Preface

This book is an introduction to the exciting new field of ecological genomics, for use in MSc courses and by those beginning their PhD studies.

When we became involved in a national research programme on ecological genomics, or ecogenomics as it became known, we realized that information on this newly emerging subject needed to be brought together. In order to start up a research programme in such a new discipline, not only the students, but also we as teachers, had to get to grips with the subject. Furthermore, although obtaining a PhD implies mastering a specialized field, the PhD student must be able to place this field in a broader context if he or she is to become a mature scientist. This approach may be called the T-model of education; the horizontal bar of the T representing a broad understanding, and the vertical bar an investigation in depth, going down to the root of the problem. Our book uses this approach.

We assume a basic level of knowledge in the biological sciences to BSc level: ecology, evolutionary biology, microbiology, plant physiology, animal physiology, genetics, and molecular biology. We have tried to link up with the content of the most common textbooks in these fields, at the same time realizing that students of ecological genomics have a variety of backgrounds. However, our main targets are students with subjects closely related to ecology and evolutionary biology, which is why we place the emphasis on aspects that we judge to be particularly new to them.

Evolutionary genomics and bioinformatics are companion disciplines to ecological genomics. In the last 10 years interest in both disciplines has grown enormously. Several textbooks on bioinformatics have already been published and subjects encompassed by evolutionary genomics, such as comparative genomics, phylogenetic analysis, and molecular evolution, can now be considered as fields in their own right. They are certainly too large to be covered in an introductory book on ecological genomics; indeed, evolutionary genomics deserves a textbook of its own.

We have organized this book around three issues important in modern ecology, choosing questions for which the links to genomics are best developed. At the outset, we perhaps use rather ambitious phrasing to announce the genomics approach to these ecological questions. Maybe our questions cannot be answered at this stage. However, we decided not to suppress unanswered, and thus open, issues. Instead we hope to stimulate discussion as well as provide factual information. We have included an appraisal section at the end of each chapter to emphasize this question-orientated approach. Combined with information given in the introductory section, this allows the reader to grasp the main points of each chapter, even if the detailed treatment of molecular principles and case studies are left aside.

Case studies are taken from literature published since the year 2000. Nevertheless, a book on genomics runs the risk of becoming outdated very quickly: the rate at which knowledge is being accrued and insight developed is unprecedented. However, we hope that our question-orientated set-up will be useful for some years to come, even when new and better case studies are available.

Before this book was written, journal articles comprised the only literature on ecological genomics. These, although very inspiring, were scattered widely. Today, most textbooks on