

Habitat. Forest understory, often in thick tangles of vegetation. Taken from poison oak, willow (*Salix* spp.), and thorny brambles in riparian areas. Nymphs were collected from under bark of fallen tree limbs and from leaf litter under a valley oak tree (*Quercus lobata* Née). Museum specimens (ER Tinkham, CAS) also indicate association with oaks.

Seasonal occurrence. Adults collected in the field from late June (23-VI-2003, JA Cole, LACM) through August (28-VIII-1983, DB Weissman, CAS). Last instar nymph collected in early June (3-VI-2017, LA Pavliscak, LACM) matured 19-VI-2017.

Stridulatory file. (n = 5) length 3.3–3.8 mm, 150–183 teeth, tooth density 49.1 ± 2.7 (45.5–52.4) teeth/mm.

Song. (n = 12) A continuous train of alternating MPT and OPT delivered at PTR 2.4 ± 0.3 s⁻¹. The PTdc is $62.1 \pm 9.7\%$, which is lower than that of *N. sequoia* (ANCOVA, $P = 3.75 \times 10^{-4}$). The PTF is high at 15.6 ± 1.2 kHz.

Karyotype. (n = 7) $2n\♂ = 21$ (2m + 16t + XtXtYm). T83-44, S83-115, type locality.

Recognition. This is the most morphologically distinctive species of the Sierranus and Sequoia Groups. Males combine a weakly constricted pronotum and a low stridulatory file tooth density (below 53 teeth/mm), lower than all other Sierranus and Sequoia Group species except *N. duplocantans* (47–52 teeth/mm) which has a more strongly constricted pronotum. Females have the shortest ovipositor of any Sierranus or Sequoia Group species, 10 mm or less in length. The song has a lower PTdc than that of the related *N. sequoia*. The karyotype is shared only by *N. inversa*. This species ranges the farthest south of any Sequoia or Sierranus Group species and occurs in the Tehachapi Mountains in addition to the Sierra Nevada.

Etymology. *l. proro* “to prolong, keep going” + *cantans* “singing,” describing the incessant and repetitive nature of the male calling song.

Notes. This species may be common in years of adequate rainfall and scarce in dry years, during which populations are localized around water sources. During the summer of 2001, a wet year for California, katydids were abundant in the Kernville area and males were seen walking and singing on bare soil on hillsides some distance from riparian or forested areas (JAC pers. obs).

Material examined. Type series only, see Type material above.

Neduba sequoia Cole, Weissman, and Lightfoot sp. n.

Fig. 19 (distribution), Fig. 29 (male and female habitus, calling song, male and female terminalia, karyotype), Plate 3F–G (live habitus), Plate 5I (male calling song), Plate 8F–H (male ventral sclerite), Plate 10I (male titillators), Plate 12G (female subgenital plate).

Common name. Big Trees Shieldback

History of recognition. Likely confused with *N. sierranus*.

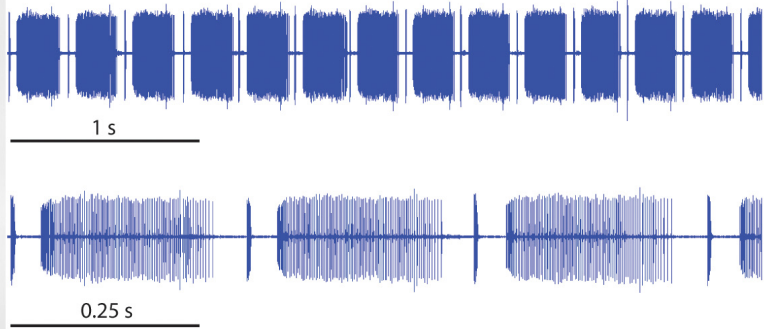
Type material. HOLOTYPE MALE: USA, CA, Tulare Co., Coy Flat Campground, Sequoia National Forest, 0.5 miles south of Camp Nelson off SR190, 36.1269N, 118.6183W, 1524 m., 30-31-VII-2012, JA Cole, DNA67 [tissue], SING357 [DNA extraction], JCR120914_00 [recording], genitalia in vial below specimen, deposited in CAS, Entomology type #19714. PARATYPES (n = 29): Tulare Co., 9♂, 1♀, same data as holotype, LACM; 1♂, same data as holotype JAC; 2♂, same data as holotype except, 20-VIII-2006, DB Weissman, DC Lightfoot, CAS; 11♂, 3♀, South Fork Campground, Sequoia National Park, 36.35029N, 118.76511W, 1112 m, 12-13-VIII-2015, JA Cole, LACM; 1m, same data except JAC; 1♂, Hwy 190 7 mi. E Springville, 36.156806N, 118.724278W, 707 m, 5-V-2011, DB Weissman, DBW.

