

posteriorly, dorsally an obscure black stripe not reaching posterior margin, antero-laterally narrowly black, tergites 6-8 shining black, vestiture pale, apex of epan-drium truncate on posterior margin, a sharp triangular point extending upward above dorsal surface of epan-drium.

Wings hyaline; from posterior vein and apical costa and subcosta veins coalesce.

Hind femora basally pale brown, clavus apically with reddish band broader than reddish black median band, base of clavus pale yellowish, hind tibia pale brown basally, medially a broad yellowish band about as broad as median dark reddish brown band.

Holotype male, BAHIA SAN CARLOS, SONORA, MEXICO, 11 April 1968 (E. M. Fisher) (CAS) (Edge of magroves).

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New Species of *Nemoura* from Western North America

(Plecoptera: Nemouridae)

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The Rocky Mountain species of the genus *Nemoura* were studied by Baumann (1970). This paper presents some of the results of that study. Three species new to science are described belonging to the subgenera *Soyedina* and *Zapada* of Ricker (1952).

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Subgenus SOYEDINA Ricker

Nemoura (Soyedina) potteri Baumann and Gaufin, new species

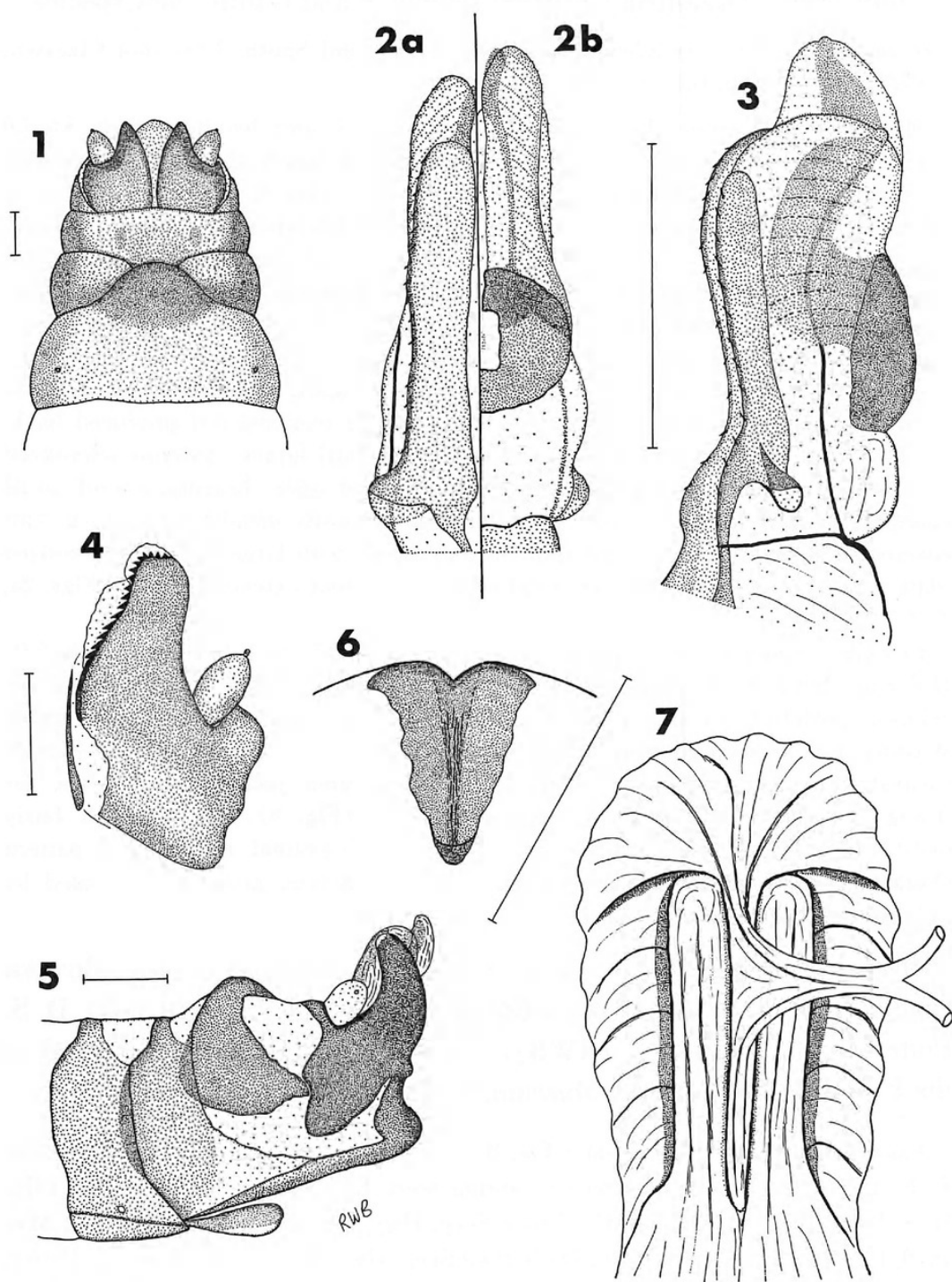
Nemoura (Soyedina) nevadensis interrupta, Logan and Smith, 1966 (not Claassen, 1923), Occas. Pap. Biol. Soc. Nev., p. 1.

