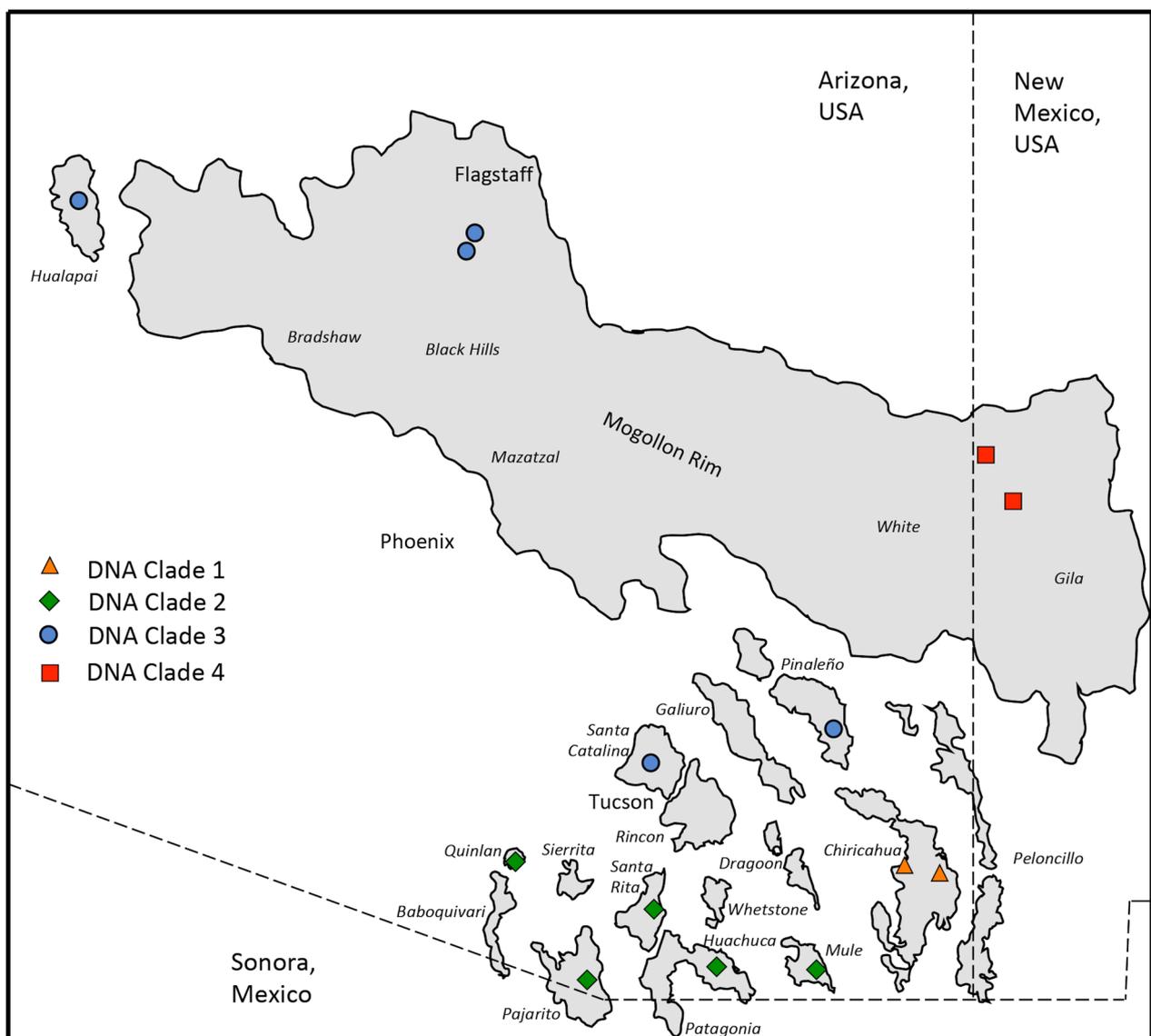


with a male from Los Gatos, CA, laid eggs (never saw a passed spermatophore) but none hatched. Thus, from eggs laid by four Midwestern females, no eggs hatched. As controls, an Indiana female mated with a North Dakota male produced lots of eggs that hatched while a North Dakota female that mated with an Illinois male produced eggs that didn't hatch.

## The Montis Group

*G. montis* Weissman & Gray, n. sp.

An almost certainly polyphyletic grouping of four genetic clades of chirping crickets which are all found under tree cover in mountainous regions of the Southwestern US (Fig. 201). They remain indistinguishable to us except by DNA, which is why we have lumped them together as a single “Group.” We discuss the characteristics and distributions of all four DNA Clades here, but we note that DNA Clade 4 is phylogenetically a stand-alone entry related to the Saxatilis Group. The relationships among DNA Clades 1-3 are not consistently resolved by 16S and ITS2, and also vary based on which analysis is applied to the multilocus data (Gray *et al.* 2019). In all cases, song is typically a slow chirp with four-pulses per chirp (Fig. 202).



