

A NEW CHLOROPID SUBGENUS AND SPECIES FROM NEW YORK

BY O. A. JOHANNSSEN,
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The species falls in the couplet with *Melanochaeta* Bezzi in the keys of Becker, Enderlein, Malloch, et al, but owing to the peculiar elongate basal segment of the abdomen is at once distinguishable from all other species of the genus known to me. *Anatrichus* Loew, an African genus, has but two visible abdominal segments, but it differs in the form of the abdomen, structure of the arista, vestiture of the thorax and in other particulars.

Genus *Melanochaeta* Bezzi

Doliomyia nov. subg. Typus *D. longiventris* nov. sp.

Doliomyia longiventris n. sp.

Male. Frontal triangle large, sides slightly convex, black, highly polished, apex nearly reaching the base of the antennae, the apical third somewhat punctate; lower portion of the front subshining reddish yellow, upper part brownish; vertex, occiput, and buccae subshining black, finely punctate; vibrissae brown, small, but distinct; genae and face brown and finely punctate; antennae yellow, third segment nearly orbicular, angulate at the base of the arista; arista dark brown with its basal joint over twice as long as wide, terminal joint with very close pubescence, though not so strongly as in *Crassiseta costata*; frontal hairs brownish, bristles of the vertex black. Thorax black; dorsum, including scutellum and the posterior part of the pleura finely and uniformly punctate, subshining; anterior part of the pleura glabrous, highly polished; hairs brown, bristles black; scutellum three-fourths as long as broad, with rounded margin and small marginal bristles. Abdomen black, subopaque, very finely punctate, parallel sided, as long as the head and thorax taken together, consisting apparently of but one segment (the fused first and second), the very minute terminal segments and the hypopygium being scarcely visible from above. Hypopygium small. Legs brownish yellow, not swollen; upper surface of the hind femora except the base, the fore tarsi and all of the tibiae except the base of the hind pair, dark brown; pulvilli large, white; claws black. Wings yellowish hyaline, veins brown, more yellowish toward the base; the costa with small bristles and ending at the tip of M_{1+2} slightly beyond the tip of the wing; R_1 ends nearly half way between the base of R_{2+3} and the radio-medial crossvein; the distance between crossveins is about one-third of the length of the last section of M_{1+2} and slightly less than the last section of M_3 ; R_{2+3} and M_3 end about equidistant from the base of the wing. Halteres white. Length 2.75 mm. Holotype, in the Cornell University collection.

Female. Like the male in structure and coloring, but the three terminal abdominal segments and the ovipositor are visible beyond the end of the elongate segment, the three terminal segments taken together measuring about one-eighth of the total length of the abdomen. Middle and hind tarsi more brownish. Two specimens, allotype and paratype, the former in the Cornell University collection, the latter in the collection of the U.S. National Museum.

The first specimen, a female, was taken in a cat-tail swamp near the golf links, Ithaca, N.Y., on April 12, 1921; the others were collected a year later in the same locality, April 16.

NEW CANADIAN EPHEMERIDAE WITH NOTES, II*

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The following paper is a continuation of the one which appeared in "The Canadian Entomologist" for February, 1922. Extensive collections of Ephemeroidea made in various parts of the Dominion by officers of the Division of Systematic Entomology and other members of the Entomological Branch have proved that our Ephemeroidea fauna is a very rich one and contains, besides a large proportion of the already described species, a number of new forms, some of which are treated of in the present article.

Genus *Hexagenia* Walsh.

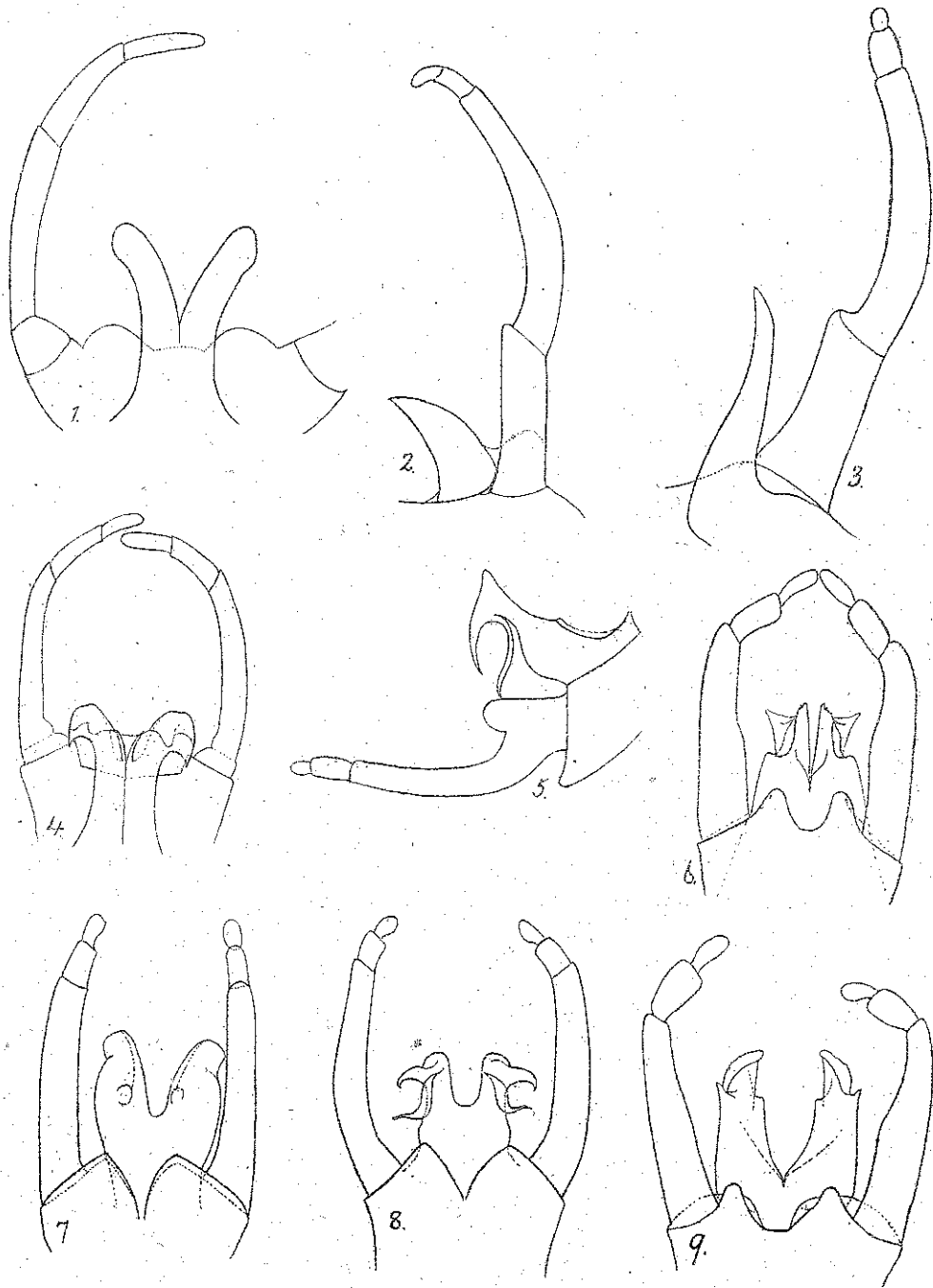
In the Archiv für Naturgeschichte 1921, Jahrg. 87, Abt. A, pp. 233-9, Dr. Georg Ulmer has very satisfactorily cleared up the doubts which have always existed in the minds of North American students of Ephemeroidea concerning the identity of *H. limbata* Guérin. From a study of type material he proves that the Serville and Pictet specimens belonged to the same species and that therefore the name *variabilis* Eaton (Monog. p. 55) has no valid standing. He further differentiates *limbata* Guérin and *bilineata* Say, giving figures of the ♂ genitalia and of the characteristic abdominal markings (figs. 4-7, pp. 236-7). With regard to *bilineata* it seems quite evident that Dr. Ulmer's idea of the species coincides with that of Walsh, who found the species very abundant at both Rock Island, Ill., and in the southern part of the State along the Ohio river. I have seen a number of specimens from this latter locality and they check up absolutely with the remarks of Walsh and Ulmer. For the present there seems no object to be gained in disputing this identification of Say's species. It must be noted, however, that Say's material came from the Minnesota (formerly St. Peter's) river and extensive collecting in this region will be necessary to prove that Walsh's and Ulmer's species occurs this far north; any Minnesota material I have examined, as well as much material in the Canadian National Collection from Southern Manitoba, belongs to *limbata* Guérin which is the common species apparently of the Canadian zone; the characteristic hooked penis, besides being figured by Ulmer as above mentioned, is depicted by Eaton in his monograph on Pl. VII, fig. 11c. From information furnished by Mr. Herbert Champion of the British Museum it seems certain that *angulata* Wlk. falls as a synonym of *limbata*; regarding *viridescens* Wlk. and *occulta* Wlk., based on subimagos, I have no information, but in view of the localities (Albany River, Lake Winnipeg) the reference to *limbata* seems fairly safe.

Besides *limbata* Guérin two other apparently undescribed *Hexagenia* species occur in Canada; these can be readily recognized by the male genitalia, although superficially very similar to *limbata*, and I describe them as follows:

Hexagenia rigida n. sp.

Male. Head yellow, suffused with ruddy brown on vertex; prothorax pale yellow with broad blackish lateral borders; meso- and metathorax light ruddy brown dorsally, tinged with yellow in posterior portion. Abdomen dorsally brown with a subdorsal series of pale yellow triangular patches situated on anterior

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



NEW CANADIAN EPHEMERIDAE

portion of each segment and pointing rearwards; a series of smaller similarly colored patches along the spiracular flange, and the posterior edge of each segment generally pale yellow; ventrally pale yellow with a series of brown oblique lateral stripes extending from the central area of one segment backwards to the middle of the lateral edge of the following segment; the posterior segments show traces of a medio-ventral brown line and large brown triangular blotches in median area. Forceps brown with second joint yellow; setae pale yellow, narrowly ringed with brown at joints. Fore legs ruddy brown with the basal portion of each tarsus tinged with yellow; other legs pale yellow with the last tarsal joint brownish. Wings hyaline with black-brown veins, costa tinged with light olive brown and with cross veins in this area heavily black, hind wings with faint brown border. In the genitalia the penes, instead of being hook-shaped as in *limbata*, are long and straight (fig. 3).

