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SASQUAPERLA HOOPA, A NEW STONEFLY GENUS AND SPECIES FROM NORTHERN CALIFORNIA (PLECOPTERA: CHLOROPERLIDAE)

B.P. Stark¹ and R.W. Baumann²

ABSTRACT.—*Sasquaperla hoopa*, a new genus and species of Chloroperlidae, is described from adults and preemergent nymphs collected in the Coast Range of northern California. Males are characterized by the epiproct reduced to a small, tablike structure bearing stiff hairs in a narrow band along the posterior margin. Females are similar to those of *Sweltsa*, but the nymphs bear several erect bristles lateral to depressed hair patches on the mesosternum. Modified keys are presented for adults and nymphs.

Key words: Plecoptera, Chloroperlidae, Sasquaperla, new genus, California.

For several years we and our colleagues have collected occasional specimens of a *Sweltsa*-like stonefly in the Coast Range of northern California. A small series of adults taken from the Willow Creek drainage near Berry Summit during the 1998 field season allowed a more comprehensive examination and confirmed that males could not be identified using existing literature (Surdick 1985, Stewart and Harper 1996). Preliminary results suggested this species might require a new generic name, thus prompting K.W. Stewart and B.P. Stark to search for and rear the nymph in order to include the prospective genus in a forthcoming revision of their nymphal monograph (Stewart and Stark 1988). Although the nymph is very similar to *Sweltsa* and is identified to that genus in Stewart and Stark (1988) and Stewart and Harper (1996), several diagnostic characters separate the nymph from known Nearctic *Sweltsa*. The evolution of nymphal morphology is conservative within the Chloroperlidae; therefore, we consider these nymphal characters and the formation of the male genitalia sufficient for recognition of a new genus.

METHODS

Specimens were collected using beating sheets and aquatic kicknets and by hand-picking from vegetation, rocks, and debris; a few preemergent nymphs were maintained in iced styrofoam coolers during transport until they emerged. Specimens were preserved in 80%

ethanol; those examined with scanning electron microscopy were dehydrated through 10-minute washes in 90%, 95%, and 100% ethanol, followed by two 30-minute washes in hexamethyldisilazane. Specimens were attached to specimen stubs with double-stick copper tape, sputter-coated with gold-palladium, and examined with an 1810D Amray scanning electron microscope. Specimens examined during this study are deposited in the following museums or collections:

B.P. Stark Collection, Clinton, MS (BPS)
Monte L. Bean Museum, Brigham Young
University, Provo, UT (BYU)
University of North Texas, Denton, TX
(UNT)
United States National Museum of Natural
History, Washington, DC (USNM)

