



## ***ISOPERLA UMPQUA* A NEW SPECIES OF WESTERN NEARCTIC STONEFLY (PLECOPTERA: ISOPERLINAE)**

**Stanley W. Szczytko<sup>1</sup> and Kenneth W. Stewart<sup>2</sup>**

<sup>1</sup> College of Natural Resources, University of Wisconsin, Stevens Point, WI 54481, U.S.A.  
E-mail: [sszczytk@uwsp.edu](mailto:sszczytk@uwsp.edu)

<sup>2</sup> Deceased Formerly, Dept. of Biological Sciences, University of North Texas, Denton, TX 76203, U.S.A.

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### **ABSTRACT**

Detailed descriptions and illustrations of *Isoperla umpqua*, a new species of western Nearctic *Isoperla* including larva, ova and adults are provided. This is a replacement name for *Isoperla muir* Szczytko and Stewart, nomen nudum.

**Keywords:** *Isoperla*, Plecoptera, Perlodidae, new species, Oregon, Pacific Northwest

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### **INTRODUCTION**

Szczytko and Stewart (2004) described a new species, *Isoperla muir* from Muir Creek, Douglas County, Oregon but failed to designate a holotype specimen or indicate a repository, resulting in a "nomen nudum" – (ICZN 1999, Art. 16.4., art. 16.4.2). This paper provides a new name, revised descriptions, illustrations and designation of a holotype for *I. umpqua* sp. n.

### **MATERIALS AND METHODS**

The description of all life stages of *Isoperla umpqua* sp. n. were based on material reared in the laboratory from field collected larvae. Larvae were transported in the field in iced Styrofoam chests (Szczytko and Stewart 1979) and airlifted to Texas where they were reared in a Living Stream® at simulated stream temperatures and photoperiod.

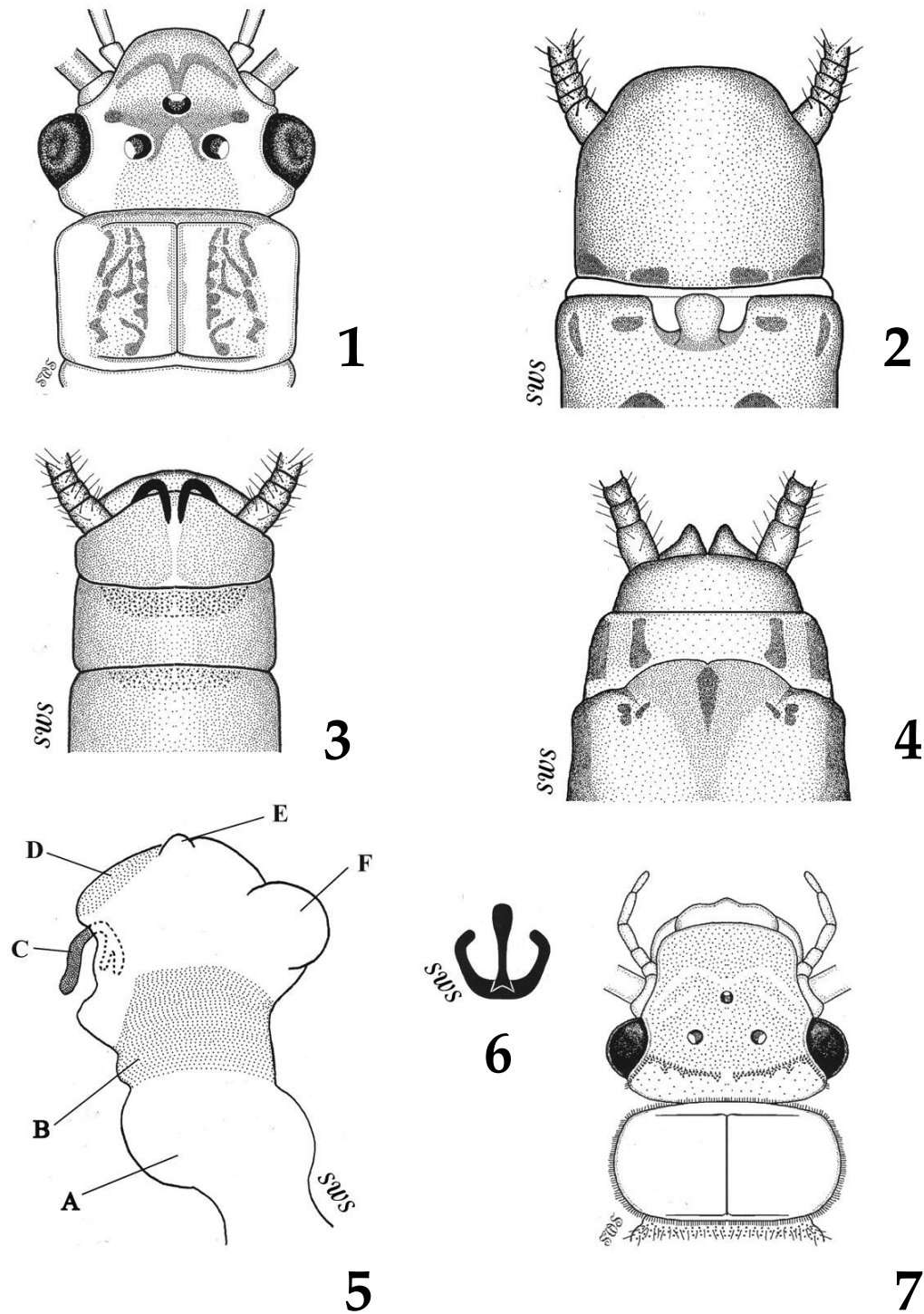
Outlines of male and female genitalia and larval habitus drawings were made using a Leica MZ 12-5 stereo dissecting microscope equipped with a camera lucida. Detailed color images were made using the Leica microscope equipped with a JVC TK-107OU

