

Excerpt from Canadian Entomologist. July, 1925.

NEW CANADIAN EPHEMERIDAE WITH NOTES, III.*

BY J. MCDUNNOUGH,

Ottawa, Ont.

EPHEMERINAE

Neoephemera nov. gen.

Wings hyaline, immaculate; third anal vein on primaries simple, connected with hind margin by only a single crossvein, running almost at right angles to it from approximately its centre and cutting off a large triangular space which may or may not contain a single short marginal intercalary. Costal crossveins obsolescent in basal half of wing, strongly anastomosed to form a network in apical region. Hindwings with very prominent pointed costo-basal projection, with long marginal intercalaries, and with no costal crossveins basad of the projection. Fore leg in male short, tibia and tarsus subequal, tibia from one and a quarter to one and a half times the length of the femur; all claws dissimilar. Male with three anal setae.

Genotype—*Neoephemera bicolor* n. sp.

Neoephemera bicolor n. sp.

Male. Head ruddy brown, pale ochreous along the margin of the eyes. Thorax ruddy brown, paler on anterior portion of mesonotum and on scutellum. Abdomen dorsally ruddy brown with posterior margin of segments narrowly pale yellow and with a broad pale yellow dorsal stripe, tending to broaden posteriorly

17.—Can. Ent., LI, 1919, 65.

*—Contribution from the Division of Systematic Entomology, Entomological Branch, Dept. of Agric., Ottawa.

on each segment and specially broad on segments 7-9, where the brown area is reduced to lateral patches; ventrally pale, shaded with brownish laterally and with a blackish dot on each segment just beneath the flange, posterior margins narrowly whitish. Setae whitish, forceps and legs pale yellowish, the fore tarsi slightly smoky. Wings hyaline with colorless veins and crossveins. Length of body 9 mm.; of forewing 10 mm.

Holotype—♂, Laprairie, Que., July 9, 1924 (G. S. Walley); No. 1292 in the Canadian National Collection.

Paratypes—7 ♂, same data.

BAETINAE

Leptophlebia debilis Wlk.

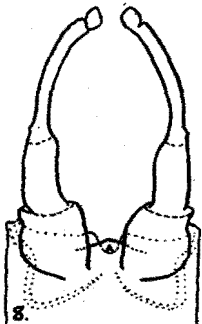
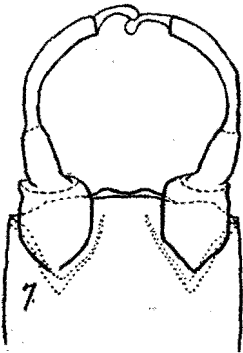
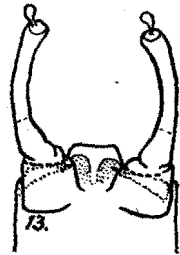
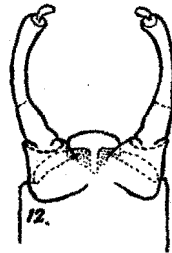
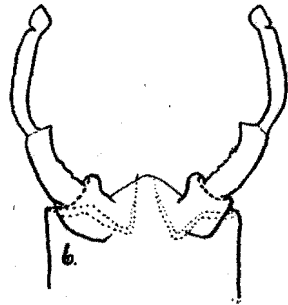
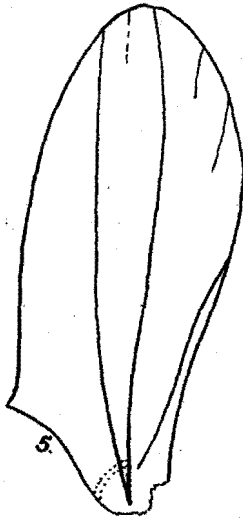
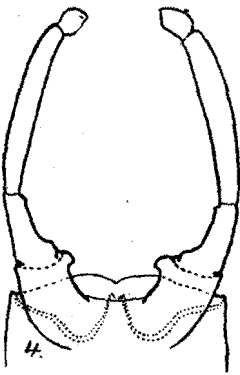
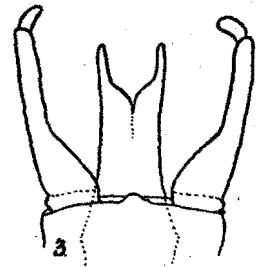
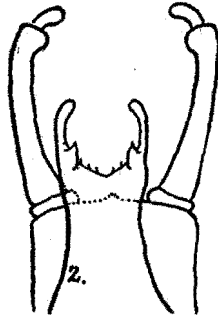
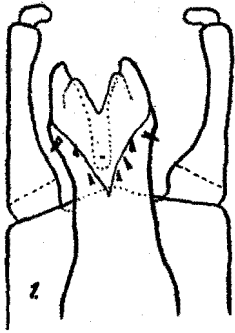
syn. *separata* Ulmer, 1921, Archiv f. Naturg. 87, Abt. A, Heft 6, p. 255.

