

The Leuctridae of Eastern Canada (Insecta; Plecoptera)¹

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After a short discussion of the taxonomy of the adult Leuctridae of Eastern Canada, the nymphs of the eight most common species are described and a key for their identification is proposed.

Après une courte discussion de la systématique des Leuctridae adultes de l'Est canadien, on décrit les larves des huit espèces les plus répandues et on propose une clef pour leur détermination.

Introduction

The Leuctridae have not reached, in North America, the great development and the variety they have attained in Europe; indeed, there are only 10 species at present recorded from Eastern Canada. Of these, *L. triloba* Claassen has been collected only once in extreme Southern Quebec (Ricker *et al.* 1968), and *L. baddecka* is known only from the type locality on Cape Breton Island (Ricker 1965). The other species are fairly common and widespread. The adults will be dealt with briefly, since adequate descriptions and illustrations are available in the literature. On the other hand, no detailed investigation of the nymphs has been made in North America, except a short study of some of the species of Southwestern British Columbia (Ricker 1943). Though a few Eastern species have been described (Claassen 1931), the present study is the first attempt to distinguish these nymphs in Eastern North America.

The Adults

The 10 species recorded from Eastern Canada are listed below; also included are references where adequate descriptions and illustrations of these species can be found. Eight of the species are included in Needham and Claassen's (1925) monograph; these are *Leuctra duplicata* Claassen, *L. ferruginea* (Walker) (as *L. decepta* Claassen), *L. sibleyi* Claassen, *L. tenella* Provancher (as *L. hamula* Claassen), *L. tenuis* (Pictet), *L. triloba* Claassen, *L. truncata* Claassen, and *Paraleuctra*

sara (Claassen) (as *L. occidentalis* Banks). Two further species that occur in Eastern Canada have since been described: *L. maria* Hanson (male genitalia in Hanson (1941b) and female genitalia in Ricker (1952)) and *L. baddecka* Ricker (female genitalia in Ricker (1965); the male is unknown). Keys to the males are presented by Needham and Claassen (1925) and more recently by Hitchcock (1969). No key to the females is presently available, but their identification from the illustrations is not particularly difficult after some experience with the group. It must be remembered, however, that the subgenital plate changes somewhat in shape and coloration with the age of the female.

The Nymphs

The nymphs of this family are not readily identifiable; in Europe, only in Britain (Hynes 1941) and in Sweden (Brinck 1949), where the number of species is small, are the nymphs easily recognized. In other areas, such as Switzerland, the great number of allied species hinders identification (Aubert 1959). However, the characters used by European authors can, to some extent, be used in distinguishing between the Eastern Canadian species.

The nymphs of the eight common species are described below and an identification key is proposed. Missing are the seldom collected *L. triloba* and *L. baddecka*, the nymphs of which are still unknown.

Taxonomic Characters

The Leuctridae are a fairly homogeneous group and there are few morphological differences even between the genera.

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The mouthparts are similar in the two genera considered here, except in the length of the labial palps (Figs. 5 and 6). The length of the abdominal pleural fold is also distinctive (Ricker 1959), but it is not easily seen. Other features, such as the shape of the pronotum, are very variable and of no taxonomic use.

The main characters in this group are undoubtedly the distribution and the size of the setae on the body surface. In this study, the term bristle is reserved for thick setae which can easily be observed under reflected light through a dissecting microscope, while the term hair is used for the very slender and silky setae which are usually seen only with transmitted light.

The main bristles used are those on the pro- and meso-notum as well as those on the abdomen. To use the key and the illustrations profitably, the specimens must be examined under a dissecting microscope with transmitted light; thus, only the bristles seen in profile are considered. It is also imperative that the specimen be correctly oriented, and for a side view it must be held in precisely the right position, so that the bristles on the exact middle of tergites and the sternites are the ones that are seen in profile. If this precaution is not taken, the bristles observed may be those set on the lateral areas of the tergites.

As much variation can be expected in most of these characters, identification should preferably be attempted only on a series of nymphs from one locality, rather than on isolated specimens.