Female. Paler than the δ but in well-marked specimens with same type of maculation; often, however, specimens lack all ventral abdominal maculation and are then very difficult to distinguish from *limbata* females. As both species occur together the range of variation in the females of each species is hard to determine but apparently the longitudinal veins in the primaries of *limbata* are pale yellowish whilst in the present species they are blackish, at least in the apical half of the wing.

Holotype— δ , Orillia, Ont., July 21, (C. H. Curran); No. 690, in the Canadian National Collection, Ottawa.

Allotype— η , Ottawa West, June 21, (C. B. Hutchings).

Paratypes—2 δ , same data as holotype; 1 δ , Kingston, Ont., July 26, (C. H. Curran); 6 δ , Port Stanley, Ont., 1922 (H. G. Crawford); 2 δ , 4 η , Ottawa West, June 21, (C. B. Hutchings); 3 δ , 6 η , Britannia (near Ottawa) Ont., June 23, (G. Beaulieu); 1 δ , Montreal, Que., June 25, (C. E. Petch); 1 δ , Lanoraie, Que., June 9, (J. Beaulne); 1 δ , 1 η , Lanoraie, Que., June, (C. E. Petch); 1 δ , Winnipeg Beach, Man., July 10, (A. J. Hunter); all in the Canadian National Collection. 2 δ , Grand Isle, Vt. (A. P. Moose), 2 δ , Harrisburg, Pa., June 12, in the Collection of the Museum of Comparative Zoology, Cambridge, Mass.

The maculation and coloration of the abdomen is quite variable, the yellow tinge being frequently obscured by dull ruddy color, as in *limbata*, possibly due to conditions when drying. Often the ends of the lateral ventral stripes are connected by a short brown line, producing a continuous waved lateral stripe which seems characteristic for the species and which I have not seen in *limbata*; the setae are generally paler and with the dark rings narrower and better defined than in our Canadian *limbata*.

Eaton's figure (Monog. Pl. VII, fig. 11b) of genitalia, as *H. bilineata*, should probably be referred to this species.

Hexagenia atrocaudata n. sp.

Male. Very dark as compared with *limbata* and *rigida*, all the venation of the wings blackish, the costa heavily tinged with brown in the apical half and between veins 2 and 3 in the basal half and with a distinct purple-brown border to the secondaries. Prothorax blackish, slightly paler centrally; mesothorax dark olivaceous brown, shaded with paler anteriorly. Abdomen dorsally dark black

brown with an indistinct paler, olivaceous, medio-dorsal band on segments 3-6, this color fading out entirely on the posterior segments; a lateral series of olivaceous triangular patches, based on the anterior edge of each segment and similarly colored small patches along the spiracular flange in posterior portion of segment, generally separated from the anterior triangles by an oblique band of dark color. The triangular dorsal portion of segment 10 is dull brown, edged with black and with geminate black medio-dorsal streaks; base of setae yellow, setae themselves deep blackish with very narrow brown intersegmental rings. Ventrally the abdomen is dull olivaceous yellow with a triangular brown patch occupying a large portion of each segment, the posterior edge of segment forming the base and the sides ascending obliquely forward to a point on the medio-anterior edge, thus leaving only lateral triangles of the yellow ground color visible. Forelegs deep blackish, other legs greenish yellow with tarsi partially blackish.

The genitalia, figured from a dried specimen (fig. 2), possess a very characteristic penis; this is short, broad and bluntly pointed, not hooked as in *limbata* nor straight and narrow as in *rigida*. Length of body 22 mm.; of forewing, 20 mm.

Female. Slightly paler than the ♂, but very similar; head marked with bright orange yellow behind the ocelli and on posterior edge of vertex, next to each eye.

Holotype—♂, Ottawa, Ont., Sept. 10 (F. P. Ide); No. 691, in the Canadian National Collection, Ottawa.

Allotype—♀, Ottawa, Ont., Aug. 25 (F. P. Ide).

Paratype—1 ♀, Ottawa, Ont., Sept. 10, (F. P. Ide), in the Canadian National Collection; 2 ♂, Straight Creek, Lee Co., Va., Aug. 8, in the Coll. Museum of Comparative Zoology, Cambridge, Mass.

This species occurs later in the season than the other allied species; up to the present it has only been seen in late summer on the Rideau river. The two males from Virginia were received with other material in the genus, sent for study by Dr. N. Banks; they had been examined by Eaton and placed by him in *bilineata* but they agree so well in all respects with the type specimen of *atrocaudata* that I have no hesitation in making them paratypes. The range of the species is thus considerably extended; it will probably occur all through the Alleghenian zone.

Leptophlebia heteronea n. sp.

Male. Head and thorax deep blackish, shiny; abdomen dorsally with segment 2 largely smoky brown, slightly paler anteriorly; segments 3-6 hyaline white with broad brown banding on posterior section, leaving a narrow white posterior edge to each segment; the band on segment 3 occupies about half the dorsal area, on 4 and 5 about one-third and on 6 two-thirds; segments 7 to 10 deep brown with narrow whitish area on anterior margin of 7, especially laterally; ventrally segments 2-7 are white with segment 2 largely tinged with dull brownish and with large, ruddy, diamond-shaped medio-ventral blotches on segments 3-7, increasing in size towards the rear so that on 7 the blotch occupies the larger portion of the ventral area; posterior segments dull brown with whitish forceps. Setae white; tracheae in spiracular area marked with black. Fore legs dull brownish with whitish tarsi; two rear pairs with light brown femora and whitish tibiae and tarsi,

the former tipped with brown proximally. Wings hyaline white; veins pale, except longitudinal costal ones which are tinged with brown.

Female. More or less unicolorous blackish-brown with some slight ruddy tinges on head and abdomen, the ventral portion of which is paler than the dorsum; legs as in male but the tarsi are not so distinctly white, being tinged with brownish. Wings hyaline white with most of the longitudinal veins slightly (costal strongly) brown-tinged. Length of body, 5-6 mm.; of fore-wing 6-7 mm.

Holotype—♂, Waterton Lakes, Alta., July 24, (J. McDunnough); No. 685, in the Canadian National Collection, Ottawa.

Allotype—♀, same locality and collector, July 23.

Paratypes—30 ♂, 12 ♀, same locality and collector, July 21-26.

A figure of the male genitalia is given; it is probably this species which is recorded by Dodds (Trans. Am. Ent. Soc., 1923, 104) from Colorado under the name *pallipes* Hag. which was described from a single female from Truckee, Calif., with pale whitish legs. The females of our Waterton species certainly do not agree in this respect but a single ♀ is before me from Oliver, Okanagan Valley, B.C., which has the pale legs as described; I am holding this specimen under the name *pallipes*. Several specimens from Banff, Alta., and Nordegg, Alta., in the Canadian National Collection are rather larger in size and the abdominal brown bands of segments 3-6 extend across the ventral side. As, however, the male genitalia (fig. 9) appear to be essentially the same, I presume that these slight differences cannot be regarded as specific.

Leptophlebia moerens n. sp.

Head and thorax shiny blackish; abdomen dorsally with segment 2 dull, semitranslucent brownish, segments 3-6 dull whitish translucent, with narrow brown bands on posterior margin and with segment 3 shaded with brown; laterally above the spiracular line is a broken brown line, generally limited to an obsolescent patch on the anterior portion and a larger, deeper colored spot on the posterior margin of each segment. Segments 7-10 deep shiny brown. Ventrally segments 2-7 whitish with the usual medio-ventral, diamond shaped, brown patches, that on segment 7 occupying the greater part of the segment; segment 2 shaded with smoky brown; posterior segments dull brown, slightly paler than the corresponding dorsal portion and less shiny. Forceps dull brownish white; setae white. Legs light brown with all the tarsi whitish. Wings hyaline with pale veins. Length of body 6 mm.; length of forewing 6 mm.

Holotype—♂, Ottawa Golf Club (near Hull) Que., June 10, (J. McDunnough); No. 686, in the Canadian National Collection, Ottawa.

Paratype—♂, same locality, June 11, (R. Ozburn).

Readily recognized by the striking male genitalia (fig. 5) with the excavated basal joint of forceps and long thin appendages to the penes.

I have before me 4 females (2 from Ottawa Golf Club, 2 from Cascades, Gatineau River, Que.) which may belong to this species; they differ from the females of the following species in having brown legs and dark veins to the primaries with a faint brownish tinge to the wing. The excavation of the posterior ventral segment is broadly triangular, the two lobes and the triangular excavation being practically equal in size.

Leptophlebia mollis Eaton

The type of this species was restricted by Ulmer (Archiv fur Naturg., Vol. 87, Heft 6, pp. 254-6) to the specimen in the Selys-Longchamps collection, originally collected by Fitch in the vicinity of New York City. I have recently examined two specimens of Fitch's original series contained in the United States National Museum and a further specimen from the Catskill Mountains, N. Y. There are also specimens in the Canadian National Collection from Covey Hill, Que., and from the Ottawa region. As Ulmer's figure of the male genitalia is evidently drawn from a dried specimen and is not entirely accurate I give a figure (fig. 6) of these parts, drawn from a permanent slide, made after removing the abdomen and treating it with caustic potash; in this group it is the only method which will insure accurate knowledge of these delicate parts.

Leptophlebia guttata n. sp.

Male. Remarkably similar superficially to *mollis* but the white of the abdomen is slightly soiled with brownish and there is a distinct lateral row of black dots in the spiracular area, one dot on the posterior edge of each segment. The color of the posterior segments is deep black-brown and segment 8, ventrally is also brown. The legs are tinged with brownish and there is a distinct dark spot at the junction of femur and tibia on all legs. The forceps are tinged with brown apically and the genitalia (fig. 8) is remarkably distinct from that of *mollis* and more closely related to that of *moerens*.

Holotype—♂, Covey Hill, Que., June 25, (C. H. Curran); No. 688, in the Canadian National Collection, Ottawa.

Paratype—♂, same data.

Leptophlebia volitans n. sp.

Male. Thorax shiny blackish; abdomen dorsally with segment 2 deep brown, segments 3-7 hyaline white with 7 more or less tinged with brown and with narrow brown bands on posterior edges of segments; a series of short, lateral, longitudinal, blackish dashes above the spiracular line, each dash on the posterior portion of segment; segments 8-10 deep black-brown. Ventrally the first seven abdominal segments are hyaline white with the medio-ventral diamond patches faintly outlined in ruddy-brown and segment 2 faintly shaded with brown; the posterior segments are lighter brown than the dorsal portions and the forceps, including their base, white. Setae white; legs dull whitish. Wings hyaline with pale venation. Length of body 5 mm., of forewing 5-6 mm.

Holotype—♂, Ottawa Golf Club, Que., July 26, (R. Ozburn), No. 689, in the Canadian National Collection, Ottawa.

