

**Napa Co.**, 1♂, end of Atlas Peak Road 10 mi. airline N of Napa, 38.450743N, 122.262753W, 6-VII-1973, JA Sutro, CAS; 1♀, north side Howell Mountain, 2 miles NNE Angwin, 38.602527N, 122.435787W, 396 m, 18-X-1974, HB Leech, CAS; **San Francisco Co.**, 5♂, Lands End, 37.787707N, 122.505528W, 17-X-1909, FX Williams, CAS; **Solano Co.**, 1♀ nymph, Green Valley, 38.227515N, 122.151579W, 34 m, 16-VI-1953, AA Grigarick, BMED; **Sonoma Co.**, 1♂, Bodega Bay, 38.33325N, 123.048057W, 20-VII-1974, LD & MD Anderson, UCR; QUESTIONABLE PLACEMENT (n = 20): **Alameda Co.**, 1♀, Oakland Hills, 37.804372N, 122.270803W, 6-IX-1948, CD MacNeill, CAS; **Marin Co.**, 1♂, McClures Beach, Pt. Reyes Peninsula, 38.187421N, 122.965276W, 2-X-1960, JS Buckett, CAS; 1♀, Mill Valley, 37.89076N, 122.523586W, 2-VIII-1925, EP VanDuzee, CAS; 1♀ nymph, same data except 24-VI-1923, EP VanDuzee, CAS; 1♀ nymph, same data except 25-VI-1925, EP VanDuzee, CAS; 1♀, same data except 26-VII-1926, EP VanDuzee, CAS; 1♀, same data except 27-VI-1925, EP VanDuzee, CAS; 1♀, same data except 5-VII-1925, EP VanDuzee, CAS; 1♀, same data except 7-XI-1925, EP VanDuzee, CAS; 2♂, Mount Tamalpais, NE slope, 37.927425N, 122.591924W, 700 m, R Hunt, BMED; **Mendocino Co.**, 1♀, Navarro, 39.151843N, 123.541956W, 18-XII-1973, DO Clark, CSCA; 1♂, VanDamme State Park, 39.27639N, 123.77333W, 13-X-1979, T Tyler, CSCA; **Napa Co.**, 1♀, Hwy 121, 6 mi. NW of Napa, 38.403064N, 122.4184W, no collector, CSCA; 1♀ nymph, Lake Berryessa, 38.58903N, 122.229496W, 20-V-1961, CD Macneill, CAS; **Solano Co.**, 1♂, Vallejo, 38.104086N, 122.256637W, 18 m, 6-VIII-1956, D Haug, CSCA; **Sonoma Co.**, 1♂ nymph, Cazadero, 38.533246N, 123.08528W, 36 m, 5-VII-1962, R Bartges, BMED; 1♀, Jenner, 38.449636N, 123.115559W, 17-X-1937, no collector, BMED; 1♀ nymph, Kenwood, 38.4138N, 122.546094W, 126 m, 14-V-1960, TH Gantenbein, BMED; 1♀ nymph, Stillwater Cove, 38.545833N, 123.298611W, 23-V-1954, EI Schlinger, BMED; HYBRIDS WITH *N. CARINATA*: **Napa Co.**, 1♀, Monticello Dam, 38.513394N, 122.104351W, 8-X-1969, F Andrews, CSCA; **Solano Co.**, 3♂, Lake Solano County Park, 5 mi. SW of Winters off SR128, 38.49576N, 122.03399W, 51 m, 30-VII-2016, JA Cole, LACM; 12♂, 3♀, same data except 31-VII-1-VIII-2013, JA Cole, LACM; 7♂, same data except 31-VII-2014, JA Cole, DB Weissman, LACM; 2♂, 1♀, same data except 31-VII-1-VIII-2013, JA Cole, JAC; 1♀, same data except 25-VII-2019, JA Cole, JAC

### ***Neduba diabolica* (Scudder, 1899)**

Fig. 9 (distribution), Fig. 13 (male and female habitus, calling song, male and female terminalia, karyotype), Plate 4D (male calling song), Plate 6F (male ventral sclerite), Plate 9E (male titillators), Plate 11D (female subgenital plate).

**Common name.** Mount Diablo Shieldback.

**History of recognition.** Originally described in *Tropizaspis* from a female taken at “Monte Diablo, California” (Scudder 1899). Rentz & Birchim (1968) assigned the majority of South Coast Range *Neduba* populations to this species and synonymized variety *picturata* (Scudder 1899) under this name. We reassign all other South Coast Range populations to *N. carinata*. The type of *picturata* was collected during the Northwestern Boundary Survey (Caudell 1907), which makes *picturata* a synonym of *N. steindachneri* (see discussion under that species) and not *N. diabolica*.

