

habitats such as pinyon-juniper and Joshua tree woodlands, where trees and bushes are widely spaced, compared with the dense forest understories inhabited by other *Neduba* species Groups. Drumming was observed during courtship in the field at the Largo Vista Road locality (see Type material above), during which a male alternated drumming and stridulating. The signaling did not result in copulation in this observed instance (JAC pers. obs.).

Material examined. (n = 26) **All USA, CA, Kern Co.,** 3♀, McGill Campground, Los Padres National Forest, 34.82539N, 119.09791W, 12-IX-2015, DA Gray, LACM; 11♂, 1♀, McGill Campground, Los Padres National Forest, 34.81505N, 119.10014W, 2271 m, 8-9-VIII-2017, JA Cole, LACM; 1♂, 1♀, same data except JAC; **Los Angeles Co.,** in addition to type material (above), 5♂, Sierra Highway, 0.6 miles west of Crown Valley Road, Acton, 34.4936N, 118.1834W, 929 m, 17-VI-2003, JA Cole, JN Hogue, LACM; 1♂, same data except 18-19-VI-2008, JA Cole, JAC sound record; 1♂, Spunky Canyon, 2 mi. SW of Green Valley, 34.6023N, 118.3863W, 1047 m, 16-VI-2012, JA Cole, LACM; 2♂, same data except 26-VII-2001, JA Cole, LACM.

Neduba macneilli Rentz & Birchim, 1968

Fig. 19 (distribution), Fig. 22 (male and female habitus, calling song, male and female terminalia, karyotype), Plate 2D (live habitus), Plate 5B (male calling song), Plate 7J–K (male ventral sclerites), Plate 10C (male titillators), Plate 11L (female subgenital plate).

Common name. MacNeill's Shieldback.

History of recognition. *N. macneilli* was described from the eastern Sierra Nevada mountains of California by Rentz & Birchim (1968). The type locality is 1 mile west of Tom's Place, Mono County, California. Tinkham (1944) referred to this species under the name *carinata*.

Type material. The male holotype is housed at ANSP. Images of the holotype are available at OSFO (Cigliano *et al.* 2020). **PARATYPES** (n = 2): **USA, CA, Mono Co.,** 2♂, Rock Creek, 1 mi. W Tom's Place, 37.5586N, 118.7025W, 2143 m, 10-IX-1966, DC & KA Rentz, CAS;

TOPOTYPES (n = 16): 4♂, 1♀, Tom's Place, 37.5586N, 118.7025W, 2143 m, 28-VIII-1986, DB & BI Weissman, DCF Rentz, CAS; 8♂, 1♀, Tom's Place, 1 mi. W, 37.5586N, 118.7025W, 2143 m, 15-16-VII-2012, JA Cole, LACM; 2♂, same data except JAC.

Measurements. (mm, ♂n = 19, ♀n = 4) Hind femur ♂16.35–21.50, ♀22.55–28.10, pronotum total length ♂9.89–11.85, ♀10.15–12.13, prozona length ♂4.59–6.30, ♀4.61–6.68, metazona dorsal length ♂4.90–6.20, ♀4.78–5.54, pronotum constriction width ♂2.58–3.85, ♀3.15–3.42, metazona dorsal width ♂6.65–7.81, ♀6.96–7.55, head width ♂4.13–5.83, ♀5.93–6.25, ovipositor length ♀17.14–19.35.

Distribution. Eastern slope of the Sierra Nevada Mountains of California.

Habitat. Yellow pine forest and pinyon-juniper woodlands. Specimens were taken from *Purshia tridentata* Pursh (DC) and *Pinus monophylla*.

Seasonal occurrence. Adult specimens have been taken from mid-July (10-VII-2003, JA Cole & JF Eguizabal, LACM) through October (22-X-1939, ER Tinkham, CAS).