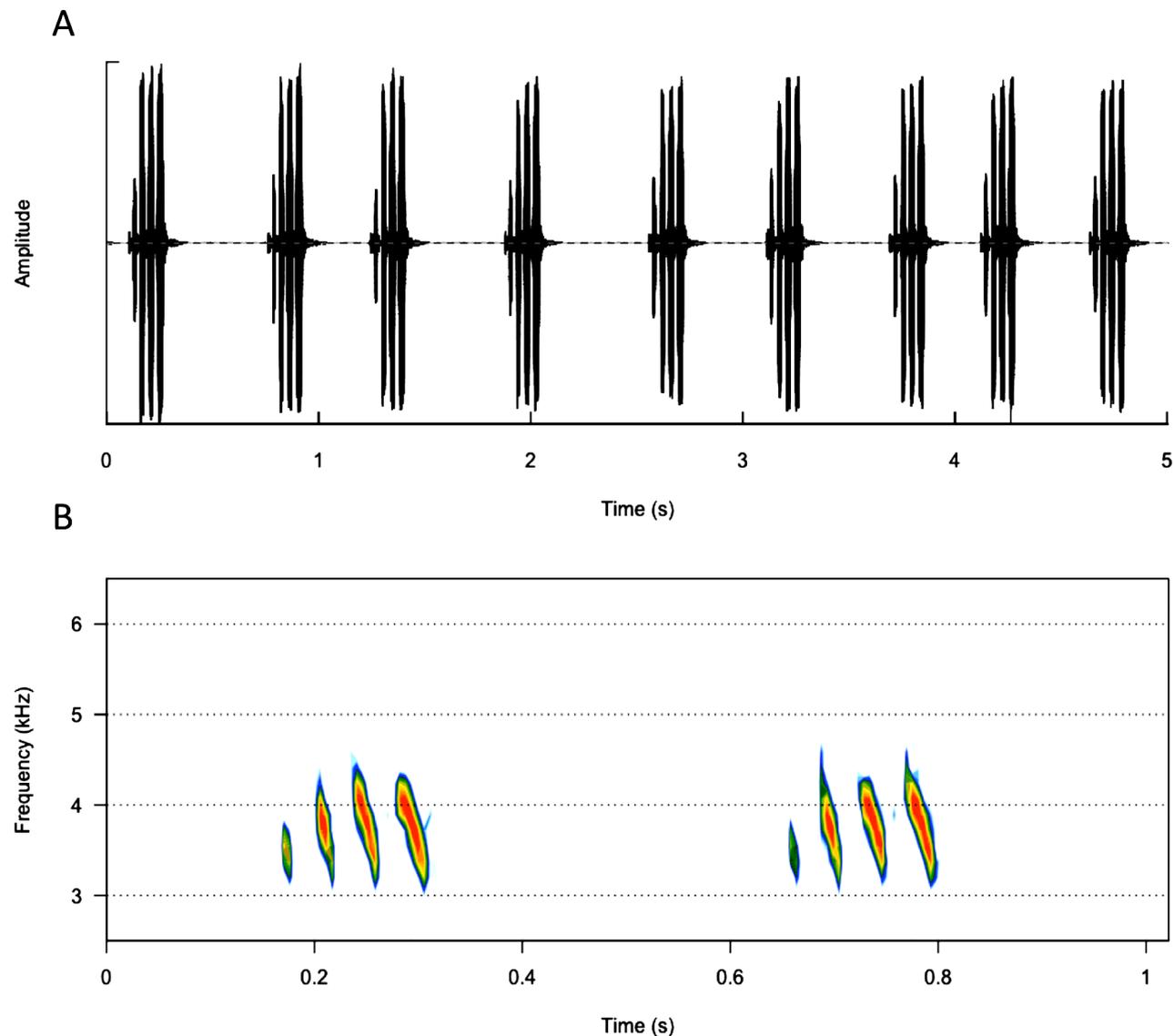
**FIGURE 201.** Known distribution of *G. montis*, with locality coding based on multilocus DNA Clade.

*Gryllus montis* Weissman & Gray, n. sp.

Mountain Wood Cricket

Figs 132, 201–206, Table 1

‘G. #25, #31’, ‘mountain Gryllus’ and ‘red legged Gryllus’ of DBW notebooks.



**FIGURE 202.** A. Typical calling song of *G. montis* (R13-71) from the type locality (S13-17), recorded at 25.5°C. B. One second spectrogram of typical calling song of *G. montis*, same male as in A.

*Distribution.* Arizona and western New Mexico.

*Recognition characters and song.* A polyphyletic complex of sky island taxa, with variable and geographically structured DNA, that we treat here as one “species” because of absence of clearly distinguishing morphological, song, or ecological characters to separate what appears to be up to 4 clades (see Discussion below). A small to medium sized, narrow body, short tegmina, early maturing, generally with black head and pronotum, leaf litter inhabiting, slow chirping cricket found in mountainous, wooded terrain from 1280–2560m, almost always with a tree canopy overhead. Cerci medium length, never longer than ovipositor in situ. Tegmina in both sexes black but can have a tegminal bar, especially in females with reddish hind legs. Hind legs usually black except for reddish inner aspect of hind femur, although most individuals in populations from western New Mexico and Ramsey Canyon, Arizona, have entire rear leg reddish. Frequently the only *Gryllus* at a site and populations, with few males singing, can be dense. *Song* (Fig. 202, R13-71) 3–5 p/c (range 3–6), 90–150 c/m, PR at 25°C 18–25 (range 17.5–27.8).

*G. montis* can be separated from other slow chirping western US taxa, as follows: DNA Clade 2 individuals