This species was described from a single female from Nova Scotia and its identity has always been a stumbling block to systematists. Recently Mr. K. G. Blair of the British Museum has kindly compared females of *moerens* McD., *volitans* McD., *guttata* McD., *mollis* Eaton (as restricted by Ulmer) and *johnsoni* McD., which I sent him, with type and he writes me that it does not agree with any of these species. He adds the following valuable notes: "Size of *johnsoni*; legs distinctly brown, the femora darker beyond the middle. Venation, veins and crossveins, distinctly brown, the crossveins of the apical costal area with a distinct and apically increasing outward sweep; vein 2A meets the posterior margin at about 60°; i.e. about parallel with 3A". A single female before me from Kirk's Ferry, Gatineau river, Que., shows all the above mentioned characters and agrees further in the shape of the subanal plate with a sketch Mr. Blair has kindly sent me, made from the type of *debilis*; this female was taken as a subimago on the same day (Aug. 22) and at the same locality as a male which is evidently *separata* Ulmer, judging by the shape of the forceps; it passed its final moult the following day and I regard it as without doubt the female of *separata* which name will fall therefore as a synonym of *debilis*.

Ephemerella excrucians Walsh.

This species, the type of the genus *Ephemerella*, has never been satisfactorily identified. Walsh's type has been destroyed but there exist fortunately at Cambridge specimens of the type lot, sent by Walsh to Hagen (*vide* Proc. Am. Ent. Soc. II. 167) and one of these, a male, has been made the lectotype by Dr. Banks. I have recently had the opportunity of studying this specimen and through the kindness of the Museum authorities have obtained another male from the same lot which undoubtedly agrees with the type. A slide made of the genitalia of this specimen shows that Needham's figure, under the name *excrucians* (1905, Bull. 86 N. Y. State Mus., Pl. X, fig. 8), is incorrect; the true *excrucians* belongs to a different group in which small spines occur on certain lateral and dorsal areas of the penes, the group including, besides *excrucians*, the species *invaria* Wlk., *inermis* Eaton, *dorothea* Needh., *infrequens* McD. and *vernalis* Banks.

Two male specimens before me from Kingston, Ont., match in genitalia the topotypical specimen mentioned above and, although rather paler in coloration, show no characters which would lead one to separate them specifically from the Illinois material. I figure the genitalia (fig. 1.) of one of these speci-



mens; the type of penis is very similar to that of *invaria* Wlk. but the two may be readily separated by the fact that the second joint of the forceps in *invaria* is enlarged apically, as in *infrequens* McD. and *vernalis* Banks. This feature is used by Ulmer in his key (1920, Stett. Ent. Zeit., 81, 119) as a partial means of separating the two genera *Ephemerella* Walsh and *Chitonophora* Bgtssn. but in view of the close similarity between the above mentioned species, I cannot believe that this character has more than specific value.

In this connection it might be well to note that the first portion of Ulmer's couplet, separating the two above mentioned genera, is incorrect. It reads as follows:—

- 4a Femur and tibia of hind leg of about equal length; hind tibia only slightly longer than tarsus *Chitonophora*
 4b Tibia of hindleg much longer than the femur and about twice as long as the tarsus *Ephemerella*

For *excrucians*, the genotype of *Ephemerella*, the above statement does not hold as the hind femur and tibia are about equal in length and almost twice as long as the tarsus (35:35:20). A reference to Bengtsson's original characterization of *Chitonophora* would make it seem as if Ulmer had reversed the correct order of the above phrases in his couplet; in any case, however, better characters than those given will be required to separate the two genera.

In the type specimen of *excrucians* the relationship of the joints of the foreleg are as follows.—5:8:4, 4, 3¼, 1½; the specimens before me show slight variations from this but in general it may be said that the tibia is less than twice as long as the femur and about equal in length to the first two tarsal joints. At the present time it is doubtful to me whether good generic characters can be drawn from the relationships of the joints of the male foreleg. I am inclined to think that such characters will be found to be merely of specific value.

***Ephemerella needhami* n. sp.**

Male. Thorax deep black-brown, paler laterally and ventrally, pro- and mesosternum tinged with yellowish. Abdomen black-brown with a vinous tinge, much more marked on segment 8-10 and on the whole ventral surface; slight pale intersegmental rings. Forceps smoky, basal portion inwardly and penes pale ochreous: setae dark smoky. Forelegs smoky brown, the tibia rather more than twice as long as the femur and longer than the first two tarsal joints (25:55:25, 25, 20, 12); two hind pairs pale yellow with subequal femora and tibiae of the same length as in *excrucians*; hind femur with slight ruddy streak. Wings hyaline with longitudinal veins very faintly tinged with smoky. Length of body 6 mm., of forewing 6 mm.

Holotype—♂, Laprairie, Que., July 8, (G. S. Walley); No. 1328 in the Canadian National Collection, Ottawa.

Paratype—♂, same locality, July 9.

Judging by the genitalia (fig. 3.) this is evidently the species formerly identified by Prof. Needham as *excrucians*; it appears closest to *tibialis* McD. but has a shorter fore tibia and much paler venation.

***Ephemerella septentrionalis* n. sp.**

Male. Thorax dorsally light yellow-brown, ventrally pale ochreous with yellowish shading. Abdomen with segments 2-7 dorsally light olive brown, semi-

hyaline, with posterior margin narrowly darker, 8-10 opaque,, light yellow-brown; ventrally 2-7 hyaline with an ochreous tinge, 8 and 9 opaque, pale yellowish; the usual subventral and lateral rows of dark dots and a small central dark patch situated on posterior margin of each segment; forceps pale yellowish. Hing leg (others missing) pale ochreous, femur darker than other joints and with a faint ruddy apical patch; both femur and tibia unusually long as compared with the preceding species, subequal, and more than twice the length of tarsus (50:50:20). Wings hyaline with entirely hyaline venation. Length of body 8 mm.; of forewing 9 mm.