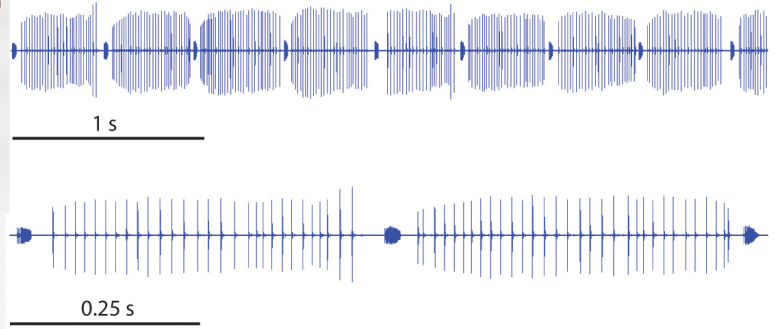
Stridulatory file. (n = 19) length 3.4–4.4 mm, 71–99 teeth, tooth density 23.1 ± 1.8 (19.8–26.4) teeth/mm.

Song. (n = 43) The song of this species was published in Morris *et al.* (1975). The calling song of *N. macneilli* is not distinguishable from that of *N. castanea* (see discussion under the former species). In addition to calling song, 2 of 5 recorded males of *N. macneilli* (identified as *N. castanea* in Weissman (2001)) from 1.3 m E Walker Pass, Kern Co. (S88-68), produced an audible drumming by visibly tapping the substrate in the laboratory simultaneously with both hind legs. Of many males recorded from various populations, these were the only males of *N. macneilli* ever heard drumming. A courting topotypic male produced short PT accompanied by obvious body movements (tremulations) that could have caused substrate vibration. This male was displaying to a female nymph (JAC, pers. obs., 15-VII-2012).

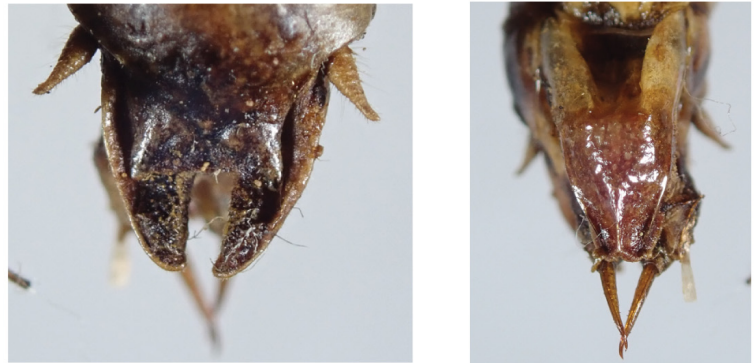
Karyotype. (n = 14) $2n♂ = 22$ (4m + 16t + XmYt), identical to that of *N. castanea*, and corrects the result of Ueshima and Rentz (1979). T86-83, S86-98, topotype.

Recognition. Males are indistinguishable from *N. castanea*. The female subgenital plate is subtriangular, in contrast to the rounded plate of *N. castanea*. This species inhabits the southeastern Sierra Nevada, whereas *N. castanea* inhabits the Transverse Ranges.

male TOPOTYPE CA: Mono Co. JAC000002237 calling song CA: Mono Co. 23.3°C JCR160924_02



