

FIGURE 178. Known US distribution of *G. lineaticeps*.

***Gryllus personatus* Uhler**

Badlands Field Cricket

Figs 170–174, 179–182, 185, Table 1

1864 *Gryllus personatus* Uhler, Proc. Ent. Soc. Philadelphia 2: p. 547. Type locality: Kansas. Holotype female (Fig. 179): “Collection of P. R. Uhler. *Gryllus personatus*_Kans. Uhler. Red type label, 14066.” In addition, there is a pink circular label without writing. Deposited at ANSP. Body length 14.6 mm, hind femur length 10.3 mm, pronotum 3.5 mm long and 5.3 mm wide. Holotype is a shriveled female once preserved in alcohol but now pinned. The head and pronotum are brown, area below eye straw brown or cream, short traverse band between the eyes, fastigium of vertex with three prominent straw brown streaks, entire lateral pronotal lobe straw brown, all legs uniform straw brown. The tegmina are darker yellow brown and almost reach the tip of the abdomen. Ovipositor curved and longer than hind femur.

‘Gryllus #17’ of DBW notebooks.



FIGURE 179. Holotype female of *Gryllus personatus*, with labels.

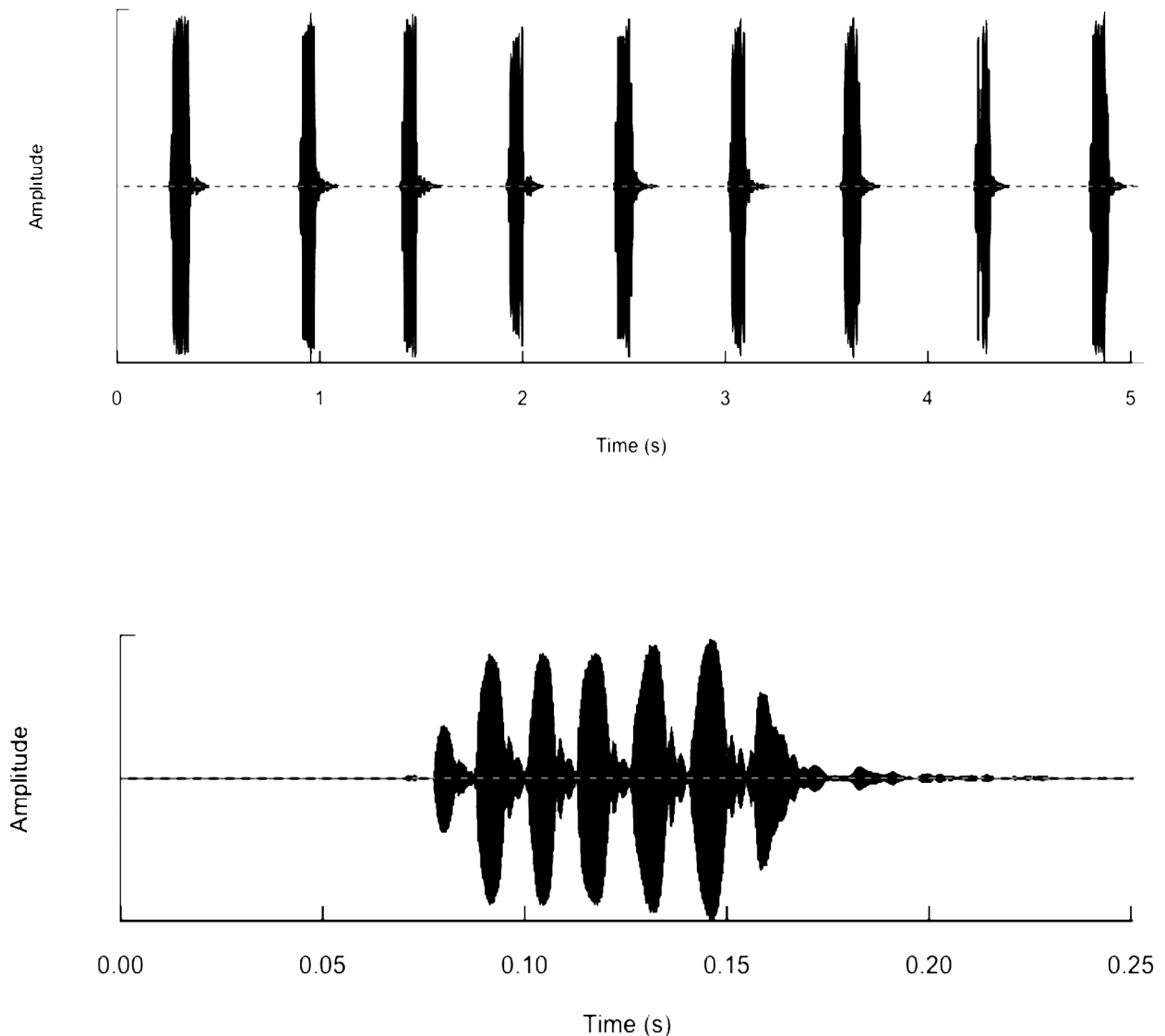


FIGURE 180. Calling song (R07-74) of *G. personatus* from Alpine, TX (S07-41), recorded at 25°C; lower panel shows structure of a single chirp.

Distribution. Known from seven western US states (see Fig. 181) and adjacent Mexico.

Recognition characters and song. Medium to very large crickets (see Table 1, p. 18). *Song* (Fig. 180, R07-74), at 25°C, unique within its range: chirps typically with 5-8 pulses, although all three males from Brackettville, TX, (S10-63), had 4 p/c. Usually from 100 to 180 c/m, pulse rate usually between 50-70 (range 48-91), dominant frequency 4 kHz. Probably two generations/year in southern distribution. Among western US taxa with similar songs, differs from sympatric (at Brackettville and Big Bend, Texas) *G. assimilis* that has a slower CR, more p/c, dull (hirsute) pronotum, inhabits moister areas such as lawns, and almost no light brown/straw colors on body. Differs from more western allopatric sister species *G. lineaticeps* which has a faster CR, higher dominant frequency (Fig. 173 and Gray *et al.