edited by Jennifer Aley, William R. Burch, Beth Conover & Donald Field. *Taylor & Francis: 1999. £20.95, $24.95*

Behavioral Ecology and Conservation Biology
edited by Tim Caro. *Oxford University Press: 1998. £65, $90*

Super news

Superconductivity and Superfluidity
by ToshihikoTsuneto (translated by Mikio Nakahara)
Cambridge University Press: 1998. 207 pp. £45, $69.95

A. J. Leggett

Most of today's standard textbooks on superconductivity (and on the superfluidity of liquid ^{4}He) date from the heyday of research on 'low-temperature' superconductors in the 1960s. But since then, in addition to these 'classic' superfluids, several related but interestingly different superfluid systems have been realized experimentally — the low-temperature phases of liquid ^{3}He, the 'heavy-fermion' and copper oxide superconductors and the (presumably superfluid!) Bose-condensed phase of dilute alkali gases.

Superconductivity and Superfluidity, which originally appeared in Japanese in 1993, is intended in some sense as an update of, or supplement to, the standard texts in the light of these developments. However, it concentrates mainly on the Fermi superfluids, with a couple of short sections on ^{4}He and a postscript on the alkalis.

A distinguishing feature of the book is its treatment of Cooper pairing, which starts from an arbitrary spin and orbital state, thereby permitting unified treatments of classic superconductivity, copper oxide (and heavy-fermion) superconductors and ^{3}He. Although the coverage of these systems is not complete (impossible in a book of this length), most of the key phenomena, at both the microscopic and the phenomenological level, are addressed.

The exposition is well organized and crisp, and the translation generally runs smoothly. The book should be useful to graduate students and those who have had some exposure to field-theoretic and diagrammatic methods but who are not ready to take the plunge into more specialized texts such as that of Vollhardt and Wölfle on superfluid ^{3}He. □

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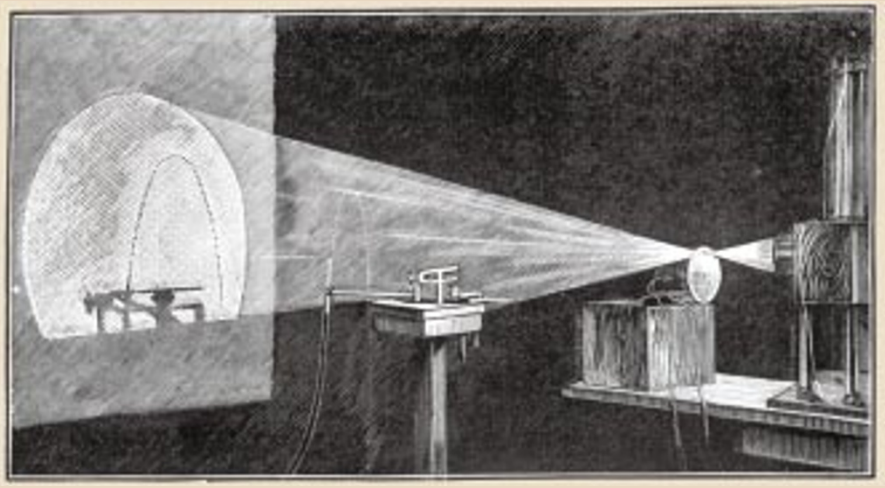
Also available
Superconductivity
J. B. Ketterson & S. N. Song
Cambridge University Press: 1999. £29.95, $49.95

Science in culture



C. V. Boys's "Experiment for showing by intermittent light the apparently stationary drops into which a fountain is broken up by the action of musical sound", from *Soap Bubbles and the Forces Which Mould Them*, 1890.

Boys's bubbles

Martin Kemp

The burgeoning shelves of 'popular science' in bookshops seem to suggest that we are witnessing a recent phenomenon. In fact, campaigns to broadcast science to mass audiences proliferated in the nineteenth century, and had been preceded by such individual initiatives as Count Francesco Algarotti's *Newtonianism for Ladies* in 1737. In Britain, luminaries such as the polemical physicist Sir David Brewster aspired through accessible publications and the founding of the British Association in 1831 to educate the public in the observational wonders of natural phenomena and experimentation, above all in a Christian spirit of devotion to nature.

One of the most delightful and enduring contributions was Sir Charles Vernon Boys's *Soap Bubbles and the Forces Which Mould Them*, originally delivered as three lectures for young people at the London Institution during the winter of 1889–90, and first published by the Society for Promoting Christian Knowledge in 1890. As late as 1959 they were reprinted in the American "Science Study Series". John Durston remarked in his preface, "that this book remains as valuable to beginning scientists today as the lectures were seventy years ago is remarkable in this age of revolution".

Boys, born in 1855 as the son of a clergyman, studied chemistry and physics at the Royal School of Mines. His first paper, published in 1880 under the wing of T. H. Huxley, described experiments to determine whether spiders would be lured by the 'buzz' of a tuning fork — which they were. Renowned for having determined the Newtonian constant for gravitation, he was also the inventor quartz fibres, which he drew out by shooting a crossbow, and an innovator in instantaneous photography. He was delighted to discover that a quartz fibre dipped into castor oil was indistinguishable in micro-photographs from the beaded filaments made by a spider. Music, fibres, viscous beads, photography and spiders became interwoven themes in his rapturous exploration of the visual and aural music of physical phenomena.

Typical of his approach is the experiment that provided the frontispiece for his little volume on soap bubbles. A beam of light is projected onto a screen through a small hole in a card, behind which is a spinning disk with six holes round its rim. The pulsing beam casts the shadow of a fountain which is vibrated by a tuning-fork. The speed of the disk is literally fine-tuned by blowing through the holes until the note is precisely that emitted by the tuning-fork.

The apparently continuous jet is revealed as an arc of beads. If the card turns fractionally more slowly, "all the drops will appear to slowly march onwards, and what is so beautiful ... each little drop may be seen to gradually break off, pulling out a waist which becomes a little drop, and then when the main drop is free it slowly oscillates, becoming wide and long, or turning over and over, as it goes on its way".

This pretty experiment is followed by an account of Chichester Bell's 'Singing water jet', in which an arched fountain falling on a rubber sheet stretched over the end of a tube "begins to sing of its own accord" under the agitation of vibrations transmitted to its nozzle from a chiming watch and muffled musical box.

In his love of the visual realization of musical sounds through the exciting of vibrations in liquids, Boys stood in a distinguished tradition that includes Christopher Wren and Robert Hooke. They would not in any way have dissented from Boys's conviction that "experiment is a question we ask of Nature, who is always ready to give a correct answer, provided we ask properly, that is, provided we arrange a proper experiment". □

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