

Another two unique biomes?

The Karoo: Ecological Patterns and Processes

by *W.R.J. Dean and S.J. Milton*

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The challenge for books on biomes, or two biomes in this case, is to rise above the particular. What makes the challenge a daunting one in the case of the Karoo is its wide environmental and biotic diversity, its high endemism, the extreme variability of its climate and the sheer vastness of the region. This substantial book summarizes the results of a wide range of basic and applied ecological research in the Karoo: biogeographic patterns, form and function of animals and plants, community dynamics and anthropogenic influences. It owes much to the dedication of members of the Karoo Biome Project – sometimes regarded as the Cinderella of the South African Biome Projects.

We tend to think of the Karoo as the nearly empty quarter of South Africa: an arid and treeless place of ancient landscapes, improbable life forms, leathery pastoralists and long-lost migrations of massive herds of springbok. Floristically, the Karoo–Namib Region extends from the Cape, up the west coast of South Africa, through Namibia and into southern Angola. Its two biomes, the succulent karoo and the Nama-karoo, experience a divergence in rainfall regimes, which underlies their biotic separation. The succulent karoo occupies a broad coastal belt with an oceanic climate giving sparse winter rainfall and dry summers ameliorated by coastal fog. It has an unparalleled diversity and endemism of leaf succulent shrubs. The Nama-karoo lies further inland, and receives summer rainfall derived from sources to the east and north of the region. Mean annual rainfall rises towards the east, and the vegetation grades from dwarf shrublands and grassy shrublands into the grassland biome. Low mean annual rainfall is associated with high interannual variability: an often-made generalization seldom better documented than in the opening chapter on climate.

The succulent karoo and Nama-karoo are distinguished further because the succulent karoo has lower variability at a given mean annual rainfall. This mild climate, with dependable (albeit low) rainfall, has selected for relatively short-lived shrub lifestyles with drought intolerance and regular germination and/or recruitment opportunities. These are conditions, it is argued, under which the high numbers of sexually reproduced generations

will inevitably lead to high rates of genetic recombination and speciation. However, shrubs in the Nama-karoo are mainly long-lived and well dispersed, with a stable community structure. Diversity and rates of diversification are not unusual when compared with other arid lands.

The book also aims to challenge generalizations about semi-arid regions. Because our understanding of plant–animal dynamics in semi-arid systems has undergone some marked paradigm shifts in the past decade, it is not always clear which generalizations are being challenged. The modern paradigm, not universally accepted, includes the view that climatic variability reduces the impacts of herbivory, because animal numbers are kept low by frequent population crashes. Examination of herbivore impacts in the highly variable Nama-karoo reveals rather the opposite picture, with the local extinction of heavily grazed species, which would otherwise be long-lived. Once lost, their lack of recovery is a result of the infrequent recruitment opportunities and the absence of persistent seed banks. Thus, extreme climatic variability would appear to make plants with these particular life history characteristics more prone to the impacts of herbivory than they would be in a less variable environment. By contrast, many short-lived ephemeral species have substantial seed banks and might irrupt quickly after suitable rains. The book also contains a thoughtful chapter on the debate about desertification – a process that some have argued is a myth that defies the evidence and serves the purposes of governments, aid agencies and scientists.

The book is a triumph for South African science, and is the product of diligence and a real care for the region's astonishing natural history. Inevitably, the treatment is parochial in parts (most of the bibliography refers to local work and does not draw on a wider literature) and varies in the depth of treatment permitted by current knowledge. With so much basic material to catalogue and describe, it is hardly surprising that the massive amount of detail occasionally gets in the way of genuine synthesis and comparison with other regions. Outstanding chapters on plant biogeography, endemism and diversity, on community patterns and dynamics, and on the succulent karoo in a global context balance the more descriptive chapters, as does the comparison of ecosystem processes in the Nama-karoo and other deserts. Verdict: not as far above the particular as it might be, but a fine synthesis that will be a lasting work of reference.

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Our wondrous world of mites

Mites: Ecology, Evolution and Behaviour

by *D. Walter and H. Proctor*

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Among arthropods the Acari (mites and Ticks) are no longer questioned as being second only to insects in species richness and as having radiated successfully into an even greater diversity of habitats (including the seas) than insects. However, other than the massive compilation of literature concerning acarines that are of agricultural and medico-veterinary importance, relatively little attention has been given to this species-rich and biologically fascinating array of animals in ecological, ethological, evolutionary and biodiversity studies. The authors' goal in writing this book is to attract a wide variety of biology students and researchers by showing that mites do interesting and intriguing things that make them excellent organisms for comparative studies and manipulative experiments, especially as these might put general vertebrate-based biological theories to the test. The resultant book succeeds in meeting this goal, and is a superb compilation of current knowledge of life cycles, feeding behavior, reproductive biology and host associations of acarines in all manner of soil, aquatic, arboreal and canopy habitats. It leaves readers with a multitude of lines of enquiry that can be pursued, using a diversity of mites as animals to observe when answering these queries.

David Walter and Heather Proctor evince a complementarity of acarological experience and interests to do full justice to most areas treated in this endeavor. They employ a casual, somewhat narrational and anthropomorphic writing style, which helps captivate readers. However, this writing style can also lead to redundant passages, especially in the chapters on life cycles and sex; occasional misleading statements, such as spider mites 'spitting silk'; and seemingly inaccurate statements, for example, a *Limnochares* mite entering a calyptostatic state each time before undergoing supernumerary moults, and eggs of *Iponemus* mites developing directly into adults. Other statements might confuse readers for whom English is a secondary language. Refreshingly, special terminology, jargon and concepts are explained, thus little prior knowledge of acarology is required; however, some terms like 'allo-specific', 'macrophytes', 'endophytically' and 'sudoriferous' slip through.