* 2016b) and lacks cream colors on the head or body. Differs from usually allopatric sister species *G. staccato* that has variable p/c, a faster pulse rate and chirp rate, a higher dominant frequency (Fig. 173 and Gray *et al.* 2016b), a shorter ovipositor (Table 1, p. 18), more file teeth and teeth/mm, and occurs in hotter, dryer areas. Some male *G. staccato* can have very uniform number of pulses/chirp but can be separated from similar sounding *G. personatus* by the presence of some chirps with variable number of pulses. *G. personatus* and *G. staccato* have been found microsympatric only at the abandoned gas station at Road Forks, New Mexico (S81-38) near the southeastern Arizona border. Even there, separated by microhabitat as *G. staccato* within the confines of the abandoned gas station while *G. personatus* is in cracks in the clay-soil fields surrounding the gas station. Both taxa can have

linear head stripes, cream colored areas completely around the eyes frequently extending onto the lower, adjacent half of pronotum, and speckles on face between eyes. *G. personatus* usually at higher elevations.

Derivation of name. “persona” = mask; “tus” = having the nature of, which nicely describes the similarity seen in the holotype and many of our specimens that have facial and pronotum markings as seen in Fig. 179.

Geographic range. Fig. 181. Known from east and west of the Rockies from 335–2005m. Despite much collecting effort in the type locality of “Kansas,” we have not found this species there. It does occur near the western Kansas border at La Junta, Colorado (S09-82). Given the amount of land usage change in Kansas in the 150 years since the type was described, its absence in that state is not surprising. Fortunately, the distinctive coloration and color pattern of the holotype female leave us confident that this ID is correct. While we document 6 species of *Gryllus* in Kansas, none look like the holotype of *G. personatus*.

