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NEW SPECIES OF NORTH AMERICAN EPHEMEROPTERA II*

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Leptophlebia strigula n. sp.

Male. Very similar in all respects to *guttata* McD. but noticeably larger in size. Thorax deep blackish, tinged with brown in the pleural sutures. Abdomen with segments 2-6 and anterior portion of 7 whitish, hyaline, with considerable brownish shading on 2. In place of the lateral black dots of *guttata* there is a short black transverse streak in the postero-lateral corner of segments 2-6 with some slight brown suffusion anterior to it, especially on segment 2. Rear segments deep chocolate-brown. Setae and forceps whitish, faintly tinted with brown at base. Legs whitish; fore femora tinged with brown throughout, mid- and hind femora only apically with the knee decidedly brown. Wings hyaline with pale venation. The genitalia are very close to those of *guttata* (Can. Ent., 1924, LVI, 91, Pl. 1, fig. 8) but the penes are convergent, not divergent, at their apices, the beak-like lateral projections are somewhat shorter and the ribbon-like stimuli are longer.

Female. Head red-brown, with black shading on vertex. Thorax and abdomen deep red-brown. Legs pale amber. Wings hyaline with the longitudinal veins faintly amber-colored. The subanal plate has a deep, narrow U-shaped excision. Length of body 7 mm.; of forewing 7 mm.

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

Holotype—♂, Dundas, Ont., May 31, (G. S. Walley); No. 3382 in the Canadian National Collection, Ottawa.

Allotype—♀, same data.

Paratypes—10 ♂, same data (two bred from nymph); 3 ♂, Jordan, Ont., June 21, 25, 1926, (G. S. Walley).

The flight of this species apparently occurs about two weeks earlier in the spring than that of *guttata*. At Dundas in 1931 no specimens of the latter species were seen, whilst at Jordan, in 1926, when *guttata* was very plentiful, only three specimens of *strigula*, representing probably stragglers, were secured.

Mr. Walley was successful in bringing several nymphs through to maturity and has prepared the following notes on this stage:—

"Nymph. Size, general form and color—Length of body, male 6.5 mm., female 7.5 mm., caudal setae, male 6.0 mm., female 10.0 mm. A larger, stouter nymph than *L. guttata* McD. with the head slightly narrower in proportion to the rest of body and the abdomen broader and not tapering so distinctly posteriorly as does *guttata*. In nature the mature nymphs are a bright coffee brown except for the black wing pads and pale appendages. The brown color is preserved but duller in the alcohol specimens described below.

Head and Mouth parts—Brownish, with traces of darker shading on vertex. Antennae and mouth parts creamy yellowish. The ocelli indicated by creamy dots surrounded by a dark brownish ring which is sub-integumental.

The maxillae resemble those of *guttata*. Both species have the palpi considerably elongate but in *strigula* the segments, particularly the second, are distinctly stouter than in *guttata*. The labial palpi have the apical segment slightly more elongate than in *guttata* but in both species this segment is unusually short as compared with the *L. mollis* type figured by Ide (Can. Ent., 1930, LXII, 208, pl. 17, fig. 4b).

Thorax—Pronotum dusky brown with slightly paler lateral margins. Mesonotum brownish, sometimes with an elongate triangular median dash and one or two lateral blotches of paler brown and in mature specimens often with indications of darker brown sub-integumental dashes. Legs entirely pale.

Abdomen—Tergites brown with lateral margins paler, anterior 5 or 6 tergites with a faint oblique pale dash on either side at base, posterior tergites with a very obscure interrupted median streak. Postero-lateral angles of gill bearing segments with a blackish *streak* along the margin. In *guttata* nymphs this streak is replaced by a small blackish spot and in both species the character is preserved in the adult. Venter paler brown with faintly darker patches on either side especially on apical sternites. Gills as in *guttata*. Caudal setae pale brown."

***Pseudocloeon parvulum* n. sp.**

Male. Turbinate eyes (dried) deep reddish, decidedly more oval than in *dubium* where they are almost circular. Thorax black-brown. Abdomen with the first six segments dull hyaline whitish with a slight smoky or pale amber suffusion (not the pure white of *dubium*); traces of a fine, geminate, ruddy mid-dorsal line and a series of five rather large diffuse, lateral, ruddy or claret-colored patches, one on each of segments II-VI, that of IV being less distinct than the others (at times obsolescent); tracheae along lateral edge marked

in black. Last four segments dorsally light chocolate-brown, ventrally opaque whitish with a brownish tinge, deepest on lateral portion of segment IX; forceps pale with the basal joint suffused with light sepia-brown and the terminal joint short and stubby, scarcely longer than broad and quite distinct from the much longer joint of *dubium*; setae whitish. Fore femora smoky with slight amber tinge, tibiae and tarsi smoky white. Mid and hind femora pale, very faintly amber-tinted with a *ruddy dash on lower edge anteriorly* and a distinct, ruddy, lateral spot near apex and well beyond middle of joint; tibiae and tarsi whitish. Wings hyaline with slight black-brown tinge at extreme base; venation pale; preostigmatic crossveins few in number, with no intervening granulations.