MALE.—Macropterous. Length of forewings 5.0–6.5 mm; length of body 5.5–7.0 mm. General color brown. Legs yellowish brown. Wings hyaline; forewings with dark areas at cord and costal space beyond cord; veins A_1 and A_2 joined near margin; anal area of hindwings large. Gills absent. Abdominal tergites membranous in apical half. Cerci small, membranous. Subgenital plate large, very long, anterior fourth bent abruptly upward between paraprocts, forming narrow point at apex; ventral lobe large, broadly rounded (Fig. 5). Paraprocts with two sclerotized lobes; inner lobes small and narrow; outer lobes very large, upcurved laterally alongside epiproct, base very broad, tapering to broad round apex, with row of small stout teeth on inner apical margin (Fig. 4). Epiproct not recurved but produced backward and upward, slightly asymmetrical with right half larger; anterior sclerotized bars of equal width throughout, broadly rounded at apex, bearing row of small spinules on outer lateral margin; posterior portion mostly membranous, apical half covered with rows of very small spinules, basal half with large circular sclerotized plate which supports a sclerotized internal structure that extends to apex (Figs. 2a, 2b & 3).

FEMALE.—Macropterous. Length of forewings 7.0–9.5 mm; length of body 7.0–10.0 mm. Body, appendages and wings similar to male. Subgenital plate well developed, posterior margin of seventh sternite rounded and produced over eighth sternite, produced portion lightly sclerotized (Fig. 1). Eighth sternite deeply excavated at median-posterior margin, excavated area membranous except for triangular sclerotized patch over genital opening (Fig. 6). Vagina with fairly distinct sclerotized pattern dorsally at junction of seminal receptacles; pattern characterized by lateral grooves on each side of junction, grooves surrounded by radiating sclerotized folds (Fig. 7).

Holotype male, allotype, and 5 male, 5 female paratypes, BUTLER CREEK, SNOW BOWL, MISSOULA COUNTY, MONTANA, 17 April 1970, D. S. Potter and R. A. Haick (RWB). Holotype and allotype deposited at the United States National Museum, Washington, D. C.

PARATYPES.—*Idaho*: Clearwater Co., 8 miles northeast of Orofino, 18 June 1964, E. R. Logan, 1 ♀ (UI). Idaho Co., spring seep, Elk Summit Road, 1 May 1970, D. S. Potter, 1 ♂, 1 ♀ (RWB); Cedar Seep, Hwy. 12, near Devoto Cedars, 1 May 1970, D. S. Potter, 1 ♀ (RWB); Dolly Pool Seep, Hwy. 12, 1 May 1970, D. S. Potter, 1 ♂ (RWB); Steep Seep, Hwy. 12, 1 May 1970, D. S. Potter, 4 ♀ (RWB). *Montana*: Flathead Co., Middle Fork Flathead River, 12 April 1969, A. R. Gaufin, 1 ♂ (UU). Glacier Co. (Glacier National Park): creek, 1 mile east of Logan Pass, 23 June 1965, A. V. Nebeker, 1 ♀ (UU); Cataract Creek, below Hidden Falls, 9 July 1966, A. R. Gaufin, 1 ♀ (UU); Iceberg Lake, 24 July 1964, D. C. Lowri, 1 ♀ (SGJ). Missoula Co., Butler Creek, Snow Bowl, 14 May 1970, D. S. Potter & R. A. Haick, 3 ♂, 13 ♀ (RWB) (DSP).



