rates due to ozone amount only to a few tenths of a degree per day, but even that may be sufficient to affect the trade circulation, which is a rather finely balanced process. The ozone layer in high latitudes is so thick that its upper strata shield it effectively against most solar influences. Changes in the ozone distribution there are mainly associated with vertical motion in the troposphere below. Near the equator the ozone is more likely to be affected directly by possible changes in ultra-violet solar radiation. Increases in short-wave radiation would tend to cause some heating and possible lowering of the tropical ozonosphere. This in turn would reduce radiational cooling in the troposphere and so decrease the efficiency of the trade circulation. It may be shown that if this effect exists, sudden changes in the tropical radiation balance would tend to cause disturbances in the atmospheric circulation pattern some two or three weeks later. This is supported by some observational evidence.

Menzel[6] and Bell[6] have discussed another possible mechanism of solar – weather relationships. They quote Craig, who found a statistically significant association of magnetic perturbations with pressure rises at 60–70° N. and pressure falls at about 40° N. It is assumed that such a pressure change would tend to oppose the accumulation of cold surface air in the Arctic. Magnetic disturbances are caused by corpuscular streams. Menzel indicates that the incoming stream may at times carry an energy density which over a limited area can be equivalent to that of solar radiation itself, and that this should cause intense heating of the surrounding atmospheric regions. Bell suggests that this causes the reported statistical changes in surface pressure. It is difficult to conceive a physical mechanism which would link high-level heating in the auroral zone with mass movements in the troposphere. If the mechanism stipulated by Miss Bell does in fact exist, it would act parallel to the one outlined above for the tropics. The increased solar activity would then tend to favour penetration of warm air into high latitudes on one hand; on the other, it would be associated with a less efficient trade circulation, decreased evaporation and a narrowed tropical rainbelt.

The tropospheric radiation balance is also affected by dust. Variations in dust content may affect in addition the available number of freezing nuclei. However, the decrease in rainfall at the end of the past century cannot be readily associated with the date of any major volcanic eruption or known change in meteoric activity; nor can this be done for the recent widespread increase in precipitation. Furthermore, these rainfall changes affected only a limited part of the globe. This seems to exclude explanations of climatic change primarily in terms of a changing number of atmospheric freezing nuclei.

To summarize: precipitation in the sub-tropics was generally above the 1881–1940 mean during the recorded part of the nineteenth century. A dry period associated with a widening of the arid belts set in abruptly at the end of the century. This lasted with only short interruption until a return of consistently wetter conditions in recent years. In several stations at the fringes of the arid zone the changes of long-term means amounted to more than 30 per cent. In climatically corresponding locations the change occurred simultaneously north and south of the equator. Tentative explanations in terms of variable solar activity are possible, but they cannot be substantiated without continuing quantitative measurements of the Sun and the upper air.

The large simultaneous change which occurred at the end of the past century at the fringes of the arid zone passed comparatively unnoticed. With the present more intensive development of marginal resources the economic effects of a similar change would be more apparent. In the case of Japan, this has been demonstrated rather strikingly by Arakawa[2]. Records of rainfall, stream flow, flood incidence, etc., which cover a limited period only, must not be used uncritically as a basis for planning costly developments of marginal water resources. The study of climatic fluctuations has therefore concrete practical implications, besides bearing upon knowledge of the past and upon interpretation of our present physical environment.

District rainfall values were made specially available by the Directors of the Australian and Indian Meteorological Services; this is gratefully acknowledged.

[1] Arakawa, H., *Archiv für Met., Geophys. und Bioklimatologie*, **7**, 406 (1956).
[2] Arakawa, H., papers in *Met. and Geophys., Tokyo*, **7**, No. 1 (1956).
[3] Kraus, E. B., *Quart. J. Roy. Met. Soc.*, **81**, 198 (1955).
[4] Kraus, E. B., *Quart. J. Roy. Met. Soc.*, **81**, 430 (1955).
[5] Kraus, E. B., *Quart. J. Roy. Met. Soc.*, **82**, 289 (1956).
[6] Shapley, H., "Climatic Change" (Harvard University Press, 1953).
[7] Veryard, R. G., *Weather*, **9**, 355 (1956).
[8] Plass, G. N., *Quart. J. Roy. Met. Soc.*, **82**, 30 (1956).

OBITUARY

Dr. A. V. Few

By the death of Dr. A. V. Few on December 24 from poliomyelitis, after a very short illness, research work on the surface chemistry of biological systems has lost one of its foremost younger workers.

Alan Victor Few was born on December 28, 1926, and was educated at Alleyn's School, Dulwich (1937–43), and then at Battersea Polytechnic, London, where in 1946 he graduated in chemistry, obtaining the B.Sc. (Special) degree with first-class honours. After a short spell in industry, he returned to Battersea in 1947 and worked with Dr. J. W. Smith. In 1949 he obtained the Ph.D. degree at the University of London for his work on the "Molecular Polarization of Amines in Solution".

However, his future interest in research was determined in 1949, when he moved to the Wright-Fleming Institute of Microbiology. Here he commenced to work on the physical chemistry of bacterial cells with Drs. P. D. Cooper and D. Rowley, work which led to the investigation of the mode of action of penicillin with the cell wall of *Staphylococcus aureus*, and emphasized the importance of studying the surface chemical properties of penicillin salts. In 1951 he moved to the Department of Colloid Science, Cambridge, with a grant from the Medical Research Council, where in the group under the direction of Dr. J. H. Schulman he commenced to study in detail the interaction of antibiotics with bacterial surfaces using surface-chemical techniques. As well as penicillin, the action of polymyxins was studied, and by

the use of a low-pressure surface balance, with salt solutions as substrate, the molecular weights of polymyxins *A*, *B*, *D* and *E* were determined. In 1953 he was awarded the Ph.D. degree of the University of Cambridge for a thesis entitled "The Surface Chemistry of Certain Antibiotics".

