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SHORT COMMUNICATIONS

FUSION BETWEEN CERCI AND ABDOMEN IN MALE GOMPHINI DRAGONFLIES (ANISOPTERA: GOMPHIDAE)

S.W. DUNKLE

Department of Entomology and Nematology, University of Florida, Gainesville, Florida 32611, United States

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The fusion between cerci and abdomen in male Gomphini of both Old and New Worlds is described, and its possible effects on mating are discussed.

INTRODUCTION

The cerci of most male Odonata are movably articulated with abdominal segment 10, allowing for adjustments of grip when the male grasps the female head or prothorax during mating. I am not aware of any previous reports of immobility of the cerci in Odonata, but I have found that in live males of various species of *Arigomphus, Dromogomphus,* and *Gomphus,* the cerci were rigidly joined to abdominal tergite 10. CARLE (1986) in his classification of the Gomphidae placed these genera in the subfamily Gomphinae, tribe Gomphini, which prompted me to look for cercal fusion in related species.

METHODS

Using a dilute detergent solution, the tip of the abdomen was relaxed in dry male specimens representing all available species in Gomphinae in my collection and in the Florida State Collection of Arthropods. The specimens were then manipulated with forceps under a microscope to assess the flexibility of the cercal articulations.

RESULTS

The foregoing study revealed that all New World species of Gomphini have the male cerci fused with tergite 10. These include species of *Arigomphus, Dromogomphus,* and *Stylurus,* as well as the subgenera of Gomphus *(Gomphurus,*

Gomphus, Phanogomphus, and *Stenogomphurus).* All of the Old World species of Gomphini examined also showed cercal fusion, including *Gomphus graslini* Rambur, *G. melaenops* Selys, *G. postocularis* Selys, *G. pulchellus* Selys, *G. simillimus* Selys, *G. vulgatissimus* (Linnaeus), *Stylurus annulatus* (Djakonov), *S. flavipes* (Charpentier), *S. nagoyanus* (Asahina), and *S. oculatus* (Asahina). CARLE (1986) includes *Gastrogomphus* in the Gomphini, but no adequate specimens of that genus were available for examination. *Asiagomphus* should be placed in the Gomphini, and *A. pryeri* (Selys) also exhibits cercal fusion.

The few available specimens classified in other tribes of Gomphinae did not display cercal fusion. These were in 3 genera: *Anisogomphus maaki* (Selys), *Burmagomphus pyramidalis* Laidlaw, and *Notogomphus speciosus* (Sjöstedt). No specimens of the other 6 genera (all Old World) listed by CARLE (1986) in Gomphinae were available for study. Thus, so far as known, fusion between cerci and abdomen in the Odonata is restricted to, and characteristic of, the Gomphini.

The fusion between cerci and tergite 10 occurs by sclerotization of the dorsal membrane of the joint, and merely looking at the joint in a dry specimen does not necessarily reveal whether it is movable or not. The proximoventral edges of the cerci remain membranous. Fusion seems complete along the lateral and dorsal edges of the cercal bases in most species, but in some, such as *Gomphus postocularis,* the fusion is incomplete dorsomedially.

DISCUSSION

Fusion between cerci and abdomen means that in Gomphini the male abdominal claspers have only one movable joint, that at the base of the epiproct. Quite a different evolutionary direction was taken by male *Progomphus* (Lindeniinae, Progomphini) in which not only the two cerci but each half of the epiproct is movable (DUNKLE, 1984). The cercal fusion of Gomphini may produce two advantages. First, no muscular energy is necessary for maintaining the grip of the cerci on the female head, other than the muscles that move the epiproct. Second, since the angle of divergence between the cerci is fixed, mating with non-conspecific females might be prevented. This would particularly be true if a narrow width between the postocular bulges of a female did not allow simultaneous admission of both male cerci. A disadvantage of cercal fusion is that it does not permit much adjustment of male grip to individual females. The interesting phenomenon of cercal fusion should be looked for in other Odonata.

REFERENCES

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