

Book Reviews

Taxonomy of *Fridericia* (Oligochaeta, Enchytraeidae)

Revision of species with morphological and biochemical methods

Author: Rüdiger M. Schmelz

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Reviewer: Jörg Römbke (j-roembke@ect.de)

ECT Oekotoxikologie GmbH, Böttgerstr. 2–14, D-65437 Flörsheim

This book is extraordinary in several ways. First of all, it is not modern (in spite of the fact that some advanced methods have been used), because it focuses on the pure central aspect of biology: The detailed, mainly morphological, description of living beings, i.e. species. This approach, very successfully between the eighteenth and twentieth century, became 'old-fashioned' due to the enormous progress made in biochemistry, genetics and related sciences in the last decades. Secondly, it covers a group of organisms, which are not very conspicuous: The species of the genus *Fridericia*, belonging to the family Enchytraeidae (Oligochaeta, Annelida). These small, usually whitish worms are related to the much larger and better known earthworms. Despite the fact that enchytraeids are common globally often in high numbers (from deep-sea sediments, to most soils, up to glaciers in the high mountains), they have been overlooked by the public and, until relatively recently, also by scientists.

Before describing the content of the book in more detail, one might ask whether (and why) this topic is relevant for the readers of JSS? Actually, it is, for the following reasons: Some years ago (and much later than for air and water) several European countries identified soil as an environmental compartment worth being protected (e.g. Germany passed the Federal Soil Protection Act in 1998). While physical and chemical methods were quickly accepted as an approach to assess the quality of soils, it is still under discussion how quality could be assessed biologically. Nobody denies the huge advantages biological methods have (e.g. organisms integrate the effects of all stressors like chemical mixtures or physical compaction), but they have not been included in the laws. The reason often cited for this contradiction is that the knowledge on soil organisms is too poor, and in particular that the taxonomy, i.e. the identification of the many species, is too complicated.

Among soil organisms, Enchytraeidae have the reputation of being an exceptionally difficult taxonomic group – and within this family the species of the genus *Fridericia* are notorious for being difficult to handle, because microscopical observation of living specimens is necessary to see all taxonomically relevant characters (most of which are soft-bodied structures), for their high number of yet undetected species even in well-studied regions and for the necessity to consult the primary taxonomic literature because there are no comprehensive, monographical revisions. The intent of Mr. Schmelz was to show that these difficulties are surmountable – and he did demonstrate in his book that the species can be identified by a combination of clear keys and very detailed descriptions, including a huge number of illustrations (photos as well as drawings), which are consistent with each other, i.e. they have both been worked out to the same level of detail. For the first time since Nielsen & Christensen's influential monography on Enchytraeidae (1959;

1961; 1963) and for the third time in general, the genus *Fridericia* (containing 197 nominal taxa, 89 of which are valid) can now be used in ecological and ecotoxicological studies (including soil quality assessment). In fact, one can argue that the species of the genus *Fridericia* can be identified unequivocally for the first time ever.

Apart from the detailed morphological descriptions of the individual species, isozyme and total protein patterns were analysed for species of which a sufficiently high number of specimens could be collected. By doing this, independent, non-morphological data could be compiled for an assessment of the morphology-based taxonomic decisions. In order to link the data from new methods, an extensive sampling programme was conducted all over Europe. In parallel, a taxonomic revision, comprising critical literature study and morphological reinvestigation of extent and available type, and other reference material was done for all species worldwide. The results of these activities are presented in a 'reader-friendly' form by Mr. Schmelz, even for beginners since relevant methods and all taxonomically useful morphological characters are described in detail in the introduction. Another important point, in contrast to many older papers in which species identification is considered to be possible only in living worms, is that the usefulness of preserved specimens is worked out. In fact, the technique of fixation and preparation applied in his study makes preserved material almost as informative as living material and minimizes fixation alterations in taxonomically important traits. Even ordinary ethanol-fixation conserves most of the essential taxonomic traits as well, which is especially important for ecological studies. Luckily for ecologists – and although several new species have been described – Mr. Schmelz generally favoured practical distinction over generating a lot of new species names for each difference.

From the viewpoint of applying the species of the genus *Fridericia* there are, of course, issues missing in this book. *Fridericia* species are an important component of the soil fauna in all soils in temperate (as opposed to tropical and arctic) regions which are not too dry and not too acidic. Therefore, the information provided on the ecology and biogeography of the individual species could be more systematic in order to clarify the indicator potential of many species (e.g. for soil properties like texture, organic content or anthropogenic stress factors) – in the book, they are scattered among the various species' descriptions. However, even so, the book is very valuable for soil quality assessment studies. Summarising my evaluation, it is strongly hoped that such a compilation as this one will be made for other genera of the family Enchytraeidae as well, and also for other soil invertebrate groups. The need is there.