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THREE NEW AMERICAN MAYFLIES (EPHEMEROP.)

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Two of my colleagues, in years long gone by, have brought back to me from their journeyings specimens of interesting undescribed mayflies that I have placed in the Cornell University collection to await for study a more convenient season. Three of these I now describe. The first two are rather unique species of two well-known genera. They were collected by Dr. J. C. Bradley on trips southward and westward in the United States. The third was collected by Dr. J. T. Lloyd in the high Andes of Columbia. It represents a new genus and species. Its diurnal habits and swift flight are unusual among mayflies.

***Isonychia velma* n. sp.**

Length of male about 14, plus tails 28, fore wings in the male 16mm.; in the female 17mm.

This is a handsome, large, reddish-plumbeous species with bicolored legs and freckled wings. Head in the male above covered by the large mouse-colored hemispherical ascalaphoid eyes, reddish brown before and behind the black-ringed ocelli, the flagellum, antennae and the nasal carina a little darker. In the female the eyes are more brownish in color, smaller, and remote, being separated by a space as wide as their own diameter. On the top of the head there is a broad parallel-sided, reddish, crown-stripe that ends posteriorly in a thin, transparent, projecting, occipital crest. The middle ocellus is half as large as the paired ones in both sexes.

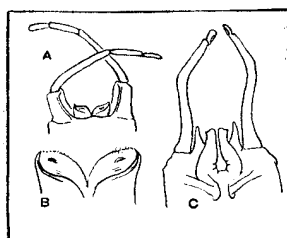
Thorax reddish brown with narrow whitish edgings on many of the sclerites and with more uniform tint of brown on the convex portions of the dorsum. Front legs rufous, darkest on the tibia; middle and hind legs bicolored; reddish on coxae, outer half of femora and tarsi with intervening portions pale, translucent, yellowish. Wings bicolored. There is a roseate tint along the costal strip covering veins C, Sc and R₁ and intervening membrane in the fore wing; and there is a little touch of the same color at the extreme anal angle of both wings. The veins are brown, paler at the extreme

base and along the costa of the hind wing, and the cross-veins along both sides of vein R are bordered with brown to form diffuse spots. The membrane is hyaline behind the costal strip except for a faint wash of brown around the outer border of the hind wings, that is best developed in the male.

Abdomen reddish plumbeous with obscure pale middorsal and midlateral stripes subtended by brighter plumbeous, forming interrupted lines. These darken and become confluent on segment 9. The large, thin, flat lobes on the side of segment 9, and the apical ventral pair at its apex, are translucent. The latter project beyond the apex of the 10th segment and are decurved at their widely separated tips. The tails in the male are reddish on half a dozen basal segments and thereafter, transparent whitish, less white in the female. The rudiment of a middle tail is five-jointed. Forceps and penes of the male, brownish, of the form shown in the figure.

The freckled wings of this species will at once distinguish it from others of the genus.

One male (the type) and two females from Putah Creek near Matjello, California, December, 1917; five females from Russian River, California (no date), and several addition females from Cloverdale, California, October 4, 1917; all collected by Dr. J. C. Bradley.



A. Male genitalia of *Isonychia velma* n. sp.; B. Penes of same species greatly enlarged; C. Male genitalia of *Alloydia cacautana* n. sp.

***Leptophlebia bradleyi* n. sp.**

Length 8, tails 11, foreleg of ♂ 10, fore wing 9 mm.

This mid-winter species is brown varied with paler. Legs yellowish brown, with black rings on the apical third of all femora. Wings yellowish hyaline with brown veins; costal cross-veins numerous and distinct, those of the stigmatic region crowded and irregular and so anastomosing as to form two rows of cells in the costal space, the outer row having half the width of the inner one. The greyish color of the semi-opaque stigmatic area overspreads sub-costal and radial inter-spaces.

Abdomen brown, darker toward the ends, with a narrow, mid-dorsal, longitudinal, pale line on segments 1-8, and on either side of this line, with two longitudinal rows of pale triangular segmentally arranged spots, confluent on the base line of each segment; the ventral side of the abdomen is paler, somewhat yellowish, but the ganglia are not marked.

Genitalia pale brownish; basal segments of forceps slowly tapering and sinuately curved, the two small terminal segments dilated internally and sub-

triangular (in one specimen there are three terminal segments). Penes long, tapering, separated for three-fourths their length by a V-shaped cleft; reflexed spur curved, spatulate, acute at tip, reaching to the level of the bottom of the cleft.

Three males of this species were taken flying over Billy's Lake, in the Okeefinokee Swamp, Georgia, on December 21, 1913, and others were taken swarming over the "run" between Billy's Lake and Cowhouse Island in the same swamp, 27th to 29th of December, 1914, by Dr. J. C. Bradley.

