

However, as noted in Weissman *et al.* (2019), courtship songs of these three species are similar in having a double-tick structure unlike any other US *Gryllus* for which courtship song is known to us.

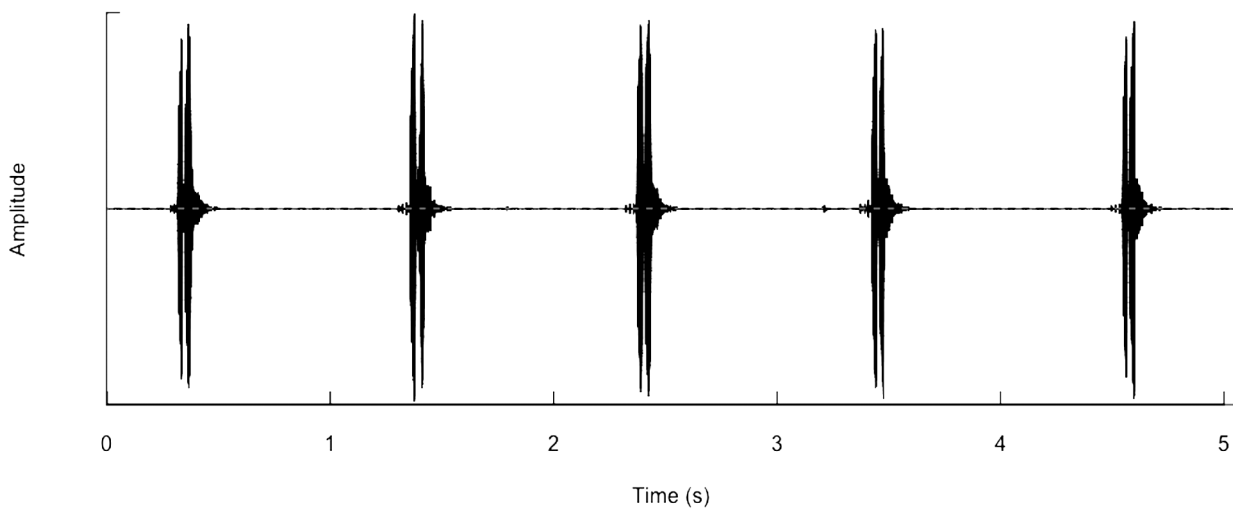


FIGURE 15. Five second calling song of *G. locorojo*: (R12-3) commercial pet store, at 22°C.

