

led in depth by others and are very much a matter for specialists. But he illuminates the conceptions that brought Fitzgerald, Lorentz and Poincaré to the brink of relativity and to the taking-off point of Einstein's dramatic leap. The mathematical framework had been supplied by his forerunners, and there were others keen to follow where Einstein led. Not so in the matter of quantum theory. The arguments that convinced him of the need to think of radiation as discrete quanta carried no conviction in the minds of others; even Planck and his colleagues, eight years later, had to ask that this error of Einstein's should not be held too much against him. This is the story that began with black-body radiation and which, with the "allergic reactions to h ", is excellently told, and makes clear how much of accepted physical truth had to be replaced. Once one appreciates Einstein's extraordinary insight and courage, it is clear why quantum theory was as important to him as relativity, and why he did not let go of it even while his energy was concentrated on the General Theory.

Nearly half the book describes the evolution of atomic models, with Rutherford and Bohr as the leading spirits, of course, but with many others as well. The struggles to find how to apply quantum theory, and the limitations of the resulting planar hydrogen atom, are of small concern to modern physicists, as is the disheartening recognition of the old quantum theory's impotence in the face of the helium atom. Yet these struggles should not be forgotten, for they show how a heroic breed undertook a nearly impossible task and yet established a foundation for the later quantum mechanics. The great breakthrough by de Broglie, Heisenberg and Schrödinger marks the point at which a new order emerges, and the purpose of the book is achieved.

I have only one and very minor criticism of this splendid work, and that is its title. It is not that the word 'chaos' has a new meaning for modern readers, but that I doubt whether the period described was seen by the participants as chaotic, in their sense. To those excited by the prospects revealed by the electron and by radioactivity, there was no lack of stimulating experimental projects, and the mental agonies of the theorists (who were few in number) were surely recognized, even by themselves, as the sort of thing that anyone must expect in searching the fundamental mysteries. If today's problems of high-energy physics should suddenly be resolved, our own times may also come to be seen as chaotic, but I doubt if many of our leading physicists would accept this interpretation. □

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Protocols and conventions

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The Greening of Machiavelli: The Evolution of International Environmental Politics. By Tony Brenton. *Earthscan/Royal Institute of International Affairs: 1994.* Pp. 282. £29.95, \$54.95 (hbk); £14.95, \$24.95 (pbk).

ONE of the defining motifs of modern environmentalism has been the steady internationalization of environmental politics and policy-making. This has, in part, been propelled by the recognition that a globalized world economy is creating social and environmental upheaval that is cumulative, sometimes uncertain and often transnational. Prognostications of impending global environmental doom have, in turn, inspired broad social movements and myriad pressure groups, some of which now link up across countries and continents to harry governments and industry for 'greener' growth. In a political world divided into separate nation states, governments have normally responded to this pressure by negotiating international legal agreements (such as conventions and protocols) and creating international institutions (to lend money, regulate trade and settle disputes).

But just how successful have these responses been and, more importantly, are they, in their current form, capable of responding to future threats of global environmental degradation and social upheaval? The general conclusion of this book, a broad historical review of international environmental issues since the late 1960s, is that they are, but that cautious reforms could nonetheless be made to facilitate global sustainability. This judgement is sufficiently sanguine to place Tony Brenton firmly in the so-called 'light green' camp. In the opening chapter, for example, he declares that he is a "moderate" and an "unreconstructed anthropocentrist"; at heart he remains unconvinced that "we yet face an environmental crisis which will overwhelm us unless we make very rapid and dramatic changes to our lifestyle and aspirations".

In the chapters that follow, Brenton provides a fairly standard conspectus of the origins of modern environmentalism, the various responses of developed and developing countries to 'green pressure' (both domestically and internationally) and the more recent emergence of the so-called 'sustainable development' paradigm. For some issues there have been what Brenton terms "level one" responses (rhetoric, nonbinding agreements and little concrete action) whereas for others there are binding treaties, and purposive

action that has led to substantial improvements in environmental quality ("level three" response). In a number of more detailed studies of individual treaties, he uses this typology in an attempt to explain how and why some environmental problems have been 'solved' while others have not.

Sensibly, Brenton chooses to frame his analysis with chapters on the two high-tide marks of modern environmentalism: the United Nations conferences at Stockholm in 1972 and at Rio de Janeiro in 1992. In an engaging comparison of the two, he notes how each was characterized by the now familiar and seemingly intractable disputes between the North and South over priorities, burden-sharing, financing and target-setting. In four somewhat less original chapters, he discusses the political background to the Earth Summit in Rio, and assesses the prospects for future international action on climate change and biodiversity.

Throughout, Brenton gives short shrift to those 'deep' greens who warn of impending 'limits' to growth (they are "so remote", he contends, "as not to be a sensible concern for public policy") and who advocate a 'coercive' approach to environmental protection. Here Brenton is on highly contested ground. Although it is certainly true that some environmentalists have tended to downgrade issues of social justice, it is equally apparent that sustainable development is not synonymous with unlimited economic growth.

In his final chapter, Brenton argues strongly for appropriately scaled modifications to, rather than a radical restructuring of, the existing systems of free trade, international governance and financing. For Brenton, sustainable development will not emerge from "dense webs of regulation" or the "old 'command-and-control' style of environmental thinking", but only when there is more democracy, greater economic prosperity and a market that works for, rather than against, the environment.

Overall, this is a book that aims to identify and explain recurrent themes and patterns in modern environmental history by condensing large amounts of existing material into a relatively small space. As such, it will no doubt be of most use to those seeking a pithy exposition of the salient trends in contemporary international environmental politics. It does not, however, cover much new ground and, because the analysis is undertaken at a relatively high level of aggregation, it is unlikely to provide much for the cognoscenti. □

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