Paratypes—9 ♂, same data; 1 ♂, Algonquin Park, Ont., July 30, (J. McDunnough).

The species is readily recognized by the male genitalia (fig. 7).

Centroptilum rufostrigatum n. sp.

Male. Face, thorax, and sternum deep black-brown with rear portion of mesothorax and the lateral sutures tinged with pale yellowish brown; abdomen with segments 2-6 paler yellowish white, hyaline, with a sublateral row of four minute red transverse dashes on each side, each dash situated on the intersegmental suture; segments 7-10 deep chocolate brown dorsally, alabaster white ventrally, the division between the two colors sharply defined by the spiracular

flange; on the pale abdominal segments this is marked by a faint, broken, slightly curved, black hair-line. Forceps and setae white; legs pale yellowish white. Wings hyaline, primaries with single intercalaries, secondaries long, narrow, with two longitudinal veins. Length of body 4.5-5 mm.; of fore-wing 5 mm.

Holotype—♂, Aweme, Man., Sept. 30, (R. M. White); No. 676, in the Canadian National Collection.

Paratypes—10 ♂s, same data as type: 3 ♂, Aweme, Man., Sept. 8, (N. Criddle); 2 ♂, Treesbank Man., Sept. 27, (R. H. White); in the Canadian National Collection.

There is a tendency for the markings on the pale abdominal segments to become obsolete in some specimens, but generally sufficient trace of the red subdorsal dashes may be found to determine the species, especially when a strong light is used. Judging by Eaton's description this species must fall near *luteolum* Mull., a European species not known to me in nature. It appears, however, to be considerably larger than *rufostrigatum*.

Centroptilum bifurcatum n. sp.

Male. Head and basal half of antennae blackish; thorax deep olive-brown with a pale yellow line extending forward from base of primaries along lateral edge of mesonotum where it ends in a small round yellowish patch; lateral sutures and rear edge of mesothorax tinged with yellowish; abdomen with segment 2-6 pale yellowish white, hyaline, with a faint ruddy broken dorsal hair line and traces of ruddy shading on the posterior portion of segments 2-4, reaching to the spiracular flange; segments 7-9 deep chocolate brown dorsally with segment 10 pale yellowish, ventrally segments 7-10 are alabaster white with the forceps and setae also whitish. A faint, broken, dark line on pale segments along spiracular area. Legs pale yellowish white, femora rather deeper in color than other portions. Wings hyaline, primaries with single intercalaries, secondaries broader than usual, (twice the width of preceding species), with two longitudinal veins the lower of which is faintly forked near its apex. Length of body 5 mm.; of forewing 5 mm.

Holotype—♂, Waterton Lakes, Alta., July 23, (J. McDunnough); No. 677, in the Canadian National Collection.

This species superficially resembles the preceding but is easily separated by the size and the venation of the secondaries.

Centroptilum bellum n. sp.

Male. Head and antennae dull blackish, eyes (dried) deep reddish; prothorax shaded with deep olive-brown, mesothorax olivaceous with variable amount of yellowish subdorsal shading, rear dorsal and lateral areas tinged with ruddy; metathorax deep olive-brown, (darker than mesothorax) with darker sutures and anterior ruddy shade dorsally. Abdomen with segments 2-6 pale yellowish, semi-hyaline, with narrow ruddy-brown band on posterior margin of each segment extending to spiracular area and ending in a faint small ruddy patch, below which is a broken, blackish spiracular line. Segments 7-10 dorsally bright ruddy brown, ventrally light, opaque yellow with ruddy lateral shading and faint traces of intersegmental ruddy lines which are wanting entirely on segments 2-6. Forceps and legs yellowish white, setae white. Wings hyaline, primaries with single

intercalaries, secondaries moderately broad with two longitudinal veins. Length of body 5 mm.; of forewing 6 mm.

Female. Head yellow, marked with ruddy centro-dorsally; thorax much as in male; abdomen dorsally dull olivaceous tinged with ruddy on posterior segments and with ruddy-brown band on segmental incisures; ventrally pale yellow.

Holotype—♂, Broadview, (vicinity of Hull), Que., July 16, (R. Ozburn); No. 680, in the Canadian National Collection.

Allotype—♀, Ottawa Golf Club, (vicinity of Hull), Que., July 16, (R. Ozburn).

Paratype—1 ♂, Aylmer, Que., July 17, (R. Ozburn).

The paratype shows considerably more yellow shading on the thorax than does the type; in fresh material the dorsal portion of the ♀ abdomen may differ from the description; the single specimen before me is rather discolored in this region by the underlying egg-masses. All the localities given are along the Ottawa river, a few miles west of Ottawa.

Centroptilum ozburni n. sp.

Male. Head and antennae blackish, the latter tipped with white; thorax unicolorous deep blackish dorsally, the lateral and sternal areas slightly more brownish and the anterior edge of mesosternum tipped with pale ochreous.

Abdomen with segments 2-6 hyaline white with traces of an interrupted geminate brown dorsal line and with the posterior edges of these segments narrowly banded with chocolate-brown, which color scarcely attains the spiracular area; segments 7-10 chocolate-brown dorsally, alabaster white ventrally; there are very faint traces of brown bands on the posterior edge of all segments ventrally, most markedly on segments 5 and 6; spiracular area marked with a blackish line. Forceps and setae white, legs whitish with traces of a ruddy band across middle of femora. Wings hyaline. Secondaries long, narrow, with the usual two longitudinal veins.

Female. Front yellow with three vertical ruddy-brown lines; thorax dull olivaceous with sutures somewhat marked in yellowish; abdomen (as far as can be determined in discolored specimens) yellowish dorsally on anterior six segments with dorsal brown patches and lateral brown triangular patches on anterior portion of each segment; the rear segments are probably dull brown; ventrally dull greenish yellow. Legs as in male. Length of body 4 mm.; of forewing 4.5-5 mm.

Holotype—♂, Ottawa Golf Club, Que., July 16, (R. Ozburn); No. 681, in the Canadian National Collection, Ottawa.

Allotype—♀, Broadview (near Hull), Que., July 16, (R. Ozburn).

Paratypes—5 ♂, 2 ♀, same data as Allotype.

Distinguished easily from *bellum* by the dark thorax in ♂ and the deeper brown color of the rear abdominal segments. It is also deeper in color than *fragile* McD. and the abdominal banding is much more pronounced.

Centroptilum simile n. sp.

Male. Very similar to the preceding species in size and maculation; the blackish thorax, however, shows a distinct pale yellow-brown lateral edge to the

mesonotum; the pale abdominal segments 2-6, besides being ringed posteriorly with ruddier brown than in *ozburni*, are shaded with paler ruddy brown over the posterior third of each segment, this color extending forward laterally, above the black spiracular line, to nearly the anterior edge; the brown of segments 7-10 is much ruddier, and ventrally segments 8 and 9 are much tinged with the same color. The legs, especially the fore legs, are deeper in color with ruddy marks at base, middle and apex of femora, these marks being connected by a dark hair-line.

Female. Shows the same ruddier color as compared with same sex of *ozburni*; the front is deep yellow with entire central area brown-shaded; the prothorax is pale olivaceous, edged with ruddy-brown and with a geminate medio-dorsal ruddy line. The anterior segments of the abdomen are discolored but the posterior five are dull ruddy-brown dorsally. Ventrally all abdominal segments are dull dirty white, tinged with ruddy on posterior three and with traces of intersegmental banding, most noticeable laterally.

Holotype—♂, Covey Hill, Que., June 25, (C. H. Curran); No. 682, in the Canadian National Collection, Ottawa.

Allotype—♀, same data.

Centroptilum infrequens n. sp.

Female. Thorax light ochreous, shaded with creamy; abdomen pale yellowish with a broad stripe extending its whole length dorsally, last three segments opaque, others semihyaline; setae white; legs pale yellow; wings hyaline with pale veins; hind wings long and very narrow, the longitudinal veins united at base for a short distance and after forking running close to each other to beyond costal projection which is long and hook-like. Length of body 7 mm.; forewing 8 mm.

Holotype—♀, Winnipeg Beach, Man., July 10, (A. T. Hunter); No. 695, in the Canadian National Collection.

The large size and prominent ruddy dorsal stripe readily distinguish the species which I venture on this account to describe from a single ♀.

(To be Continued)

Mailed April 5th, 1924

VESPOIDEA

Odontophotopsis crassus n. sp.

Related to *O. conspicuus* Blake.

Male. Length 12 mm.; flagel uniformly dull stramineous, legs uniformly stramineous, hind and mid femora darkened toward apex, front without a furrow, postocellar line: lateral ocellar line :: 11:5, malar line: lateral ocellar line :: 2:5; furrows of the dorsulum extending nearly to the anterior margin, metanotum costate, mesopleura polished and nearly impunctate on the depressed part, tooth on each side of mesolcus robust, triangular in outline when seen from behind, stronger than in *O. obliquus* Vier., third submarginal cell and second recurrent vein faintly outlined, that part of the metapleura nearest the hind coxae nearly sculptureless; second sternite without a felt-like line corresponding to the felt-like line on the second tergite, pygidium much wider than in *O. obliquus* Vier. and apparently impunctate.

Holotype—♂, Oliver, B. C., July 24, 1923, (E. R. Buckell); No. 754, in the Canadian National Collection, Ottawa.

Paratype—♂, Redonde, California, June 30, 1919, (Am. Mus. Nat. Hist.).

Odontophotopsis obliquus n. sp.

Related to *O. brevicornis* Fox.

Male. Length 12 mm.; reddish-stramineous, flagel more or less pale stramineous stained with brown, the scape concolorous and paler than the remainder of the antennae, legs more or less pale stramineous, mid and hind femora partly blackish, stigma dark, translucent, veins pale stramineous, membrane yellowish, most hairs whitish or almost colorless; head polished, with well separated punctures that are closer on the front than on the vertex, front with an indistinct furrow between the antennal line and the anterior ocellus, postocellar line: lateral ocellar line :: 9:4, eye nearly contiguous to the mandibular joint, clypeus concave, nearly polished, apparently impunctate except for some marginal setigerous punctures, mandibles decidedly curved, with a strong upper and lower margin, the latter deeply notched, the notch extending inward nearly half the width of the mandible, joint one of the flagel is to joint two as ten is to eleven; prothorax coarsely reticulated, dorsulum polished, with separated punctures, its furrows extending from about one-third the distance from the anterior margin to the posterior margin, scutel sculptured much like the prothorax, metanotum indistinctly sculptured, propleura roughened above, rather smooth below, mesopleura punctured on the depressed part, the bulged part coarsely reticulated, posterior border smooth, polished and punctured, tooth on each side of the mesolcus robust, triangular in outline when seen from behind, second recurrent vein not defined; disc of propodeum with an irregular oblong area and an almost triangular area on the left side of the median enclosure, the rest of the propodeum with great meshes to the reticulation, upper part of metapleura forming a polished channel, the lower part coarsely sculptured; petiole obviously longer than wide at apex, its punctures large but not sharply defined, second tergite with finer, better defined punctures than the first, with a long, felt-like line near the lateral margin, the analogous felt-line on the second sternite nearly spot-like, pygidium smooth, not margined, punctured near apex.

