

Preface

This book is concerned mainly with the process of species formation in birds, and with the factors that affect their geographical ranges. The current distributions of species depend not just on prevailing conditions, but also on past conditions which have enabled species to reach the areas they have or eliminated them from areas formerly occupied. Important processes involved include: on the longest time scales, the movements of the continents and the formation and loss of volcanic islands; on shorter time scales, the changes in glacial and other climatic conditions; and on yet shorter time scales, the effects of human activities on habitats and biodiversity.

Any attempt to understand these processes places us at the interface between several traditional scientific disciplines: palaeontology, ecology, genetics and evolutionary biology, in addition to the 'earth sciences' of geology, oceanography and climatology. These various sciences form the basis of biogeography, which itself underlies many aspects of evolutionary biology. Some of the founders of modern evolutionary theory, notably Charles Darwin and Alfred Russel Wallace, were biogeographers, although they may not have thought of themselves as such.

Research in all the relevant sciences has made enormous advances in recent years, supporting some earlier ideas but changing others, as well as providing fresh insights. These advances have shed new light on speciation and extinction events, and on the shifts in geographical ranges that have shaped the composition of current avifaunas. Particularly influential has been the development of molecular biology: the study of the structure of DNA, the chemical responsible for genetic inheritance. Such study has enabled us to trace the history of species in ways not previously imaginable.

In this book, I have attempted to integrate new information from these various fields of science in order to gain more understanding of speciation in birds, and of the histories and distributions of populations. The book is intended primarily for advanced students of population and evolutionary biology, but jargon has been cut to a minimum in the hope that the text will be enjoyed by a wider readership, including interested bird-watchers. A glossary is provided, and no background in mathematics is necessary.

After an introductory chapter, giving some necessary background information, the book is arranged in five main sections. These deal respectively with: (1) species formation and diversity in birds; (2) major distribution patterns on continents, islands and seas; (3) effects of past glacial and other climatic changes in shaping current distribution and diversity patterns; (4) contemporary factors limiting geographical ranges; and (5) the influence of dispersal and migration on bird distribution patterns. The book ends with a concluding chapter summarising the main findings. With this treatment, some topics inevitably arise in more than one chapter, but I have tried to keep repetition to a minimum, and to cross-refer wherever possible. Because many species are mentioned from different parts of the globe, scientific names are given with common names throughout.

Much of this book was written while I was the grateful recipient of a grant from the Leverhulme Trust. Many of the maps and diagrams in the book have been redrawn from previously published sources, as acknowledged in the captions. For permission to use this material, I thank Academic Press, the American Ornithologists' Union, Birdlife Finland, Birdlife South Africa, Blackwell Science Limited, the British Ecological Society, the British Ornithologists' Union, the Ecological Society of America, *Evolution* Editorial Office, the National Academy of Sciences, *Nature*, the Royal Society, the Smithsonian Institution, Oxford University Press, Springer-Verlag and University of Chicago Press, as well as those of the original authors that I managed to track down.

I am grateful to Mrs Doreen Wade for typing the several drafts of each chapter and for helping to put the book together; also to Linda Birch of the Alexander Library in Oxford for helping me find some relevant literature, and to Angela Turner for meticulous copy-editing. Throughout, I have benefited from discussion with many friends and colleagues too numerous to mention individually. Among them, Anthony Cheke, Mike Brooke, Ian Owens, David Parkin and Pertti Saurola kindly allowed me to read their manuscripts before publication. For commenting on particular chapters, I thank Mark Avery (14), Bill Bourne (8 and parts of 9), Mike Brooke (8), Anthony Cheke (6 & 7), Fred Cooke (part of 2), Jeremy Greenwood (2 & 3), Shelley Hinsley (14), Peter Jones (11), Mick Marquiss (2 & 3) and Iain Taylor (part of 5). Finally, for commenting helpfully on the whole book in draft I am grateful to David Jenkins and my wife, Halina. Any errors that remain are entirely my own.

Ian Newton