

BOOK REVIEW

MOSS MITES—MITES OF TERRESTRIAL ECOSYSTEMS. Wojciech Niedbała. 1980. State Scientific Publishing House, Warsaw, Poland. 255 p. Price: 60 Złoty. In Polish, a 2nd Table of Contents in English. Unedited English translation for Biosystematics Research Institute, from the Translation Bureau, Multilingual Services Division, Secretary of State, Canada.

The book is intended mainly for soil biologists and ecologists with a strong interest in oribatid mites. It was designed for use by Polish students and researchers, who do not have readily available the extensive literature present in the West. The 1st section, "General Part" (53 p.), provides a brief background on arachnids, plus a more detailed review of the characteristics of mites, including their morphology, anatomy, life cycle, and classification, a key for identification of superorders and orders, and remarks on mite life-forms (freeliving and parasitic).

The 2nd part, "Characteristics of Moss Mites (Oribatida)" (169 p.), is one of the most comprehensive examinations of this relatively little known, but increasingly investigated, group of soil mites in recent literature. It is divided into 15 chapters, with the first 4 comprising a brief history, morphology, anatomy and development, classification and phylogeny, and identification. Most of the remaining parts are devoted to ecological investigations of the oribatids with sections on the influence of environmental factors, vertical distribution and ecological morphotypes, horizontal migration, feeding, population dynamics and phenology, synecological groups, metabolic and feeding activity, and geographical distribution. The final 3 chapters review the role of oribatid mites as intermediate hosts of tapeworms, and as ecological indicators with a final segment on collection, preservation, identification, and rearing methods.

The book includes a bibliography of 296 citations of which 130 in the translated version are either in languages other than English or French or are retransliterated Russian entries. There is also an Index.

The "General Part" is far too short to be of any real value to a serious student of acarology, and there are errors. The year 1798 is cited as being decisive for zoological nomenclature, whereas the 10th ed. of *Systema Naturae* (1758) is usually given. Using Murphy (1952) for the density of soil micro-arthropods, when Lebrun (1976), Crossly (1977), Mitchell (1977, 1979), etc. were available is an example of dependence upon older literature. Dr Niedbała lists some general acarological references, but then adds that it is difficult to gain access to these publications in Poland. The section on arachnids is culled from Savory (1935) instead of the 1977 edition. The part on mite characteristics is based upon Baker & Wharton (1952) and Ghilyarov & Krivolutskii (1975). Interestingly, the date given for Baker & Wharton is 1955, which is for the Russian translation. Many statements, some controversial, are without substantiating citations, e.g., p. 32, "All mites are dioecious; in most cases males can be distinguished from the females." Later (p. 74) he states that "sexual dimorphism is a rare phenomenon among the Oribatida." The section on classification is heavily dependent upon Hammen (1968, 1970) and that on life forms of mites on Krantz (1978). There are spelling and terminology errors.

A complete review of the second and major portion of the book is impossible within the space constraints of this critique; therefore, criticisms of only a few chapters will follow.

History of Investigations. The number of genera of oribatids is given as 500, while Balogh (1972) lists 700 and approximately 200 more have been added since that publication. The section on history of oribatology touches on highlights but lacks specific references essential to taxonomists and useful to other workers.

Morphology, Anatomy, and Development. This section is taken mainly from Balogh (1972). It would have been useful, particularly to beginning investigators, if structures figured in the text were identified with accepted abbreviations. Norton's review of Grandjean's system of leg chaetotaxy should have been cited. The internal anatomy is from Woodring & Cook (1962) and Bulanova-Zakhvatkina (1967) with no mention of the classical dissections of Michael (1884). The excretory system is disposed of in 2 short sentences. In *Reproduction* it is said that the penis "serves only for the insertion of the spermatophore," while it is well-known (Pauly 1952, 1956; Sengbusch 1958, 1961; Shereef 1971, 1972, 1977; etc.) that the spermatophores are deposited on the substrate and are eventually picked up by the female, as Niedbała himself states on p. 75. The paragraph and table on chromosome number are based upon Taberly (1958a), omitting his later papers (1958b, 1960). The work of Sokolov (1954) and a review of Oliver (1977) are disregarded. Total length of post-embryonic development of 8 species is found on p. 77 (Butcher et al. 1971), but a more complete table is found on p. 88, which is needless duplication. Excluded is Sengbusch & Sengbusch (1970), who listed all known (49) life histories published since the initial work of Michael (1884).

Classification and Phylogeny. In one of the more useful sections, Niedbała has constructed a key to the more common species of oribatid mites in Poland. Other comprehensive keys are mentioned, but Wooley & Baker (1958), Suzuki (1978), and McDaniel (1979), etc. are left out. He does not observe that one of the better ways to keep current is Englemann's, "Bibliographia Oribatologica," published annually.