Description of the Nymphs

FAMILY Leuctridae

The nymphs of this family are readily recognized by the following combination of features; the glossae and the paraglossae are subequal; the wing-pads are parallel to the body axis; the second tarsal segment is very small; the abdominal segments 1-4 or 1-6 but never 1-9 (as in the Capniidae) are separated by a membranous pleural fold. The shape of the abdomen, parallel sided in top and side views and round in cross section, is probably the character that is most distinctive.

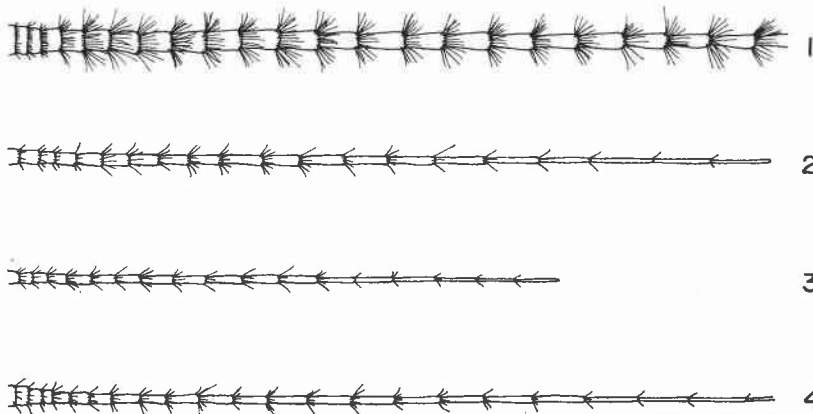
GENUS *Leuctra* Stephens 1835

All of the known species of *Leuctra* possess the following characteristics: the labial palps are long, reaching much beyond the tips of the paraglossae; the abdominal segments 1-4 are separated by a membranous pleural fold; the abdomen bears, at least on the apical segments, a clothing of stout bristles, and the subanal lobes are covered ventrally and apically with many stout bristles. These also bear, on the inner apical region, two long bristles (Figs. 14-18), a character first observed by Hanson (1941a) on *L. variabilis* Hanson.

1. *Leuctra duplicata* Claassen 1923

Description—Total length of mature nymph: 6-7 mm. General color, yellowish brown.

Head with a few long bristles near the compound eyes and the angle of the frons; many bristles on the labrum; a loose row of short stout bristles behind the compound eyes.



FIGS. 1-4. Lateral view of cercus. Fig. 1, *L. sibleyi*; Fig. 2, *L. duplicata*; Fig. 3, *L. ferruginea*; Fig. 4, *L. truncata*.

Margin of pronotum with many very short bristles, especially on the angles; there may be a long bristle on the posterior corner; mesonotum with patches of short bristles on the anterior and posterior margins; wing-pads bare, except for a few short bristles at the base of the outer margin of the forewing (Fig. 12); legs with short bristles; a few long hairs on the outer surfaces of femora, tibiae, and tarsi.

Abdomen covered throughout with short clothing bristles; there are also a few long inconspicuous dorsolateral hairs on the lateral thirds of the tergites; the sternites are usually all covered with short clothing bristles, though the first four sternites are less hairy; the margins of the last three or four sternites bear a few slightly longer bristles (Fig. 15); subanal lobes with many short bristles distally; also, two long bristles arising from the inner apical surface of each lobe; a similar long bristle is set on the small supraanal lobe (Fig. 15); cerci moderately hairy (Fig. 2).

Source of material examined—small tributary of Paudash Lake, Haliburton Co., Ontario.

Habitat and distribution—small streams in Southern Quebec and Southeastern Ontario, also inhabits temporary streams; an early summer species.

2. *Leuctra ferruginea* (Walker 1852)

1931, *L. decepta*, Claassen, description, Fig. 208, nymph.

1942, *L. decepta*, Frison, no description, reference to anal gills.

Description—total length of mature nymph: 6–7 mm. General color, light yellow to yellowish brown, often with an inconspicuous purplish pattern on the head.

Setation of the head as in *L. duplicata*.

Pronotum with many long bristles on the anterior corner; two long bristles on the posterior corner; mesonotum with patches of short bristles on the anterior angles; a few long silky hairs on the anterior and posterior margins of the meso- and meta-nota; wing-pads bare except usually for a row of short bristles along the base of the outer margin of the fore wing-pad; these bristles may be absent in some mature nymphs (Fig. 10); legs covered mostly with short bristles but often with a few much longer ones, as long as the width of femur; a few long silky hairs on the outer surfaces of femora, tibiae, and tarsi.