Holotype—♂, Oliver, B. C., July 24, 1923, (E. R. Buckell); No. 753, in the Canadian National Collection, Ottawa.

NEW CANADIAN EPHEMERIDAE WITH NOTES, II*

BY J. MCDUNNOUGH,

Ottawa, Ont.

(Continued from page 98.)

Cloeon implicatum n. sp.

Male. Eyes (living) olive-green, (dried) deep olive-brown; thorax dark black-brown with sutures on posterior portion of mesothorax marked with ruddy-brown, laterally below the wings shaded with pale yellow and ruddy, sternum brown, paler than dorsum; abdomen with segments 2-7 dorsally pale olive-brown, semi-hyaline, shaded considerably with ruddy laterally (and on 6-7 dorsally) and with the segmental incisures pale yellowish; posterior segments bright ruddy brown; traces of a fine broken black stigmal line. Ventrally abdomen pale yellowish, forceps and setae whitish, latter with faint ruddy intersegmental banding basally. Legs pale yellowish, fore femur shaded with smoky, fore tibia smoky on basal third and with a smoky longitudinal dash before apex, joint dusky; hind tibiae slightly dusky at base, wings hyaline.

Holotype—♂, Waterton Lakes, Alta., July 22, (J. McDunnough); No. 696 in the Canadian National Collection.

Paratypes—2 ♂, same locality and collector, July 24, 25.

This species is close to *ingens* McDunnough but is paler and ruddier in coloration and the legs are yellowish, not entirely smoky, with rather characteristic marking on the fore tibia. There is also a single ♂ from Vernon, B.C., August 8th, (D. G. Gillespie) before me, which, apart from its considerably smaller size, agrees with the above description.

Cloeon inanum n. sp.

Male. Smaller and paler than the preceding species. Eyes (dried) dull orange. Thorax olivaceous brown, shaded with pale yellowish at base of wings and posteriorly. Abdomen pale yellowish, semihyaline on segments 2-6 dorsally, with faint ruddy patches laterally above the spiracular line, which is marked in black; segments 7-9 dorsally bright ruddy-brown, 10 pale yellow. Ventrally pale yellowish with forceps and setae similarly colored. Legs pale yellowish with faint smoky tinges on the fore femora and tibiae. Wings hyaline. Length of body 6 mm.; of forewing, 6.5 mm.

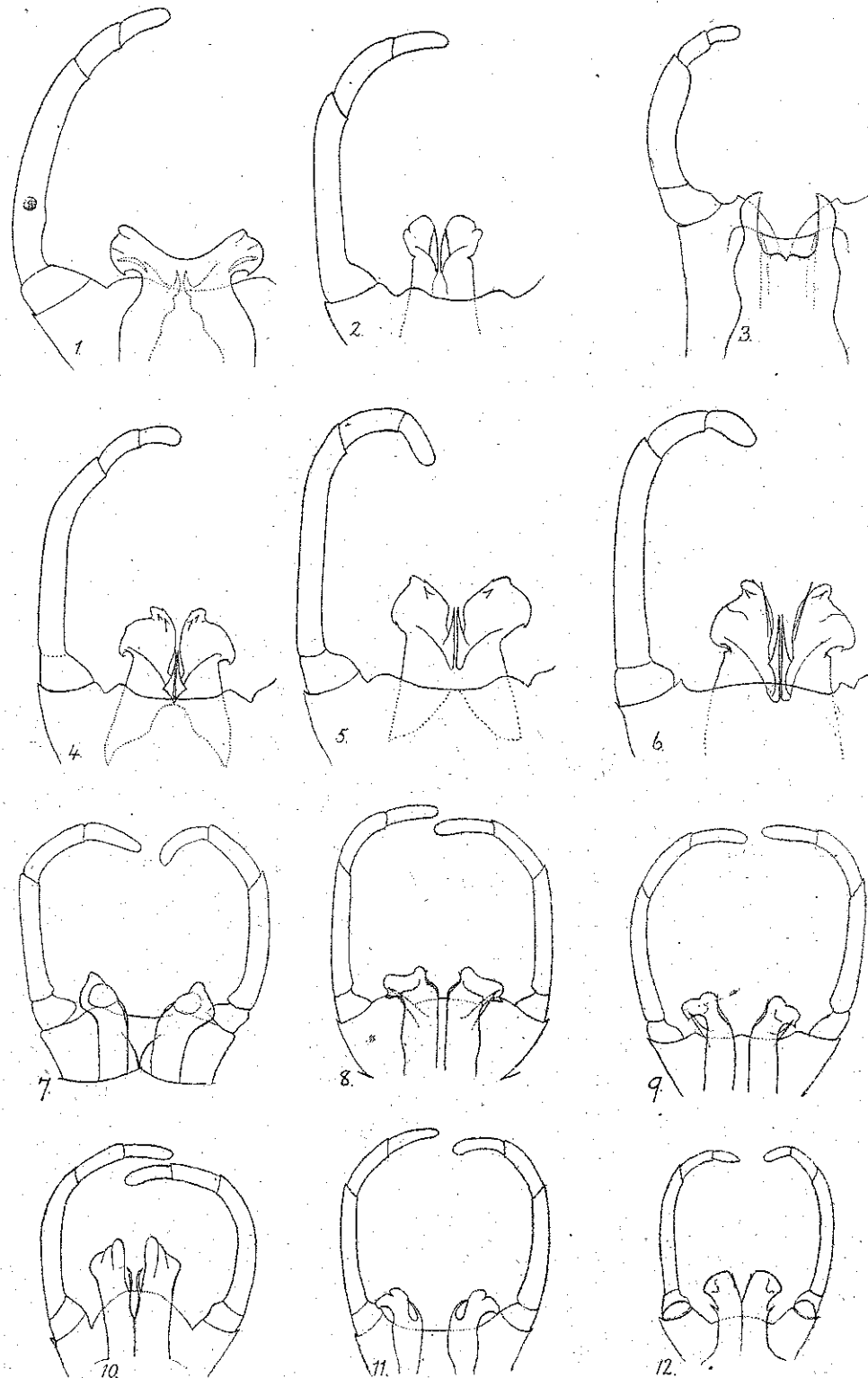
Holotype—♂, Waterton Lakes, Alta., July 23, (J. McDunnough); No. 697 in the Canadian National Collection.

Paratype—♂, same data.

The specimens of the above two species were taken singly, mostly as subimagos flying some distance from the water; there is apparently a good representation of large *Cloeon* species in the west but they seem difficult to secure in numbers.

Pseudocloeon turbidum n. sp.

Male. Turbinate eyes large, circular, considerably larger than in *dubium* Walsh, red-brown (living), deep red-brown to blackish (dried); thorax shining blackish, tinged with ruddy in the lateral sutures below the wings. Abdomen dorsally entirely dark olivaceous brown, ventrally pale yellowish-white, forceps and setae white. Legs with all femora dark smoky brown, tibiae and tarsi pale yellowish-white, tinged with smoky on forelegs. Wings hyaline. Length of body 4 mm.; of forewing 4 mm.



NEW CANADIAN EPHEMERIDAE

Female. Head, thorax and abdomen light to ruddy ochreous dorsally, thorax with posterior dorsal portion and lateral sutures pale yellowish; ventrally the abdomen is pale yellowish-white. Legs dull yellowish-white, the femora, especially of the forelegs, deeper in color, ochreous brown.

Holotype—♂, Waterton Lakes, Alta., July 24, (J. McDunnough); No 694 in Canadian National Collection.

Allotype—♀, same locality and collector, July 22.

Paratypes—58 ♂, 25 ♀, same locality and collector, July 22-26.

The genus *Pseudocloeon* was erected by Klapálek for species without hind wings and with paired intercalaries on primaries. It includes the North American species, *dubium* Walsh, *punctiventris* McDunnough, *chlorops* McDunnough and *virilis* McDunnough. From these species *turbidum* is easily separable by the entirely dark dorsum of the abdomen.

Pseudocloeon virilis McDunnough

The description of this species (Canadian Entomologist, 1923, p. 46), was based on a single Ottawa male. A long series of both sexes is now before me, captured on June 12, by Mr. R. Ozburn, a few miles up the Ottawa river on the Quebec side. The males vary considerably in size; the type happened to be one of the large specimens, the smallest in our series having a wing length of scarcely more than 4 mm. Features in the original description which are more or less inconstant are,—the black tracheal markings in the stigmal area, the ruddy medio-ventral dots on abdominal segments 5 and 6 and the ruddy tinge on the segmental incisures. The yellow streak on lateral edge of mesonotum may be reduced to an anterior dot of yellowish. Characteristic features seem to be the red subdorsal dots and the red-banded femora, the bands frequently showing on the foreleg as well. A feature overlooked in the description is the presence of a lateral row of minute brown patches, one to a segment, placed just above the spiracular area. In poorly marked specimens, some at least of these spots are visible. The eyes are noticeably larger than in *dubium* Walsh, from the Rideau river, although there appears to be considerable variation in size in the dried series before me.

The ♀ of *virilis* has the thorax light brown with the posterior elevation of the mesothorax light ochreous, often tinged with greenish. The abdomen (as far as can be told from dried specimens, which are usually discolored) is dorsally pale brown, with posterior segments opaque and more distinctly colored; traces of the subdorsal red dots can be observed in some specimens. Ventrally the abdomen is pale ochreous with paler posterior segmental margins, except laterally, where for a short distance they are brown; there are sometimes traces of brown shades below the spiracular flange. Legs yellowish with brown fore femur; orange-red banding on four posterior femora distinct. Wings hyaline with pale venation.

The ♀ is very close to that of *dubium* Walsh, but can be generally differentiated by the red banding of the femora which in *dubium* is mostly entirely lacking or, if present, is quite faint.

Ameletus vernalis n. sp.

