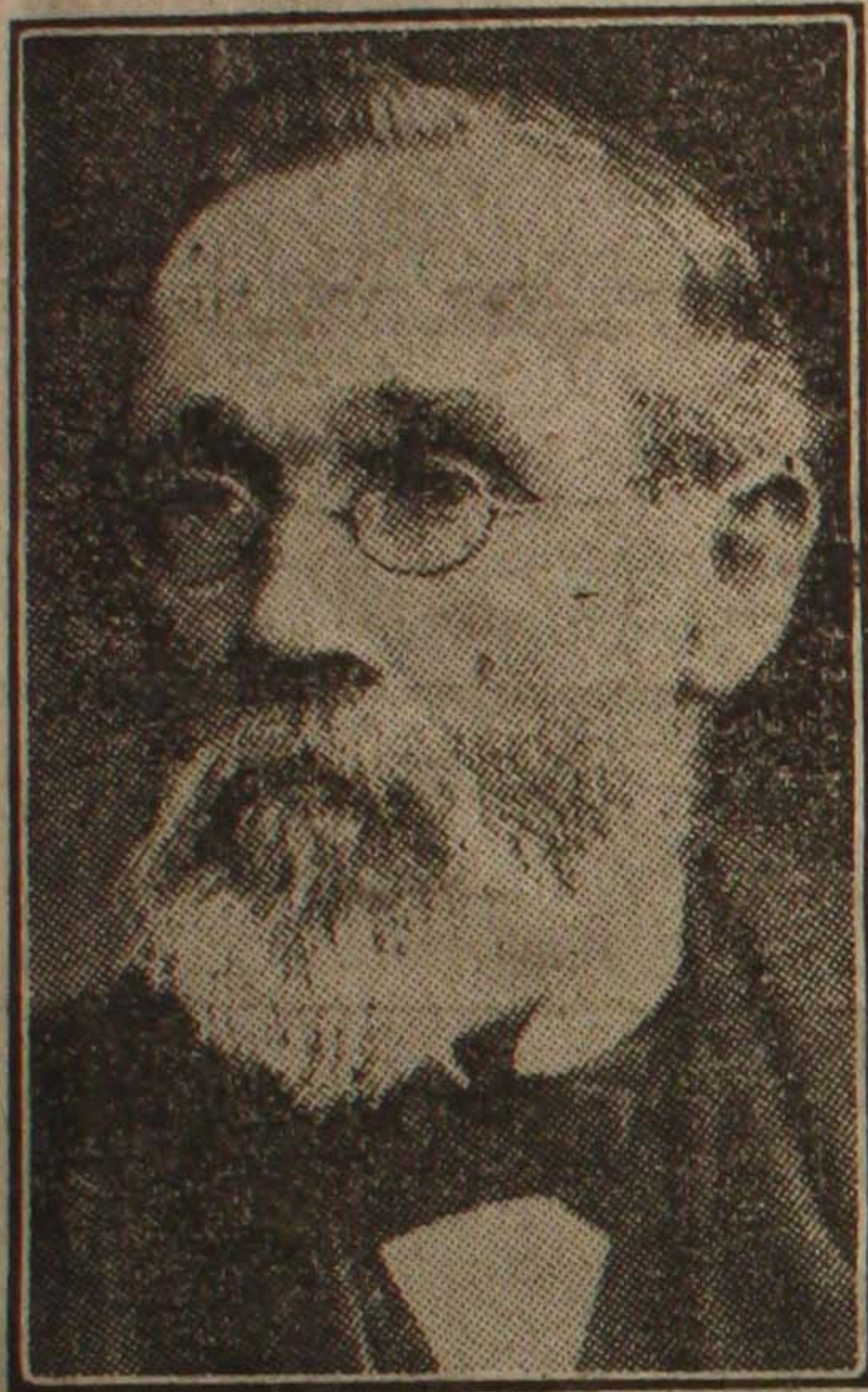


PRE-CAMBRIAN LIFE.

"A Titanic Surprise."

Changing Conceptions of Science.

