

logical Research Station continues to increase: during 1952-53, 4,467 tons was used for this purpose compared with 2,109 during 1951-52, and production of DDT-superphosphate during 1953-54 is estimated at 6,200 tons. Of about 150 tons of DDT used in the Dominion, 107 tons is used to control these two pests alone, about 20 tons being used for orchard work and 20 tons for fly sprays and other purposes. In the Canterbury and Waikato areas alone, grass-grub attack on the 3.5 million acres of pasture is liable to cause an annual loss of £4 million. Attention is being given to particle size, wettability and the distribution of insecticide within a batch of fertilizer. The Entomological Research Station's investigation into the roles of *Eriococcus* and the associated fungus in relation to the death of manuka (*Leptospermum scoparium*) continued and also the mapping of the distribution of *Eriococcus*.

Tests of introduced varieties of linseed indicate that Marine, although not yielding as heavily as Golden Viking in a disease-free year, is a more reliable variety for New Zealand owing to its resistance to fungus (Pasm) and to rust disease, except the rare and weak Race 12 of rust. Steps are being taken to reduce the great variation of type within strains and varieties of commercial vegetable seeds, especially among the Brassicas, by bulk seeding of selected plants, followed by progeny testing and further selection, and lines of savoy cabbage have been developed and characterized by increased percentage of marketable heads and uniformity of type and maturity. A comprehensive bulletin covering present knowledge of plant virus disease in New Zealand, and describing the control of cherry plum mosaic among cuttings grown as stocks, which has been achieved by removing infected plants, was published during the year.

Considerable progress was made by the Animal Ecology Section during the year with its analysis of data on reproduction and parasites of rabbits and with other rabbit population studies.

The Geophysics Division is conducting a gravity survey which will provide information on the depth of volcanic debris overlaying the basement greywacke and also more detailed surveys of the Waiotapu area, using seismic and gravity methods to elucidate the geological structure, and magnetic and electrical methods to delineate the high-temperature conditions near the surface. These surveys will provide the data required for the development of power from geothermal steam, and the Dominion Laboratory has continued and extended observations of the temperature and discharge of hot springs, the periods of geysers, etc. Officers from this Laboratory and the Dominion Physical Laboratory have developed the technique of radiocarbon dating of carbonaceous materials for use in New Zealand, and a number of the ash showers blanketing a large part of the centre of the North Island have already been dated.

In the Dominion Laboratory a small team has developed a process of drying meat in slices up to half an inch thick, in which the slices of frozen meat are submerged in melted fat at 140-160° F. (60-71.1° C.) and the moisture extracted under vacuum. Satisfactory material has been obtained from both beef and mutton in pilot-plant trials and were tested by Sir Edmund Hillary on his recent Himalayan expedition. Flour testing and reporting procedures at the Wheat Research Institute have been improved, and experimental studies of baking processes continued. Large reserves of coal in the Maramarua area

for possible steam-electric generation were proved by the Geological Survey in co-operation with the Mines Department. The Department is now responsible for the annual preparation of charts showing the magnetic variation of the compass for an extensive area of the south-west Pacific, and the shipping companies and Royal New Zealand Navy are co-operating in a programme to determine the chart error at about thirty selected points. Large-scale tests of promising pozzolanic materials for constructional purposes have been made at the Dominion Physical Laboratory. Some eighty per cent of the original recommended range of standards equipment has now been received, including a Diesselhorst thermo-electric free potentiometer for temperature measurement and the first of a range of precision balances for calibrating weights, and an electron microscope which is in constant use. Full-scale field trials by the Extension Division of the Department of Agriculture indicate that the process for the production of fused calcium-magnesium phosphate from New Zealand olivine rocks, developed by the Chemical Engineering Section of the Dominion Laboratory, is technically feasible.

## POLITICAL SCIENCE AS A UNIVERSITY SUBJECT

A REPORT on "The University Teaching of Social Sciences: Political Science"\* has been prepared by Prof. William A. Robson on behalf of the International Political Science Association and published by the United Nations Educational, Scientific and Cultural Organization. Political science, writes Prof. Robson, "is, no doubt, the master science which can do most to assuage the maladies and struggles and conflicts of man in society"; this is so, he argues, because "political science is concerned with the study of power in society"—a "fundamental concept" which "integrates all the various branches of the subject". Having regard, then, to the troubles of the world in which we live and the "burning practical importance" of political science, it might be expected that a large measure of attention would be paid both to teaching and to research in the subject; but the interesting and painstaking survey of developments in this field which Prof. Robson has carried out shows that this is far from the fact. His assumptions about the nature of political science being what they are, this leaves him with an interesting problem to solve.

What Prof. Robson has to say is illuminating, but somewhat pessimistic. Political science exists as an under-developed territory, or backward area, within the universities of the Western world because it has never cut itself adrift from other subjects, such as law, economics and philosophy. It is treated as a somewhat unwanted step-child, whereas, he asserts, it should be accepted as "a separate and clearly distinguished discipline" to which the same status should be accorded as any other of the basic subjects that form part of the university curriculum of a liberal education. It is simply because those who have been responsible for making university and public policy have failed to recognize the importance of teaching and research in political science, Prof.