Easy recognition characters for this species are the black rings on the femora and the pattern of pale linear markings on the abdomen.

Alloydia n. gen.

Tails two, exclusively long in the male, short in the female. Fore legs shorter and more rudimentary than middle and hind legs; all, crooked and distorted, especially their tarsi. Face personate, with a pair of very broad transparent flaps descending from the frontal carina to end below in broadly rounded free margins. Eyes small, smooth, in the sexes subequal. Wings with costal and radical veins approximated at the front border, closing the subcostal furrow, and with strong cross-veins in several series joining the long veins of the wing disc. Hind wings with dilated humeral angle, but without cross-veins. Male forceps two-jointed.

This genus belongs to the Oligoneuria series, is like Oligoneuria in leg characters. In the disposition of the principal veins of the wing disc it resembles the diminutive neotropical Lachlania, but it differs markedly from all the genera of this series in cross-vein arrangement.

Type, the following species:

Alloydia cacautana n. sp.

Length ♂ 13, ♀ 15, plus ♂ tails 38-40, ♀ 13, front wing 17, hind wing 8mm.

Colors blackish brown and amber yellow. Head blackish above, including the antennae, with a wide M-shaped yellowish bar across the front before the eyes, the outer legs of the M short. Disc of prothorax blackish, paler across front and extreme rear margins. Mesothorax blackish with a pair of transverse pale marks on the front border, an obscure pale middorsal line, and parallel therewith two sharply marked lateral lines that are conjoined to rearward by a narrow distinct, pale W-mark on the most convex portion of the dorsum. A diffuse pale line encircles the mesothorax in the rear, and the metathorax is wholly paler. Venter of thorax infuscated on the more convex areas of the sterna, paler on the sutures and about the bases of the legs.

Wings obscure hyaline, with veins heavily infuscated, especially at the front. Costal border strongly arched. Costa and radius closely approximated or even appressed, closing the subcostal furrow. The broad triangular area of the wing lying between veins R1 and Cu1 is traversed lengthwise by three long veins and crosswise by rather strong cross-veins in several transverse series. The foremost of these three long veins appears as a branch of R1, being closely applied thereto from the base outward and separating therefrom just beyond midway its length. On either side of this apparent branch are five cross-veins. In the next succeeding interspace are four cross-veins and the next one is

divided by an angulated intercalary vein with three cross-veins before it and two behind. These longitudinal veins are perhaps compound veins (their homologies are not clear) since they all widen out broadly at the base and appear double there. Vein *Cu*₁ appears forked near its basal third and is strongly recurved in its apical fourth. There are no cross-veins in the cubital area, and there are none in the hind wing. The latter is hopelessly crumpled in the specimens before me.

Abdomen yellowish, infuscated on the lateral margins and across the apices of the segments, lightly in the male, heavily in the female. Tails white in the male (as are also the forceps), blackish in the female. Forceps with a long, weak and sinuous basal joint, and a very short terminal one. Penes separated in their basal half then convergent and parallel, tapering to a rounded apex which bears a little lateral external tooth. The triangular lobes of the subgenital plate (9th sternite) are prolonged rearward in a pair of slender sharp points that surpass the level of the tips of the penes. The extremely long tails of the male are composed of segments of variable length. They are much wider than long at the base, but quickly lengthen and become several times longer than wide, and at the slender tips they become again a little shortened.

Many specimens of both adults and nymphs were collected by Dr. J. T. Lloyd in the Valle de Papas, Upper Cacaota River in the high Andes of Colombia, March 24, 1912. Most of the imagos and all of the nymphs were taken for study to Mt. Holyoke College, where they were burned in the fire that destroyed the zoology building. A vial of duplicate imagos that was retained in the Cornell University collection has furnished the material for this description. There are fifteen male and three female specimens, none in very good condition.

Doctor Lloyd has written me concerning his field observations on this species as follows:

"They were of greater interest to me than any other insects I saw in South America. I can still picture them with their gray-blue bodies and curious wings, flying up and down the upper Cacaota with a rapidity that would rival the swiftest dragonflies. They flew about an inch above the water and followed perfectly the undulations of the swift riffles. They successfully dodged my net until I learned to strike down stream with the bottom of the rim of the net under water.

"They flew up and down stream *in copulo*, after the manner of dragonflies. I caught several mating pairs. They oviposited (I'm quite certain this is what they were doing) by dipping the tip of the abdomen in the swift water during flight. I spent much time during two weeks in the Valle de Papas watching them. They were abundant there."