FIGS. 1-7. *Nemoura potteri*. FIG. 1. Female terminalia, ventral view. FIG. 2a. Epiproct, left half, anterior view. FIG. 2b. Epiproct, right half, posterior view. FIG. 3. Epiproct, lateral view. FIG. 4. Paraproct, ventral view. FIG. 5. Male terminalia, lateral view. FIG. 6. Sclerotized patch over genital opening. FIG. 7. Vagina, dorsal view. Length of scale lines .25 mm.

Nemoura potteri is most similar to the eastern *Nemoura washingtoni* Claassen and *Nemoura vallicularia* Wu. All three species have slightly asymmetrical epiprocts with the right half larger than the left. The paraprocts of *N. potteri* are broader apically than those of *N. vallicularia* and they differ from *N. washingtoni* in having rounded tips which bear stout teeth on the inner apical margin. The detailed structure of the epiproct is also species specific. The females of these species are almost inseparable externally but seem to exhibit differences in the sclerotized pattern on the dorsum of the vagina.

Some specimens included in the *N. potteri* type series were listed by Baumann (1970) under *Nemoura* (*Soyedina*) *nevadensis interrupta* and the manuscript name, *Nemoura* (*Nemoura*) *barri*.

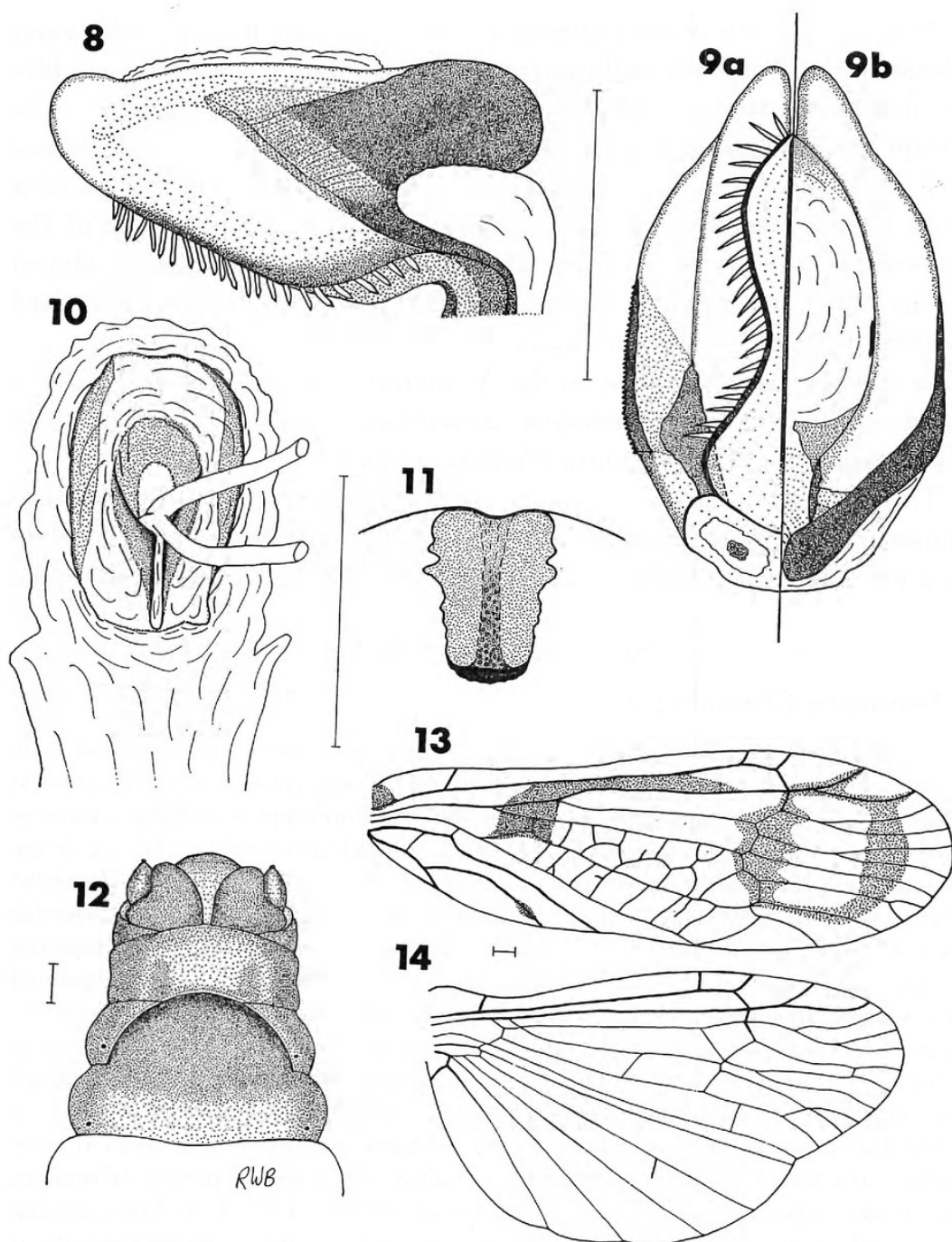
This species is named for Mr. David S. Potter of Leicester, Massachusetts. Mr. Potter has collected many interesting Plecoptera specimens as a graduate student at the University of Montana, Missoula, Montana.