from type locality (Ramsey Canyon, AZ) and DNA Clade 3 individuals most genetically similar to Mohave Desert-separated, and allopatric *G. veletisoides* but distinguished by cerci 2–4 mm shorter in *G. veletisoides* which is only found at low elevations and not associated with mountain top woodlands. From Organ Mts., New Mexico, endemic *G. sotol* (nearest populations are ~265 km apart), separated by later maturing, generally more teeth/mm in *G. sotol* which is associated with open Chihuahuan Desert as opposed to under mountain top tree covered habitats. From ecologically, morphologically and DNA Clade 1 genetically similar but allopatric (nearest populations are ~510 km apart on opposite sides of the Rocky Mts.) Davis Mts., Texas, endemic *G. planeta*, by *G. montis* having a slower pulse rate (Table 1, p. 18), slightly longer cerci, and longer ovipositor. From morphologically and similar song *G. lightfooti*, distinguished by microhabitat: under tree canopy for *G. montis* vs. more open, adjacent shrub-grasslands, frequently with *Yucca elata*, for *G. lightfooti*. *G. montis*, despite being at higher, cooler elevations, can become adult a full month before *G. lightfooti*. Cerci in *G. montis* never longer than ovipositor in situ while some 50% of *G. lightfooti* females are. Adult female *G. lightfooti* typically have distinctive tegminal bars while few females of *G. montis* do. Chirp rate is more rapid in *G. lightfooti*. Also, morphologically similar to *G. veletis* but distinguished by cerci 2–4 mm longer in *G. montis* and the latter's preference for tree cover. *G. montis* DNA Clade 4 and *G. veletis* are microsympatric at NM, Catron Co., just southwest of Reserve (S01-39) and 3.5 km south of Reserve (S07-53), and separable there by longer cerci length in faster chirping *G. montis* with entire hind leg reddish, as opposed to almost solid black hind legs of *G. veletis*. Separated from allopatric (nearest populations are 480 km apart on opposite sides of the Continental Divide) *G. transpecos* by ITS2 genetics, habitat, shorter ovipositor and longer cerci in the latter. Compared to occasionally sympatric (Kitt Peak, S13-36; road to Hualapai Mt Park, S90-56; Bog Springs, Madera Canyon) *G. longicercus*, cerci shorter than ovipositor tip in *G. montis* with less file teeth and a faster pulse rate (Table 1, p. 18). Similar to slow chirping *G. saxatilis* but *G. montis* has shorter cerci, a non-rocky habitat, and earlier maturation when individuals from similar elevations compared.

*Holotype*. Male (Fig. 203): Arizona, Cochise Co., Ramsey Canyon Reserve near Sierra Vista, 1-vi-2013, 5233', 31° 27' 34.7" -110° 17' 44.6". S13-17, R13-67, G2475. 16S GenBank accession # MK446561; ITS2 GenBank accession # MK441899. BL21.46, HF 11.4, LC 10.93. Right tegmen removed: 128 teeth, FL 3.35, TL 10.8, TW 4.55. Type deposited in CAS, Entomology #19266.



**FIGURE 203.** Holotype male (left) and type locality female (right) of *G. montis*.

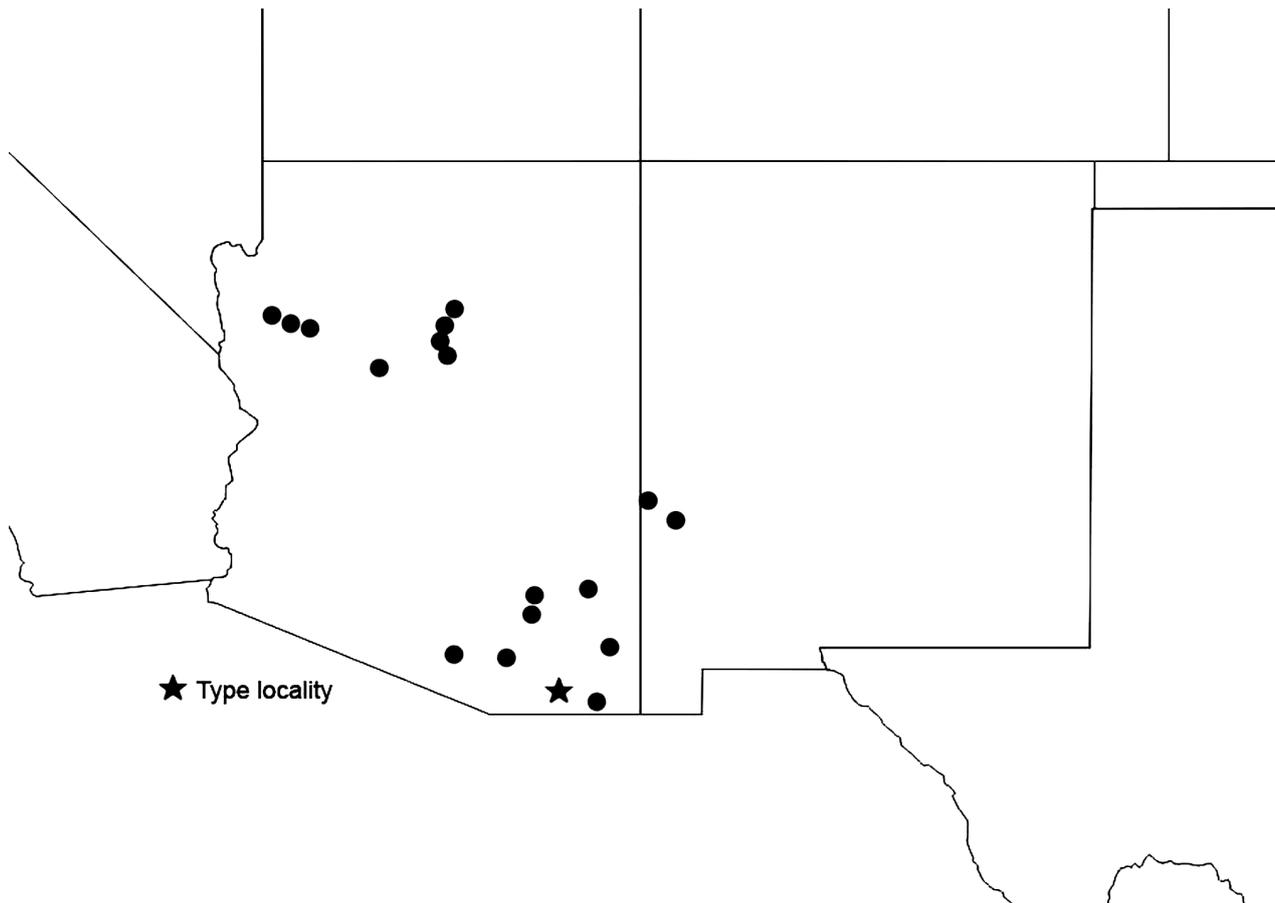


FIGURE 204. Known distribution of *G. montis*.