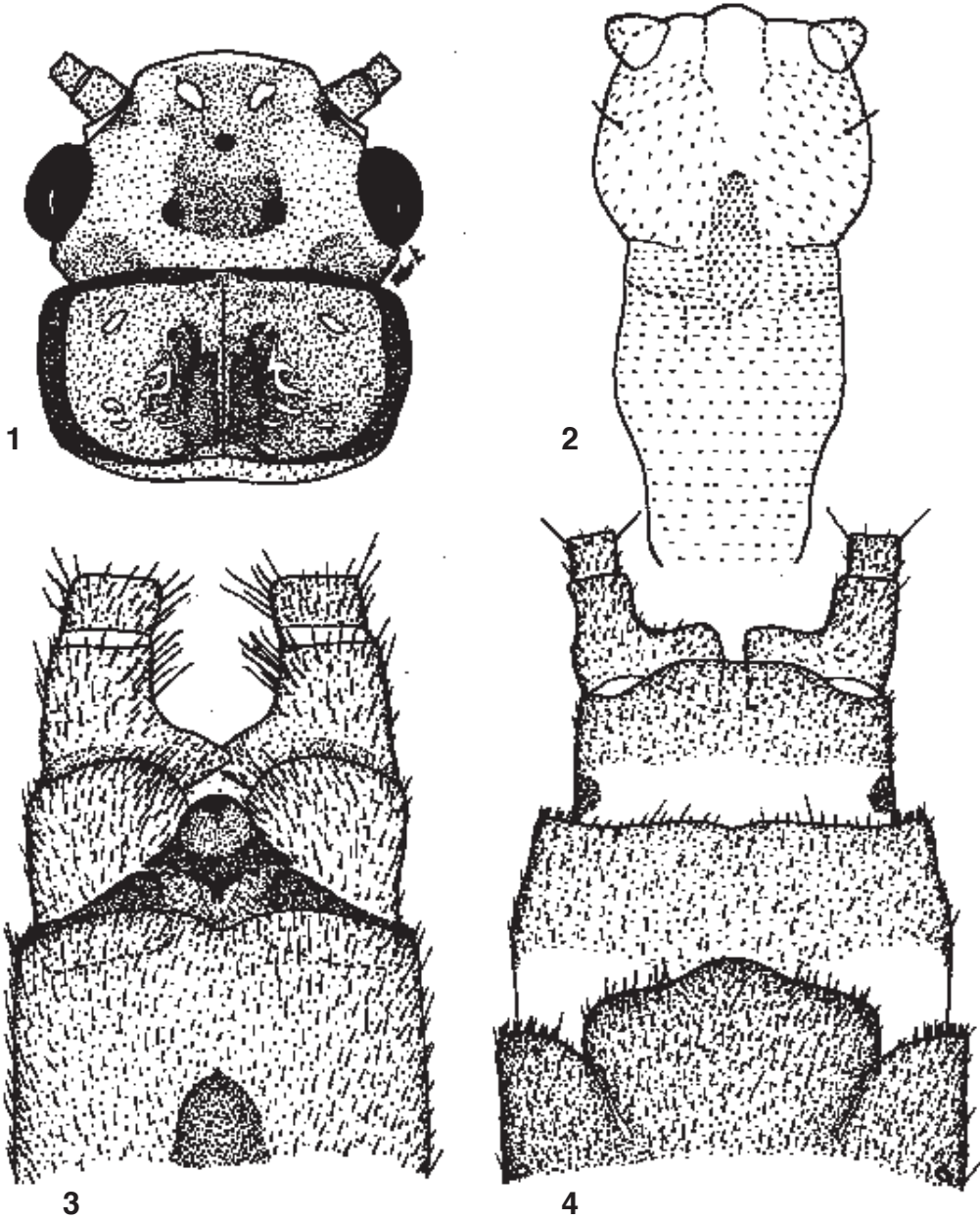
Sasquaperla, new genus

TYPE SPECIES.—*Sasquaperla hoopa*, new species, by monotypy.

ADULTS.—Body pale yellow with black and brown markings. Wings transparent, veins pale; anal area of hindwing with 3 anal veins; forewing 2nd anal vein forked. Pale brown mesal area covers ocelli and extends forward over clypeus. Pronotum with black margins and irregular brown areas near median suture (Fig. 1). Meso- and metascutellar U-sutures black. Abdomen with dark mesal pigment band extending to tergum 8 or 9; narrow lateral pigment bands extend through segment 4.

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Figs. 1-4. *Sasquaperla hoopa* adult structures: 1, head and pronotum; 2, aedeagus, ventral; 3, male terminalia, dorsal; 4, female terminalia, ventral.

Mesosternal Y-arms obsolete; dark pigment surrounding Y-stem projects forward beyond stem apex (Fig. 5). Cerci of 9-10 segments.

MALE GENITALIA.—Epiproct unhinged, reduced to a small, tablike structure embedded in upturned membrane of tergum 10, which bears a narrow band of stiff hairs around the posterior margin (Figs. 9-10). Basal bar short

and wide; paragenital plates obsolete, anterior transband of segment 10 wide and heavily pigmented (Fig. 3). Aedeagus membranous and sparsely armed with microtrichia (Fig. 2).

FEMALE GENITALIA.—Subgenital plate a short, entire flap extending over about one-third of sternum 9 (Fig. 4), forming a blunt point medially.

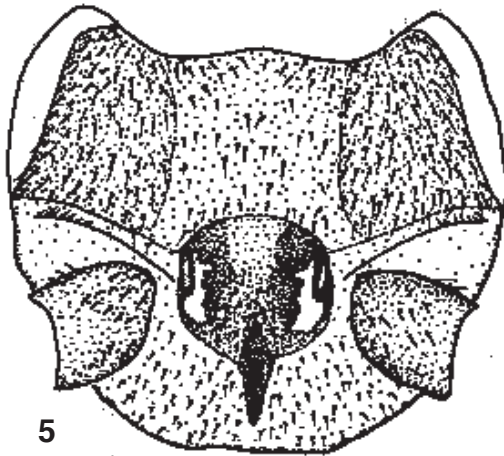


Fig. 5. *Sasquaperla hoopa*: adult male mesosternum.

