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NEW SPECIES OF UTAH MAYFLIES. I. OLIGONEURIIDAE  
(EPHEMEROPTERA)

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During the course of a study of Utah mayflies the writer has encountered several species which are apparently undescribed. The present paper presents the description of the first species of the family Oligoneuriidae to be discovered in Western North America.

*Lachlania powelli*, new species

*Lachlania* sp.? Edmunds, Ent. News 59:43, 1948; Proc. Biol. Soc. Wash. 61:143, 1948.

*Male imago*. Length: body 8-10; wing 8-10; tails 22-30 mm.

Head dark brown above antennae, lighter below; antennae dark brown; eyes black, separated by one-third the distance of their greatest diameter. Prothorax brownish black with a pale median stripe widest at the anterior end. Mesonotum shiny black, a pair of large paramedian pale spots at the anterior margin; inner parapsidal furrows pale; about two-thirds of the distance from the anterior margin a pale stripe arises from each parapsidal furrow and curves mesad and cephalad to where the two stripes meet at the median line, thus forming a pale open flaring V-shaped mark with its apex cephalad; the pale furrows and V together forming a pale roughly H-shaped mark on the mesonotum as in *L. saskatchewanensis* Ide. At the posterior end of the parapsidal furrows a pale stripe proceeds antero-laterad along the postero-lateral margin of the mesonotum. Meso- and metanotal humps brownish-black. Pleura deep brown, the extensive membranous areas yellowish white. Venter brownish black. Fore legs shorter than middle or hind legs; tarsi apparently three segmented; first two segments very short, the third about three and one-half times as long as the first; coxae brown; femora and tibiae with a narrow dark brown dorsal stripe; tarsi pale; claws large and bulb-like, similar, pale. Coxae of middle and hind legs brown, femora paler; tibiae and tarsi yellowish white; femoro-tibial joints marked with brown; claws bulb-like, pale (see figures). Wings with a faint blue reflection in dried specimens. Venation as in figure, pale brown; the concave veins generally lying beneath the convex veins.

Abdominal segments deep brown, alternating with a hyaline "inter-segmental" area nearly as long as the brown portion on the first segment but diminishing posteriorly until the hyaline area is normally obscured on segments 8-10; lateral margins of tergites with a dark pleural stripe (see figure); paired paramedian markings on the brown portion of each

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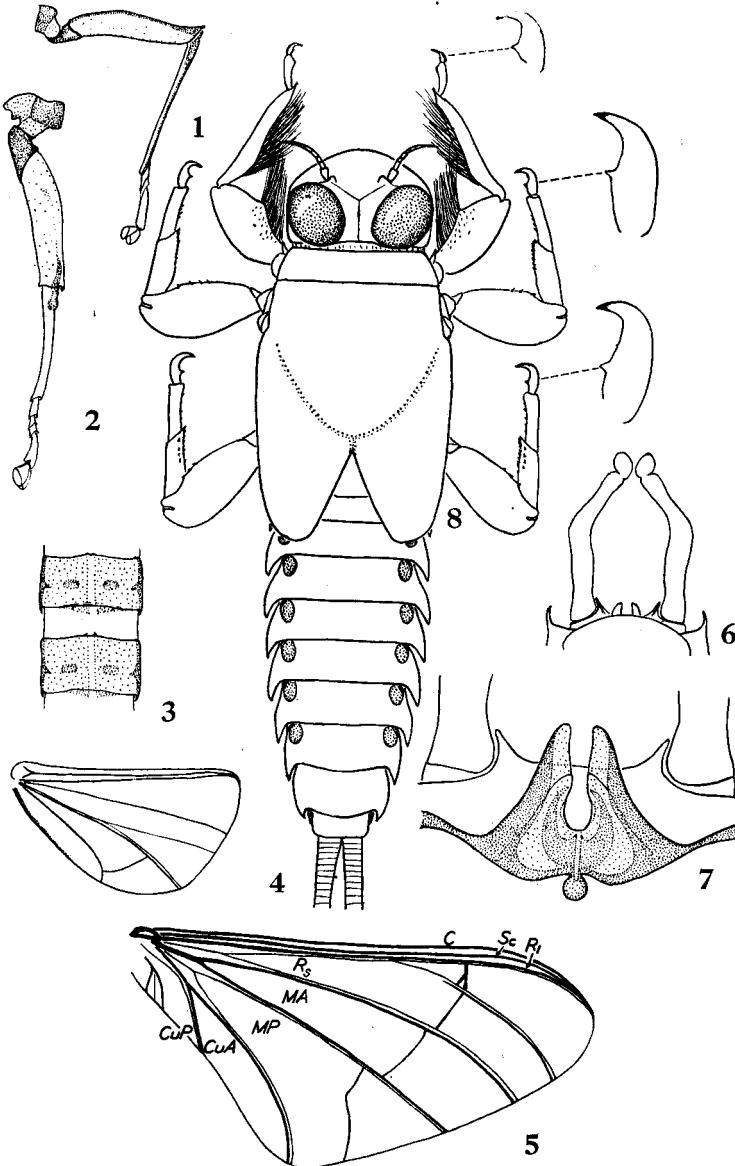


PLATE 41. *LACHLANIA POWELLI*

Figures 1-7, male imago. Fig. 1, fore leg; fig. 2, hind leg; fig. 3, tergites 3 and 4; fig. 4, hind wing, same scale as fore wing; fig. 5, fore wing, slightly flattened to expose concave veins; fig. 6, terminalia, ventral view; fig. 7, penes, dorsal view. Figure 8, nymph, dorsal view; enlargements of claws.

tergite; traces of a pale median stripe evident in most specimens. Postero-lateral angles of segments 3-8 with variously curved extensions. Each abdominal sternite with paired paramedian dark arc-shaped marks on anterior portion and paired paramedian dark spots on the posterior portion. Genitalia as figured; forceps pale. Tails two and one-half times as long as body, white, pilose.

