

incoming solar radiation affects temperature, but the new theory of climatic variations put forward by Dr Budyko of the Soviet Union at the Symposium on Radiation at Bergen last August has already provoked some searching questions. There has been a reduction of between three and four per cent during the past twenty years in the amount of solar energy reaching the surface of the Earth, and Dr Budyko interprets this as the result of an increase in the quantity of dust in the Earth's atmosphere. This view is not universally held, however, for variations in the intensity of the source radiation could also account for the observed pattern of monitored radiation. Before the present period of decreasing solar radiation, there was one of about thirty years when the radiation stood at a constant level, but before that it had again been at a lower level.

If the latest trend is a consequence of increased atmospheric dust, it is hard to see how the dust could be of volcanic origin. The first major volcanic eruption since the Second World War took place in 1963, which is well after the beginning of the declining radiation period. It is more probable that exhaust gases from various artificial sources are the cause of the offending dust particles if, that is, the dust serves as a radiation shield as Dr Budyko suggests.

TRANSPLANTATION

Life without Kidneys

from our Social Medicine Correspondent

THE social and ethical problems posed by the effective but expensive treatment of kidney disease were the subject of the lecture delivered by Dr George E. Schreiner, director of the renal and electrolyte division, Georgetown University Hospital, Washington, DC, at Newcastle upon Tyne on June 5. Precisely how many people die annually from kidney disease in the United States is unknown, but a crude death rate of 14.3 per hundred thousand has been suggested. Oddly enough, it is the only medical subject on which a White House commission has convened. Although Dr Schreiner could name five methods used for treating uraemia, dialysis and kidney transplants (substitution techniques) are, he said, the most effective.

Patients preferred for dialysis are those with vascular problems, or with azathioprine toxicity, or who have experienced repeated transplant failures. But, even with the choice thus narrowed, the decision as to who should receive dialysis is far from easy. Among the factors to be considered are freedom of consent on the part of the patient, the emotions of the parents or relatives, the drain on the energy of the family, and the demand on professional skills, on funds, time and space. Although few of his colleagues agree with him, Dr Schreiner firmly believes that the patient should have the right to withdraw from treatment if desired.

On the subject of kidney transplants it was encouraging to hear that, in spite of the immunological barriers yet to be overcome, there has been a great improvement in the survival rate of transplants during the past two years; Dr Schreiner attributed this improvement to experience alone. Quoting percentages for the survival of 2,321 patients after one year, he said that this was 91 per cent where a kidney has come from a monozygous twin, 73 per cent from a dizygous twin, 72 per cent from

siblings, 64 per cent from parents, 67 per cent from other blood relatives, 25 per cent from living unrelated donors and 36 per cent from cadavers.

Dr Schreiner said that patients preferred for transplants are young children, sterile adults wanting to have children, those who have responded poorly to dialysis and those with difficult shunt problems (for example, clotting). On the one hand, transplantation may bring many benefits—to the donor and recipients; to the doctors and staff (who get a sense of accomplishment); to medical students (who derive an increased knowledge of human biology); and to the public (who welcome a tangible return for their financial support). But kidney transplantation may also do harm—the donor could suffer as a result of having one kidney only; the recipient could suffer from infection, radiation exposure, medical complications of transplantation or psychiatric problems; and the doctor could be taken away from other work that might be more productive.

Finally, Dr Schreiner discussed briefly the cost effectiveness of the two chief forms of treatment. He quoted the cost per year of life of dialysis at a centre as \$11,600, that of dialysis at home as \$4,200, and that of a transplant as \$2,600.

PLANT BREEDING

New Wheat and Potatoes

THE unravelling of the mechanism that controls meiosis has been taken a step further during the past year at the Plant Breeding Institute in Cambridge. In the latest annual report, Dr Ralph Riley and his colleagues in the cytogenetics section describe how they found that a single locus controls the pairing of chromosomes in hexaploid wheat, *Triticum aestivum*. This wheat has six sets of chromosomes and normally during meiosis only chromosomes of the same set pair with each other. This homoeologous pairing is controlled by one chromosome, called *5B*. Using ethyl methane sulphonate to produce mutant wheat in which chromosomes from different sets pair with each other, Dr Riley and his colleagues have shown that just one locus on *5B* is responsible for the maintenance of homocologous pairing (the *Hp* locus).

By suppressing the activity of *5B* it has been possible to introduce new characters into *Triticum aestivum* through crosses with closely related species. Last year 'Compair' was described with resistance to the yellow rust fungus (*Puccinia striiformis*), introduced from *Aegilops comosa*, and this year attention has centred on introducing quantitative characters into *T. aestivum*. Crosses with *Aegilops bicornis* have produced striking modifications of the parent wheat variety 'Holdfast'. The most important improvement is an increase in yield which does not affect the quality of the grain.

The importance of 'Compair' was underlined last year by a collaborative pathological investigation carried out in Cambridge, the Netherlands, Germany and Kenya. Although 'Compair' turned out to be susceptible to yellow rust in Kenya and to two races of the fungus in Turkey and Japan, it maintained resistance to all races isolated in western Europe, as well as to races from the north-west United States. 'Compair' has also remained resistant in field tests carried out in Mexico.