Influence of Environmental Factors. This is one of the more extensive and cogent chapters. It treats temperature, humidity, pH, salinity, light, organic content (incl. fertilizers), pesticides, pollution, and radiation. The material is adequately cited but lacks any discussion of methodology, which would be of great use to soil biologists.

Feeding. Food is mentioned several places in the text before it is expanded upon here. In the section concerning the correlation of mouth-parts with food preference, no references are given. Although normal chelate-dentate chelicerae are figured, no acknowledgment is made of the elongate-attenuate type found in *Gustavia microcephala* (although this species is listed as a bacterial-feeding microphytophage), or the narrow, elongate chelicerae of the Pelopoidea. Niedbała concedes that coprophagy is not unusual in the Oribatida "if the excreta contains comparatively fresh particles of macrophytes"; however, it is probable that these saprophytic mites are feeding on the material being decomposed by bacteria and fungi (Wallwork 1970). Zoophagy is dismissed in 2 sentences, although the work of Rockett & Woodring (1966), who reported that *Pergalumna omniphagous* feed on saprophytic and parasitic nematodes, should have been included.

Oribatids as Intermediate Hosts of Tapeworms. This short chapter, which concerns one of the more important economic roles of the Oribatida, reviews the work of Rajska (1959) in Poland but omits the pioneering studies of Stunkard (1937, 1939, 1940), who first elucidated the oribatid-anoplocephaline cycle. Also absent is Kates & Runkel (1948), who first differentiated the vector populations from pasture and forest soils. The detailed review paper of Sengbusch (1977) is alluded to only briefly.

Oribatids as Ecological Indicators. This well-written passage is one of the few in which references are made to other sections in the book. It discusses the role of oribatids as indicators of soil degradation (Puchalski & Prusinkiewicz 1975), and of soil fertility (Seneczak 1978). It also treats methods of bioindication (Górny 1976), zoocoenological analyses to demonstrate

indicatory value of oribatid groupings (Wauthy & Lebrun 1975), oribatid groupings that parallel plant successions to determine stages of the progression (Rajski 1961, Niedbała 1972), use of vertical migration as a sensitive index of soil conditions (Krivolutskii 1975), faunal succession as an indication of soil humification (Lebrun 1979), and use of food preferences or oribatids as evidence of food type (macrophyte, microphyte, etc.) found in the habitat (Luxton 1972), etc.

Collection, Preparation, Identification, and Rearing Methods. What should have been the most detailed and comprehensive chapter from the standpoint of soil ecologists and beginning oribatologists is one of the poorest. A discussion of the Tullgren funnel is incomplete: no mention is made of mesh size, sample size, bulb wattage, etc., and a diagram on p. 217 is taken from Krantz (1978) with no credit. It is disappointing that no field extractor is noted (such as Balogh's 1972), since fieldwork remote from laboratories can be important in the study of terrestrial ecosystems. A short paragraph on preparation is also inadequate, stating that extracted mites are preserved in 75% alcohol (Krantz 1978 recommends 70%) and not warning that if the storage period is more than 3 mo, they must be transferred to another preservative, such as Oudemans's (Sengbusch 1963). Clearing is covered in 3 sentences, with no mention of lactophenol, Andre's, Nesbitt's, or Vitzthum's fluids, or the advantages and disadvantages of each. Techniques are not included. Dissection is totally ignored. Preparation of temporary mounts and microscopic examination rely heavily on Grandjean (1949), but in a very abbreviated form. Much better reviews are given in Wallwork (1970) and Krantz (1978). Permanent mounts are dismissed as being inappropriate for the oval-shaped oribatids. While this is generally true, there are instances where a permanent preparation is convenient, and it is a technique which ought to be available to any acarologist. The section on rearing is less than 2 pages and is probably insufficient for anyone who has not reared mites. A comprehensive review of culture methods was given by Sengbusch (1974). It is regrettable that there is no information on scanning electron microscopy.

Since this is the only book on the biology of oribatid mites published recently, it is well-recommended as a reference for anyone seriously interested in terrestrial ecosystems and particularly in oribatology. There are many excellent figures, tables, graphs, etc., and the bibliography is extensive, even though 1979 is the latest date of reference. I added current citations in the margins of my copy. However, there are serious omissions. The various sections tend to be isolated entities without reference to similar material in other parts of the book. The emphasis on Poland is a drawback for a general publication, and the Polish language presents a problem for most Europeans and Americans. But the advantages far outweigh the disadvantages.

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