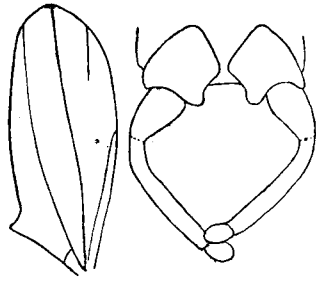


Fig. 8. Hind wing and forceps of *Baëtis saliens* n.sp. (Orig.).

Baëtis bioculatus L.

A: Quaruforssen (WEURLANDER). — V: Karjalohja (JSc). — U: Tuusula (SLA). — LK: Sortavala (SLA, Ts); Lumivaara; Jaakkima; Impilahti (Ts). — EH: Sysmä Suopelto (ARO). — PS: Kuopio; Tuovilanlahti (ARO). — PK: Juuka (WDT). — PP: Kemi (LMI); Oulu (Vs). — [MRL: Gavrilovo (ENVALD)].

Observations on the occurring of adults are from the time 16. VI. — 7. VIII. — Finnish specimens of this species have recently been examined by BREKKE, and he has confirmed that it is identical with the species known in Norway by the same name.

Acentrella lapponica BGTN.

KemL: Muonio (JSc). — EnL: Enontekiö (NORRLIN). — InL: Utsjoki (JSc). — PsL: Pummanki (FR, VLE) 4. VIII. 1928, 3 ♂ 1 ♀. — [VL: Lujaur (PN). — PoL: Ponoï (MLL)].

Centroptilum tenellum ALB.

St: Kokemäki, shore of Pilito (ARO) 3—18. VIII. 1904, many specimens.

Centroptilum diaphanum MÜLL.

V: Naantali (Ts); Karjalohja (HN). — U: Tuusula (SLA). — EK: Jääski Vuoksi; Karilahti (ARO). — Kk: Muolaa Hotakka (ARO); Punnusjärvi (SLA). St: Nakkila Kokemäenjoki (ARO); Heinoo Prihti (ARO). — EH: Sysmä Suopelto (ARO). — LK: Parikkala (JSc); Kurkijoki; Lumivaara; Jaakkima; Sortavala; Harlu; Impilahti; Salmi (Ts). — PH: Konginkangas Keitele (Lr); Rautalampi Soikarinniemi (Kst). — PS: Iisalmi (JSc); Kuopio; Tuovilanlahti (ARO). — PK: Liperi Murkiniemi (ARO); Juuka (WDT). — PP: Ii (S. NORDBERG). — Ks: Kuusamo (HN); Salla (Hn); — KemL: Sodankylä Tähtelä (VLE). — EnL: Enontekiö (JSc). — PsL: Nautsi; Salmijärvi (VLE); Nautsijoki (LMI).

Flight observations 31. V—30. IX. — BENGTTSSON (1912 a, p. 12—13) has proved that the significance of the name *C. luteolum* MÜLL., which, it is true, has already an established usage, is uncertain, and that this species on account of the priority-rule shall bear the name of *diaphanum* MÜLL.

Centroptilum ? stenopteryx ETN.

LK: Lumivaara Tervunjoki (Ts); Sortavala Ristoja and Rytty (Ts).

Flight observations 27. VII—9. VIII. Solitary specimens in flight after sunset, above brooks. — It is very doubtful, whether this really is *stenopteryx*, which up to date is known only from

Kärnten, or whether it perhaps is a new species. In each case it is near *C. diaphanum*, and is perhaps to be considered as a variety of it. The color characteristics and the structure of the hindwings are similar to those of the species mentioned. The only differences are the smaller size (the length of the body 3.5–4.5 mm, *diaphanum* 5–6 mm) and the form of the gonopods (fig. 9), especially of their terminal joint.

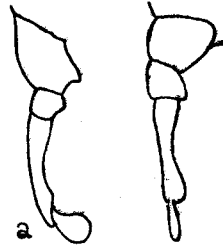


Fig. 9. Gonopod of *Centroptilum ? stenopteryx* ETN. (a) from Finland compared with the same of *C. diaphanum* MÜLL. Drawn from dried specimen (Orig.).