*Paratypes.* (267♂ 189♀). **Arizona: Clade 1:** Chiricahua National Monument, Visitor's Center, 5348', 2-vi-2013 (S13-21) 15♂ 10♀. Portal, Southwestern Research Station, 20-viii-2012, 5400' (S12-103) 1♂ 4♀. Chiricahua Mts., Herb Martyr Dam Campground, 5620', 22-vi-2008 (S08-51) 3♂ 1♀, DC Lightfoot. Cave Creek Canyon, Sunny Flat Campground, 5107', 21-vi-2008 (S08-50) 6♂ 3♀, DC Lightfoot. **Clade 2:** *Cochise Co.*, Bisbee, 5500', 1-vi-2013 (S13-18) 7♂ 6♀. Coronado National Forest, Reef Campsite, 29-ix-2012, 7150', 31.42873° -110.28987° (S12-123) 5♂ 2♀, all collected as nymphs. Huachuca Mts., Parker Canyon Lake, 7-iv-2004, 5400' 4♂. Ramsey Canyon Preserve, 1-vi-2013 (S13-17) 15♂ 18♀. *Pima Co.*, Kitt Peak, 17-vi-1990 (S90-52) 3♂ 4♀; picnic area at mile 10.5, 6277', 8-vi-2013 (S13-36) 9♂ 5♀. *Santa Cruz Co.*, Madera Canyon Rec Area, 4900', 26-vii-1990, (S90-79) 14♂ 12♀; 5-vii-1994 (S94-57) 7♂ 5♀; 11-ix-2010, as nymphs, 5887', 2010-082 1♂. Pajarito Mts., Sycamore Canyon, 4017', 8-iv-2004, 31.4303° -111.1895°, 1♂, as nymph. **Clade 3:** *Coconino Co.*, Sedona, 4680', 25-vi-1980 (S80-44) 2♂; 16-v-1995 (S95-37) 1♂; 12-vi-1996 (S96-62) 1♂. Hwy 89A 4 m N Sedona, 4900', 25-vi-1980 (S80-43) 1♂; 12-vi-1996 (S96-63) 3♂ 3♀; 15-vi-2007 (S07-60) 4♂ 8♀. Hwy 89A 6 m N Sedona, 5350', 15-vi-2007 (S07-59) 3♂. Hwy 89A 8.9 m N Sedona, 15-vi-2007 (S07-58) 2♂ 1♀. 9 m S Flagstaff on Hwy 89A, MP 390, 6500' 5-viii-1991 (S91-76) 10♂ 6♀. 15 m S Flagstaff on Hwy 89A, 6000', 25-vi-1980 (S80-42) 12♂ 13♀. *Graham Co.*, Pinaleño Mts., Hwy 366, Mt. Graham, 5000-8400', 4-vii-1994 (S94-53) 10♂ 3♀; 10-vi-2012, 7900' (S12-18) 11♂ 4♀. *Mohave Co.*, Hualapai Mt. Park, 6700', 19-vi, 1990 (S90-55) 11♂ 11♀; 3-viii-1991 (S91-62) 1♂ 2♀; 16-vi-2007 (S07-62, 63) 6♂ 1♀. Road between Hualapai Mt. Park and Kingman: 12.7 m SE Kingman, 6000', 3-viii-1991 (S91-63) 4♂ 5♀; 13-vi-2012 (S12-30) 15♂ 10♀. 11 m SE Kingman, 5700', 3-viii-1991 (S91-64) 2♂; 16-vi-2007 (S07-65) 2♂. 8.7 m SE Kingman, 5400', 19-vi-1990 (S90-56) 4♂; 3-viii-1991 (S91-65) 9♂ 8♀; 13-vi-2012 (S12-31) 3♂ 2♀. Mt. Lemmon Recreational Area, Mile 13, 5900', 27-vii-1990 (S90-81) 6♂ 1♀; 7-vii-1994 (S94-60) 8♂ 6♀; Mile 11.7, 5800', 27-vi-2009 (S09-50) 3♂ 4♀; Mile 11.3, 5840', 11-vi-2012 (S12-22) 8♂ 18♀. Oracle, 4260', 18-viii-1998 (S98-64) 4♀. *Yavapai Co.*, Prescott National Forest, Hwy 89A 25 m NE Prescott, 6820', 30-vi-1994 (S94-38) 7♂. Sedona Airport, 12-vi-1996, 5060' (S96-61) 2♂; 15-vi-2007 (S07-61) 1♂. **New Mexico: Clade 4:** *Catron Co.*, Reserve, 5870' 20-v-2001 (S01-39) 3♂. Hwy 12 2.2 m SW Reserve, 6020', 3-vii-1994 (S94-51) 10♂ 1♀

(female collected as last instar); 20-v-2001 (S01-40) 2♂ 1♀; 14-vi-2007 (S07-53) 2♂ 5♀. Hwy 180 1 m E AZ—NM border, 7880', 20-v-2001 (S01-41) 4♂, 1 male nymph; 14-vi-2007 (S07-54) 4♂ 3♀.

*Derivation of name.* “montis” meaning of the mountains to reflect where this complex is found.

*Geographic range.* Fig. 204.