Holotype—♂, Little Current River, Thunder Bay Dist., Ont., July 11, (W. J. Wilson); No. 1330 in the Canadian National Collection, Ottawa.

The type is not in the best of condition and I should scarcely have ventured to describe the species if the structural characters exhibited in the long hind-leg and the genitalia (fig. 2) had not been so marked. According to Mr. K. G. Blair of the British Museum it is probable that one of Walker's three types of *invaria* belongs here.

Baetis propinquus Walsh

A recent examination at Cambridge of a male specimen of *propinquus* sent by Walsh to Hagen and which I propose to regard as the lectotype, shows that my conception of the species (1923, Can. Ent., LV, 40) was erroneous. The above mentioned type has no costal projection near the base of the hind wings and only veins 1 and 2 are present, without any intercalaries; the true *propinquus* is extremely close to the species I described from Manitoba as *dardanus* and I should not be surprised if the two proved to be identical; until, however, more Illinois material is available for dissection, it will be well to keep the two names separate.

A female in the same collection, also labelled "*propinquus*" by Walsh, shows a prominent costal projection and is probably some other species; in the Manitoba specimens the hind wings are the same in both sexes.

Baetis pygmaeus Hagen

The identity of this species has always been a subject of great doubt. It was described from a single very small specimen taken by Osten Sacken on the St. Lawrence River, probably belonging to the summer generation, in which the specimens average much smaller than those of the spring or late fall broods. Unfortunately all that remains of this unique type at Cambridge is one forewing and a portion of the mesothorax with legs attached. A recent careful study of these fragments shows that the legs are pale whitish (as stated in the original description) and that the crossveins of the primaries are *pale*, with no granulation between the costo-apical crossveins and with no marginal intercalaries in the first interspace. Only two of the *Baetis* species from this region known to me comply with these characters, viz: the species I have heretofore referred to as *propinquus* Walsh and a species which I am placing as *parvus* Dodds on account of the forked second vein of the hind wings and of which I have only seen females. These two species can be readily separated on hind-wing characters as in the former species vein 3 is wanting and vein 2 is not forked; I have, however, as yet discovered no good characters for separation in the forewing. Since (as I have shown previously) the name *propinquus* Walsh

has been misapplied and the species going under this name is now apparently left nameless, although one of our commonest Baetids, I propose, rather than further involve the synonymy, to use the name *pygmaeus* Hagen for this species, leaving the other one for the present as *parvus* Dodds.

Baetis brunneicolor n. sp.

Male. Turbinate eyes (living), large, deep brown, stalk rather short and shaded with yellow; head and thorax deep black-brown, the latter shaded with paler brown on lateral anterior edge of mesonotum, the pleural suture and the lateral extensions of the mesosternum and with slight ruddy brown markings on rear portion of mesothorax; anterior mediodorsal projection of metathorax cream colored. Abdomen dorsally deep brown with faint ruddy tinge and with obsolescent pale subdorsal dashes on anterior portion of first six segments; ventrally pale ochreous brown. Legs pale ochreous brown, the fore legs deeper in color and shaded with smoky at apex of tibiae. Forceps and setae dull yellowish white. Wings hyaline with pale venation, costal crossveins with strong granulations in the interspaces; intercalaries well developed, those in the first interspace being much longer than those in the second; hind wing (fig. 5) large, broad, with well-developed third vein, two marginal intercalaries between it and second vein and frequently a small intercalary between veins 1 and 2. Length of body 6 mm.; of forewing 6 mm.

Female. Very similar to male but with dark veins and crossveins; the head is light brown, shaded with yellow-brown along the margins of eyes, especially in the upper corner, and with blackish vertex.

Holotype—♂, Cave Creek, Ottawa W., May 25, 1921, (A. W. Richardson); No. 1283 in the Canadian National Collection, Ottawa.

Allotype—♀, same locality and collector, June 11, 1924.

Paratypes—1 ♂, same data; 5 ♂, same locality, May 27, 1921, (A. W. Richardson and J. McDunnough); 1 ♂, June 11, 1924 (A. W. R.); 4 ♀, same locality, June 12, 1924.

I had at first identified this species as *unicolor* Hagen; this species, however, is based on a female specimen from Washington, D.C., and until the male has been definitely associated, there are no grounds for supposing that this sex also is unicolorous brown. The present species is close in appearance to eastern forms of the *moffatti* group (which I shall discuss in another paper) but the male genitalia (fig. 4) are distinctive, showing a strong apical tubercle on inner margin of the first joint of the forceps and a conical second joint.

Baetis frondalis n. sp.

Male. Head and thorax deep shiny blackish, the pleural sutures marked with brown. Abdomen dorsally deep brown, segments 7-10 opaque, 2-6 with the anterior margins, especially laterally, partially semitranslucent and pale; ventrally pale dull creamy, shaded partially on the posterior opaque segments with brown; forceps and setae pale; legs pale yellow brown; wings hyaline with few costal crossveins, not anastomosing, on primaries, and no marginal intercalaries in first interspace, secondaries (fig. 10) with a greatly reduced basal costal projection, long, narrow, with margins subparallel, vein 3 reduced to a mere trace. The male genitalia (fig. 8) are quite characteristic, the first joint

of the forceps being subquadrate, the second cylindrical, the third long and narrow and the fourth very short and rather truncate apically; between the bases of the first joints is a small triangular plate (penis-cover) covering a deep excavation of the posterior margin of the ninth segment, at the base of which is a small spine. Length of body 5 mm.; of forewing 5-6 mm.