NYMPH.—Mature nymph brown with obscure darker pattern on dorsum of head and thorax; abdominal terga with narrow, transverse apical bands. Head with a few long setae near eyes, at antennal bases, and anterior corners of frons. Pronotum heavily setose around anterior and posterior margins; mesonotum with strong bristle row along lateral margins. Apical abdominal terga with a few intercalary bristles and an apical fringe of bristles (Fig. 6). Thorax, abdomen, and legs covered with red-brown clothing hairs; tibial and femoral silky fringe hairs sparse (Fig. 7). Mesosternal Y-arms obsolete (Fig. 8); strong, erect bristles located lateral to clothing hairs on thoracic sterna. Cerci of about 18 segments; cercal segments with well-developed apical whorls of bristles (Fig. 6).

DISTRIBUTION.—Coast Range of northern California from the greater Trinity River drainage.

DIAGNOSIS.—Adult *Sasquaperla* are characterized by a dark middorsal stripe, by narrow lateral stripes on anterior abdominal segments, and by dark pronotal margins. The male epiproct consists of a small, upturned, unhinged sclerotized tab arising from a short, wide basal bar (Figs. 3, 9–10). Males cannot be resolved in existing keys by Surdick (1985) and Stewart and Harper (1996), but females and nymphs key to *Sweltsa* in these publications. *Sasquaperla* nymphs and adults have the mesosternal Y-arms obsolete (Figs. 5, 8), although in fully pigmented adults the mesosternal Y-region is dark except for a pair of irregular pale spots

near the furcal pits (Fig. 5); nymphs have the tibial fringes poorly developed (Fig. 7) and have a few erect bristles located lateral to the mesosternal clothing hair patches (Fig. 8).

Nymphal morphology would suggest that *Sasquaperla* belongs in the tribe Alloperlini, since it bears large patches of clothing hairs on the meso- and metathorax. Since the male epiproct is unhinged, generic placement according to Surdick (1985) would seem to fall in the Chloroerlini. However, the actual sister genus is obviously *Sweltsa*, so *Sasquaperla* would need to have possessed a hinged epiproct and then secondarily lost it. This explanation would be stronger if the present condition of the male genitalia were described in a positive way as an apomorphic state, instead of simply as a lack of a hinged epiproct, which is plesiomorphic.

KEY MODIFICATIONS.—Modifications are provided for keys to adults or nymphs given in Surdick (1985), Stewart and Harper (1996), and Stewart and Stark (1988).

Surdick (1985)