Male. Head and thorax deep black-brown, the sutures partially marked with ochreous. Abdomen with segments 2-6 translucent, dull greyish-white, 7-10

opaque, pale ochreous, with a dorsal series of deep purple-brown subtriangular patches, based on the posterior margin of each segment with the apex reaching quite or nearly to anterior margin; a similar series of lateral brown patches, leaving the pale ground color showing as triangular patches based on the anterior margin of segments and hardly extending to posterior margin; segment 9 dorsally almost entirely brown. Ventrally segments 2-6 pale grey-white with faint traces of medio-ventral brownish spots connected by a fine line or stripe and with the usual lateral row of depressed oval spots more or less visible; segments 7-10 opaque, pale ochreous, in addition to the above mentioned spots they show brown triangular patches based on the posterior margin on segments 7 and 8; segments 9 and 10 are largely brownish with the exception of the posterior rounded projection of segment 9, which is pale ochreous; forceps deep smoky. Wings hyaline with an apical brown shade on primaries and a slight brown tinge at base of R_3 where there is a collection of six crossveins; veins and crossveins brown except 3 or 4 crossveins on costa just beyond the bulla which are pale and indistinct; beyond these the costal crossveins anastomose forming a series of small costal cells with larger ones below them. Legs with femora black-brown, the color of fore femur being deepest, a slight ochreous tinge at base and apex and an ochreous line along upper edge; fore tibiae and tarsi black, posterior ones light brownish.

Female. Head ochreous, shaded heavily with brown behind the ocelli and with a central longitudinal blackish line on vertex. Thorax more shaded with ochreous than in male. Abdominal maculation similar but generally confused, ventrally the segments are largely tinged with purplish brown. Legs rather paler than in male, the four hind femora being largely ochreous. Length of body 12 mm.; of forewing 12 mm.

Holotype—♂, Oliver, B. C., April 27, (C. B. Garrett); No. 749, in the Canadian National Collection, Ottawa.

Allotype—♀, same locality and collector, April 28.

Paratypes—1 ♂, 12 ♀, same locality and collector, April 26, 27, May 5, 9, 11, 16 and 21.

The ♂ genitalia (fig. 3) are rather similar to those of *velox* Dodds but show a ventral spine below the penes not present in Dodds species (l. c. Pl. VIII, fig. 17).

Genus *Heptagenia* Eaton

The correct placing of our numerous North American species of Heptageninae in the various genera adopted by Eaton (*Ecdyonurus*, *Rhithrogena*, *Iron*, *Epeorus*, *Cinygma*, *Heptagenia*) has always been a matter of difficulty, largely due, it seems to me, to the fact that Eaton has used as a primary means of generic separation the comparative lengths of the first and second tarsal joints of the hind tibiae. These joints in many instances are very short and difficult to compare accurately in dried specimens, and, while Eaton's association of our American species was correctly made, later attempts to follow his system of classification have resulted in numerous wrong associations.

As a primary means of separation of the above mentioned genera Needham's key in Bulletin 86 of the New York State Museum, p. 23 (1905), based on the length of the first joint of the male fore tarsus, seems to offer much

better possibilities for accurate placing and correct association of species. An examination of our species in this family shows that they fall, roughly speaking, into three main groups, as follows:—(1) first joint of male fore tarsus very short, generally only one-sixth the length of the second, occasionally one-third its length (*Heptagenia*, *Rhithrogena*); (2) first joint moderate in length, generally about one-half the length of second joint (*Ecdyonurus*); (3) first joint long and equal to (*Epeorus*, *Iron*), or slightly shorter than, the second joint (*Cinygma*). The type of ♂ genitalia more or less bears out the above grouping, especially in the second group, which contains species with the apices of the penes broadened laterally, the whole lobe being L-shaped.

Banks in his notes on the eastern species of *Heptagenia* (1910, Can. Ent. 197) makes no attempt at a separation of species along the above lines except in the case of three new species which he tentatively places under *Epeorus*.

Clemens (1913, Can. Ent., 249, 329), (1915, Cont. Can. Biol. 117, 133) has reversed the correct usage of the generic terms *Heptagenia* and *Ecdyonurus*; his criticism of Needham's key (l. c. p. 119) is incorrect and probably based on a misidentification of *H. flavescens* Walsh, the type species of *Heptagenia*, which is recorded in the above papers from Georgian Bay. A reference to Clemens' description of so-called *flavescens* (l. c. p. 135) shows clearly that it is not Walsh's species that he had before him at the time. Walsh distinctly states (1863, Proc. Ent. Soc. Phil. II, 206) that the first tarsal joint of the ♂ foreleg is "much shorter" than the second in both *flavescens* Walsh and *cruentata* Walsh.

Ulmer (1920, Stett. Ent. Zeit. 144), who follows Eaton's characters in separating the various genera but who is obviously unacquainted with many of the North American species, places a heterogeneous assemblage of species under *Heptagenia*; many of these will fall into *Ecdyonurus*.

At the present time I am using the generic term *Heptagenia* for all those species with short first fore-tarsal joint, and am discarding the genus *Rhithrogena*, based on a European species, *semicolorata* Curtis, until such time as material of the genotype can be studied. It is probable that further subdivisions within the above limits may be necessary but these can safely be left for a later date.

The following species fall into *Heptagenia* as above characterized:—*flavescens* Walsh, genotype; *cruentata* Walsh, *marginalis* Banks (unknown to me); *maculipennis* Walsh; *pullus* Clemens; *lucidipennis* Clemens; *jejuna* Eaton (*fusca* Wlk.); *brunnea* Hag.; *elegantula* Eaton; *coxalis* Banks (very close to *elegantula*); *manifesta* Eaton, *vitrea* Wlk. (according to Eaton); *robusta* Dodds (from Colorado, unknown to me). As certain of the above species have been heretofore unknown or misidentified I offer a few notes on some of them together with descriptions of several new species.

Heptagenia flavescens Walsh.

Banks records this species (1910, Can. Ent., 200) from St. Anthony Park, Minn. In the Canadian National Collection are 3 ♂, 1 ♀ and 2 sub-imagos from Aweme, Man. The species is a large yellowish one with a brown dorsal band extending the entire length of the body, broadening somewhat on the mesothorax and becoming reddish on the posterior abdominal segments. The wing venation is quite characteristic, the costal crossveins being faint in the basal half of the wing, becoming thicker and darker in color in the apical section, where

all the veins are distinctly fuscous, just as stated by Walsh in his description, which is quite accurate. The first foretarsal joint in the ♂ is about one-quarter the length of the second and on the hind tibia the first joint is distinctly shorter than the second. I figure the ♂ genitalia (fig. 1). As stated above, Clemens' record of this species from Georgian Bay, Ont., is erroneous.

Heptagenia reversalis n. sp.

Male. Very similar to *flavescens* but smaller and with paler dorsal area. Light yellow, head shaded with reddish, and with light brown dorsal area on thorax and abdomen, this color paling on the posterior abdominal segments; the overlapping sections of the segments appear darker, giving the appearance of rings. Legs yellow, femora with median and apical bands of reddish, fore tibiae tipped with smoky, first foretarsal joint one-third the length of second. Wings hyaline with entire costa of forewing tinged with yellow; costal crossveins distinct, black in basal half of wing, becoming pale and indistinct in apical section (the reverse of *flavescens* in this respect); other veins and crossveins fine, blackish, paler at base of wing. Length of body 8.5 mm.; of forewing 10 mm.

Holotype—♂, Aweme, Man., June 22, (R. M. White); No. 739, in the Canadian National Collection, Ottawa.

Paratype—♂, same locality and collector, June 28.

I had at first considered this species to be *cruentata* Walsh but it does not agree with the description either in regard to the color of the legs (on which Walsh lays considerable stress) or in the color of the costal crossveins. In both specimens before me the setae are lacking. The ♂ genitalia appear in the dried condition very similar to those of *flavescens*.

Heptagenia lucidipennis Olem.

I have specimens before me from both Orillia and Ottawa, Ont.; the first joint on the fore tarsus of the male is about one-quarter the length of the second; on the hind tarsus this same joint is distinctly longer than the second joint and the species would fall on this character into *Rhithrogena*; for the size of the insect the hind tarsal joints are quite long.

Heptagenia inconspicua n. sp.

Male. Head light yellow, the face shaded next the eyes with orange-brown; thorax dorsally pale to dark olive-brown, laterally light yellow; abdomen pale yellow, semihyaline on segments 2-7 with a broad dorsal band of light or ruddy brown (varying in intensity in different specimens) and with the hind margin of each segment opaque, producing an annulate effect; forceps and genitalia pale ochreous. Legs pale yellow, the fore femora and tibiae tipped with smoky brown; first foretarsal joint about one-third the length of the second, first hindtarsal joint longer than the second. Wings hyaline with pale venation, the costal veins in the basal half of wing scarcely perceptible. Setae whitish, slightly annulate with ruddy brown in basal portion. Length of body 4 mm.; of forewing 5-½ mm.

Female. Head largely tinged with ruddy brown; otherwise similar to male but paler in dorsal coloration.

Holotype—♂, Treesbank, Man., Sept. 8, (T. Criddle); No. 743, in the Canadian National Collection, Ottawa.

Allotype—♀, Wawanesa, Man., Sept. 22, (R. M. White).

Paratypes—32 ♂, Treesbank, Man., Sept. 8, Oct. 1, (T. Criddle); Sept. 27, (R. M. White); 5 ♂, 7 ♀, Wawanesa, Man., Sept. 22 (R. M. White); 6 ♂, Aweme, Man., Sept. 29, 30, (N. Criddle).

A smaller species than *lucidipennis* and differing in genitalia (fig. 2). It is probably allied to *manifesta* Eaton which is unknown to me; Hagen, however, states of this species (1863, Proc. Ent. Soc. Phila. II, 170, as *debilis* Walsh) that the genitalia are black.

Heptagenia querula n. sp.

Male. Thorax pale ochreous with median dorsal brown band, a faint pinkish patch preceding the posterior mesothoracic protuberance; rear margin of mesothorax and most of the metathorax tinged with smoky brown. Abdomen pale, semihyaline, faintly banded with smoky brown dorsally on posterior portion of segments 2-7; segments 8-10 opaque, tinged with pink dorsally, ventrally pale ochreous. Legs pale yellow, fore femur deeper in color than others, all femora faintly tinged with ruddy at apex and coxae of four hind legs tinged with purplish at base; fore tibiae tipped with smoky; first foretarsal joint in ♂ one-sixth length of second, joint 1 on hind legs slightly shorter than 2. Wings hyaline with costal margin tinged with pale lemon yellow, veins 2 and 3 largely pale yellow, other longitudinal veins fine, dark; crossveins dark, the costal ones being thicker and black with a well defined black bulla.

