

A MORPHOLOGICAL KEY TO FIELD CRICKETS
OF SOUTHEASTERN UNITED STATES
(ORTHOPTERA: GRYLLIDAE: *GRYLLUS*)¹

D. A. NICKLE AND T. J. WALKER²

Department of Entomology and Nematology
University of Florida, Gainesville 32611

ABSTRACT

Five species of *Gryllus* occur in southeastern United States: *assimilis* (Fabricius), *firmus* Scudder, *fultoni* (Alexander), *ovisopis* Walker, and *rubens* Scudder. They can be identified by head and tegminal color patterns, tooth number and length of stridulatory file, and dimensions and proportions of wings, pronotum, ovipositor, posterior femur, and tympana.

From 1915 to 1957, all field crickets of eastern United States were assigned to a single species: *Gryllus* (or *Acheta*) *assimilis*. Prior to 1915, as many as 12 species were recognized, and these were separated on the basis of coloration, size, wing venation, and lengths of structures such as tegmina, legs, and ovipositor. These characters are variable, and after making careful measurements and comparisons of hundreds of preserved specimens, Lutz (1908) and Rehn and Hebard (1915) concluded that all field crickets in North America belonged to a single though highly variable species.

Fulton (1952) proved that this approach oversimplified *Gryllus* taxonomy. He showed that in North Carolina four populations occurred with distinctive songs, seasonal histories, and habitats. In crossing experiments he got no hybrids between populations, although his control crosses usually produced offspring. Alexander (1957) revised the taxonomy of *Gryllus* of eastern United States, recognizing 5 previously described species and 1 new species. Alexander and Walker (1962) added *G. assimilis* (strict sense) to the *Gryllus* known from southeastern United States, and Walker (1974) added *G. ovisopis*.

This paper presents a key for identifying adult field crickets of southeastern United States. No adequate key has been published, and one is needed. For example, in the Florida fire ant project, Mirex bait residues are being monitored with field crickets (D. J. Wojcik, pers. comm.), and for effective monitoring, the species must be distinguished.

The key is intended to be useful in identifying dried specimens or specimens preserved in alcohol. Tegminal characters are more easily seen if the tegmen is mounted between glass slides, a simple procedure with alcohol-preserved specimens. The key is most effective in identifying mature adults, since teneral specimens lack the characteristic markings used in the key. Measurements were made with the apparatus described by Grant (1965).

File Characters. Rakshpal (1960) and Alexander and Walker (1962) reported that the number of teeth in the stridulatory file is useful in distin-

¹Florida Agricultural Experiment Station Journal Series No. 5008.

²Research Associate, Florida State Collection of Arthropods.

guishing certain species of *Gryllus*. Table 1 and Fig. 10 show the results of examining files of the 5 species considered here. The greater number of teeth distinguishes *G. firmus*. *G. ovisopis* and *G. fultoni* overlap in each of their file characteristics (Table 1), but their clusters of points are discrete (Fig. 10). *G.*

TABLE 1. CHARACTERISTICS OF STRIDULATORY FILES OF SOUTHEASTERN *Gryllus*. TWENTY REARED INDIVIDUALS OF EACH SPECIES WERE EXAMINED. EACH SAMPLE OF 20 INCLUDES PROGENY OF AT LEAST 3 FEMALES. IN EACH SAMPLE SOME CRICKETS WERE REARED OUTDOORS AND SOME IN THE LABORATORY.

Species	Number of Teeth		Length of File (mm)		Teeth per mm	
	$\bar{x} \pm \text{S.D.}$	range	$\bar{x} \pm \text{S.D.}$	range	$\bar{x} \pm \text{S.D.}$	range
<i>assimilis</i> *	113 \pm 5	102-121	3.2 \pm 0.2	2.6-3.5	36 \pm 2	33-39
<i>firmus</i> **	185 \pm 13	166-210	3.8 \pm 0.3	3.3-4.4	48 \pm 3	42-53
<i>fultoni</i> **	115 \pm 8	100-133	2.8 \pm 0.2	2.2-3.1	41 \pm 2	37-46
<i>ovisopis</i> **	141 \pm 8	126-154	2.7 \pm 0.7	2.3-3.1	50 \pm 4	45-59
<i>rubens</i> **	103 \pm 7	91-117	2.7 \pm 0.2	2.3-3.2	40 \pm 2	34-42.

