

Plant endemism in the central Namib Desert

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ABSTRACT

Questions: Have Namib endemics evolved from old or recent evolutionary lines? What are their phylogenetic patterns at different levels of taxonomic order? What is the role of environmental factors in determining current distributions?

Data description: Distribution of central Namib plant endemics and environmental indices, based on field surveys and published sources.

Method of analysis: Chi-squared and *G*-tests to examine differences in phylogenetic aspects, growth form, and dispersal spectra between endemic and non-endemic flora. Canonical correspondence analysis to investigate the effect of environmental variables on the distribution of plant endemics in a 15-minute interval geographic grid.

Conclusions: Central Namib endemics have probably descended from old evolutionary lines in contrast to those in the southern Namib. Different selective forces are therefore likely to be driving evolution in different parts of the Namib Desert. Although leaf-succulents are over-represented among both central Namib and southern Namib endemics, leaf-succulents in the central Namib are likely to be a result of former environmental conditions (i.e. winter rainfall) and/or the influence of fog, in contrast to the southern Namib where phylogenetics play a more important role. Species-specific responses are indicated among the Namib endemics, as the influence of fog seems to be important for some, and substrate conditions for others. These need to be taken into account when predictions are made regarding broad-scale biogeographic patterns and when modelling the effect of climate change.

Keywords: arid lands, biogeography, climate change, evolution, growth forms, southern Africa.

INTRODUCTION

The Namib Desert straddles southern Africa's west coast and is considered one of the oldest deserts in the world (Ward *et al.*, 1983). During a long history of evolution, plants and animals have hence adapted to these arid conditions. Endemism is high among insects, in particular ground-dwelling insects, such as tenebrionids (Tenebrionidae) (Louw, 1983) and scarabs (Sole *et al.*, 2005), as well as among reptiles (Branch, 1988; Griffin, 2000), but little is known about plant endemism in this ancient desert.

Two contrasting climate regimes reign in the Namib Desert. The very south is within the influence of the southern hemisphere's temperate cyclone system and receives winter rains

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