Female. Pale ochreous, the abdomen often tinted with egg-yellow from the underlying egg-masses; behind the lateral ocelli on the vertex of the head are triangular black patches with faint ruddy tint between them. Wing venation as in male. Length of body 10 mm.; of forewing 12 mm.

Holotype—♂, Aweme, Man., June 14, (N. Criddle); No. 740, in the Canadian National Collection, Ottawa.

Allotype—♀, same locality, June 14, (R. M. White).

Paratypes—4 ♀, same locality and collector, June 4, July 17, 19.

Very similar to *elegantula* which also occurs in Manitoba but differing in much larger size and structural details of hind tarsal joint; the ♀ of *elegantula* has ruddy spots on the vertex of head, not black ones, and a small black spot next the eye on a level with the antennae which is lacking in *querula*; the species must also run very close to the European *sulphurea* judging by Eaton's description but without material before me I am unable to make comparisons.

Heptagenia solitaria n. sp.

Male. Head light-brown, tinged on vertex with ruddy and with a black dash on the face next the eye below the level of the antennae; thorax brown dorsally with a deeper brown median stripe most distinct on anterior portion of mesothorax; laterally the thoracic segments are pale ochreous brown. Abdomen very pale brownish, segments 2-7 semitranslucent and shaded dorsally with purple-brown, this color occupying the posterior half of segments 4-7 and most of segments 2 and 3, causing a somewhat banded appearance; segments 8-10 opaque, light ruddy-brown dorsally, paler ventrally. Forceps ochreous, setae dull ochreous, narrowly banded with brown. Legs pale ochre-brown, all the femora and the fore tibial and tarsal joints tipped with purplish; first fore-tarsal joint about one-sixth the length of second, first joint of hind tarsus slightly shorter than second. Wings hyaline, slightly tinged along costa with pale lemon yellow.

longitudinal veins fine, deep brown except basal half of 2 and 3 which are thickened and pale yellowish; crossveins thicker than other veins, especially along costa, all deep brown. Length of body 9 mm.; of forewing 11 mm.

Holotype—♂, Waterton Lakes, Alta., July 7, (J. McDunnough); No. 741, in the Canadian National Collection, Ottawa.

A much darker species than any others in this group and probably allied to *pullus* Clem.; the ♂ genitalia are of the *elegantula* type.

Heptagenia adaequata n. sp.

Male. Head light ochreous with black dash next the lower corner of each eye and two blackish spots on vertex adjacent to the eyes; the bases of antennae ringed with black; ruddy brown shading at base of median carina and a small spot of similar color on each side of the central ocellus. Thorax pale ochreous, tinged with deeper color dorsally on mesothorax. Abdomen very pale yellowish, semitranslucent on segments 2-7, with narrow deep brown posterior margin dorsally to first eight segments and paler triangular subdorsal patches of brown situated on the posterior margin of each segment; segments 9 and 10 shaded dorsally with light brown. Setae pale, very distinctly ringed with brown. Legs ochreous, base of coxa on four hind legs with a black streak, femora with median and apical bands of purplish, fore tibiae tipped with smoky, first joint of fore tarsus one-fifth length of second, of hind tarsus slightly shorter than second. Wings hyaline, veins fine, blackish, except basal portions of 2 and 3 which are thickened and yellowish; crossveins thicker than other veins, blackish, especially well marked along costa. Genitalia of same type as in the preceding species. Length of body 10 mm.; of forewing 11 mm.

Holotype—♂, Cowley, Alta., June 25, (R. N. Chrystal); No. 742, in the Canadian National Collection, Ottawa.

Heptagenia simplicioides n. sp.

Male. Entirely pale creamy white with abdominal segments 2-7 more or less translucent, clypeus slightly sprinkled with brown dots; the tip of the fore tibia and the first fore tarsal joint and all the claws deep smoky; other joints of fore tarsus slightly smoky. Wings hyaline with pale veins and crossveins. First fore tarsal joint about one-quarter the length of the second.

Female. Similar to male; head either entirely pale or with ruddy shading anterior to the ocelli; slight traces of ruddy shades at base of wings and fore legs. Length of body 7 mm.; of forewing 8 mm.

Holotype—♂, Waterton Lakes, Alta., July 13 (J. McD.); No. 744, in the Canadian National Collection, Ottawa.

Allotype—♀, same locality and collector, July 6.

Paratypes—1 ♂, 1 ♀, same locality and collector, July 18, 24.

Similar to *simplex* Walsh but differing in the length of the first fore-tarsal joint in the male which in *simplex* is fully three-quarters the length of the second.

Heptagenia maculipennis Walsh

The identifications of this species by Needham (1905, Bull. 86, N.Y. State Mus., pp. 51, 57) and Banks (1910, Can. Ent., XLII, 200) are erroneous. Walsh's description clearly calls for a species with the abdominal segments pale yellow, immaculate, with the exception of the posterior segments, which are what

Walsh terms "piceous." Such a species is before me from Aweme, Man., and as it agrees excellently in all other particulars with the description, I have no hesitation in identifying it as the true *maculipennis*. The group contains several closely allied species, very similar in size and in the maculation of the primaries but differing in the color of the abdomen and structural details of the male genitalia. For purposes of comparison I figure (fig. 4) the genitalia of *maculipennis*.

Heptagenia minerva n. sp.

Male. Face pale yellow marked with black along anterior edge; thorax pale lemon yellow with a geminate brown medio-dorsal line extending backward to a point opposite base of wings, laterally with a broad blackish stripe above the bases of the legs; abdomen pale yellow tinged with ruddy-brown dorsally on segments 8-10, and with a series of lateral longitudinal deep brown stripes, continuing the thoracic dark stripe and almost forming a continuous line; these stripes are broadest on segments 2 and 3. Posterior edge of each segment narrowly edged with blackish, which broadens into a small dark patch on the posterolateral corner below the above mentioned stripe; ventrally immaculate, forceps and setae pale. Legs pale yellow, the femora with a median ruddy and an apical black longitudinal dash on ventral side, fore tarsi and apical half of fore tibiae smoky, first tarsal joint one-quarter to one-sixth the length of the second.

Wings hyaline with fine dark longitudinal veins; crossveins heavier, black-brown in the costal and subcostal interspaces; 3-4 crossveins on costa before bulla, well spaced, crossveins in area of bulla (3-4 in each interspace) close together, the margins more or less coalescing to form dark blotches in both the costal and subcostal interspaces, a similar group of 3 or 4 crossveins in apical area of costa, and a small dark blotch at the furcation of the median vein. Length of body 6 mm.; of forewing 7 mm.

Female. Very similar to ♂, vertex of head margined with black and tinged with reddish; no brown shading posteriorly on abdomen.

Holotype—♂, Ottawa Golf Club, Que., July 16, (R. Ozburn); No. 746, in the Canadian National Collection, Ottawa.

Allotype—♀, same locality and collector, July 26.

Paratypes—3 ♂, Ottawa, Ont., June 11, (J. McDunnough); 2 ♀, same data as Allotype.

This is probably the species determined as *maculipennis* by Banks; the ♂ genitalia are very similar to those of *maculipennis*.

Heptagenia juno n. sp.

Male. Size of preceding species, pale whitish yellow, lateral edge of prothorax and bases of legs slightly marked with blackish, a very faint brownish shade laterally on thorax below wings. Abdomen with segments 2-7 hyaline, faintly margined dorsally with brownish; segments 8-10 tinged dorsally with light brown. Legs pale yellow (fore legs lacking); femora with dark apical streak. Wings hyaline, longitudinal veins mostly pale, crossveins fine, blackish in costal half of wing, those along costa slightly thickened but not nearly so heavily margined with blackish as in the preceding species, the dark margin being confined to the crossveins basad of the bulla; there is no coalescing to form dark streaks and the dark shade at the median fork is wanting.

Female. Very similar to ♂, abdomen slightly yellower and without posterior brown shading.

Holotype—♂, Covey Hill, Que., June 25, (C. H. Curran); No. 747, in the Canadian National Collection, Ottawa.

Allotype—♀, same data.

Paratype—1 ♂, same data.

The ♂ genitalia (fig. 5) are similar to those of *maculipennis* but there is only a single apical spine on the penis.

Heptagenia hebe n. sp.

Male. Size of preceding, face pale yellow with dark anterior margin, vertex of head deep brown. Thorax olive-brown dorsally, shaded slightly with pale ochreous, light yellow laterally and ventrally, with a broad brownish lateral stripe above bases of legs. Abdomen dorsally deep brown with subdorsal series of semihyaline pale elongate streaks which unite on segments 4-6 to form broad dorsal semihyaline patches; lateral edges of segments 2-7 pale smoky, semihyaline; posterior segments tinged with light brown; venter pale yellowish as are also the forceps and setae. Fore-legs pale brownish, coxae and base of femora yellowish, dark streak ventrally at apex of femora, other legs pale yellow. Wings hyaline, faintly tinged with brownish apically, maculation much as in *minerva* with a tendency for the costal crossveins before the bulla to increase in number.

Female. Much paler than the male; pale ochreous to light yellow, with a lateral series of semitriangular brown patches on the posterior section of abdominal segments and generally a fine brown posterior margin.

Holotype—♂, Broadview (vicinity of Hull), Que., July 12, (R. Ozburn); No. 748, in the Canadian National Collection, Ottawa.

Allotype—♀, same data.

Paratypes—3 ♂, 2 ♀, same locality and collector, July 12, 16; 2 ♂, Deschênes, Que., June 30; 3 ♂, 2 ♀, Ottawa Golf Club, Que., July 16, 17, 25; 2 ♂, Aylmer, Que., July 17; 2 ♂, 2 ♀, Hogsback, Rideau River, Ont., June 29; (all above collected by R. Ozburn); 3 ♂, Ottawa, Ont., May 27, June 11, (J. McDunnough); 4 ♀, Hull, Que., June 26, July 5, (Miss Cramp).

Much darker than the two preceding species and with a tendency to an elimination of the pale abdominal areas by a spreading of the brown color. The male genitalia (fig. 6) show much longer spines in the penes than in the other species and approach Needham's figure of the false *maculipennis* (l. c. p. 51), although no central setae, as shown in this figure, have been observed by me.

(To be continued)

RECENT COLLECTIONS OF CANADIAN SPIDERS

BY J. H. EMERTON,
Boston, Mass.

In the summer of 1920, Mr. Fritz Johansen, while exploring the waters of James and Hudson Bays, collected spiders at several stations, in all 22 species.