*Homestead, Fla.

**Alachua Co., Florida

rubens, *G. assimilis*, and *G. fultoni* broadly overlap in the features of their files.

Geographical Ranges. *Gryllus assimilis* is restricted to south Florida below Lake Okeechobee. *G. rubens* and *G. firmus* are widely distributed in the southern states and have been found in all parts of Florida. The range of *G. ovisopis* is poorly known, but it has not been found south of Gainesville. Northward it probably extends at least into south Georgia. *G. fultoni* is widely distributed in the eastern United States, but in Florida it is not known south of Gainesville except for a population on Key Largo!

The western limits of usefulness for the key are uncertain. In western Florida and Mississippi, *G. rubens* is replaced by, or is overlapped by, or intergrades with, a similar but faster trilling species known as *G. integer* Scudder (Alexander 1968).

A KEY TO ADULTS OF *Gryllus* OF SOUTHEASTERN U. S.

1. Lateral arms of ecdysial suture well-defined. Most of circumocular area light yellow-brown (Fig. 1). Metathoracic wings never shorter than tegmina (*i.e.* macropterous). Occurring only in South Florida *Gryllus assimilis* (Fabricius)
- 1'. Lateral arms of ecdysial suture poorly defined or obsolete. Most of circumocular area dark brown or with only a small patch of light beneath eye (Fig. 2, 3). Metathoracic wings sometimes shorter than tegmina (*i.e.* macropterous or micropterous). Not restricted to south Florida 2

