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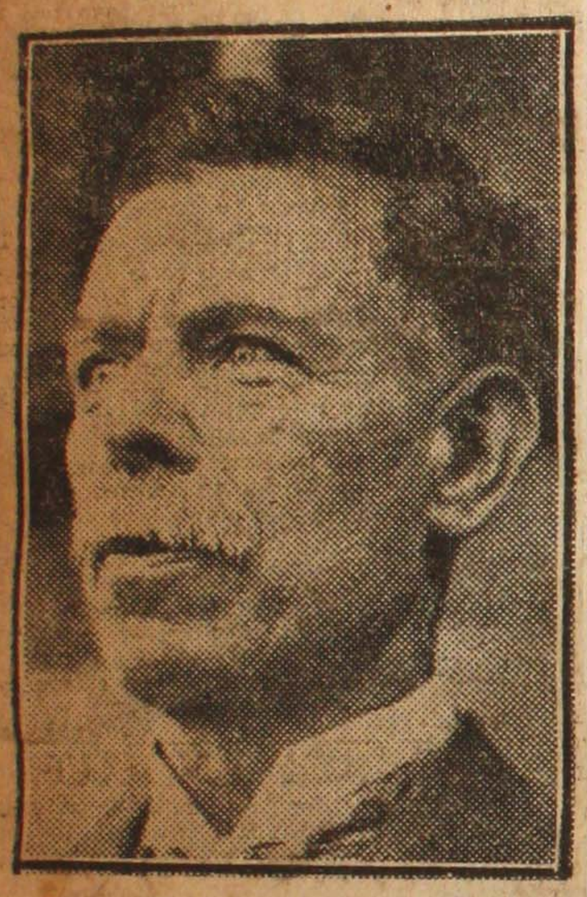
MODERN FARMING.

The Application of Science.

Lecture by Sir John Russell.

A lecture on "Science and Modern Farming," under the auspices of the University, was delivered by Sir John Russell, Director of the Rothamsted Experiment Station, in the Brookman Hall, School of Mines, on Wednesday evening. There was a large and representative attendance.

In introducing the lecturer, the Chancellor of the University (Sir George Murray) said it was a pleasure to welcome Sir John, the distinguished director of the famous agricultural experiment station, which was founded by Sir John Bennett Lawes in 1843. A few years ago the Universities of Australia adopted the practice of inviting distinguished men to Australia to help them with inspiration in the work in which they were engaged. They had already had visits from Professor J. W. McKail, Sir John Adams, and Sir Ernest Rutherford. During the present year they had invited Sir



Sir John Russell.

John Russell and Professor R S. Conway, and the latter would be here in a month or two. What South Australia owed to Rothamsted was most graphically described by the single word "superphosphate." It took the farmers 40 years to realise the benefits to be derived from it. The undaunted efforts of Professor William Lowrie, of Roseworthy College, in that direction had done much to give fresh life to farming in South Australia. Full particulars of the activities at Rothamsted would be related by Sir John on Friday night. His visit was most opportune. One effect of the war was to stimulate interest in the application of science to industry in all its forms, particularly to primary production. With soil, air, and water, with the minerals and organisms contained in them, and with light and heat derived from the sun they had all the capital required for the support of an enormous population on the earth. The problem before them was to find how the application of intelligence and labor could be best used to make the country more productive. The Empire Marketing Board had been appointed in England and the Council for Scientific and Industrial Research in Australia to aid in the work. Problems had been set, and were now engaging the attention of research stations all over the world. One of the objects of Sir John's visit was to see what was being done in Australia. Two important subjects for investigation had been entrusted to the University of Adelaide. One, the mineral contents of Australian pastures, would be undertaken at the Waite Research Institute by Professor A. E. V. Richardson, and the other, the problem of animal nutrition, was in the hands of Professor Brailsford Robertson. Other researches had been instituted by the Waite Institute, which were of enormous importance to Australia as a whole and South Australia in particular. Sir John had seen the Waite Institute, and he felt sure he would agree that the great benefaction of Mr. Peter Waite which made the establishment of the institute possible, was one of the most splendid contributions that could have been made to the future development and prosperity of the country. (Applause.)

The Importance of Fertilisers.