The breeding of potatoes at the Plant Breeding Institute is now well oriented to the needs of the processors. Makers of crisps, frozen chips and instant mashed potato all have similar requirements: a potato with a large content of dry matter but not much reducing sugar. 'Record', the variety now used most for crisps, was found to have as high a dry matter content as most varieties tested last year.

Potatoes for canning, on the other hand, should have as small a content of dry matter as possible, so that they do not break up when cooked. Although the acreage devoted to these potatoes is never likely to exceed 2 per cent of the total acreage of potatoes, it is considered worthwhile to select suitable clones, many of which have been discarded in the past for having tubers that were too small. Some canners have already found the Cambridge variety 'Maris Peer' suitable for their needs, and more and better varieties are expected in the future.

EDUCATION

New Technological Institute?

By stressing the importance of industrial cooperation, Cranfield, the aeronautical and automobile post-graduate engineering college, succeeds in giving its students a training that is immediately applicable in seeing through research projects of potential value to industry. Students come to the college with university degrees or equivalent qualifications and preferably some experience in industry. They then take one-year or two-year diploma courses in the College of Aeronautics, the School of Automotive Engineering or the School of Management. In some fields, the Cranfield diploma has long been internationally recognized as equivalent to a master's degree, and the college is hoping soon to be able to award higher degrees as an Institute of Technology. This was one of the specific recommendations in the Robbins Report and the Privy Council's decision on it is expected within the next few weeks. The college also runs a number of short courses.

One of the attractive features of teaching at Cranfield is the range of experimental equipment available—students in the Flight Department, for instance, spend at least one day a week actually flying. The aircraft owned by the department include Hawker Siddeley Doves, which are used as flying classrooms, a turbo-jet used to look at the effects on the aircraft structure of turbulence during flight, Canberras for investigating aquaplaning and attempting to measure slush drag, a helicopter and two gliders. The college has a large, 32K-word ICL digital computer which, it is hoped, can be linked to the 100 amplifier analogue computer.

The college with its 500 students is supported by a direct grant of about £1 million from the Department of Education and Science and there seems to be no lack of money for research projects. The Science Research Council is supporting research into the vibration of road vehicles to the tune of £100,000 and also a number of smaller projects including the study of a particular type of welding failure. There is some money from industry—Rolls-Royce, for instance, is supporting work on air spray burners for gas turbines—and the college is hopeful that more will be forthcoming.

Pergamon Press is putting £10,000 towards a two-year information retrieval project. The Ministry of Technology is helping with some ambitious feasibility studies including the much publicized use of carbon fibre resins to save weight in the primary structure of airframes. Work done this year on the wings of an airbus suggests that these could be made 50 per cent lighter than conventional wings by using a basic carbon fibre resin structure filled in with lightweight foam, and this sort of design is likely to be equally useful for the tailplane and fins where stiffness is of paramount importance. Next year the Department of Aircraft Design intends to look at the whole airframe design in terms of carbon fibre composites.

The Ministry of Technology has given large grants—£50,000 for aquaplaning trials and a similar amount for runway friction and slush drag trials—to the Department of Flight over the past five years or so and the Materials Handling Research Unit is hoping for a large grant for a study of track-powered air cushion vehicles. A particularly interesting section is the unit for precision engineering—one of five units intended by the Ministry of Technology to bridge the gap between academic and industrial institutions. The unit provides a consultancy service for industry and the director, Professor J. Loxham, hopes that it will be self-supporting by 1970.

CHEMICAL WARFARE

All Peace at Porton

If you grasp a nettle hard, it won't sting. At any rate, that seems to have been the theory of the Chemical Defence Experimental Establishment at Porton when, for the first time in its history, it held open house last week. Previous requests for public access to the laboratories have always been refused on the grounds of national security, but this time the story was very different. "If you find a locked door, just ask and we'll open it," said the director, Dr Neville Gadsby, and this tone was maintained throughout the public exposure which followed.

Colour videotapes flickered in the laboratories, marquees clustered on the lawns outside, and the fairground atmosphere was completed by a jovial mixture of staff and public relations men who tended their martial exhibits like barkers at their stalls. In fact, the grislier the exhibit, the more jovial were its attendants, though this may have been coincidence rather than design.

All the staff were ready with Porton's justifying syllogism: "Even if we don't develop new weapons, *they* will, so we have to explore all the possibilities in order to know what we have to defend ourselves against". This argument is unanswerable in its own terms, and it is true that everything on show at the open day was at least consistent with a defensive function. Nerve gases and the like were clearly being made, but there were no signs of stockpiling, nor of research into delivery systems. The laboratory displays also made much of the civil spin-off from Porton's work. Use of a caeruloplasmin assay system has sparked off what may become another pink spot saga—the detection of specific compounds in the urine of schizophrenics. A marvellous infrared spectrophotometer, with a forty-metre light path, was there