



VEGA F.E. & HOFSTETTER R.W. (EDS) 2015: BARK BEETLES: BIOLOGY AND ECOLOGY OF NATIVE AND INVASIVE SPECIES, 1st ed. Elsevier, Academic Press, Amsterdam, Boston, Heidelberg, London, New York, Oxford, Paris, San Diego, San Francisco, Singapore, Sydney, Tokyo, 640 pp. ISBN 9780124171565. Price EUR 92.95.

The title appropriately indicates a group of insects of high recent economic and environmental importance, which includes some of the most damaging agents in forests and most frequent “unwanted passengers” in world-wide trade. Bark beetles, although generally considered secondary pests, can inflict considerable damage and cause enormous economic losses. There can be outbreaks of some species when conditions are suitable, during which they rapidly switch from a “quiet” lifestyle to primary attackers of their host plants, mostly forest trees. They can also kill their host when the original reason for the outbreak (such as drought) is not necessarily fatal for the forests.

At the beginning of this book, general information about bark beetles, their relationship with host plants and their role in nature is given, and the following chapters continue with discussions of all the aspects of bark beetle life. The book contains 15 chapters, which deal with natural history and ecology, morphology, taxonomy and phylogeny, evolution and diversity, population dynamics, resistance, symbiotic associations, natural enemies, climate change, management strategies, economics and politics of bark beetles. Each chapter is prepared by a team of leading specialists in the respective topics (33 contributors altogether). Both editors are outstanding experts in bark beetle ecology.

Bark beetles are species with very “secret” lifestyles. They spend nearly their whole life hidden under bark, within wood, in seeds or other plant tissues. The adults spend only a short time in the open, mostly just for dispersal and searching for suitable host plants, which take just a few hours or a few days at most. Otherwise they spend most of their lifetime excavating their breeding galleries in which the mating (with some exceptions), oviposition and brood care take place. Such circumstances logically result in behavioural and morphological adaptations to living in tight galleries, for overcoming host defence, attacks of internal and external natural enemies, etc. All these aspects are precisely explained and discussed in the corresponding chapters, including the most recent knowledge on these topics. We would know much more about their lives if we could follow their behaviour under bark (excavating the tunnels, ovipositing, tunnel maintaining, sexual behaviour, brood care, etc.). Recent studies using the most modern techniques and rearing them on artificial diets in the laboratory are promising in this respect. For the reasons mentioned above, nearly all bark beetles are rather uniform in colour and shape as they do not have to display for pairing or protect themselves against “visual” predators. As mentioned in the book, among the usually uniformly yellowish brown to dark brown species there are a few colourful metallic green to bronze species in the genus *Campitocerus*, whose adults feed on green leaves before tunnelling into the bark to breed. Besides these species there are

also a few variegated species in the genus *Aphanarthrum* (distributed mainly in the Macaronesian region) with opalescent greenish spots on their elytra (mostly visible only in live specimens).

Taxonomy of bark beetles is very difficult not only due to their small body size and uniformity. There is a lack of comprehensive worldwide keys to genera and species. As an example, there are rather good keys to species of *Ips* in North America and the same for Europe. But an inexperienced (e.g., quarantine) entomologist with a specimen of unknown origin could identify the same specimen/species as two (or more) species using these “local” identification keys. In bark beetles, probably more than in any other group of insects, the availability of reliably identified comparative museum material is very important and, in most cases, comparison is the only way to correctly identify species. But even museum collections frequently contain misidentified material. Proper identification is the essential first step in bark beetle research, otherwise our conclusions could lead to serious mistakes. The identification of bark beetles is difficult even at the generic level. In addition, properly determined specimens are scattered in many museums. Last but not least, the preparation is very often not good enough to allow reliable identification; glued specimens on rectangular card (“European” type) often do not show many of the details necessary for generic identification, as most characters are hidden by paper card or in drops of glue, which is in marked contrast to those mounted on triangles (“American” type). All these aspects make the identification of bark beetles very complicated. With the increasing number of young specialists it is likely there will be a somewhat brighter future.

