

## Book review

### SCHMID-HEMPEL, P. 2011: *Evolutionary parasitology: the integrated study of infections, immunology, ecology, and genetics*

Oxford University Press, New York, 496 pp.; Hardback, ISBN: 978-0-19-922948-2, Price: USD 126.00; Paperback, ISBN: 978-0-19-922949-9, Price: USD 58.50

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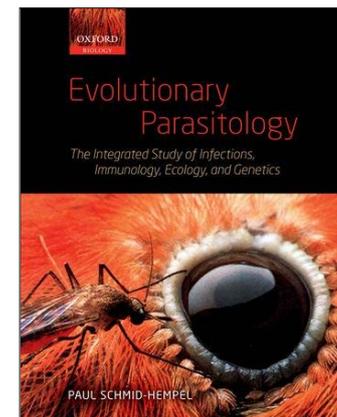
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Thirteen years after his seminal book *Parasites in social insects*, Paul SCHMID-HEMPEL published the monograph *Evolutionary parasitology* that will serve as a basic reference for students, teaching and scientific staff in several fields: parasitology, immunology, ecology and evolution. In his new monograph, he combined fundamentals of evolutionary theories and models with recent findings in genetics, physiology and immunology to answer intriguing questions on parasitology.

In 14 chapters, *Evolutionary parasitology* describes in detail a fascinating journey through the scientific world of hosts and parasites. After illustrating the importance of studying evolutionary parasitology, all types of parasites are introduced, including all levels from viruses to parasitoids. The following chapters deal with all kinds of factors influencing host-parasite life-cycles, and trade-offs between parasite infection and host defence strategies. Such strategies, including behaviour, physiology and immune systems, are illustrated using numerous examples from plants, invertebrates and mammals. Invertebrates, especially insects, represent the largest number of species on earth and can be found in each chapter as either hosts or parasites, or both. At least 50% of the chapters use examples from ants and bees to show variability in host-parasite interactions (e.g., specificity, defence strategies, parasite-induced host change, genetic diversity and parasitism, and parasite effects on host competition).

In the majority of chapters, the impact of the immune system (innate and adaptive) on parasite evolution is explained. By avoiding intensive usage of immunological acronyms the author successfully reaches scientists lacking a very strong background of complex host immune systems and the myriad of tissues, cell types, and molecules behind them.

Analysing the development of research fields and questions in host-parasite interactions during the past decades, two major fields play a central role in natural and artificial host-parasite systems: ecological immunology and disease ecology, but also a combination of both fields can not be neglected (HAWLEY & ALTIZER 2011: *Functional Ecology* 25: 48-60). This topic is also known as "outdoor immunology" (BOUGHTON & al. 2011: *Functional Ecology* 25: 81-100) or "wild immunology" (PEDERSEN & BABAYAN



2011: *Molecular Ecology* 20: 872-880) and covered in Chapter 5 (Ecological immunology). It illustrates the impact of variation of parasitism on costs and strategies of immune defences.

Many important topics related to immunity are also included: specificity and memory of immune systems, active and passive host defence strategies, immune evasion strategies of the parasite to manipulate host phenotypes and parasite transmission. Host-parasite interactions are on the one hand presented using empirical studies and living organisms, and on the other hand the underlying models and theories are also outlined. The final chapters highlight epidemiology of parasites, evolution of virulence and ecology of hosts and parasites, including host communities. Last but not least Paul SCHMID-HEMPEL discusses some ideas on the impact of climatic change on disease emergence.

At the end of each chapter, essential information is summarised in general statements. Within the chapters the reader can find boxes describing general definitions of technical terms, explaining theories and models, and introducing specific mechanisms addressed in the respective chapter. Plenty of summarising tables, and clear and comprehensible figures help to illustrate mentioned statements with many different well structured examples.

Unfortunately, *Evolutionary parasitology* does not provide examples from all major taxa in the discussion of every chapter, especially parasites of plants are underrepresented, but this is already mentioned by the author. It may be argued that some important information is missing. In my opinion, however, Paul SCHMID-HEMPEL copes well with the challenge to reach a broad reader spectrum by reducing the amount of information addressed in each chapter. Thus, all important facts are brilliant included providing a general overview and giving the reader the possibility to delve into topics he or she will be interested in. Overall, Paul SCHMID-HEMPEL succeeds, in an impressive way, to address researchers with general or specific interests in parasitology and anyone else with a general background in life sciences.

This long overdue monograph presents a state-of-the-art update on parasitology and evolutionary mechanisms contributing to host-parasite interactions, especially on insects and other invertebrate systems.