

Preface to the First Edition

Deserts are difficult to define. They vary greatly in their aridity, from close to 0 mm of rainfall annually to more than 500 mm. They range in temperature from more than 50°C to far less than 0°C. Most of all, they are distributed across the globe in so many places that it is difficult to define exactly where they are and what makes a desert what it is. I have used the term 'desert' in the broadest sense of the word, but have tried to keep away from neighbouring topics such as savannas and grasslands. I have usually used the term to include all 'arid' and 'semi-arid' habitats, or where the term 'xeric' seemed to fit. Most of all, I have tried to focus on the studies that use the term prominently, especially where I am familiar with the system.

The amount of research done varies greatly among deserts, and often there is a difference in the issues that are focused on in a particular region. North Americans have done more work of interest in terms of evolutionary studies and population and community ecology. Israeli scientists have done a lot of research on population and community ecology, as well as ecosystem and conservation ecology. Researchers in Russia (and allied states) and China have mostly been concerned with applied issues, as have researchers in many Arab states and Iran and India. Researchers in Australia have focused a lot on rangelands as well as on plant, lizard, and small mammal diversity. Southern Africans have focused on a range of issues, especially on animal physiology and plant diversity, but very little has been done on plant physiology and population and community ecology. In contrast, German researchers have extensively studied desert plant physiology in the Sahara, Middle East, and the Namib and Kalahari deserts. South Americans have conducted studies on a wide range of desert issues, with a focus on population ecology. Clearly, if we each learned a bit from each other, we could gain a lot more insight into how desert systems work. It is not possible to assume that if a trend has been demonstrated elsewhere, it will work the same way in all deserts. I believe that we need to consider how we might replicate studies in different deserts (e.g. plant and animal physiology studies) and expand the number of deserts in which we study competition, facilitation, predation, parasitism, and plant-animal interactions (as well as ecosystem studies).

In this book, I have decided to focus on an evolutionary approach to deserts because I believe that this is what makes them so interesting. Deserts are indeed laboratories of nature. I realize that evolution means different things to different people. Here, I use the term very broadly, covering phylogenetic constraints, optimization, and convergence, among other things. This is not to say that there is no coverage of other issues. I believe that I would be doing a disservice if I were to focus on evolutionary

issues alone, so I do cover ecosystem approaches, desertification, and conservation issues, to name but a few. However, there are other excellent books published on community and ecosystem approaches such as Gary Polis' (1991) *Ecology of Desert Communities*, Walt Whitford's (2002) book on *Ecology of Desert Systems*, and many others covering specific deserts. I particularly like John Sowell's (2001) book titled *Desert Ecology: An Introduction to Life in the Arid Southwest*. Clearly, its focus is on North American deserts, but it covers a tremendous range of issues. These are all very good books; it will be hard to find a niche among them.

There are many people that I would like to thank. Most of all, I thank my wife, Megan Griffiths-Ward, for her help in copy-editing (and Maureen Ward and Betsy Griffiths) and in so many other ways. Elizabeth and Jonathan Griffiths were very kind to us in Gettysburg. I thank my colleagues at the Blaustein Institutes for Desert Research in Sede Boqer, Israel, including my long-time collaborator and friend, David Saltz, as well as Zvika Abramsky, Yoav Avni, Yoram Ayal, Burt Kotler, Boris Krasnov, Yael Lubin, Ofer Ovadia, Berry Pinshow, Uriel Safriel, Moshe Shachak, Jura Shenbrot, Josef Plakht, Eli Zaady, and Yaron Ziv. I pay special thanks to my technician of many years, Iris Musli. I am indebted to my many Israeli students, especially Gil Bohrer, Keren Or, Natalia Ruiz, Madan Shrestha, and Sergei Volis. In South Africa, I am very grateful to my research assistant, Vanessa Stuart, my German collaborator, Kerstin Wiegand, and my students, especially to Tineke Kraaij, Mari-Louise Britz, Khanyi Mbatha, and Michiel Smet, as well as to Katrin Meyer, Aristides Moustakas, and Jana Schleicher. Last, but definitely not the least, I would like to thank my editor, Ian Sherman, and his assistant, Helen Eaton, at Oxford University Press for their inspiration and assistance.

Preface to the Second Edition

A major difference in this second edition is that I have tried to emphasize the role of global changes and desertification more than in the first edition. In my opinion, too much emphasis has been placed on global warming and not global changes *per se*. While, ultimately, the world will continue to heat up as fossil fuels are burned, many people struggle to understand that it is human-induced changes in the world rather than a simple case of warming that is likely to occur. Thus, decreases in temperature and increased rainfall are also consequences of the ways that we are altering our world. Among these varied effects, desertification is often among the most egregious. Desertification usually occurs on the periphery of deserts, leading ultimately (and unfortunately) to the increasing size of arid and semi-arid regions. Hopefully, more researchers and policy-makers will take up the defence of deserts and means of combatting desertification. The cause is usually due to one effect or another of an increase in human population sizes. Controlling human population sizes is likely to be a very slow process, if it happens much at all. Hence, we need to strive to minimize the effects of desertification on our environments by increasing our efficiency of resource use. I have also tried to link the chapters on plant and animal physiology more than in the first edition through emphasis on heat shock proteins. In this second edition, I have updated many of the references I believed important to change. Science is, of course, a continually progressive topic that is always in need of updating. However, there are also many things that have stood the test of time—these references I have retained.

In South Africa, I am very grateful to my research assistant Kayleigh Muller, my long-time German collaborator, Kerstin Wiegand, and my students, especially to Tiffany Pillay, Admore Mureva, Desale Okubamichael, and Snehalatha Vadigi. I thank Stephan Getzin of Göttingen University for providing me with photographs and advice. I thank my colleagues at the Blaustein Institutes for Desert Research in Sede Boqer, Israel, including my long-time collaborator and friend, David Saltz, as well as Burt Kotler, Boris Krasnov, Yael Lubin, Ofer Ovadia, and Berry Pinshow. I am also grateful to Tony Verboom, Michael Cramer, and Timm Hoffman at the University of Cape Town, Ian Wright from Macquarie University, and Willie Stock from Edith Cowan University in Australia and Doug Kelt from the University of California at Davis for their advice and assistance. I thank too the various people who provided photographs and figures, including Gidske Andersen, Trine Bilde, Wolfgang Bodenmüller, Eli Greenbaum, Aaron Greenville, Yael Lubin, Doron Nissim, Julián Padró, Michal Samuni-Blank, Adrian Shrader, Alon Ziv, and Leo Zwarts. I am most grateful to the

School of Life Sciences (especially Richard Beckett) at the University of KwaZulu-Natal for granting me sabbatical leave. I am thankful to the Biology Department at Gettysburg College during my sabbatical there, to my host Veronique Delesalle, for her assistance and collegiality, and to Janelle Wertzberger and the staff of ILL of the Gettysburg College Library for their tremendous assistance with tracking down articles. I am also grateful to my colleagues at Kent State University, especially Laura Leff, for giving me time to complete this edition. I thank Charles Lauder and Indu Srinivasan for their attention to detail prior to publication. Last, but definitely not the least, I would like to thank my editor, Ian Sherman, and his assistant, Lucy Nash, at Oxford University Press for their inspiration and assistance.