Adult Male Key

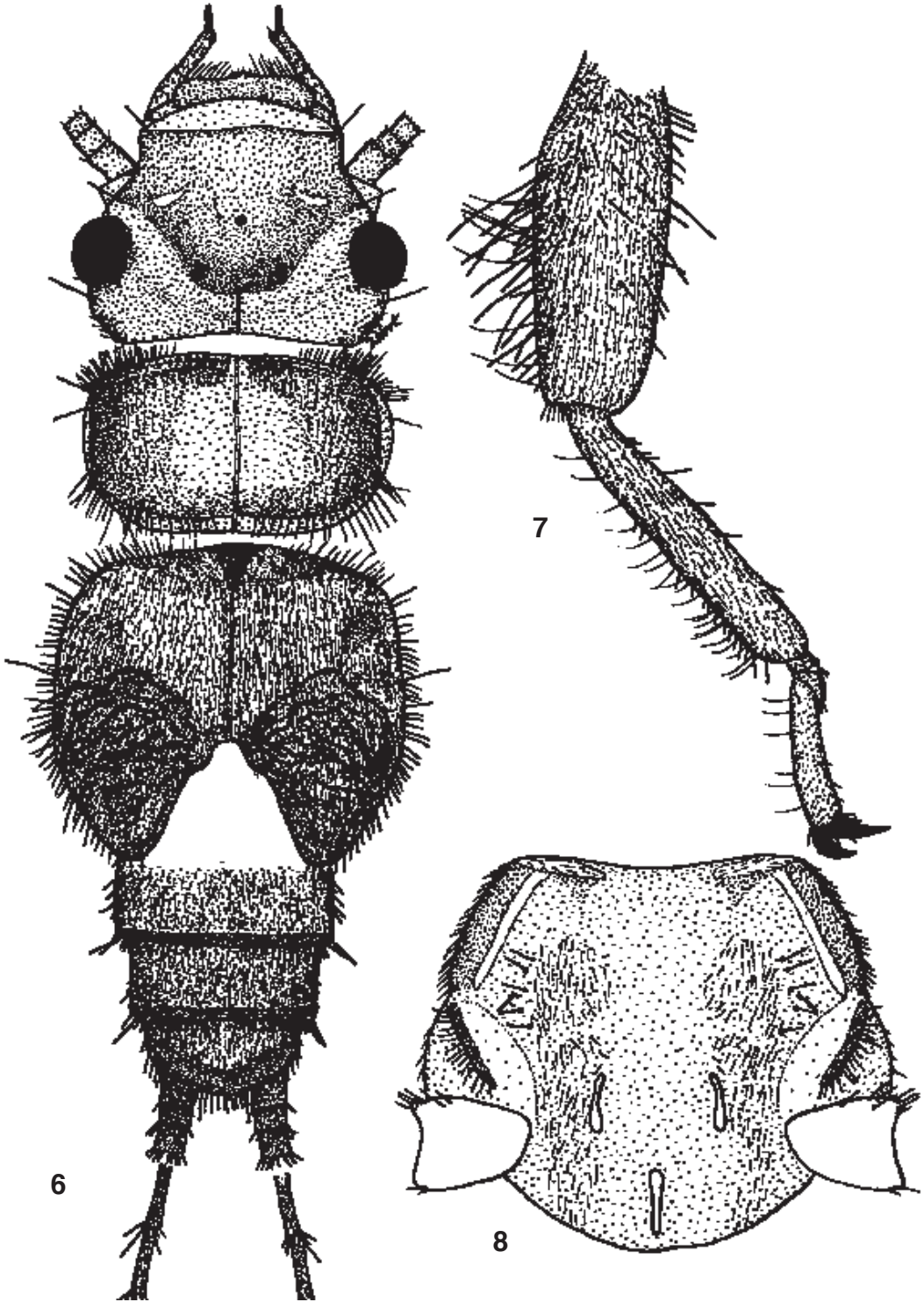
- 7. Aedeagus terminating in pair of thin, feathery processes; hammer absent *Plumiperla*
- Aedeagus lacking thin, feathery processes; hammer present or absent 7A
- 7A. Terminal abdominal segments lacking hair brushes; small median hammer on abdominal sternum 7; aedeagus armed with conspicuous basal band of scale-like spines *Triznaka*
- Terminal abdominal segments with hair brushes (Fig. 3); hammer absent from abdominal sternum 7; aedeagus without basal band of scale-like spines (Fig. 2) *Sasquaperla*

Stewart and Harper (1996)

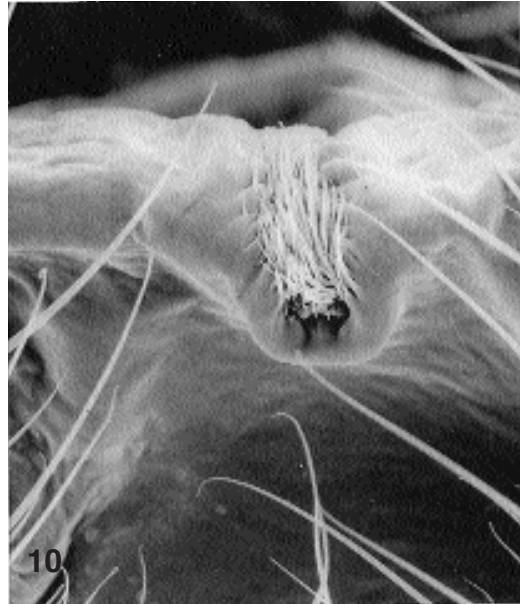
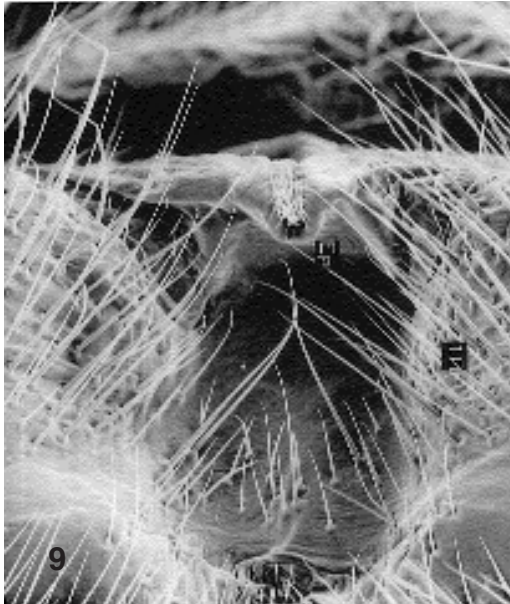
Adult Key