color video camera and a Sony Mavigraph UP-1200A thermal color video printer. Habitus drawings were completed using the computer program Corel Photo-Paint Version 10 from the outline drawings made with the camera lucida and referencing the digital images and color prints.

Male and female terminalia were treated for study by the methods of Szczytko and Stewart (1981). The aedeagus was prepared and studied according to the methods described by Szczytko and Stewart (1984). Ova dissected from preserved gravid females were prepared for SEM study as described by Szczytko and Stewart (1979). Scanning electron micrographs of ova were made with a JEOL JSM-5400 scanning electron microscope at the University of Wisconsin-Stevens Point. Eggs were dissected from preserved gravid females. The holotype specimen is deposited in the United States National Museum (USNM).

### **DESCRIPTION AND DISCUSSION**

***Isoperla umpqua* sp. n.**  
(Figs. 1-15)



Figs. 1-7. *Isoperla umpqua*. 1. Adult head pattern. 2. Terminal male sterna. 3. Terminal male terga. 4. Terminal female sterna. 5. Male aedeagus; a. expanded proximal area, b. wide median band of stout spinulae, c. posterodorsal sclerotized rod, d. posterodorsal dense band of medium stout spinulae, e. paired small dorsal lobes, f. paired anterodorsal lobes. 6. Detail of posterodorsal sclerotized aedeagal rod. 7. Larval head & pronotum with spinule pattern.

*Isoperla muir* Szczytko and Stewart 2002, 130:233. Muir Creek, Douglas Co., Oregon.

**Material examined. Holotype** ♂, **USA – OR:** Douglas Co., Muir Crk., Hwy 230, downstream from bridge, 12/V/2002, S.W. Szczytko and K.W. Stewart, (emerged in laboratory) (USNM); **Paratypes** (same locality), 25/V/2002), B.P. Stark & D.D. Ziegler, 8 larvae (BYUC); upstream from bridge, 19/V/2001, B.P. Stark and K.W. Stewart, 3♂, 21 larvae (emerged in laboratory 25/V/2001), (BYUC), downstream of bridge, 12/V/2002, S.W. Szczytko and K.W. Stewart, 2♂ (emerged in laboratory 25/V/2002) (BYUC), 1♂ (emerged in laboratory), 27/V/2002) (BYUC), 2♂, 1♀ (emerged in laboratory 30/V/2002) (BYUC), 1♂ (emerged in laboratory 01/VI/2002), (BYUC), 1♂, 2♀ (emerged in laboratory 2/VI/2002) (BYUC), 2♀ (emerged in laboratory 1/VI/2002), (BYUC), 1♂ (emerged in laboratory 5/VI/2002), (BYUC), 1♀ (emerged in laboratory 11/VI/2002), 19 larvae (BYUC).