Subgenus ZAPADA Ricker

Nemoura (*Zapada*) *cordillera* Baumann and Gaufin, new species

MALE.—Slightly brachypterous. Length of forewings 5.0–6.0 mm; length of body 6.0–8.5 mm. General color brown. Legs yellowish brown, femora with dark areas at base and apex, tibiae dark at base. Wings hyaline; forewings with dark transverse bands at cord and near apex, dark areas in basal half between Sc and Cu, longitudinal veins branched near margin in apical fourth, median and costal crossveins often aberrant; hindwings with large anal area, extra branches and crossveins present in apical half. Four unbranched cervical gills, constricted at base, tapering to pointed tip. Subgenital plate small, broad at base, tapering abruptly to pointed tip; ventral lobe large, twice as long as wide. Paraprocts with two sclerotized lobes; inner lobes long and very thin, $\frac{1}{3}$ length of outer lobes; large rectangular outer lobes, slightly pointed at lateral posterior corner. Cerci rather small, rounded and membranous. Epiproct recurved, mostly membranous; dorsally oblong, base broad, tip narrowly rounded and divided, broad transverse sclerotized bands at base, central area membranous, lateral margins slightly sclerotized; laterally triangular, base broad, tapering to rounded tip, very broad sclerotized bands at base, running transversely from dorsal margin, small narrow sclerotized bands arising ventrally at base, running forward and loosely joining broad bands, large spinules visible along ventral margin; ventrally two narrow sclerotized bands bear row of large spinules, rows close together medially but separated at base and apex (Figs. 8, 9a & 9b).

FEMALE.—Slightly brachypterous. Length of forewings 6.5–9.0 mm; length of body 7.0–10.0 mm. Body, appendages and wings similar to male. Wing aberrations even more developed than in male; forewings with numerous branches in apical area near margin, median and costal crossveins often highly aberrant (Fig. 13); hindwings with numerous crossveins and branches in apical half (Fig. 14). Subgenital plate well developed, posterior margin of seventh sternite greatly expanded and broadly rounded, almost completely covering eighth sternite, produced portion sclerotized (Fig. 12). Eighth sternite excavated medially, excavated area mem-



FIGS. 8-14. *Nemoura cordillera*. FIG. 8. Epiproct, lateral view. FIG. 9a. Epiproct, left half, ventral view. FIG. 9b. Epiproct, right half, dorsal view. FIG. 10. Vagina, dorsal view. FIG. 11. Sclerotized patch over genital opening. FIG. 12. Female terminalia, ventral view. FIG. 13. Right forewing, female. FIG. 14. Right hindwing, female. Length of scale lines .25 mm.

branous except for wide rectangular sclerotized patch over genital opening (Fig. 11). Vagina with distinctive sclerotized pattern dorsally at junction of seminal receptacles; pattern characterized by elongate lightly sclerotized ring around junction, ring covering vertical groove with darkly sclerotized margins, groove nar-

row at base and becoming abruptly wider at apex, two wide lateral sclerotized bands resulting from dorsal lateral invaginations (Fig. 10).