Female. Front and head and base of antennae rather a bright brown; vertex of head behind ocelli light yellowish, suffused over the median area with light brown of a rather ochreous tinge, leaving the yellowish color adjacent to the eyes. Thorax light brown. Abdomen dorsally light brown with a yellowish tinge, deeper in color laterally, due probably to darker patches corresponding to the ruddy patches in the male; ventrally pale yellowish. Legs pale yellowish, fore femora largely suffused with bright brown; mid and hind femora with the ruddy streak and spot of the male sex. Wings hyaline with pale venation. Length of body 3 mm.; of forewings 3.5 mm.

Holotype—♂, Tillsonburg, Ont., June 4, 1926, (G. S. Walley); No. 3391 in the Canadian National Collection, Ottawa.

Allotype—♀, same data, June 5.

Paratypes—23 ♂, 20 ♀, same data, June 4, 5.

The species is one of the smallest known; the larger spring generation is about the size of the second, summer one, of *dubium*, and the summer generation, of which a single male was secured at Kazubazua, Que. by Mr. W. J. Brown, is extremely minute.

It appears to be widespread and quite variable in regard to the red spotting of the abdomen. While my entire Tillsonburg series shows these red blotches very clearly I have a series before me from Niagara Falls, Ont., taken in late July, some of which are well-maculate whereas others have lost all trace of the red abdominal spots. Most of these immaculate specimens still show the red ventral dash on either the mid or hind femora; as there is further no difference in the male genitalia I consider them to be merely poorly-marked specimens of *parvulum*. The same remark applies to a series before me from Milk River, Alta. (July, August) only a few specimens showing any traces of ruddy spotting, the majority being a dirty whitish in respect to the color of the first 6 abdominal segments and only definitely separable from specimens of *dubium* from the same region by the more oval turbinate eyes and the male genitalia. Nymphs from the Milk River correspond with eastern nymphs mentioned in the following paragraph. The larger *rubrolaterale* McD. from the same locality has much more extended ruddy abdominal suffusion than even typical *parvulum* and is at once distinguished by the medio-ventral dark dots.

Although a definite association was not made, what I believe to be the nymph of this species was found by Messrs. Brown and Walley at Tillsonburg in early June 1931, at a time when subimagos of *parvulum* were emerging from

the stream; similar mature nymphs were taken at Kazubazua, Que., by Mr. Brown in August, 1931 at the spot where the small specimen, mentioned above, was captured, no other mature nymphs being found in either locality at the time.

The nymph is a very slender, delicate creature and is at once distinguished from others of the genus by the fact that the setae are alternately banded with pale and dark color as in *Ecdyonurus* nymphs. The abdomen is brown with a mediodorsal row of pale spots, one on the anterior margin of each segment; in well-marked specimens there are two lateral anterior dots each side of the median dots and further a pale latero-posterior spot. In the females these spots are often obscure, but in the males, as is usual in the genus, they tend to expand and coalesce so that segments 4, 8 and 9 are largely pale, with a median quadrate dark patch on 4 and subdorsal dark streaks on 8 and 9. In the legs the femora show moderately long hair on the dorsal edge; they are largely dark, with pale patches, the tibiae and tarsi with the apical section brown. The gills are large, oval, pale, with a distinctive dark subapical patch and a median black trachea which usually gives off a single short branch at base.

The nymphs of *punctiventris* McD. and *virile* McD. are now also known, single female specimens having been bred by Mr. Walley and myself at Miner's Bay, near Minden, Ont. in May, 1931 and the nymphal skins secured. Of *punctiventris* a mature male nymph was also taken, the midventral spots showing up subcutaneously (these spots do not persist in the nymphal skin). No further *virile* nymphs were found at Miners' Bay, but a few from the Moira river at Belleville, Ont. seem to match the nymphal skin before me. The following key, largely based on male nymphs, will augment that given in this journal recently (1931, Vol. LXIII, p. 85). The number of species in this genus is apparently not yet exhausted as there are several unassociated series of nymphs before me from various eastern localities which do not match any species given in the key.

