

news and views

Fluctuations in climate

THROUGH most of the first part of this century it was widely taken for granted that climate is essentially constant, apart from short-term fluctuations, some of which might involve shadowy cyclic changes. In fact, the global climate was at that time changing—a rather general warming and increasing moisture in continental interiors (apart from the Americas)—in ways that made life easier for most people in most places. Hence, there was little investigation of the phenomenon. Now, however, the decades of neglect have given place to widespread concern over climatic change. This is partly because there is some evidence of a global cooling, and a change in the rainfall trends also, setting in from the 1950s onwards. There is also a more pressing alarm over the many signs in recent years of an increased range of variability of climate from one year (or short group of years) to another. The world population is already so large that there is no margin for even occasional bad years—bad, that is, in the sense of lowered harvest yields in several of the world's principal grain-producing areas. Indeed, the world's grain reserves have been reduced each year since 1970: both 1972 and 1974 will rank as bad years in the sense just mentioned, but even in a good year, such as 1971, the reserves fell, and are now under a quarter of what they were before this decade.

It was with facts such as these in mind that US Secretary of State Henry Kissinger told the United Nations General Assembly in April 1974:

"The poorest nations, already beset by man-made disasters, have been threatened by a natural one: the possibility of climatic changes in the monsoon belt and perhaps throughout the world. The implications for global food and population policies are ominous. The United States proposes that the International Council of Scientific Unions and the World Meteorological Organisation urgently investigate this problem . . ."

And, in similar vein, Lord Rothschild wrote recently:

". . . there are several subjects in which I regret that the Think Tank has not so far taken an interest: one of these is the effect of the possible changes in our

climate on the life of the inhabitants of this island. It would, I believe, repay study."

Also, the Climatic Research Unit at the University of East Anglia in Norwich, of which I am director, whose financial plight over the first 2½ years of its existence has several times been mentioned in *Nature*, now has the funds needed to start its work—thanks to the generosity of the Wolfson and Nuffield Foundations in this country and the Rockefeller Foundation in the United States.

This issue of *Nature* carries three more in the series of contributions to knowledge on the variations and variability of climate which it has been publishing in recent years. Drs Wood and Lovett report on page 594 on the rainfall variations measured in Ethiopia over the last 70 years, and the records of major drought years since AD 1540, analysed in relation to the 11-year sunspot cycles. Their result highlights the great range of variation of the annual rainfall in that country within each 10 or 11-year period as likely to have more impact than the longer-term trends, though possibly made more serious by these. On page 592 Brown reports a new link between variations in the Earth's magnetic field at the time of sunspot minimum and the strength of the subsequent sunspot maximum; together with the climatic evidence such as that presented by Wood and Lovett this raises the possibility of the use of the Earth's magnetic field to forecast changing weather patterns five or six years ahead.

The third contribution, on page 582, is concerned with what can be learnt of the longer record of climatic behaviour from tree rings, in this case the year-rings in spruce (*Picea*) growing in southern Germany. Dr Schiegl uses deuterium measurements on the tree rings to show how an indication of a long history of annual mean temperature might be derived. This technique is one example of a rapidly increasing number of types and uses of 'proxy' data to extend and corroborate the climatic record for periods before the invention of most meteorological instruments.

H. H. LAMB

Mass extinctions in the fossil record

THE problem of what caused the extinction of particular groups of fossils continues to intrigue both palaeontologist and layman. Every schoolboy learns about the dramatic and relatively sudden extinction of the dinosaurs at the end of the Mesozoic Era, and many are the more or less ingenious hypotheses put forward to account for it. My own favourite relates the extinction to the relative decline of the gymnosperms or naked seed plants in favour of the flowering plants during the Cretaceous period. The surviving conifer and cycad representatives include many producing oils with renowned purgative properties, from which one is drawn ineluctably to the conclusion that the poor dinosaurs died of constipation! The trouble with all such hypotheses is their *ad hoc* character, devoted specifically to the dinosaurs. Viewed in a broader context, the dinosaurs are seen as but one of a whole series of animal groups, both terrestrial and marine, which died out at the end of the Cretaceous about

65 million years ago. An even more spectacular phase of mass extinction, affecting a majority of invertebrate and vertebrate classes both on land and in the sea, took place towards or at the end of the Permian some 160 million years earlier. It is no coincidence that the three faunally defined eras of Phanerozoic time, the Palaeozoic, Mesozoic and Cainozoic, are divided by these two so-called crises in the history of life.

Attempts to account for these, and lesser, phases of mass extinction can be grouped into two broad categories, involving phenomena either extrinsic or intrinsic to our planet. The extraterrestrial explanations have usually centred around the deleterious effect of high levels of cosmic radiation, leading to widespread destruction of organisms, either directly or by damaging genes and thereby preventing successful reproduction. Some have argued for episodic pulses of increased radiation compared with that operating