Holotype male, allotype, and 5 female paratypes, BUTLER CREEK, SNOW BOWL, MISSOULA COUNTY, MONTANA, 4 May 1969, R. W. Baumann (RWB). Holotype and allotype at the United States National Museum.

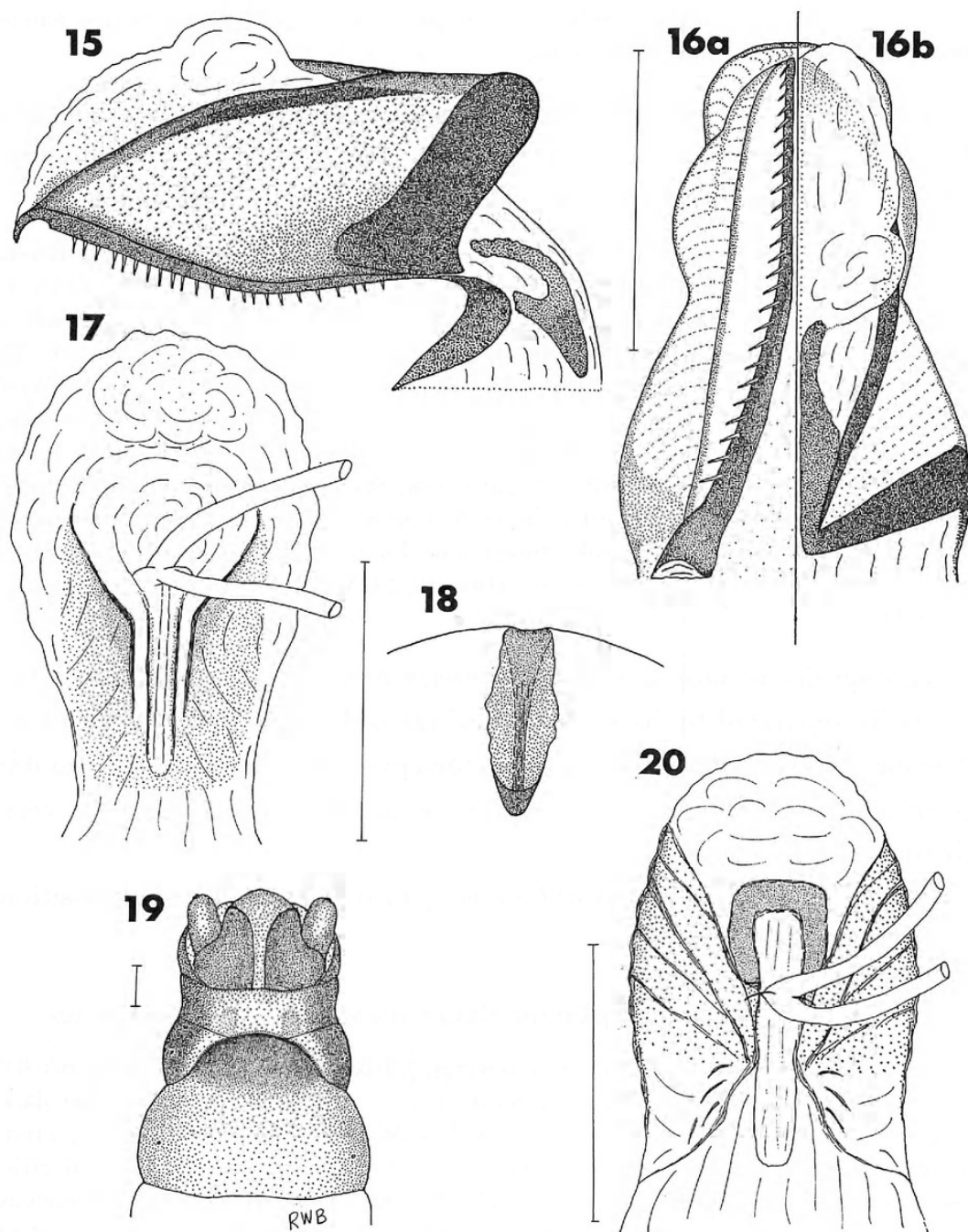
PARATYPES.—*Idaho*: Idaho Co., Sherman Creek, Hwy. 12, junction Lochsa River, 24 March 1969, R. W. Baumann & B. R. Oblad, 1 ♂ (UU). *Montana*: Flathead Co., Boulder Creek, Flathead Lake, 24 April 1970, D. S. Potter, 1 ♂, 1 ♀ (RWB); Middle Fork Flathead River, Walton Ranger Station, Glacier National Park, 26 March 1966, P. Milam, 1 ♂; 4 April 1969, A. R. Gaufin, 7 ♂, 3 ♀ (UU); Wolf Creek, 24 April 1966, P. Milam, 11 ♂, 4 ♀ (UU). *Missoula Co.*, Butler Creek, Snow Bowl, 15 April 1970, D. S. Potter, 2 ♀; 14 May 1970, D. S. Potter & R. A. Haick, 9 ♂, 16 ♀ (RWB) (DSP); Grant Creek, Snow Bowl Road, 27 March 1970, D. S. Potter, 1 ♂, 2 ♀; 15 April 1970, D. S. Potter, 1 ♂, 1 ♀ (RWB). *Washington*: King Co., Rocky Run Creek, Snoqualmie Pass, 21 April 1954, W. E. Ricker, 1 ♂, 2 ♀ (WER); Snoqualmie River, Hwy. 10, 21 March 1970, R. A. Haick, 1 ♀ (RWB).