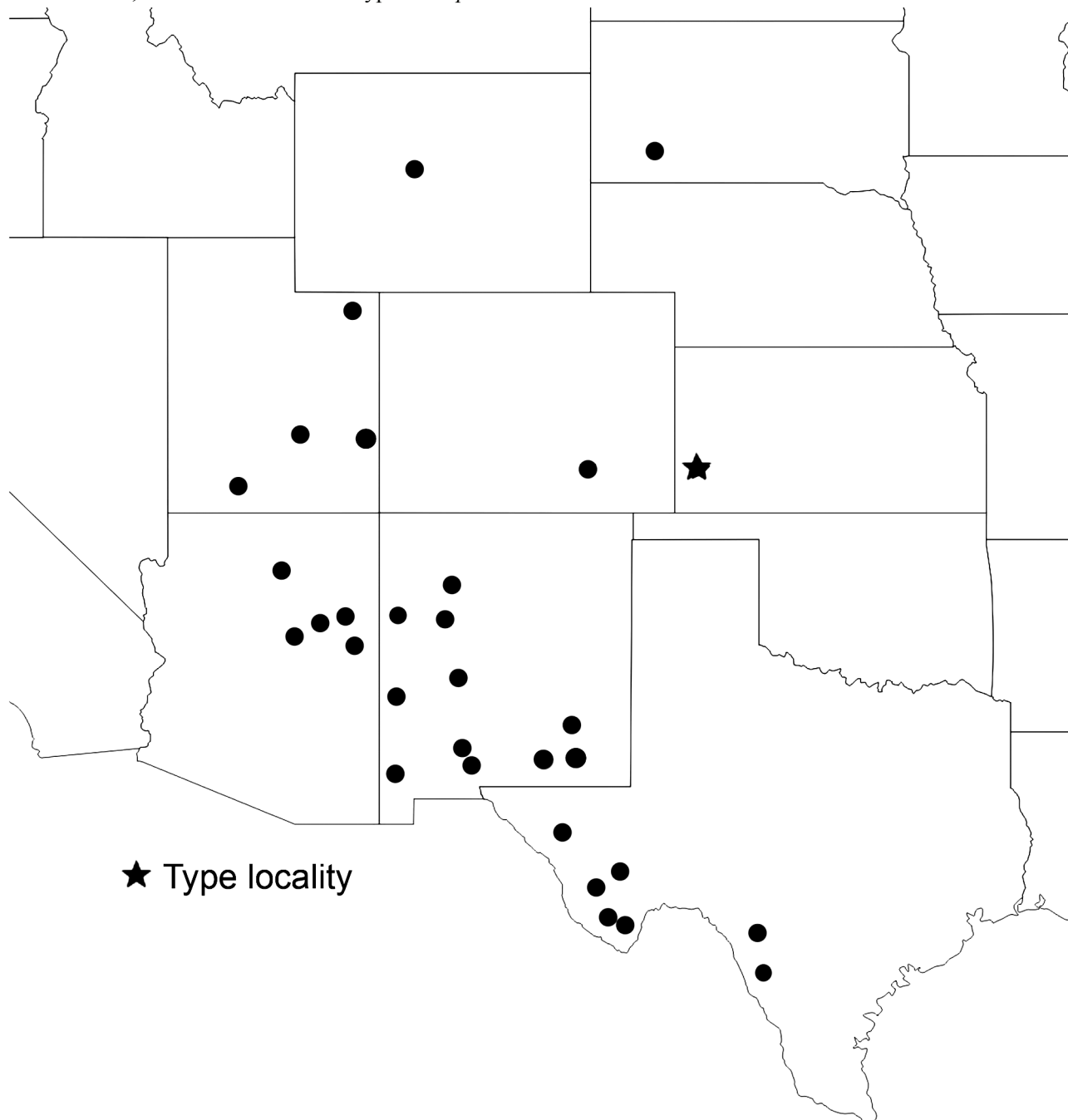


FIGURE 181. Known US distribution of *G. personatus*.

