

NOTE

**TAXONOMIC USE OF ENDOPHALLUS IN
WEEVILS OF THE GENUS *SITONA*
(COLEOPTERA : CURCULIONIDAE)¹**

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ABSTRACT

Endophallic structures in weevils of the genus *Sitona* Germar show a high degree of intraspecific stability and are excellent means for species separation. These characters have not been previously used in the taxonomy of this genus. The internal sac and its chief armature, the transfer apparatus, were examined in 9 species from southern Iran. The sac is basically composed of three pairs of lobes and a ventral papilla. The armature is made up of three pairs of sclerites, arranged together in a typical manner to form a complete apparatus for sperm transfer.

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استفاده تاکسونومیکی از دستگاه انتقال اسپرم در سرخرطومیهای
جنس *Sitona* (Coleoptera : Curculionidae)

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چکیده

ساختمان دستگاه انتقال اسپرم و ضمائم آن (endophallus) در سرخرطومیهای جنس *Sitona* از ثبات زیاد درون گونه‌ای برخوردار بوده و خصوصیتی با ارزش برای تفکیک گونه‌ها بشمار می‌رود. تا کنون از این خصوصیت در طبقه بندی جنس مذکور استفاده نگردیده است. دستگاه انتقال اسپرم و کیسه نگهدارنده آن در ۶ گونه از سرخرطومیهای جنس *Sitona* در جنوب ایران مورد مطالعه قرار گرفت. کیسه داخلی در کاملترین شکل خود دارای سه جفت لوب و یک پاپیل شکمی می‌باشد. دستگاه انتقال اسپرم از سه جفت قطعه سخت کیتینی تشکیل می‌گردد که به شکل مشخصی کنار یکدیگر قرار گرفته‌اند و یک ساختار کامل را برای عبور اسپرم به وجود می‌آورند.

INTRODUCTION

Investigations concerning the male genitalia of weevils (1, 6, 11, 12) have revealed that endophallic structures possess points of constancy in different groups and are useful for generic fixation and species separation.

Lindroth and Palmén (9) referring to the endophallic structures of male genital tube in Coleoptera state that a general terminology of the elements had not been produced except for a sclerotized terminal prolongation of the

ejaculatory duct which has been called flagellum.

The internal sac varies in size, shape and armature in the different groups of *Sitona* and even in allied species. The sac is produced into a transfer apparatus, lying in front of the median orifice in repose and which becomes the apical part of the sac when eversion occurs. The transfer apparatus also appears in various forms. This armature bears the functional orifice of the sac, so that all other parts of the copulatory organ are merely accessory to it.

Although different authors have defined the morphological characters of median lobe in several species of the genus *Sitona* (2-5, 7, 8, 10), yet it seems that an important part of male genitalia, the endophallus, has been ignored entirely. In the present study attempts have been made to use endophallus for identification of the *Sitona* species in southern Iran, whereby in different species they can be more readily compared and understood.

METHODS

To evaginate the internal sac, the genitalia were removed from the abdomen, heated in 15% KOH for 5 min and transferred to distilled water. By using a hooked minuten, the sac was teased out little by little through the median orifice so that by inserting the fine point of a syringe into the median foramen and gently applying pressure, the internal sac could be forced out.

For studying the sperm transfer apparatus, it was necessary to open the internal sac through the median foramen by incising it and taking the transfer apparatus out. Dissected and extended male genitalia were stored in glycerine in microvials attached to the specimen or were mounted on slides in Canada balsam. Abdominal parts not treated in this way were glued to card points and mounted with the specimen from which they were removed.

