

Preface

Guest editors' introduction to the special issue: integrating phylogeography and ecological niche modelling

In this special issue of the Folia Zoologica, we did not focus on a specific problem or a taxon, but on two key disciplines that have been widely used together in recent biogeographic studies: “Phylogeography and Ecological Niche Modelling”. Phylogeography itself deals with the spatial arrangements of genetic variation and diversity especially within and among closely related species. In late 1980s, John Avise developed its theoretical framework based on the principals of population genetics and phylogenetics (Avise et al. 1987). At the beginning, mitochondrial DNA (mtDNA) studies became more common especially in animal phylogeography. Hence, astounding numbers of phylogeographic studies based on mtDNA data have been published for last 20 years (see Knowles 2009, Gutiérrez-García & Vázquez-Domínguez 2011). The rising interest in phylogeography together with recent advancement in DNA technology and statistical processes make this field a fast-evolving discipline. Perhaps the most significant development in phylogeography in the past ten years has been the introduction of new sequencing techniques that allow rapid sequencing from large amount of gene loci and the advances in coalescent theory.

Phylogeography is a synthetic discipline that integrates with different disciplines within ecology and evolutionary biology to provide a comprehensive understanding of the spatial arrangements of genetic variation and diversity in the past and present. Ecological niche modelling, for instance, is an important methodological development designed to predict the past, present and future geographic distribution of organisms. The integration of phylogeography and ecological niche modelling provides incorporating the patterns of geographic ranges into analyses of genetic variation and diversity (Carstens & Richards 2007, Alvarado-Serrano & Knowles 2014). In a nutshell, phylogeography together with ecological niche modelling certainly provides valuable insights that can improve our understanding of the spatial patterns of biodiversity in the past and present.

This issue aims to consider the advances in both phylogeography and ecological niche modelling. There are eight articles that are set in the two sections, and two book reviews. The first section includes two studious and comprehensive reviews. In the phylogeography review, Edwards, Shultz & Campbell-Staton focused on next generation sequencing and its contribution to phylogeography. On the other hand, in the ecological niche modelling review, Peterson & Anamza focused on species-level distributional ecology with a brief historical review and methodological considerations and advances. The second section includes a nice set of six research articles. Galbreath & Hoberg focused on phylogeography of host-parasite co-speciation in the North American pika/parasite assemblage. Smyth, Patten & Pruett examined ring species formation in song sparrow complex that surrounds Sierra Nevada in North America. Ornelas and his colleagues focused on genetic diversity of eight hummingbird species in Mesoamerica and its relationship with past climatic fluctuations. Fahey, Ricklefs & DeWoody examined historical demography of 16 bird species in Hispaniola based on nuclear DNA (nuDNA) data and discussed the concordance between nuDNA and mtDNA. Savit & Bates focused on phylogeography of the burnished-buff tanager in South America. At the end, in our research article, we examined historical demography of the Eurasian green woodpecker to discuss glacial refugia hypothesis in Europe. The third section includes two book reviews. Thus, this issue closes with up-to-date reviews of recently published books in the field of statistical phylogeography and climate change ecology.

It is certainly inevitable that phylogeography as a fast-evolving discipline will continue to grow. We believe that this set of articles, written by well experienced experts of phylogeography and ecological niche modelling, reflects its fast-evolving nature and may be a valuable resource.

Finally, we would like to give our sincere thanks to all contributing authors and to all reviewers, who helped to improve all contributions in this issue in terms of both contents and readability. We also extend our warmest thanks to the chief editor, Prof. Jan Zima, and the managing editor, Lenka Glosová, for making this special issue possible in the Folia Zoologica.

Literature

- Alvarado-Serrano D.F. & Knowles L.L. 2014: Ecological niche models in phylogeographic studies: applications, advances and precautions. *Mol. Ecol. Resour.* 14: 233–248.
- Avice J.C., Arnold J., Ball R.M., Bermingham E., Lamb T., Neigel J.E., Reeb C.A. & Saunders N.C. 1987: Intraspecific phylogeography: the mitochondrial DNA bridge between population genetics and systematics. *Ann. Rev. Ecol. Syst.* 18: 489–522.
- Carstens B.C. & Richards C.L. 2007: Integrating coalescent and ecological niche modelling in comparative phylogeography. *Evolution* 61: 1439–1454.
- Gutiérrez-García T.A. & Vázquez-Domínguez E. 2011: Comparative phylogeography: designing studies while surviving the process. *BioScience* 61: 857–868.
- Knowles L.L. 2009: Statistical Phylogeography. *Ann. Rev. Ecol. Syst.* 40: 593–612.

Utku Perktas & Hakan Gür