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Nota Científica
(Short Communication)

ABOUT DUNG BEETLES (COLEOPTERA: SCARABAEOIDEA) GENITALIA: SOME REMARKS TO A RECENT PAPER

Zunino, M. 2014. Acerca de los genitalia en escarabajos (Coleoptera: Scarabaeoidea): algunas observaciones a un artículo reciente. *Acta Zoológica Mexicana (n. s.),* 30(2): 439-443.

RESUMEN. Se analiza críticamente una publicación extensa sobre los genitalia en diferentes grupos de Coleoptera Scarabaeinae; se subraya la necesidad de revisar las homologías de las diferentes estructuras así como de unificar la nomenclatura en una forma no arbitraria como una precondicionante para su uso en taxonomía y análisis filogenético.

Male, and less frequently female, genitalia characters have often been utilized in beetles taxonomic and phylogenetic research, since as early as the beginning of the 20th century, starting at least from the seminal books by Sharp and Muir (1912), and subsequently by Jeannel (1955), where the genital anatomy of Coleoptera was first systematized (for some historical remarks mostly concerning Scarab beetles see Zunino 2012). The prevailing importance of genitalia not just in alpha taxonomy, but as reliable phylogenetic tracers against external morphological characters underlies a great amount of papers throughout at least fifty years; it was explicitly stressed by Zunino (1983, 1987), Zunino & Palestrini (1988), and was formally demonstrated by Tarasov & Solodovnikov (2011) by means of a cladistic analysis of a large sample of Onthophagini. Medina *et al.* (2013) emphasize the importance of recognizing the homologies within different male genital structures in the frame of Scarabaeinae, and of unifying the relative nomenclature, for several scientific purposes. The authors thank me for "… read[ing] the manuscript and [giving] us important suggestions" (*ibid*: 474); however, as my former main criticisms to their manuscript (Zunino to Medina and Molano, personal communication, 14/03/2011) were entirely overlooked, even having in mind the ethical principle of the absolute freedom of scientific research, I would like to make the following brief remarks.

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Although the nomenclature of anatomical pieces is not subject to strict priority rules, in the same way as that of taxonomic entities is, it seems quite evident that we need a certain stability, and any change should be explicitly justified, not only due to reasons of fair play, but above all to avoid confusion in the literature. As to this topic, let us examine just a few nomenclature items proposed by Medina *et al*. (*ibid*., Tab 2, p. 459).

- "Apical sclerites". These structures were first described, in a group of Onthophagini, by Binaghi *et al*. (1969) who named them "lamelle accessorie", *i. e*. accessory lamellae. Their anatomical position is proximal, and can become distal - apical or sub-apical - only during copulation (see figure 1 and 2a). In several phyletic lines one or two pieces may appear more or less strongly differentiated and separated (according to Medina *et al.,* "basal sclerite", "plate sclerite"). Although they were differently named according to distinct authors and systematic groups, it seems important to stress their belonging to the accessory lamellae complex.

- "Medial sclerite". It corresponds to the "lamella copulatrice" (copulatory lamella) of Binaghi *et al*. (1969), and is independent of the accessory lamellae and likely not homologous to any of them (Fig. 2b).

- "Raspules" (Fig. 2d). Described by Binaghi *et al.* (1969), such structures do not correspond to the "cinta espinosa lamelar" quoted by Medina *et al*. 2013 from Zunino

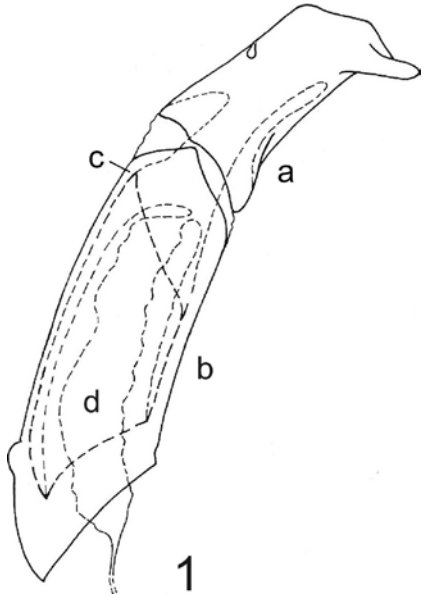

Fig. 1. Male genital structures in a generalized Scarabaeinae beetle (modified from Zunino, 1978). *a*: paramere; *b*: phallobase; *c*: median struts; *d*: internal sac.