RESULTS AND DISCUSSION

Observations on the *Sitona humeralis* Stephens group of species in southern Iran showed that the internal sac in its seemingly complex form was composed of three pairs of lobes and a ventral papilla (Fig. 1): a pair of "posterior lobes" which reach over the tip of median lobe in its complete

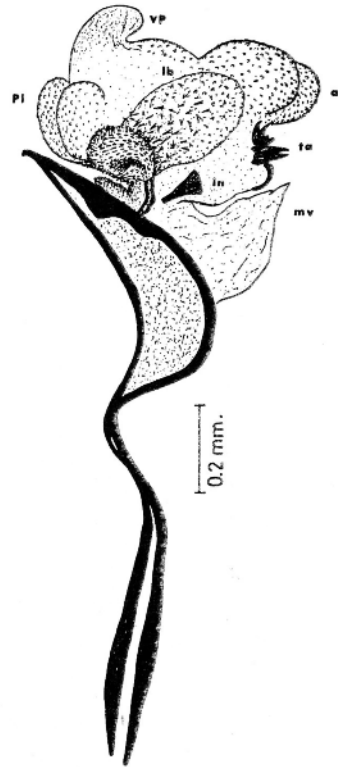


Fig. 1. Male genitalia of *Sitona discoideus* Gyllenhal, lateral view: al, anterior lobe; in, infundibulum; lb, lateral lobe; mv, median valve; pi, posterior lobe; ta, transfer apparatus; vp, ventral papilla.

eversion, a pair of "anterior lobes" over the median valve, a pair of "lateral lobes" on which various armatures with characteristic shapes occur, and a single "ventral papilla" produced anteriorly. Other groups of *Sitona* species had internal sacs more or less different from this type (unpublished results). The greatest modification was seen in *S. puncticollis* Stephens and *S. sulcifrons* Tunberg with the fusion of posterior lobes and obliteration of ventral papilla. Generally speaking, it is the large lobes of this sac and the enclosed armatures that when everted inside the female, secure the phallus during copulation.

All of the *Sitona* species observed had the transfer apparatus composed of three pairs of basic sclerites (Fig. 2): a dorsal pair which joins together and forms a receptacle for receiving the ejaculatory duct, a dorsolateral pair and a ventral fork-shaped or heel-shaped pair. In the *Sitona humeralis* group a

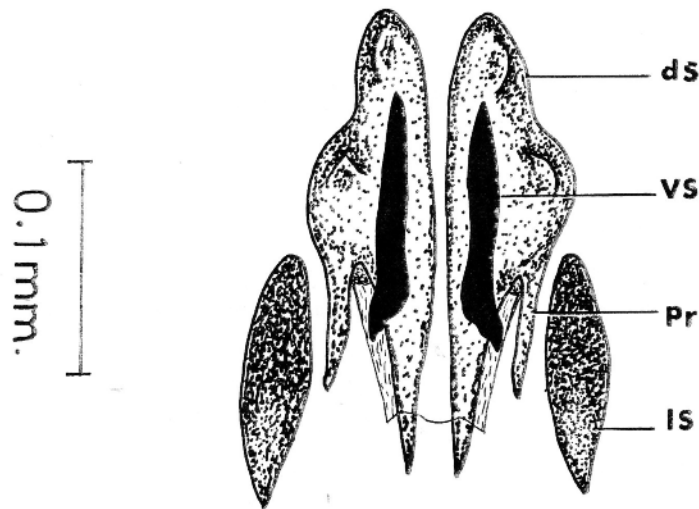


Fig. 2. Transfer apparatus of *Sitona cylindricollis*, Fahrenus ventral view: ds, dorsal sclerite; ls, lateral sclerite; pr, process; vs, ventral sclerite.

separate funnel-like structure, the infundibulum, was observed within the sac (Fig. 1), while in other groups an additional pair of processes were attached to the sides of the dorsal sclerites (Fig. 2) probably for fitting the functional orifice of transfer apparatus against the opening of the spermathecal duct. The paired sclerites of transfer apparatus had considerable variation of shape and relative size in different *Sitona* species groups (unpublished information). Allied species such as *S. callosus* Gyllenhal and *S. tenuis* Rosenhauer, however, could be differentiated after close examination of the basal orifice of the transfer apparatus. Comparison of transfer apparatus in *S. macularius* Marsham also revealed some similarities between this species and the *S. callosus* group of species.

Further investigations in the taxonomic use of endophallus may result in a revision of the genus *Sitona*.

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