Holotype—♂, Laprairie, Que., July 8, (G. S. Walley); No. 1281 in the Canadian National Collection, Ottawa.

Paratypes—2 ♂, same data; 1 ♂, Ottawa Golf Club, Que., Aug. 8 (F. P. Ide); 1 ♂, same locality, Aug. 25 (G. S. Walley).

Baetis spinosus n. sp.

Male. Turbinate eyes (dried) deep red-brown, slightly smaller than in *intercalaris*. Head and thorax deep shiny blackish with the latero-anterior edge of mesonotum and edges of central portion of mesosternum as well as the pleural sutures pale yellowish or yellowish-brown. Abdomen with segments 2-6 semi-translucent, white or yellow-white with faint black spiracular dots; segments 7-10 opaque, dorsally deep chestnut or chocolate brown, ventrally white; forceps, setae and legs white. Wings hyaline with pale venation on primaries; costal crossveins 8-9 in number without or with scarcely any intervening granulations; no intercalaries in first interspace; secondaries (fig. 11) long, leaf-like, with only a trace of costal projection, vein 3 absent. Length of body 4½ mm., of forewing 5½ mm.

Holotype—♂, Darlingford, Man., July 16, (N. Criddle); No. 1291 in the Canadian National Collection, Ottawa.

Paratypes—13 ♂, same date; 1 ♂, Aweme, Man., July 13, (N. Criddle); 1 ♂, Aweme, Man., Aug. 16 (R. H. White).

In the shape of the secondaries the species is allied to *frondalis* McD. and in general appearance is close to *dardanus* McD. from the same region; the male genitalia (fig. 6) are, however, very characteristic, the second joint of the forceps having a strong pointed projection on the inner apical margin, a feature which is unique in our North American *Baetis* species.

Baetis frivolus n. sp.

Male. Turbinate eyes very large, deep black-brown with paler edges (dried); head and thorax shiny blackish marked with light brown on postero-lateral edge of prothorax, antero-lateral edge of mesothorax, the pleural sutures (which are tinged with reddish), the lateral edges of the mesosternum and its side projections and the postero-lateral edge of mesothorax near the scutellum. Abdomen dorsally deep brown, all segments opaque, with traces of a broken black spiracular line; ventrally dull ochreous, shading into whitish posteriorly; forceps and setae white. Fore legs smoky brown, two hind pairs pale yellowish. Wings hyaline with pale venation, costal cross-veins 6-7 in number and well anastomosed, intercalaries well-developed, except the upper one in the first interspace which is rudimentary or absent; hind wings (fig. 9) entirely without basal costal projection, long, narrow, vein 3 lacking. Male forceps (fig. 7) with the second joint cylindrical, the fourth joint longer than usual, fully three times as long as wide and slightly knob-shaped at extremity; the posterior margin of ninth segment shows a small raised plate between the bases of the forceps. Length of body 5 mm., of forewing 6 mm.

Female. Head pale ochreous brown shaded with yellowish, particularly on the vertex next the eyes. Thorax dorsally bright light brown, or yellow-brown, tinged with pale yellow along the lateral edges and in the sutures and with the posterior portion of the mesonotum (scutellum) entirely yellowish; abdomen dorsally bright brown. Beneath pale yellow-white, with sternum at times tinged with brown. Legs pale yellowish, fore femora deep ruddy brown. Forewings hyaline with pale venation; secondaries much smaller than in the male sex and with only vein 2 visible. Length of body 4 mm.; of forewing 5 mm.

Holotype—♂, Wakefield, Que., June 25, (J. McDunnough); No. 1282 in the Canadian National Collection, Ottawa.

Allotype—♀, Wakefield, Gatineau river, Que., June 25 (J. McDunnough).

Paratypes—1 ♂, 2 ♀, same data; 1 ♀, Aylmer, Que., July 5, (C. H. Curran); 1 ♀, Ottawa, Ont., July 17, (F. P. Ide).

The species would fall into Bengsston's genus *Acentrella* (1912, Ent. Tidskr., 110), along with *dardanus* McD., on the strength of the shape of the hindwing (no costal projection); in view, however, of the much reduced projection in the preceding species I am inclined to think that the character is hardly of generic value and prefer to retain *frivolus* and *dardanus* for the present in *Baetis*.

Heterocloeon n. gen.

(Type, *Centroptilum curiosum* McD.)

At the time of description (1923, Can. Ent., LV, 43), I called attention to the fact that a new genus might be necessary for the reception of this species and I now propose the above name. The genus is allied to *Baetis* in the paired intercalaries of the primaries, differs, however, in the great reduction of the secondaries, which have become a mere thread without costal projection and only occasional traces of a single vein (vein 2). In the male foreleg the tarsus is one half to two thirds the length of the tibia. *Heterocloeon* is evidently intermediate between *Baetis* and *Pseudocloeon*, in this latter genus the reduction of the secondaries having been continued to complete obliteration of same. The short foreleg seems characteristic.

Centroptilum caliginosum n. sp.

Male. Turbinate eyes (dried) deep black-brown with paler edges; head and thorax deep brown with the sutures and lateral edges of mesonotum and a small patch preceding the scutellum paler brown. Abdomen with segments 2-6 pale translucent, very faintly tinged with brown, especially along the posterior and lateral margins of segments, 7-10 chocolate brown, paler ventrally; forceps and setae whitish. Legs dull whitish, fore legs tinged with smoky. Wings hyaline with pale venation, 6-7 costal crossveins, marginal intercalary missing in interspaces 1 and 2, first cross vein between radius and the radial sector slightly basad of the second one; hindwings long, narrow, with a strong costal hook.

