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A NEW GENUS OF MAYFLIES FROM WESTERN  
NORTH AMERICA (LEPTOPHLEBIINAE)

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In early September of 1947 the writer reared adults of *Thraululus albertanus* McDunnough from nymphs collected from the Green River at Hideout Canyon, Daggett County, Utah. A comparison of both nymphs and adults of *albertanus* with Eaton's figures (Revis. Monog.: pls. 12, 35) of *Thraululus bel-lum* Eaton, the generotype\* of *Thraululus* reveals sufficient morphological differences that in the opinion of the author it is necessary to erect a new genus for the North American species now placed in *Thraululus*. This new genus is herewith named *Traverella*† and *Traverella albertana* McDunnough, originally described in *Thraululus*, is designated as the generotype.

Genus *Traverella* new genus

Rather small mayflies with forewings about six to ten mm. long. Eyes of the male nearly contiguous above the head (fig. 3); eyes of the female separated by over three times their own diameter (fig. 5). Forelegs of male about two-thirds as long as wing; length of joints of foreleg of *albertana* in relation to the femur are, tibia 1.87, first tarsus .10, second tarsus .52, third tarsus .42, fourth tarsus .25, fifth tarsus .15, and claw .10. Claws dissimilar on all legs. Venation of the forewing as in figure 1; a few obsolete costal cross veins may be present in the costal space basad of the bullae; stigmatic cross veins simple, slightly aslant; outer fork of the radius ( $R_4+5$ ) asymmetrical (Needham-Traver venational nomenclature),  $R_4$  tending to follow the course of  $R_4+5$ ,  $R_5$  sagging to the rearward basally; two cubital intercalaries present. Hind wings as in figures 2 and 4; small with a prominent costal projection slightly basad of the middle; about six to twelve well developed cross veins mostly grouped behind the costal projection; as many as twenty obsolete cross veins may be present behind  $R_1$ ; subcosta terminates at a cross vein behind the costal projection;  $R_1$  terminates in the anterior margin subapically. Male forceps three jointed (fig. 6), terminal joints short; a pair of caudally directed rod-like projections present on forceps base dorsad of forceps. Subanal plate of female with a small median V-shaped emargination in the apical margin (fig. 7). Tails subequal; a little

\*Dr. R. V. Chamberlin, et. al., use "generotype instead of the more usual form genotype as being etymologically the correct form, the stem of genus being *gener-* and non *gen-*." There is also the advantage of distinctness from genotype as used by geneticists." (Chamberlin, R. V., 1947, Bull. Univ. Utah, Biol. Ser., 10, no. 5:5.)

†I take great pleasure in naming this genus in honor of Dr. J. R. Traver who has generously aided me in my studies on Utah mayflies.

longer than body in female; more than one and one-half times as long as body in male.

Nymph depressed (fig.16). Head rectangular, as long as or longer than broad; head capsule constricted ahead of the eyes and antennae, expanded at clypeus; clypeus with a small median frontal projection; antennae about one and one-half times as long as head; labrum as wide as head capsule, with a deep median notch in the anterior margin; mandibles exposed dorsally in area between head capsule and labrum; maxillary palpi lie alongside the head; other mouthparts as figured (figs. 9, 11, 12, 14), similar to the Neotropical genus *Hermanella* (see Needham and Murphy, 1924, and Spieth, 1943). Prothorax wider than head capsule; a cluster of four or five spines near the lateral margins. Mesothorax as wide as or wider than prothorax. Legs depressed; claws with about twelve denticles, those on the prothoracic legs short and wart-like, those on meso and metathoracic legs usually well developed (fig. 8). Posterolateral corners of abdominal segments eight and nine developed into spines. Spinules present on the posterior margins of all tergites. All gills double, gill one largest, diminishing in size to gill seven; gills one to five bilamellate; each lamella with a fimbriate margin (fig. 10), the longest fimbriae being about as long as the body of the gill; posterior member of each pair about two-thirds to three-fourths as large as the anterior member; gill six similar to one to five except that the body of the posterior member is so reduced as to make the gill fibrilliform. Gill seven with both members fibrilliform, the posterior member smaller. The gill body is narrow on young nymphs and widens as they mature. Tails slightly shorter than body; median tail slightly longer than laterals.

A discussion of the Nearctic species of the genus *Traverella* follows.

*Traverella albertana* (McDunnough) 1931

*Thraulius albertanus* McDunnough, *Canad. Ent.* 63:82, 1931. Traver, *Biol. Mayflies*, p. 554, fig. 146, 1935.

*Type locality*.—Medicine Hat, Alberta. Also known from Saskatoon, Saskatchewan, and the Green River at Hideout Canyon and at Jensen, Utah.