The species from Moose River and Charlton Island are the common ones of eastern Canada; but farther north toward Richmond Gulf he found *Lycosa pictilis*, *L. albohastata* and *Pardosa furcifera*, which usually occur on mountaintops or in Labrador and Greenland. At Moose Island a new species of *Grammonota* was found (described in the "Canadian Entomologist" for October, 1923). The list of species follows.

MOOSE RIVER ISLANDS, June 28: *Hahnia radula*, male; *Epeira strix*; *Pardosa greenlandica*, male and female.

MOOSE ISLAND (MOOSE FACTORY), July and October: *Grammonota spinimana* n. sp.; *Clubiona canadensis*, male; *Drassus neglectus*; *Pachygnatha brevis*; *Dolomedes sexpunctatus* (from pond).

COAST BETWEEN MOOSE AND ALBANY RIVERS, July: *Pardosa albiceps*; *Pardosa greenlandica*; *Pirata insularis*; *Erigone longipalpis*.

CHARLETON ISLAND, July and September: *Tibellus oblongus*; *Cariarachne versicolor*; *Epeira displicata*; *Clubiona canadensis*; *Pardosa greenlandica*.

CAPE HOPE ISLANDS, East coast of James Bay (about Lat. 52½° N.), Sept. 13: *pardosa luteola*, female.

MOUTH OF SEAL RIVER, East coast of James Bay (about Lat. 54½° N.), Sept. 3: *Erigone longipalpis*.

SOUTH TWIN ISLANDS, James Bay; July 22: *Epeira pataginata*.

EAST COAST OF HUDSON BAY (between Great Whale River and Richmond Gulf), August: *Lycosa pictilis*; *L. albohastata*; *Pardosa greenlandica*, female and young; *P. hyperborea*, female with eggs; *P. furcifera*, female; *P. glacialis*, female; *P. brunnea*.

In the summer of 1922 Dr. C. W. Townsend of Boston visited Gaspé and collected the following species:

On Mt. Albert, Gaspé, from the tree line upward—

| | |
|-----------------------------|-----------------------------|
| <i>Bathypantes alpina</i> ♂ | <i>Pardosa greenlandica</i> |
| <i>Epeira patagiata</i> | " <i>musicicola</i> |
| <i>Lycosa beanii</i> | " <i>furcifera</i> Th. ♂ ♀. |

Gaspé coast from St. Anne des Monts to Chaudreuve—

| | |
|------------------------------|-----------------------------|
| <i>Steatoda borealis</i> | <i>Pardosa greenlandica</i> |
| <i>Ceratimella fissiceps</i> | " <i>xerampelina</i> |
| <i>Helophora insignis</i> | " <i>mackensiana</i> |
| <i>Linyphia marginata</i> | <i>Lycosa pratensis</i> |
| <i>Epeira patagiata</i> | <i>Tegenaria derhamii</i> |
| " <i>nordmanni</i> | <i>Zelotes ater</i> |
| <i>Cyclosa conica</i> | <i>Misumena vatia</i> |

In the summer of 1923 Dr. Townsend visited Grand Manan and collected the following:

HOUSE SPIDERS

| | |
|---------------------------|---------------------------|
| <i>Steatoda borealis</i> | <i>Zilla atrica</i> |
| <i>Epeira sclopetaria</i> | <i>Tegenaria derhamii</i> |

CANADIAN SPECIES

| | |
|---|--|
| <i>Theridion zelotypum</i> (webs in spruce trees). | <i>Pardosa xerampelina</i> |
| | " <i>mackensiana</i> |
| <i>Epeira labyrinthea</i> (bog variety). | " <i>hyperborea</i> Th. (Alpine and Arctic bog species). |
| <i>Gnaphosa brumalis</i> | |
| <i>Clubiona riparia</i> (nests in folded leaves of Iris). | |

under such conditions and at once rising on hot sunny days. The peak of *Dendroctonus* emergence, is given in Tables 4 and 5.

TABLE 4.

| Tree | 1st emergence | Peak of emergence | Last emergence | Period of emergence in large numbers | Remarks | |
|--------|---------------|-------------------|----------------|--------------------------------------|--------------------|---------------------------------|
| | | | | | | <i>Dendroctonus brevicornis</i> |
| 18 in. | 1921 | July 17 | July 22 | Aug. 18 | July 19 to 25 | Total of only 62 in tree |
| 24 in. | 1922 | June 18 | July 24 | July 29 | June 20 to July 6 | Total of 1751 |
| 32 in. | 1923 | June 19 | June 25 | July 18 | June 22 to July 11 | Total of 4547 |

TABLE 5

| Tree | 1st emergence | Peak of emergence | Last emergence | Period of emergence in large numbers | Remarks | |
|--------|---------------|-------------------|----------------|--------------------------------------|--------------------|--------------------------------|
| | | | | | | <i>Dendroctonus monticolae</i> |
| 18 in. | 1921 | July 17 | July 19 | Aug. 26 | July 17 to Aug. 1 | Total of 4121 |
| 24 in. | 1922 | June 25 | July 28 | Aug. 24 | July 4 to Aug. 3 | Total of 4543 |
| 32 in. | 1923 | June 25 | July 12 | Aug. 15 | June 29 to July 25 | Total of 2423 |

From these dates we may safely say that it is not advisable to conduct much control work in yellow pine for infestations of *Dendroctonus* later than June 20, in ordinary seasons in British Columbia. It is also evident that the heavy emergence lasts from two to four weeks, generally, somewhat shorter in *Dendroctonus brevicornis* than in *Dendroctonus monticolae*.

TABLE 6

| Tree | | Insects Collected in the Cages | | | | | Total |
|--------|------|--------------------------------|-------|-----------|---------|-----------|-------|
| | | Coleopt. | Dipt. | Hymenopt. | Hemipt. | Lepidopt. | |
| 18 in. | 1921 | 5754 | 108 | 103 | 16 | 21 | 6002 |
| 24 in. | 1922 | 15968 | 2848 | 73 | 65 | 8 | 18962 |
| 32 in. | 1923 | 25935 | 2180 | 502 | 181 | 29 | 28827 |

In this article has been shown the approximate numbers of emergence which may be expected from trees of certain diameters of the primary *Dendroctonus*; the enormous number of some of the secondary beetles which occasionally become primary and breed in tops, limbs and stumps; the relation of emergence from stump, bole, top and limbs; and an indication of the emergence of *Dendroctonus* the second year from trees abandoned by *Dendroctonus* the previous year.

NEW CANADIAN EPHEMERIDAE WITH NOTES, II*

BY J. MCDUNNOUGH,
Ottawa, Ont.

(Continued from page 122)

Siphloplecton interlineata Walsh

I have already called attention in my previous paper to the fact that on the strength of the forewing venation the genus *Siphloplecton* falls into the Heptageninae. It agrees with *Iron* in the comparative lengths of the fore tarsal joints in the male sex but may be separated by the short tibiae in all three pairs of legs

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

and by the fact that the fore tibia shows a distinct dorsal row of small spines. *Flexus* Clem., the type species, is evidently a synonym of *basalis* Wlk.; a second closely related species has been taken in numbers by Mr. N. Criddle at Aweme, Man., which I at first regarded as undescribed. However, in reading through Walsh's description of the species identified by him as *femoratus* Say I was struck by the similarity to our Manitoba species, and correspondence with Dr. Banks, who kindly examined the specimens sent by Walsh and Hagen, elicits the information that Walsh's specimens fall into *Siphloplecton* and not into *Siphonurus* as placed at present in catalogues. As there was considerable doubt expressed at the time as to the correctness of Walsh's determination, Walsh himself (1863, Proc. Ent. Soc. Phil. II, 190) proposed the name *interlineata* for the species, which name I shall use, leaving *femoratus* Say for the present unidentified. From *basalis* the species is distinguished by the paler abdomen and more restricted brown shading at the base of the wings in the male sex; the crossveins are pale except in the costal and subcostal regions and along the basal portion of the median vein.

Genus *Iron* Eaton

Under this genus I include all our North American species in which the first three tarsal joints of the ♂ are long and subequal. Several of the species have been described under the generic name *Epeorus* Eaton but this genus is based on a European species (*torrentium* Eaton) in which the ungues of the fore tarsus in the ♂ are stated to be similar, whilst in all the North American species with which I am acquainted they are dissimilar; whether the other differences used in separating these two genera, notably the comparative lengths of the joints of the hind tarsus, are of generic value, I am not at the present time prepared to say.

Used in the above sense, *Iron* contains the following species:—*longimanus* Eaton; *pleuralis* Banks, which according to Ulmer (1920, Stett. Ent. Zeit., 81, 142) is a synonym of *longimanus* but which I prefer to hold distinct for the present; *nitidus* Eaton; *fragilis* Morgan; *humeralis* Morgan; *modestus* Bks.; *californicus* Bks. and *tollandi* Dodds. Of these species *longimanus* occurs in Alberta and has been taken by me at Waterton Lakes and at Nordegg; what from the genitalia appears to be *humeralis* is fairly common here at Ottawa in late June; the following undescribed species also occur in our Canadian fauna.

Iron albertae n. sp.

Male. Very similar to *longimanus* but best distinguished, apart from ♂ genitalia, by the black humeral crossvein on primaries. Eyes (living) blue-gray; thorax light brown with darker central band spreading out on rear portion of mesothorax where there is a median spot of pale ochreous. Abdomen dorsally with segments 2-6 semihyaline, slightly smoky, with posterior transverse bands of brown; posterior segments largely brown, ventrally segments 2-7 pale, hyaline, with faint traces of medioventral spots, segments 8-10 creamy, opaque. Forceps creamy, tipped with brown, setae brown, legs pale brown with dark spot on centre of each femur and the joints tinged with dark brown. Wings hyaline with venation fine, inconspicuous, pale brown, except the humeral vein on primaries, which is marked with blackish. Length of body 10 mm.; of forewing, 11 mm.

Female. Similar to ♂ but rather paler.

Holotype—♂, Waterton Lakes, Alta., July 24, (J. McDunnough); No. 718, in Canadian National Collection.

Allotype—♀, same data.

Paratypes—11 ♂, 6 ♀, same locality and collector, July 19-26. The lack of the rounded projection of the subgenital plate (Pl. I, fig. 4) found in *longimanus*, is quite characteristic of the present species.

Iron grandis n. sp.

