Book Reviews

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Book Reviews

Cloyd RA. 2016. Greenhouse Pest Management. CRC Press, Boca Raton, Florida. 196 pp. ISBN 978-1-4822-2778-9, US$67.96 (hardback)

This book claims to be "the first comprehensive book on managing greenhouse arthropod pests." Indeed, it treats the major tenets of integrated pest management, namely pest identification, scouting, cultural control and sanitation, physical control, pesticides, and biological control. The target audience is stated to be everyone from students and hobbyists to crop consultants and researchers.

The strengths of this relatively slim volume are the chapters devoted to pesticides (insecticides and miticides) and biological control. These chapters include not only the principles but also many practical aspects of using these approaches to implement pest suppression and elimination. For example, in the Pesticides chapter, the author discusses operational aspects such as timing of application, water quality, shelf life, and of course managing insecticide resistance. Similarly, in the Biological Control chapter, the author discusses the increasingly popular banker plant system, the effects of different plants (e.g., foliar pubescence), and the integration of insecticides and natural enemies.

The principal shortcoming is the diagnostic section (pest identification). This book treats only the "major insects and mites." Although adequate for an introduction to the subject, it hardly seems adequate for the purported "comprehensive" treatment of the subject. So although a beginner might be satisfied with 5 pages devoted to aphids (4 species are mentioned, and there is no attempt to distinguish among them), practicing professionals might be better served by consulting more complete treatments such as Gill & Sanderson's (1998) "Ball Identification Guide to Greenhouse Pests and Beneficials," which provides 20 pages of information on 15 species of aphids, including distinguishing characters and host range information. Further, the latter shows how to distinguish aphids from other insects when they are embedded in the adhesive of sticky cards, which are commonly used for sampling flying insects.

The organization of the diagnostic section also seems suboptimal. Although most taxa are treated as a group (e.g., aphids, mealybugs, whiteflies), the mites are treated as individual species (broad mite, cyclamen mite, and twospotted spider mite each get their own section). This may be appropriate given the importance of these species, but because they are all presented in alphabetical order, the mite treatments are spread throughout the diagnostic section instead of being grouped together. Only the mites and western flower thrips are treated separately; all other pests are grouped into higher-level taxa. Gastropods (snails and slugs) and isopods (pillbugs and sowbugs) each have a section but then are not mentioned again. Lack of information about snails and slugs is problematic because the approaches and materials for their management are different than for arthropods. Rodents are not included.

This book contains numerous photographs, and many are quite nice, especially the images of plants, plant damage, and greenhouses. The images of insects are more variable; better magnification might have made some of these more useful. Curiously, there is quite a lot of redundancy among the images. This book lacks direct referencing, so it is not easy to follow up on some topics if more information is desired. Chapter 9 consists of "Suggested Readings" but contains less than 50 references, and no online references are included. The author favors simplified terminology (e.g., "molting skins"), which probably is appropriate for beginners or those without much formal education. Overall, "Greenhouse Pest Management" is a useful book, quite appropriate as an introduction to pests and pest management associated with greenhouse crops. It does not, however, supplant Gill & Sanderson (1998) as a reference and identification aid for greenhouse pests.

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Deloya C, Ponce Saavedra J, Reyes Castillo P, Aguirre León G [eds.]. 2016. Escarabajos del Estado de Michoacán (Coleoptera: Scarabaeoidea). S y G Editores, México D.F. Xx + 210 p. ISBN 978-607-8116-59-1 (paperback). Printed copies were produced only in small numbers for deposit in libraries and are now used up. A pdf version may be obtained from the principal author at cuauhtemoc.deloya@inecol.mx.

Michoacán is ranked 16th in size among Mexican states. It is west of the state of Mexico, and it borders the Pacific Ocean. Its agricultural land area has 43% in cattle production, 27% in planted timber production, and 24% in agricultural crop production, one of the main crops being avocado. Its capital city is Morelia. In its borders are the large (29,660 ha) Pico de Tancítaro National Park, the much smaller (980 ha) Cerro de Garnica National Park, and, on its eastern border, the Monarch Butterfly Special Biosphere Reserve. Running NW to SE is part of the Sierra Madre Occidental, a very long mountain range with a peak reaching 3,840 m (Pico de Tancítaro), with many volcanoes, and with oak–conifer forest as principal vegetation. The Sierra Madre Occidental is the most species-rich part of Michoacán, at least for scarabs.

This book is about superfamily Scarabaeoidea (families Ceratocanthidae, Geotrupidae, Hybosoridae, Lucanidae, Ochodaeidae, Passalidae, Scarabaeidae, and Trogidae are represented). The authors report 275 species, as contrasted with about 1,875 species known at present from all of Mexico (about 15%). The first chapter of the book is on the Scarabaeoidea, their place in the order Coleoptera, an appendix listing all places, with their coordinates, from which specimen collections were made, and a second appendix with a list of all the species named.