Habitat. When far from human habitation, this cricket frequently associated with clay-type badlands (Road Forks, NM, S81-38; near Dinosaur National Monument, CO, S99-128; and Badlands National Park, SD, S09-89), usually living in deep cracks and the only *Gryllus* resident there, except at Badlands where it occurs with *G. mak-*

hosica. Found within ~100 meters of *G. saxatilis* in San Juan Co., UT (38.399167, -109.401148, on 26-v-2017), but separated by microhabitat (clay soils v. rocky slope). Also occurs around human structures in towns away from clay soils.

Life cycle and seasonal occurrence. No egg diapause (checked from Las Cruces, NM, S83-103; and Tom Green Co., TX, S88-31). Probably 2 generations/year in southern distribution (e.g. Big Bend, Texas [S85-39]), but undoubtedly one generation in Badlands National Park, South Dakota. Adults known from mid-March into September but we have not collected areas where it could occur outside of this time period.

Variation. Color: Variable from light colored bodies, frequently with linear head stripes (Fig. 182) similar to those seen in *G. staccato*, to individuals almost pure black except for a light-colored patch below the eyes (Fig. 182) as seen in one male from Badlands National Park, SD, S93-53 and one female from Alpine, TX, S07-41). Females can have a light tegminal stripe along the fore wing angle (Fig. 182). **Pulses/chirp:** see "Discussion". **Wing length:** Of 155 individuals of both sexes, 56 had long hind wings.



FIGURE 182. Color variation in *G. personatus*, moving left to right: Navajo Co., AZ (S91-86); Navajo Co., AZ (S91-88); Navajo Co., AZ (S91-86); Tom Green Co., TX (S88-31); Alpine, TX (S07-41).