KEY TO KNOWN NYMPHS OF PSEUDOCLOEON SPECIES

1. Two caudal setae alternately banded with light and dark . . . *parvulum* McD.
Two caudal setae otherwise 2
2. Caudal setae with median dark band 3
Caudal setae unbanded 5
3. Abdominal segments, especially in ♂, with strong color contrasts; segments 3, 4, 8-10 being largely pale, others dark; 9 with a dark lateral dash
 *dubium* Wlsh.
Abdominal segments largely dark; no lateral dash on 9 4
4. Rear abdominal segments with traces of pale dorsal band; usual dark subdorsal and subventral dots distinct; anterior segments with pale subdorsal dots; medioventral dark dots of adult present . . . *punctiventris* McD.
Rear abdominal segments with dorsal pale band; dark dots obscure; pair of subdorsal pale spots on anterior portion of each segment; no medio-ventral dark dots *virile* McD.
5. Short, chunky species with broad thorax; long hairs on dorsal margin of femora and tibiae; first eight abdominal segments almost entirely dark

.....*carolina* Bnks.
 More elongate species; hairs on femora considerably shorter; abdomen paler
 with segments 4 and 8-10, particularly in ♂, frequently pale
*cingulatum* McD.

In conclusion it might be noted that nymphs of *Heterocloeon curiosum* McD. fall into the section with unbanded caudal setae, but may be distinguished by the fact that the gills are largely blackish with a narrow pale border.

Genus **Baetisca** Walsh

In working over the species of this genus in our collections in connection with Miss Traver's recent paper (1931, Jour. N. Y. Ent. Soc., XXXIX, 45) I find two undescribed species, both of which have been definitely associated with the nymphal stages. I am further able to record the occurrence of what I believe to be *carolina* Traver at Knowlton, Que.; nymphs were taken by Mr. W. J. Brown in Knowlton Creek, about 3 miles south-east of town in 1928 and a male and female secured at the same place on June 14 and 16. Miss Traver, who has examined specimens of the nymphs, states that they differ from those of *carolina* in having less sharp lateral spines and in lacking the large black spots on the abdomen behind the gills; such differences, however, I can hardly regard as specific in view of similar variation in other material before me and as the adults agree very nicely with the characterization I am holding them for the present under this name. We also have a single immature nymph from Kazubazua, Que., taken in August, 1931, by Mr. Brown, which corresponds to the diagnosis of *callosa* Traver. It is evident that the nymphs on which the description of *callosa* was based were very immature and in all probability neither these nor our Kazubazua one would have reached maturity and emerged until the spring of the following year; consequently it is impossible to say whether the lack of spining on the mesonotal shield (which is characteristic of *callosa* nymph as described) is found in mature nymphs or whether possibly spines may develop during the later nymphal stages; the matter must await future study.

As very excellent characters for specific separation are found in the nymphs I offer the following key to those species of which the early stages are known; this includes the two undescribed species above mentioned but omits *rubescens* Prov., the early stages of which are still to be discovered.

KEY TO KNOWN SPECIES OF BAETISCA NYMPHS

1. Mesonotal shield without either dorsal or lateral pairs of spines.....
*callosa* Traver
 Mesonotal shield with at least lateral pair of spines present.....2
2. Both dorsal and lateral spines on mesonotal shield3
 Only lateral spines on mesonotal shield4
3. Head with a pair of prominent frontal projections.....*obesa* Say
 Head with frontal projections reduced to very small, blunt tubercles
*laurentina* n. sp.
4. Head with genae produced into sharp, upcurved spines; no frontal
 tubercles*carolina* Traver
 Head with genae not produced into spines; two small rounded frontal
 tubercles; lateral spines of shield very long and sharp....*lacustris* n. sp.

Baetisca laurentina n. sp.

Male. Entire insect dorsally deep brown with the lateral, somewhat flange-like, edge of the mesonotum paler; thoracic sternum deep brown; abdominal sternites paler brown with the forceps dull dirty amber-colored; setae pale brownish, ringed intersegmentally with darker. Wings hyaline, the longitudinal veins brown, the crossveins pale, scarcely visible except in the anal area. Legs dull amber, the prothoracic pair rather deeper in color than the two hinder pairs.

Female. Very similar to male in coloration but with the head and prothorax slightly paler brown than the remainder of the body. The wing venation is also paler. Length of abdomen 8 mm.; of forewing 10 mm.

