

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

m, 8-VII-2016, DI Weissman, CAS; 1♀ nymph, same data as holotype except 10-VII-1935, FE Blaisdell, CAS; 1♀ nymph, same data as holotype except 20-VII-1936, FE Blaisdell, CAS; 1♀, same data as holotype except 3-VIII-1989, BI Weissman, CAS; 2♂, 2♀, same data as holotype except 9-VII-1988, DB Weissman, CAS; 1♂ nymph, same data as holotype except VII-1915, LS Rosenbaum, CAS; 1♀ nymph, same data as holotype except VII-1931, OH Swezey, CAS; 6♂, 1♀, Loon Lake, 38.997163N, 120.3095W, 1950 m, VIII-1991, BI Weissman, CAS; **Placer Co.**, 1♂, Finning Mill Rd. at Forest Hill Rd., 39.0586N, 120.7696W, 1097 m, 20-VII-2012, JA Cole, JAC; 1♂, Squaw Valley, foot trail by Squaw Creek, 39.21169N, 120.198611W, 1920 m, 1-VIII-1988, VF Lee, CAS.

Measurements. (mm, ♂n = 20, ♀n = 4) Hind femur ♂18.00–20.91, ♀19.05–22.36, pronotum total length ♂8.70–10.16, ♀7.35–8.46, prozona length ♂3.38–4.36, ♀3.80–4.62, metazona dorsal length ♂4.82–6.47, ♀3.32–4.66, pronotum constriction width ♂2.10–2.65, ♀2.55–2.87, metazona dorsal width ♂6.35–7.55, ♀5.28–5.62, head width ♂4.20–4.75, ♀4.50–5.22, ovipositor length ♀12.78–15.54.

Distribution. High elevations in the central and northern Sierra Nevada of California.

Habitat. Mixed conifer woodland. Taken from understory tangles and leaf litter in coniferous forest, under logs, in a small shrub in an open field, and from riverbanks. One male paratype sang from 2.4 m above ground in thicket of branches. He dropped to the ground when approached (JAC pers. obs.).

Seasonal occurrence. Midsummer through fall, from July (1-VII-1950, HL McKenzie, CSCA) through November (17-XI-1967, HR Ingham, CSCA). Nymphs occur from early June through August, thus overlapping broadly with adult activity.

Stridulatory file. (n = 6) length 3.3–3.9 mm, 115–135 teeth, tooth density 35.4 ± 3.4 (30.8–40.9) teeth/mm.

Song. (n = 19) PTR is significantly faster than all other Convexa Clade lineages (ANCOVA, $P = 1.08 \times 10^{-5}$), owing to significantly shorter MPTL of 202.5 ± 53.6 ms (ANCOVA, $P = 4.27 \times 10^{-11}$). MPT often have a characteristic amplitude modulation pattern, with a gradual increase in amplitude followed by an abrupt increase at the middle of the PT (Plate 4F). Males may sing in the late afternoon as well as at night.

Karyotype. (n = 7) $2n♂ = 26$ (2m + 22t + XtYt), T88-8, S88-60, paratype.

Recognition. The male ventral sclerite has straight, thick shaft, the apex rounded with the highest point lateral to the central axis, and the short lateral process directed 45° anterior to plane of shaft. This genital morphology may only be confused with *N. diabolica* and some *N. carinata*, both of which have higher stridulatory file tooth densities and lispings songs and are distributed in the South Coast Ranges. The female subgenital plate is distinct from all other Carinata Group species: wider than long with a strongly bifurcate apex. The song PTR is faster and MPTL shorter than all other Convexa Clade taxa. This species is the only *Neduba* found in high elevation yellow pine forest in the central and northern Sierra Nevada Mountains of California.

Etymology. *l. radicata* having roots, having found a home.

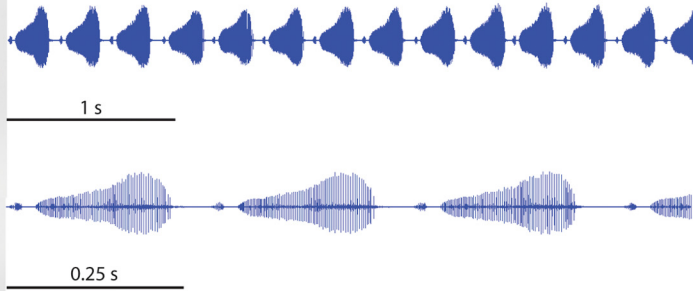
Notes. At China Flat Campground, El Dorado County, California, two males were observed emerging from leaf litter to sing in understory tangles. Acoustical activity commenced before dusk at this locality during overcast conditions after a rainstorm. At the southern extent of the range along Finning Mill Road, males were singing before sunset at 2019 h. This species is sympatric with *N. radocantans* (Sierranus Group) in El Dorado County, California.