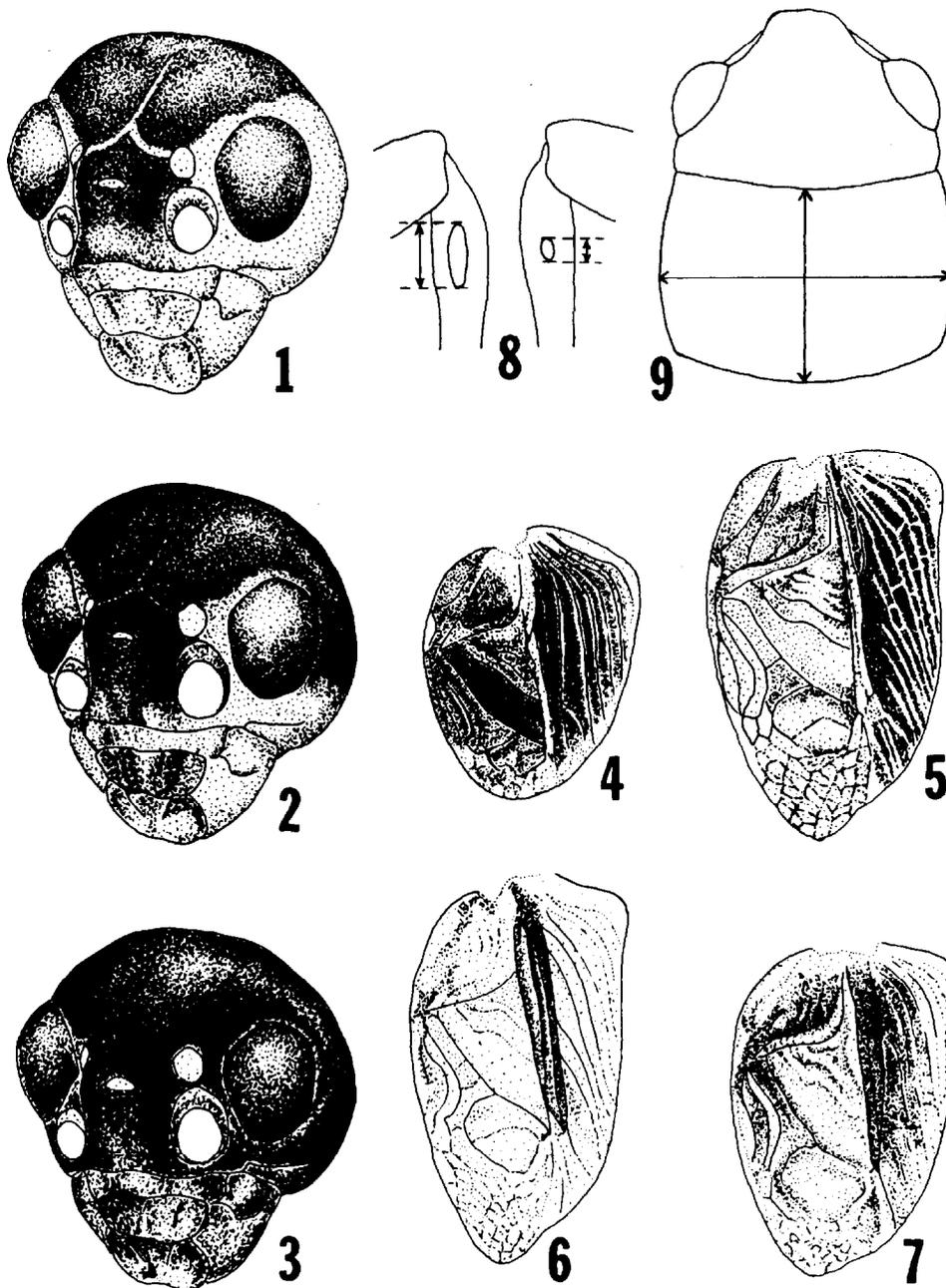


Fig. 1-9. Morphological features of *Gryllus* species. 1-3. Head color patterns, dorsolateral view: 1—*assimilis*; 2—*firmus*, *rubens*; 3. *ovisopsis*, *fultoni*. 4-7. Right tegmina of males: 4—*ovisopsis*; 5—*firmus*; 6—*rubens*; 7—*fultoni*. 8—Tympanal measurements. 9—Pronotal measurements.

