

MORPHOLOGY OF THE FEMALE ORGANS OF REPRODUCTION IN THE MIRIDAE (Hemiptera)¹

NORMAN T. DAVIS

Department of Zoology and Entomology, University of Connecticut, Storrs

This investigation was undertaken in order to provide a more complete understanding of the structure and function of the parts of the female reproductive system in Miridae. Special emphasis has been given to the structure of the genital chamber and to the possible homologies of its parts. Since certain structures of the genital chamber are now becoming important as taxonomic characters, there exists a definite need for a morphological study so that these structures may be adequately understood. When possible, it is highly desirable that names of structures used in taxonomy be standardized by determining the existing homologies in various groups of insects. This must be done to avoid adding to the abundant synonymy and excessive number of morphological names. Of course, in many instances structures apparently become differentiated out of relatively unspecialized areas and, therefore, no particular homologies exist. To such structures descriptive names can be applied. However, basing such descriptive names on the location relative to structures which can be homologized should avoid needless complexity in morphological names.

The study of the female reproductive system of Miridae is also of great interest from a purely morphological point of view. In Miridae, as well as in Reduviidae, Nabidae, and Anthocoridae, the arrangement of the genital organs and genital ducts appears to be distinctly different from the arrangement in other Hemiptera as well as from insects in general. In so far as is known, the definitive spermatheca of insects arises posterior to the opening of the median oviduct. In Miridae the sperm receiving organ lies anterior to the median oviduct opening, but it is not known whether this organ is homologous to the spermatheca of other insects or if it is an organ peculiar to this group.

Final determination of the homologies of certain structures of the female genitalia of mirids must await more extensive studies of the genitalia of other Hemiptera. However, it is felt that the present investigation will at least provide a useful link in the eventual establishment of a complete knowledge of the female genitalia of the various groups of Hemiptera.

Four species, *Lygus lineolaris* (Palisot de Beauvois)*, *Miris dolabratus* (Linnaeus), *Lopidea staphyleae* Knight, and *Plagiognathus albatus* (Van Duzee), were studied in detail during the course of this investigation. These species were selected because it was felt that each was representative of one of the several types of modifications of the female genitalia found in Miridae and these species were readily available to the author during certain parts of the spring and summer.

REVIEW OF LITERATURE

Although thorough studies have been made of the genitalia of some Hemiptera, there was almost no knowledge of the anatomy of the female genitalia of Miridae until extensive investigations were made by Kullenberg (1946, 1947). His first paper was concerned primarily with the biology of Swedish species, but in connection with his biological studies he investigated the mating positions and egg laying habits of various species and described the general anatomy of the external genitalia of the mirid female. In his second paper Kullenberg published the results of an extensive investigation of the anatomy and function of the various parts of the male and female reproductive systems of Miridae. This study included a general description of the anatomy of the genitalia and of the copulation process of twenty four species. In another phase of this study Kullenberg has described the tissues of the reproductive organs.

Kullenberg made his studies largely from a standpoint of functional anatomy rather than of comparative morphology. Consequently the names which he has applied to many of the structures of the genital chamber are primarily descriptive and without basic morphological significance. However, it should be noted that the extensive scope of Kullenberg's studies and his emphasis on functional anatomy provide a most valuable guide in establishing homologies.

The next important study concerned with the female genitalia of Miridae was by Slater (1950). His investigation of the structure of the female genitalia for taxonomic characters successfully demonstrated that certain sclerotized parts in the

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**Lygus lineolaris* (P.B.) has recently been shown by Slater and Davis (1952) to be the valid name of the Nearctic *Lygus* known in the economic literature as the Tarnished Plant Bug.