

FIGURE 15. Distribution of Morsei Group species.

***Aglaothorax costalis* (Rentz & Weissman, 1981) stat. rev.**

Neduba (Aglaothorax) morsei costalis—Rentz & Weissman, 1981: 99.

Aglaothorax costalis **stat. rev.** (Revised to species level).

Neduba (Aglaothorax) morsei curtatus—Rentz & Weissman, 1981: 100 **New junior subjective synonym.**

Neduba (Aglaothorax) morsei tectinota—Rentz & Weissman, 1981: 104 **New junior subjective synonym.**

Fig. 15 (distribution), Figs. 17–18 (male and female habitus, calling song, male and female terminalia, karyotype), Plate 5 (male terminalia), Plate 8 (female subgenital plate), Plate 11 (male titillators), Plate 14 (male calling song).

Common name. Coastal Shieldback

History of recognition. Described as a subspecies of *Neduba (Aglaothorax) morsei* (Rentz & Weissman 1981). All *morsei* subspecies were returned to *Aglaothorax* (Rentz & Colless 1990) where this species remains classified (Cigliano *et al.* 2025). We elevate this taxon to species rank based on morphological and bioacoustical evidence. Furthermore, we synonymize the two other Santa Monica Mountains subspecies: *A. m. curtatus* and *A. m. tectinota*, under *A. costalis*. With large series now available, the morphological and bioacoustical characters used to separate these subspecies vary more within populations than between taxa. *A. m. curtatus* was named for a short echeme consisting of few pulse trains, but the number of pulse trains per echeme is variable and *A. costalis* songs show clinal song variation from east to west across the Santa Monica Mountains (Cole 2010).

Type material. The holotype male in CAS is from Point Mugu State Park, Ventura County, California (Rentz & Weissman 1981). Images of the type are available at OSFO (Cigliano *et al.* 2025). PARATYPES EXAMINED: (n=17) *costalis* **USA, CA, Ventura Co.**, Point Mugu State Park, 34.100007, -119.017600 4 m, 13-VIII-1973, DB Weissman, CAS, 2♂, 2♀; same data except 20-VIII-1974, d B Weissman, CAS, 1♂; same data except 21-VIII-1974, d B Weissman, CAS, 1♂, 1♀; *tectinota* **USA, CA, Los Angeles Co.**, Point Dume, corner Birdview and Cliffside Dr., 34.000278, -118.806667, 60 m, 13-VIII-1973, d B Weissman, CAS, 1♂, 1♀; same data except 18-VIII-1974, d B

Weissman, CAS, 6♂, 1♀; *curtatus* USA, CA, Los Angeles Co., SR23S & Mulholland Hwy., 34.0873, -118.8742, 548 m, 13-VII-1972, d B Weissman, CAS, 1♂; TOPOTy PES EXAMINED : (n=128) *costalis* USA, CA, Ventura Co., Point Mugu State Park, 34.100007, -119.017600 4 m, 21-VIII-1974, d B Weissman, CAS, 1♂; Point Mugu State Park, Sycamore Canyon, 34.0728, -119.0145, 4 m, 11-VI-2007, JA Cole, JF Eguizabal, LACM, 1♂; same data except JAC, 1♂; same data except 14-15-VI-2007, JA Cole, JF Eguizabal, LACM 1♀; same data except LACM, 10♂, 1♀; same data except 16-17-VI-2008, JA Cole, LACM, 5♀; same data except JAC, 3♀; same data except 19-VI-2007, JA Cole, JF Eguizabal, LACM, 8♀; same data except 2-3-VI-2008, JA Cole, LACM, 4♀; same data except 28-V-2007, JA Cole, LACM, 1♂; same data except JAC, 1♂; same data except 4-VI-2007, JA Cole, JN Hogue, LACM, 1♂, 3♀; same data except 5-6-VI-2006, JA Cole, LACM, 1♀; same data except 6-7-VII-2006, JA Cole, AMNH, 1♂; same data except 6-VII-2006, JA Cole, LACM, 3♂; same data except 9-10-VI-2008, JA Cole, LACM, 4♀; same data except JAC, 2♂; same data except 9-VI-2005, JA Cole, LACM, 2♂; same data except 9-VI-2005, JA Cole, JA Eguizabal, LACM, 1♂; Point Mugu State Park, visitor parking lot, 34.083332, -119.050003, 4 m, 5-VII-1982, d B Weissman, CAS, 2♂; *curtatus* USA, CA, Los Angeles Co., jct. SR23S & Mulholland Highway, 34.0873, -118.8742, 464 m, 1-VII-2008, JA Cole, LACM, 7♂; same data except, 17-VI-2008, JA Cole, LACM, 2♂, 2♀; same data except JAC, 2♂, 2♀; same data except 14-VIII-1982, d B Weissman, CAS, 1♀; *tectinota* USA, CA, Los Angeles Co., Point Dume Headlands State Park, Birdview and Cliffside Drive, 34.0046, -118.8055, 44 m, 1-VI-2006, JA Cole, JF Eguizabal, LACM, 2♂; same data except 1-VII-2008, JA Cole, LACM, 1♀; same data except JAC, 1♀; same data except 10-22-VI-2005, JA Cole, JF Eguizabal, LACM, 1♂; same data except 10-VI-2005, JA Cole, JF Eguizabal, LACM, 5♂, 1♀; same data except JAC, 1♂; same data except 12-13-X-2006, JA Cole, LACM, 10♂; same data except 12-VI-2006, JA Cole, JAC, 1 pair in copula; same data except 12-VI-2006, JA Cole, JF Eguizabal, LACM, 5♀; same data except 16-VI-2006, JA Cole, GL Miller, LACM, 5♀; same data except 22-VI-2005, JA Cole, LACM, 2♂; same data except 22-VI-2005, JA Cole, JF Eguizabal, LACM, 1♂; same data except JAC, 1♂; same data except 26-V-2008, JA Cole, SC d eVaney, LACM, ♀; same data except JA Cole, JF Eguizabal, AMNH, 1♂; same data except LACM, 11♂, 2♀; same data except JAC, 1♂, 1♀; same data except 6-VI-2006, JA Cole, JAC, 1♀; same data except 6-VI-2006, JA Cole, JF Eguizabal, LACM, 1♀; same data except 1-VI-2006, JA Cole, JF Eguizabal, LACM, 1♂; Point d ume, area E of intersection Cliffside and Birdview d rives, 34.000278, -118.806667, 60 m, 5-VII-1982, d B Weissman, CAS, 2♂.