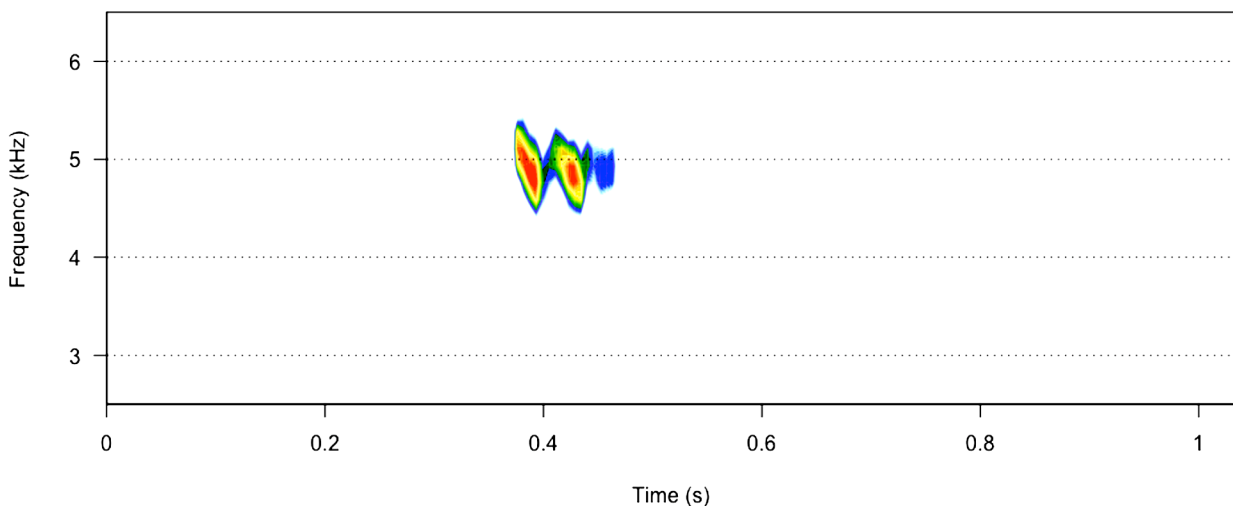


FIGURE 16. One second spectrogram of *G. locorojo*, same male as in Fig. 15.

The *Brevicaudus* Group

G. brevicaudus Weissman, Rentz, and Alexander

Within the US, *G. brevicaudus* is the only representative; however three other island-inhabiting endemic species (*G. insularis*, *G. alexanderi*, and *G. bryanti*) are close relatives (Fig. 6, p. 28). These island species are all flightless, short winged, slow chirpers. While loss of flight capability is common in many island taxa (Carlquist 1974, Darlington 1938), these 3 dispersed island endemics still generate interesting biogeographical questions. *G. bryanti* is discussed here (p. 40), but treatment of *G. alexanderi* and *G. insularis* will be included in future work on the *Gryllus* of Mexico.

***Gryllus brevipaudus* Weissman, Rentz, and Alexander**

Short-Tailed Field Cricket

Figs 17–21, Table 1

1980 *Gryllus brevipaudus*. Weissman et al. 1980, p. 338. Holotype male (Fig. 18): California, Santa Clara Co., Palo Alto, Type deposited at CAS, Entomology type #13219.

1977 ‘*Gryllus* VIII’, Weissman & Rentz (1977a).

‘*Gryllus* #8’ of DBW notebooks.

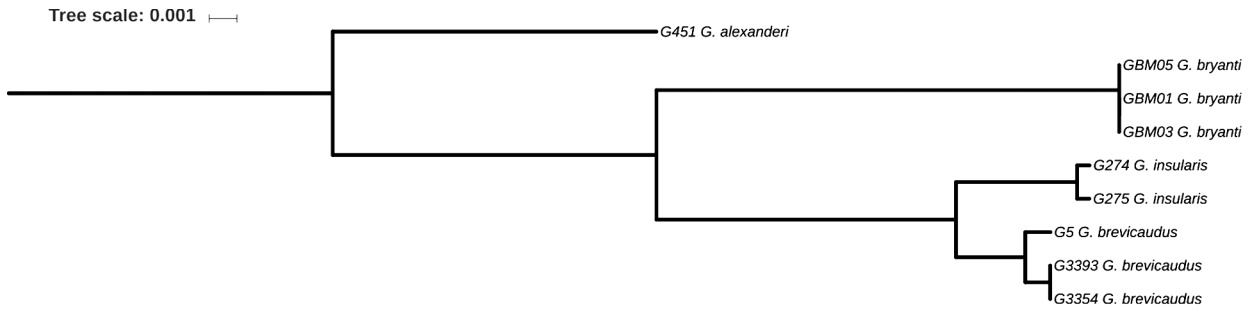


FIGURE 17. ITS2 gene tree. *G. brevipaudus* samples: S03-8 (G5); S16-1 (G3354, G3393); *G. insularis* samples: Guadalupe Island, Baja California Norte, Mexico; *G. bryanti* samples: Andros Island, Bahamas; *G. alexanderi* sample: Clarion Island, Colima, Mexico.



FIGURE 18. Holotype male, and labels, of *G. brevipaudus*.

Distribution. California only. Restricted to areas of central California usually surrounding the Central Valley.