*Female imago.* Length: body 6-9; wing 7-9; tails 3.5-5 mm.

Head deep brown, paler behind ocelli and between eyes along posterior margin. Thorax similar to that of male. Legs similar to male in coloration but shriveled, twisted, and much shorter. Wings as in male.

Abdominal segments as in male, except that there are no hyaline "intersegmental" areas, the segments are darker, and the markings are obscure. Abdominal sternites similar to those of male. Subanal plate with a broad, shallow, median excavation. Tails slightly more than half the length of the body.

*Nymph.* Length: body 8-10; tails 6-9 mm.

Form as in figure 5. Coloration of nymph so variable as to be of little taxonomic value, generally brown to black. All general features such as mouthparts, body shape, legs and gills are similar to those of the nymph figured by Needham and Murphy (Bull. Lloyd Libr. 24, Ent. Series 4: plate VI, 1924) for *Lachlania* sp.? (possibly *L. lucida* Eaton) from Guatemala. It differs from that nymph in having a relatively smaller but more strongly curved claw on the foreleg and apparently also in the shapes of the lateral margins of the abdominal segments.

Nymph associated with adult by rearing.

*Holotype* ♂. Green River at Hideout Canyon, elev. 5800 feet, Daggett Co., Utah, 4-IX-47. *Allotype* ♀. Same data. *Paratypes.* About 300 males, 50 females, 50 nymphs, same data and 3-IX-47; additional nymphs 5-IX-48, 11-IX-50; 1 ♀, several nymphs 9-VIII-47. Holotype, allotype, and paratypes deposited at University of Utah. Additional paratypes have been, or will be, distributed to collections of J. R. Traver, W. C. Day, H. T. Spieth, University of Massachusetts, Illinois Natural History Survey, Cornell University, California Academy of Sciences, American Museum of Natural History, U. S. National Museum, University of Florida, and Canadian National Collection.

This species is dedicated to Major J. W. Powell who explored the type locality area in the year 1868.

#### TAXONOMY

*Lachlania powelli* males will key to *L. lucida* Eaton (Guatemala and Panama) in Ulmer's key (Stett. Ent. Zeit. 104:36; 1943) to the species of *Lachlania* (*sensu lato*, including *Noya* and *Noyopsis*), but can be distinguished from *L. lucida* by the presence of the pale roughly H-shaped mark on the mesonotum. In addition to the mesonotal markings, the black tails

of the female distinguish it from *L. lucida* Eaton and *L. abnormis* Hagen. Its nearest relative, *L. saskatchewanensis* Ide, known only from a single female, shares the character of the pale H-shaped mesonotal marking and black tails. *Lachlania powelli* differs from *L. saskatchewanensis* by having a pair of large paramedian pale spots on the anterior margin of the mesonotum rather than a continuous pale band, by the lesser curvature in the veins of the forewing, and by the relatively broader hind wing.

#### BIOLOGY

The Green River at Hideout Canyon has been described briefly by the writer elsewhere (Proc. Biol. Soc. Wash. 61: 143; 1948). Nymphs of *L. powelli* were found mainly clinging to small sticks lodged in the interstices of rocks in a long rapid, although a number were taken from the undersides of rocks. When the nymphs were disturbed they acted much in the manner of *Ephemerella* nymphs, tipping the tail up over the back. They are very slow moving and cling to the sticks with great tenacity.

The nuptial flight of *Lachlania powelli* is especially interesting. Observations began at 7:45 a.m. when small companies of mayflies were already swarming wherever the morning sun shone. The subimaginal stage apparently lasts only a few minutes. The subimaginal skin is shed from all parts of the body except the wings *while the insects are in flight*. A great number were observed to cast the skin and at no time were the insects seen to alight or leave the air above the river. It is interesting to note that the tails of the males are smooth in the subimaginal stage but pilose in the imago, a reversal of the normal ephemerid condition. The males and females flew very rapidly, with a speed comparable to that of the swiftest dragonfly, and actually followed the contour of the rapids as they patrolled up and down only an inch or two above the water. Whenever a male pursued a female she would rise one to four feet above the water; this action usually resulted in several more males giving chase. Many copulating pairs alighted on the water, but usually they continued in normal flight while copulation took place. Several pairs were captured and it was seen that the copulation position is similar to that for other genera except that the short forelegs attach to the thorax of the female just ahead of the wing bases.

Many of the pairs were flying tandem with the male grasping the female between the second and third abdominal segment and flying dorso-caudad and parallel to the female. Several of these tandem pairs were seen to alight on the water and it may be that this is an oviposition flight. Many single females, however, were seen to oviposit by dipping their ab-

domens to the water while flying, the normal oviposition behavior in ephemerids. At 11:00 a.m. the air temperature reached 75° F. and was rising rapidly. Coincident with this increase in temperature, the mayflies died and great numbers soon were seen floating on the surface of the river.

The observations on swarming behavior were made September 3, 1947. A return trip was made September 5, 1948, but only a few males were seen patrolling over the water. Another visit was made September 11, 1950 during which no adults were seen but a few nymphs were obtained. It is possible that this species becomes abundant only on certain years, for on the three September visits to the area the relative abundance of all species found in the river has been strikingly different.