An announcement in The Register on Thursday that Professor Sir Edgeworth David, the eminent geologist, speaking in Sydney, attached great importance to discoveries made recently among the rocks of the Mount Lofty Ranges and Flinders Ranges in this State, aroused much interest in scientific circles in Adelaide. Sir Edgeworth David stated that during his visit to South Australia a few weeks ago he had, in company with Professor W. Howchin, found indisputable evidence in geological formations of this State that the birth of life must have taken place millions of years earlier than science had hitherto supposed. Professor David as-



PROFESSOR WALTER HOWCHIN, F.R.G.S.

serted that there was no doubt that the ancestors of the Cambrian fossil animals—the earliest fossil remains which scientists had hitherto been able to definitely classify—were to be found in great numbers in the Adelaide hills. The discovery made by Sir Edgeworth David represented the sequel to 30 years' laborious research work. The prehistoric remains found are perfectly and exquisitely coloured and, as Professor David stated, "had come as a titanic surprise, which would change many conceptions of science."

Professor Walter Howchin, when interviewed by a representative of The Register on Thursday, confirmed the notable discoveries and said he thought the remains in question were very ancient types of worms and crustaceans. They were very small, and what Sir Edgeworth David had discovered were largely fragmentary portions. These were found in the limestone at Reynella, and in the blue metal limestone at two geological horizons in the foothills near Adelaide. The localities visited by Professor David, under his guidance, were the Montacute and Sixth Creek areas, and also at the Devil's Elbow, above Glen Osmond, and it was in those vicinities that he obtained his material. Further materials would have to be secured, and they would be placed in the hands of zoological experts for more complete determination and description. They did not accord with anything that could be recognised as closely related forms, either in present life, or even previously known, palaeontologically. Years ago, in sectioning those limestones, he had discovered those special fragments, which were suggestive of organic forms; but it was only lately that he had been able to correlate them. In a letter he (Professor Howchin) had just received from Sir Edgeworth David, that gentleman said that the Nulla gine rocks of Pilbarra and Kimberley (W.A.), were full of the spiral limbs and gills of annelids (worms), which were similar to those discovered here, and of a similar age.

Professor David on the Discoveries.

In the course of his remarks recently in Adelaide, when dealing with the subject, Sir Edgeworth David said that some interesting lowly forms of fossil animals had been found, chiefly in the limestone rocks of Brighton and Reynella. The discovery of those fossils would, it was hoped, shed considerable light on difficult problems in the geology of South Australia. He paid a high tribute to the valuable work done by one who was the joy of all Australian geologists at the time of his death last January, and who

was probably second to none among the geologists of the world, for the vastness of the regions which he had geologically mapped in South Australia, Central Australia, Northern Australia, and Western Australia, and for his quickness at seizing salient points observed in his very long and arduous journeys over the continent, he referred to the late Mr. H. Y. Lyell Brown. Much of Mr. Brown's work was now embodied in the excellent geological map of South Australia just produced, under the direction of Dr. L. K. Ward, by the South Australian Department of Mines.

Sir Edgeworth David explained that the finding of the fossils now announced was due in large measure to another very famous South Australian geologist, Professor Howchin, whose brilliant discoveries, particularly of wonderful glacial deposits in the Mount Lofty and Flinders Ranges, had thrilled the geological world. Mr. Howchin, who had collaborated from time to time with him, had supplied him with the greater part of the specimens in which those fossils had been discovered as the result of microscopic examination.

Oldest Fossils in Australia.