Cloëon dipterum (L.) BGTN.

V: Karjalohja (HN) 1 ♀. — U: Espoo Lill-Lötö (LVR) 1 ♂ 1 ♀. — EK: Antrea Karilahti (ARO) 1 ♀.

Cloëon inscriptum BGTN.

V: Parainen (KST) 7. VII. 1924, 1 subimago. — Kk: Kuolemajärvi, Kipinolan järvi (SLA), nymphs. — LK: Sortavala (Ts) 27. V—4. IX, adults; Lohioja (SLA), 1 ♀. — PH: Keitele, the mouth of Ukonpuro (LR) 14. VI. 1897, 1 nymph. — PS: Savonia bor. (L. SALLMÉN); Tuovilanlahti (ARO) 9. VI—18. VIII. 1901.

Cloëon rufulum MÜLL.

EK: Antrea Karilahti (ARO) 22. VIII. 1923, 5 specimens. — St: Kokemäki, the river (ARO) 22. VII. 1904, 3 ♂. — ES: Rantasalmi (WESTERLUND). — LK: Sortavala; Salmi (Ts) 10. VII—2. IX. — PH: Keitele (LR) 21. VII. 1897, 1 subimago and 7 nymphs. — Kn: Sotkamo Kukkonen (LR) 25. VI. 1908, fullgrown nymphs.

ARO (1928, p. 46) described this species under the name *C. rufulum* var. 2. — It appears often together with the following species, which it resembles rather much in habitus.

Cloëon simile ETN.

U: Kirkkonummi Jorvas (FR) VI. 1918, 9 full grown nymphs; Porvoo Långholm (P. SUOMALAINEN) 10. VII. 1928, adults. — EK: Koivisto (SLA), nymphs; Antrea Karilahti (ARO) 22. VIII. 1923, 1 ♂; Johannes (SLA), nymphs. — EH: Sysmä Suopelto (ARO) 5. VIII. 1902, 2 ♀. — LK: Käkisalmi, from the pool of the fish-breeding institution (LVR), 11 nymphs; Sortavala (SLA, Ts) 24. VI—3. IX; Salmi (Ts); Jaakkima (MLL). — PS: Tuovilanlahti (ARO).

According to ARO (1928, p. 45) flying throughout the whole summer and is the most common of our *Cloëon* species. He, however, also included *praetextum* in the *simile*, into which it comes by his key to the species (l.c., p. 31). That the description of the species (l.c., p. 45) refers just to *simile*, is shown, as well as from the figure (l.c., fig. 43), from the description, in which among other things he says: »setae white, with red rings.» In the material, that Aro himself had collected, *simile* is actually abundant, but there are only two small samples of *praetextum*.

Note. — The species *C. rufulum* MÜLL. and *C. simile* ETN. at present have not yet been found in Scandinavia (see BENGTTSSON 1914), which makes their occurrence in Finland interesting. Being common in Central and Eastern Europe, they have easily spread into Finland by land from the southeast. But why have they not been able to spread to Scandinavia? Taking into consideration, how with the aid of their sharp senses they are able, while swarming, to stay in the vicinity of the pools, I consider it very likely, that they on the other hand are capable of avoiding the vicinity of salt and brackish water, and consequently have not started to fly over the Danish sounds, still less over the wide Baltic Sea or Gulf of Bothnia. And if such slender fresh-water animals fall into sea-water, it causes their death as well as the death of their eggs and nymphs. Neither have they been able to extend the territory inhabited by them to Sweden by way of the north side of the Gulf of Bothnia, since they have not yet spread to the provinces bordering on Sweden. Kn is the most northern province, in which the former, PS in which the latter species has been found. Neither has *C. rufulum* been yet found at the seashore, but only inland.

Cloëon praetextum BGTN.