Sir John Russell said modern farming might be said to have started about 40 yeras ago when the development of transport enabled farm products to be sent all over the world, and so broke the monopoly which the home farmers had always previously enjoyed. It caused a revolution in farming, and science aimed at helping in two ways—in increasing production per acre and per man, and in cheapening production by eliminating wastes and losses. The application of science to agriculture became possible because practical men had already built up sound systems of husbandry. The old system, wheat, fallow, or wheat, barley, fallow, had given about 10 to 15 bushels of wheat an acre, and that lasted without change for about 1,000 years. Then in the 18th century the system was diversified and a four-course rotation instituted. That gave yields of 20 to 25 bushels of wheat an acre. On the sheep farms of the south of England the system became very complex and the yields of all crops rose. The first great triumph of science was its introduction of artificial fertilisers, notably superphosphate, sulphate of ammonia, nitrate of soda, and potassic salts. Those had added greatly to the productiveness of soils all over the world, giving large crops of cereals, potatoes, sugar beets, and so on, and they were now being used extensively in England and in Europe on grass land, adding greatly to the production of milk and meat. The importance of superphosphate in developing Australia was known to all. Further, it was shown that fertilisers not only increased the crop, but altered its composition and habit of growth. That was being used to influence quality and especially to help the plant adapt itself to different weather conditions. Superphosphate encouraged root development and therefore helped the young plant to become established and to send its roots down into the moist subsoil—a very valuable thing in dry seasons. Sulphate and muriate of potash increased the efficiency of the leaf and so helped the plant in a sunless season. That explained their importance in Northern Europe. In regions where the climate was very regular from season to season that method of adjusting the crop to the climate by means of fertiliser was likely to be very useful when it was better understood, and in the uncertain climate of England it had already proved useful in levelling up good and bad seasons, especially for the growth of fodder crops.

Production of New Varieties.

Another direction in which science was helping agriculture was in the production of new varieties of crops better adapted to the conditions of the farm, or more resistant to disease than the old oens. Those new varieties were being produced all over the world. Australia had produced varieties of wheat known everywhere, such as Farrar's Federation. Some such as Marshall III., Hugenot, and Florence, were not only useful here, but were being used as a basis for breeding new sorts in other countries, such as in Palestine. There, however, the breeders were having to put beards on to the wheat to keep off birds. The good effects of fertilisers and of new varieties, along with the improvements in machinery had enabled British farmers to attain high yields. A good farmer expected 40 or 50 bushels of wheat, 50 to 70 bushels of barley, 60 to 80 of oats, and ten to twelve tons of potatoes an acre. From an acre of good grass land he would hope to get 600 to 1,000 gallons of milk in the season, or 200 live weight increase in sheep. Although those yields could not be obtained every year he no longer got disasters such as occurred 50 years ago when the wheat crop almost completely failed; there was always a crop. The problem of increased production an acre was solved sufficiently for to-day's needs.

Plant Diseases.

In recent years there had been increases in the number of plant diseases. Every country had always had a few, and nowadays with efficient transport, diseases were liable to be carried from one country to another. Further, under cultivation, plants were more liable to disease than in the wild state. Wild wheat on the hills of Palestine and Trans-Jordan did not get rust, but cultivated on the experiment farm it did. The most destructive crop disease in the history of mankind had been the ordinary potato blight. That was a native of South America, and it never reached Europe until steamships began to make the journey from South America in such short time that they could carry vegetable products. About 1840 it got into Ireland and swept the country with all the vigor of a new pest, destroying the potato crop on which the peasants lived, and reducing them to starvation so that thousands died in the terrible famine that followed. For 40 years Ireland was never free. Once the disease appeared the farmer was helpless; nothing could be done. Of all the tyrants Ireland ever had the potato disease was the worst; it cost thousands of lives, untold suffering and misery, and millions in money. Then after 40 years science found a remedy and the blight had never caused serious trouble since. A simple operation, spraying with Bordeaux mixture, avoided all the trouble. Another troublesome disease, much more recent, was the wart disease of potatoes. That appeared in one corner of England about 1896. No one thought much about it but it spread gradually all over the country and threatened terrible destruction. But by that time the scientific workers were ready. Some were looking for a remedy, and some for resistant varieties. Happily an immune variety was found, from which a number of others had been raised. The result had been that that disease, which might have been a catastrophe, had been only a nuisance, causing nothing like the loss of the old one. To-day they were threatened with virus, or mosaic diseases, such as the tomato wilt now being studied at the Waite Institute. Those affected many, perhaps all, crops, and they were spreading everywhere. But they were being closely studied by experts all over the world, and there was now for the first time a co-operative effort to cope with them. The plant pathologists were collaborating in a way they never did before, and although the problems were difficult they had every confidence that they would be satisfactorily solved.

Cultivation of Waste Spaces.