Measurements. (mm, ♂n = 23, ♀n = 5) Hind femur ♂17.48–24.26, ♀22.03–24.14, pronotum total length ♂8.36–10.66, ♀9.50–10.05, prozona length ♂3.34–5.40, ♀4.78–5.96, metazona dorsal length ♂4.08–6.05, ♀3.79–4.72, pronotum constriction width ♂2.15–3.15, ♀2.57–2.96, metazona dorsal width ♂5.40–6.97, ♀5.85–6.65, head width ♂4.45–5.72, ♀5.10–5.90, ovipositor length ♀14.68–17.42.

Distribution. Western slope of the southern Sierra Nevada Mountains between the Kaweah River and Tule River watersheds, in the vicinity of Sequoia National Park.

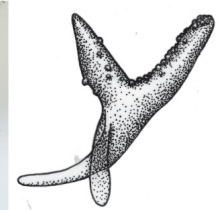
Habitat. Understory of mixed conifer forests, especially in riparian habitats and mesic areas. At the South Fork localities, many adults were feeding on green leaves of mountain mahogany (*Cercocarpus*). Singing males at this locality were observed and recorded in young dead cedars at the forest edge.

male HOLOTYPE CA:Tulare Co. JAC000002314 calling song PARATOPOTYPE CA:Tulare Co. 22.8°C JCR120914_01



male terminalia PARATOPOTYPE CA:Tulare Co. JAC000002325

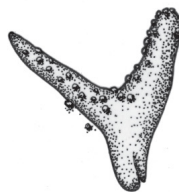
ventral sclerite HOLOTYPE



female PARATYPE CA:Tulare Co. JAC000002338



ventral sclerite PARATOPOTYPE JAC000002321



female terminalia PARATOPOTYPE CA:Tulare Co. JAC000002324



male PARATYPE CA:Tulare Co. JAC000002334



karyotype PARATOPOTYPE CA:Tulare Co. S06-80 T06-12

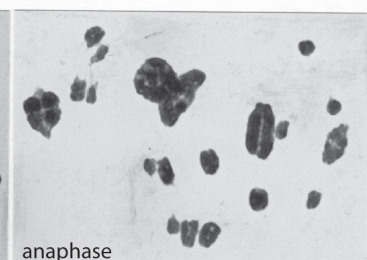
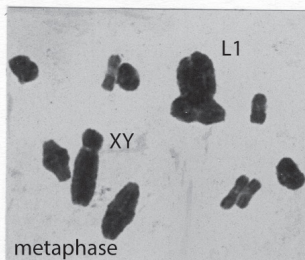
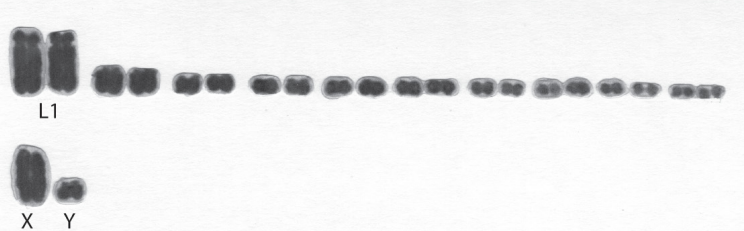


FIGURE 29. *N. sequoia* male and female habitus, calling song, male and female terminalia, karyotype.

Seasonal occurrence. Adults from late July (27-VII-1986, DJ Burdick, CAS) through August (20-VIII-2006, DB Weissman, CAS). Nymphs from May through mid-June.

Stridulatory file. (n = 18) length 2.7–3.7 mm, 152–203 teeth, tooth density 57.5 ± 3.4 (47.5–61.6) teeth/mm.

Song. (n = 19) A continuous series of alternating MPT and OPT as in other Sequoia Group species (except *N. inversa*). The PTR of 3.0 ± 0.5 s⁻¹ is significantly faster than *N. prorocantans*, which is distributed to the south, and is half the rate of syntopic *N. duplocantans*. PTdc of $75.1 \pm 8.7\%$ is significantly higher than all other Sequoia Group species (ANCOVA, $P = 3.75 \times 10^{-4}$). PTF is 14.3 ± 1.0 kHz.

