Victorian phylloxerated vineyards had begun. At Rutherglen alone 10,000 acres had been planted with these hybrid grafts, and experience had shown that the grafted vines were absolutely immune from attack, and that they yielded and thrived well in phylloxera infested soil. South Australia had never suffered from this disastrous disease.

Fungoid Pests.

The plant pathologist had rendered signal service to the farmer and orchardist. The life history of many fungoid pests of plants had been worked out, and simple methods of controlling the pests had been formulated. Smuts, rusts, and mildews in cereals had been known from the very earliest times. A scientist named Kuhn was the first pathologist to make a systematic study of the smut fungus with a view to finding a method of control. In 1858 he found that smut attacked wheat just at the seeding stage, and that it penetrated the young seedling within a few days of germination. He suggested dipping the seed in a dilute solution of bluestone or copper sulphate of a strength sufficient to kill the sports of the fungus without causing injury to the tissues of the wheat seed. By this simple process a serious fungus disease which had ravaged wheat crops throughout recorded history was brought under control. In 1895 a scientist named Genther found that a dilute solution of formalin (one part of formalin in 300 parts of water) would kill the spores of the fungus without affecting the wheat. Wheatgrowers in Australia had used both these fungicides extensively for controlling smut in wheat. Within the last few years Dr. Darnell-Smith, of New South Wales, suggested the use of dry powdered copper carbonate dusted over the seed as a means of controlling the disease. The great advantage of this method—which promised to displace all others within a few years—was that the farmer might pickle his seed months before sowing without any damage to it.

Less than a century ago it took a man three hours to cut with sickle and thresh with flail a bushel of wheat. With the modern harvester the work might be done in less than three minutes. The modern stripper had its prototype in the Gallic header described by Pliny in 70 A.D. This consisted of a two-wheeled cart pushed through the crop by an animal yoked behind the cart. The heads were stripped from the standing crop by a series of lance-shaped knives, and the ears were raked into the body of the cart by an attendant as it proceeded through the crop. It was left to Ridley, of South Australia, to produce in 1845 the first successful stripper. He employed the principle of the Gallic machine and removed the heads from the standing crop by means of a comb and a rapidly revolving beater. The harvester evolved next by an easy process from the stripper. The reaper-thresher combined the cutting action of a mower, the threshing action of a heavy beater, and the cleaning action of a winnower. The modern harvester was the most efficient, economical, and labor-saving machine, and its introduction had greatly reduced the cost of labor in the harvest-field, and had greatly increased the acreage of wheat that could be handled by one man.

Carriage of Perishable Products.

The application of the principle of refrigeration to the carriage of perishable products overseas opened up a new era of progress for Australia. In February, 1880, the first shipment from Australia, consisting of 34 tons of beef and mutton, was delivered in London by the Strathleven, and in July, 1882, the sailing vessel Dunedin took from New Zealand to London, after a passage of 98 days, 4,900 carcases of sheep and 22 pigs, all in perfect condition.

Recently much scientific effort had been devoted to determine the conditions under which perishable fruit, such as pears, citrus, peaches, and grapes, might be conveyed to London, and how certain defects which arose in the carriage of fresh fruit under cool storage conditions might be obviated. There was much work to be done in determining the best period of maturity to harvest the fruit, and the most favorable conditions of temperature humidity and methods of ventilation of the fruit in the hold of the ship. It was not too much to hope that eventually most of the difficulties attendant on the transportation of fruit overseas would be removed, in which case a new era of prosperity would be ushered in for Australian fruit industries.

After dealing with the progress of agricultural science in Britain, Germany, and the United States, Professor Richardson said what they as a State or as a Commonwealth were spending on agricultural education and research was trifling compared with the total value of their agricultural production, and trifling in comparison with what other countries were doing. If they were to make the fullest use of the great natural resources of Australia and maintain it as a great white continent they must develop it to the utmost, not only by encouraging immigration, developing their transport systems, conserving all their available water supplies, and promoting land settlement, but also by applying all the resources of science to the development of their primary industries, on which the whole fabric of the nation rested.

News 22/7/25

Agricultural Bureau Congress

Although the agenda for the thirty-sixth annual congress of the Agricultural Bureau of South Australia, which is to be held in Adelaide on September 7, 8, and 9, has not been finalised, Mr. H. J. Finnis (Secretary of the Advisory Board of Agriculture) has intimated that some special features have already been fixed. His Excellency the Administrator has consented to open the congress.

Professor A. J. Perkins (Director of Agriculture) will deliver an address entitled "Is rural production on the decline in South Australia, and if so, what are the factors contributing thereto?" Dr. A. E. V. Richardson, M.A., D.Sc. (Director of the Waite Agricultural Research Institute) will give an address illustrated with lantern views on "Methods of Increasing Primary Production," and Professor T. Harvey Johnston, M.A., D.Sc. (Professor of Zoology, University of Adelaide), will address the congress on "The Sheep Maggot Fly Problem."