Specimens examined. (n = 21) **All USA, CA, El Dorado Co.**, in addition to type material (above), 1♂, Kelsey, 38.798791N, 120.820768W, 24-VII-1939, J Labadie, CSCA; 1♀, Pollock Pines, 38.761292N, 120.586594W, 1207 m, 1-VII-1950, HL McKenzie, CSCA; 1♀ nymph, Snowline Camp, 38.746292N, 120.624373W, 21-VI-1948, CD MacNeill, CAS; 1♂, Strawberry, 38.796852N, 120.145187W, 1768 m, 1-X-1954, ME Gardner, BMED; 1♀, same data except WJ Wall, BMED; 1♀ nymph, same data except 28-VII-1950, ME Gardner, BMED; 1♀ nymph, same data except 3-VIII-1952, WJ Wall, BMED; 1♂ nymph, Strawberry Valley, 38.796582N, 120.145187W, 12-VIII-1912, EC VanDyke, CAS; 1♂ nymph, same data except 5-VIII-1912, EC VanDyke, CAS; 1♂, US50 3.7 mi. W Kyburz, 38.76427N, 120.35897W, 1112 m, 19-VII-2015, JA Cole, DB Weissman, JAC sound record; **Nevada Co.**, 1♂, junction SR20&I-80, 4-X-1972, AM Shapiro, BMED; **Placer Co.**, Cisco, 39.301569N, 120.546874W, VI-1910, C VanGeldern, CAS; 3♂, Emigrant Gap, 39.300456N, 120.668268W, 1567 m, 17-XI-1967, HR Ingham, CSCA; 1♀, Michigan Bluff, 39.042956N, 120.741319W, 1073 m, 11-V-1962, G Buxton, CSCA; **Sierra Co.**, 1♂, 10 mi. S Downieville, 39.41439N, 120.826891W, 28-VII-1962, WJ Turner, CSCA; 1♂, Goodyears Creek, 39.540911N, 120.88824W, 10-VII-1925, EB Nast, CAS; 1♂, St. Charles Hill, 39.56795N, 120.911061W, 7-VII-1925, EB Nast, CAS; **Yuba Co.**, 1♂ nymph, Challenge, 39.487389N, 121.223572W, 1-VII-1963, J Vercamp, CAS; 1♂, same data except 20-VIII-1964, R Whitely, CAS; 1♀, same data except VIII-1963, E Ball Jr, CAS.

male HOLOTYPE CA: El Dorado Co.
S88-60 R88-75A



calling song PARATYPE CA: El Dorado Co. 24.1°C JCR120808_03



female PARATYPE CA: El Dorado Co. S91-96



male terminalia PARATYPE CA: El Dorado Co. JAC000002285



ventral sclerite
HOLOTYPE



female terminalia PARATYPE JAC000002299



male PARATOPOTYPE CA: El Dorado Co.
S88-60 R88-75B



karyotype PARATYPE CA: El Dorado Co. S88-60 T88-8

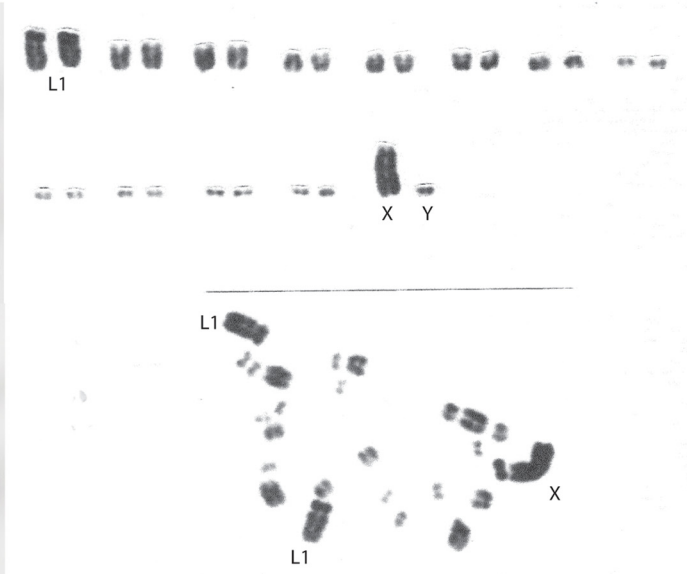


FIGURE 15. *N. radicata* male and female habitus, calling song, male and female terminalia, karyotype.