2(1'). Length of tegmina less than 2 times median length of pronotum 3

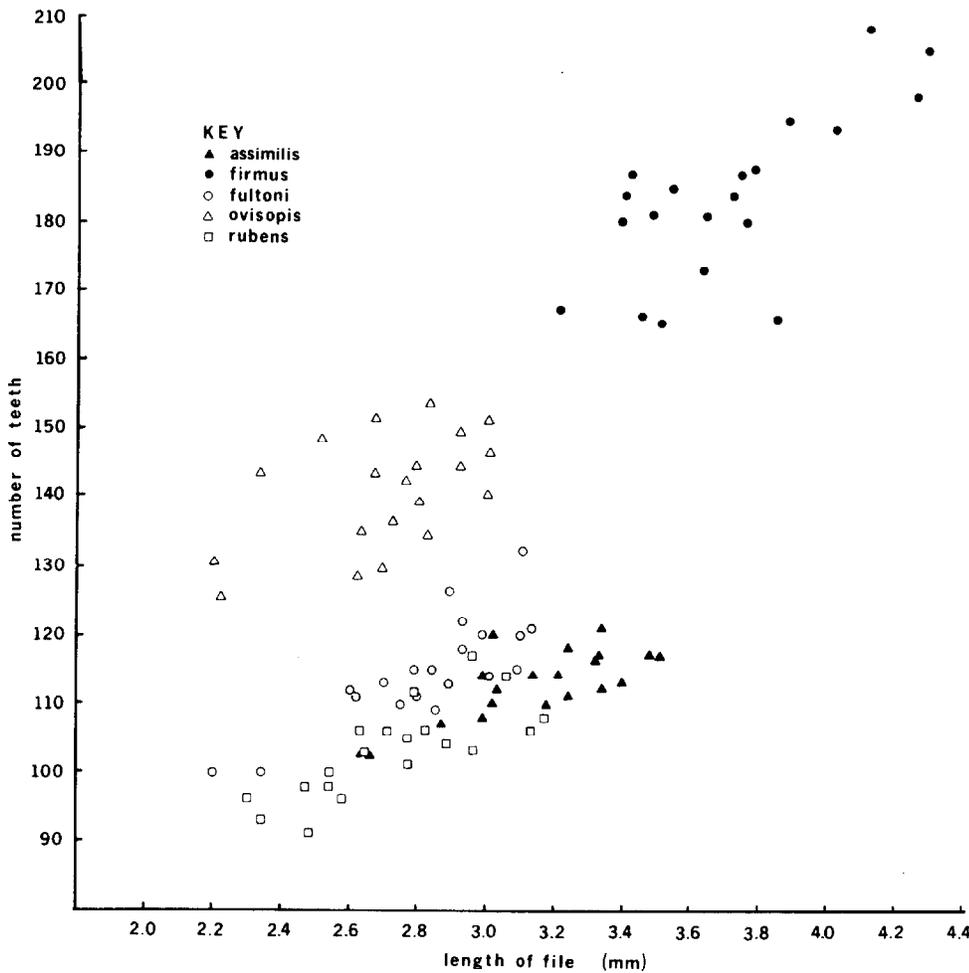


Fig. 10. Scatter diagram showing characteristics of the stridulatory files of 5 species of *Gryllus*.

- 2'. Length of tegmina greater than 2 times median length of pronotum 4
- 3(2). Tegmina dark brown (Fig. 4). Stridulatory file usually with more than 125 teeth and mean number of teeth \times mm⁻¹ greater than 45. Length of ovipositor greater than \times 1.30 length posterior femur. Adults only in fall
Gryllus ovisopis Walker
- 3'. Tegmina pigmented as in Fig. 7. Stridulatory file with fewer than 125 teeth and mean number of teeth \times mm⁻¹ less than 45. Length of ovipositor less than \times 1.20 length posterior femur. Adults not restricted to fall
Gryllus fultoni (Alexander) (in part)
- 4(2'). Stridulatory file with more than 160 teeth. Lateral fields of tegmina with numerous conspicuous cross-veins. Coloration of costal area entirely dark brown with light-colored veins and cross-veins (Fig. 5) *Gryllus firmus* Scudder

- 4'. Stridulatory file with fewer than 160 teeth. Lateral fields of tegmina with few or inconspicuous cross-veins. Coloration of costal area usually light brown and venation not contrastingly lighter 5
- 5(4'). Lateral field of tegmen with a well-defined narrow dark stripe along costal vein (Fig. 6). Length of posterior tympanum less than $\times 3.5$ length of anterior tympanum. Pronotal width more than $\times 1.3$ pronotal length *Gryllus rubens* Scudder
- 5'. Lateral field of tegmen lacking a well-defined stripe along costal vein (Fig. 7). Length of posterior tympanum greater than $\times 3.5$ length of anterior tympanum. Pronotal width less than $\times 1.3$ pronotal length *Gryllus fultoni* (Alexander) (in part)

LITERATURE CITED

- Alexander, R. D. 1957. The taxonomy of the field crickets of the eastern United States (Orthoptera: Gryllidae: *Acheta*). Ann. Ent. Soc. Amer. 50:584-602.
- Alexander, R. D. 1968. Life cycle origins, speciation, and related phenomena in crickets. Quart. Rev. Biol. 43:1-41.
- Alexander, R. D., and T. J. Walker. 1962. Two introduced field crickets new to eastern United States (Orthoptera: Gryllidae). Ann. Ent. Soc. Amer. 55:90-94.
- Fulton, B. B. 1952. Speciation in the field cricket. Evolution 6:283-295.
- Grant, H. J., Jr. 1965. A measuring device for use in insect systematics. Ent. News 76:249-251.
- Lutz, F. E. 1908. The variation and correlations of certain taxonomic characters of *Gryllus*. Univ. of Chicago, Chicago. 63 p.
- Rakshpal, R. 1960. Sound-producing organs and mechanisms of sound production in field crickets of the genus *Acheta* Fabricius (Orthoptera: Gryllidae). Can. J. Zool. 38:499-507.
- Rehn, J. A. G., and M. Hebard. 1915. The genus *Gryllus* as found in America. Proc. Acad. Nat. Sci. Phila. 67:293-322.
- Walker, T. J. 1974. *Gryllus ovisopis* n. sp.: an egg-diapausing univoltine cricket with no calling song (Orthoptera: Gryllidae). Fla. Ent. 56:13-22.