**Type material.** The female holotype is housed in ANSP. Type not examined by us but images available at OSFO (Cigliano *et al.* 2020). **TOPOTYPES EXAMINED** (n = 23): **USA, CA, Contra Costa Co.**, 1♀, Mount Diablo State Park, 37.862703N, 121.93107W, 1021 m, 1-IX-2002, DB Weissman, CAS; 3♂, Mount Diablo State Park, 37.862703N, 121.93107W, 670-1160 m, 30-VI-1990, DB & DD Weissman, CAS; 3♂, Mount Diablo State Park, Fire Interpretive Trail, 37.8807N, 121.9172W, 1131 m, 20-21-VII-2005, JA Cole, JF Eguizabal, LACM; 1♂, Mount Diablo State Park, Juniper Camp, 37.8785N, 121.9339W, 886 m, 27-28-VI-2008, JA Cole, W Chatfield-Taylor, W Ericson, JAC; 1♂, 1♀, same data except LACM; 1♂, Mount Diablo State Park, Juniper Camp, 37.862703N, 121.93107W, 886 m, 28-VIII-1982, DB Weissman, CAS; 1♂, 1♀, Mount Diablo State Park, Lookout Point, 37.862703N, 121.93107W, 7-VI-1967, DC & KA Rentz, CAS; 2♂, Mount Diablo State Park, near North Gate Entrance, 37.862703N, 121.93107W, 229 m, 13-VII-1982, DB Weissman, CAS; 1♂, 2♀, Mount Diablo State Park, summit, 37.862703N, 121.93107W, 1021 m, 11-VIII-1990, DB Weissman & DW Weissman, CAS; 1♂, same data except 13-VII-1982, DB Weissman, CAS; 2♂ nymphs, 1♀ nymph, Russelman Park, Mount Diablo East Slope, 19-IV-1931, EP VanDuzee, CAS; 1♂ nymph, same data except 24-IV-1932, EC VanDyke, CAS.

**Measurements.** (mm, ♂n = 8, ♀n = 3) Hind femur ♂20.09–22.49, ♀21.80–23.09, pronotum total length ♂9.50–

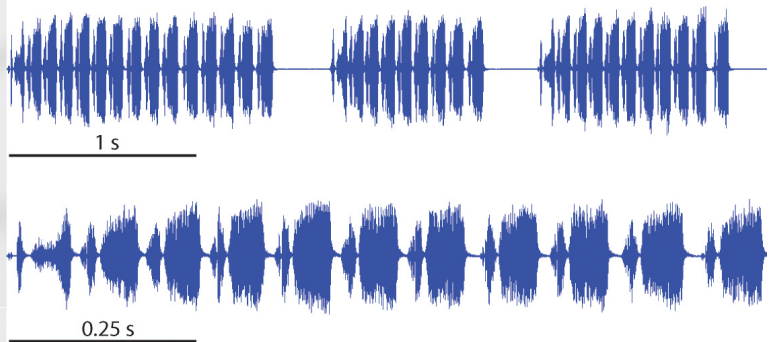
11.02, ♀9.40–9.98, prozona length ♂4.38–4.92, ♀4.81–5.34, metazona dorsal length ♂4.86–6.10, ♀4.59–4.75, pronotum constriction width ♂2.55–3.21, ♀2.55–3.10, metazona dorsal width ♂6.30–6.86, ♀5.89–6.05, head width ♂4.60–5.95, ♀4.95–5.39, ovipositor length ♀16.47–18.04.

**Distribution.** Known only from Mount Diablo at the north end of the Diablo Range, California. Not known from Mt. Hamilton, also in the Diablo Range, some 67 km southeast of Mt. Diablo where *N. oblongata* occurs. The Vallecitos Valley is a possible biogeographic break between these two species (See *N. oblongata* species account above).

**Habitat.** Oak woodland and chaparral habitats. Males call from the interior of large bushes, especially in canyon bottoms.

**Seasonal occurrence.** Adults have been taken from late June (27-VI-2008, JA Cole, W Chatfield-Taylor, W Ericson, LACM) to September (1-IX-2002, DB Weissman, CAS). Nymphs were collected 7-VI-1967 (Rentz & Birchim 1968).

male TOPOTYPE CA: Santa Clara Co. S82-113 calling song TOPOTYPE CA: Santa Clara Co. 25.0°C S90-61 R90-103



male terminalia TOPOTYPE CA: Santa Clara Co. JAC000002133



female TOPOTYPE CA: Santa Clara Co. S02-65



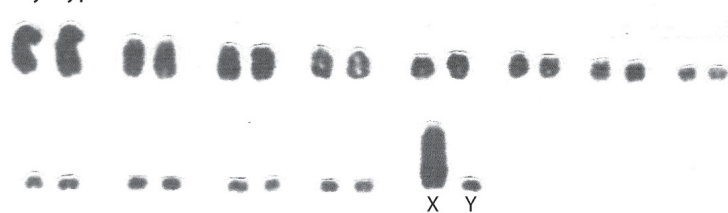
ventral sclerite  
TOPOTYPE  
S90-61, R90-103



female terminalia TOPOTYPE  
JAC000002135



karyotype TOPOTYPE CA: Santa Clara Co. S90-61 T90-12



**FIGURE 13.** *N. diabolica* male and female habitus, calling song, male and female terminalia, karyotype.

**Stridulatory file.** (n = 4) length 3.0–3.5 mm, 132–145 teeth, tooth density  $43.2 \pm 4.5$  (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  $10.8 \pm 0.7$  s<sup>-1</sup> is identical to *N. carinata*. PTF  $13.3 \pm 2.3$  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  $33.7 \pm 3.0$  (31.0–36.8) teeth/mm.