

Stridulatory file. (n = 4) length 3.0–3.5 mm, 132–145 teeth, tooth density 43.2 ± 4.5 (37.7–48.3) teeth/mm.

Song. (n = 12) The song of *N. diabolica* consists of bouts of uniform rate “lispering” as in *N. carinata*. PTR 10.8 ± 0.7 s⁻¹ is identical to *N. carinata*. PTF 13.3 ± 2.3 kHz; a high frequency lab recording measured PTF at 19.2 kHz. PTdc $80.4 \pm 8.0\%$ is significantly higher than that found in *N. carinata* songs (ANOVA, $P = 2.36 \times 10^{-3}$). PTdc is a temperature-invariant song character (linear regression, $P = 0.188$), and thus can be compared among recordings that lack temperature control. Males are nocturnal singers. Bout length is variable, but the bouts of *N. diabolica* males tend to be shorter and more even in length than those of *N. carinata* males.

Karyotype. (n = 4) $2n\♂ = 26$ (2m + 22t + XtYt) T90-12, S90-61, topotype. This corrects the information of Ueshima and Rentz (1979).

Recognition. The high stridulatory file tooth density (37–48) is shared only with *N. carinata* in the Carinata Group. The ventral sclerite is narrow with a high convex to pyramidal apex and a poorly developed anterolateral process. In contrast, ventral sclerites of *N. oblongata* have a low convex apex and a minute lateral process. Except for *N. radicata*, all other Convexa Clade taxa have long anterolateral processes. The female subgenital plate is pentagonal and flat as in *N. carinata* and *N. oblongata*, but those two species lack a distinct medial groove, which is present in this species. Songs of *N. diabolica* males are qualitatively similar to those of *N. carinata* but have a higher duty cycle. The distribution is restricted to the vicinity of Mount Diablo, California.

Notes. This species exhibits a mosaic of characters. DNA places *N. diabolica* with the Convexa Clade, the song type and stridulatory file are like those of *N. carinata*, and the genitalia resemble those of *N. radicata*. Mount Diablo has remained above sea level since the early Miocene (Bartow 1991) and lies at the junction of the distributions of the southern Carinata and northern Convexa Clades. The mixture of characters found in *N. diabolica* suggests past introgression. By maintaining its species status, we recognize that *N. diabolica* is a phylogenetically distinct, philopatric lineage that inhabits an ancient region of high endemism and provided it remains protected (Mount Diablo is a California State Park), this lineage may persist into the future with its mixture of characters. The name *picturata* Scudder was originally described to differentiate insects with a mottled color pattern as opposed to uniform or striped coloration. These color pleomorphisms are shared by all species in the Carinata Group.

Material examined. See Type material above.

Neduba longiplutea Cole, Weissman, & Lightfoot, sp. n.

Fig. 9. (distribution), Fig. 14 (male and female habitus, calling song, male and female terminalia, karyotype), Plate 4E (male calling song), Plate 6J (male ventral sclerite), Plate 9F (male titillators), Plate 11E (female subgenital plate).

Common name. Trinity Alps Shieldback.

History of recognition. Apparently confused with *N. convexa*, 1 male and 1 female from CA, Trinity Co., Big Flat, 15-VIII-1960, PH Benson (Rentz & Birchim 1968).

Type material. HOLOTYPE MALE: USA, CA, Humboldt Co., East Fork Campground, 5.2 mi. W of Willow Creek, Six Rivers National Forest, 40.90582N, 123.7068W, 471 m, 6-VIII-2014, JA Cole, DB Weissman, JAC000002182 [specimen barcode], DNA125 [tissue], SING0458 [DNA extraction], JCT14-2 [karyotype], deposited at CAS, Entomology type #19711.

PARATYPES (n = 10): 5♂, 2♀, same data as holotype, LACM; 2♂, same data as holotype, CAS; 1♂, same data as holotype, JAC.

Measurements. (mm, ♂n = 8, ♀n = 2) Hind femur ♂18.35–20.00, ♀21.41–21.61, pronotum total length ♂8.17–9.30, ♀7.60–7.78, prozona length ♂2.92–3.75, ♀3.93–3.96, metazona dorsal length ♂4.73–5.69, ♀3.64–3.85, pronotum constriction width ♂1.96–2.90, ♀2.21–2.51, metazona dorsal width ♂5.90–6.36, ♀5.20–5.40, head width ♂4.08–4.30, ♀4.45–4.81, ovipositor length ♀15.68–16.45.

Distribution. Trinity Alps in the North Coast Ranges of California.

Habitat. Forest understory, on ferns, leaf litter, and occasionally arboreal. Some CSCA specimen labels indicate range grass.