Female. Head pale ruddy brown with slight yellowish shading centrally; thorax and dorsum of abdomen dark brown; ventrally segments 2-6 are dull hyaline with brown semitriangular shades in the anterior lateral corners. Legs all whitish. Wings as in male. Length of body 6 mm.; of forewing 6½ mm.

Holotype—♂, Lachine, Que., Aug. 6, (G. S. Walley); No. 1285 in the

Canadian National Collection, Ottawa.

Allotype—♀, same data.

Paratype—1 ♀, same data.

The species is allied to *rufostrigatum* McD. but is considerably larger and shows no trace of ruddy maculation; the male forceps show a much stronger inward bulge at the apex of joint 2 than is found in *rufostrigatum*.

Excerpt from Canadian Entomologist, August 1925.

NEW CANADIAN EPHEMERIDAE WITH NOTES, III.*

BY J. MCDUNNOUGH,

Ottawa, Ont.

(Continued from page 176)

Cloeon simplex n. sp.

Male. Turbinate eyes (living) light green, (dried) pale orange-yellowish with deep brown base; head and thorax dorsally dark black-brown, the latero-anterior margins of mesonotum somewhat paler; the posterior margin of pronotum creamy with a ruddy brown dot; posterior margin of mesonotum, the entire scutellum and a small patch anterior to it, and the anterior margin of the metanotum creamy; pleura largely creamy, tinged with ruddy brown; prosternum whitish, meso- and metasternum largely brown, shaded laterally and centrally with creamy; legs entirely pale, whitish. Abdomen with segments 1-6 pale whitish hyaline with traces of black stigmatal hair-line; segments 7-10 opaque, dorsally bright chestnut brown, shaded with creamy on lateral margin and on posterior portion of segment 10, ventrally entirely pale creamy; forceps and setae white. Wings hyaline with pale veins and crossveins; costal crossveins 6-7 in number without granulations in interspaces; intercalary lacking in first interspace and frequently also in second; first crossvein between radius and the first vein of the radial sector in a line with following one. Length of body $4\frac{1}{2}$ mm.; of forewing 5 mm.

Holotype—♂, Ottawa Golf Club, Que., Aug. 14, (F. P. Ide); No. 1284.

in the Canadian National Collection, Ottawa.

Paratypes—2 ♂, same locality and collector, Aug. 14, 25.

Distinguished from *rubropicta* by the paler eyes, pale markings on thorax, and lack of ruddy spots on abdomen. On the strength of the position of the cross-veins in the radial sector the species would fall into *Procloeon* Bngtssn (1914, Ent. Tidsk., 218) along with *vicinum* Hag., *rubropicta* McD. and *inanium* McD.; I am, however, not at all certain that this character is constant in our North American species and prefer not to use it for generic separation at the present time.

The females of the species are very pale ochreous, tinged noticeably on the thorax and legs with greenish and at times showing traces of this color on the abdomen, setae and wings; they are somewhat larger in size than the males, and occur in the same locality.

***Cloeon insignificans* n. sp.**

Male. Eyes (dried) black-brown; head and thorax deep brown, almost unicolorous, slightly paler on sternum; abdomen with segments 2-6 pale, hyaline, immaculate with the exception of obsolescent, short geminate mediodorsal ruddy streaks on segments 2 and 3; segments 7-10 opaque, deep fawn brown, somewhat paler ventrally. Legs, forceps and setae whitish. Wings hyaline with pale venation; costal crossveins 5-6 in number; no intercalaries in first and second interspaces; first crossvein between radius and the radial sector in a line with second one. Length of body 3 mm.; of forewing 4 mm.

Holotype—♂, Ottawa, Ont., Aug. 21, (F. P. Ide); No. 1290 in the Canadian National Collection, Ottawa.

Paratype—1 ♂, same data.

Close to *rubropicta* McD. but lacking the ruddy streaks and dots except as above mentioned; there is also no black stigmatal line and the ventral surface of the posterior segments is light fawn brown, not white. The male forceps (fig. 12) are shorter and generally wider apart at the base in dried specimens than in *rubropicta* (fig. 13) and there is also a difference in the shape of the penis-cover.

***Siphonurus quebecensis* Prov.**

Through the kindness of Canon Huard I have recently been enabled to examine Provancher's types of *Heptagenia quebecensis* and *Siphonurus quebecensis*.

The former, a male, labelled in Provancher's handwriting and with an additional blue label "38", is in poor condition, one side of the wings being missing and portions of the abdomen eaten by *Anthrenus*. It proves to be, not a *Heptagenia*, but a *Siphonurus*, and is undoubtedly the same species as that which we have been calling *triangularis* Clem.; certain segments of the abdomen distinctly show the triangular dark ventral maculation and the genitalia are similar. The type is peculiar in that the crossveins of the primaries are few in number and those that are present are rather broken; this fact was noted by Provancher (nervures transversales interrompues, peu apparentes) but is merely aberrational.

A label with the name "*Siphonurus quebecensis*" was attached to a subimago male with blue label "39"; following this specimen the collection contained a male and a female imago, unlabelled. The subimago, evidently the specimen

mentioned in the original description (under *Baetis canadensis*), belongs to *quebecensis* of the preceding paragraph, as does also the female imago; the male, however, which fits in quite well with Provancher's description and which may have been a type, is very close to *Siphonurus berenice* McD. and probably this species. As, however, in any case, the name now becomes a homonym, the actual identity of the type specimen is of minor importance.

