respond to conventional therapies and are not expected to live more than 90 days. And it is here that we face the most controversial issue of Rosenberg's work. For although his laboratory studies have been exceptionally successful — he has written more than 500 scientific articles — the treatments have been fraught with disappointment and distress for both doctors and patients. All of the first 21 patients treated with LAK cells died of their cancers, and many of the patients who received IL-2-based therapies have experienced severe side-effects (IL-2 is highly toxic).

Indeed, there have been cases in which the treatment itself has killed. These deaths, which are at the usual frequency for experimental therapies for cancer, highlight Rosenberg's determination to succeed. He admits that it is this aggressive but necessary nature of his therapies that has attracted the most criticism from both the press and his peers: only patients with otherwise untreatable disease are eligible for the trials, and the new therapies have to excel if they are to make a good impression. The considerable physical pain of the treatments to the patients is honestly described, and Rosenberg does not shirk recalling the failures of his treatments and the personal torment they cause him.

Yet there have also been triumphs. The first patient to receive LAK cells and IL-2 in high doses is alive and well seven years after arriving in Rosenberg's clinic with a huge and spreading tumour. In other patients, tumours have shrunk but later re-appeared. About ten per cent of treated patients have seen their tumours vanish completely. Rosenberg argues that this minority "speaks powerfully" for his form of immunotherapy.

It sometimes seems paradoxical that the hatred of senseless pain that initially drove Rosenberg should result in such aggressive treatments. Yet the sensibility of Rosenberg to his patient's needs cannot be doubted; not only do the patients desperately want to be cured, but many also feel an urge to help in new trials that may eventually benefit others to come.

It may be the dream of many cancer scientists to have an office from which one can exit by one door to the laboratory and by the other to the ward, combined with the resources to carry ideas with ease from one to the other. Don't dream too hard though — the good sense behind Rosenberg's ideas and the punishing sensibility required to prove them are clearly difficult to reconcile. □

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Dynamics in the balance

John M. Wallace

Physics of Climate. By José P. Peixoto and Abraham H. Oort. *IOP/AIP: 1992. Pp. 520. £66, $95 (hbk); £31.25, $45 (pbk).*

THIS book is dedicated to the late Victor P. Starr, professor of meteorology at the Massachusetts Institute of Technology and the authors' mentor during the late 1950s and early 1960s. Starr's idea of obtaining a mathematically rigorous set of balance requirements for the conservation of mass, momentum and energy and of using it as a framework for diagnosing the complex workings of the atmospheric general circulation, has had a profound influence on the development of the field of climate modelling. Here Peixoto and Oort review the application of these methods to an assortment of physical parameters encompassed by the global climate system.

The authors address a well chosen subset of the issues. The book is divided into 17 chapters, most of which are fairly self-contained. Some would be suitable as chapters of a textbook, whereas others are more in the spirit of review articles. The first two chapters provide a clear definition of the climate system and a concise and readable discussion of fundamental concepts that provide a basis for a quantitative discussion of climate variability and its causes. Chapter 3 presents a highly compressed derivation of the governing equations. In Chapter 4, the authors describe how the atmospheric and oceanic circulation can be decomposed into time and zonal mean components and departures from them; this section constitutes essential background material for understanding many of the observational results presented in later chapters. Chapter 5 introduces the reader to climate data sets and data analysis techniques. Chapter 6 is a comprehensive and reliable treatment of radiative transfer in the atmosphere and the observed global radiative balance.

In Chapters 7–15, which are in a sense the core of the book, the authors review the three-dimensional structure of the principal components of the climate system and document the exchange processes at the atmosphere's lower boundary, the angular momentum balance, the hydrological cycle, the balance of total energy, the kinetic energy cycle and the generation of entropy. These chapters are densely illustrated with maps and vertical cross-sections; they include discussion of the balance requirements themselves and their implications for climate variability. Oceans and cryosphere are incorporated into the discussion, as appropriate.

In Chapter 16, the authors present a readable and informative discussion of interannual and interdecadal climate variability. Of all the material in the book, I found it the richest in insights into how the climate system works. The final chapter provides an introduction to climate modelling and a review of some of the applications of climate models.

Most of the chapters should be readily accessible and useful to graduate students and postgraduates in the physical sciences who are seeking an understanding of the observed climate and the causes of climate variability. Chapter 4 and Chapters 11–14 will appeal to a more specialized audience of atmospheric and oceanic dynamicists and modellers. Those wanting an introduction to the governing equations may find Chapter 3 overly terse. More expansive treatments with examples and illustrations are available in J. R. Holton's *An Introduction to Dynamic Meteorology* (Academic, 3rd edn, 1992) and A. E. Gill's *Atmosphere–Ocean Dynamics* (Academic, 1982).

In documenting the general circulation, the authors rely almost exclusively on their own univariate analyses of rawinsonde data. I would have liked a little more emphasis on recent studies using multivariate analyses derived from operational numerical weather-prediction models. These are more reliable, particularly in the data-sparse regions of the Southern Hemisphere. I would also have preferred less emphasis on balance requirements for their own sake (such as in the case of energetics and entropy) and more extensive discussion of climate variability.

On the whole, the book is informative and authoritative on a remarkably wide range of topics. It is a fitting tribute to Victor Starr and a unique and useful addition to the literature on climate dynamics. □

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Autumn Books

Next week's issue (26 November) contains *Nature*'s Autumn Books supplement, which will feature reviews by, among others, Michael Berry (counting, thinking and being), Ruth Hubbard (the abortion controversy), Mary Warnock (university education), S. S. Schweber (Richard Feynman and modern physics), Ernest Gellner (irrationality), John Polkinghorne (science and common sense) and Lawrence Freedman (the Cold War).