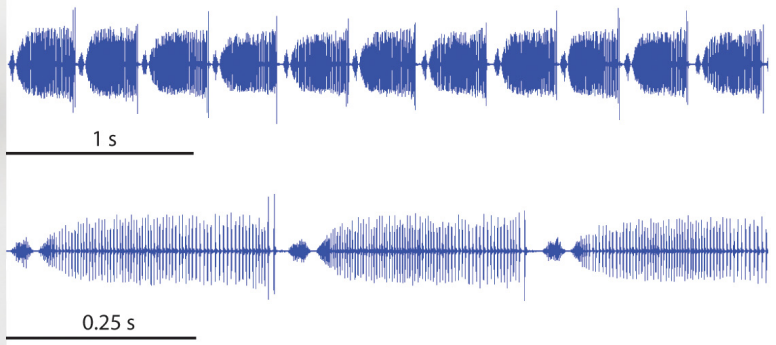
Seasonal occurrence. Midsummer through fall, from July (19-VII-1934, EC VanDyke, CAS) to October (17-X-1995, Spadoni, CSCA). Nymphs from May through July.

Stridulatory file. (n = 4) length 3.4–3.9 mm, 114–125 teeth, tooth density 33.7 ± 3.0 (31.0–36.8) teeth/mm.

male PARATOPOTYPE CA:Trinity Co.
JAC000002187



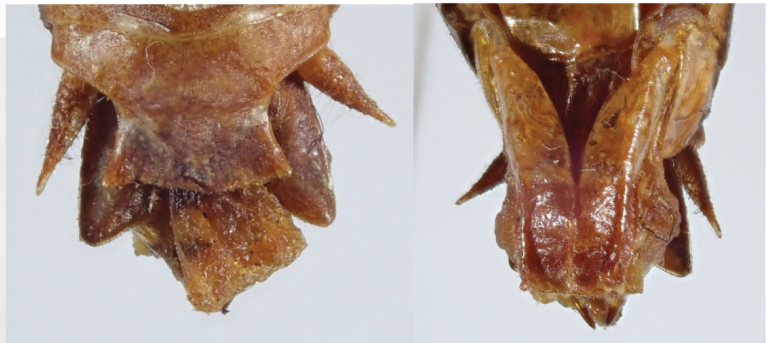
calling song PARATOPOTYPE CA:Trinity Co. 24.4°C JCR140823_02



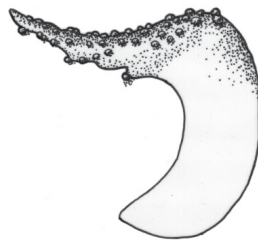
female PARATOPOTYPE CA:Trinity Co.
JAC000002189



male terminalia PARATOPOTYPE CA:Trinity Co. JAC000002187



ventral sclerite
HOLOTYPE



female terminalia PARATOPOTYPE
JAC000002189



male HOLOTYPE CA:Trinity Co. JAC000002182



karyotype PARATOPOTYPE CA:Trinity Co. S14-65 T14-26

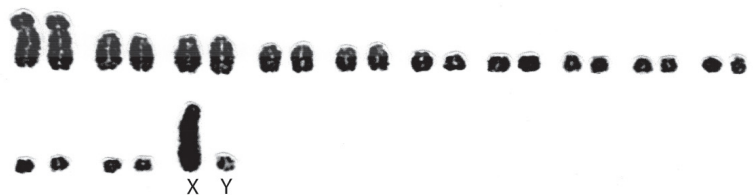


FIGURE 14. *N. longiplutea* male and female habitus, calling song, male and female terminalia, karyotype.

Song. (n = 4). PTR $2.7 \pm 0.3 \text{ s}^{-1}$, PTF $14.4 \pm 2.7 \text{ kHz}$, indistinguishable from topotype *N. convexa*.

Karyotype. (n = 4) $2n\text{♂} = 26 (2m + 22t + XtYt)$. T14-25, S14-65, paratopotype.

Recognition. Male genitalia unique: the lateral process is as long or longer than the short, thick shaft. Female subgenital plate longer than wide and has a bifurcate apex. The subgenital plate of *N. convexa* has similar proportions but the apex is usually entire, rarely bifurcate.

Etymology. *l. longi* long + *plutea* barrier, screen, low wall, parapet. Descriptive of the long lateral process of the male ventral sclerite.

Notes. This species replaces *N. convexa* to the west. Populations may be large and widespread, judging from an 80 km acoustic transect through Humboldt and Trinity Counties, California (JAC and DBW, pers. obs.) and from the number of nymphs in museum collections. The song is identical to that of *N. convexa*. Color patterns are variable and beautifully match the complex background of the forests of the Trinity Alps.