The women's session of the congress will be addressed by Dr. Gertrude Halley (Medical Officer of the Education Department).

Adv. 23/7/25

THE SPENCE SCHOLARSHIP.

It was ascertained yesterday from the Director of Education (Mr. W. T. McCoy), who is also chairman of the Catherine Helen Spence Advisory Committee, that that body will meet in October or November for the purpose of inviting applications for the Catherine Helen Spence scholarship, provided by the Government to enable the holder to enter upon a course of study relating to social science. The scholarship is open to women of not less than 23 years of age, and not more than 40, who have been bona fide residents of the State for five years. The total value of the scholarship is £300, and it is tenable for four years. The successful applicant may spend two years at the University of Adelaide in studies relating to social science and thereafter, or for the whole tenure of the scholarship, must investigate the treatment of social problems in Europe or America. The applicant selected will take up the scholarship, which becomes vacant every four years, during the latter part of next year. Dr. Constance Davey of the Educational Department, was the last holder of this scholarship.

Adv. 23/7/25

A CHAIR OF LAW.

WANTED IN THE WEST.

Perth, July 22.

The legal profession of Western Australia recently decided to ask the Government to establish a chair of law at the University, expressing willingness to contribute towards the cost if legislation were passed for the purpose. A deputation to the Minister of Justice (Mr. Willcock) stated to-day that they would contribute £500 per year to an estimated cost of £1,300. A student could serve one year of his articles during the course, and one year afterwards, covering a maximum a period of five years.

The Minister said the matter would be considered by the Cabinet, and he hoped the Government would be able to make the necessary provision.

Adv 23.7.25

THE STRUCTURE OF ATOMS.

Sir Ernest Rutherford, the distinguished physicist, who is to visit Australia at the invitation of the various universities for the purpose of delivering a series of public lectures, will arrive in Adelaide about September 5. He will deliver two lectures here, under the auspices of the University of Adelaide, the first of which is entitled "The Structure of Atoms."

Reg 23/7/25

MIDDAY ORGAN RECITAL.

Mr. Harold Wylde, F.R.C.O., will continue the series of midday organ recitals in the Elder Hall to-day, beginning at 1.13 p.m. A conspicuous feature of the programme will be the great Toccata and Fugue in D minor by Bach, so well known and appreciated by music lovers. Miss Alice Cummins will play a 'cello solo.

Reg 23/7/25

LECTURE BY PROFESSOR BRAILSFORD ROBERTSON.

A lecture of unusual interest will be given in the Public Library lecture room on Wednesday evening next, when Professor Brailsford Robertson will take as his subject, "The life and work of Jacques Loeb." The discourse will be under the auspices of the Victoria League, and the Vice-Chancellor of the University (Professor W. Mitchell) will preside. Further particulars appear in our advertising columns.

Reg. 23/7/25

PERTH UNIVERSITY.

CHAIR OF LAW PROPOSED.

PERTH, Wednesday.

The legal profession of Western Australia recently decided to ask the Government to establish a chair of law at the University, expressing its willingness to contribute towards the cost if legislation were passed for the purpose.

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Reg. 23/7/25

SCIENCE AND AGRICULTURE

Value of Discoveries.

Babcock Test for Butter Fat.

No. 2.

Dr. A. E. V. Richardson (Director of the Waite Agricultural Research Institute) resumed by giving a few examples of the far-reaching effect of scientific discoveries of the chemist, biologist, geneticist, and the engineer in assisting to increase primary production.

Superphosphate.

An interesting case was the simple discovery by Liebig, the famous German agricultural chemist, that the insoluble tribasic phosphate as found in bones and natural rock phosphates could be converted into a water soluble phosphate by treatment with sulphuric acid. Liebig in his report to the British Association in 1840 suggested that would be a suitable form in which to apply phosphoric acid to crops. Sir John Lawes, of Rothamsted, was one of the first to profit by the discovery, for he not only tested the efficacy of the dissolved bones in his famous experimental plots, but began the manufacture of superphosphate from rock phosphate in 1842, and thus laid the foundation of the large fortune which he subsequently made and devoted to agricultural research. Since then the practice of using superphosphate had spread to every agricultural country. In no part of the world were these soluble phosphates more popular than in Australia. Owing to a common deficiency in Australian soils in available phosphoric acid, the response of the soils to water soluble phosphates was remarkable. In Australia in 1922-23 no less than 463,673 tons of artificial fertilizers were used, nearly all of which was superphosphate. Seventy-three per cent. of the whole area sown in crops was fertilized, and in South Australia 87 per cent. of the total area of all crops was treated with artificial manure. 114,155 tons of artificial fertilizer were used in South Australia in 1923. When superphosphate was first introduced as a fertilizer for wheat in Australia, and applications of quantities as low as .56 lb. per acre were advocated, it seemed beyond the bounds of commonsense that so small a dose could appreciably affect yields. The grounds of that early scepticism were not hard to understand when it was remembered that the top 6 in. of soil weighed about 1,000 tons per acre, and that only a fraction of the super (about one-fifth) was of direct benefit to the plant. To-day, so widespread was the use of superphosphate on Australian soils, and so consistent were the results, that the phenomenal response of the average soil to the fertilizer had become commonplace, and it was only when the seed drill happened to miss sowing the regular quantity of fertilizer that the farmer was reminded of the vital part which this light dusting played in producing profitable yields.

