

reviews

Coming to terms with Nature

Eric Ashby

The Twenty-Ninth Day: Accommodating Human Needs and Numbers to the Earth's Resources. By L. R. Brown. Pp. 363. (Norton: New York, 1978.) \$11.95.

THE title of this book is another example of the hypnotic effect of exponential and sigmoid curves upon those who have never used them in serious scholarly work. The lily pond which doubles its leaf-area every day and is half-full on the twenty-ninth day will, so the introduction to this book says, be full on the thirtieth day. Had the author taken the trouble to read the brilliant analysis of population growth published by Alfred Lotka over half a century ago in *Elements of Physical Biology*, he might have hesitated before starting his argument with such a misleading example. The dilemma facing mankind is not what to do about exponential growth; it is how to devise political systems which can be used to manage the second-order consequences which follow the point of inflection of a sigmoid curve of growth.

Forecasts of population growth, oil reserves, capacity of the land to produce food, resources of minerals: all these vary by whole orders of magnitude. Disputes about the forecasts miss the point: that all these parameters already are, or sooner or later will be, above the point of inflection of a sigmoid curve; and the general characteristic of this part of the curve is that feedback, which was positive while the curve was convex to the time-axis, now becomes negative.

Discontinuities invariably occur: nations like China successfully limit the birth rate; nuclear power may replace oil for some purposes; plant breeders may increase yield per hectare, aluminium may replace copper. Some of the discontinuities (for example, the substitution of steam-power for water- and wind-power) have profound social consequences, which have been well documented. But, discontinuities apart, the trend is indisputable; exponentials become sigmoid and the seminal social problem is not how to delay the point of inflection by technological innovation, nor is it how to bring forward the point of inflection by rationing; it is how to manage society when many

measurable variables lie on the upper reaches of sigmoid curves.

This is the worthy theme in Lester Brown's book. In the first nine chapters he covers familiar, not to say overcrowded, ground: the evidence for over-fishing, over-grazing, deforestation; the inevitable rise in population; the geopolitics of energy production; the economic stresses which followed a sixfold increase in oil prices imposed by OPEC and (though western countries are more reticent about this) a two-and-a-half-fold increase in wheat prices imposed by the grain-producing nations and a threefold increase in the price of newsprint; and the growing gap between affluence and poverty.

His sources of information for the material in these chapters are practically all from journalistic and sometimes emotive accounts in the press or in popular books. His exposition of these issues is no worse, and no better, than that in a dozen other books covering similar ground. So it is to the last three chapters, which are about how society is to come to terms with Nature, that I turned with some anticipation. For Lester Brown, unlike many middle-class élitists keen on conservation, has really encountered the world-dilemma at close quarters, as an agricultural officer, as a dweller in Indian villages, and with the Overseas Development Council. This experience (I hoped) would dissuade him from advocating the utopian remedies which prompt decision-makers to drop such books into the waste paper basket.

That Lester Brown's three chapters on accommodation to the new phase of world economy do not provide encouraging solutions is not his fault. No one has come up with even the rudiments of a solution. But Lester Brown does put the emphasis where it belongs, namely on the need to find solutions for social and ethical problems rather than material problems. The great disillusion is not directed against the technologists; it is directed against the economists; and he quotes a telling remark made by Pierre Trudeau: "Inflation has not found its Keynes. I personally think the Keynes of inflation will not be an economist . . ." but will instead "be a political, philosophical or moral leader inspiring people to do without the excess consumption so

prominent in the developed countries". The difficulty is that this recipe may be valid for the inhabitants of Dorking and Wimbledon (well heeled suburbs of London) but not for the swarms of people who squat on the streets of Calcutta. Up to a point there is a close correlation between growth in GNP and the overall improvement in quality of life; it is in affluent societies that the correlation breaks down. So—and this is the conclusion that hurts—the initiative lies in Dorking and Wimbledon and not in Calcutta. And the choice before Dorking and Wimbledon is voluntary adjustment to austerities or submission to bureaucratic regulation.

Some writers—Heilbroner, for example, and Ophuls—are pessimistic about the outcome of this choice. They see (as Heilbroner puts it) the latitude for voluntary choice diminishing "under the slowly closing vise of environmental constraint". Lester Brown is more optimistic, though I confess he does not support his optimism with encouraging arguments. All the same, he is right to be optimistic. The ultimate treason to mankind is to lose confidence in humanity. □

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Photoemission from surfaces

Photoemission and the Electronic Properties of Surfaces. Edited by B. Feuerbacher, B. Fitton and R. F. Willis. Pp. 540. (Wiley: Chichester and New York, 1978.) £19.50.

THE study of photoemission from solids has grown enormously in the past decade. Although the photoelectric effect has been known for many years and provided a key result for the development of quantum theory, its application to the study of electronic structure of solids is much more recent and the appreciation of its essential surface sensitivity has encouraged its inclusion in the growing armoury of techniques of surface science. Indeed, in the case of ultraviolet photoelectron