*Habitat.* Straminicolous (living in leaf litter), highest known inhabiting US *Gryllus* and, along with geographically restricted *G. planeta*, only obligate forest *Gryllus* west of Texas. Found in most (every?) sky island woodlands above 1250m of western New Mexico and Arizona. Associated with oaks, pines and occasional junipers and living in leaf litter on forest floor. Also in riparian situations with ash and sycamores (AZ, 6 m N Sedona, S07-59). Rarely in open dirt area at 2408m surrounded by pines (AZ, Mt. Graham, S12-18). After sunset, individuals of both sexes walk around on top of leaf litter with males rarely singing. Nevertheless, some males (e.g. S07-54, near AZ-NM border) sing well into the night at low temperatures that suppress singing in males of most other species.

*Life cycle and seasonal occurrence.* One generation/year. No egg diapause S91-76 (14.5 km S Flagstaff), S07-54 (near AZ-NM border), S12-18 (Mt. Graham), S12-103 (Southwest Research Station), S13-17 (Ramsey Canyon). Even in late spring/early summer on Mt Graham, at 2573m (S94-53, 4-vii-1994) and 2408m (S12-18, 10-vi-2012), most of population apparently adult for a while since many with damaged cerci. Yet at the lower type locality (Ramsey Canyon, S13-17), only ~30% of population adult on 1-vi-2013. Both sexes readily attracted to oatmeal trails.

We collected a number of late instar nymphs from AZ, Cochise Co., Reef Campsite (S12-123, 2180m), on 29-ix-2012, and initially kept them at 27C° on 12L/12D. By 29-xi-2012, 5♂ and 2♀ had molted to adult. Subsequently, all individuals exposed to outdoor photoperiod and temperatures between 12-22°C. Males first started singing in April. If this behavior reflects natural life cycle, then *G. montis* at Reef Campsite may overwinter as either adults or late instars.

*Variation.* **File tooth number:** Individuals on Mt. Lemmon with higher tooth numbers (range 143-171) than elsewhere (Table 1, p. 18). **Hind femur color:** The entire rear leg of most individuals from western New Mexico and the type locality of Ramsey Canyon are reddish. Females in such populations more likely to have tegminal bars. **Ovipositor length:** Longest known ovipositor (19.8 mm) is from a female from Reef Campsite, Cochise Co., AZ (S12-123), at 2180m, that was raised to adult in the laboratory.

*DNA.* This complex appears likely to be polyphyletic (Gray *et al.* 2019, and see Discussion below) with affinities to other mid to high elevation Southwestern species (e.g. *G. sotol*, *G. planeta*, and *G. transpecos*) as well as to west coast *G. veletisoides*.

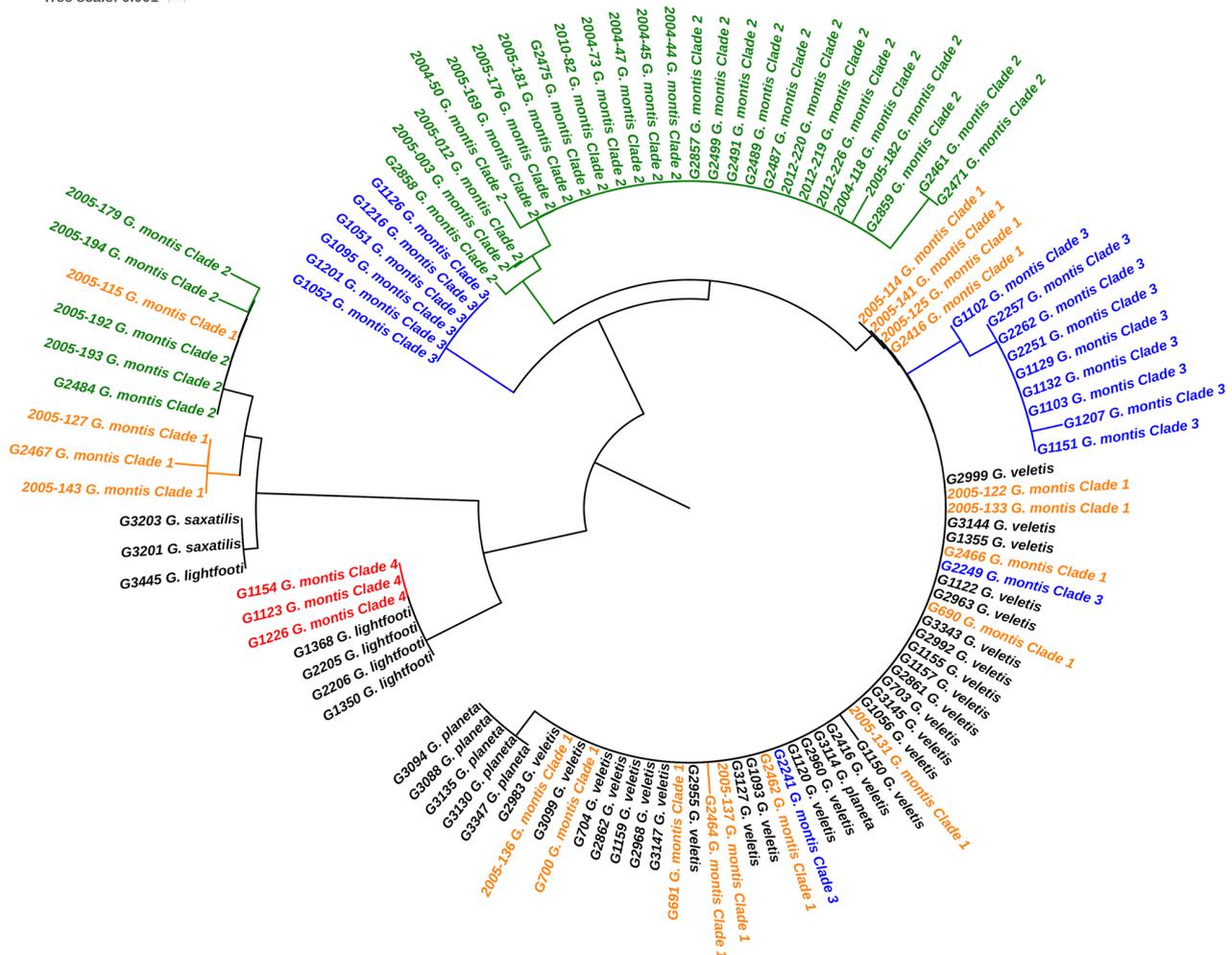
*Discussion.* The Madrean Sky Islands of Arizona, Sonora, Chihuahua, and New Mexico are a set of some 60 high elevation mountains rising out of lowland valleys and surrounded by Sonoran and Chihuahuan Deserts (Warshall 1995). As such, populations of flightless crickets located on such mountain peaks are probably genetically isolated. We are unsure about the relationships of these populations of *G. montis* as different genes, and the multilocus species' tree analysis, segregate into different clades. Thus, we summarize these genetic relationships here but leave decisions as to species' boundaries for future investigations. Should any of these clades have at least one distinguishing morphological character, then species' status for that clade would be appropriate.