A: Finström Långsjö; brook of Bjärnström; Maarianhamina (M. WEURLANDER). — V: Karjalohja (HN). — U: Tvärminne (POPPIUS, SLA); Tvärminne Gloviken (FR, KST, A. NORDMAN); Tammisaari (HN); Espoo Löfö (LVR); Helsinki (FR); Porvoo Äminsby Livalahti (E. SUOMALAINEN), nymphs. — EK: Seiskari (HN). — Kk: Terijoki (HN). — St: Pori Preiviiki; Heinoo (ARO); Pori (LÖNNMARK). — PS: Kuopio (VESTERLUND). — PP: Simo (INGELIUS); Hailuoto (Vs); Ii (S. NORDBERG). — PsL: Petsamo (HN).

Flight observations from the end of June to 20. IX. — Contrary to the two preceding species, this one seems to live mostly at the

seashore, or at least in the vicinity of it. There are only two records from the inland. Nymphs have been collected in many places in seabays with brackish water.

Procloëon bijidum BGTN.

V: Lohja (LR). — U: Helsinki (TENSTRÖM). — EK: Karilahti Vuoksi (ARO). — St: Kokemäki, from the river (ARO). — EH: Nastola, Pieni Kukkanen (SLA). — LK: Sortavala Paksumiemi (SLA); Ristoja (Ts); Lumivaara Tervunjoki and Ihalanjoki (Ts); Salmi Tulemajoki (Ts). — PH: Saarijärvi (Kst). — PS: Kuopio and Tuovilanlahti (ARO). — KP: Kokkola (HELLSTRÖM). — PsL: Nautsi (VLE) 22. VI—4. VII. 1928, 24 specimens.

Adults have been taken during the time 22. VI—27. VIII. — Without having any knowledge of BENGTTSSON's (1914) paper about the *Cloëon* species, ARO nevertheless understood, that this form differs from the proper *rufulum* MÜLL. He called it *C. rufulum* var. 1. and gave a detailed description of it (ARO 1928, p. 45—46).

Paraleptophlebia submarginata STEPH.

LK: Kurkijoki (Ts); Sortavala Rytty (Ts).

In Kurkijoki at the brooks I collected 30. V. 1936 subimagines, which the next day changed into adults. My observations of the appearing of the adults in Sortavala are from the time 9. VI—7. VII

Paraleptophlebia cincta RETZ.

EK: Suursaari (HN). — Kk: Metsäpirtti (P. H. LINDBERG); Viisjoki (Ts), 2 ♂. — St: Yläne (JSc), 2 ♂; Karkku Heinoo Myllypuro (ARO), 5 ♂. — EH: Padasjoki (EHNBERG). — LK: Sortavala, Törsävän lampi (SLA); Sortavala Rytty; Kurkijoki Ihojärvi; Impilahti Hunttila (Ts). — PS: Tuovilanlahti Korkeakoski; Kuopio (ARO). — Kn: Kajaani Ämmäkoski (ARO). — KemL: Muonio (SLA).

Observations on adults 22. VI—8. VIII.

**Paraleptophlebia tumida* BGTN.

Ks: Kuusamo (HN) 1 ♂.

A dried specimen, but well preserved, wherefore it could be determined on the basis of BENGTTSSON's (1930 a, p. 8—10) description and figures. Previously known only from Northern Norway.

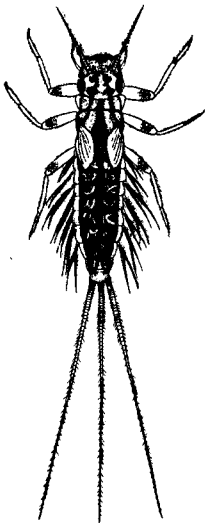


Fig. 10.
Paraleptophlebia strandi EN., nymph.