Recognition characters and song. A small to medium sized, always short hind-winged cricket (see measurements Table 1, p. 18) that when alive or recently killed, is immediately recognizable because of contrast between totally black body and legs versus unique tegmina that have an area, especially in males (see Fig. 19), of yellow-orange tinge on the lateral field and anteriorly where the tegmina attach to the body. When alive, usually with golden pubescence on pronotum and hind femurs. Ovipositor shortest of any described *Gryllus* (Fig. 19), even shorter than those of smallest *G. veletis* from Mirror Pool, North Dakota. Hind femur longer than cerci, cerci usually longer

than ovipositor in situ. Song (Fig. 20; R03–8) 3–6 p/c, PR usually 20–30. Song similar to *G. veletisoides* but never microsympatric (although individuals synchronic) and *G. brevicaudus* separable from the latter by its longer cerci, shorter ovipositor, tegmina with a yellow-orange tinge.

Derivation of name. “brevicaudus” or “short tailed” in reference to having the shortest known ovipositor in the genus *Gryllus*.

Geographic range. Fig. 21.



FIGURE 19. Top: Live male (Jasper Ridge, S92-44) *G. brevicaudus* showing distinctive yellow-orange markings that contrast with rest of black cricket. Bottom: Female from Palo Alto, CA (S87-33) showing short ovipositor.

Habitat. Always in open grasslands, both sandstone and serpentine, below 610 m elevation. When ground wet and saturated from winter and spring rains, under rocks (SE Paicines, S03-8; Clayton, S19-3). As grasslands dry out and soil cracks form, individuals then move into these deep cracks (Jasper Ridge, S93-26; W Springville, S09-37)

where they can be difficult to flush with water. Often at moderate to high density, when found within appropriate habitat, as gauged by the number of singing males.

Life cycle and seasonal occurrence. One generation/year. No egg diapause. Along with *G. lineaticeps*, probably the earliest maturing *Gryllus* species in central California with first adults singing in mid-winter when males can be heard during warm, early-March days. Latest known collection date is 27 August, but usually no males heard in most populations well before then. We wonder if some August collected adults represent areas where they can retreat into deep, cool soil cracks, which prolongs survival. This is one species where we have been able to do multiple surveys during the season—on Jasper Ridge, San Mateo Co., there is clearly only one generation. Nymphs from laboratory hatched eggs do not grow well and most stop developing as middle/late instars, perhaps indicating the presence of an obligate winter diapause.

Variation. Size: San Luis Obispo Co. specimens average larger body size, have longer ovipositors, and longer stridulatory file than individuals from more northern localities. *Color:* After death, the yellow-orange tegmina areas (especially of males) darken with drying and time (see Fig. 18 of holotype).

