life with the building of three laboratories. However, it was only with the third of them, this new laboratory at Camden Town, that he had had the pleasure of contributing little but the expression of his requirements. This was the result of having good colleagues. He had worked with Sir George Thomson during the War, and it was at Sir George's instance that he had come to Hilger and Watts to succeed Mr. Frank Twyman. Sir George had added with a smile that the job was an easy one, so Dr. Menzies had frequently overcome difficulties since then by reminding himself that they could not exist. When he started with the firm, he turned one of the smallest rooms in an outside building into a dark room; "it had the advantage that water was laid on already". Such conditions made him resolve to work for a satisfactory, attractive place where his colleagues could work comfortably and effectively. Now they had it.

After the luncheon, the guests toured the laboratories and saw research being undertaken into spectroscopic analysis by emission, X-ray diffraction and X-ray fluorescence; infra-red absorption; optical design; absorption spectroscopy; optical instruments for the control of chemical processes; electron-spin resonance spectrometry; and generators for arcs and sparks.

N. J. Goodman

SCIENTIFIC RESEARCH IN AUSTRALIA

THE twelfth annual report of the Commonwealth (of Australia) Scientific and Industrial Research Organization, covering the year ended June 30, 1960, departs considerably from the form of previous years*. To facilitate its presentation to Parliament early in the 1960 Budget sitting, the chapters describing detailed technical matters characterizing previous reports have been replaced by a brief account of the more important developments during the year, and the details are to be published separately as a research review. The bulk of the present report consists of lists of published papers, and the membership of the Advisory Council, State Committees and staff and finance.

Of the expenditure of £9,489,741, £8,862,160 was on normal research activities and £144,600 on grants to outside bodies. Among new arrangements with the universities are noted support of an investigation by the Department of Zoology, University of Melbourne, into the effects of chromosomal inversion on viability of grasshoppers; collaboration with the University of New South Wales in an investigation of tritium-labelling techniques; continuation of research at the Australian National University into aggregation and denaturation of protein; and an extended loan to the Electrical Engineering Department, University of Tasmania, of the differential analyser developed by the Mathematical Instruments Section. Construction of the giant radiotelescope at Parkes, New South Wales, for the Division of Radiophysics is expected to be complete early in 1961.

Among the more important developments of the year noted in the chapter "Progress in Research" are the solution of serious problems preventing the development by irrigation of large areas of potentially fertile but intractable soils in the Riverina by using low concentrations of gypsum in the irrigation water to make the surface clays permeable. A study of the characteristics of coats of cattle in the tropics showed that gain in weight can be predicted much more accurately from the type of coat than from actual records of past gain in weight. A new process by which cheese is matured in a plastic wrapping has been adapted for Australian conditions, and a new kind of anti-fungal compound, 'Pisatin', has been isolated from peas. A strain of cocksfoot grass, introduced from Brignolles in France, has proved outstandingly productive as a component of winter pastures near Canberra and has persisted well under heavy stocking. Up to 90 per cent control of rabbits has been achieved with sodium fluoroacetate using a suitable bait; but its effective use depends on intelligent application of accurate knowledge of feeding habits and behaviour of the rabbit. Striking increases in beef production have been obtained in grazing trials with a grass-legume mixture in native spear grass country near Gladstone, and further evidence has been obtained of the primary importance of nutritional factors in determining the mortality among new-born lambs. The compounds causing certain off-flavours in butter have been identified, and most of the conditions under which these flavours develop have been recognized. Research at Crookwell has shown that sulphur is an essential constituent of the soil organic matter, and that lack of sulphur often limits the rate of build-up of soil fertility under improved pastures.

The first commercial plant for the manufacture of fully mechanized Cheddar cheese has been installed and successfully operated, and a field experiment in North Queensland suggests that control of the cattle tick can be greatly improved both by pasture spelling and strategic dipping. Equipment has been designed to overcome the difficulty of measuring the temperature of biscuits in a long conveyor-type oven due to the very limited access to the interior of the oven, and the method for producing washable non-iron effects in wool fabrics has reached commercial application. Two new statistical techniques have been developed for accurate spatial prediction of rainfall.

Polyethylene box liners have been used to increase significantly the storage life of four main varieties of apples. A new pre-steaming procedure has been developed which is greatly improving the drying of refractory timbers with a saving of 20 per cent in the time of drying with some species. It has now been found that sugar-cane wax as it occurs on the cane consists chiefly of polymerized long-chain aldehydes, with lesser amounts of long-chain alcohols. A study has also been made of the waxes coating the tubercule and diphtheria bacteria.