This species is most similar to *Nemoura oregonensis* Claassen but can be easily separated by its shortened wings with their aberrant venation. The male also differs in the details of the epiproct. The female subgenital plate is similar, but its vaginal pattern is much different from the very distinct vagina of *N. oregonensis*.

The species *Nemoura cordillera* is named as a noun in apposition after the cordilleran mountains.

***Nemoura (Zapada) glacier* Baumann and Gaufin, new species**

MALE.—Macropterous. Length of forewings 7.0–8.0 mm; length of body 6.5–8.0 mm. General color brown. Legs yellowish brown, femora dark at tip; tibiae dark at apex. Wings hyaline; forewings with wide dark transverse bands at cord; hindwings with dark area in costal space beyond cord. Four unbranched cervical gills, constricted at base, width equal throughout length, tip blunt; some specimens possess one or more short, round malformed gills. Subgenital plate small, broad at base, tapering abruptly to pointed tip; ventral lobe large, broadly rounded at apex. Paraprocts with two sclerotized lobes; inner lobes long and thin, $\frac{1}{3}$ length of outer lobes; large rectangular outer lobes, slightly pointed at lateral posterior corner. Cerci rather small, rounded and membranous. Epiproct recurved, mostly membranous; dorsally triangular, base wide, apex narrow, L-shaped sclerotized bands at base, central area membranous, longitudinal sclerotized bands running from band of L forward along lateral margin; laterally triangular, base wide, downward directed hook-like band at apex, vertical sclerotized bands at base, lateral surface covered with rows of very small spinules, margins sclerotized, ventral spinules visible along ventral margin; ventrally two median sclerotized bands, base of bands wide, tapering to narrow apex, bearing row of spinules (Figs. 15, 16a & 16b).



FIGS. 15-19. *Nemoura glacier*. FIG. 15. Epiproct, lateral view. FIG. 16a. Epiproct, left half, ventral view. FIG. 16b. Epiproct, right half, dorsal view. FIG. 17. Vagina, dorsal view. FIG. 18. Sclerotized patch over genital opening. FIG. 19. Female terminalia, ventral view. FIG. 20. *Nemoura oregonensis*. Vagina, dorsal view. Length of scale lines .25 mm.