Measurements. (mm, ♂n=14, ♀n=14) Hind femur ♂12.91–15.66, ♀14.60–17.04, pronotum total length ♂7.80–9.52, ♀6.55–8.20, prozona length ♂2.90–5.23, ♀3.54–5.05, metazona dorsal length ♂4.15–5.07, ♀2.60–4.05, pronotum constriction width ♂2.45–3.25, ♀2.54–3.31, metazona dorsal width ♂5.70–7.15, ♀5.35–6.37, head width ♂3.35–4.12, ♀3.88–4.34, ovipositor length ♀10.60–12.89.

Distribution. Santa Monica Mountains of Southern California west of Malibu Creek.

Habitat. Coastal sage scrub, inland chaparral, and riparian habitats. Taken from Monkeyflower, Laurel Sumac (*Malosma laurina*), and Elderberry (*Sambucus* spp.). Nymphs commonly fed on Elderberry flowers and leaves at night.

Seasonal occurrence. Adult activity from late spring (2-VI-2005, JA Cole, LACM) through fall (15-X-2006, JA Cole, LACM). Nymphs from spring (28-V-2007, JA Cole, LACM) through early summer (19-VI-2007, JA Cole, LACM).

Stridulatory file. (n=15) length 2.50–3.70 mm, 78–117 teeth, tooth density 29.3±3.0 (24.6–34.8) teeth/mm.

Song. (n=170) The *A. costalis* song is a high frequency “shuffling” sound caused by echemes (“chirps”) that consist of pulse trains that are produced too rapidly to count by ear. Pulse trains of 60±30 ms repeat at a rapid rate of 14.77±1.66 s⁻¹. Mean peak frequency is 17.50±3.67 kHz with significant sound energy in the ultrasonic, where peak frequencies as high as 29.40 kHz were detected with ultrasonic equipment. Echemes are rather consistent in length within a population and contain 10±4 pulse trains (range 3–23) that are repeated at a variable rate of 1–23 (mean 13±4) min⁻¹. Echeme length decreases and pulse train rate increases across a cline from west to east (Cole 2010). Males engage in synchronous choruses.

Karyotype. (n=3) 2n♂=24 (22t+Xty t), topotype T82-21 (S82-33).

