Ecology of Butterflies in Europe

Due to the importance of butterflies as indicators of environmental quality and their usefulness as model systems to address ecological and evolutionary questions, butterfly biology has become a focus of research, especially within Europe. This book synthesizes all relevant and recent knowledge in the field, making this a definite work for those making use of this taxonomic group as a model system. It is divided into five major parts which deal with habitat use, population biology and genetics, evolutionary ecology, distribution and phylogeny, and global change and conservation. There are growing numbers of scientific projects and networks in Europe in which the use of butterflies as tools and targets for conservation is central, and application of knowledge is closely related to European cultural landscapes. However, the material can also be applied to a wide geographic scope. Written by an international team of experts, this timely book is suitable for students, researchers and enthusiasts.

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Preface

WHY?

The last 20 years has seen a dramatic increase in research on butterflies, driven from two directions. The first has been academic, with a realisation that butterflies can be model organisms to study evolutionary, behavioural and biogeographic processes. The second has been, and continues to be, an urgency to tackle extensive declines in butterfly species, a phenomenon not just restricted to Europe. As recently as 50 years ago there were no major issues concerning the conservation of butterflies and biodiversity was not regarded as an issue, though even at that time a few species of butterfly were in decline within Europe. About 30 years ago the study of butterflies was often regarded as an academic sideline, since when the contribution of butterfly biologists to mainstream biology has increased in importance. Over the last 10 years there has been a remarkable synthesis of ideas and an increasing realisation that academic studies can contribute much to conservation. The science of conservation is becoming increasingly evidence-based and a true dialogue between academics and conservationists is emerging, including a scientific approach to using butterflies as biodiversity indicators. It is thus timely to produce a European-scale book about butterfly ecology, with the potential to make a clear statement about the 'state of the art' and the emerging issues. Not least, such a text should clearly indicate where the current research is taking place and which scientists and research teams are focusing on what. In producing this book it has been our intention to do just this.

WHO?

The idea for this book was conceived by Roger Dennis almost 10 years ago in September 1999 at the time of 3rd International Symposium of Butterfly Conservation, organised by Butterfly Conservation in Oxford, UK. The original three editors were Roger Dennis, Tim Shreeve and Andrew Pullin. For health reasons Roger Dennis stepped down from his lead role and the team was then joined by Josef Settele. Andrew Pullin left because of other commitments and the editorial team 'evolved' into a combination of colleagues from four different European countries, namely Josef Settele, Tim Shreeve, Martin Konvicka and Hans Van Dyck. During the gestation period, chapter authors changed, with the majority of author combinations reflecting the international dimension of butterfly ecology in Europe. Surprisingly, the editorial team as a whole physically only met once, to finalise arrangements, at Wageningen (Netherlands) in April 2008 during the 'Future of Butterflies II' conference, organised by the Dutch Butterfly Conservation. All other communication between the editors has been electronic.

Although Roger Dennis left the editorial team, all the editors thought it appropriate that he be asked to write an introductory overview, firstly as a tribute for his originating the concept and secondly for his long-standing contribution to the development of butterfly ecology.

WHAT?

Within this book there is occasional evidence of differences of opinion and interpretation between the authors of some chapters. These differences are a healthy sign that there is room for debate, and as editors we have taken the view that authors are experts and that the differences of opinion reveal that the science of butterfly ecology is permanently developing and in a productive state. The subjects within each chapter cannot be viewed in isolation; there is thus an element of necessary overlap between some chapter parts. As editors, we have had to make decisions on some points; we have added cross-referencing between chapters to indicate where different areas merge; and for nomenclature, which is not consistent over Europe, we have been relatively conservative and adopted Karsholt & Razowski (1996) as the core reference.

We have attempted to provide a wide coverage of the many aspects of butterfly ecology that are being undertaken by European researchers. The text is broadly thematic and clearly states where there are knowledge gaps. Where

appropriate authors also indicate where cross-disciplinary studies can contribute to the advancement of knowledge. It is, however, inevitable in a text of this size that some areas have not received as much attention as some readers would prefer. Reference to these areas, such as the major advances being made in the study of ant–lycaenid interactions, or the painstakingly detailed work on metapopulation models using *Melitaea* species, is made where relevant but we also think that these topics either warrant complete new exhaustive treatments or are covered elsewhere.

WHERE TO IN FUTURE?

It is evident from the contributions to this book that there are emerging new areas of butterfly research and we hope that the synthesis provided within the chapters will provide a stimulus to further work. Each chapter raises important questions. Despite extensive research there are many gaps in our existing knowledge; for example, we do not even know the host-plant ranges of many species, our grip on what determines a habitat for most species is rather limited, and our knowledge of population dynamic processes and interactions at the community level is in its infancy. We now have a range of techniques for studying processes from the molecular to the community and biogeographic levels. Integration of these techniques to provide novel approaches to studying academic questions and addressing immediate conservation issues is now possible and the levels of co-operation between different research groups to achieve these goals are also clear from the contributions to this book.

Research on butterflies within Europe is now transnational, and it is surprising how much has been achieved within the last two decades, often with limited financial resources. The emergence of Butterfly Conservation Europe, as yet poorly funded, provides a potential future mechanism for increasing European co-operation, in providing a forum for raising key issues and bringing subject experts and end-users together. Our plea to politicians and grant-awarding bodies is to guarantee the continuation of basic research and enhance funding for future collaborations. Within Europe there is a wealth of talent working on the ecology of butterflies, and their work is making major contributions to understanding the state of biodiversity, the mechanisms controlling it, and increasing the power of predictive models in a rapidly changing world. The work contained in this book is a testimonial to what has already been achieved. It is our hope that this book provides a stimulus for further work, in particular that it encourages the next generation of butterfly ecologists. Our one hope is that theory and practice can combine quickly enough to ensure a secure future for butterflies and the species they are associated with in a dynamic European landscape.

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