The problem to-day was not, however, one in which the advisableness of the use of superphosphate was questioned, but rather to ascertain how much to use. It had been shown that the quantity varied with a number of factors:—(1) The rainfall during the growing period; (2) the thoroughness of cultivation; (3) The nature of the soil, and in particular the lime content of the soil; (4) the type of crop sown. The determination of the quantity to sow in each of the climatically different districts of the State with some degree of precision was a matter of considerable importance. Experiments showed that on most soils there was a steady and proportionate increase in the yield as the amount of manure applied was increased until a point was reached, after which the same ratio was not maintained, until eventually there was no further response to further dressings. Obviously then in practice it was necessary to determine the rate of application which gave the greatest net profit, and that was not necessarily that which gave the greatest yield.

There was a further point to consider. It had been found that liberal dressings of phosphate not only enabled a profitable cereal crop to be grown, but the indirect effect of the unused residuum was of great value in stimulating the growth of grass when the cereal crop was removed. It was somewhat difficult to determine the extent to which the use of superphosphate had increased wheat production in Australia. On a conservative estimate the increase in yield due to the use of superphosphate was certainly not less than 3 bushels per acre over the wheat belt. The value of that increase, valuing wheat at 5/ per bushel is £7,500,000 per annum. At present some 400,000 tons of super, valued at £1,750,000, were used in Australia, practically all of which was manufactured in Australia. The rail freight on the increased wheat produced by superphosphate was at least £500,000. Superphosphate was destined to become even more important to their economic welfare, for there was abundant evidence to show that the pasture lands, especially in regions with a rainfall over 20 in., could be greatly increased in stock carrying capacity by the use of fertilizer. The area of land in Australia with a 20 in. rainfall was at least 50 times greater than that sown annually to wheat.

Babcock Test For Butter Fat.

In 1890 Dr. Babcock, of the School of Agriculture, Wisconsin University, discovered a simple method of determining the butterfat content of milk. The principle of the method was that the casein of the milk was dissolved by concentrated sulphuric acid, and that the fat might be readily separated from the milk by centrifugal force. He developed a simple piece of apparatus which enabled one to determine with a fair degree of accuracy the fat content of a sample of milk in a few minutes. That simple discovery had meant much to the dairying industry. Not only had it enabled butter factories to use an exact method of payment for milk and cream in accordance with the quality of the product, but it permitted a more careful control of factory processes than formerly, and resulted in an enormous saving of butterfat formerly lost in skim milk. The greatest service of the butterfat test, however, had been to provide a means of systematically improving the dairy herds of a country. The simple and rapid method of determining the butterfat percentage of milk provided the dairyman with a means of detecting the unprofitable animals in his herd, and enabled him to build up a herd of efficient butterfat manufacturers. A new standard for breeding had been placed in the hands of dairymen, the breeding and feeding of cattle that would produce the highest quality of butterfat per annum, and not merely the greatest quantity of milk. That simple test had provided a scientific basis for herd testing, and for detecting the unprofitable members of a herd.

How much improvement was possible in their dairy herds might be realized when they compared the record of the best dairy cow in Australia with the average Australian herd. The average production of butterfat per cow for Australia was about 160 lb. Melba XV of Darbalara produced in an official test, 3,252 gallons of milk and 1,614 lb. butterfat. The latter was the world's record.

Sugar Beet Industry.

Another interesting application of the value of scientific work in assisting agriculture was the improvement of the sugar content of the beet. In 1760 the German chemist, Marggraff, showed that the maximum percentage of sugar obtainable from white varities of beet, was 6.2, and from red varieties, 4.5 per cent. The sugar beet industry was established by Napoleon as a movement hostile to England. He closed European ports to British trade, and thereby cut off supplies of sugar. In 1807 at the time of the establishment of the sugar beet industry, the average content of the roots was 6.7 per cent. In 1818 there were 313 beet sugar factories operating in France, each having a capacity of 10½ tons of sugar per annum. After Napoleon's overthrow the young industry nearly died out, but under the stimulus of bounties it made rapid strides, and to-day nearly two-thirds of the world's sugar was grown by white labour in temperate zone from sugar beet, while the remainder was produced from the sugar cane in the tropics. The modern beet sugar factory produces 10,000 tons per annum, i.e., nearly 1,000 times as much as the factories of Napoleon's time. The great progress in sugar-beet industry had largely been brought about by the great improvement effected in the sugar content of the beet by systematic selection aided and controlled by chemical analysis. The average sugar content of the beet had