Specimens examined. Arizona. Coconino Co., 3.1 m SE Yuba City, 4800', 6-viii-1991 (S91-82), 1♀. Hwy 99 6.85 road m NW intersection US 40, 4900', 8-viii-1991 (S91-89) 1♀. *Navajo Co.,* Holbrook, 5080' 8-ix-1999 (S99-116) 1♂. Winslow, 4852', 10-viii-2003, 10♂ 9♀; 10-viii-2010, 4♂ 9♀; 27-vii-2012, 6♀. Hwy 77 0-12 m N US40, 5400', 7-viii-1991 (S91-86) 5♂ 5♀. Hwy 180 1 m S entrance Petrified Forest National Park, 5400', 8-viii-1991 (S91-88) 1♂; 8-ix-1999 (S99-114) 1♀. **Colorado. Crowley Co.,** Manzanola, 4200', 26-viii-1989 (S89-65) 1♂ 3♀. *Huerfano Co.,* 10 m E Walsenburg, 5800' 22-vi-1987 (S87-64) 1♂ 1♀. *Otero Co.,* La Junta 4100', 2-vii-2009 (S09-82) 2♂ 6♀. *Pueblo Co.,* Hwy 96 between Fowler and Hwy 50, 4300-4600', 26-viii-1989 (S89-64) 1♂. **New Mexico. Chaves Co.,** Roswell, 28-vi-2009 (S09-58) 2♂. *Cibola Co.,* Grants, 6340' 1-vii-1994 (S94-43) 2♂. *Dona Ana Co.,* Las Cruces, 26-vi-1983 (S83-103) 5♂ 2♀; Las Cruces, University New Mexico, 23-viii-1982 (S82-99) 2♂. *Eddy Co.,* Artesia, 3428', 30-vi-2015 (S15-58) 1♂ 1♀. Hope, 4095' 30-vi-2015 (S15-57) 1♂ 1♀. *Hidalgo Co.,* Road Forks, 4000', 29-vii-1981 (S81-38) 2♂. *McKinley Co.,* Gallup, 2005m, 27-vii-2003, 35° 31' 56.9" -108° 39' 57.8 (DAG2003-31) 1♂. *Sandoval Co.,* San Ysidro, 5600' 6-vi-1985 (S85-51) 1♂. *Socorro Co.,* Socorro 4460' 13-vi-2007 (S07-50) 3♂ 2♀; 29-vi-2015 (S15-54) 1♂ 1♀. **South Dakota. Jackson Co.,** Badlands National Park, Big Badlands Overlook, 3100', 22-vi-1993 (S93-53) 12♂ 3♀; 30-vii-1997 (S97-90) 1♂. Cedar Pass, 2700' 29-viii-1989 (S89-75) 1♂; 3-vii-2009 (S09-89) 4♀. **Utah. San Juan Co.,** Blackridge, 3.1 m E Hwy 191, 5849', 38.399167, -109.401148, 26-v-2017, 1♀. *Uintah Co.,* Hwy 149 1 m S entrance Dinosaur National Monument, 5000' 10-ix-1999 (S99-128) 1♂. *Washington Co.,* W border of Zion National Park, 4060' 10-vi-1996 (S96-55) 1♂ 1♀. *Wayne Co.,* Hanksville, 4500' 1-viii-1992 (S92-109) 1♂. **Texas. Brewster Co.,** Alpine, 4200', 5-vi-1991 (S91-44) 1♂ 3♀; 12-vi-2007 (S07-41) 6♂ 4♀. Big Bend National Park, Rio Grande Village, 2100' 11-iii-1985 (S85-39) 4♂ 4♀; 9-vi-1985 (S85-56) 4♂ 2♀; 5-vi-1991 (S91-43) 2♂ 2♀; 28-v-2016 (S16-12) 5♂ 6♀. 12 m SW Marfa, 19-viii-1984 (S84-53) 1♂. Hwy 118 near Terlingua, 2566' 2-vii-2015 (S15-71) 5♂ 2♀. *Culberson Co.,* Van Horn, 4100' 6-vi-1991 (S91-48) 5♂ 2♀. *Dimmit Co.,* 19-viii-1964, TJ Walker, 2♂. *Kinney Co.,* Brackettville, 1160' 7 and 8-ix-2010 (S10-63) 4♂ 6♀. *Presidio Co.,* Presidio, 2400' 26-vi-1986 (S86-46) 1♂; 27-v-2016 (S16-5, 6) 2♂ 2♀. *Tom Green Co.,* near junction Hwy 277 and 67, 1900' 11-vi-1988 (S88-31) 2♂ 1♀. **Wyoming. Fremont Co.,** Shoshoni, 4849', 18-vii-2011 (S11-72) 1♂.

DNA. Multilocus G1357, La Junta, CO, S09-82. Two sister species are *G. lineaticeps* (multilocus 2016-033) and *G. staccato* (multilocus 2016-034) (Gray *et al.* 2019). 16S DNA groups all 3 species together (also see Gray *et al.* 2016b).

Discussion. *G. personatus* typically has between 5-8 p/c, except for the 3 collected males from Brackettville, Texas (S10-63), its most eastern locality, where each had 4 p/c. *G. assimilis* has similarly spaced chirps but with 6-9 p/c, and it is generally separated ecologically from the former. We initially wondered if calling-song character displacement might be operative in reducing the p/c in this Brackettville *G. personatus* population? We subsequently discovered both species also sympatric at Rio Grande Village (S16-12) in Big Bend National Park, TX, where *G. assimilis* sang its typical song and the 5 recorded males of *G. personatus* had 6-7 (range 5-8) p/c.

G. personatus has been used in several recent investigations: Gray *et al.* 2016b, Gabel *et al.* 2016, Hennig *et al.* 2016, Blankers *et al.* 2016.

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

Stutter-Chirping Field Cricket

Figs 170–174, 183–188, Table 1

‘*Gryllus* #15’ in DBW notebooks.

‘G15’ and irregular chirping cricket in Sakaguchi & Gray 2011, Blankers *et al.* 2016.