Dorsum of abdomen covered with short clothing bristles; a few dorsolateral silky hairs on the lateral thirds of the tergites; sternites bare, without short clothing bristles, only with a few long bristles on the posterior margin of the last few tergites (Fig. 17); subanal lobes and cerci much as in *L. duplicata*; cerci as in Fig. 3.

Source of material examined—Small streams south of Baden and east of Woolwich, Waterloo Co.; Lutteral Ck., Mimosa, Wellington Co., Ontario.

Habitat and distribution—Found predominantly in small cold streamlets; it can also occur in a wide variety of streams, even in small warm rivers. Widespread throughout Eastern Canada; emerges throughout the summer.

3. *Leuctra maria* Hanson 1941

Description—Total length of mature nymph: 6–7 mm.

The nymph of this species is very similar to that of *duplicata*. Constant differences found between them are the nymph of *maria* is somewhat less hairy; the anterior angle of the pronotum of *maria* bears at least one long bristle (Fig. 13), whereas in *duplicata*, the anterior bristles are all very short (Fig. 12). Furthermore, the base of the outer margin of the fore wing-pad is bare in *maria*, except for a long silky hair; in *duplicata*, there is also a row of short stout bristles.

Source of material examined—Mud Ck., Algonquin Provincial Park, Ontario.

Habitat and distribution—Small cold streams, often springfed, in Southeastern Ontario and Southern Quebec; an early summer species.

4. *Leuctra sibleyi* Claassen 1923

1931, *L. sibleyi*, Claassen, description, Figs. 147–152, mouthparts, hind legs.

Description—Total length of mature nymph: 8–9 mm. General color, rich yellowish brown, sometimes with an orange tinge, no pattern on head capsule.

Head as in *duplicata*; labium, Fig. 5.

Pronotum with many long bristles on the anterior corner and one or two long ones on the posterior angle; mesonotum with many short bristles on the anterior angle; base of outer margin of fore wing-pad beset with a row of short bristles; margins of meso- and meta-nota with a few long silky hairs (Fig. 7); femora beset with long bristles, the longest equalling the width of the femur, and a few silky hairs on the outer

surface; tibiae and tarsi bearing short spines and a few long hairs.

Abdomen covered dorsally with many short clothing bristles and a few dorsolateral silky hairs; venter mostly glabrous, except at the margins of the apical sternites, which bear a few long bristles; there are often a very few short bristles on some sternites (Fig. 14); subanal lobes much as in *duplicata*; cerci with bushy whorls of bristles (Fig. 1).

Source of material examined—Stream at Station de Biologie, St. Hippolyte, Terrebonne Co., Quebec.

Habitat and distribution—Small streams to medium-sized rivers in Southeastern Ontario and Southern Quebec; a late spring species.

5. *Leuctra tenella* Provancher 1878

Description—Total length of mature nymph: 6–7.5 mm.

We have seen only one nymph of this species; it is, in most respects, similar to *truncata* described below; however, the nymph of *tenella* bears the usual patches of half a dozen or so stout bristles on the anterior angles of the mesonotum (Fig. 8), while that of *truncata* has only one or two very short bristles (Fig. 9).

Source of material examined—Ruisseau des Erables, Mont-Tremblant Provincial Park, Quebec.

Habitat and distribution—Small streams, often spring-fed, in Ontario, Quebec, and the Maritimes; emerges throughout the summer.

6. *Leuctra tenuis* (Pictet 1841)

1901, *L. tenella* Needham *nec* Provancher, short and imprecise description.