Sequencing ~500 genes with the multilocus technique yields support for 4 clades (Fig. 201, and Gray *et al.* 2019): Clade 1 is found in far southeastern Arizona and includes 2 localities in the Chiricahua Mts.: Chiricahua National Monument (G2464, S13-21) and at the Southwest Research Station (G2416, S12-103). Clade 2 is found distributed across other southern Arizona sky islands, and includes populations from Huachuca Mts. (G2475, S13-17, type locality of Ramsey Canyon); Quinlan Mts. (G2491, S13-36, Kitt Peak); Pajarito Mts. (2004-073, Sycamore Canyon); Santa Rita Mts. (2005-012, Madera Canyon); and the Mule Mts. (G2471, S13-18, Bisbee). Clade 3 is distributed across the remainder of our Arizona mountain localities: Santa Catalina Mts. (G1353, S09-50, Mt. Lemmon); Pinaleno Mts. (G2241, S12-18, Mt. Graham); Hualapai Mts. (G1151, S07-62, Hualapai Mt. Park); and around Sedona (G1097, S07-60) and to the north towards Flagstaff (G1126, S07-59; and G1051, S07-58). Clade 4 includes two New Mexico localities along the border with Arizona (G1123, S07-54) and around the town of Reserve (G1048, S07-53).

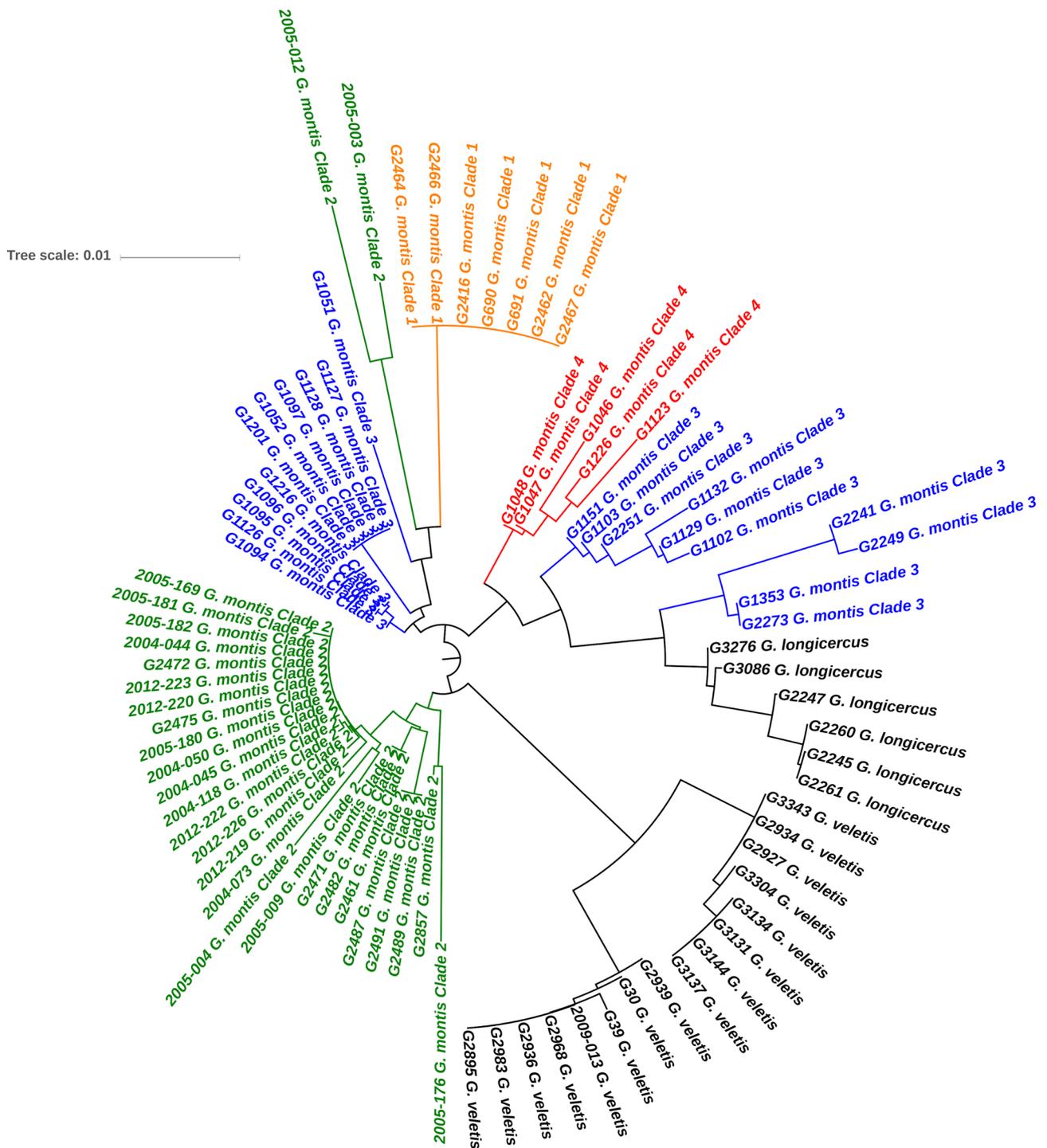
If we apply the four clade names from the multilocus analysis to additional samples with sequenced 16S mtDNA (Fig. 205) or ITS2 nDNA (Fig. 206) based on geography, we get additional support for the distinctness of some clades, although with variable consistency. The distinctness of Clade 4 from Clades 1-3 is supported by all analyses; however, we note that inclusion of the Clade 4 samples as *G. montis* appears to make *G. montis* polyphyletic. The 16S gene sequences yield a much messier picture: Clade 1 (Chiricahua Mts.) shares haplotypes with *G. veletis*; Clade 4 (NM/AZ border, Continental Divide region) shares haplotypes with *G. lightfooti*; Clade 3 individuals from the same population, tend to cluster together, but not necessarily especially close to other Clade 3 localities. For ex-