Recognition. Morphology, geography, song. The male supra-anal plate is rounded, tongue-like, and dorsally concave, unlike the plates of the Diminutiva Group that have an indentation on the apical margin. The male paraproct has a subapical internal tooth as opposed to the apical tooth of Diminutiva Group species including syntopic *A. dactyla*. The paraproct processes are knob-like, about as long as wide unlike all other Morsei Group species except for *A. morsei*, which have a flat supra-anal plate. The male titillator arms are short and curved, in contrast to the long, distinctly bowed arms of most Diminutiva Group species. Among Morsei Group species with short titillator arms, the lack of a basal notch or constriction eliminates *A. morsei* from consideration, and distinct curvature eliminates *A. hulodomus* and *A. nesiazio*, both of which have nearly straight titillator arms. The female subgenital plate has a

straight apical margin without any projection or tooth as in other Morsei Group species. The short triangular lateral processes of the female subgenital plate are about as long as wide, never long and digitiform as in sympatric *A. dactyla* or other members of the Diminutiva Group. Echemes of *A. costalis* are long with rapidly produced syllables that cannot be counted by a human listener. Echemes of *A. longipennis* distributed to the east are short with the syllables produced more slowly, often slow enough to count at cool ambient temperatures. *A. amathitis* have long echemes of many syllables but produce echemes slow enough to count at ambient temperature.

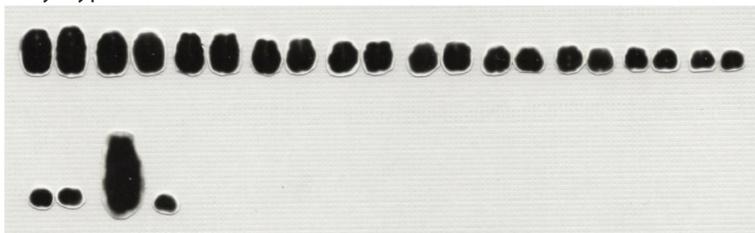
male PARATYPE USA. CA:Ventura Co.



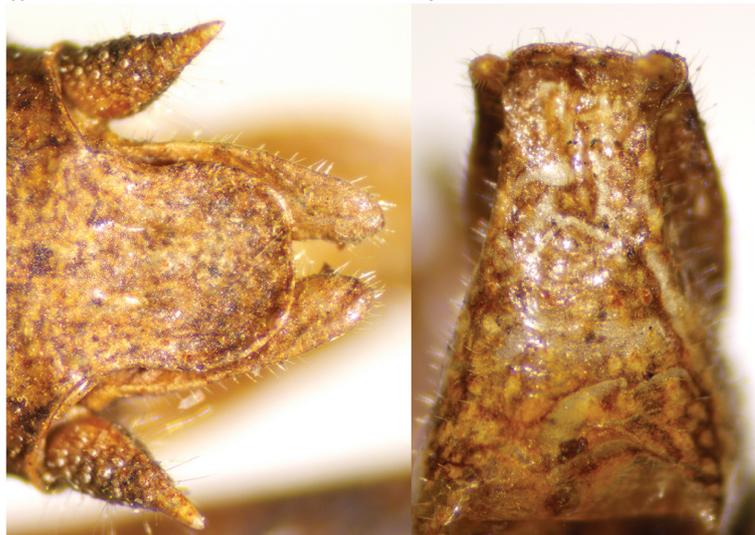
calling song TOPOTYPE USA. CA:Ventura Co. 24.9°C JCR05MU04-1



karyotype TOPOTYPE USA. CA:Ventura Co. S82-33 T82-21



male PARATOPOTYPE USA. CA:Ventura Co.
R V



female PARATYPE USA. CA:Ventura Co.



titillator PARATOPOTYPE
USA. CA:Ventura Co.



female subgenital plate
PARATOPOTYPE

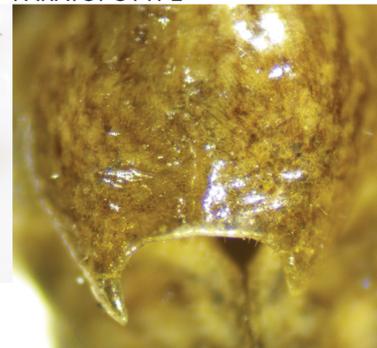


FIGURE 17. *A. costalis* male and female habitus, calling song, male and female terminalia, and karyotype. Idiogram shows karyotype $2n\♂=24$.

male *curtatus* TOPOTYPE
USA. CA: Los Angeles Co. JAC000002869



female *curtatus* USA. CA: Los Angeles Co.
JAC000002892



male *tectinota* PARATOPOTYPE
USA. CA: Los Angeles Co.



female *tectinota* PARATOPOTYPE
USA. CA: Los Angeles Co.



