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A COMPARATIVE STUDY OF SOUND PRODUCTION
IN INSECTS, WITH SPECIAL REFERENCE TO THE
SINGING ORTHOPTERA AND CICADIDAE OF
THE EASTERN UNITED STATES
(VOLUMES I AND II)

Richard Dale Alexander, Ph. D.
The Ohio State University, 1956

Reprinted from DISSERTATION ABSTRACTS Vol. XVII, No. 5, 1957

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Forty-two species of Tettigoniidae, thirty-two species of Gryllidae, and ten species of Cicadidae are discussed. Descriptions and analyses of their sounds, and information on geographical, ecological, and seasonal distribution, and on singing behavior are included. The song analyses are based on approximately 700 tape recordings made between 1953 and 1956 in eastern United States, chiefly in Ohio, Indiana, and Illinois, but also in Kentucky, Tennessee, West Virginia, and North Carolina. Audiospectrograms (made with Vibralyzer, manufactured by Kay Electric Company, Pinebrook, New Jersey) or diagrams are presented for every type of sound recorded. For many species this, in addition to the common or calling song, includes courtship, fight, "protest," and several other sounds, with accompanying notes on the behavior associated with the production of the different sounds.

Special taxonomic problems are reviewed and clarified in several genera (Acheta, Anaxipha, Oecanthus, Nemobius, Amblycorypha, Orchelimum, and Tibicen), with particular emphasis on the value of comparative sound analysis. An especially detailed account is included of the distributional, ecological, seasonal, morphological, and song relationships, and of the degree of reproductive isolation of the eastern field crickets (Acheta spp.).

A general discussion of the nature and significance of sound production in insects reviews our present knowledge of which insects produce sounds, of how and when they do it, and the biological significance of the different sounds produced by different orders and families. Chapters are included on equipment and methods in the study of insect sounds (the history of instrumental analysis, and the suitability of different kinds of recording and analyzing equipment for different types of studies), the effect of temperature on insect sounds, and the evolution of sound production and mating behavior in orthopteroid insects.

In addition to audiospectrographs, the illustrations include photographs and drawings of singing Orthoptera and their sound-producing apparatus; the equipment and techniques used in this study; scatter diagrams on the effect of temperature on frequency and pulse rate in insect songs; and diagrams showing the seasonal and daily song periods, and ecological distribution, of Ohio singing Orthoptera and Cicadidae.

The bibliography of about 1,500 references on sound production and perception in arthropods is divided into 26 sections, with the references dealing with different orders or parts of orders separated for convenience. A section is included on arthropods other than insects, and another on general references. The appendix contains field notes on the evening singing behavior of Orthoptera and Cicadidae, with data on temperature, relative humidity, and light intensity.

547 pages. \$6.95. Mic 57-1854

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