ample, Kingman, AZ, Clade 3 samples are well clustered but somewhat separate from Sedona, AZ, Clade 3 samples. The nuclear ITS2 gene sequences demonstrate that *G. montis* Clade 1 is distinct from *G. veletis* despite their 16S DNA being the same. *G. montis* Clade 4 is likewise distinct from *G. lightfooti* in ITS2 despite their 16S DNA being the same (Tamura-Nei ITS2 distances: within *G. montis* Clade 4  $0.0097 \pm 0.0052$ ; within *G. lightfooti*  $0.0073 \pm 0.0050$ ; between *G. montis* Clade 4 and *G. lightfooti*  $0.0307 \pm 0.0040$ ). Both Clade 2 and Clade 3 ITS2 sequences do cluster generally together, but with a few anomalous Clade 2 sequences and two groups of Clade 3 sequences, some apparently close to *G. longicercus* ITS2.

Tree scale: 0.001 —



**FIGURE 205.** 16S gene tree, indicating multilocus DNA clade based on locality. *G. montis* **Clade 1** samples (orange) mostly have 16S DNA like *G. veletis*, as do two *G. montis* **Clade 3** samples (blue, both from Mt. Graham). *G. montis* **Clade 2** samples (green) fall into two groups. *G. montis* **Clade 3** samples mostly fall into two geographically separated groups (Hualapai Mtn. near Kingman, AZ, and Sedona, AZ area). *G. montis* **Clade 4** samples have 16S DNA like *G. lightfooti*. Collection stop numbers: *G. montis* samples: S07-45 (G1194); S07-54 (G1123, G1154, G1226); S07-58 (G1051, G1216); S07-59 (G1095, G1126); S07-60 (G1052, G1201); S07-62 (G1102, G1151); S07-63 (G1129, G1207); S07-65 (G1103, G1132); S08-50 (G690, G691); S08-51 (G700); S12-18 (G2241, G2249); S12-30 (G2251, G2257); S12-31 (G2262); S12-103 (G2416); S13-17 (G2475, G2857, G2859); S13-18 (G2461, G2471); S13-21 (G2462, G2464, G2466); S13-36 (G2487, G2489, G2491, G2499); Parker Canyon Lake, Cochise Co., AZ (2004-44, 45, 47, 50, 73); Madera Canyon, Bog Springs, Santa Cruz Co., AZ (2004-118, 2005-003, 012); Madera Canyon, Mt. Wrightson picnic area, Santa Cruz Co., AZ (2010-082); Cave Creek Canyon, Chiricahua Mts., Cochise Co., AZ (2005-115, 122, 127, 131, 133, 136, 137, 143); Miller Canyon, Huachuca Mts., Cochise Co., AZ (2005-169, 176, 179, 181, 192, 193, 194); Reef Camp, Huachuca Mts., Cochise Co., AZ (2012-219, 220, 226). *G. veletis* samples: S04-107 (G2861, G2862); S07-51 (G1155, G1159); S07-53 (G1120, G1122, G1157); S07-57 (G1056, G1093); S07-72 (G1150); S08-53 (G703, G704); S09-63 (G1355); S15-19 (G2892, G2960, G2999); S15-25 (G2955, G2963, G2968, G2983, G2992); S15-51 (G3099, G3127); S15-53 (G3343); S15-67 (G3144); S15-78 (G3145, G3147). *G. lightfooti* samples: S09-51 (G1368); S09-59 (G1350); S11-86 (G2205); S11-88 (G2206). *G. saxatilis* samples: S15-89 (G3201, G3203). *G. planeta* samples: S15-61 (G3088, G3094, G3114, G3135, G3347); S15-63 (G3130).