‘*G. staccato*’ in Gray *et al.* 2016b, Gabel *et al.* 2016, Hennig *et al.* 2016.

Distribution. Arizona and adjacent deserts of California, Nevada, Utah, and New Mexico.

Recognition characters and song. Most variable calling song of any US *Gryllus*. A medium to large sized cricket with a shiny pronotum generally at low elevations in some of the hottest, driest desert areas of the southwestern US, including most of Arizona (except for the northeast corner). **Song** loud, unique for New World *Gryllus*: many individuals produce a highly irregular “stuttered” series of chirps (Fig. 183, R15-291) with high variability in inter-chirp interval. Chirps at 25°C with variable p/c (typically 3-9; range 1 to 10), variable CR (typically 120-240; range 100-720) depending on p/c and inter-chirp interval, pulse rate 70-110, dominant frequency 5.25 kHz. Within most populations, 10 to 60% of males sing with a more or less constant number of p/c and uniform inter-chirp interval (Fig. 184A, R11-124) with some males (see Fig 184B, R09-147) singing both regular and irregular segments. Color usually light (Fig. 186) but dark individuals (Fig. 187) known even in summer. If male singing irregular stutter-chirp song, then can be confused with no other US *Gryllus*. If singing with constant p/c and uniform inter-chirp intervals in the Southwestern US, then only has to be distinguished from *G. lineaticeps*, *G. personatus*, and *G. multipulsator*. From allopatric sister species *G. lineaticeps*, no overlap in distribution (Fig. 172), DNA (Fig. 174), and pulse rate (Fig. 173). From allopatric sister species *G. personatus*, which it most closely resembles morphologically and which it geographically broadly overlaps in only north-central Arizona and SW New Mexico (but has been only found microsympatric with *G. personatus* at Road Forks [S81-38 and S12-104] and Socorro [S07-50], New Mexico), *G. staccato* is distinguished by a combination of characters (Table 1, p. 18): more file teeth and more teeth/mm on average, shorter ovipositor relative to body size (Fig. 185), microhabitat different (dirt substrate vs. clay substrate), although both can occur at gas stations that have bright night lights, no overlap in dominant frequency (Fig. 173), irregular pulses/chirp, faster PR and CR, and differences in DNA. Both taxa can have linear head stripes, cream colored areas completely around the eyes frequently extending onto the lower, adjacent half of pronotum, and speckles on face between eyes. *G. personatus* usually at higher elevations. From *G. multipulsator*, which it overlaps in distribution in southeastern CA, southern NV, and west-central AZ, the latter has more p/c, slower CR and a hirsute (dull) pronotum and general absence of linear lines on the head.

Holotype. Male (Fig. 186). USA. Arizona, Pima Co., Ajo. 1-viii-2009. 520m. D.B. Weissman. S09-102, R09-149, DNA sample G1410. 16S ribosomal RNA gene GenBank accession # MN136664. Body 25.3, HF 12.88, LC 13.09. Right tegmen removed: 149 teeth, file length 3.45, TL 14.8, TW 4.6. Type deposited in CAS, Entomology Type #19271.

Paratypes. (Total: 132♂ 109♀) **Arizona.** *Cochise Co.*, Benson, 1240m, 27-vi-2009 (S09-54) 1♂. Wilcox Playa, 4155', 29-vii-2015 (S15-104) 32° 11' 55.5" -109° 52' 42.4", 2♂ 1♀. *Coconino Co.*, Sedona, 4400', 25-vi-1980 (S80-45) 4♂; 15-vi-1990 (S90-49) 1♂; 30-vi-1994 (S94-35) 1♂; 12-vi-1996 (S96-61, at airport) 1♀; 15-vi, 2007 (S07-61) 1♂ 5♀. *Gila Co.*, Coolidge Dam, 2400', 30-vii-1981 (S81-43) 2♂. Globe, 3548', 30-vii-1981 (S81-44)