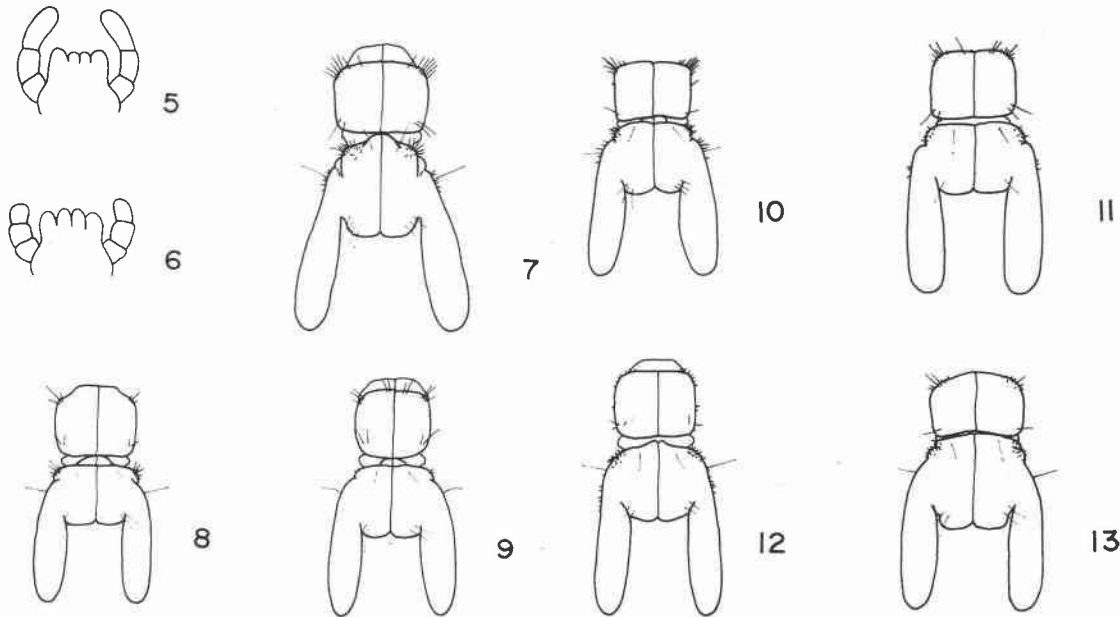
1942, *L. tenuis*, Frison, no description, reference to anal gills.

Description—Total length of mature nymph: 6–7 mm.

Similar in most respects (Fig. 11) to *ferruginea* (Fig. 10), from which it can be distinguished by the following character: the ninth sternite of *tenuis* is clothed with short stout bristles; the preceding sternites are mostly bare but may have a few short bristles; the margins of the apical sternites bear the usual long bristles (Fig. 16); in *ferruginea*, the short stout bristles are absent on the sternites (Fig. 17).

Source of material examined—Eramosa R., Ospringe, Wellington Co., Ontario.

Habitat and distribution—A warm water species, it inhabits large streams and rivers through-



FIGS. 5-6. Outline of labium. Fig. 5, *L. sibleyi*; Fig. 6, *P. sara*.
 FIGS. 7-9. Dorsal view of pronotum and mesonotum. Fig. 7, *L. sibleyi*; Fig. 8, *L. tenella*; Fig. 9, *L. truncata*.
 FIGS. 10-13. Dorsal view of pronotum and mesonotum. Fig. 10, *L. ferruginea*; Fig. 11, *L. tenuis*; Fig. 12, *L. duplicata*; Fig. 13, *L. maria*.

out Southern Ontario, Southern Quebec, and the Maritimes: emerges throughout the summer.

7. *Leuctra truncata* Claassen 1923

1926, *L. truncata*, Chu, Fig. 114, labium.

Description—Total length of mature nymph: 6–7.5 mm.

Head much as in *duplicata*.

Pronotum with a few long hairs on the angles; the mesonotum lacks the usual patches of short bristles on the anterior angles; a few long hairs on the anterior and posterior margins of the meso- and meta-nota; wing-pads bare, at the most, a long silky hair at the base of the outer margin of the fore wing-pad (Fig. 9); legs covered with few short bristles; a few long hairs on the outer surface of femora, tibiae, and tarsi.

Abdominal tergites 9–10 covered with short clothing bristles; the extent of clothing of the bristles decreases gradually on the preceding tergites; on the first tergites, the bristles are found only in the anterolateral areas; the last

abdominal tergites bear the usual long silky dorsolateral hairs; abdominal sternites bare, except for a few long bristles on the margin of the last two sternites (Fig. 18); subanal lobes as in *duplicata*; cerci with few bristles in the apical whorls (Fig. 4).

Source of material examined—Ruisseau des Erables, Parc du Mont-Tremblant; small stream near Sutton, Brome Co., Quebec.