Material examined. DETERMINED (n = 63): **All USA, CA, Humboldt Co.,** 1♀ adult, 1♀ nymph, Bullrun Flat, Garberville, 40.100145N, 123.795029W, 27-VII-1934, EC VanDyke, CAS; 3♂, 1♀, Hoopa, 41.050408N, 123.674224W, 524 m, 19-VIII-1959, Tabor, Graham, Gallian, CSCA; 1♂, Humboldt County State Park, 40.70501N, 123.91582W, 6-VIII-1957, J Keefe, CSCA; 1♂ nymph, Johnsons Bar, 41.350401N, 123.872012W, 16-VII-1964, D Ramsey, CSCA; 1♂, Miranda, 40.234586N, 123.823646W, 19-VII-1934, EP VanDuzee, CAS; 1♀, Orick, 41.28679N, 124.059794W, 10 m, 17-X-1995, Spadoni, CSCA; 1♀ nymph, same data except 4-VII-1931, EC VanDyke, CAS; 1♂, 2♀ nymphs, Weott, 40.321897N, 123.921706W, 12-VII-1929, EC VanDyke, CAS; 1♂, 2♀ nymphs, same data except 13-VII-1929, EC VanDyke, CAS; 4♂, 4♀ nymphs, same data except 15-VII-1929, EC VanDyke, CAS; **Te-hama Co.,** 1♀, N Yollabolly, 40.17556N, 122.98W, 27-IX-1964, D Sale, CSCA; **Trinity Co.,** in addition to type material (above), 1♂, 1♀ nymphs, Burnt Ranch, 40.809027N, 123.474208W, 449 m, 1-VI-1964, G Harmon, CSCA; 1♂ nymph, Carrville, 41.064868N, 122.70419W, 18-V-1934, EC VanDyke, CAS; 1♂ nymph, same data except 25-VI-1931, EC VanDyke, CAS; 1♂, 1♀ nymphs, same data except 26-VI-1913, EC VanDyke, CAS; 2♀ nymphs, Carrville, same data except 27-V-1934, EC VanDyke, CAS; 1♀ nymph, Coffee Creek, 23-VI-1931, EC VanDyke, CAS; 1♀, East Weaver Lake, 40.81389N, 122.98556W, 25-IX-1964, FL Blanc, GM Buxton, CSCA; 1♂, 8♀, Grizzly Lake, 41.010046N, 123.049925W, 2166 m, 10-15-IX-1964, Buxton, Gurney, Forbes, Kamp, Thompson, CSCA; 3♀, Grizzly Meadows, 41.017084N, 123.05198W, 10-15-IX-1964, Buxton, Gurney, Forbes, Kamp, Thompson, CSCA; 1♀, Hyampom, 40.617364N, 123.452536W, 392 m, 27-VII-1962, J Reed, CSCA; 1♀, same data except CAS; 1♂, 4♀, Lamb Gap, South Fork Mountain, 40.507087N, 123.497257W, 19-IX-1962, FL Blanc, CSCA; 1♀, Ruth, 40.269591N, 123.321414W, 829 m, CSCA; 1♂, 1♀, Sids Place Hwy 36, 40.419033N, 123.456698W, 1109 m, 19-IX-1962, FL Blanc, CSCA; 1♂, 4♀, Weaver Bally, 40.815976N, 122.99364W, 2129 m, 9-VIII-1964, Buxton, Gurney, Forbes, Kamp, Thompson, CSCA; QUESTIONABLE PLACEMENT (n = 2): **Humboldt Co.,** 1♀, Mad River Mountains, 40.925112N, 124.115737W, 19-VII-1934, EC VanDyke, CAS; 1♀, same data except no date, EC VanDyke, CAS.

Neduba radicata Cole, Weissman, & Lightfoot, sp. n.

Fig. 9 (distribution), Fig. 15 (male and female habitus, calling song, male and female terminalia, karyotype), Plate 1D (live habitus), Plate 4F (male calling song), Plate 6K (male ventral sclerite), Plate 9G (male titillators), Plate 11F (female subgenital plate).

Common name. Lake Tahoe Shieldback.

History of recognition. Confused with *N. convexa*, specimen from CA: El Dorado Co., Ice House Road, 22-X-1965, D.C. Rentz, 1 male (Rentz & Birchim 1968).

Type material. HOLOTYPE MALE: **USA, CA, El Dorado Co.,** Stanford University Sierra Camp, Fallen Leaf Lake, 38.901076N, 120.061626W, 1940 m, 9-VII-1988, DB Weissman, CAS, S88-60 [stop], R88-75A [recording], T88-8 [karyotype], genitalia extracted and cleared in vial and excised tegmen in gelcap below specimen, deposited in CAS, Entomology type #19679.

PARATYPES (n = 36): **USA, CA, El Dorado Co.,** 8♂, 1♀, China Flat Campground, El Dorado National Forest, 2 mi. SE of Kyburz off US50, 38.7535N, 120.2671W, 1470 m, 20-21-VII-2012, JA Cole, LACM; 1♂, same data except JAC; 4♂, same data except 12-VIII-2002, JA Cole, LACM; 1♂, same data JAC; 2♂, same data except 19-VII-2015, JA Cole, DB Weissman, LACM; 1♂, Emerald Bay State Park, Lake Tahoe, 38.964888N, 120.090884W, 1890