UPON THE FUNCTION OF THE PSEUDOSTERNITE IN THE ACRIDIIDAE

by C. J. Spencer
University of British Columbia, Vancouver

The tip of the typical male Acridiid abdomen consists of the large, bulbous, up-turned ninth sternum which meets dorsally, the terminal tergite or telson as illustrated in the accompanying diagrams. If this ninth sternum or subgenital plate be depressed, there comes to view a reddish, much-folded membrane, the pallium (Fig. 1.) which in turn conceals the intromittent organ or aedeagus; the aedeagus is composed of two dorsal and two ventral lobes (Fig. 2.) lying in the deeply depressed genital cavity. Cephalad of the aedeagus and still further sunk in the genital cavity, lies a heavily sclerotised plate, the pseudosternite or epiphallus (Figs. 2 and 3, **epi. st.**). The conformation of this structure varies more than any other part of the male genitalia and forms a valuable point for separation of the species of the Acridiidae. Unfortunately, it is so sunk and concealed in the genital cavity, and snaps back into place so readily, that it is difficult to expose even in fresh insects without injuring the surrounding parts, unless the specimens are captured in the act of pursuing females, when the genitalia are often partly extended; in dried specimens it is necessary to make caustic potash preparations necessitating mutilation of the specimen.

This remarkable structure is roughly square or rectangular and carries very variously-formed projections at the four corners; the anterior or cephalic hooks are better developed than the caudal ones which may be poorly developed or wanting. The hooks point latero-cephalad.

I first observed this structure many years ago when working on the homology of insect genitalia and became interested in its function, but could find no reference to it in literature. This note is concerned only with the function of the pseudosternite, which function I determined by watching grasshoppers in the field at mating time, checked by a laboratory study of **Camnula pellucida** Sc. For this study, specimens were collected in coitu in the field, killed in a powerful cyanide bottle, the bodies snipped off behind the meta-legs and the abdomens dehydrated and embedded in wax, still clasped together. A sagittal section was then made with a razor and the relationship of the parts checked. The mating clasp of **camnula** is so strong that some specimens were obtained by stalking a pair mating in the field, snipping off the thorax of the male with a pair of scissors and then before the female could hop away, snipping through her body also; the locked-together abdomens were then dropped into alcohol, and in some cases, remained tightly clasped.

Incidentally, I have often studied the mechanics of egg-laying of **Camnula pellucida** by this method of snipping in two, the bodies of ovipositing females; the thorax hops away with a startled expression indicated by the excited movements of the antennae, while the abdomen remains inserted in the ground, placidly continuing the egg-laying. By grasping one wall of the severed abdomen with forceps and gently lifting it from the ground, the action of the valves when digging and the extrusion of the eggs and froth, can be readily followed. De-