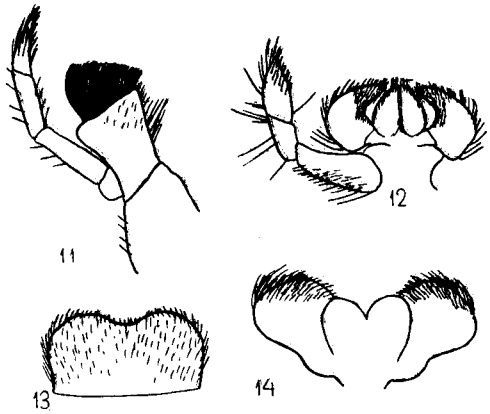


Fig. 11—14. *Paraleptophlebia strandi* ETN., nymph. — 11. maxilla, 12. labium, 13. labrum, 14. maxillulae and hypopharynx (Orig.).

Paraleptophlebia strandi ETN.

LK: Lumivaara Huhtervu and Kesvalahti; Sortavala Rytty and Ristoja; Impilahti Hunttila and Syskyä (Ts). — PH: Äänekoski (JSG); Rautalampi (KST). — PS: Suonenjoki (KST); Maaninka Tuovilanlahti, Korkeakoski (ARO), EATON det.; Iisalmi (ARO). — KemL: Kolari (LM1); Muonio Jerisjoki (O. SIIRONEN). — [ImL: Kannanlahti (JSG)].

My observations concerning the swarming in Sortavala are from July, 2. VII—29. VII; in Northern Savo adults have still been seen 26. VIII (ARO). During the last days of June I found in a small brook in Sortavala two fullgrown nymphs of this species, of which I here give a short description.

Nymph (fig. 10—14). Body not so slender as in *P. cincta*, coloration greenish gray. Abdomen dorsally with irregular pale streaks. Setae somewhat longer than the body, short haired. Both branches of the tracheal branchiae about equal in length. Labrum concave on the fore margin, hypopharynx apically notched. The basal joint of labial palpi nearly as long as the joints 2 and 3 in total, second joint only a bit shorter than third. Terminal joint of maxillary

palpi somewhat shorter than the third joint of the same. Length of body 5 mm, setae 5–6 mm.

Leptophlebia vespertina L.

A: Sund, brook of Ryssböle (M. WEURLANDER); Geta (MLL). — V: Karjalohja (HN); Ispoinen (? leg.). — U: Tuusula Järvenpää (SLA); Nurmijärvi (K.E. KIVIRIKKO); Tvärminne (A. NORDMAN). — EK: Vehkataipale (ARO); Heinjoki (Ts). — Kk: Muolaa (KRS). — St: Pori; Kokemäki (ARO); Huittinen (LÖNNGREN). — EH: Pirkkala Siuro; Sysmä Suopelto (ARO); Padasjoki (ENNBORG). — LK: Sortavala (O. SITONEN, SLA, Ts); Lumivaara (Ts); Harlu (Ts); Valamo (CHYDENIUS). — PH: Rautalampi Vaajasaari; Soikarinniemi Kahkosaari (KST); Keitele Syvälahti (LR). — PS: Kuopio Raimajärvi (ARO); Iisalmi (JSG). — PK: Liperi (ARO, WDT). — Kn: Suomussalmi (HN). — PP: Kuhmo (VLE); Pudasjärvi (ENVALD); Tornio (FR). — Ks: Paanajärvi (HN); Kuusamo Soppelojärvi; Peräjärvi (FR). — KemL: Muonio (MLL). — EnL: Enontekiö Näkkälä Hiekkaranta (KRS). — InL: Inari; Ivalo (HN). — PsL: Petsamo (STORÅ); Haukilampi (VLE). — [ImL: Kannanlahti (JSG). — TL: Kuolla (NYBERG, PN). — MrL: Voroninsk (PN)].

Swarms in South-Finland from the end of May to the end of June; my own observations are from the time 27. V—30. VI. In Lapland it swarms from the middle of June to the middle of July. Also after the regular swarming period one may toward the end of the summer find sporadic adults; the latest observation is 14. VIII, Kokemäki (ARO).

Leptophlebia marginata L.