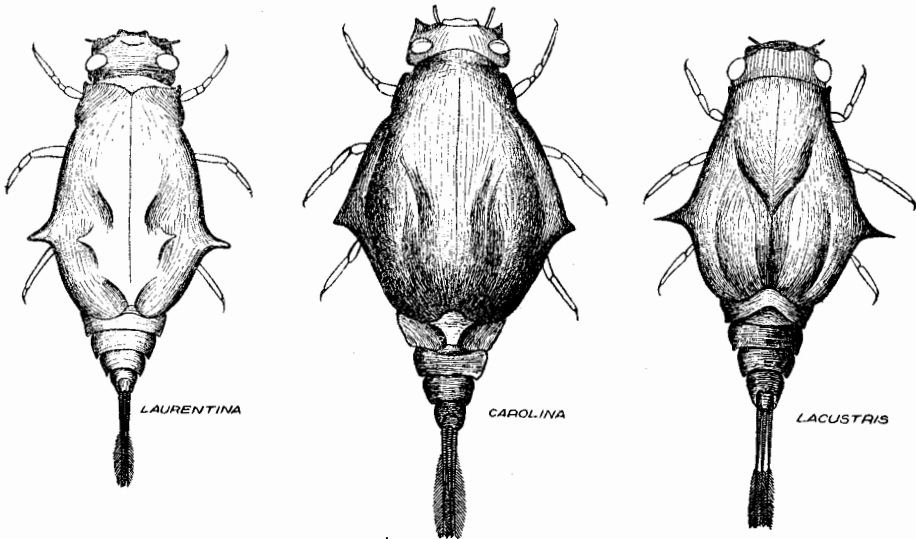
Subimago. Color much as in adults. Wings varying from almost black with fine hyaline reticulations to a pale-banded form in which the median and terminal areas show bands and streaks of pale color.

Holotype—♂, Lachine, Que., June 6, 1930. (G. S. Walley) (bred from nymph); No. 3383 in the Canadian National Collection, Ottawa.

Allotype—♀, same data, June 7.

Paratypes—3 ♂, same locality and collector, June 6, 8.

A number of specimens from Ottawa, Ont. and a single male from Fredericton, N. B. probably also belong here but without nymphs from these localities I refrain from including them in the type series.



In the adults the species is separable from *obesa* Say (as represented in our collection by one of Walsh's specimens) by the dark longitudinal venation. The nymphs should be readily recognized by the characters given in the key and in the accompanying illustration.

Baetisca lacustris n. sp.

Male. Dorsally brown, tinged with ruddier brown on the apical abdominal segments. Thoracic sternites pale brown; abdominal sternites, forceps and legs pale yellowish-white. Setae whitish, unbanded. Wings hyaline with entirely pale venation.

Female. Somewhat paler than the male but in general with similar coloration. Length of body 7 mm.; of forewings 8 mm.

Subimago. Body coloration as in adult. Wings much less heavily reticulate with black than in preceding species, the dark color more or less confined to the median area of primaries where it forms a transverse band and to the apical section of both primaries and secondaries. At times the dark color is much reduced so that the subimago appears almost unmottled.

Holotype—♂, Pelee Island, Ont., July 3, 1931, (G. S. Walley); No. 3384 in the Canadian National Collection, Ottawa.

Allotype—♀, Leamington, Ont., June 24, 1931 (W. J. Brown).

Paratypes—15 ♂, Pelee Island, July 3, 1931, (Walley and Brown); 2 ♀, Fisher Glen, Ont., June 12, 1931, (W. J. Brown); 3 ♀, Pt. Pelee, Ont., June 19, 24, 1925, (G. S. Walley); 1 ♀, Pt. Pelee, Ont., June 29, 1931, (W. J. Brown).

Numerous cast nymphal skins of this species were found along the shore of Lake Erie in the vicinity of Normandale, Ont. and a mature nymph found in a pool in the same region was bred to a subimago which corresponded to the subimagos found on Pelee Island and in the Pt. Pelee region. Similar nymphal skins were also found at Southampton on Lake Huron and an examination of Clemens' material from the Georgian Bay shows that it was this species he recorded (1913, Can. Ent. 333) under the name *obesa* Say. It is evident that we are dealing with a species indigenous to the Great Lakes. A small series of adults from Treesbank and Aweme, Man., also appears to belong here but I have no knowledge of the nymphs.

The striking difference between the dark upper and the pale underside of the adult abdomen together with the entirely hyaline wings should identify the species readily. The male genitalia are very similar throughout the genus and offer no characters which can be used satisfactorily to separate species.