*Adult*.—Specimens from the Green River at Hideout Canyon agree with McDunnough's original description except that the "bands of deep smoky" (McDunnough) on the abdominal tergites do not meet at the median line, thus leaving a pale median stripe. This stripe is quite evident in alcoholic material but is obscured in dried specimens.

*Nymph*.—Length: body 10, tail 9.5 mm. General ground color pale yellow brown; all spines and hairs light golden-brown. Head capsule with variable smoky markings but usually smoky near the ocelli; mandibles smoky on dorsal surface with a pale spot near the anterior margin; clypeus rounded on anterior margin with a small slightly elevated median projection; ocelli white, broadly ringed with black basally; eyes of the female and lower portion of eyes of male black, upper part of eye of male mahogany red. Pronotum pale yellow brown with all margins and submedian areas marked with smoky; a group of four or five spines on the lateral margins. Mesonotum pale yellow brown with smoky markings along the lateral margins and along the lines corresponding to the parapsidal furrows of the adult. Legs pale yellow brown except for the dorsal surface of the femur which is smoky in the central area. About

twelve denticles on each claw, those on the first claw usually short and wart-like, middle denticles on the middle and hind claws usually well developed, but variable in length (fig. 8). Tergites pale yellow brown with large smoky areas which arise along the entire lateral margin and extend nearly to the median line and arching forward from the posterolateral corner thus leaving a pale median stripe and a pale triangular area on the posterior margin of each tergite. Gill six with body of the posterior member reduced so as to be fibrilliform; gill seven with both members present, fibrilliform (fig. 13). Tails pale yellow brown.

*Biology.*—Adults of this species started swarming over the sandy shores of the Green River as soon as the morning sun shone on the area and continued the nuptial flight until nearly 11:00 A.M. when the rapidly increasing temperatures reached 75°F. The flight took place from ten to twenty feet above the ground with the wings beating on both the ascending and descending portions of the vertical flight. This species emerges during late August and probably throughout September. In early September when the collections at the Green River were made, only an estimated one per-cent of the nymphs had the black wing pads which appear before emergence.

The subimagos started to emerge from the river at about 7:10 P.M. when the light intensity was reduced to approximately five foot candles. A great number of individuals emerged during the next twenty minutes and then they abruptly stopped as the light intensity dropped to less than one foot candle.

The Green River at Hideout Canyon varies in width from 150 to 500 feet and averages three to four feet in depth, except in the main channel which reaches a depth of eight feet. It carries considerable amounts of silt and sand at this point and deposits it continuously wherever the current is retarded. The water temperature fluctuated between 66° and 68° F. during the time of collecting. Much of the bottom is covered with shifting sand which constantly changes its profile but there are several outcroppings of rock and a long rocky rapid in the area in which collecting was done. The nymphs were associated with these rocks and were most abundant in the long rapid. Most of the rocks examined had but one or two individuals clinging to the underside but on some the nymphs were very numerous. One rock which had less than a square foot of surface area had more than a hundred nymphs on it, mostly on the underside. Associated mayfly nymphs were those of *Heptagenia elegantula* Eaton, *Tricorythodes* sp., *Baetis* spp., *Ephoron* sp., and *Lachlania* sp. The stomachs of channel catfish and roundtails which were collected from the river contained several young nymphs of *Ametropus albrighti* Traver and a portion of a carnivorous Siphonurine of an undetermined genus.

*Traverella presidiana* (Traver) 1934

*Thraulius presidianus* Traver, *Journ. Elisha Mitch. Sci. Soc.* 50:199-200, fig. 16, 1934. Traver, *Biol. Mayflies*, p. 555, figs. 146-147, 1935.

*Type locality.*—Presidio, Texas.

*Adult.*—The wing venation and terminalia place this species rather close to *albertana* and it is herewith transferred to the genus *Traverella*. The nymph is unknown (see remarks below).

*Biology.*—Unknown, the type emerged in August.

*Traverella* sp?

The nymphs described below were sent to the author by Dr. J. R. Traver who has generously permitted their description in this paper. The specimens from Zapata, Texas (Rio Grande River, February 26, 1936) were given to Dr. Traver by Dr. J. G. Needham who collected them. The specimens from Tamaulipas Province, Mexico (Rio Guayalejo, Dec. 22, 1939) were collected and given to Dr. Traver by Dr. Lewis Berner.

