



Norbert Jürgens

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Biodiversity & Ecology 7

Fairy Circles of the Namib Desert

Ecosystem engineering by subterranean social insects

About this book

This volume of *Biodiversity & Ecology* offers a monograph on our present knowledge of a number of ecosystem structures in the drylands of southern Africa, which are engineered by social insects. Among the different insect-engineered systems in Africa, the fairy circles of the Namib Desert are perhaps the most astonishing and puzzling ones. Therefore, they are used as the anchor point and central thread of the book.

The monograph reviews published studies, which are referred to by numerous literature references for further reading, as well as provides original new results. Merely the two short Chapters 2 and 3 are designed to introduce the reader to the topic and therefore do not provide literature references. For the quick reader the initial Chapters 1 to 5 will provide all necessary information. The other Chapters (6 to 11) focus on specific aspects and offer more detail in terms of data and evidence.

The main objective of the book is to provide a robust knowledge base, which is of crucial importance for the study and understanding of fairy circles and other ecosystems designed by social insects. This effort is also motivated by various contradictory hypotheses that were brought forward during the last decades to explain the origin of the fairy circles. The resulting scientific debate attracted the wider media to an extent that the television channel CNN dubbed the fairy circles “nature’s greatest mystery” (Carrington 2014). This mystification increased the public awareness of fairy circles. However, in the emerging broad public and scientific discussion the complexity of this phenomenon was often reduced and single aspects, like the regularity of the spatial patterns, were overestimated.

One problem of the public debate is the frequent transformation of terms like “fairy circle” to a variety of quite different structures. Therefore, in the context of this book, special care has been taken to describe and name geomorphological and pedological structures precisely and to highlight a causative role of organisms by including them into the term. Terms like “*Psammotermes* Fairy Circle” are only used when robust evidence for the presence of the organisms (in this case *Psammotermes*) was given.

To dispel potential misinterpretations and to provide facts and arguments to ground future discussions, in this book the full spectrum of potentially relevant processes and mechanisms including all known and potentially relevant desert organisms and ecosystems properties are introduced and discussed in detail (Chapters 4 to 11). This is the first comprehensive compilation of all the facts, arguments and observations about the Namib Fairy Circles based on a very broad and long-term study of all parts of the Namib in Angola, Namibia and South Africa.

Another objective of the book is to identify gaps in the current understanding of the biology of the relevant desert organisms and the ecology of the engineered structures. Insect colonies show great plasticity in adaptation to different environmental conditions and the resulting structures are context depending. Chapter 9 and 10 introduce structures with many similarities to fairy circles such as the so-called heuweltjies from the southern African winter rainfall regions. Chapter 8 offers an inventory and characterisation of numerous known organisms which play a role on, underneath or around fairy circles. A wide range of interactions of high complexity among these desert organisms and their environments are mentioned in several of the chapters. It will require a lot of focused research to understand the biology and behaviour of those organisms that forms the foundation of the “engineering”. In many places, gaps in the present knowledge are highlighted and these should be understood as recommendations for future research.

Finally, after more than 42 years of field research in all parts of the Namib Desert the senior author, Norbert Jürgens, wants to make sure that his knowledge accumulated over decades in all landscapes of the Namib region does not get lost.