**Male.** Macropterous. Body length 9.0 – 11.0 mm; forewing length 9.0 – 10.0 mm. General body color pale brown with dark brown markings. Dorsum of head with medium brown “M” bands anterior to median ocellus extending anterior and lateral to near base of antennae; medium brown bands connecting ocelli and extending laterally to near base of antennae with dark brown terminal spots; pale brown median area from anterior ocellus to posterior margin of head (Fig. 1). Antennae pale brown; scape dark brown. Pronotum with wide median pale stripe, disks cream, rugosities, irregular shaped, raised, dark brown, anterior, posterior margins pale, lateral margins with a wide pale band (Fig. 1). Meso- and metanota dark brown, with irregular pale spots. Wings pale, veins medium brown. Legs pale brown, dorsal surface of femora with dark, ovoid, proximal spot, outer surface with a thin incomplete median, longitudinal, brown band. Abdominal terga pale brown with 3 lateral, and 2 mesal longitudinal rows of small dark spots and faint median longitudinal band. Ninth and 10<sup>th</sup> terga with mesal patch of short stout spinulae. Tenth tergum weakly sclerotized along midline; paraprocts sharply pointed, extending over 1/3 length of 10<sup>th</sup> tergum (Fig. 3). Abdominal sterna pale brown with paired dark anteordinal spots on segments 1-10 and smaller paired

posteromedian dark spots. Eighth and 9<sup>th</sup> sterna with mesal patch of long setae; 8th sternum with a well developed vesicle, 1.25 times as long as wide, evenly rounded and expanded slightly apically; posterior margin fringed with medium length setae (Fig. 2). Aedeagus mostly membranous with large paired anterodorsal (Fig. 5f) and small paired dorsal (Fig. 5e) lobes; small posterodorsal patch of dense medium stout spinulae (Fig. 5d); wide median band of dense medium stout spinulae (Fig. 5b); proximal area expanded and membranous (Fig. 5a), exposed posterodorsal sclerotized rod, expanded slightly apically, base embedded and bifurcated with wide slender incurving arms (Figs. 5c, 6).

**Female.** Macropterous. Body length 11.0 mm; forewing length 12.0 mm. Body coloration and morphology similar to male. Eighth sternum with posteromedian dark brown patch and broad medium brown inverted triangular patch. Subgenital plate produced over 1/3 length of 9<sup>th</sup> tergum, broadly rounded with slight posteromedial emargination (Fig. 4).

**Larva.** Body length of mature larvae 11.0 – 14.0 mm. General body color medium brown. Dorsum of head covered with short, blunt, stout spinulae, spinulae absent in pale patches; mostly brown with various pale areas (Figs. 7-8); thin, pale “M” shaped pattern anterior to median ocellus; thin, pale, slanting bars near antennal bases; interocellar area medium brown; ecdysal stem and “Y” arms thin pale lines; posterolateral areas with large pale spots infused with thin dark lines; occiput with sinuous row of stout, medium length setae interrupted medially; labrum mostly medium brown, lighter medially; antennae medium brown (Figs. 7-8). Lacinia triangulate, bidentate; subapical tooth ca. 1/2 length of apical tooth; 1 axillary seta; 8-10 long, stout marginal setae below subapical tooth; sparse, irregularly spaced row of long, fine submarginal setae below row of stout setae proximal to 3/4 length of lacinia (Fig. 9). Mandibles with 6 cusps; large median row of long medium stout setae below outer apical cusp to near mandibular base; inner marginal fringe of 25 - 30 long, stout setae; right mandible with row of short stout acanthae below inner 3rd apical cusp (Figs. 10-15), right mandible with dense brush of medium length, stout setae below inner 3<sup>rd</sup> apical cusp (Fig. 11). Pronotum mostly medium brown with pale, thin