Male. Head light brown shaded with smoky; thorax light olivaceous brown, with two black lateral lines extending forward from base of wings; abdomen dorsally deep brown with a broad pale yellowish lateral border and a series of pale yellow subdorsal patches on posterior portion of each segment; these patches are obsolete on segments 2 and 3, faint on 4, large on 5-8, occupying more than half the segmental area and separated by a narrow brown line from each other. The brown area occupies the anterior third of each segment and juts into the yellow patches dorsally as a dark triangle, laterally it separates these patches from the yellow lateral border and broadens out on the posterior portion of each segment, causing the dorsal edge of the yellow border to appear very irregular in outline; segments 9 and 10 dorsally almost entirely yellowish. Ventrally the abdomen is purplish brown, paler posteriorly; forceps smoky brown with light brown base; setae deep black brown, forelegs black-brown, paler at base of femur; other legs light yellow-brown, unmarked. Wings hyaline with narrow dark veining, pterostigmatic area slightly tinged with brown and with crossveins anastomosing with each other. Length of body 11 mm.; of fore wing 14 mm.

Female. Similar to ♂ but generally paler with more extended yellow areas on abdomen.

Holotype—♂, Waterton Lakes, Alta., July 23, (J. McDunnough); No. 719, in Canadian National Collection.

Allotype—♀, same locality, July 20.

Paratypes—1 ♂, 5 ♀, same locality and collector, July 15-23; 2 ♂, Hedley, B.C., July 21, (C. B. Garrett).

The entire series from Waterton was secured through subimagos flushed from bushes bordering Cameron Creek near its junction with Waterton Lake. The description is drawn up from a well-marked specimen; in other specimens the abdominal maculation is often blurred by a reddish suffusion or by an extension of the dark areas.

Genus *Cinygma* Eaton

It is possible that the generic name *Cinygma* may fall to *Iron* Eaton but for the present I am retaining it in Eaton's sense for those species in which the first tarsal joint in the ♂ anterior legs is long but yet noticeably shorter than the second joint. It includes a number of delicate species, with a tendency to amber-colored wings, which are superficially very similar but which may be separated by characters found in the ♂ genitalia. In order to satisfactorily determine these characters it is necessary to make a slide of the parts in question as they have a great tendency to distortion in dried material. Eaton's figures of the genitalia of *integrum* and *par* (Mon. Pl. LXV, figs. 4, 5) from dried specimens are probably inaccurate and until it is possible to examine the types in the MacLachlan

collection or secure adequate material from the type localities (Oregon, Arizona) the identity of these species will remain doubtful.

Cinygma mimus Eaton

Through the kindness of Dr. Banks, specimens of the type series from Manitou, Colo., are before me. An examination of the ♂ genitalia shows that the species doubtfully recorded and figured by Dodds (1923, Trans. Am. Ent. Soc., XLIX, 106, Pl. VIII, fig. 18) is not the true *mimus*, the genitalia of which are quite different, as shown herewith (fig. 7).

I captured a long series of *mimus* early in July, at Waterton Lakes, Alta., where on certain days it occurred commonly in the late afternoon along the lake shore; it is readily recognized by the rather yellow-brown tint of the wings, this color being strongest in the basal half of the wing; in allied species the tint of the wing is deeper and more evenly suffused over the entire surface.

Cinygma atlantica n. sp.

Male. Head between the eyes dark brown, thorax light brown shaded with dark brown laterally on prothorax. Abdomen dorsally with segments 2-6 pale, semihyaline, shaded with brown; the brown color occupies the greater portion of segments 2 & 3, leaving a pale centrodorsal area; on the other segments this color is restricted more to the posterior lateral areas; there are traces of subdorsal pale vittae, outlined partially with brown; posterior segments almost entirely brown. Ventrally the abdomen is pale ochreous, becoming opaque on posterior segments. Setae brown, forelegs smoky brown, other legs yellowish brown. Wings hyaline, untinted, with all veins fine, brown. Length of body 7 mm.; of fore wing 8 mm.

Holotype—♂, Kentville, Nova Scotia, June 25, (R. P. Gorham); No. 720 in the Canadian National Collection.

The genitalia (fig. 12) show the species to be allied to *par* Eaton.

Cinygma confusa n. sp.

Head deep red-brown; thorax light olive brown, shaded with darker brown centrally and with purplish tinges on prothorax and laterally below the wings. Abdomen with segments 2-7 hyaline, banded on posterior half of each segment dorsally with purple-brown and with indistinct pale subdorsal vittae outlined in brown and most distinct on segments 2 & 3, where the brown color extends over a larger portion of each segment. Rear segments light brown, opaque, slightly shaded with purplish dorsally and paler ventrally; on hyaline segments a centroventral row of purplish patches. Forceps smoky, brown at base; setae deep black-brown; legs with light brown coxae, fore femur deep purplish, remainder of foreleg blackish, other legs light purplish brown. Wings evenly suffused with deep amber color, with dark, clean cut venation. Length of body 9 mm.; of forewing 10 mm.

Holotype—♂, Moraine Lake, Alta., Aug. 1, (J. McDunnough); No. 723, in Canadian National Collection.

Paratypes—8 ♂, same data.

The type series was captured swarming in late afternoon over a small creek at the junction of the Moraine Lake and Lake Louise roads; I secured a series of the same species at Waterton Lakes, Alta., on July 7, from subimagos emerging from a mountain brook, which later dried up. The genitalia (fig. 9) are very similar to those of the Colorado species figured erroneously by Dodds

as *minus* (1923, Trans. Am. Ent. Soc., Pl. VIII, fig. 18); this Colorado species probably represents the true *par* Eaton which has evidently a basal spine on the penis (rather misplaced in Eaton's drawing); I have made slides of the genitalia of two specimens received from Dr. Dodds and find them larger and stouter than in our Alberta forms and slightly differently shaped at apex of penis. I have also before me a long series of dried specimens from Tolland, Colo., which show the dark brown shading at base of wing mentioned by Eaton, the remainder of the wing being practically pale hyaline gray.

***Cinygma hyalina* n. sp.**

Male. Very similar to the preceding species. It can best be distinguished by the hyaline wing-membrane which is untinted, except for a slight shade in the pterostigmatal area. In mature specimens the thorax is slightly deeper in color than in *confusa*; the banding of the abdomen shows less purple tinges in the brown color and the definition between the pale and dark areas is less distinct; segments 2 and 3 are almost entirely brown and there is only a trace of the pale subdorsal vittae; the ventral area is more opaque, being suffused with whitish; the legs also show no purple tinge but are light to deep brown. The differences between the ♂ genitalia (fig. 8) of the two species are slight but seemingly constant; the best distinction is found in the length of the basal spine of the penis.

Holotype—♂, Moraine Lake, Alta., Aug. 6, (McDunnough); No. 724, in the Canadian National Collection.

Paratypes—3 ♂, same locality and collector, Aug. 5, 6, 10.

There are also before me several specimens of both sexes from Waterton Lakes, Alta., (July 15-23) and 1 ♂, 3 ♀, from Banff, Alta., (July 19, Aug. 21) which appear to belong here.

***Cinygma ramaleyi* Dodds**

This species was described (l. c. p. 101, fig. 9) as an *Ecdyurus*. I have a ♂ before me, received from Dr. Dodds, which has lost its forelegs; a number of other specimens recently received from various localities in Colorado agree with Dodds' specimen in general appearance and in genitalia (fig. 11); these show the *Cinygma* type of foreleg and fit in well in general habitus with the other members of the group. The species occurs in Canada and in the Canadian National Collection there is a series captured at Banff, Alta., early in September.

***Cinygma deceptiva* n. sp.**

Male. Bears the same relation to *ramaleyi* that *hyalina* does to *confusa*, having the wing membrane clear, hyaline; type of maculation similar to that of the preceding species. The genitalia of the ♂ (fig. 10) are quite distinct and the rounded projection of the subgenital plate between the bases of the forceps (as in *Iron longimanus*) is an easy means of identification.

Holotype—♂, Banff, Alta., Sept. 5, (C. B. Garrett); No. 726, in the Canadian National Collection.

Allotype—♀, same data.

Paratype—1 ♂, same data.

The two males before me have unfortunately lost their forelegs but on account of the general similarity I place the species in *Cinygma*. It is possible that it is this species, the genitalia of which are figured by Dodds (l. c. fig. 22) as representing a mature form of *Iron longimanus*; in a long series of this latter species

examined by me the genitalia all correspond with Eaton's figure and Dodds' fig. 21, and as no cases are known to me of a radical change in the shape of these organs in the adult males, I presume that two species have been confused by Dr. Dodds under the name *longimanus*.

EXPLANATION OF PLATE I.

1. Male genitalia of *Iron grandis* McD.
2. Male genitalia of *Hexagenia atrocaudata* McD.
3. Male genitalia of *Hexagenia rigida* McD.
4. Male genitalia of *Iron albertae* McD.
5. Male genitalia of *Leptophlebia moerens* McD. (lateral view)
6. Male genitalia of *Leptophlebia mollis* Eaton.
7. Male genitalia of *Leptophlebia volitans* McD.
8. Male genitalia of *Leptophlebia guttata* McD.
9. Male genitalia of *Leptophlebia heteronea* McD.

EXPLANATION OF PLATE 2.

1. Male genitalia of *Heptagenia flavescens* Walsh.
2. Male genitalia of *Heptagenia inconspicua* McD.
3. Male genitalia of *Ameletus vernalis* McD.
4. Male genitalia of *Heptagenia maculipennis* Walsh.
5. Male genitalia of *Heptagenia juno* McD.
6. Male genitalia of *Heptagenia hebe* McD.
7. Male genitalia of *Cinygma minus* Eaton.
8. Male genitalia of *Cinygma hyalina* McD.
9. Male genitalia of *Cinygma confusa* McD.
10. Male genitalia of *Cinygma deceptiva* McD.
11. Male genitalia of *Cinygma ramaleyi* Dodds.
12. Male genitalia of *Cinygma atlantica* McD.

SEVEN NEW SPECIES OF RHAPHIUM (DOLICHOPODIDAE,,
DIPTERA)*

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In the following pages seven species of *Rhaphium* occurring in Canada are described for the first time. The genera *Xiphandrium* Loew and *Porphyrops* Mg., are not considered distinct from *Rhaphium* as all these genera intergrade perfectly. Six of the species described would come under the genus *Porphyrops*. One (*R. arborium*) would be placed in *Xiphandrium*.

It was originally intended to deal fully with the Canadian species, but after this paper had been practically completed a large number of undescribed species were received from Dr. J. M. Aldrich and it was considered advisable to omit all but descriptions of new species at present and proceed with a monograph of the North American species. Types of all the species herein described are in the Canadian National Collection, paratypes of all but *R. patchi* in the United States National Museum.

***Rhaphium campestris* new species**

Face narrow, white, third antennal joint acute, nearly three times as long

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