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Journal of Arid Environments 66 (2006) 385–388

Journal of Arid Environments

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Editorial

Historical biogeography and origin and evolution of arid and semi-arid environments: An introduction

What extant taxon distributions tell us about the history of arid and semi-arid environments? Which are the biogeographical histories of extant taxa inhabiting them? When have these environments been originated? How their distributions varied over the time? How could these past environments be identified through different proxy data? These are some of the questions we are intending to answer with this special issue of the Journal of Arid Environment.

This volume comprises ten papers, whose taxonomic, methodological, and geographical diversity represents an excellent approach to answer the aforementioned questions. Six of the ten papers have their focus on historical biogeography, the four remainder ones are focused on the paleontological evidence. Why include all these papers in a single volume? The kind of questions we are intending to respond require a multidisciplinary answer and the interaction between historical biogeography and paleontology is a fundamental step to achieve accurate answers (Pascual and Ortiz-Jaureguizar, 1990; Crisci et al., 2003).

The first paper by Paula Posadas et al. (2006) sets the historical biogeographic scenario by reviewing the history, basic concepts and approaches to the discipline. Also, this paper discusses the need for a new conceptual framework to solve some of the current critical issues in historical biogeography (i.e. the historical and ecological binary opposition in biogeography; the problem of methods; the inclusion of time in historical biogeography analysis; and the role of biogeography in biodiversity conservation).

The second paper, by Sergio Roig-Juñent et al. presents a view of the historical biogeography of South American arid lands using an area biogeography approach. Roig-Juñent et al. (2006) construct a hypothesis of area relationship for arid and semi-arid environments of South America based on the information encoded in several arthropod phylogenies by means of the application of paralogy-free subtree analysis. Additionally, they postulate which are the main geological events which could explain the present pattern of distribution of arid and semi-arid environments in this continent.

Mariano Donato presents a taxon biogeograhic analysis of the South American endemic locust family Tristiridae. Several hypotheses of the biogeographical origin of this South American endemic group have been proposed. Donato (2006) reviews these previous hypotheses and reconstructs the biogeographical history of this taxon by means of

0140-1963/$ - see front matter
doi:10.1016/j.jaridenv.2006.01.003

dispersal-vicariance analysis (an event-based approach to historical biogeography). Additionally, Donato frames his results on the geobiotic scenario of southern South America.

Brett Riddle and David Haffner reveal the complexity of the extant warm desert biota of western North America. They analysis is based on a set of different taxa including mammals, birds, reptiles, amphibians, and cactuses. Riddle and Hafner (2006) provide us with a stepwise approach which combines the strengths of phylogeography and phylogenetic biogeography.

Pauline Ladiges et al. (2006) analyse the biogeographic history of Australian arid lands analysing the phylogenies and distributions of several *Acacia* species groups. Acacias are the largest genus of higher plants in the region, with the phillodinous acacias represented by more than 900 species in this continent. The Ladiges et al. study is carried out applying paralogy-free subtree analysis (as in the paper by Roig et al., 2006). Additionally, they frame their results in an appropriate temporal scenario by using relative branching pattern of the obtained area cladogram and information from the fossil record and the geological and climatological history of Australia.

Óscar Moyá et al. (2006) explore the population history processes of recent colonizers in Canary Islands. They provide a good example of how Nested Clade Phylogeographic Analyses (NCPA) can be applied to investigate population processes in the colonisation of island chains. The taxon analysed, genus *Pimelia*, belongs to Tenebrionidae (Insecta: Coleoptera). Tenebrionids (also known as darkling beetles) constitute important elements of the arid and semi-arid terrestrial ecosystems.

The four remaining papers are devoted to the paleontological evidence on when and how arid and semi-arid environments have originated and evolved. Using different proxy records, three of these papers present us a complete revision of the origin and evolution of arid and semi-arid environments on different continents (i.e. South America, Australia, and Africa).

Edgardo Ortiz-Jaureguizar and Gerardo Cladera (2006) present a complete review of the environmental changes in southern South America during the Cenozoic. Their review is plenty of information which came from different proxy data. Paleobotanical, paleogeographical, geological, paleoclimatic, paleoecological, and paleozoological evidences are surveyed by these authors, providing us an up-to-date review of the changes that affected southern South America.

Hellen Martin reviews the history of arid vegetation in Australia. This continent is today essentially arid, with more than one-third of its surface receiving less than 250 mm of annual precipitation. In her paper, Martin (2006) explores the environmental changes which resulted in the present conditions. Martin uses as evidence several proxy records to reconstruct the different vegetation types through time and the paleoclimatic changes of the Australian continent during the Cenozoic.

René Bobe presents a review of the environmental changes in Africa through the Cenozoic. As in the two previous papers (Ortiz-Jaureguizar and Cladera, 2006; Martin, 2006), the scenario provided by Bobe (2006) is based on several proxy records, including paleoclimatic and paleobotanical evidence, as well as an analysis of Cenozoic faunal changes with a focus on the taxonomic richness of large terrestrial herbivorous mammals. Also, he presents a new analysis of changes in the abundance of bovids indicative of seasonally arid environments from the Late Miocene to the Pleistocene of the Turkana Basin in Kenya.

The last paper of this volume explores the adequacy of broadly used methodologies to infer past environments (i.e. ecological diversity and cenograms). Hernández Fernández et al. (2006) analyse in their work the perfomance of these paleocological methods when applied to Iberian mammal fossil communities.

This special issue leads us to the fascinating history of arid and semi-arid lands providing an excellent review on the issue. A broad approach to the considered subject was achieved since the papers included ranges geographically: South and North America, Australia, Africa, and Europe, and taxonomically: vascular plants, arthropods, and vertebrates. Also, this special number presents different methodological approaches and reviews the main paleontological sources of evidences, discussing their utility.

We want to acknowledge all the contributing authors. It has been a pleasure for us to work with all these fine authors whose expertise in their respective fields have resulted in this excellent synthesis to the subject we want to address in this issue. Also, we want to acknowledge the collaboration of all those who contributed to this volume as peer-reviewers of the manuscripts. The encouragement and constant support of Damián Ravetta, chief editor of the Journal of Arid Environments, made this work possible.

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