BOOK REVIEWS

GENETIC APOCALYPSE?

Genetics and the Future of Man

Edited by John D. Roslansky. (A Discussion at the Nobel Conference, organized by Gustavus Adolphus College, St. Peter, Minnesota, 1965.) Pp. xii + 204. (Amsterdam: North-Holland Publishing Company, 1966.) 18 guilders; 36*s*.

In 1963 the Nobel Hall of Science was dedicated at Gustavus Adolphus College, St. Peter, Minnesota, as a memorial to Alfred Nobel. In January 1965 the first Nobel Conference was held there, and among the participants were, we are told, four Nobel laureates. According to the dust cover of this book, the conference was attended by eight thousand people and the lectures delivered are presented in *Genetics and the Future of Man*

The conference was introduced by Polykarp Kusch, and consisted of six lectures. Of these, two, by Sheldon C. Reed and Bentley Glass, are fairly standard and uncontroversial accounts of the genetical adjustments which human populations might undergo in stable and unstable physical environments. Edward L. Tatum follows with an account of some of the things that might be achieved by techniques being developed for treating human cells like cultures of micro-organisms. William B. Shockley discusses population control and eugenics as it appears to a professor of engineering science and does so in a rather "grass roots" kind of way, in the course of which he falls into one of the classical genetical errors of confusing the apportionment among contributory agencies of the causation of a character itself with the apportionment of causation of the variation it is observed to show. The geneticist may find it difficult not to regard parts of this presentation as bordering on the unsophisticated, but at least Shockley emphasizes the need for "a continuing objective fact finding approach to these enormously controversial, enormously significant problems" even if the problems themselves are neither clearly set out nor clearly agreed by the participants in the symposium—perhaps because the necessary facts are not yet available.

Moral and religious implications are discussed at length by Paul Ramsey, who holds a chair of religion at Princeton. He takes his text largely from Muller and the genetic Apocalypse which he sees Muller as foretelling, and leaves at least one reader with the feeling that his discussion, closely argued as one would expect from a student of religion and ethics, would have had more impact if it had taken the genetic Apocalypse less for granted and had insisted on a firmer assessment of the genetical problem with which our ethics would have to cope. Lastly, Kingsley Davis analyses the sociological aspects of genetic control. He exposes the weakness of many of the arguments for genetic control as based on the assumed genetic consequences of social practice itself rather than on independently ascertained facts. He points to the resistance to any drastic programme of hereditary improvement inherent in the stability system of existing societies, and envisages change as more likely to be precipitated by a genetic crisis, possibly consequent on a nuclear holocaust, but sees some genetic change as essential if man is to overcome the limitation to his socio-cultural evolution—itself a novel and by no means obviously valid notion.

This book touches on subjects of vital interest to everyone and it makes interesting reading if only for the contrasts and disparities of assumption that it brings out. One wonders what the eight thousand who attended the conference made of it—perhaps that before we can discuss fruitfully the problem of controlling the genetic structure of mankind we need to know more certainly what is now happening to that structure and to decide more clearly how far the continuing biological evolution of man (as distinct from the control of hereditary disability) is really as essential to continuing social progress as some of the speakers seem to have taken for granted.

Kenneth Mather

WEATHER

Physical Climatology

By William D. Sellers. Pp. viii + 272. (Chicago and London: University of Chicago Press, 1965.) $7.50; 56*s*.

Professor Sellers's book has the same title as the well known book by H. Landsberg, but the two texts are very different. Professor Sellers concentrates more on physics and less on climatology, and his treatment is rather more advanced than that of Landsberg.

The variety of subject matter covered in the thirteen chapters of this book may be judged from a few chapter titles, such as "The Radiation Balance", "Heat Transfer in Soil", "Atmospheric Diffusion" and "Paleoclimatology and Theories of Climatic Change". To me the most attractive chapters are those which deal with radiation and the water and energy balances.

The basic facts and theories of solar and terrestrial radiation have no doubt been treated adequately in many books, including Brunt's classical *Physical and Dynamical Meteorology*, but Professor Sellers succeeds in stimulating the reader even in his tables and diagrams. For example, one table strikingly compares the energy equivalents of many natural and man-made phenomena; thus it appears that the quantity of solar energy received each day on the Earth is equivalent to the energy released by 10^4 hurricanes or by 10^8 Nagasaki atomic bombs. Apart from the value of his tables, it is pleasant to see so much up to date information; for example, the data on surface albedo were published by Kung *et al.* as recently as 1964. At the same time, Professor Sellers never fails to quote old authorities whenever their work is still relevant. Appropriately, the well known empirical formulae for effective outgoing radiation from the Earth's surface formulated by Ångström (1916) and Brunt (1932) are discussed with later equations developed by Elsasser and Budyko and others, including two formulae of Swinbank (1963) which have, surprisingly, only surface temperature as the independent variable. Equally appropriately, in a summary of estimates of the annual poleward heat flux at various latitudes of the northern hemisphere required to balance the radiative sources and sinks of energy in the atmosphere and at the surface of the Earth, it is interesting that G. C. Simpson's figures of 1929 are substantially the same as the latest estimates made by Budyko and London.

Professor Sellers clearly demonstrates the connexion between rainfall, evaporation (or evapotranspiration), run-off and the convergence of the flux of moisture through the water balance equations for the Earth's surface and the atmosphere, based on the principle of the conservation of matter. Climatological estimates of the various terms are given for particular geographical regions, for the oceans and the continents and for different seasons; they are of fundamental importance in connexion with the rather local problem of water conservation, in the classification of climates and in the general circulation itself. The author next links together radiation and moisture (or water) in balance equations based on the conservation of energy. The energy balance equations are thoroughly discussed, with the aid of informative graphs, for the Earth's surface, for the atmosphere and for the combined system of Earth and atmosphere.