male termina TOPOTYPE CA: Mono Co. JAC000002243



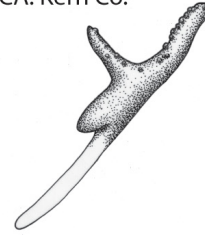
female CA: Kern Co. JAC000002231



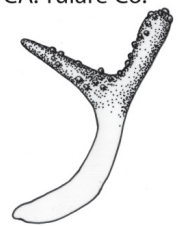
TOPOTYPE
S86-98, R86-216



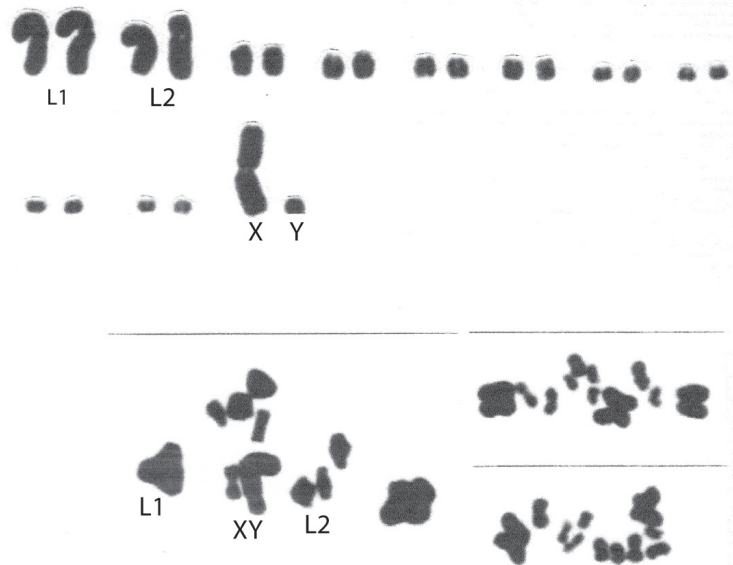
ventral sclerites
CA: Kern Co.



CA: Tulare Co.



karyotype TOPOTYPE CA: Mono Co. S86-98 T86-83



female terminalia CA: Kern Co.
JAC000002231



FIGURE 22. *N. macneilli* male and female habitus, calling song, male and female terminalia, karyotype.

Notes. Color pattern features that were used to separate *N. macneilli* and *N. castanea* (Rentz & Birchim 1968) are variable and are correlated with habitat rather than with lineage. The darker, mottled coloration of *N. macneilli* matches the background in higher elevation pinyon-juniper woodlands, while the lighter coloration typical of *N. castanea* is more cryptic in Joshua tree woodlands of the lower, arid foothill slopes. Both *N. castanea* and *N. macneilli* may have greenish or bluish abdominal pleura when alive (Plate 2C), colors that are invariably lost in museum specimens even if gutted and stuffed. Only freeze-drying retains such colors.