V: Uskela (MÄKLIN); Kaarina (VLE). — U: Tikkurila; Oulunkylä Vantaa (ARO); Tuusula (SLA); Järvenpää (LVR); Espoo Kauniainen (HN). — EK: Viipuri (SLA). — Kk: Kivennapa; Usikirkko (SLA); Terijoki (HN). — St: Pori (ARO); Huittinen (LÖNNGREN). — EH: Nastola (LR). — LK: Sortavala (O. SITONEN, SLA, Ts); Valamo (CHYDENIUS). — PH: Rautalampi (KST). — PS: Savonia bor. (L. SALLMÉN); Tuovilanlahti (ARO). — PK: Liperi (ARO, WDT). — KP: Kalajoki Rahja; Siipojoki (Vs). — Kn: Kajaani (ARO, Vs); Sotkamo Sapsojärvi (LR). — PP: Kuhmoniemi (VLE); Pudasjärvi (ENVALD); Tornio (FR); Ii (S. NORDBERG). — Ks: Kuusamo (ARO); Paanajärvi (HN); Juuma (FR). — KemL: Muonio (JSG); Sodankylä Tähtelä (VLE). — EnL: Enontekiö (FR); Näkkälä (SS). — InL: Inari (HN); Utsjoki Thule (FR). — PsL: Petsamo (STORÅ); Vaitolahti (HN); Pummanki Karhujärvi; Nautsi Höömanjoki; Kervanto; Parkkina; Salmijärvi (VLE). — [KerK: Soukelo (JSG); Kuntijärvi (ENVALD). — ImL: Kannanlahti (FR). — TL: Ryhpijaur (PN). — VL: Kuzomen (FR). — PoL: Ponoj (MLL). — MrL: Jokonga (ENVALD); Gavrilovo (FR, HN); Voronja (PN)].

Observations of swarming have been made in South-Finland during the time 16. V—15. VI (Ts), in Petsamo 18. VI—6. VIII (VLE).

Habrophlebia lauta MCLACHL.

EK: Jääski, brook of Ahtiala (ARO) 3—28. VII. 1917. — LK: Sortavala Hotinjoki (SLA) 31. VII. 1902; Lohioja (SLA) 21. VII. 1902, EATON det!; Sortavala Rytty; Jaakkima; Impilahti; Lumivaara (Ts) 22. VI—29. VII. — Ks: Kuusamo (HN); Salla (FR) 4. VII. 1936; Kutsajoki (KRS).

The segments 2—7 of the specimens found in Finland are purely white, without the dark brown lateral stripes, which according to SCHOENEMUND (1930, p. 55, fig. 97) occur in the Central-European form. Our form thus corresponds better with EATON's (l.c., p. 120—121) description.

Ephemerella ignita PODA.

V: Karjalohja (JSG). — EK: Jääski; Vuoksi (ARO). — Kk: Terijoki (Ts); Muolaa; Johannes; Uusikirkko (SLA). — St: Kokemäki (ARO). — LK: Käki-salmi (S. SAHLBERG); Sortavala (SLA, Ts); Lumivaara; Jaakkima; Salmi (Ts). — EP: Ylistaro (A. NORDMAN). — PH: Rautalampi (KST); Konginkangas Keitele Iitsalo (LR); Sumiainen; Keitele Mattilanvirta; Viitasaari (LR). — PS: Keuvonkoski Kiurujoki (A. RUOTSALAINEN); Kuopio; Maaninka (ARO); Kallavesi (LVR). — PK: Juuka (WDT); Liperi (ARO). — Kn: Kajaani (ARO). — PP: Oulu (Vs). — KemL: Muonio (MLL). — InL: Inari (B. POPPIUS). — PsL: Petsamo (HN). — [LPom: Rukajärvi (K. E. KIVIRIKKO). — ImL: Konesero (EDGREN)].

Lives at open shores of lakes, which are washed by the waves, in riverwaters and in larger brooks. Appears as adult only during the end of the summer; observations of swarming have been made in Finland 14. VII—3. IX.