**FIGURE 206.** ITS2 gene tree, indicating multilocus DNA clade based on locality. *G. veletis* samples: S03-58 (G39); S03-60 (G30); S15-9 (G2939); S15-16 (G2927, G2934); S15-21 (G2895); S15-24 (G2936); S15-25 (G2968, G2983); S15-53 (G3343); S15-62 (G3131, G3134, G3304); S15-67 (G3137, G3144). *G. montis* samples: S07-53 (G1046, G1047, G1048); S07-54 (G1123, G1226); S07-58 (G1051, G1094, G1216); S07-59 (G1095, G1096, G1126); S07-60 (G1052, G1097, G1127, G1128, G1201); S07-62 (G1102, G1151); S07-63 (G1129); S07-65 (G1103, G1132); S08-50 (G690, G691); S09-50 (G1353); S12-18 (G2241, G2249); S12-22 (G2273); S12-30 (G2251); S12-103 (G2416); S13-17 (G2472, G2475, G2857); S13-18 (G2461, G2471, G2482); S13-21 (G2462, G2464, G2466, G2467); S13-36 (G2487, G2489, G2491); Parker Canyon Lake, Cochise Co., AZ (2004-44, 45, 50, 73); Madera Canyon, Bog Springs, Santa Cruz Co., AZ (2004-118, 2005-003, 004, 009, 012); Miller Canyon, Huachuca Mts., Cochise Co., AZ (2005-169, 176, 180, 181, 182); Reef Camp, Huachuca Mts., Cochise Co., AZ (2012-219, 220, 222, 223, 226). *G. longicercus* samples: S12-23 (G2245, G2247, G2260, G2261); S15-52 (G3086, G3276).

The multilocus analysis also varies in placement of *G. montis* Clade 1 depending upon analysis method: concatenated analysis places *G. montis* Clade 1 within the Veletis Group, whereas Astral analysis places *G. montis* Clade 1 with *G. montis* Clade 2. Given the apparent capture of *G. veletis* mtDNA by *G. montis* Clade 1 and *G. lightfooti* mtDNA by *G. montis* Clade 4, and the inconsistency between the concatenated and the Astral analyses, we predict that further more detailed genetic data, e.g. RAD-seq, will reveal a history of hybridization among the southwestern montane species of *Gryllus*.

During altitudinal transects in Arizona, starting in high elevation trees, one hears *G. montis* seamlessly transition to lower elevation, more open grassland *G. lightfooti* on Kitt Peak, Mt. Lemmon, Mt. Graham, Madera Canyon, and the Sedona area, with no or a very narrow zone of overlap. Also, *G. montis* can be narrowly sympatric, during such transects, with the lower elevation slow chirper *G. longicercus* (Kingman, Bisbee, Kitt Peak, Mt. Lemmon). *G. montis* microsympatric with both *G. lightfooti* and *G. longicercus* at 8.4 km SE Hualapai Mt. Park (S90-56) at 1524m, and in the town of Bisbee (S13-18). All 3 sympatric slow chirpers are acoustically distinguishable as follows: *G. longicercus* with individual pulses countable, both *G. montis* and *G. lightfooti* with pulses not countable but chirp rate some 50% slower in former compared to latter.

Hualapai Mt. Park, Mohave Co., AZ, is at 1829m, in good forest, and *G. montis* is common there. As one drives down Hualapai Mt. Road toward Kingman, female field crickets are occasionally observed wandering on the road. We can thus easily see the transition from almost all black *G. montis*, without tegminal bars, while under the tree canopy, to *G. lightfooti*, with tegminal bars, once into more open shrub-grassland. This shift is also seen while driving out of Madera Canyon in the Santa Rita Mountains. For example, at Bog Springs campground area under tree cover at 1527 m elevation, *G. montis* and *G. longicercus* found microsympatric (19-viii-2004); within 2.2 km linear distance into Sonoran grassland on Proctor Road at 1333 m elevation, both species completely replaced by *G. lightfooti* (10-ix-2010). The same situation occurs as one loses elevation going east from the Southwestern Research Station, near Portal, toward New Mexico.

Even surprising for a cricket species that lives at high elevations, repeated attempts to kill adults from Herb Martyr Dam, Chiricahua Mts. (S08-51), by placing them in a home freezer (-15°C) for 1-2 hours duration, all failed. Such treatment normally kills adult *Gryllus* of all species. On the fourth try, freezing them overnight succeeded.

Parasitized by tachinid *Exoristoides johnsoni* at both 40 km NE Prescott (S94-38, 2 males: one with 2 and second with 3 larvae); and 3.5 km SW Reserve (S94-51, 2 males: one with 1 and second with 2 larvae). Parasitized by mermithids: 1 female Ramsey Canyon (S13-17). One of seven males collected 26-vii-2005 at Miller Canyon, Huachuca Mountains (31.42620°, -110.25816°) parasitized by tachinid *Ormia ochracea* (1 larvae).

## The Lightfooti Group

*G. lightfooti* Weissman & Gray, n. sp.; *G. sotal* Weissman & Gray, n. sp.; *G. transpecos* Weissman & Gray, n. sp.

Sister species of chirping field crickets found primarily in Sonoran and Chihuahuan Desert scrub grasslands (*G. lightfooti*); the Organ Mountains of southern New Mexico (*G. sotal*); and in western Texas (*G. transpecos*). Songs similar, typically 3-5 pulse chirps (Figs 207, 208); best separated from each other by combination of distribution, habitat, morphology, and DNA (Gray *et al.* 2019, Fig. 209).

### *Gryllus lightfooti* Weissman & Gray, n. sp.

Arboreal Desert Field Cricket

Figs 205, 207–212, Table 1

‘G. #23’, ‘yucca *Gryllus*’ in DBW notebooks.

*Distribution.* Southeastern California through central and southern Arizona and New Mexico, into western Texas.

*Recognition characters and song.* A frequently arboreal, locally common field cricket that ranges from southeastern California through central and southern Arizona and New Mexico, into western Texas. Typically, a desert grassland species, extending into desert scrub and upper desert grassland/oak conifer zones. They can also colonize