

The Taxonomic Value of the Vulvae in Millipedes of the Family Julidae (Diplopoda)

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The Diplopoda exhibit an overwhelming diversity of reproductive strategies associated with specialized copulatory organs. Most males of this group possess modified walking legs, so-called gonopods, as secondary copulatory structures additionally to their primary copulatory organs (penes). Since Latzel (1884), the morphology of these gonopods has gained exceptional importance in regard to diplopod taxonomy and systematics. However, females do not possess such secondary copulatory structures, and their primary sexual organs, the vulvae or cyphopods, have been vastly neglected in modern taxonomy and phylogeny. Only a handful of studies emphasise vulva structure as an additional character for modern diplopod classification. Our aim is to extend the knowledge of vulvae morphology and re-examine their value for the determination of diplopod taxa of the family Julidae. Using μ CT, SEM and CLSM in combination with dissections we tried to find easily accessible characters suitable for identification on species-level. First results indicate the external morphology of vulvae to be highly variable and species-specific, showing no phylogenetic signal. Therefore it is not a useful character for the classification even on the genus level. On the other hand, this variation pattern allows discrimination between morphologically similar females of closely related species. We therefore recommend to always include descriptions of the female vulvae in species descriptions of julid diplopods.

KEYWORDS: Diplopoda, Julidae, taxonomy, vulvae