\* The University Teaching of Social Sciences: Political Science. By W. A. Robson. Pp. 252. (Paris: Unesco; London: H.M.S.O., 1954.) 1.50 dollars; 8s. 6d.; 400 French francs.

Robson suggests, that the present somewhat lamentable state of affairs has arisen.

On the other hand, it may be asked what have political scientists done to establish themselves in the influential position which Prof. Robson has marked out for them. Is theirs, in fact, a 'master science'? Here Prof. Robson injects into the discussion some very wise remarks, which place the problem of the under-development of political science in a somewhat different setting. It is evident to him that, in the light of our present knowledge, it is beyond the power of political science "to formulate general laws which associate in a precise manner particular causes with specified effects". The political scientist is, indeed, "dealing with a realm of thought and action about which men and women hold the most profound differences of opinion and belief". His methods are imprecise, and his work is apt to be influenced too directly by the winds of passion. If this is accepted as the truth, where, it must be asked, do political scientists stand in relation to the other social and natural sciences?

The bold claim that political science can exist as a 'master science' must indeed be relinquished in favour of something more humble. The solving of such problems as the 'cold war', the international control of atomic energy, race relations in Africa, the stimulation of "genuine citizen participation in government", and the protection of the world against "stiff-necked bureaucracies incompatible with democracy", which Prof. Robson regards as the concern of the political scientist, is a task that will require the collaboration of all social scientists—supposing that they do not prove to be too much for the wit of man altogether. If political science is to flourish it must, in present circumstances, accept more help from the other social sciences than it contributes to them.

We thus find ourselves in the position of seeking the foundations of a political science that can be taught as part of a liberal education. It may be suggested that it is because this has not been done with sufficient intellectual courage that the subject has failed to expand with the rapidity that the necessities of our times would appear to demand. The solving of the political problems that are so essentially bound up with the acquisition and exercise of power within any society can only be achieved on an empirical basis; it is only in this way that we shall be able to lay the foundations of a subject of study which can be called truly scientific.

In Great Britain we are in an especially favourable position to attempt this, because our tradition in political science has always been empirical or practical as well as philosophical or theoretical. We have never taken a sentimental or idealized view of the personalities or behaviour of our rulers. As William Pitt remarked at the end of the eighteenth century, "unlimited power is apt to corrupt the minds of those who possess it", and we have acted accordingly. It was in Prof. Robson's own London School of Economics that Graham Wallas made such strenuous efforts to apply practical wisdom of this kind to the conditions of his own day, and it is for the contemporary political scientist, in collaboration with sociologists, anthropologists and psychologists, to work out a theory dealing with the use of political power which can be applied both to problems of government and administration, on one hand, and to those of the individual politician, administrator and citizen on the other.

T. S. SIMEX

## EFFECTS OF RADIATION AND OTHER DELETERIOUS AGENTS ON EMBRYONIC DEVELOPMENT

THE Biology Division of the United States Atomic Energy Commission sponsored a symposium on the effects of radiation and other deleterious agents on embryonic development, which was held on April 20, 1953, at the Oak Ridge National Laboratory, Tennessee. The proceedings have been published as a supplement to the *Journal of Cellular and Comparative Physiology* (43, Supp. 1, May 1954. Pp. 337+6 plates; from the Wistar Institute of Anatomy and Biology, Philadelphia; n.p.). This symposium volume contains eleven full-length papers and some short but valuable summarizing remarks by Dr. Paul Weiss. Each of the papers is followed by a discussion by the author and members of an obviously interested and critical audience.

Four of the papers deal with the effects of ionizing radiations on developing embryos of the rat, an amphibian and the mouse; and one may perhaps add to this group a study on the outcome of pregnancy in women exposed to the atomic bomb blast in Nagasaki. Experimental papers in this group have been mainly concerned to plot out the different types of radiation damage which follow exposure to irradiation at different times of embryonic development. The facts which are revealed are interesting and probably of considerable technological importance in a world in which ionizing radiation seems likely to become one of the normal hazards not only of war but also of peaceful industry. The interpretation which should be put on them still remains rather obscure. Much of the discussion is in terms of critical periods; but, as Weiss points out, one is not justified in assuming that the crucial activities which bring about the final visible effects are produced at the actual time at which the irradiation is given, a situation which makes the identification of the critical periods by no means easy. Moreover, the evidence suggests that radiation may produce many different types of damage, not only on the chromosomes but also on the cytoplasm.

One might hope, perhaps, to have rather more understanding of the kind of damage produced by certain chemical substances such as the nitrogen mustards, the vitamins, cortisone, etc. There are five papers dealing with such topics. Again, the reader is confronted with a large amount of actual information, the explanation of which remains for the most part still to seek. Perhaps the most interesting of this group of papers is a further report by Landauer of the recent progress of his massive and thorough study of the production of phenocopies by chemical means in chick embryos. In general, however, one gets the impression that our understanding of embryonic development would be better advanced by studies which employ agents the activities of which are more precisely understood than those of irradiation or toxic substances such as the mustards (for example, specific enzyme poisons or metabolic analogues); while for the interpretation of the embryonic effects of these 'blunderbuss' deleterious agents one will probably have to wait until studies on simpler systems have revealed more precisely the nature of the effects which they produce.