

BIOTIC INTERACTIONS AND ENVIRONMENTAL CHANGE IN THE BALKANS DURING THE HOLOCENE

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As one of the main peninsular refuge areas of Europe during the Pleistocene (the others being Italy and Iberia), the Balkans are of particular interest to biogeographers and others who seek to understand the processes of biotic change as the area responded to environmental warming during the Holocene.

With a complex geology and relief, and a variable pattern of climate, the vicitudes of which are by now fairly well known, both at present and during the post-Pleistocene past, vegetation responses are particularly interesting, involving as they did a mixture of essentially northern, Mediterranean and continental species at the beginning of the Holocene. The presence of glacial microrefuges at this time appears to have greatly facilitated the spread of forests, but good scrubland was also identifiable.

The spread of forests was complicated by the fact that some species changed their distribution only slightly, eventually becoming endemic or extinct: others had a massive extension of range. Reasons for this will be examined. In addition, molecular changes in some species, along with significant differences in the altitudinal ranges of others, will be noted. The particular dominance of certain species (*e.g. Pinus*) in the western half of the area is explained, along with regional and local changes of vegetation elsewhere.

An understanding of these will be helpful to any explanation of animal distributions in the Balkans, and to the human-induced modifications of both, which followed.

Key words: environmental change, Holocene, climate, *Pinus*, vegetation