Males

- 119 (118'). Epiproct large, its tip hinged and elaborate; epiproct set in a deep groove in tergum 10; brushes of close-set setae on lateral margins of terminal abdominal segments 120
- 119'. Epiproct small, about as wide as long, tergum 10 entire or slightly depressed; brushes of close-set setae present or absent on lateral margins of terminal abdominal segments 119A
- 119A (119'). Brushes of close-set setae on lateral margins of terminal abdominal segments; aedeagus without dense basal bands of



Figs. 6-8. *Sasquaperla hoopa* nymphal structures: 6, partial habitus; 7, right foreleg; 8, mesosternum.



Figs. 9–10. *Sasquaperla hoopa* male terminalia: 9, terga 9 and 10, Ep = epiproct; 10, epiproct apex, anterodorsal aspect.

- | | | | |
|--------------|--|--------------------|--|
| | dark scale-like armature (Fig. 2); epiproct tip scarcely projecting forward from posterior margin of tergum 10 (Fig. 3) | <i>Sasquaperla</i> | |
| 119A'. | Brushes of close-set setae absent from lateral margins of terminal abdominal segments; aedeagus with dense basal bands of dark scale-like armature; epiproct tip projecting forward from posterior margin of tergum 10 | 121 | |
| | Females | | |
| 125 (124'). | Size small (4–6 mm); mesosternal Y-ridge with median branch extending cephalad; subgenital plate scalloped with long hairs restricted to scalloped margins | <i>Bisancora</i> | |
| 125'. | Size larger (8–18 mm); mesosternal Y-ridge without anterior extension of median branch; subgenital plate variable, if scalloped, hairs arranged otherwise | 125A | |
| 125A (125'). | Mesosternal Y-arms obsolete; subgenital plate with slightly projecting mesal lobe covered with short setae (Fig. 4) | <i>Sasquaperla</i> | |
| 125A'. | Mesosternal Y-arms normal; subgenital plate variable but without projecting mesal lobe armed with short setae | <i>Sweltsa</i> | |
| | Stewart and Stark (1988)
Nymphal Key | | |
| 5. | Thick, depressed black clothing hairs laterally on all thoracic sterna | 5A. | Thick, depressed black clothing hairs absent from lateral thoracic sterna; sternal hairs erect, light-colored 6 |
| | | | Mesosternum without erect bristles lateral to clothing hair patch; tibial fringes of silky setae well developed; mesosternal Y-arms well developed <i>Sweltsa</i> |
| | | | Mesosternum with several erect bristles lateral to clothing hair patch (Fig. 8); tibial fringes of silky setae sparse (Fig. 7); mesosternal Y-arms obsolete |
| | | | <i>Sasquaperla</i> |
| | Stewart and Harper (1996)
Nymphal Key | | |
| | | 63 (62'). | Thick, depressed black hairs present inside coxae on thoracic sterna; both pairs of wing pads divergent from body axis; long pronotal fringe hairs except on side 63A |
| | | 63'. | No black hairs inside coxae on thoracic sterna; wing pads variable in divergence 64 |
| | | 63A (63). | Mesosternum without erect bristles lateral to depressed hair patches; tibial fringes of silky setae well developed; mesosternal Y-arms well developed <i>Sweltsa</i> |
| | | 63A'. | Mesosternum with several erect bristles lateral to depressed hair patches (Fig. 8); tibial fringes of silky setae sparse; mesosternal Y-arms obsolete <i>Sasquaperla</i> |

ETYMOLOGY.—*Sasquaperla* occurs in small streams that contain other stoneflies with restricted distributions such as *Salmonperla sylvanica* (Baumann and Lauck 1987) and *Capnia fiali* (Nelson and Baumann 1990). The prefix, *sasqua*, was chosen to honor this region that provides habitat for so many biological treasures, including “Bigfoot”!

