DEMONSTRATING PRACTICAL SCIENCE.

PAPERS ON MANY SUBJECTS DELIVERED TO SECTIONS.

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Register

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OF PARTICULAR INTEREST TO AGRICULTURISTS.

The Adelaide meeting of the Australasian Association for the Advancement of Science was advanced a further stage at the Adelaide University on Wednesday. The various sections were addressed throughout the day by men prominent in their various branches of scientific endeavour. The papers delivered in the Agricultural section included one by Dr. Richardson, the newly appointed Director of the Waite College, on "The water requirements of crops," and a large number of other papers of particular interest to agriculturists were delivered in the same section.

GENERAL COUNCIL MEETING.

The 1928 Conference.

The question of the venue of the nineteenth meeting in 1928, which had been adjourned from Monday to allow the Tasmanian delegates to receive a reply from their Government as to what financial support would be forthcoming, was again raised at the General Council meeting on Wednesday. The Tasmanian delegates (Professor D. B. Copland and M. S. Giblin) informed the council that they were not in a position to issue a definite invitation for the Congress to go to Tasmania in 1928, as they had not yet received a reply from the State Government. The Professor said he had two suggestions to make. One was that the council should wait until a reply was received, and the other to decide formally to hold the 1928 conference in Hobart, provided that Tasmania was in a position in a month's time to state that the Government had decided to guarantee a sum towards the conference. If the offer were not forthcoming, then they could decide on another venue.

Dr. J. S. Purdy suggested that the 1928 conference should be held at Canberra. The Commonwealth Government had given the association great support, and by that time Canberra would be so far advanced as to afford sufficient accommodation.

Sir Baldwin Spencer—Are you sure of that? He thought they owed a debt to Tasmania. They had had to cancel the 1920 meeting at Hobart owing to the shipping strike. The permanent honorary secretary (Mr. E. C. Andrews) said that an integral part of the success of the Congress was in the enthusiasm of the people in the localities in which the conference was held. Canberra did not have a population. The matter of meetings at country centres had been raised before, but those centres could not supply the necessary entertainments, hospitality, or accommodation, and that would rule out Canberra.

The council decided to further adjourn the matter until the next council meeting on Saturday, and in the meantime the Tasmanian delegates will again get into touch with their Government in the matter of financial support.

Name Unchanged.

The council had a motion before it that the name of the association should be changed from Australasian to Australian and New Zealand Association. The members refused to alter the name, but in future the correspondence of the society will be under the title of the words "Australia and New Zealand."

Permanent Office.

The matters of getting 1,000 copies printed of the index to volumes 1 to 16 of the proceedings of the association, and the establishment of a central office in Sydney, with a paid permanent secretary were referred to a committee consisting of Sir John Monash, Sir Baldwin Spencer, Sir George Knibbs, and Mr. E. C. Andrews (hon. secretary).

THE WORLD'S FOOD SUPPLY.

Possibility of a Failure.

The problems of the world's food supply formed the subject of the Presidential address to the agriculture and forestry section, by Professor R. D. Watt, of Sydney. In the course of his remarks he said that in a country like Australia, where they grew food products far in excess of their own requirements, and especially in South Australia, which produced more wheat per head of the population than any other State of the Commonwealth, or any country in the world, it might come as a surprise to many that the food supply of the world should give any concern either at the present time or in the future. They had been hearing in recent months of the possible exhaustion of sources of power, and of an approaching world shortage of some of the metals, and of timber, but only occasionally did they find public men drawing attention to a still more serious possibility, namely, a world's food famine. There were many potential sources of power, and there were many substitutes for metals, and timber—for certain classes of work at least—but there was only one source of food, and the area on which it could be grown was definitely limited. No one could tell what the synthetic chemist of the future might do in the way of food production, but at present they were absolutely dependent on the greatest synthetic chemist of the universe, namely, the green plant, which alone could, under the influence of solar energy, build up those complex organic compounds (carbo-hydrates, proteins, and fats) which were capable of nourishing mankind from such simple substances as carbon-dioxide, water nitrates, and phosphates. Man depended entirely for his nutrition on such products.

World's Population Doubled.

It was estimated that the members of the human race had approximately doubled during the last 100 years, and the rate of increase in population had been greater during the period than at any previous time in history. That rapid growth had only been made possible by the application of science to transportation, medicine, and surgery, to food production, and to many other phases of human activity. As recently as the eighteenth century each country, and indeed each local community, was more or less self-supporting in the matter of food supply, and depended on adventurers who braved the ocean and its perils for only a few minor luxuries. To-day, owing to safe and rapid transit by land and sea, to refrigeration, de-hydration, and other modern inventions, the resident of any advanced country had the whole world for his farm. The present population of the world was over 1,800 millions, and was increasing at the rate of approximately 1 per cent. per annum. That might seem a very moderate increase, but it meant that 18 million people, or more than three times the population of Australia, were added to the world's dinner table annually, and the addition became greater year by year. The total area of the globe—33 million acres—seemed large, but they could not utilize all the area for growing crops. The areas available for agriculture totalled about 13 million acres. Of that potential world farm some 5,000 million acres were now being cared for by the hand of man. On the calculation of 2.5 acres per person, the maximum population the earth could support was a little over 5,000 millions. At the present rate of increase the time of excess population was not so far distant, but that some of their grandchildren would live to see it. Until such time as Russia had a surplus again it looked as if Europe would have to depend mainly on Canada, the Argentine, and Australia for her imports of wheat, and as those three countries were all rather subject to climatic vicissitudes, and dependent upon a variety of circumstances for their rate of development, there was likely to be at times a good deal of anxiety and a somewhat nervous market in the near future. The carry-over from last wheat year, which ended on August 1, was quite considerable, but in spite of that the reports of damage by drought and by rust to the Canadian crop had recently caused a sudden rise in wheat prices. The harvest returns from the northern hemisphere were available in time to affect the acreage under even winter wheat, and those of the southern hemisphere in time to affect the spring wheat acreage in the United States, which would always have a steadying effect on the supply, and, therefore, on the market price.