Chapter 2 deals with precinction or precinctivity ("endemism"), especially of the Scarabaeoidea in Michoacán, and names the 16 species and mentions the approximate locality of their collection. Chapter 3 deals with external structure of adults and larvae of Scarabaeoidea, and Chapter 4 describes vegetational zones in which these beetles may be found. Chapters 5 to 11 are family-level accounts of Michoacán's Scarabaeoidea, their distribution, biological notes, and some keys to identification of adults.

The final Chapter, 12, differs from all others in being a study of diversity of neocrophilous Scarabaeidae of a large hill called "El Aguila" within the borders of the municipality of Morelia. Eighteen species were encountered, a few of them abundantly, during the course of a year, and then indices of diversity were calculated.

Then follows a taxonomic index for the book. There is no overall bibliography for the book, but each chapter (1–11) has its own Literature Cited section. Clustered at the end of the book, on pages 164 to 210, are color plates. Each displays to advantage due to printing on high-quality paper. Color maps include vegetational zones, physiographic provinces, biotic provinces, biogeographic provinces, climate, elevation, soils, and all of these are marked with dots to indicate collection localities. The dots are in no way linked to names of beetle species but serve instead to give an indication of sampling intensity. In contrast, 3 additional monochrome maps show collection localities for named species of Lucanidae and Passalidae. There are more color plates, including 60 habitus photos of beetles mentioned, 15 photos of people who have helped in the work that led to this book, and 14 photos showing natural habitats in Michoacán.

To anyone tempted to visit Michoacán to collect Scarabaeidae (or any other insects), be aware that even Mexicans now need government permits to collect beetle specimens in their country, and not only in parks and preserves. This is the 3rd work published in Mexico about the scarabaeoid fauna of individual states: the others are for the states of Guerrero (Deloya & Covarrubias-Melgar 2010) and Jalisco (Navarrete-Heredia et al. 2001).

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Hunt DJ & Nguyen KB [eds.]. 2016. Advances in Entomopathogenic Nematode Taxonomy and Phylogeny. Nematology Monographs and Perspectives, Volume 12. Brill, Leiden, Netherlands. xvi + 438 pp. ISBN13: 9789004285330, E-ISBN: 9789004285347, US$166.00 (hardback)

The rise of molecular methods caused a revolution in the systematics of many organisms, including entomopathogenic nematodes (EPN). From the 1990s, we experienced an enormous increase in the number of described EPN species. However, many of these taxa were inadequately supported by morphology and molecular data. Thus, in 2007 two respected nematode taxonomists, K. B. Nguyen and D. J. Hunt, prepared their excellent book entitled "Entomopathogenic Nematodes: Systematics, Phylogeny and Bacterial Symbionts" (Nguyen & Hunt 2007) that clarified the EPN taxonomy and became a vital tool for any EPN taxonomist. In his review, Ralf Ehlers wrote (Ehlers 2008) that he expected the 2nd edition of the book would come out in 10 yr and expressed the wish that the book would be published with a hard cover. Indeed, the growth in the number of EPN species being discovered has not stopped, and from the year 2007 about 50 new EPN species have seen the light of day. The new book, "Advances in Entomopathogenic Nematode Taxonomy and Phylogeny" by the same authors, came out in 2016 and in a nice hard cover. Just in time.

The book is divided into 6 main chapters. The introductory section gives the perspective of the authors and briefly describes the current situation in EPN systematics. The 2nd chapter is focused on taxonomy and systematics**.** At the beginning, the authors engagingly summarize the milestones of EPN systematics achieved in the last 100 yr. In the next part, the authors examine all described EPN species and select 95 valid species of *Steinernema* (Rhabditida: Steinernematidae) and 16 of *Heterorhabditis* (Rhabditida: Heterorhabditidae). The authors also include an updated list of *species inquirendae* and *nomina nuda* and discuss the taxonomic status of problematic species in the form of notes at the end of the chapter.