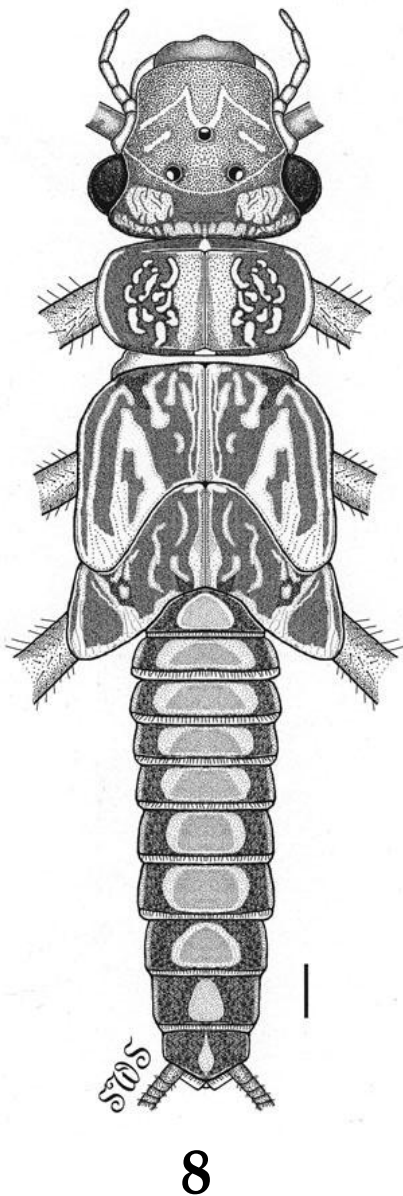


Fig. 8. *Isoperla umpqua* larval habitus - line = 1.0 mm

rugosities; discs with sparse short, black clothing hairs; margins fringed with dense, short stout setae (Figs. 7-8). Anterior and posterior intersegmental membrane of pronotum with dense band of medium length stout hairs and chloride cells. Meso- metanota with sparse median patches of short stout spinulae and black clothing hairs. Mesonotum with dark brown lateral bands and 2 median dark brown bands; metanotum with wide, dark brown lateral bands and