DR. A. E. V. RICHARDSON,
Director of the Waite College, who gave an instructive address to the Science Congress on water requirements of wheat crops.

Yield Increasing.

One comforting fact was that the average yield per acre had been steadily going up in every country of which they had reliable records, at least, until the many-sided influence of the Great War came into play. In the United Kingdom the average yield in the sixteenth century was eight bushels per acre. At the beginning of last century it was less than 20, and now was over 30. There was an important limiting factor affecting wheat and other plants which had been intensified rather than diminished by the facilities for ready communication between distant nations, namely, fungus and allied diseases. For instance, in 1916 the loss sustained by wheat crops in the United States through fungus diseases amounted to 77 million bushels, or more than the total wheat crop of Australia in 1918. If they could gain anything like complete control over wheat diseases the time of reckoning would be put still further away. The most effective manner of preventing a world's bread shortage in their time or in that of their children was to give sufficient encouragement to scientific research and investigation, on the one hand, and educational and propaganda work, on the other, so as to ensure that the fruits of the work done in the laboratory or at the experiment station might become available to the farmer. "But why all this emphasis on wheat?" he asked. It was because there was no crop of the temperate regions which produced such a quantity of nutritious and palatable food with so little trouble, because it was much the most satisfactory cereal for the making of bread, because the palate of the white races had become accustomed to it for centuries, and because it formed a much larger proportion of the food of the people of Europe, and especially of the poorer classes than was generally realized. At the beginning of his address the lecturer said he had indicated that the land was the only source of ther food supply. That statement required only slight modification to include another, which might not at first sight seem so closely connected with it as it was in reality. He meant the sea. The oceans of the globe were abundantly supplied with plant food material leached from the land throughout the ages. At present they caught and utilized a trifling percentage of that vast store of human food, and man's increasing ingenuity might be the means of securing a much larger proportion of them in the future. When they considered all these facts it was obvious that they of the present generation need spend no sleepless nights worrying over the possibility of an approaching world famine. But if they were to make assurance doubly sure they must see to it that those engaged in the production of food got a fair deal from other members of the community. They must encourage every effort designed to advance science generally and the various branches of agricultural science in particular. In the past the Governments of other countries like Germany, Denmark, and the United States of America had realized those things more clearly and given greater practical effect to them than any part of the British Empire. Work of that kind should not be left entirely to Government, and it was pleasing to note that wealthy and public-spirited citizens had begun to appreciate the importance of the endowment of agricultural research in Australia. Future generations would undoubtedly rise up to call them blessed.

AGRICULTURAL TOPICS.

THE WHEAT CROP.

Its Water Requirements.

Dr. A. E. V. Richardson, the newly appointed director of the Waite College of Agriculture, lectured on the subject of "The water requirements of the wheat crop" to the agricultural section. Dr. Richardson told the members that the quantity of water used in the growth of farm crops was so considerable that the water supply of the soil was frequently a limiting factor in crop production. It had long been known that crops differed materially in their water requirements, but the results obtained in Victoria showed that climatic and soil conditions profoundly affected the amount of rain required by any given crop. Those were matters of great scientific interest and of great economic importance, especially in countries with a large area of relatively arid country. The amount of water or rain transpired by the crop during the whole of its growth was measured and expressed in terms of the dry weight of the crop and grain produced. The result of six years' investigations in Victoria showed that winter-grown cereals under Australian conditions required more rain to produce a unit weight of crop than in England and Northern Europe, but much less than similar crops grown in the United States and India. For a period of six years in Victoria the wheat crop required, apart from losses of moisture in the soil, approximately 4 in. of rain to mature a ton of dry matter, grain, and straw. To produce a ton of grain 19½ in. of water was required to pass through the crop. Thus for moderate rainfalls every inch of rainfall was capable of producing 3½ bushels of wheat per acre—3½ bushels per inch of rain. The composite average winter rainfall—April to October—in the South Australian and Victorian wheat belt was practically identical, namely, 11½ in. Assuming that the extra water conserved by fallowing would balance the losses of water by evaporation from the soil, the rainfall was sufficient to produce an average of 40 bushels per acre in each State. Less than one-third of that amount was actually

MR. W. S. KELLY,
Chairman of the Advisory Board of Agriculture, who discoursed on the rotation of peas with wheat crops.

DR. C. FENNER,
Director of Technical Education, who lectured to the Science Congress on Wednesday on apprenticeship training.