This work had merely acted as an *apéritif*, and on his appointment to the external staff of the Medical Research Council, he proceeded with great enthusiasm to study the interaction of many other compounds with bacterial surfaces, and with cell extracts. His most recent work included investigations on the behaviour of the cyclic polypeptides, tyrocidine and gramicidin *S* at the air–water interface, the binding of surface-active agents by proteins, and an extensive study with Dr. A. R. Gilby of the interaction of surface-active agents with bacterial surfaces.

A modest man of charming disposition, he was an enthusiastic and determined research worker, always willing to discuss problems with junior workers and to give advice when consulted. He will be remembered with great affection by his colleagues and collaborators. His untimely death at an early age has robbed surface chemistry of a very active and promising worker.

His marriage to Gwendolen Mary Crookenden in 1949 was a very happy one, and there can be no doubt that his happy home-life contributed greatly to his research. He is survived by his wife and two young daughters. R. H. Ottewill

NEWS and VIEWS

Commonwealth Trans-Antarctic Expedition

The Commonwealth Trans-Antarctic Expedition led by Dr. Vivian Fuchs arrived at Scott Base on the Ross Sea at 1.47 p.m. on March 1, having completed the "last great journey in the world". The expedition has crossed the Antarctic Continent from Shackleton Base on the Weddell Sea, a distance of 2,150 miles, in ninety-nine days. The purpose of the journey has been to conduct a programme of scientific observations including seismic soundings, gravimetric readings, and meteorological observations in connexion with the International Geophysical Year. The survey party was accompanied by Sir Edmund Hillary, who met Dr. Fuchs at Depot 700, the last of the chain of five depots of food and fuel, established earlier between Scott Base and the South Pole. The other members of the expedition are : Warrant-Officer Roy Homard, engineer (Brixton) ; Ralph Lenton, wireless operator and carpenter (Coulsdon, Surrey) ; George Lowe, photographer (Hastings, New Zealand) ; David Pratt, engineer and transport officer (Bournemouth) ; Allan Rogers, medical officer (University of Bristol) ; David Stratton, surveyor and second in command of the team (London) ; Johannes la Grange, meteorologist (Keighley) ; and Geoffrey Pratt, physicist (Richmond, Surrey). They were met by vehicles and sledges manned by the New Zealand party which set out from Scott Base to accompany the expedition for the last mile or so. Dr. Fuchs was greeted at Scott Base by congratulatory messages from scientific and geographic institutions throughout the world, and from the prime ministers of the United Kingdom, New Zealand and South Africa.

A message from H.M. The Queen, who has announced her intention of conferring a knighthood upon Dr. Fuchs, said : "On the completion of your hard and adventurous journey across Antarctica my husband and I send our warmest congratulations to you and all members of the Commonwealth Trans-antarctic Expedition. You have made a notable contribution to scientific knowledge and have succeeded in a great enterprise. Well done. Elizabeth R."

Woods Hole Oceanographic Institution : Dr. C. O'D. Iselin

Dr. C. O'D. Iselin, director of the Woods Hole Oceanographic Institution and its mainstay since it was founded in 1930, is retiring. He started his oceanographic career by exploring the Labrador current in his own schooner *Chance* in the summer of 1926. He had much to do with the building of *Atlantis*, which still serves the Institution, and took command on her first voyage in 1931. He was appointed director of the Institution in 1940, but after serving for ten years asked to be relieved of this responsibility (as Dr. Bigelow had done after the first ten years) to gain time for research. He is best known for his contributions to our knowledge of the Gulf Stream and the circulation of the western North Atlantic Ocean, but since 1940 he has devoted much of his time to the commendable task of guiding the many new developments created by the growing demands of science, defence and industry, for better understanding of the oceans. Although it has been a period of great expansion of interest in marine physics, he has maintained the traditional interest of the Woods Hole Institution in biological problems, and has done much for the local fisheries. For his work on the application of science to undersea warfare he was awarded the Legion of Merit in 1948, and he received the Agassiz Medal of the U.S. National Academy of Sciences in 1951. He had to return to the directorship of the Institution as a temporary measure in 1956 on the retirement of Admiral E. H. Smith, and will continue to be associated with the laboratory as the first holder of the chair of Henry Byant Bigelow Oceanographer recently founded by the Board of Trustees.

Dr. P. M. Fye

Dr. Paul M. Fye, the future director, is a chemist with long experience of government service and research administration. In 1942, at the age of thirty, he went to the Underwater Explosives Laboratory at the Woods Hole Institution, and became research director of the project in 1945. After the Second World War he returned to teaching for a year in the University of Tennessee, and then went to work at the Naval Ordnance Laboratory, where he was appointed associate director for research in 1956. His research interests have been in the fields of gas kinetics, photochemistry, purification of gases, high explosives damage, underwater photography, gas equilibria, liquid state and explosion of products. His work at Woods Hole and in the Naval Ordnance Laboratory has interested him in oceanographic problems, and he is well known to marine scientists in the United States.