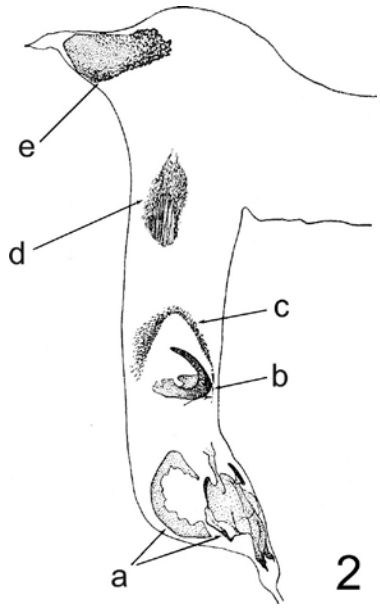

Fig. 2. Sclerotized pieces of the internal sac in *Euonthophagus* (modified from Zunino, 1972). *a*: accessory lamellae (left arrow indicates the parietal accessory lamella); *b*: copulatory lamella; *c*: lamellar spiny belt; *d*: raspula; *e*: specula.

& Halffter (1988). Once again it is a structure described, as "pacchetto squamigero reniforme", by Binaghi *et al*.; it was renamed "fascia spinosa lamellare" (lamellar spiny belt: Fig. 2c) by Zunino (1972) in order to stress its intimate connection with the copulatory lamella.

- "Spicule" (Fig. 2e). It is reported as a synonym of "Elongate sclerite" quoting Matthews (1974), who actually used the term in its most undefined sense ("flagellum or spicule"), in order to indicate some sclerotized structures, who really are accessory lamellae. The copulatory spicule was described by Zunino (1972) as "spicola copulatrice" for the genus *Euonthophagus* Balthasar. Such structure is totally independent of the accessory lamellae complex, and clearly non homologous to any of them (Fig. 2e).

Confusion continues to reign in the nomenclature of the genital anatomy of Scarabaeidae, so that especially its repercussions on the study of real homologies are indeed unlikeable and are not exempt from negative effects on the studies of phylogeny and taxonomy of the group. Although self-quoting can be inelegant, once again I have to refer to my own research, in particular concerning the genus *Copris*. López Guerrero *et al.* (2009) studying an American group, described in detail the sclerotized pieces of the internal sac in two species, underlined their taxonomic importance, and named some peculiar structures. An extensive study involving 64 species from

Africa, Eurasia, and Americas, *i.e.* all components of the whole distribution area of the genus, as well as representatives of 12 other genera of Scarabaeinae more or less closely related, was published by Marchisio & Zunino (2012). In this frame, the authors highlighted the lack of any copulatory lamella in the internal sac of *Copris*, and the presence of two well differentiated accessory lamellae, named (according to the nomenclature created by Binaghi *et al*.) "parietal accessory lamella" and "(conic) external lamella". By Medina *et al.,* (2013) the first of such structures, as well as the true copulatory lamella of other groups, is considered as belonging to their really heterogeneous "medial sclerite".

It can be assumed, even if only on the basis of the short foregoing considerations, that the whole matter should be revised –as indeed also emphasize Medina *et al*., (2013). In this context, an extensive collaboration between several researchers is highly desirable, mainly in order to establish true homologies between structures, and hence unequivocally stabilize the nomenclature to be used.

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