Perhaps the greatest triumph of science had been to bring into cultivation the waste places of the earth. First of all the trouble had to be diagnosed. Sometimes it was lack of plant food; sometimes lack of water; sometimes too much acidity, too much alkalinity, or too much salt. Soil chemistry was now so well advanced that the trouble could be located without much difficulty. Remedies were being devised for all those troubles. Australia had already done much in solving the problem of dry land cultivation. Two methods were adopted. The water requirements of the crop were ascertained, and methods were found for increasing the efficiency of the water in promoting plant growth. That problem had been studied in detail by Dr. Richardson. The soil was also studied so as to see how to increase its power of holding moisture. At present an even more serious problem was associated with the salts often present in soil in semi-arid regions. Directly irrigation began, these were liable to cause alkali, or salt, troubles. Behind every irrigation scheme there lurked the spectre of alkali, which might bring to nought all the efforts of the engineer and cause losses of hundreds of thousands of pounds. Fortunately, South Australia possessed the Waite Institute, and in the new chemical laboratories presented by one of South Australia's great citizens, Sir John Melrose, they should look to see valuable work done on that terribly urgent problem under the leadership of Professor J. A. Prescott, who had had the advantage of studying it in Egypt, where it was already causing trouble. During all that work one striking truth had emerged. In their essentials those soil problems were the same. The acidity that worried them in a cold, wet, northern climate, was fundamentally only another aspect of the alkalinity that caused so much trouble in hot, dry climates. And as there were soil experts all over the Empire, working at their different problems, it had been decided at the Imperial Agricultural Conference—and the Australian representatives took a leading part in getting the decision adopted by the whole body of representatives—that there should be a Central Soil Bureau set up for interchange of information, so as to ensure that any knowledge obtained in any part of the Empire—indeed, of the world—should be at once made available to soil workers throughout the Empire, thus ensuring that the experience of one might be available for the benefit of all. The representatives further asked that the bureau should be located at Rothamsted, and while he was in Australia he was seeking to learn in what ways it might be made most useful.

Achievements of Science.

The achievements of science in agriculture were perhaps best summed up by comparing the prediction of Sir William Crookes in 1898 with the accomplishments of agriculture to-day. Speaking with a full knowledge of science, as it then was, he predicted that the world in 1931 would require 90 million tons of wheat to feed its population, but that that represented the utmost that the wheatgrowers of the world could do; afterwards the world would be faced with starvation. The accuracy of his forecast in regard to consumption showed how carefully he had made his calculation. The world did, as he predicted, require in 1928 about 90,000,000 to 100,000,000 tons of wheat. But science has advanced so much as to upset altogether his calculations about the possible production. The 90,000,000 tons, which he thought was the limit, had been much exceeded, even in 1911, and could be considerably exceeded to-day if it were wanted. The fear of world starvation had gone, and the achievements of science were only at their beginning, and there remained ample scope for patrons, such as Mr. Peter Waite and Sir John Melrose, and for the patient efforts of the quiet scientific worker. The problem before the world now was to ensure that the farmer should get his fair share of the profit, so as to encourage him to use all that science could teach him. (Applause.)

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ENTOMOLOGICAL RESEARCH.

Proposed New Schemes.

Articles on scientific and industrial subjects of importance to the development of Australia are contained in the fourth quarterly number of the Journal of the Council for Scientific and Industrial Research.

In one of these Professor A. E. V. Richardson of the Waite Research Institute, set out tentative proposals for a scheme of dairy research, which he submitted at the meeting of the standing committee on agriculture last March. In another, Dr. R. J. Tillyard, chief entomologist to the council, presents a scheme of entomological research which he recently recommended to the council. The lines he proposes are divided into two types:—(1) Control of insect pests by beneficial parasites or predators; (2) control of noxious weeds by their natural insect enemies. To carry out his proposals he recommends that a central research station be built at Canberra, and that sub-stations be established in various parts of the Commonwealth.

In stressing the Imperial value of the scheme Dr. Tillyard says that Australia not only presents economic entomological problems of outstanding difficult, but also an insect fauna probably of greater general interest than any other in the world. The combination of research work on the two offers a unique opportunity for the training of Empire entomologists.

In a note by the editor of the journal it is mentioned that the council will not be able to give immediate effect to all Dr. Tillyard's recommendations, as the shortage of trained entomologists, apart from financial considerations, is a serious difficulty. A commencement, however, has been made, and Dr. Tillyard, who is now abroad is arranging for obtaining insects and parasites likely to be useful in the attack on Australian entomological problems.

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INSPIRATION IN AGRICULTURE.

Sir John Russell (Director of the Rothamsted Experimental Station, England), who has spent a week in this State under the aegis of the Adelaide University, in connection with agricultural research, today will inspect the Mount Barker district and the reclaimed swamps at Wood's Point, River Murray. He will join the express on Sunday evening for Melbourne. At the conclusion of a lecture in Adelaide on Friday night, by Sir John, in connection with the University, the Chancellor (Sir George Murray) said they were deeply grateful for the visit and lectures, which would prove a great inspiration to them in the further study of science in connection with agriculture. Sir John Russell, in replying, said the visit had afforded him much pleasure. Wonderful work was being done at the Waite Agricultural Research Institute in connection with the University. That work was important not only to the State, but also to the Commonwealth, and they knew, too, the importance of development to the Empire as a whole. Farmers would be all the better producers for knowing something about what they were doing, and why they were doing it. It was a tragedy to find young men on the land who knew nothing about it. That was something akin to a blind man standing before a beautiful picture, or a deaf man being where inspiring music was being played. If they could teach the young people on the land something about the wonders which surrounded them in their work—and none knew really much about them yet—they would at least have a more interesting life. It was inspiring to note the attitude of the Premier (Mr. Butler), and others responsible for the destiny of the State, towards the development of agriculture on scientific lines, which was a very good augury for the future of the country. He had much enjoyed his visit and regretted that it had been of so short duration.