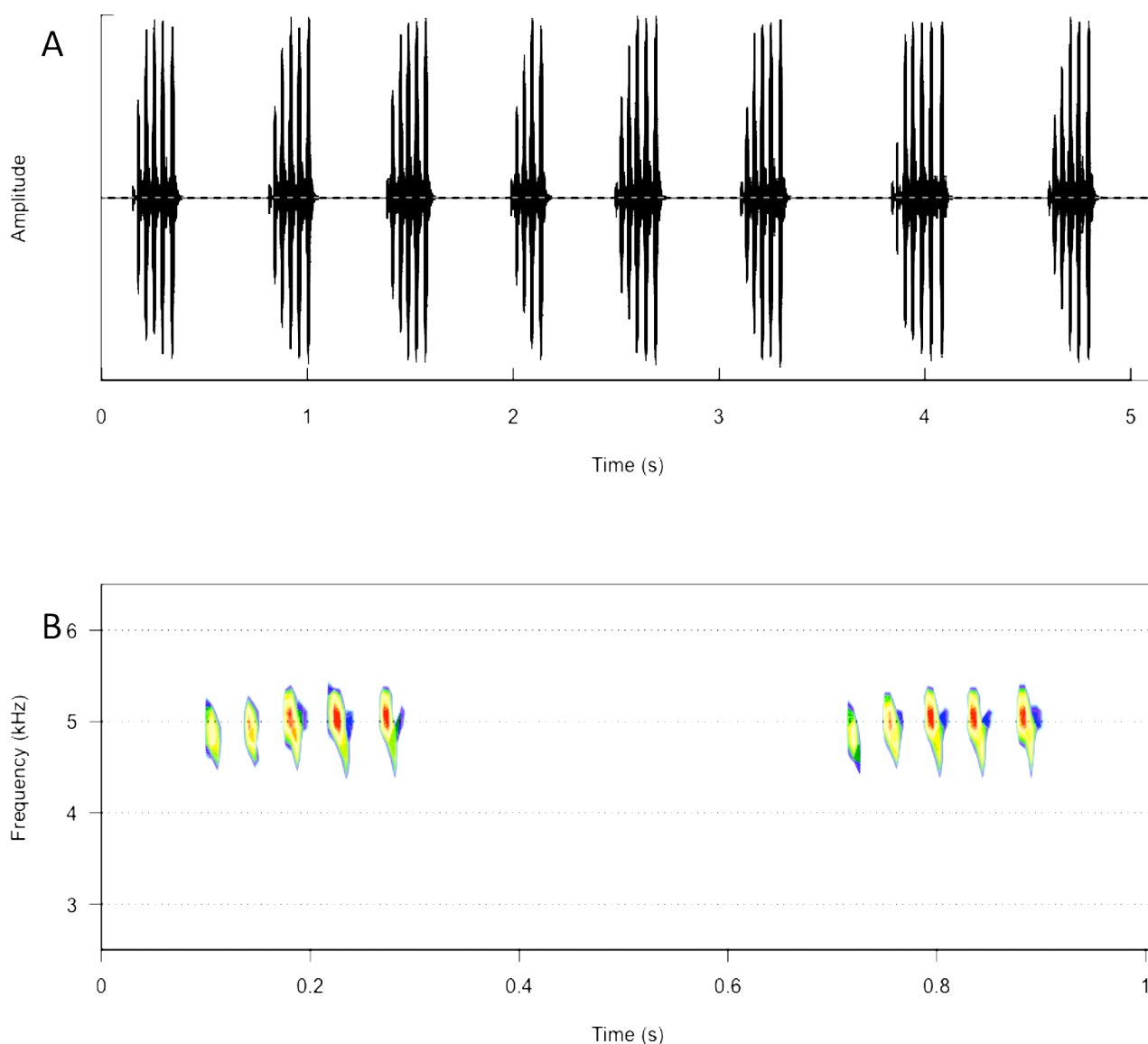


FIGURE 20. Five second waveform (A) and one second spectrogram (B) of calling song (R03-8) of *G. brevicaudus* from San Benito Co., CA (S03-8), recorded at 24.5°C.