Investigations of the hardening of brass have proved that alpha brass is 'ordered' after slow-cooling treatments, and that the degree of order can be considerably increased by isothermal annealing at low temperatures. X-ray methods have been further developed for the determination of the structures of large molecules, by applying a high-power X-ray generator and by collecting intensity data at low

* Commonwealth of Australia. Twelfth Annual Report of the Commonwealth Scientific and Industrial Research Organization for the year ending 30th June, 1960. Pp. ii+129. (Melbourne: Commonwealth Scientific and Industrial Research Organization, 1960.)

temperatures. In extensive tests at Umberumberka (Broken Hill) and at Lake Corella reductions of as much as 50 per cent of the normal evaporation have been obtained in still conditions by dusting with solid hexadecanol, but when the wind velocity exceeds 5 m.p.h. the saving is very much less. The first model of the 'Evaporotron', an instrument designed to yield direct readings of evaporation from natural sources on the eddy-flux principle, has been completed. Fundamental study of the physics of wool has established the existence of a transition temperature above which irreversible change occurs if the wool fibre is strained, and also that fibres of animal tendon have a transition temperature only slightly above normal blood temperature. Investigations of the retarding of non-enzymic browning of stored food by addition of sulphur dioxide or bisulphite indicate that the bisulphites may act through oxidation of the carbonyl compounds found in the aldose-amine reactions preceding browning.

STRONTIUM-90 IN HUMAN DIET IN THE UNITED KINGDOM, 1959

A REPORT by the Agricultural Research Council contains the results for the second year of the survey of strontium-90 in human diet in the United Kingdom which was initiated by its Radiobiological Laboratory in 1958*. Two types of investigation are described : a country-wide survey, which enables the mean ratio of strontium-90 to calcium in the average diet of the population to be assessed, and local studies in areas where the quantities of strontium-90 in the diet are likely to exceed the average.

The general organization of the country-wide survey was similar to that in 1958, though some additional foods were examined. The major effort was devoted to milk ; bulk samples were prepared for analysis from milk collected twice each month from some 200 depots which handled more than 40 per cent of Britain's total production. Potatoes, leaf vegetables, flour, cheese, eggs, proprietary cereal-based infant foods and tea were also examined. It has already been reported that the quantity of strontium-90 in milk rose appreciably in the early part of 1959 with the result that the mean value for the twelve months ending in the middle of the year was 40 per cent greater than it had been six months earlier. Afterwards, however, the level of strontium-90 in milk decreased and, in the latter part of the year, it was similar to those observed in 1958 ; thus, the mean value for the preceding twelve months changed little between June and December. The country-wide mean values at the end of June and December 1959 were 11·7 and 12·2 μμc./l. (9·6 and 9·8 μμc./gm. calcium), respectively.

It is estimated that the mean ratio of strontium-90 to calcium in the average diet of the whole population in the United Kingdom during 1959 was 9·0 μμc./gm. and that it did not exceed 15 μμc./gm. in the diet of any large section of the population. Because of the relatively high levels of contamination early in the year, these values are about 50 per cent higher than those estimated for 1958. The estimated level in the diet of the population as a whole, however, represents less than one-twentieth of the maximum permissible level recommended by the Medical Research Council.

During the year, investigations were intensified to identify localized areas where the combination of high rainfall and agricultural factors could lead to abnormally high levels of strontium-90 in human food. Thirteen individual farms or groups of small adjacent farms were examined in wet upland areas in England, Wales, Scotland and Northern Ireland. All these areas are small, and only a fraction of the food consumed in them is produced locally. The results of these studies, however, enable conclusions to be reached as to the hypothetical maximum levels of strontium-90 which could occur in the diet of any individual. If it is assumed that an individual could consume the most highly contaminated foods of different types which have been found in these investigations (and these were, in fact, produced in widely separated parts of the country), the ratio of strontium-90 to calcium in the total diet would be 80 μμc./gm. This value, which is one-tenth of the maximum permissible level recommended by the Medical Research Council for individuals, is in fact considerably in excess of the likely levels in the diet of any one person. Moreover, it is less than one-third of the maximum permissible level for the whole population.

Milk continues to be the component of diet which contributes the largest quantities of strontium-90. The ratio of strontium-90 to calcium in milk is, however, similar to, or less than, that in many other foods. Since the concentration of strontium-90 in newly formed human bone depends on the ratio of strontium-90 to calcium, rather than on the absolute quantity of strontium-90 in the total diet, milk should not be regarded as giving rise to any special hazard.

Variations in the composition of diet usually have only small effects on the mean ratio of strontium-90 to calcium in the total daily intake. The only substitution in a normal diet which is likely to have a significant effect is that of wholemeal bread for white bread. The calculations in this report for the average mixed diet are for that containing white bread. The substitution of wholemeal bread which contains a higher quantity of strontium-90, and does not generally contain added calcium of mineral origin, would not, however, increase the ratio of strontium-90 to calcium in the average mixed diet by more than 6 μμc./gm. This increase is less than one-fortieth of the maximum permissible level for the general population.

Because climatic factors can exert considerable effects on the quantities of strontium-90 and of calcium which are absorbed by plants, and hence on the levels in human diet, it is not possible to make quantitative predictions as to the situation in the immediate future. There is, however, considerable evidence that strontium-90 which has hitherto been released into the atmosphere has already exerted its major effect ; decreasing levels in human diet may therefore be expected in the future.

* Agricultural Research Council. Radiobiology Laboratory. Report No. 3. : Strontium-90 in Human Diet in the United Kingdom, 1959. Pp. x+58. (London : H.M. Stationery Office, 1960.) 3*s.* 6*d.*