FEMALE.—Macropterous. Length of forewings 9.0-11.0 mm; length of body 8.0-10.0 mm. Body, appendages and wings similar to male. Subgenital plate well developed, posterior margin of seventh sternite expanded and rounded, extending over eighth sternite, produced portion sclerotized (Fig. 19). Eighth sternite exca-

vated medially, excavated area membranous except for narrow elongate sclerotized patch over genital opening (Fig. 18). Vagina with fairly distinct sclerotized pattern dorsally at junction of seminal receptacles, pattern characterized by ventral vertical groove, two narrow parallel sclerotized bands on each side of groove, outer bands close together at base, becoming abruptly divergent at junction of receptacles, inner band closely parallel throughout length, broad patch of light sclerotization ventrally (Fig. 17).

Holotype male, allotype, and 1 male, 1 female paratypes, CATARACT CREEK, BELOW GRINNELL LAKE, GLACIER NATIONAL PARK, GLACIER COUNTY, MONTANA, 11 July 1964, A. R. Gaufin (UU). Holotype and allotype deposited at the United States National Museum.

PARATYPES.—*Montana*: Glacier Co. (Glacier National Park): Cataract Creek, 9 July 1966, A. R. Gaufin, 1 ♂, 3 ♀ (UU) (RWB); Grinnell Creek, 9 July 1966, A. R. Gaufin, 3 ♀ (UU); Iceberg Creek, below Iceberg Lake, 28 July 1964, A. R. Gaufin, 3 ♀; 27 July 1965, A. R. Gaufin, 1 ♀; 30 July 1965, A. V. Nebeker, 2 ♀; 19 July 1966, M. L. Miner, 3 ♀; 27 July 1969, R. A. Haick, 2 ♀ (UU) (RWB); Ptarmigan Creek, 28 July 1964, A. R. Gaufin, 1 ♀ (UU); Wilbur Creek, Many Glacier, 13 July 1963, A. R. Gaufin, 1 ♀ (UU).

Nemoura glacier resembles *Nemoura haysi* Ricker in general appearance. The male epiproct is, however, quite different. Female specimens are almost inseparable externally but differ in the details of the sclerotized pattern on the dorsal surface of the vagina.

The specific name is a noun in apposition taken from Glacier National Park, Montana. All specimens in the type series were collected in glacier-fed streams. Further collections at lower elevations in the spring months could result in an enlargement of the known range.

DISCUSSION

The detailed studies of the vagina were accomplished after preparation by a technique described by Ludwig and Schmidbauer (1966). The method involves clearing with KOH and then staining with safranin. This technique has not been used before in the study of North American Plecoptera and promises to be very useful in future revisions.

A *Nemoura* (*Zapada*) female collected at Tuckermans Ravine, Mt. Washington, New Hampshire was studied by this technique. This female was listed in Ricker (1952) and Hitchcock (1969) as possibly belonging to *Nemoura oregonensis* Claassen. It was found that this specimen did not belong to any known species and especially not *N. oregonensis*, which has very distinct vaginal sclerotizations (Fig. 20). A description is not given here, but will be included later in a revision of the subgenus *Zapada* by the senior author.

ACKNOWLEDGMENTS

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SCIENTIFIC NOTE

The type locality of *Endeodes terminalis* Marshall (Coleoptera: Malachiidae).—Following his description of *Endeodes terminalis* (1957, Coleopt. Bull., 11:13) Marshall stated "Holotype, male, 'Baja Calif., Mexico. SE end of Isla Caballo. III-20-53. J. P. Figg-Hoblyn, collector.'" After fruitlessly attempting to locate "Isla Caballo," I wrote to John Figg-Hoblyn, who replied that he feels certain the correct locality is Isla Cerralbo. Hugh B. Leech informs me that the labels on the type specimen read as follows: top label "Mexico: B. Cal. SE. end Isla Cerralbo III-20-1953" under label "Col. by J. P. Figg-Hoblyn." Isla Cerralbo is the southernmost large island in the Gulf of California. According to John Figg-Hoblyn the spellings: Cerralvo, Cerralvo and Cerralbo appear with equal frequency.—IAN MOORE, *University of California, Riverside* 92502.



Baumann, Richard W. and Gaufin, Arden Rupert. 1971. "New species of *Nemoura* from western North America (Plecoptera: Nemouridae)." *The Pan-Pacific entomologist* 47, 270–278.

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