A two-fold interest attached to them. First they were older than any other recognised fossils hitherto found in any part of Australia, and as regarded the details of their structures, they were better preserved probably than any of such high geological antiquity hitherto recorded from any part of the world. So far the oldest known fossils showing any detail in South Australia were those recorded by Mr. C. T. Madigan (Lecturer in Geology at the Adelaide University). Those occurred near Myponga Jetty. The fossils now recorded were met with on the geological horizon known as the Brighton limestone, and in part came from the more siliceous limestones underlying the former limestone; both were, of course, extensively used at present in the manufacture of Portland cement. Microscopic examination showed that these limestones were chiefly built up of myriads of minute organisms of the nature of tiny shrimps, though of a far more primitive type; and of many varieties of sandworm, whose delicate feet and bristles were in many cases very finely preserved. Similar fossils had now been traced in the limestone at the Devil's Elbow on the Mount Barker road as well as in the limestones already mapped in some detail by Professor Howchin in the Torrens Valley. They also occurred at Crystal Brook. It would be a matter of no little interest to observe whether they were also present in the widely spread limestones of the Tent Hill series, west of Lake Torrens. The geological age of this series was still in doubt. The fact that these lowly forms of marine animal life were more or less continuous throughout so vast a thickness of rock as that of the order of 8,000 to 10,000 ft., suggested a remarkable continuity in the great formations of which Mount Lofty and the Flinders Range were composed. It was also of stratigraphical interest that those marine sandworms occurred both above and below the glacial deposits discovered in the Sturt Valley by Professor Howchin. This showed that the glacial deposits must have been deposited along the shore line of an ancient sea, extending far northward inland, at least to the latitude of the Willouran Ranges, just as was now taking place around the shores of Antarctica.

Early Stages in Evolution.

In the second place the discovery was very interesting from the point of view of the evolution of animal life, some of the forms now described for the first time being entirely new to science. A special characteristic of some of them was that their limbs were mostly constructed on a spiral pattern, something like the spiral springs of old-fashioned armchairs. These were inclined outward and downward, and no doubt imparted some springiness to the movement of the animals, such as in a later stage of evolution was afforded by the simpler method of the jointing of the limbs. Attached to those locomotory appendages were delicately and exquisitely preserved spiral gills, and beautifully rolled scroll-like tentacles about the head. In view of the fact that, as based on modern radio-active methods of estimating geological time, no less than 500,000,000 years had elapsed since Cambrian time, to which the fossils recorded by Mr. C. T. Madigan belonged, and that the Brighton and Reynella limestones were considerably older, it seemed little short of miraculous that those marine animals had been preserved so as to show, in so exquisite a state of preservation, such very delicate and minute structures. There could be little doubt that in the near future the Adelaide, Flinders and Mount Lofty Ranges area would be looked upon as a world treasure house, full of gems without price for those who sought to follow life on the earth to its early beginnings. These newly discovered fossils from Adelaide showed that still, as we traced life backward into past aeons, then, as now, life forms were full of that beauty and exquisiteness which the Great Artificer had given even to the most lowly of His creatures.

The Advertiser

ADELAIDE: FRIDAY, JUNE 8, 1928.

SIR JOHN RUSSELL ON AGRICULTURAL SCIENCE.

To have in our midst the distinguished agricultural scientist, Sir John Russell, director of the world-famous Rothamsted Agricultural Station in Hertfordshire, is a privilege, the magnitude of which will be everywhere recognised. To South Australians it is recommendation enough that he comes from Rothamsted, for it is to that home of agricultural research that, as Sir George Murray (Chancellor of the University) reminded the audience at Sir John's initial lecture, we owe the discovery of that talisman, superphosphate, which, thanks to Professor Lowrie, has done so much to unlock the riches of our soil. This premier institution of its kind is one of many examples of the devotion of a single individual to a great ideal. For Rothamsted had been in existence for several years before its public-spirited founder, Sir John Lawes, called to his counsels Dr. Joseph Gilbert, who for upwards of half a century shared his labors and with other workers gave the institution its world-wide prestige. It is always pleasing to the student of human nature to meet with such a case as that of Lawes. Inheriting as a young man a large fortune, he might easily have given himself up to the pleasures which so many in the same circumstances have found irresistible. But this was not Lawes' way. No sooner did he find himself his own master than he had a complete laboratory fitted up at Rothamsted and thenceforward devoted himself exclusively to the investigation of chemistry in its connection with agriculture and the production of meat.

