

as is the description of the nature of the BCS theory (with a debt here to Victor Weisskopf, whose explanation is quoted).

The story thereafter becomes sketchy indeed, and misses many vital points. I might suggest that the authors' relative unfamiliarity with the anglophone world, and their weakness in theory, begin here to warp the coverage. There is emphasis on Pierre-Gilles de Gennes' group in France, with its remarkable collective ethos and a significant number of detailed applications of the BCS ideas to its credit, but does this work stand out so much relative to many things that at the time seemed more important? And I cannot let pass the authors' failure to note that although Alex Müller's great discovery of high-temperature superconductivity in the cuprates was unquestionably motivated by bipolaron theory (not an original concept of Benoy Chakraverty, by the way), that theory is nonetheless generally thought to be wrong. This is far from the first time since Christopher Columbus that a wrong concept motivated a great discovery.

In the discussion of the state of theory in this field, my words in a 2001 article for a Nobel symposium are quoted out of context, misreading or misunderstanding the message that the article was meant to convey, namely, that the source of high-temperature superconductivity is not a mystery, and that theory has not been pointless and futile. The reasons why the misleading popular impression of chaos and controversy in this field is so hard to dispel is not explored here, which is a pity. Still, in these final chapters the authors make some telling points about the overselling of the hopes for practical applications that characterized this period. But this critical observation is never balanced against the value of the MRI industry and other applications of superconductivity — by no means a unique story in the history of tensions between research and technology, where hitting the jackpot is a rarity but adds enormous value when it happens.

This year's Nobels bring out both the strengths and the weaknesses of the book. On the one hand, it is an excellent source for the background of the physics prizes to Vitaly Ginzburg and Alexei Abrikosov. But the intricate history of helium-3, now the source of yet a second physics Nobel, to Tony Leggett, is barely mentioned. I have already noted the absence of MRI, the subject of the physiology prize, from their horizon.

The intriguing piece of scientific history in *Cold Wars* has not been as well presented elsewhere, and the book is worth the attention of layman as well as scientist. But *caveat emptor*: the real inside story is not here if you're interested in what actually happened or in just who did what. But I found it refreshing to find judgements as to the broad trends of socio-scientific history, even if some of these were off by a little or, occasion-

ally, a lot. Far too often the history of science confines itself to bare facts — when it pays attention to them at all. ■

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## The rise and fall of populations

### Complex Population Dynamics: A Theoretical/Empirical Synthesis

by Peter Turchin  
*Princeton University Press: 2003. 456 pp.*  
 \$75, £52 (hbk); \$29.95, £19.95 (pbk)

#### Nils Chr. Stenseth

People have been fascinated and puzzled for centuries by the profound variations from one year to the next in the abundance of lemmings and populations of hares and lynxes. The archbishop of Uppsala, for example, wrote about the phenomenon as long ago as the fifteenth century. And hunters and other rural people such as the Sami of northern Scandinavia have their own theories to explain the burgeoning populations of lemmings, for instance, in some years. But it was the Oxford zoologist Charles Elton who built the scientific platform for the modern study of population cycles with a 1924 publication in the *British Journal of Experimental Biology*. That paper and his 1942 book *Voles, Mice and Lemmings* have been key references ever since.

Much of this work has focused on vertebrates of the north, but similar phenomena have been observed for species in other regions, such as the larch budmoth found in the Alps. The scientific literature on population cycles is vast and has to some extent been characterized by heated debates. So a book that aims to synthesize this rather chaotic field and make it more accessible to outsiders is to be welcomed.

*Complex Population Dynamics*, written by Russian-born ecologist Peter Turchin, is split into three parts: theory, data and finally a series of six case studies. The theory part provides an excellent synthesis of the work by Turchin and colleagues, but specialists



Now you see it... Many suggestions have been made to explain the lemming's disappearing act.

on population cycles may find that it does not cover the literature as fully as they might like in a book with ambitions of providing a synthesis of the field. I preferred the second part of the book, which covers both phenomenological (time series-based) and mechanistic modelling — the latter more fully than the former.

The section on case examples is good for the systems that Turchin has worked on himself, but is rather shallow for some of the other systems described, a good exception being the chapter on grouse. However, I think that this book contributes profoundly to the literature, in particular with its emphasis on integrating statistical analysis, theoretical modelling and experiments, rather than relying solely on experimental work. I fully agree with Turchin's conclusion that ecological investigations of population cycles and similar phenomena should start with statistical data analysis, aimed at describing the patterns to be explained, and end with experimental work to discriminate between alternative mechanistic explanations. In this respect the book may have a huge impact on the field, not necessarily because everybody agrees with Turchin's conclusions, but because he provides examples of what a research programme ought to look like.

Turchin's book covers many of the same elements as *Population Cycles* (Oxford University Press), which was published last year. Edited by Alan Berryman, who contributed an opening chapter and a postscript, *Population Cycles* comprises seven chapters written by specialists in the field, each considering an example of a population cycle. These chapters, although somewhat variable both in form and quality, display great enthusiasm in attempting to understand why some species and populations exhibit extensive population cycles whereas others do not. A concluding chapter is written by ecologists Xavier Lambin, Charley Krebs, Robert Moss and Nigel Yoccoz, who favour the experimental approach over statistical data analysis. Together with the postscript by Berryman, this provides a good balance regarding methodological approaches — a balance that I am convinced is needed if we are to find the solution to the cycle puzzle.

Both of these books show that the study of population cycles is a stimulating field, with much data and several plausible hypotheses needing to be tested by specifically designed and well-planned experiments. Although both books will provide active scientists in the field with much to think about — and to disagree with — I would not recommend either of them as textbooks, as they both seem too biased or narrow to serve a general educational purpose.