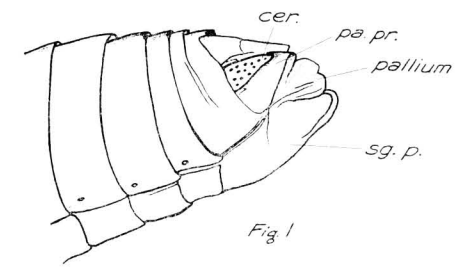

Fig. 1

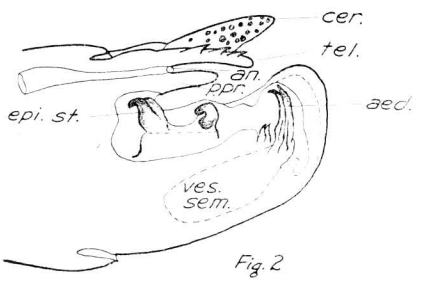

Fig. 2

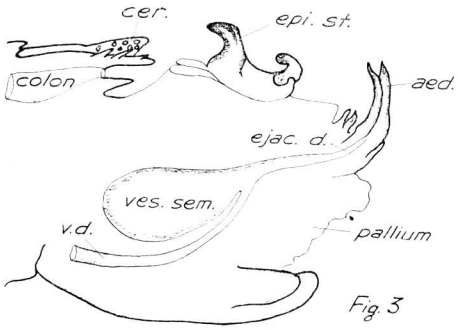

Fig. 3

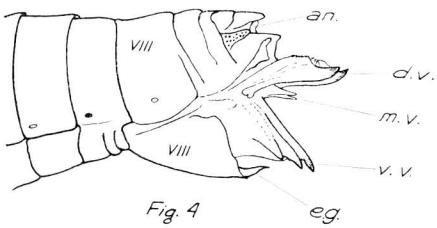

Fig. 4

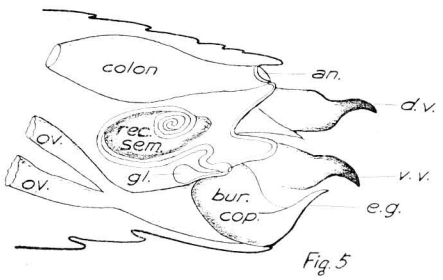

Fig. 5

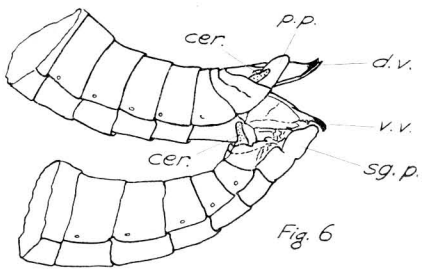

Fig. 6

Fig. 1: Male **Acridiid** abdomen slightly opened to show pallium.
Fig. 2: Male. Diagrammatic section to show relationship of parts.
Fig. 3: Details of fully expanded male genitalia.
Fig. 4: Female **Acridiid** abdomen, slightly opened to show external genitalia.
Fig. 5: Female. Diagrammatic section to show relationship of parts.
Fig. 6: Diagram showing mating clasp.

pending upon the number of eggs already laid, the process will continue in the air from two or three minutes to nearly fifteen minutes in extreme cases, before the muscles entirely cease their action or the quota number of eggs has been extruded.

In the field, the function of the pseudosternite is observable only at mating time when excited males are seeking females. At this time males walk around with their abdomens extended, the sub-genital plate depressed and the pallium cover partly withdrawn from the genital cavity. If the male finds a female, he jumps on her, bends his abdomen

to one side of and below hers and endeavors to establish the mating clasp. (The structure of the female abdomen is shown diagrammatically in Figs. 4 and 5). If the female is receptive, the male completely everts the floor of the genital cavity thus exposing the armature of the pseudosternite to the fullest extent, fastens the cephalic hooks of the apparatus around the caudal margin of female sternite VIII and pulls downwards. The hooks fit each side of the egg-guide (Fig. 4 **e.g.**), depress the whole sternite VIII, open the genital chamber or bursa copulatrix (shown partly cut away in Fig. 5 **bur. cop.**) and enable the aedeagus to be inserted into the opening of the receptaculum seminis.

Egg-laying females of **Camnula pellucida** are almost invariably attended by from one to five or six fighting males, one of which establishes the mating clasp immediately after egg-laying is finished and before the female has time to close the egg-laying mechanism (Fig. 6). However, if a female is feeding or has just arrived on the egg bed preparatory to laying, she can close the ovipositor valves and sternite VIII so tightly that no amount of grappling with the pseudosternite hooks will enable the male to establish the mating clasp, although the whole apparatus may be exserted to the full and literally turned inside out. The muscles of this entire structure are apparently in a state of permanent tension and are extended spring-like only at mating time. As soon as the mating clasp is established they return to tension, thus holding the female genitalia in a firm grasp aided, in some species, by the cerci.

INSECTS ATTACKING FOREST PRODUCTS AND SHADE TREES IN WASHINGTON AND OREGON IN 1937

by R. L. Furniss
U. S. Department of Agriculture, Bureau of Entomology and Plant Quarantine.

In the course of a year many requests for information concerning the control of insects attacking forest products and shade trees are received at the Portland, Oregon, laboratory of the Division of Forest Insect Investigations. These requests furnish much valuable information relative to the more important pests in these two groups. In addition, records of unusual interest are occasionally obtained from this source. The following discussion summarizes the most noteworthy observations resulting from 91 requests for information concerning insects affecting shade trees and forest products that reached the Portland forest insect laboratory in 1937.

Insects Attacking Forest Products—Inquiries concerning the control of ants, particularly those infesting dwellings, were most numerous. The calls, 24 in all, came in every month except January, February, and December. Sixteen of these calls concerned carpenter ants, **Camponotus. Camponotus maculatus** subsp. **vicinus** Mayr var. was the only carpenter ant definitely identified, although it is probable that **C. laevigatus** (Smith) was also present. In no case was extensive damage noted. These ants prefer to construct their nests in openings between floors and walls; only occasionally do they mine extensively in building timbers. A survey is needed to determine how much dam-