Habitat and distribution—Small cold streams in Southern Quebec; a late summer species.

GENUS *Paraleuctra* Hanson 1941

It is presently impossible to give the nymphal characteristics of the genus since the nymph of only two species are known, *P. sara* (Hanson 1941) and *P. occidentalis* Banks (as *L. bradleyi* Claassen in Ricker 1943). These differ in a number of respects, especially setation, and it seems that the labial palps of *P. occidentalis* are not as short as those of *P. sara*. The two species evidently have an abdominal pleural fold on segments 1–6, but this feature is also shared by other leuctrid genera such as *Moselia* Ricker and *Zealectra* Ricker (Ricker 1959).

8. *Paraleuctra sara* (Claassen 1937)

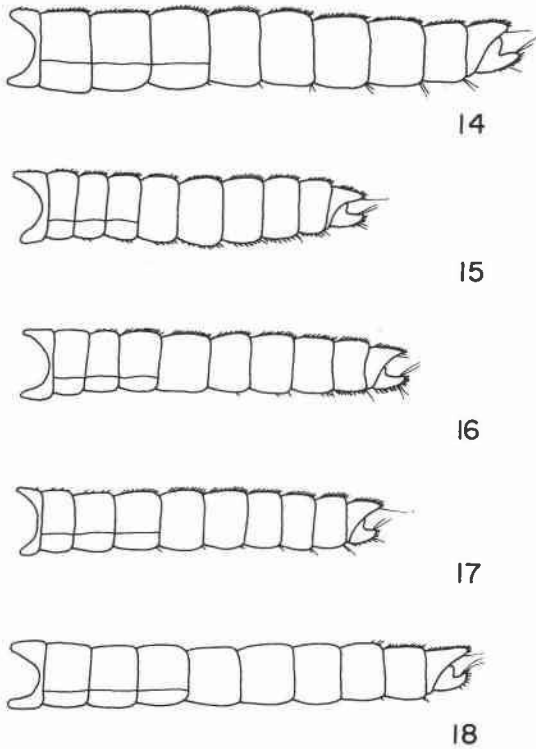
1941a, *P. sara*, Hanson, description, Figs. 13, 14, subanal lobes.

Description—Total length of mature nymph: 6–7.5 mm. General color, yellowish brown.

Head with a few long bristles near the compound eyes and the anterior angles of the frons; a row of long fine bristles behind the eyes; labial palps short (Fig. 6).

A few long bristles on the anterior corners of the pronotum and one long bristle near each posterior corner; anterior corners of the mesonotum without patches of bristles; a few long hairs on the anterior and posterior margins of the meso- and meta-nota; one stout bristle at the base of the outer margin of the fore wing-pads; femora with bristles as long as the width of the femora; a few stout bristles on the inner surface of the tibiae; outer surfaces of femora, tibiae, and tarsi bearing a few long silky hairs.

Abdominal segments 1–6 separated by a pleural fold into tergal and pleural regions, the others being entire; abdomen bare except for a few inconspicuous posterolateral hairs; subanal lobes bare; cerci with whorls of bristles moderately hairy; the vertical bristles are slightly longer.



FIGS. 14–18. Lateral view of abdomen; only the bristles seen in profile are indicated. Fig. 14, *L. sibleyi*; Fig. 15, *L. duplicata*; Fig. 16, *L. tenuis*; Fig. 17, *L. ferruginea*; Fig. 18, *L. truncata*.

Source of material examined—Tributary of Koksoak R., Ungava, Quebec (leg. J. R. Coleman).

Habitat and distribution—Streams and small rivers, throughout Quebec and Eastern Ontario; a late spring species.