They both express rather similar perspectives, for instance in emphasizing feedback interactions between different trophic levels (between plant and herbivore, predator and

## Exhibition

**Force of nature**

The photograph shown here, called *Forces #7*, is one of a series staged and shot by New York-based artist Sonja Braas. Braas is interested in the way that we perceive our natural environment, particularly those uninhabitable landscapes where danger is a counterpart to beauty. For the *Forces* series she built models depicting the raw violence of nature. Once Braas had photographed the models, she destroyed them.

*Forces #7* is a compelling, ambiguous image, with a reality that becomes less clear the more closely one looks. It reflects the fading of the romantic notion that parts of nature will always remain pristine and inaccessible to humans.

Some of the *Forces* series can be seen at the Tanit Gallery in Munich, Germany, from 6 November to 13 December 2003. **Alison Abbott**



prey, and parasite and host). But do such trophic interactions provide a general explanation of population cycles? In my view, much more work (involving all elements of the research programme advocated by Turchin) is needed to settle this question.

Turchin claims that ecology has become a mature science, but I think it is still maturing, and as such is all the more exciting to work in — it is during the maturing stages of any life cycle that the interesting developments happen. I am quite sure that Elton and the group around him in the Bureau of Animal Population, which he set up at Oxford University, would have agreed and been happy about the development of what they started three-quarters of a century ago. ■

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## Rambling in the rain

### **The Cruise of the Betsey with Rambles of a Geologist**

by Hugh Miller, with a preface by T. C. Smout and an introduction and notes by M. A. Taylor  
*National Museums of Scotland: 2003.*  
576 pp. £20

**Philippe Janvier**

It is rather unusual to find poems, folklore and polemic in the same book as an analysis of the structure of the scales from 370-million-year-old lobe-finned fishes. But Hugh Miller's *The Cruise of the Betsey with*

*Rambles of a Geologist* contains both. It is rather disconcerting at first but it soon becomes fascinating once you imagine you are making your way with the author, who passes from one topic to another according to either the area he's visiting or an incidental encounter with a curio of nature.

*The Cruise of the Betsey* is mainly an account of Miller's geological and journalistic exploration of the Scottish isles of Eigg, Rum and Skye in 1844 and 1845; *Rambles of a Geologist* relates to voyages he made in the late 1840s through Scotland to Caithness and Orkney in search of geological and palaeontological outcrops. The two texts were first put together in 1857 by Miller's wife, Lydia Fraser, after his suicide in 1856. This new edition is enriched with a foreword by T. C. Smout, Scotland's historiographer royal, and with a detailed and informative introduction by M. A. Taylor, a palaeontologist at the National Museums of Scotland. It also contains a geological timetable, a glossary, notes and an index, although there is no simplified geological map of the areas being considered.

Miller was a self-taught man. As a young stonemason he became fascinated by the fossils he found around his native town of Cromarty in Scotland, especially the Devonian (470-million-year-old) fish and Jurassic (150 million-year-old) molluscs. In learning about geology and palaeontology he found no conflict between his Calvinist faith and the history of life told by the rocks. But by rejecting a literal reading of Genesis about the history of life on Earth, Miller helped to promote science within the strongly religious society of his time. He was a talented writer, and his books on this subject, *The*

*Old Red Sandstone* (1841), *Footprints of the Creator* (1849) and *Testimony of the Rocks* (1857), were successful in Victorian times.

Even so, Miller never adhered to the pre-darwinian evolutionary views of his time. To both Miller and his mentor, the palaeontologist Louis Agassiz, evolution, if it occurred at all, was merely a form of degeneration. In *The Cruise of the Betsey*, Miller rarely alludes to this; most of his scientific considerations are about geology, its bearings on our knowledge of the vastness of time, and its moral or physical benefits. Thanks to his popular style, this book has long increased people's interest in geology, hence the importance of this new edition.

Readers not from Scotland might have been lost in Miller's allusions to church and land politics without the book's excellent introduction. This explains that the Free Church of Scotland was created by the 'disruption', in which Miller played a role as the editor of the evangelical newspaper *The Witness*. The 'clearances' were a little-known (outside Scotland) form of 'soft' ethnic cleansing, which Miller condemned.

The diversity of subjects dealt with in this book is immense, including sociology, folklore, poetry, Gaelic language, archaeology, history, politics, religion, morality, zoology, geology, palaeontology and geography. This breadth makes it impossible to dissect the book into particular sections (as Taylor puts it, it is like trying to cut quicksilver). Yet Miller's style is clear and steady, with great care for detail. It variously recalls Walter Scott, Balzac and sometimes even Jules Verne. Although undoubtedly Victorian, Miller's English is remarkably easy to read for non-native anglophones.

Miller often alludes to rainy days ("another rainy day, varying only from the preceding day by the absence of wind"), so put on your boots and raincoat (or plaid) and just wander with him along the shore. Listen to him, inspired by a dead, tortured fish on the beach, considering the origin of moral evil, or, in a cave on Eigg, meditating over a sixteenth-century clan massacre, or explaining why Cromwell's helmet and Devonian fish scales were similarly fluted.

I warmly recommend this marvellously rambling book, which is full of sensitivity and poetry, to anyone who loves Scotland or is a humanist, a sociologist, an ethnologist, a geologist, a palaeontologist or just a fossil fan. ■

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### **More on Miller**

#### **Celebrating the Life and Times of Hugh Miller**

edited by Lester Borley  
*Cromarty Arts Trust/Elphinstone Institute, University of Aberdeen, £13.50*