Notably, 11 species have been proposed as junior synonyms of existing taxa based on molecular data: *Steinernema anatoliense,* Hazir, Stock & Keskin, 2003; *Steinernema meghalayense* Ganguly, Rathour & Singh, 2011; and *Steinernema websteri* Cutler & Stock, 2003 are regarded as conspecific with *Steinernema carpocapsae* Weiser, 1955; *Steinernema everestense* Khatri-Chhetri Waeyenberge, Spiridonov, Manandhar & Moens, 2011 is a junior synonym of *Steinernema akhursti* Qiu, Hu, Zhou, Mei, Nguyen & Pang, 2005; *Steinernema dharanai* Kulkarni, Rizvi, Kumar, Paunikar & Mishra, 2012 is a junior synonym of *Steinernema hermaphroditum* Stock, Griffin & Chaerani, 2004; *Steinernema maqbooli* Fayyaz, Khanum, Gulsher & Javed, 2013 is a junior synonym of *Steinernema pakistanense* Shahina, Anis, Reid, Rowe & Maqbool, 2001; *Steinernema tbilisiense* Gorgadze, Lortkhipanidze, Ogier, Tailliez & Burjanadze, 2015 is a junior synonym of *Steinernema thesami* (Gorgadze, 1988) Gorgadze & Lortkipanidze, 2004; *Heterorhabditis gerrardi* Plichta, Joyce, Clarke, Waterfield & Stock, 2009 is a junior synonym of *Heterorhabditis indica* Poinar, Karunakar & David, 1992; *Heterorhabditis sonorensis* Stock, Rivera-Orduño & Flores-Lara, 2009 is a junior synonym of *Heterorhabditis taysearae* Shamseldean, Abou El-Sooud, Abd-Elgawad & Saleh, 1996; *Heterorhabditis somsookae* Maneesakorn, An, Grewal & Chandrapatya, 2015 is a junior synonym of *Heterorhabditis baujardi* Phan, Subbotin, Nguyen & Moens, 2003; and *Heterorhabditis pakistanensis* Shahina, Tabassum, Salma, Mehreen & Knoetze, 2016 is a junior synonym of *H. indica*.

The problem with the original descriptions of these junior synonyms was usually the use of non-edited sequences that created false differences from the existing species or an inadequate selection of reference sequences. This shows the extreme importance of molecular data in EPN systematics but also the necessity of good practice in interpretation. It is obvious that the genetic markers currently used in EPN taxonomy, the ITS and D2–D3 expansion segments of the 28S ribosomal RNA (rRNA), are sufficient for distinguishing species of EPN. What is also evident is that the level of 95% and lower similarity in the ITS sequence for the separation of new species, as suggested in the 1st edition (Nguyen & Hunt 2007), cannot be sustained because some species regarded as valid are separated by no more than 3%. The authors

left this topic without comment; however, the status of EPN species will probably need further clarification in the future.

It might seem that nematode morphology is out of date. However, besides being a source of joy for nematologists, the morphology can be useful in many other ways. Excellent examples are the tabular keys to species of *Steinernema* and *Heterorhabditis* that form another section of the new book. Each key is easy to follow because the nematode species are ordered by body length of the infective juvenile stage, and the key provides the most important characters of the infective juvenile stage and male, including a photograph of the male spicules. The key can be very useful, especially when dealing with EPN from a particular geographic region with known EPN diversity (e.g., the major part of Europe or the USA), but it can also be used to rank any EPN to a particular phylogenetic group.

The major part of the book is occupied by species descriptions of *Steinernema* and *Heterorhabditis* from 2007. From my own experience with the previous edition, I can state that this compilation is probably the most valuable part of the book. For any taxonomic work, it is extremely useful to have all the information to hand, instead of searching for particular manuscripts of which only some may be available online.

The last chapter was written by 2 renowned experts in nematode molecular biology, S. E. Spiridonov and S. A. Subbotin, and is focused on the phylogenies of *Heterorhabditis* and *Steinernema* nematodes. The phylogenetic reconstructions generally correspond to current knowledge but are definitely among the best published so far. The phylogenetic analysis of the genus *Heterorhabditis*, performed using the ITS region of the rDNA, without doubt confirmed the closer relationship of the "*bacteriophora*" and "*megidis*" groups. In the genus *Steinernema*, the analysis based on the sequences of the D2–D3 of 28S and ITS rRNA genes did not support the traditional division into 5 main clades but gave 3 clearly supported superclades. The position of the "*affine*" clade and several smaller groups is unclear. Thus, it is evident that although the relationships on the lower phylogenetic level are satisfactorily resolved with the regularly used rDNA genes, for the clarification of the deeper phylogeny we will have to wait for new genes or whole genome data. Within the steinernematid phylogenetic tree, the authors propose 12 strongly supported subclades named after flagship member species. The use of this terminology for the subclades within the genus *Steinernema* would, if accepted by other researchers, simplify orientation within the taxonomy of the group.

The biogeography of entomopathogenic nematodes is a largely unexplored area. The phylogeographic analysis presented within this chapter is the first of its kind ever made for EPN and shows very interesting patterns. Clearly, many steinernematid groups originated on the Asian continent, which corresponds to the fact that more than half of all known EPN species have been recovered from this area, including a large number of indigenous species. We can only hope that the phylogeographic approach will become a more frequent tool in EPN research.

My conclusion is very short. Together with the previous edition, the present book is a must-have for anyone dealing with the taxonomy of entomopathogenic nematodes, but it is also valuable for any research or student nematologist. And finally, shall we see a 3rd edition? Considering the rate of new EPN species descriptions and the still relatively large unexplored areas (most of Africa and South America), the answer seems clear.

Acknowledgment

The review first appeared in "Nematology" but should be of interest to entomologists, too. Used with permission of the author.

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