
Preface

This book has taken several years to write, but it has been much longer in preparation. In fact I can probably trace it right back to growing up in central London. As a young schoolchild I was a regular visitor to the local library where the staff were very tolerant of me sitting on the floor to read. I devoured anything I could find on birds and animals, and one day as I turned over the pages of a newly arrived book I came across a grainy but evocative image of a forbidding mountainous landscape. Little did I know that I would later spend almost five years of my life undertaking research at this very spot: South Georgia, an isolated island in the Southern Ocean and on the edge of Antarctica.

Fieldwork in polar regions inevitably focuses attention on temperature, and the more I thought about the links between temperature and ecology, the more interesting they became. They proved to be the focus of my entire research career, so it was perhaps inevitable that once I retired from active fieldwork, I would write a book on temperature.

Although I often referred to the classic review edited by Precht and colleagues (*Temperature and life*, Springer, 1973), for much of my research career the book I kept immediately to hand was the ground-breaking *Strategies of biochemical adaptation* by Peter Hochachka and George Somero (Saunders, 1973). With its regular revisions this has remained a definitive work for ecological physiologists. Apart from those general physiology texts that had chapters on temperature, a few highly specialised symposium volumes and *Temperature biology of animals* (Andrew Cossins and Ken Bowler, Chapman & Hall, 1987), there was nothing else available for those needing an overview of thermal ecology until Michael Angilletta's *Thermal adaptation* (OUP, 2009). This takes an innovative behavioural and

evolutionary perspective, reflecting the approach of those ecologists who work with animals in the field rather than cells or proteins in the laboratory. It therefore complements the approach I have tried to take, which is a more traditional path through physiology to ecology.

In writing this book I have been able to present some topics in the way I would like to have been introduced to them as a student. To take one example, metabolism is so much easier to understand when it is built from its foundations through a single, simple idea: energy carried by electrons is used to generate a proton gradient which powers the synthesis of ATP. With this one concept, all of the bewildering detail of the metabolic chart and the enormous evolutionary variety of microbial metabolism have a common framework. I have also been able to indulge myself by exploring the history of some topics. It has been fun to track down some of the very early literature but salutary to find that some of this did not say what I (and many others) thought it said, and that some classic references had clearly not been read for many years as they are systematically mis-cited.

Like all scientists I have benefited from support, encouragement and the continual exchange of ideas with colleagues. One of the great unspoken benefits of fieldwork in distant places is the time spent travelling, or in bad weather, when there is an opportunity to talk science away from the everyday concerns of a modern research institute. These conversations are essential to scientific development; they are where ideas are explored, errors corrected and new projects planned.

All young scientists need guidance as they set out on a career, and I was lucky to receive this from a series of outstanding mentors. In particular I

benefitted from support from two notable department heads, Dick Laws and Nigel Bonner, and also from John Lawton at the Natural Environment Research Council; in addition there was sound advice at important moments from Inigo Everson, John Croxall, John Gray and John Sargent. Throughout my career in Antarctic science I have enjoyed discussion with many colleagues, both within the institute and abroad, conversations which have done much to sharpen my thinking and eradicate errors, so thanks are due to Mike Angilletta, David Barnes, Chris Cheng, Steven Chown, Melody Clark, Pete Convey, Alistair Crame, Paul Dayton, Bill Detrich, Art DeVries, Hugh Ducklow, Brian Enquist, Inigo Everson, Ray Huey, Roger Hughes, David Jablonski, Tim Jickells, Ian Johnston, Adrian Friday, Kevin Gaston, Nick Lane, Simon Laughlin, Barry Lovegrove, Carlos Martínez del Río, Mike Meredith, John Morris, Eugene Murphy, Lloyd Peck, Hans-Otto Pörtner, Langdon Quetin, Robin Ross, Bruce Sidell, Victor Smetacek, George Somero, Chris Todd and Paul Tyler.

Science involves teamwork, and I was particularly lucky to have worked with a series of wonderful research assistants, Lesley Holmes, Liz Prothero-Thomas and Nadine Johnston. It is also a pleasure to thank two librarians at the British Antarctic Survey, first Christine Phillips and then Andrew Gray, for their outstanding professional support in tracking down every obscure historical

reference I could challenge them with. Scholarship is all about checking primary sources, and I could not have done this without them.

I am also grateful to those colleagues who agreed to read through draft chapters. All of them took care and time, and they all found things I had got wrong. Needless to say any remaining errors are down to me. My thanks to David Atkinson, Martin Baker, Chris Cheng, Melody Clark, Pete Convey, Paul Cziko, Richard Davies, Art DeVries, Jack Duman, Fritz Geiser, Michael Kearney, John King, Nick Lane, Barry Lovegrove, Andrew McKechnie, Ian Renfrew, Brent Sinclair, George Somero, Jim Staples, John Turner and Eric Wolff.

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