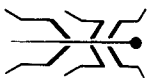


In the case of the rest of the subfamilies, which include the Sagrinae, Megascelinae, Aulacoscelinae and the family Bruchidae, we are not able to give a grouping at this time because of the lack of data on complete larval morphology. It is quite possible of course that further investigations on larval morphology will alter these results, particularly as concerns the phylogenetic weight of the single characteristics, which was neglected in the present study, since more importance was given to the greatest possible number of characteristics.

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Male Reproductive Organs as Taxonomic Characters for a Broad Classification of Chrysomelidae (Coleoptera)

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ABSTRACT. — Male reproductive organs may provide useful characters for a broad classification of Chrysomelidae. For example, Galerucinae and Alticinae have non-septate testis follicles, while Cassidinae, Hispinae, Criocerinae, Clytrinae, Chlamysinae, Eumolpinae and Chrysomelinae have septate testis follicles. The two groups of subfamilies also differ in their aedeagal apparatus. The former has an aedeagus without a basal muscular bulb, while the latter has a basal muscular bulb. Thus, there are two natural groupings among the chrysomelid subfamilies.

Details of internal anatomy often provide useful characters for classification of higher taxa (Mayr, 1969). Male reproductive organs may provide some valuable taxonomic characters for a broad classification of Chrysomelidae. The following are some observations in this context.

Testis follicles among Chrysomelidae may be distinguished into two types, septate and non-septate. Classification of testis follicles into two types, septate and non-septate was originally suggested by Virkki (1957) for Scarabaeidae. That this classification could be extended to Chrysomelidae was pointed out by Mohan and Verma (1981). In a non-septate testis follicle the tunica interna forms a smooth wrapper on surface of the follicle and the tunica externa, a layer of fat-body-like tissue, does not form extensions into the structure of the follicle (Verma, 1969). In a septate follicle the tunica interna is repeatedly inflected into the follicle, so that the interior of the follicle becomes divided into a number of loculi. The tunica externa in such a follicle forms plate-like extensions into the infoldings of the internal tunic (Wieman, 1910a, 1910b; Harnisch, 1915; Mohan & Verma, 1981). Non-septate follicles have been seen in Galerucinae and Alticinae, while septate follicles occur in Cassidinae, Hispinae, Criocerinae, Clytrinae, Chlamysinae, Eumolpinae and Chrysomelinae (Fig. 1).

The aedeagal apparatus also significantly differs in Galerucinae and Alticinae on one hand and the remaining subfamilies on the other

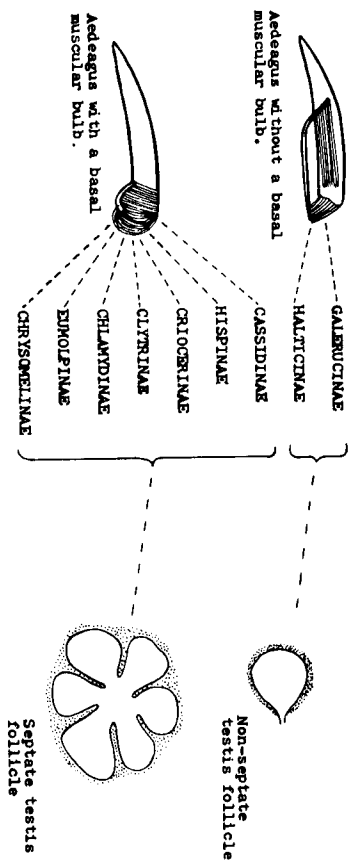


Fig. 1. The figure includes a list of subfamilies of Chrysomelidae studied. The shapes on right show non-septate and septate testis follicles in sections. In these sections thin line indicates the tunica interna and dots the tunica externa, which is a layer of fat-body like tissue. The shapes on left show the aedeagal apparatus; the lower rod-like structure in these is the first spiculum. In the upper figure the retractor and protractor muscles of the aedeagus are separate; in the lower figure the fibres of the two groups are closely compacted together to form a basal muscular bulb.

(see Fig. 1). In Galerucinae and Alticinae the first spiculum (= tegumen of some authors) is a long apodemal rod. Associated with it are two main sets of muscle fibres, the protractors and the retractors of the aedeagus (Verma, 1969; Kumar & Verma, 1980). In the remaining subfamilies included in Fig. 1, the first spiculum is considerably shortened, and although among the muscle fibres arising from it two sets can be distinguished (corresponding to the protractors and retractors of the aedeagus in Galerucinae and Alticinae), the fibres of the two sets are compacted together to form a basal muscular bulb; this bulb has the function of sealing haemolymph in the aedeagus during copulation and thus, maintaining the internal sac in a state of eversion (Verma & Kumar, 1972).

Thus, Galerucinae and Alticinae represent one direction of evolutionary flow and the remaining subfamilies, (listed in Fig. 1) another direction. Each direction may be polyphyletic. But, in the list a number of subfamilies have been left out, and each subfamily covered is known through observations on only a few species each. Hence, here is a problem for future investigations.

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