Note. — BENTSSON (1917, p. 178—180) has described from Sweden the species *E. torrentium*, which there has spread from Skåne as far as to Lapland. BREKKE (1938, p. 65) reports, that it occurs also in Norway. It is of the size of *E. ignita*, but differs from it on account of its color characteristics. BENTSSON does not present any figures nor mention anything about the structure of the genitalia. Among our material, which for the greatest part consists of old alcohol specimens, which have lost their color, I have not been able to find any form differing from *ignita*. It is true, that this

species varies greatly in color, as I have noticed from fresh specimens, that I myself have collected. Also SCHOENEMUND (l.c., p. 56) relates variation in color.

**Chitonophora aurivillii* BGTN.

PP: Oulu (HOUGBERG); Tornio (FR); Tervola (O. SIITONEN). — Ks: Paanajärvi (HN). — KemL: Turtola (BERGROTH); Muonionniska (JSG); Rovaniemi Ounasjoki (A. B. NYMAN). — EnL: Enontekiö (JSG); Peltotunturi (Ss). — InL: Utsjoki Outakoski (Ss); Kaunispää (A. NORDMAN). — PsL: Trifona (HN); Salmijärvi Kolosjoki; Nautsi Hoomanjoki (VLE). — [ImL: Kannanlahti (HN); Konosero (EDGREN). — VL: Lusmjaur (PN). — PoL: Ponoï (MLL). — TL: Kuolla (PN)].

Observations of adults from the time 25. VI—3. VIII.

Chitonophora mucronata BGTN. (*Ephemerella aronii* ETN).

St: Kokemäki Pahdinginkoski (ARO) 22. VI—30. VII. 1904, abundantly adults; Nakkila Kokemäenjoki (ARO) 22. VI. 1906. — Kn: Hyrynsalmi (HN). — PP: Tornio (FR). — Ks: Kuusamo (in coll. LVR), mouth-parts of two nymphs in a sample from the stomach of a dipper. — PsL: Petsamo (HN).

The synonymics has been made clear by BENGTTSSON (1930 b, p. 3).

Eurylophella carelica TIENS.

LK: Kurkijoki (Ts) 30. VII. 1934, half-grown nymphs (see Ts 1935 p. 20—22).

Melanameletus brunnescens TIENS.

LK: Sortavala Ristoja (Ts) 18. VI. 1931, 1 ♀.

J. A. LESTAGE has by correspondence informed me, that he on the basis of the figures (Ts 1935, fig. 6—7) has ascertained, that this species belongs to the *Ephemerellidae*. The only known specimen has, anyhow, only two setae. According to my notes, the median seta was already wanting, when I caught it, and I was not able to see any scar of a rupture on it. The species has thus an exceptional position amongst the palaeartic *Ephemerellidae*, of which all the others have a long median seta. It deserves acquiring a new and more correct description, but I nevertheless postpone

it to some other time in the hope, that I shall succeed in procuring more specimens. The species seems to be very rare, as my renewed excursions to Ristoja have up to date been fruitless.

Caenis horaria fennica ARO.

U: PORVOO (P. SUOMALAINEN). — Kk: Uusikirkko (SLA). — St: Kokemäki (ARO). — EH: Sysmä Suopelto (ARO); Tampere (LUNDAHL). — ES: Kangasniemi (SUNDMAN). — LK: Sortavala (SLA, Ts); Impilahti; Salmi (Ts). — PH: Rautalampi Vaajasalmi (KST). — PS: Savonia bor. (L. SALLMÉN); Suonenjoki Iisvesi (KST). — PK: Liperi (ARO). — InL: Inari (POPPIUS).

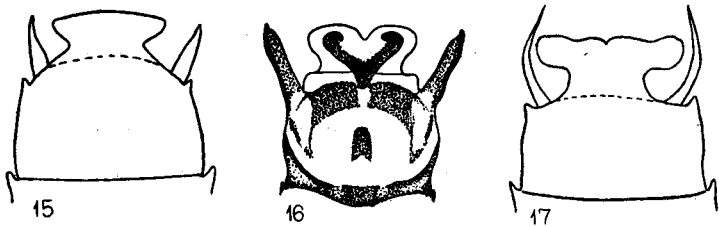


Fig. 15—17. Male genitalia of 15. *Caenis horaria fennica* ARO, 16. *Caenis undosa* n.sp., 17. *Caenis nivea* BGTN. (Orig.).