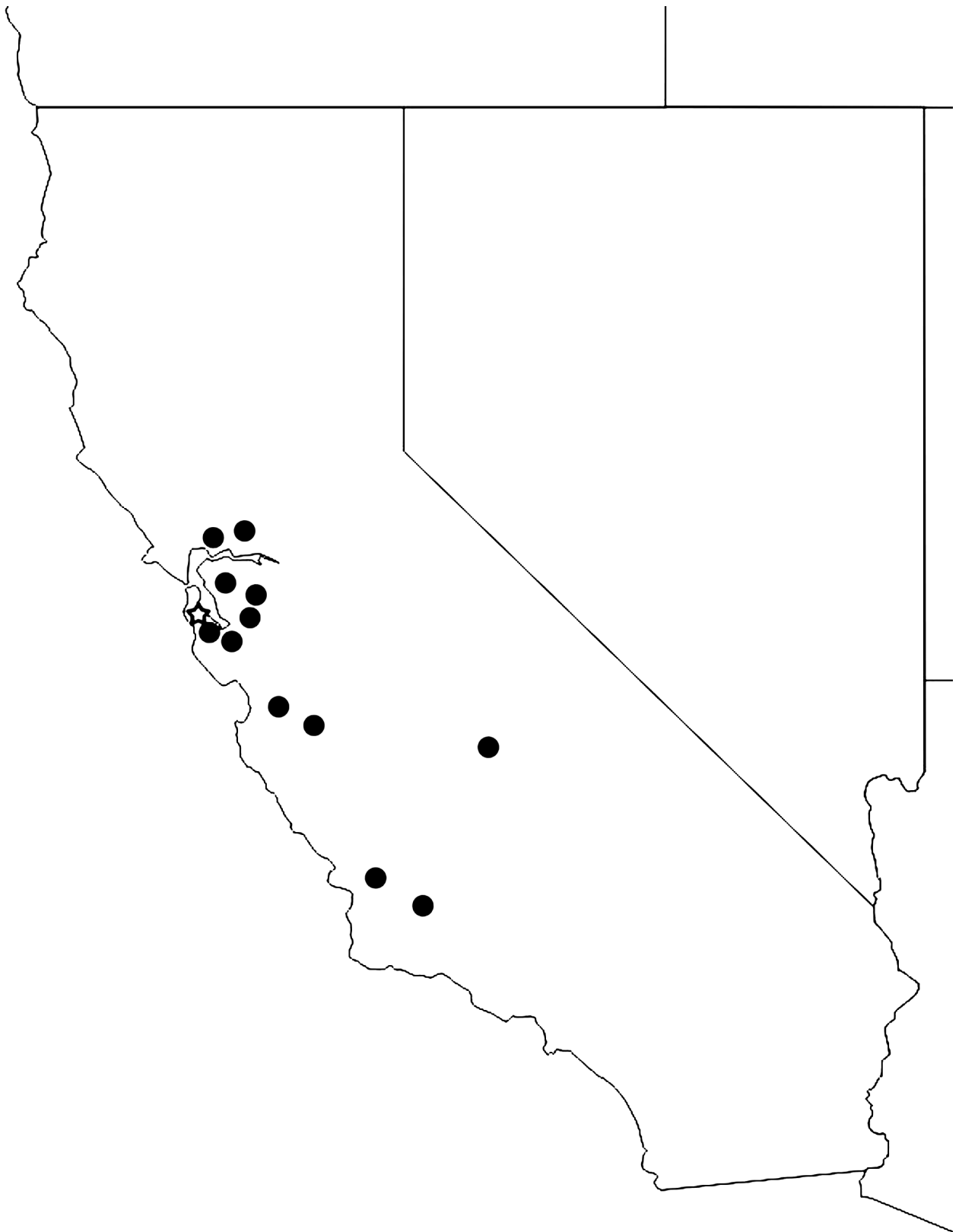


FIGURE 21. Known distribution for *G. brevicaudus*. Star shows type locality.

Specimens examined. California: Contra Costa Co. Clayton, Russelmann Park Road, 252m, 12-iv-2019, 37° 54' 56.98" -121° 54' 17.95" (S19-3). Lafayette, 21-vi-1965 (CIS). Marsh Creek, 28-iv-1957 (CIS). Mt. Diablo, 750', 29-iv-1923; 21-vi-1940 (CIS); 13-vii-1982, (S82-39). *San Benito Co.* Hollister, 1-viii-1980 (S80-55). 18 m SE Paicines, 1480', 21-iii-2003 (S03-8). *San Luis Obispo Co.*, Carrizo Plain National Monument, 2-3 m N Caliente Range, 700m, 27-iii-2002, 35° 10' 30" -119° 51' 50" P. Schiffman (DAG 2002-010). San Luis Obispo 14-v-1967; 27-viii-1967. 1 km E Santa Margarita 14-v-1967. El Chorro Regional Park Campground, 307', 13-vii-2017, 35.33163 -120.73091°. *San Mateo Co.* Stanford University Jasper Ridge, 21-iii-1970, 2-v-1992 (S92-44), 2-v-1993 (S93-26), 18-v-2016 (16-1). *Santa Clara Co.* Mountain View, 9-vi-1981 (S81-13); Palo Alto, field at Foothill Expressway and Stanford Avenue, 24-vii-1974, 23-v-1987 (S87-33). *Solano Co.* 20 m NW Rio Vista 6-v-1978, N. Corey (CIS). *Tulare Co.* 10 m W Springville, 700' 29-v-2009 (S09-37).