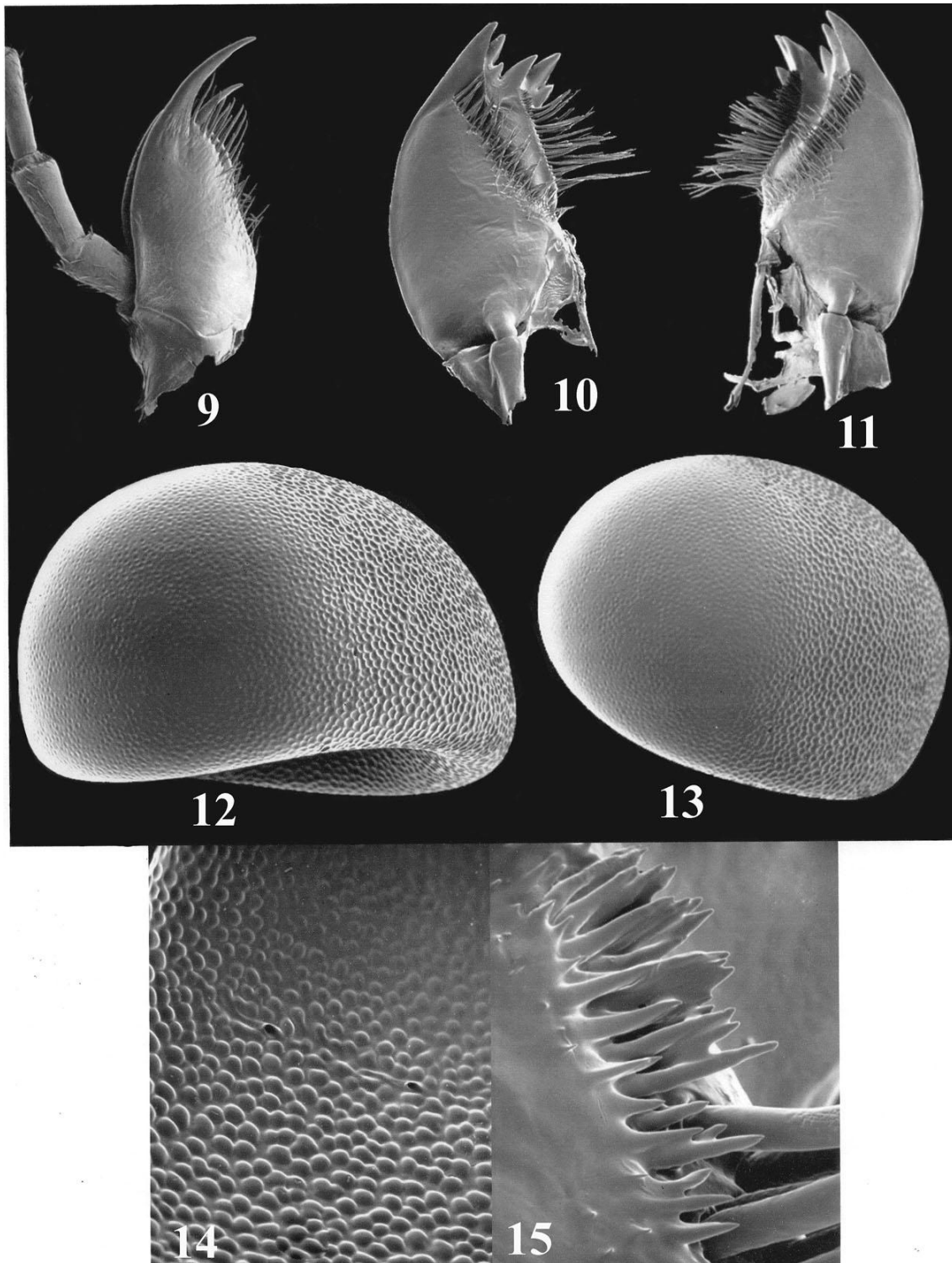
2 wide, median dark brown bands (Fig. 8). Legs medium brown, outer surface of femora with scattered medium length, stout setae and black clothing hairs; median pale, thin longitudinal band with no setae or clothing hairs; proximal ovoid, pale spot on dorsal surface void of setae or clothing hairs; outer tibia surface with sparse medium length stout setae and clothing hairs. Abdominal terga with wide median pale brown patches that decrease in size posteriorly, forming a broad median longitudinal band, bordered laterally on each side by a dark longitudinal band; posterior margins of terga fringed with very short stout setae and occasional longer setae, lateral margins with more longer setae; dorsal surface with scattered heavy setae and clothing hairs; intersegmental membranes with concentrated chloride epithelia (Fig. 8). Cerci medium brown with posterior whorl of short setae.

**Ovum.** General shape oblong, cross section concave, collar absent (Figs. 12-13). Color pale brown. Length 280 - 295  $\mu\text{m}$ ; width 210 - 220  $\mu\text{m}$ . Choronic surface covered with numerous shallow, round follicle cell impressions (FCI's), FCI's near posterior pole shallower; walls of hexagonal follicle cell impressions faintly visible (Figs. 12-13). Micropyle row subequatorial; orifices small and not elevated (Fig. 14).

**Distribution.** *Isoperla umpqua* is known only from Muir Creek, Douglas County, Oregon. It is surprising that this species has not been collected from other streams in the Cascade Mountain Range since the color pattern of the larvae is distinctive from other western Nearctic *Isoperla* species.

**Etymology.** We honor the people of the Umpqua Native American Tribe which is federally recognized as a Cow Creek Band of the Umpqua Tribe. These native Americans live in south-central Oregon near the type locality of this stonefly.

**Diagnosis.** In the male, the clavate sclerotized posterior process of the aedeagus is most similar to *I. adunca* Jewett, however it is larger and the shape and spinule patterns of the aedeagus easily distinguishes *I. umpqua*. The female subgenital plate with a shallow emargination and rounded lateral margins is similar to *I. pinta* Frison, but lacks the pronotal checkerboard pattern of *I. pinta*. Sandberg (2011) provides a detailed description of the nymph and especially in mouthpart characters is also most similar to *I. adunca*,



Figs. 9-15. *Isoperla umpqua*. 9. Left lacinia. 10. Left mandible. 11. Right mandible. 12. Ova showing concave profile. 13. Ova. 14. Detail of ova chorion and micropyles. 15. Detail of right mandible.

but can be separated by the characters of the maxilla. Additionally, *I. umpqua* appears to be restricted to type locality in south-central Oregon.

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