There must be something fascinating in agricultural science for its pursuit to have enlisted the enthusiasm of so many able men. Though an ardent devotee, Lawes was no faddist. The greater part of his life was given to ascertaining by practical and prolonged observation the effect on the soil of different classes of manures and their effect on different soils; the point at which the outlay on certain kinds of manure ceases to be remunerative; and also what kind of soil is capable of doing without any manure at all. On his death in 1900 his fields and laboratories came into the hands of the Lawes Agricultural Trust together with a bequest of £100,000 for their maintenance; and this sum, augmented by other pecuniary assistance, has enabled the institution to continue and extend its operations. Sir John Lawes' death (he was then a baronet) was followed a year later by that of his collaborator, and since the formation of the Trust Rothamsted has had successively two directors, of whom Sir John Russell, D.Sc. (who was appointed in 1912) is the second. Sir John has expanded its operations, especially in the biological department. As to wheat-growing, what he does not know can hardly be worth knowing, for he has under his control land that has been devoted to this purpose for eighty-four consecutive years. The origin of superphosphates is an old story now, but its users will never forget their debt to Lawes, whose research began in the application of sulphuric acid to bones, from which mixture emerged what was then called superphosphate of lime. The fertiliser would have made little headway had its manufacture depended on the employment of bones, relatively scarce and dear as they were. It was the discovery that rock phosphate treated as the bones had been would produce much more cheaply the same product, that revolutionised agriculture. Innumerable experiments conducted by Sir John Russell have enormously extended the bounds of knowledge with regard to nitrogenous, phosphatic, and potassic fertilisers, and have enabled advice to be given as to those best adapted to varying soil and weather conditions.

Our farmers were perhaps a little slow in waking up to the facts on which their prosperity depended. There is probably no one of our industries that was pur-

sued so long in a careless, happy-go-lucky, unscientific fashion as agriculture. We dropped the seed into the ground and waited on the bountiful influences of air and rain and sunshine for the wished-for blessings. This beautiful trust in Nature was for a long time well rewarded, because we had a virgin soil and a liberal climate to favor us. But the outcome of leaving everything to Nature must have been apparent to the shrewder minds engaged in the industry. The patient, long-suffering soil must ultimately have refused her bounty and Nature been driven to her last revenge—barrenness. Happily science was summoned in time to avert the catastrophe; and though, as Sir George Murray says "it took the farmer forty years to realise the benefits to be derived from superphosphate," the lesson was finally mastered, and with it was acquired a new respect for scientific theory. Sir John Russell's stay in South Australia will not be so brief as to leave him with an imperfect impression of what State action and private philanthropy between them have done towards enabling the resources of the country to be fully utilised. Like the rest of the debt-burdened world, South Australia is under an imperative obligation to make the best use of its soil and climate; and though what has been done may represent a halting and hesitating step in comparison with what might be accomplished, Sir John Russell will have seen from the measures taken to diffuse the light that we are far from being indifferent to the claims of the science of which he is so brilliant an exponent. As evidence of this, the Chancellor of the University was able to cite the undaunted efforts of Professor Lowrie, of Roseworthy College, the research work at the Waite Institute, more particularly with regard to the mineral contents of South Australian pastures, and the progress Professor Brailsford Robertson has been making in the mastery of the problem of animal nutrition. The motherland has for some time been looking to Australia, with its immense area, as an outlet for her surplus population, and as alike a market for her commodities and a source on which she may draw for a larger supply of food-stuffs and other primary products. It behoves us, therefore, as a branch of the nation of shopkeepers to rise to the occasion as well as we can. There are problems affecting soil chemistry which have yet to be solved here as in other parts of the Empire if the land is to be susceptible of a higher degree of cultivation, and valuable results are promised from the Central Soil Bureau if it is proposed to establish for the interchange of information concerning the troubles arising from the inadequacy of plant food, lack of water, and excessive acidity or alkalinity or salt. It takes an expert to realise the many ways in which science has justified itself, but everyone can grasp what is meant by the claim advanced in its name by Sir John Russell of having dissipated the fear of world-starvation adumbrated two decades ago by the late Sir William Crookes. The ninety million tons which he then thought was as much as the earth could produce in the way of wheat has long been exceeded, thanks to scientific advances, which are far as yet from having reached their potential limit. It will be a long time, therefore, before the world is troubled with the danger of its population outgrowing their means of subsistence.