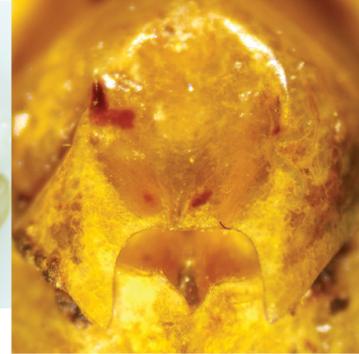
male *curtatus* USA. CA: Los Angeles Co. JAC000002872
R V



titillators *curtatus* USA. CA: Los Angeles Co. JAC000002912



female subgenital plate *curtatus* USA. CA: Los Angeles Co. JAC000002908



male *tectinota* PARATOPOTYPE USA. CA: Los Angeles Co.
R V



titillators *tectinota* TOPOTYPE JAC000002836



female subgenital plate *tectinota* USA. CA: Los Angeles Co. JAC000002845



FIGURE 18. Variation in *A. costalis* including previously recognized subspecies synonymized in this work.

Notes. *A. costalis* is a common species across the western Santa Monica Mountains. Sympatry with *A. dactyla* furnishes a case of evolution in action, as the two species show partial partitioning by song, habitat, and phenology. Of the two species *A. costalis* occurs in more mesic habitats than does *A. dactyla*. *A. costalis* has a later activity period in midsummer into early winter, while *A. dactyla* adult activity peaks in spring. During wet years populations of both species are syntopic to a greater degree while on drier years, *A. costalis* is limited to riparian areas and other mesic habitats while *A. dactyla* is found on the drier upland slopes. The fast *A. costalis* pulse train rate represents a song extreme for the genus that is located at the contact zone with *A. dactyla* at west end of the Santa Monica Mountains. The pulse train rate decreases to the east away from the contact zone along a cline (Cole 2010). Evolution of this extreme rate was driven by reinforcement due to a history of hybridization with sympatric *A. dactyla* (Cole 2016). Our phylogenetic hypotheses again found significant introgression of *A. dactyla* mtDNA (Fig. 3) into the *A. costalis* lineage that is consistent with hybridization. Both nDNA (Fig. 2) and mtDNA (Fig. 3) recovered this species as monophyletic from the closely related *A. amathitis* and *A. longipennis*.

At Point Dume State Park, Los Angeles County, California, 13 males were mapped along a 122 m transect. Males were clustered into three choruses with 4–5 males each that were separated by 17.8–20.4 m. Within choruses, males were separated by 1.2–14.9 m.

Material examined. (n=53) **All USA, CA, Los Angeles Co.,** Backbone Trail near Tapia Park, 5 miles north of SR1 on Malibu Canyon Road, 34.0799, -118.7037, 156 m, 11-X-2002, JA Cole, LACM, 2♂; same data except JAC, 1♂; same data except 11-XI-2001, JA Cole, LACM, 1♀; same data except 28-VII-2004, JA Cole, LACM, 2♂, 1♀; same data except 29-XII-2006, JA Cole, LACM, 2♂; Charmlee Wilderness Park, 3.8 miles north of SR1 on Encinal Canyon Road, 34.0608, -118.8771, 427 m, 2-VI-2005, JA Cole, LACM, 1♂; same data except 2,7-9-VI-2005, JA Cole, JF Eguizabal, LACM, 4♂; same data except 29-30-V-2,7-VI-2005, JA Cole, JF Eguizabal, LACM, 1♀; same data except 29-30-VI-2006, JA Cole, JF Eguizabal, LACM, 6♂, 3♀; JAC, 1♀; same data except 7-VI-2005, JA Cole, JF Eguizabal, AMNH, 1♀; same data except LACM, 2♂; Leo Carrillo State Park, Nicholas Flat, at end of Decker School Rd., 34.0638, -118.9128, 457 m, 11-X-2002, JA Cole, JAC, 1♂; same data except 13-XII-2005, JA Cole, LACM, 3♂, 1♀; same data except 18-VI-2007, JA Cole, LACM, 1♀; same data except 21-VII-2004, JA Cole, LACM, 2♂; same data except 30-V-2007, JA Cole, LACM, 4♂, 5♀; same data except 31-V-1997, JA Cole, LACM, 1♀; same data except 5-VI-2007, JA Cole, LACM, 1♂, 2♀; same data except JAC, 2♀; Malibu, corner of Malibu Canyon Rd and Pacific Coast Highway, 34.005008, -118.810089, 1-VII-1976, dB Weissman, CAS, 1♂; Solstice Canyon, Santa Monica Mountains, 34.001944, -118.5075, 65 m, 19-VI-2-VII-2009, BV Brown, JN Hogue, LACM, 1♂.