***Siphonurus columbianus* n. sp.**

Male. Similar to *occidentalis* Eaton in size and maculation but differing in genitalia.

Thorax deep brown, shaded with paler ruddy brown anterior to the mesothoracic scutellum, which is blackish; pleural sutures and bases of wings yellowish. Abdomen dorsally deep purplish brown, shaded irregularly with light ochreous on latero-anterior portion of each segment, most obviously on segments 8 and 9; ventrally dull ochreous with broad oblique purple-brown lateral stripes, which generally coalesce on anterior margin of each segment to form U-shaped marks; these marks are much less distinct than in *occidentalis*, especially on segments 8 and 9, where they hardly join and appear diffuse and poorly defined, within the U on each segment are generally two minute dark dots; segment 10 wholly brown; forceps dark with paler base. Setae dark basally, becoming paler toward tips and showing brown annulation. Forelegs deep black-brown, two hind pairs light ochreous brown, the femora with slight purple-brown streak before apex, the joints of the tarsi marked with same color. Wings hyaline with slight brownish tinge in costo-apical section; venation entirely blackish. Length of body 12 mm.; of forewings 13 mm.

Female.—Very similar to the male, but somewhat larger.

Holotype—♂, Agassiz, B. C., May 1, (R. Glendenning); No. 1327 in the Canadian National Collection, Ottawa.

Allotype—♀, same data.

Paratypes—3 ♂, 14 ♀, same data.

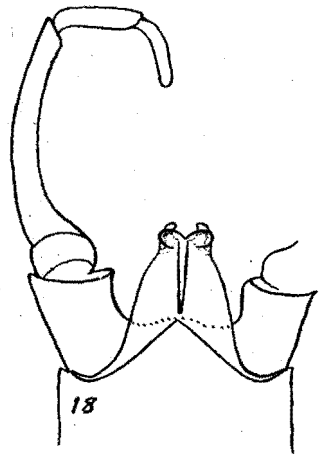
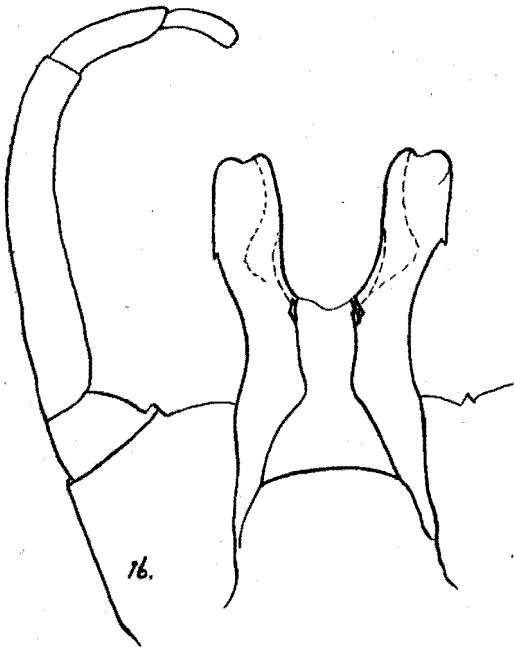
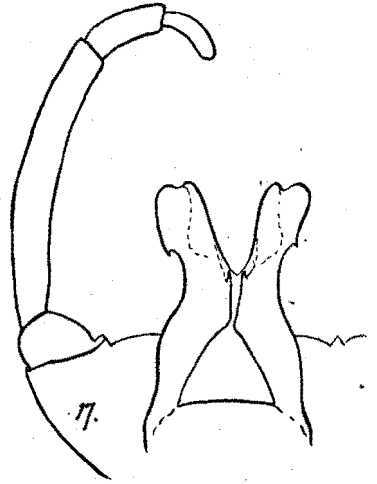
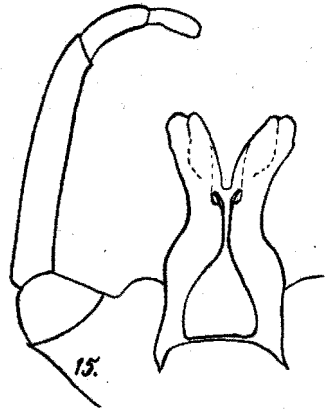
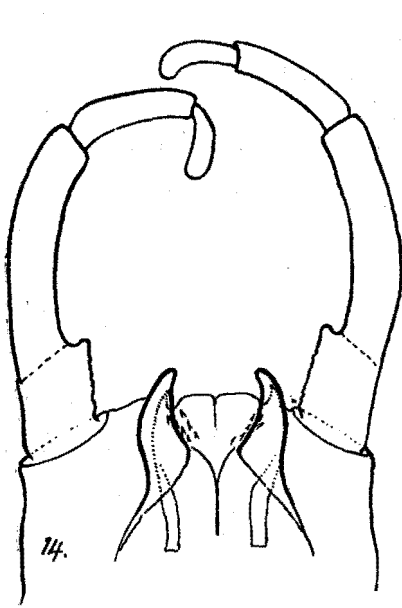
The pale ruddy spot on the rear of the mesonotum and the faint dark apical shade on the forewing are characteristic. The male genitalia (fig. 14) are closest to those of the eastern *barbarus* McD. but the lateral edges of the penes are drawn out into short points and the spining of the central area is much reduced.