DNA. Multilocus G3393 Jasper Ridge, S16-1, closest extant relative may be *G. insularis* Scudder from Guadalupe Island, Baja California Norte, MX; ITS2 also shows a close relationship between *G. brevicaudus* and *G. insularis* (Fig. 17).

Discussion. This species is one of the few *Gryllus* that can be morphologically recognized in museum collections. Nevertheless, it is rarely collected perhaps because it matures in winter/spring, and males sing from the edges of deep cracks from which they are difficult to flush with water. Once days warm up, males sing only at night. Oatmeal trails through known populations can attract females and occasionally males.

We wonder if this species' short ovipositor is associated with egg laying deep in cracks, where humidity may be higher, that are so prevalent in grassy fields during California's dry spring and summer.

We have flushed individuals of *G. lineaticeps* from the same soil cracks (Mt. View, S81-13; Mt. Diablo, S82-39; Clayton, S19-3) in which *G. brevicaudus* males were singing. *G. integer* can also be singing at such localities. One adult male (Jasper Ridge, S93-26) parasitized by unidentified tachinid.

Gryllus bryanti Morse

Bahama Island Field Cricket

Figs 17, 22, Table 1

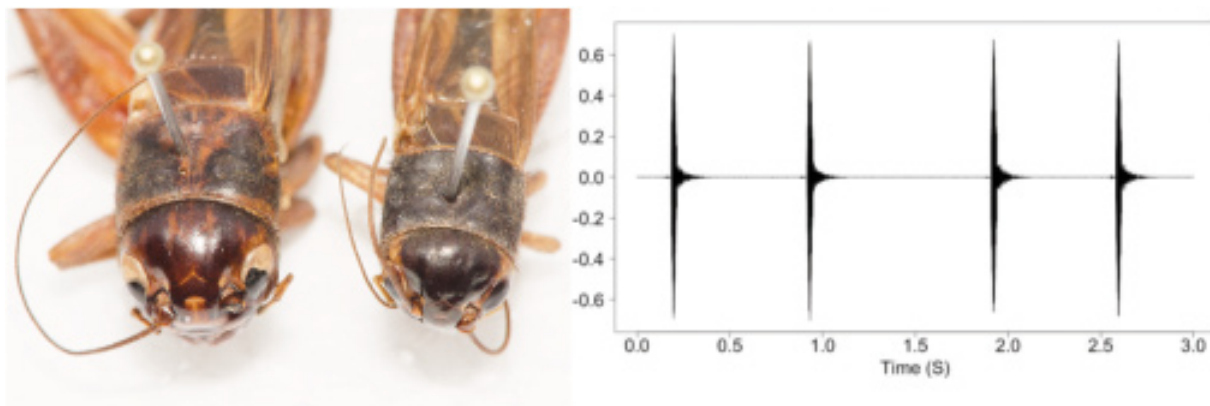


FIGURE 22. Left Panel: *G. bryanti* (on left) vs. sympatric *G. assimilis* (right), both from Bahamas. Note head wider than pronotum in *G. bryanti*. Right Panel: Three second waveform of typical single-pulse chirp calling song of *G. bryanti* (neotype male, GBM08, Andros Island, at 25 °C).