As one of the most serious pests of forests, bark beetles are studied by foresters and applied biologists as well as professional entomologists, which has also contributed to the problems with their systematics and nomenclature. It may well be the group of insects with the highest number of species synonyms. The assignment of the same species to different genera by different authors are not real synonyms and should not be included in synonymic lists (Table 10.1). Even though the whole group was treated historically separately, mostly at the family level, recent phylogenetic results indicate bark beetles should be included as a subfamily of true weevils (Cuculionidae), the Scolytinae. This placement has been debated for several decades and although still not universally accepted, mainly by the practitioners, there is an evident need for this change. This development is described in detail in the chapter on taxonomy and phylogeny, which reflects the current status quo. All notorious non-believers, to which I partly belong (for practical reasons and simply being of the “old school”), are recommended to study this chapter in detail, but should bear in mind that a new comprehensive classification of bark beetles is still needed. All the 247 currently recognized genera need to be newly organized based on current knowledge (the 282 genera mentioned on page 70 is probably a misprint because the following Table 2.8 contains the correct number of genera, as does the table in the Appendix to chapter 3). The position of platypodids is even more complicated and is discussed in a separate section. *Hylobius abietis*, a species of true weevils mentioned several times

in chapter 13, should be omitted from the book because it is not a bark beetle.

As already mentioned, there are several species that can switch from a relatively inconspicuous existence to an aggressive phase, leading to outbreaks, which result in great environmental damage and considerable economic losses. Their population dynamics, ability to overcome host resistance, reaction to climate change and consequent human management strategies, economics and politics are explained in detail in separate chapters. Actually, not many of the slightly more than 6000 bark beetle species described cause such problems; there may be just a few dozen (about 1% is the estimate in this book) among which are just a few species that are really very seriously harmful to forests. Separate chapters are devoted to the most important species, which explain the situation in broad terms and considerable detail. These chapters deal mostly with the most serious pest taxa. Some additional important genera are added, but they are mostly of Nearctic importance, while similarly important genera from the Palearctic are not included (e.g., *Hylastes*, *Phloeosinus*, *Polygraphus*, other *Ips* and *Scolytus* species, etc.). For example, *Polygraphus proximus* recently spread from the Far East westward and is already present in the European part of Russia where it seriously damages fir stands. *Dendroctonus micans*, the species described in detail in the book, also seems to have adapted its biology and is exploiting an unoccupied niche, *Picea pungens*, an exotic tree planted in mountainous areas damaged by air pollution (and also often as an ornamental tree in gardens) in central Europe. On the other hand I cannot agree that *Dendroctonus valens* changed its biology when it was introduced into China. It simply continued to attack pine trees, but in its original range they were “big” trees, which are not available in the stands infested in China where the species attacks smaller pines, which frequently die simply due to the beetle’s extensive gallery system, which cuts through the phloem elements around the whole perimeter of the stem.

Even though we know quite a lot about the biology of at least some bark beetles, there are still many gaps. Following on the discovery of basic chemical communication, mainly in the 70’s and 80’s of the last century (although these studies are still continuing), it is likely that other kinds of communication might be discovered that will provide answers to unresolved questions in the future. For example, sound communication; we know that some species produce sound, but we do not know anything about how

they receive this information or even the location of their “ears”. But hopefully, future research together with the most modern equipment will allow us to learn more about these topics, as is mentioned in several chapters.

This is a valuable and unique book with a lot of useful information. Some particular aspects deserve special mention as they may surprise the reader. First, it is the incredible amount of literature listed in each chapter, which covers both the history and the most recent developments, and reflects the diligence and thoroughness of all the authors of the chapters. Roughly, more than 5000 papers (overlaps included) are cited. Second, for some readers it could be the existence of a diminutive species of bark beetle, *Hypothenemus hampei* (treated in a separate chapter), which very seriously damages one of the most popular plants worldwide, coffee, or more precisely coffee seeds. I am pretty sure that the existence of such species is unknown to most people, including not only coffee drinkers, but also researchers and entomologists. It is an excellent example of how important aspects of our lives, from well-being to food or medicinal compounds, may depend on such minute organisms. And guess what, even though this pest is nearly the smallest species of bark beetle treated in detail in this book, the chapter on the tribe Cryphalini contains the longest list of literature (more than 650 citations)!

A minor, but given the comprehensive character of this book, inevitable problem is that information about a species or genus is scattered and partly repeated in several chapters, for example population dynamics, host resistance, symbiotic associations, natural enemies, etc. On the other hand, the “Conclusions” at the end of each chapter (and occasionally also a section, when they are entitled “Interesting questions and challenges” and highlight future research topics) was a fortunate and convenient editorial decision.

This book is dedicated to Dr. Donald E. Bright, outstanding expert on bark and ambrosia beetles. It is my pleasure to join the editors of the book and other contributors to express my congratulations to Don’s scientific achievements! And, of course, thanks are due to all the editors and contributors for preparing such an excellent compendium of bark and ambrosia beetle taxonomy and biology.

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