*Nymph.*—Length: body 7; tails 7 mm. General ground color pale yellow brown, all spines and hairs light golden brown. Head capsule with variable smoky markings (fig. 15); mandibles smoky on dorsal surface, a pale spot near the antero-median corner; clypeus with a large median spatulate frontal projection that extends beyond the anterior margin of the labrum, clypeus arched antero-laterally from the base of the clypeal projection; ocelli white, broadly ringed with black basally; eyes of the female and lower portion of eyes of male black, upper part of eye of male deep brownish orange. Pronotum yellow brown with smoky markings on lateral margins and smoky submedian streaks; a group of four or five spines present on the lateral margins. Mesonotum yellow-brown with smoky markings along the lateral margins and along the lines corresponding to the parapsidal furrows of the adult. Legs yellow brown except for the smoky distal third of the femur and variable patch near the middle of the segment; ventral side less distinctly marked than the dorsal side. About twelve denticles on each claw; those of the first claw short and wart-like; those of the second and third well developed but not as long as those of the third claw of *albertana*. Tergites mostly smoky with indications of a pale median line in some specimens, distribution of yellow-brown and smoky areas variable. Ventral side of head, thorax, and abdomen immaculate pale yellow brown. Gills as in *albertana* except that the posterior member of gill six is similar to the anterior member and the posterior member of gill seven is absent. Tails yellowish brown, darker basally.

*Biology.*—Mr. Stanley Mulaik who accompanied Dr. Needham at the time the nymphs were collected at Zapata, Texas, informs the writer that this area of the Rio Grande River has rocky areas very similar to those in the Green River where the nymphs of *albertana* were collected. It is possible that the nymphs were from these rocky areas. Dr. Berner (in letter) informs the writer that the Rio Guayalejo varies from 200 to 300 feet in width and is deep. He collected from clay bottom and from emergent vegetation in the slower parts of the stream and from a rapid in which there were large rocks covered with a layer of sticky gray clay. The underside of some of the rocks were smooth, others rough, while the upper sides were covered with caddisfly nets and moss. It is very probable that the nymphs came from these rapids.

*Remarks.*—The writer believes that the above described nymph is clearly congeneric with *albertana*. It differs from the latter species primarily in the presence of the large spatulate clypeal process and the differently shaped clypeus. The lamella of the posterior member of gill six is somewhat broader than that of *albertana* and the posterior member of gill seven is absent. In all other structures such as head shape, mouth parts, presence of spines on the pronotum, dentition of the claws, form of the gills, presence of spinules on the posterior margins of the tergites, and spines on the postero-lateral corners of tergites eight and nine, this

species is very similar to *albertana*. As this nymph has not been reared and because of the structural differences between this species and *albertana*, the nymphs of *Traverella* have been characterized from *albertana* alone. Traver (in letter) has "a suspicion that the nymph may be that of *presidiana* on the basis of the incipient genitalic structures as seen in one well advanced male nymph." Further evidence in favor of this view is the fact that the nymphs were taken from the Rio Grande River by Dr. Needham and that the type locality of *T. presidiana* is at Presidio, Texas which is on the same river.

There are numerous structural differences which justify the erection of the genus *Traverella* for the North American species formerly placed in the genus *Thraulius*. A discussion of the most obvious differences follows. References to the genus *Thraulius* are to *T. bellum*, the generotype. In the adult the distinct sag near the middle of the anterior margin of the forewing of *Thraulius* is absent in *Traverella*, and the outer fork ( $R_4+5$ ) is nearly symmetrical in *Thraulius* but is distinctly asymmetrical in *Traverella*. The  $R_1$  of the hind wing of *Thraulius* terminates in the anterior margin just beyond halfway from the costal projection to the apex while in *Traverella* it ends in the anterior margin subapically. The genital forceps of the two genera are similar but the penes differ markedly; the rod-like structures on the forceps base of *Traverella* are absent in *Thraulius*. The rounded apical margin of the female of *Thraulius* is entire but in *Traverella* has a medium V-shaped emargination. The nymph of *Traverella* is strikingly different than *Thraulius* in the form of the head and mouthparts. The gills of *Traverella* are similar to those on segments two to seven of *Thraulius* but the linear lanceolate first gills of *Thraulius* contrast with the fimbriate lamelliform first gills of *Traverella*. In the opinion of the writer *Traverella* is more closely related to the Neotropical genus *Hermanella* than to *Thraulius*.

In addition to the above named species some of the Mexican and Neotropical species now placed in *Thraulius* probably belong in *Traverella*. The genus *Thraulius* is excluded from the North American fauna by the placement of the only North American species in the genus *Traverella*. Traver's (1935) placement of *Thraulius* in the key to the adults of the genera of Leptophlebiinae and the description of the adults are based on *presidiana* and *albertana* and are therefore applicable to *Traverella*. However, the position of *Thraulius* in the generic key to the Leptophlebiinae nymphs and the description of the nymphs are based upon a true *Thraulius*. Nymphs of *Traverella* can not be placed in Traver's key but are readily distinguished from all North American Leptophlebiinae by the labrum which is as wide as the head and the fimbriate lamelliform gills.

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