Key to the Nymphs of Leuctridae of Eastern Canada

(The nymphs of *L. baddecka* and *L. triloba* are unknown)

- 1a. Labial palps short, barely reaching beyond the tips of the paraglossae (Fig. 6); abdomen glabrous except for a few inconspicuous posterolateral hairs; subanal lobes bare; abdominal segments 1–6 separated by a pleural fold.....*Paraleuctra sara*
- 1b. Labial palps longer, reaching well beyond the tips of the paraglossae (Fig. 5); abdomen covered, at least in part, with short and stout bristles; subanal lobes bearing many short and a couple of long bristles (Figs. 14–18); abdominal segments 1–4 separated by a pleural fold.....*Leuctra* 2
- 2a. Whorls of bristles on cercal segments bushy (Fig. 1).....*L. sibleyi*
- 2b. Whorls with fewer bristles (Figs. 2–4)..... 3
- 3a. All abdominal tergites, in side view, covered with short stout bristles (Figs. 14–17)..... 5
- 3b. Only the last 3 or 4 abdominal tergites with short stout bristles (Fig. 18)..... 4
- 4a. Anterolateral angles of the mesonotum with many short stout bristles (Fig. 8).....*L. tenella*
- 4b. Few very short stout bristles on the anterolateral angles of the mesonotum (Fig. 9); a late summer species.....*L. truncata*
- 5a. Some abdominal sternites, at least the ninth, bearing short stout bristles, as seen in profile (Figs. 15, 16)..... 6
- 5b. No stout bristles on the abdominal sternites; there are, however, a few long bristles on the posterior margins of the last segments (Fig. 17).....*L. ferruginea*
- 6a. Short and stout bristles on nearly all the sternites, at least on sternites 4–9 (Fig. 15)..... 7
- 6b. Short and stout bristles numerous only on sternite 9, though there may be a few on the preceding sternites (Fig. 16).....*L. tenuis*
- 7a. Pronotum with many short bristles on the margin, no long bristle on the anterior angle (Fig. 12); a few short stout bristles at the base of the anterior margin of the fore wing-pad (Fig. 12).....*L. duplicata*
- 7b. Pronotum with at least one long bristle on the anterior angle (Fig. 13); no short stout bristles at the base of the anterior margin of the fore wing-pad (Fig. 13).....*L. maria*

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- AUBERT, J. 1959. Plecoptera. *Insecta Helv. Fauna*, 1: 1–140.
- BRINCK, P. 1949. Studies on Swedish stoneflies (Plecoptera). *Opuscula Entomol. Suppl.* 11: 1–250.
- CLAASSEN, P. W. 1931. Plecoptera nymphs of America (north of Mexico). *Thomas Say Found. Publ.* 3: 1–199.
- FRISON, T. H. 1942. Studies of North American Plecoptera with special reference to the fauna of Illinois. *Ill. Natur. Hist. Surv. Bull.* 22: 233–355.
- HANSON, J. F. 1941a. Studies on the Plecoptera of North America II. *Bull. Brooklyn Entomol. Soc.* 36: 57–66.
- 1941b. Records and descriptions of North American Plecoptera I. *Amer. Midland Natur.* 26: 174–178.
- HITCHCOCK, S. W. 1969. Plecoptera from high altitudes and a new species of *Leuctra* (Leuctridae). *Entomol. News*, 80: 311–316.
- HYNES, H. B. N. 1941. The taxonomy and ecology of the nymphs of British Plecoptera with notes on the adults and the eggs. *Trans. Roy. Entomol. Soc. London*, 91: 451–557.
- NEEDHAM, J. G. 1901. Plecoptera. *In Aquatic insects in the Adirondacks. Edited by J. G. Needham and C. Betten.* *Bull. N.Y. State Mus.* 47: 412–418.
- NEEDHAM, J. G., and P. W. CLAASSEN. 1925. A monograph of the Plecoptera or stoneflies of America north of Mexico. *Thomas Say Found. Publ.* 2: 1–397.
- RICKER, W. E. 1943. Stoneflies of Southwestern British Columbia. *Indiana Univ. Publ., Sci. Ser.* 12: 1–145.
- 1952. Taxonomic studies in Plecoptera. *Indiana Univ. Publ. Sci. Ser.* 18: 1–200.
- 1959. Plecoptera. *In Freshwater biology.* 2nd edition. *Edited by W. T. Edmonson.* John Wiley and Sons, New York. pp. 941–957.
- 1965. New records and descriptions of Plecoptera. *J. Fish. Res. Board Can.* 22: 475–501.
- RICKER, W. E., R. MALOUTIN, P. HARPER, and H. H. ROSS. 1968. Distribution of Quebec stoneflies (Plecoptera). *Natur. Can.* 95: 1085–1123.

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