HEPTAGENIINAE

***Metretopus norvegicus* Eaton.**

I have received a pair of what appears to be this European species collected by Mr. O. Bryant at Slave Lake, Alta., on Aug. 17, 1924. The genus belongs to Ulmer's family Ametropodidae (1920, Stett. Ent. Zeit. 81, 135) which is distinguished from his Ecdyonuridae by the presence on the primaries of only a single pair of intercalaries between the first and second anal veins; this family contains the two genera *Ametropus* Albeda and *Metretopus* Eaton and it might be well to call attention to the fact that in Ulmer's key (l. c. 135) the references to the median caudal seta are reversed; it is in *Metretopus* (not *Ametropus*) that this seta is rudimentary.

The male specimen before me agrees so well with Eaton's figures and description (1901, Ent. Mo. Mag. 37, 254) of *norvegicus* that for the present I am



listing the species under this name.

Iron humeralis Morg.

As originally described *humeralis* is a pale species with slight dark shading along the posterior margin of the abdominal segments. Such specimens occasionally occur in the Ottawa region; specimens from Covey Hill, Que., while agreeing with these Ottawa specimens and with Morgan's figure in the male genitalia, have the abdomen dorsally suffused with brown, leaving a double row of oval white spots which at times coalesce to form a single pale patch; the legs also of this series are suffused with ruddy-brown. Owing to the similarity of genitalia I am treating them as a dark form of *humeralis*; a similar condition exists in *Ecdyonurus canadensis* which varies considerably in the amount of dark abdominal maculation.

Iron suffusus n. sp.

Male. Very similar to the above-mentioned dark specimens of *humeralis*; rather larger in size with larger eyes; thorax dull brown, shading into deeper brown posteriorly; abdomen as in dark *humeralis* with the double row of pale subdorsal spots. Legs pale yellowish with median and terminal dark spots on all the femora. Setae pale with traces of brown annulation in basal portion. Genitalia with the penes distinctly longer than in *humeralis* (about 5:3) and more widely separated apically.

Female.—Paler than the male with frequently a red tinge to the abdomen. Length of body 11 mm.

Holotype—♂, Ottawa Golf Club, Que., June 15, (J. McDunnough); No. 1294 in the Canadian National Collection, Ottawa.

Allotype—♀, Aylmer, Que., June 24, (C. B. Hutchings).

Paratypes—15 ♂, 5 ♀, from the above localities and other points on the Ottawa river, captured on various dates in June.

This is a common species of the Ottawa river. I should have considered it to be merely a large *humeralis* (fig. 17) if it had not been for the distinctly larger genitalia, (fig. 16) as shown in the accompanying figures.

Iron punctatus n. sp.

Male. Allied to *humeralis* Morgan; eyes smaller, not contiguous; head and thorax deep black-brown, the lateral edges of the mesonotum and a patch behind the scutellum, as well as the pleural sutures, ochreous; mesosternum between first two pairs of legs shaded with ochreous. Abdomen with segments 2-7 pale hyaline, segments 8-10 opaque and shaded with brown dorsally; the pale segments are very faintly and narrowly edged with blackish posteriorly and there is a distinct median row of blackish dots, one situated on posterior portion of each segment; in certain lights faint traces of a lateral row of small darkish spots is evident. Forceps and setae pale whitish, legs yellowish white with the usual central and apical dark patches on femora; fore tibia black-tipped. Wings hyaline, with pale veins and crossveins; costo-basal crossvein tinged with black. Length of body 8 mm.; of forewing 8 mm.

Holotype—♂, Ottawa, Ont., Aug. 6, (F. P. Ide); No. 1295 in the Canadian National Collection, Ottawa.

Paratypes—1 ♂, Ottawa Golf Club, Que., Aug. 14, (G. S. Walley); 1 ♂,

Laprairie, Que., July 8, (G. S. Walley).

Distinguished in the male sex from *humeralis* by the smaller eyes, much darker thorax and the lack of the small lateral spines in the apical portion of the penes (fig. 15).

Two females (Ottawa, July 19, Aug. 28) before me, I at present associate with this species: they are pale ochre-brown on the head and thorax and show a dorsal and two lateral rows of dark spots on the abdomen as well as a narrow, dark, posterior border to each segment.

***Anepeorus* n. gen.**

Agrees with *Epeorus* and differs from all other genera in the subfamily in having the claws of the male foreleg equal and blunt. Differs from *Epeorus* in the relative size of the fore tarsal joints, joint 1 being rather more than one half as long as 2 which is distinctly longer than 3; 4 is longer than 5 and subequal to or slightly longer than 1 (relative length, 15, 25, 20, 15, 10); fore tibia one and one quarter times the length of femur; fore tarsus about two thirds the tibia; hind legs with tibia slightly shorter than femur (45 to 50); tarsus about one third the length of tibia, joints 1 and 2 subequal and distinctly longer than 3 and 4 which are subequal, 5 equal in length to 2-4 combined. Forceps 4-jointed; penes united and broadly triangularly expanded at the base, apically forming two simple cylindrical lobes, separated by a V-shaped incision.

Genotype: *Anepeorus rusticus* n. sp.