Sasquaperla hoopa,
new species

MALE.—Forewing length 9–10 mm. General color pale yellow marked with brown and black. Dorsal abdominal band consists of dark brown quadrangular and triangular segmental median patches and extends to tergum 9; anteriorly located patches (terga 3–4) are quadrangular; whereas those on terga 5–8 are triangular; all patches through tergum 8 include a pair of pale mesal spots. Tergum 9 with small posteromesal indentation (Fig. 3); tergum 10 with broadly rounded hemiterga. Epiproct complex greatly reduced; basal bar expanded laterally but not reaching anterior margin of tergum 10; unhinged apex embedded in membrane and sparsely armed with setal-like spines and a narrow band of hairs (Figs. 3, 9–10). Aedeagus membranous and sparsely armed with pale microtrichia (Fig. 2); apex with small ventrolateral lobes.

FEMALE.—Forewing length 11–12 mm. Dorsal abdominal stripe extends through tergum 8. Subgenital plate short; mesal lobe slightly developed beyond lateral margins and armed with short setae; longer submarginal setae located lateral to expanded mesal lobe (Fig. 4).

NYMPH.—Preemergent nymph 9–11 mm. General color brown with obscure darker pattern on head and pronotum, mesosternum bearing several erect bristles lateral to depressed clothing hair patches. Abdominal terga with transverse posterior pigment bands. Abdominal terga with conspicuous intercalary bristles through segment 8, but reduced on segments 9 and 10. Red-brown clothing hairs conspicuous over most of body (Fig. 6).

TYPES.—Holotype ♂, 3 ♂ and 8 ♀ paratypes from California, Humboldt Co., Slide Creek, Hwy 13, south of Fish Lake Campground, Six Rivers National Forest, 31 May 1991, R.W. Baumann, B.P. Stark, holotype and 1 ♂, 1 ♀ paratype deposited at the United

States National Museum, Washington, DC. Additional paratypes: California: Del Norte Co., unnamed small stream, Hwy 199, 3 miles NE Hiouchi, 1 June 1991, B.P. Stark, R.W. Baumann, 1 ♂ (BPS). Humboldt Co., unnamed tributary of Willow Creek, 2.7 miles E Berry Summit, Hwy 299, 8 June 1984, P. Wilkinson, D.R. Lauck, 1 ♂, 1 ♀, (BYU); 22 June 1985, R.W. Baumann, C.R. Nelson, M.F. Whiting, 2 ♂, 2 ♀ (BYU); 19 May 1998, B.P. Stark, C.R. Nelson, S.W. Szczytko, I. Sivec, 1 ♂, 3 ♀ (BPS, BYU); 20 May 2001, B.P. Stark, K.W. Stewart, 10 ♂, 10 ♀, 8 nymphs (BPS, UNT). Humboldt Co., Cedar Creek, Hwy 299, 6 miles W Willow Creek (town), 15 May 1984, P. Wilkinson, D.A. Lauck, 4 ♀ (BYU); 31 May 1991, R.W. Baumann, B.P. Stark, 1 ♀ (BYU). Humboldt Co., small tributary of Willow Creek, Hwy 299, 6.5 miles W Willow Creek (town), 19 May 1998, C.R. Nelson, B.P. Stark, S.W. Szczytko, I. Sivec, 1 ♀, 1 nymph (BYU). Humboldt Co., Little Bidden Creek, Hwy 299, near Boise Creek Campground, 15 May 1984, P. Wilkinson, D.A. Lauck, 1 ♂ (BYU). Trinity Co., Indian Creek, Hwy 299, 1.4 miles W Hayden Flat Campground, 21 June 1985, C.M. & O.S. Flint, Jr., 1 ♂ (USNM).

ETYMOLOGY.—The species name honors the Hoopa people who live in the Willow Creek area of the Trinity Alps, California.

ACKNOWLEDGMENTS

We thank our colleagues C.R. Nelson, I. Sivec, K.W. Stewart, S.W. Szczytko, and M.F. Whiting for assistance in fieldwork and in sharing specimens with us. D.R. Lauck and P. Wilkinson made the first specimens of this interesting species available from their study on the Willow Creek drainage and also shared their data on the original collecting localities.

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