COLLECTION OF MALE PHANEROPTERINE KATYDIDS BY IMITATING SOUNDS OF THE FEMALE

JOHN D. SPOONER
Department of Biological Sciences
Augusta College, Augusta, Georgia

ABSTRACT

Males of 13 species of bush katydids (Orthoptera, Tettigoniidae, Phaneropterinae) have been collected by imitating the sounds made by the female. These sounds are important in the acoustical pair-forming systems of most species in the subfamily.

Males of several species of bush katydids (Orthoptera, Tettigoniidae, Phaneropterinae) can be collected by imitating the sound of the females. The method is particularly useful for attracting males of those species which inhabit treetops and thickets and thus generally are inaccessible. Grove (1959), probably the first to use the technique, describes collecting males of *Microcentrum rhombifolium* (Saussure) by imitating the female sound. Lloyd (1966) reports employing a similar technique for capturing male fireflies by simulating the flash-patterns of females.

Females of Phaneropterinae produce a tick at species-typical time intervals after certain sounds made by males. The tick of the female, which attracts males, can be simulated in a variety of ways, the only requisite being that the tick contain high frequency sound and be produced at a specific time after the male signal. Snapping the fingernails together or striking a knife blade against a solid object such as a beating net rod or glass has been successful. Best results have been obtained by striking the tip of a small knife blade against the curved bottom edge of a small bottle. Males of thirteen species have been collected by attracting them in this manner.

To attract a male, the timing of the female response is critical. It varies significantly between species and is influenced by ambient temperature. Furthermore, in certain species, the timing of the female answer varies geographically. Mean timing values of effective female answers near 25°C, measured from responsive females of eastern United States, are as follows: *Scudderia texensis* Saussure-Pictet, 1.16 sec.; *S. furcata* Brunner, 1.37 sec.; *S. cuneata* Morse, 0.35 sec.; *S. curvicauda* (DeGeer), 0.84 sec.; *Amblycorypha carinata* Rehn-Hebard, 0.10 sec.; *A. floridana* Rehn-Hebard, 0.14 sec.; *Inscudderia strigata* (Scudder), 0.95 sec.; *Microcentrum rhombifolium*, 0.16 sec. (Spooner, 1964 and in press). No precise timings have been measured for *Microcentrum minus* Strohecker, *M. retinerve* (Burmeister), *Amblycorypha oblongfolia* (*DeGeer*), or *Scudderia pistillata* Brunner. Yet males of *M. minus* and *S. pistillata* respond strongly to simulated ticks between one-half second and one second after the appropriate male call, while *M. retinerve* and *A. oblongifolia* are attracted to artificial ticks produced about one-tenth second after each male call.

Difficulties imposed by variations in female response timing can be largely overcome by varying the timing of simulated ticks between 0.1 and 1.5 seconds after the male call. Typical acoustical interactions between males and females of all species of *Scudderia* and *Microcentrum* investigated involve three steps: (1) male sound which elicits a tick from females, (2) female tick after a specific interval, and (3) rapidly delivered erratic ticks or shuffling sounds by the male (male spacing sounds). Not only do the

answered males produce the erratic response, but listening conspecific males often do likewise. The males begin repeating the sound which elicits the tick from females, and usually decrease the intensity of their sounds as if to prevent other males from overhearing. Males of *Amblycorypha* do not typically produce erratic sounds after they have been answered but often decrease the intensity of their sounds. A collector can determine the proper time to stimulate a female tick by noting the erratic behavior of answered males. It is important that the collector maintain a constant, high intensity simulated tick so as to give the appearance of a stationary female.

The biggest limitation to the general usefulness of this collecting procedure is lack of familiarity with phaneropterine singing behavior. The following observations may be of some value. Males of most bush katydid species regularly produce two or more calls, only one of which triggers answering ticks from females (Spooner, 1964 and in press). Further, males often take several minutes (5 - 30) to move all the way to the answering ticks (even to answering females), so that the collector should not become impatient too soon. Treetop inhabiting species sometimes are especially reluctant to move downward. Often, sexually responsive males do not sing, but they will still move toward ticks produced by females that are responding to singing males. One may overlook these silent males which sometimes alight on or near a collector before singing males arrive.

With practice, one can learn to recognize bush katydid calls. Crickets can be distinguished by the pure tones (pitch) of their highly redundant trills or chirps. Non-phaneropterine katydids produce buzzes or rasping chirps for long periods of time. Bush katydid calls typically are repeated only a few times in each acoustical performance, and several minutes elapse before the katydid sings again. Calls which elicit ticks from females are brief and consist of one to several pulses (usually less than 20). The calls of several species are described in detail by Spooner (1964 and in press).

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Dr. Alton N. Sparks has been appointed Investigations Leader for Southern Grain Insects Investigations and Director of the Southern Grain Insects Research Laboratory at the Georgia Coastal Plain Experiment Station, Tifton, Georgia. Born in Robert Lee, Texas, Dr. Sparks received the B.S. degree from Texas Technology College, Lubbock, Texas, and the M.S. and Ph.D. degrees from Iowa State College, Ames, Iowa. He and his wife, Dannie, three daughters, Tanya K., Beverly L., and Neta M. and one son, Alton, Jr., reside at 1627 North Park Avenue.