***Anepeorus rusticus* n. sp.**

Head brown, tinged with ochreous along the eye-margins opposite the antennae; thorax dull brown, pleura tinged with pale ochreous, especially anterior to base of wings; abdomen dorsally dull clay-brown, slightly translucent on anterior segments and shading into light ochreous brown on three posterior ones; very faint traces of subdorsal and lateral rows of small darker brown spots; ventrally slightly paler than dorsally with two small central dots and narrow lateral oblique dashes on each segment. Forceps ochreous brown; setae dirty white. Forelegs brown, shading into blackish on the tarsus, two hind pairs pale ochreous. Wings hyaline, longitudinal veins pale, crossveins darker and very fine, except in apical region of primaries where they are much thicker and slightly anastomosed along costa. Length of body 8 mm., of forewing 9 mm.

Holotype—♂, Saskatoon, Sask., Sept. 14, 1924, (K. M. King); No. 1293 in the Canadian National Collection, Ottawa.

Paratypes—2♂, same data.

The similar blunt claws on the foreleg and the general dull brown color should render the species easily recognizable. The male genitalia (fig. 18) are quite unique, the basal plate of the forceps being strongly excavated and the apical portion of the penes consisting of three superimposed projections which in the figure (dorsal view) are hard to delineate but which are easily seen in a lateral view.

***Ecdyonurus femoratus* Say.**

This species, described as a *Baetis* was placed by Eaton (Mon. p. 220) in the genus *Siphonurus*; Eaton's description, however, is based on Walsh's misdetermination, and his species, as I have already shown (Can. Ent., LVI, 128)

should be known by the name *Siphloplecton interlineata* Wlsh. The true *femoratus* Say is, I believe, an *Ecdyonurus*; it was described from material taken at Cincinnati, Ohio, and I have before me topotypical specimens, received through the kindness of Miss A. Braun, which agree extremely well with the description. These specimens show the brown-bordered crossveins, mentioned by Say, (a character not known in *Siphonurus* species) and two of the older specimens agree with the characterization "wings snowy white", the membrane being suffused with a milky opalescent tinge; the femora are distinctly banded with red-brown and the abdomen beneath is pale yellow-white. In amplification of Say's description it might be added that the costal apical margin of primaries is suffused with ruddy and that the apex of secondaries is tipped with brown; dorsally segments 2-6 of the abdomen are pale brownish, deeper laterally and posteriorly, segments 7-10 much deeper brown; there are obscure lateral rows of small brown patches and a mediodorsal row of small black dots, one situated on the posterior margin of each segment; the caudal setae are longer than given by Say but it is quite possible that the tips were broken off in his specimens.

The present species, or a very similar one, has been known as *vicarius* Wlk. but this identification is incorrect; from information I have received regarding the type, *vicarius* shows no brown apical shade on secondaries.

***Ecdyonurus pudicus* Hagen.**

This species will have to be removed from the synonymy of *vicarius* Wlk. as placed by Eaton. The type is a subimago from Washington, D.C., in very poor condition in the Museum of Comparative Zoology, Cambridge, Mass., but Dr. Banks has succeeded in matching it with specimens taken in the vicinity of Washington and in the Black Mountains, N. C. The species is very similar to the preceding, showing the same dark tip to the hindwing; it is however larger, paler, with the abdomen very decidedly ringed with brown dorsally and with a series of mediodorsal sagittate marks in place of the dark dots of *femoratus*.

***Heptagenia impersonata* n. sp.**

Male. Head, thorax and abdomen deep brown, the latter two pale ventrally, more ochreous brown; forceps and setae dark brown. Legs brown, almost the same shade as the ventral portion of the abdomen, the femora broadly shaded in their central portion with deeper brown, especially noticeable on the forelegs. Wings hyaline, slightly tinged with brown at base, with strong blackish veins and crossveins, the crossveins in the apical costal region of primaries being more or less branched and anastomosed. Length of body 9 mm.; of forewing 10 mm.

Female. Very similar to the male; almost unicolorous brown.

Holotype—♂, Montreal, Que., June 20, (C. H. Curran); No. 1299 in the Canadian National Collection, Ottawa.

Allotype—♀, same data.

Paratypes—3♂, same data.

The species is allied to *jejuna* Eaton but differs in the details of the male genitalia, the apices of the penes being broader and much less outcurved. The branching of the costal crossveins is characteristic of this whole group which includes *luridipennis* Burm., *brunnea* Hagen, *flavianula* McD., *undulatus* Banks, and *morrisoni* Banks. (These last two species were erroneously diagnosed in the

original description, joint I of the male foreleg is short.). This feature may possibly be of generic value; it is certainly useful in separating the group from the remainder of the species included under *Heptagenia*, and removes it also from *Rhithrogena*, where some of the species were placed by Eaton.

EXPLANATION OF PLATES

Male genitalia of 1.—*Ephemerella excrucians* Walsh; 2.—*Ephemerella septentrionalis* n. sp.; 3.—*Ephemerella needhami* n. sp.; 4.—*Baetis brunneicolor* n. sp.; 5.—Hind wing of *Baetis brunneicolor* n. sp.; male genitalia of 6.—*Baetis spinosus* n. sp.; 7.—*Baetis frivulus* n. sp.; 8.—*Baetis frondalis* n. sp.; Hind wing of 9.—*Baetis frivulus* n. sp.; 10.—*Baetis frondalis* n. sp.; 11.—*Baetis spinosus* n. sp.; Male genitalia of 12.—*Cloeon insignificans* n. sp.; 13.—*Cloeon rubropicta* McD.

Male genitalia of 14.—*Siphonurus columbianus* n. sp.; 15.—*Iron punctatus* n. sp.; 16.—*Iron suffusus* n. sp.; 17.—*Iron humeralis* Morg.; 18.—*Anepeorus rusticus* n. sp.