Material examined. (n = 110). **All USA, CA, Inyo Co.**, 1♂, 4 Jeffrey Campground, Inyo National Forest, 37.24759N, 118.56942W, 2479 m, 10-11-IX-2016, JA Cole, J Bailey, JAC sound record; 1♂, 8.1 mi. W of Big Pine on road to Sage Flat Camp, 37.164839N, 118.43694W, 2195 m, 28-VIII-1986, DB & BI Weissman, DCF Rentz, CAS; 11♂, 1♀, Big Pine Canyon, 37.164931N, 118.289546W, 16-VIII-1938, ER Tinkham, CAS; 1♂, same data except J Davis, CAS; 2♂, same data except 22-VIII-1948, ER Tinkham, CAS; 9♂, same data except 24-X-1939, ER Tinkham, CAS; 5♂, Glacier Lodge Rd. SR168, 1.38 mi. NE of Aspendell, 37.25047N, 118.58169W, 2497 m, 10-IX-2016, JA Cole, J Bailey, LACM; 1♀, Glacier Lodge, 11 mi. W of Big Pine, 37.164762N, 118.48971W, 4-VIII-1931, ER Tinkham, CAS; 5♂, 5♀, Lone Pine Canyon, 36.606044N, 118.062865W, 3-VIII-1931, ER Tinkham, CAS; 2♂, Lone Pine, 9 mi. W, 36.605934N, 118.225457W, 7-VIII-1961, JS Buckett, BMED; 2♂, Mouth Big Pine Canyon, 37.164931N, 118.289546W, 22-X-1939, ER Tinkham, CAS; 1♂, Sage Flat Camp, 8 mi. W of Big Pine, 37.082856N, 118.392482W, 2243 m, 19-VIII-1982, DB Weissman, CAS; 1♂, Sage Flat, 6 mi. SW of Big Pine on Glacier Lodge Rd., 37.1279N, 118.4037W, 2204 m, 13-VII-2003, JA Cole, JF Eguizabal, LACM; 1♂, same data except JAC; 1♂, same data except 4-VIII-2004, JA Cole, LACM; 1♀, Saline Valley, Grapevine Canyon Road Station 3, 36.58917N, 117.58472W, 1958 m, 18-VIII-1959, B. Banta, CAS; **Kern Co.**, 6♂, 2♀, 1.3 mi. E of Walker Pass on SR178, 35.66245N, 118.003532W, 1460 m, 5-VIII-1988, DB Weissman & DC Lightfoot, CAS; 1♂, 1♀, Freeman Canyon, 1.5 miles southeast of Walker Pass on SR178, 35.6509N, 118.0055W, 1470 m, 10-VII-2003, JA Cole, JF Eguizabal, LACM; 2♂, 2♀, same data except 14-VII-2005, JA Cole, LACM; 4♂, SR178, 4.1 mi. W of Walker Pass, 35.662431N, 118.099936W, 1280 m, 5-VIII-1988, DB Weissman & DC Lightfoot, CAS; 2♂, 1♀, Walker Pass, 35.662453N, 118.02674W, 1600 m, 18-VIII-1982, DB Weissman, CAS; 1♂, Walker Pass, 35.67669N, 118.04383W, 1416 m, 21-22-VII-2015, JA Cole, DB Weissman, JAC sound record; 1♂, Walker Pass, 35.662453N, 118.02674W, 1537 m, 21-IX-1967, RE Love, CAS; 4♂, 4♀, Walker Pass, 35.662453N, 118.02674W, 1537 m, 22-VIII-1938, ER Tinkham, CAS; 2♂, same data except 29-IX-1960, JR Helfer, CAS; 3♂, Walker Pass, 35.662453N, 118.02674W, 1524 m, 7-IX-1966, DC & KA Rentz, CAS; 1♂, Walker Pass Campground, BLM, 15 mi. E of Onyx off SR178, 35.689934N, 117.952753W, 1537 m, 13-14-VII-2012, JA Cole, JAC sound record; 2♂, Walker Pass Recreation Area, BLM, 15 miles east of Onyx off SR178, 35.6646N, 118.037W, 1537 m, 13-14-VII-2005, JA Cole, LACM; 1♂, same data except 23-24-VI-2008, JA Cole, JAC sound record; **Mono Co.**, in addition to type material (above), 2♂, 13 mi. N of Lee Vining, 38.145913N, 119.121816W, 2164 m, 24-VIII-1957, ER Tinkham, CAS; 1♂, French Camp, Inyo National Forest, 0.25 mi. S of Tom's Place on Rock Creek Rd., 37.5505N, 118.6836W, 2249 m, 16-VII-2012, JA Cole, LACM; 11♂, Mono Lake, 38.007604N, 119.014763W, 1958 m, 11-VIII-1938, ER Tinkham, CAS; 7♂, Mouth of Tioga Pass, nr. Mono Lake, 38.007604N, 119.014763W, 1-VIII-1931, ER Tinkham, CAS; **Tulare Co.**, 2♂, Kennedy Meadow, 26 miles northwest of Pearsonville via Nine Mile Canyon Road and Kennedy Meadows Road, 36.0518N, 118.1288W, 1883 m, 11-13-VII-2003, JA Cole, JF Eguizabal, LACM.

Lucubrata Group

The Lucubrata Group contains one early branching species (Figs. 3–5) that inhabits the South Coast Ranges of California (Figs. 8, 19). This group is defined by having one spine on the posterior margin of the fore femora, a pair of well-developed prosternal spines, and in having the apices of the tegmina darkened. This suite of characters is shared only with the Propsti Group. The lateral carinae of the male subgenital plate taper regularly to a narrow apex and styli are rudimentary. Male subgenital plates of the Carinata, Propsti, and Castanea Groups have subparallel lateral carinae and well-developed articulate styli. The song of the Lucubrata Group is delivered in bouts (Plate 5C), as opposed to the continuous PT of the Propsti Group (Plate 4J). The karyotype is unique.