Lives both in lakes and in larger rivers. According to ARO it has been found swarming from the end of May to September. My own observations are from the time 26. VI—27. VIII. — EATON, to whom ARO at his time sent specimens of this form, declared that he considered it to be a variety of *C. horaria*, for which reason ARO called it var. *fennica*. The main form has not been found in Finland. In var. *fennica* the black spot at the end of the hind femur, which is characteristic of the main form, is lacking; furthermore its penis (fig. 15) is relatively narrower and has a more rounded outline than that of *horaria* (see SHOENEMUND 1930, fig. 110).

Caenis undosa n.sp.

Male. Head dark brown, eyes black. Antennal seta not thickened at the base. Pronotum even in breadth, with the front edges rounded, above dirty grayish brown, ventrally grayish white. Thorax above dark brown, ventrally whitish, the sides brown and white striped. Abdomen without pleural spines, above with a broad, brownish

gray stripe, laterally and ventrally white. Some specimens have the segments 9 and 10 brownish. Caudal setae white, legs grayish white, fore femur brown. Middle and hind coxae with a sharply limited black dot. The length of fore tarsus ca. $\frac{2}{3}$ of the fore tibia, the joints 3 and 4 equal in length, second joint as 3 and 4 in total, the fifth joint ca. $\frac{3}{4}$ of the fourth. Genitalia (fig. 16) with brown patterns, which on some specimens are faintly visible, on others rather dark. The gonopods brownish in color, sometimes whitish, with a minute notch at the inner side near the apex. They are almost from the base to the end equal in breadth, narrowing only at the apex. Penis somewhat widening apically, with rounded outlines. Wings whitish, costa, subcosta and radius gray, other nervures colorless. Length of body 3.5–4.5 mm, wing 3.5–4 mm, caudal setae 12–14 mm.

Female unknown.

Types in the Entomological Museum of Helsinki University.

Localities: V: Lohja Jalassaari (HÅK. LINDBERG) 22. VIII. 1933 at 22 o'clock, swarming towards a lamp in incredibly large numbers. — LK: Salmi Lunkulansaari (Ts) 13. VIII. 1934, small swarms on the sheltered side of the island, looking towards the mainland, at sunset; 7. VIII. 1936 from the same place a few specimens, all males.

Previously (Ts 1935, p. 22) I determined this species erroneously as *nocturna*, the description of which (BENGTSSON 1917, p. 185) fits it rather well. When I later on got alcohol material and could examine the genitals, I noticed, that it cannot be *nocturna*, which species thus has to be removed from our list. BENGTSSON has by correspondence informed me on the basis of the figure, that he has seen (fig. 16), that this is none of the species he knows, but that it comes nearest *C. moesta* BGTN.

Caenis nivea BGTN.

LK: Salmi Mantsinsaari and Lunkulansaari (Ts) 2. VII–15. VIII.

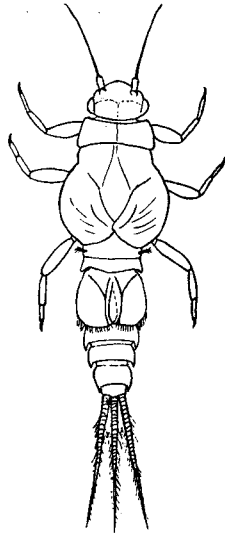


Fig. 18. *Caenis nivea* BGTN., nymph. (Orig.).

BENGTSSON'S (1917, p. 181) description fits my specimens in every respect so well, that I consider my determination certain. I here present a figure of the genitalia of the male (fig. 17) and of a fullgrown nymph, that I found at the outermost shore of Lunkulansaari at a depth of ca. 30 cm. I assume, that it belongs to *nivea*, as I have not found any other *Caenis*-species at the place mentioned.

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