Karyotype. (n = 4) Unique. $2n\♂ = 22$ (2m + 18t + XtYt). T06-12, S06-80, paratopotype.

Recognition. This is a plastic species that is difficult to recognize. A higher stridulatory file tooth density (55–59 teeth/mm) as well as larger body size will separate this species from the lower density (47–52 teeth/mm) of both *N. prorocantans* distributed to the south and *N. duplocantans*, with which it is sympatric. To the north, *N. inversa* has a greater stridulatory file tooth density (64–68 teeth/mm). The song PTR is faster than that of *N. prorocantans* but half that of *N. duplocantans*, whereas *N. inversa* sings with numerous OPT between MPT as in Sierranus Group taxa. The karyotype is unique. *N. sequoia* inhabits an area between the Kaweah River and Tule River watersheds, a range that it shares only with *N. duplocantans*.

Etymology. Named after Sequoia National Park and Sequoia National Forest of the southern Sierra Nevada of California.

Notes. This species is common at all localities where collected. Taxidermy of South Fork specimens showed the gut contents to be full of *Cercocarpus*. Collections were also made at oatmeal trails.

Material examined. DETERMINED (n = 2): **Tulare Co.**, in addition to type material (above), 1♀, Ash Mountain, Kaweah Power Station 3, 36.48606N, 118.83586W, 27-VII-1996, DJ Burdick, CAS; 1♀ nymph, Ash Mountain, Kaweah Power Station 3, 36.48606N, 118.83586W, 3-VI-1984, DJ Burdick, CAS. QUESTIONABLE PLACEMENT (n = 8): **Tulare Co.**, 2♀ nymphs, Sequoia National Park, Potwisha Campground, 36.517446N, 118.799821W, 13-VI-1923, EC VanDyke, CAS; 3♀ nymphs, same data except 13-VI-1929, EC VanDyke, CAS; 1♀ nymph, same data except 27-V-1928, EC VanDyke, CAS; 1♂, 1♀ nymphs, same data except 8-V-1931, EC VanDyke, CAS.

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

Fig. 19 (distribution), Fig. 30 (male and female habitus, calling song, male and female terminalia, karyotype), Plate 3H (live habitus), Plate 5J (male calling song), Plate 12H (female subgenital plate).

Common name. Doubletime Shieldback.

History of recognition. None.

Type material. HOLOTYPE MALE: **USA, CA, Tulare Co.**, South Fork Road, 9.75 miles southeast of Three Rivers, 36.35334N, 118.78451W, elev. 970 m, 25-VI-2017, JA Cole, W Chatfield-Taylor, 170625_03 [recording], JCT17-1 [karyotype], 173 [teeth], 3.4 [mm], tegmen in gelcap below specimen, deposited in CAS, Entomology type #19709.

PARATYPES (n = 24): **Fresno Co.**, 1♀, Big Creek Road, 5 mi. S of Bretz Mill Campground, 36.97546N, 119.21088W, 810 m, 13-VIII-2015, JA Cole, LACM; **Tulare Co.**, 3♂, 8♀, same data as holotype, LACM; 2♂, same data as holotype, CAS; 1♀, same data as holotype, JAC; 1♂, 1♀, South Fork Campground, Sequoia National Park, 36.35209N, 118.76511W, 1112 m, 12-13-VIII-2015, JA Cole, CAS; 1♂, 6♀, same data except LACM.

Measurements. (mm, ♂n = 7, ♀n = 17) Hind femur ♂19.46–21.95, ♀21.44–22.69, pronotum total length ♂8.20–9.28, ♀8.10–8.95, prozona length ♂3.30–4.71, ♀3.48–5.28, metazona dorsal length ♂4.42–5.44, ♀3.09–4.75, pronotum constriction width ♂2.00–2.35, ♀2.03–2.95, metazona dorsal width ♂5.60–6.05, ♀5.20–6.41, head width ♂4.60–5.12, ♀4.85–5.85, ovipositor length ♀13.09–17.60.

Distribution. At present, known only from the vicinity of the Kaweah River in the Sequoia National Forest.

Habitat. Found in tangles and among grass along a stream flowing out of a side canyon. Also collected on bushes along the road paralleling the Kaweah River.

Seasonal occurrence. Males were active and females were a mixture of last instar nymphs, teneral adults, and mature adults in late June (25-VI-2017, JA Cole & W Chatfield-Taylor, LACM). By August this species was rare (12-VIII-2015, JA Cole, LACM). This species may be active earlier in the season than sympatric *N. sequoia*.