Adv. 28.8.25.

# VALUE OF SCIENCE.

## PROFESSOR LAMB'S ADDRESS.

**Professor Lamb claims that science tends to increase the intellectual, the material, and even the aesthetic possessions of the world.**

LONDON, August 26.

In his presidential address at the meeting of the British Association for the Advancement of Science to-day at Southampton, Professor Horace Lamb (formerly of Adelaide, and now of Cambridge University) discussed the nature and purpose of science.

He said the quarters exhibiting suspicion and dislike of science were now political rather than ecclesiastical. The habits of sober and accurate analysis promoted by science were not always favorable to social and economic theories resting mainly on an emotional basis.

Referring to the disappointment and disillusionment sometimes expressed because science had not produced a new era of prosperity and international reconciliation, Professor Lamb said science was unable to improve human nature, but he claimed that science tended to increase the intellectual, the material, and even the aesthetic possessions of the world.

Dealing particularly with geo-physics, he expressed regret that the observational side had been neglected in England. He paid a tribute to the geodetic and the gravitational work done very efficiently by the survey of India. He alluded to the institution of a readership in geodesy at Cambridge University, whereby he hoped a gravity survey of the British Isles would be initiated, while, with the co-operation of the navy, he hoped a gravity chart of the world, hitherto almost a blank as regards the ocean, might be gradually filled in. He regretted the present inactivity in respect to the interpretation of seismic records.—Reuter.

Adv. 2.9.25.

## *SIR ERNEST RUTHERFORD.*

Adelaide will be honored to-day by the presence of one of the most eminent of living physicists. Sir Ernest Rutherford's researches into the structure of the atom are known all over the world, and in our own part of it they acquire an extraneous interest from the fact of the savant having been born no farther away than New Zealand. The number of Australasians who in recent years have found a place in the most august of scientific bodies has been a subject of frequent remark. Sir Ernest Rutherford is only one example out of many. One might instance Professor Grafton Elliot Smith, the far-famed anthropologist, who was in Australia not long ago, and of whom the senior State of the Commonwealth boasts as the product of its public school system even when it was less advanced than now. Professor William Lawrence Bragg, collaborator in X-ray and other researches with a brilliant father, is another typical Australian, having been born and received his training in our own city. And if it comes to Australasians who have won distinction in the schools at home and abroad, we have more than a sufficient number to disprove any talk of degeneracy arising from climatic or other causes. All these are cases of exceptional men, but even exceptional men often owe a great deal to preliminary training; and the educational facilities provided on this side of the world cannot be altogether faulty when we have such intellectual results to show for them.

Before entering the Cavendish Laboratory for Experimental Physics at Cambridge, Sir Ernest Rutherford was well equipped by his academic career in his own Dominion to take advantage of the unique opportunities it provided for research. He was fortunate in having as tutor Sir J. J. Thomson, then director of the Cavendish Laboratory, to whose discoveries in electricity and magnetism the science of radio-activity owes so heavy a debt. It was in later years, as incumbent of the Chair of Physics at Montreal, that, in collaboration with Professor Soddy, he propounded the explanation of the changes undergone by radio-active substances which, together

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with his own discovery of the alpha rays, at once placed him in the front rank of physicists, and led, after some years of service in the Manchester University, to his appointment in 1919 to the directorship of the Cavendish Laboratory which, as already stated, he had entered as a student. The stir made by Rutherford's contribution to the science of radio-activity is a measure of its importance, and of the magnitude of the mystery which it solved. Until the results were published of his years of investigation and theorising, physicists were at a loss to account for the potency of the heat generated by radium. So intense is this heat that the eyesight would be destroyed, and life itself might be imperilled, in a room in which a pound of the material was stored, so scorching are the rays emitted; and a small fragment enclosed in a tube in the waistcoat pocket will blister and burn the skin. Yet, in spite of its tremendous energy and its prodigal expenditure of it, the substance sustains no ascertainable diminution in weight. This was the phenomenon for which the physicists were puzzled to account. The energy liberated was known to be many thousand times greater than that latent in any explosive or associated with any other chemical action. One theorist suggested that instead of being latent in the substance, the energy might be subtracted from the surrounding atmosphere, so that radium might be perpetually receiving as much heat as it gave out. Then came Rutherford's ingenious explanation. Accepting the prevalent view of the structure of the atom, according to which the particle is not, as Dalton supposed, indivisible, but a collection of electrical entities, called by Sir J. J. Thomson (one of the earliest investigators in this field) "corpuscles," and by Crookes "electrons" or carriers of electricity, Rutherford supposed the electrons in the radium atom to be travelling at a speed so enormous that the friction generated set up a heat far transcending that to be found in any other kind of atom. The number of electrons varies greatly in different atoms. Where the number is almost incalculably great the danger of collision is proportionate, there being, of course, less room for them to move without colliding, and it only requires the velocity to be great enough for disaster to follow.

These conditions are present in the radium atom, and the disaster is represented by the rupture of the atom itself. In other words, the atom is resolved into its original elements, some of which escape in the form of rays, and others in the form of a gas, while others, again, do not leave the radium, but remain to form a new system, to be again shattered in due time. Although the liberation of the energy of a disintegrated atom is a very slow process (like the radiation of the heat of the sun into space), the stream of fragments it expels from its mass is far indeed from being infinite. According to Thomson, "thousands of years would probably elapse before the weight of matter expelled from a small piece of radium could be detected in the balance." Still, there is an end to this energy, for there is nothing in radium to contravene the recognised law that governs the behaviour of matter. The breaking up of an atom is a spontaneous process, and only a few atoms are seen to exhibit this instability; most, as Lodge says, behaving as though their stability were permanent, though, he adds, not one of them is of this character. Birth, culmination, and decay constitute the law of all phenomena, from a plant to an animal, from an Empire to a sun, and the atom is no exception to the rule. It is a tempting speculation to consider the possibility of abbreviating the life of the atom; in other words of liberating at a stroke the energy confined in it and rendering it available for human purposes. When the instability of the particle was first demonstrated physicists themselves revelled in dreams of so hastening the radio-active processes of uranium or thorium as to reduce the period of disintegration from thousands of millions of years to a few days. Addressing the British Association at its Liverpool meeting Sir Ernest Rutherford admitted that an incalculable source of energy might thereby be obtained. But he added that the most powerful laboratory agencies had failed to break up or explode the atom, and that with the increased knowledge of atomic structure now available physicists spoke with

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much more diffidence about the possibility of the feat ever being achieved by science than they did a decade ago. Still, science is in its infancy, and in our own day we have seen problems once deemed insoluble yielding to laborious investigation. Who shall say what is impossible to those magicians of science who, with Rutherford, have taken us out of the region of matter into that of energy, and, with Lodge, from the region of energy to that of mind? We can but hope that before the savants make themselves masters of the whirling forces of the atom the moral evolution of the race will have so far progressed that no maleficent use will be made of the now dormant potencies. Frankenstein could create a monster; the difficulty was to control it. And when science tells us, as Thomson told the British Association at Winnipeg some years ago, that even ordinary matter contains stores of energy vast enough if they were exploded all together to turn the earth into a gaseous vapor, we have to ask ourselves whether it will ever be safe to trust poor human nature with that power of control over atomic forces which is now exercised by the watchful electrons charged with negative electricity.

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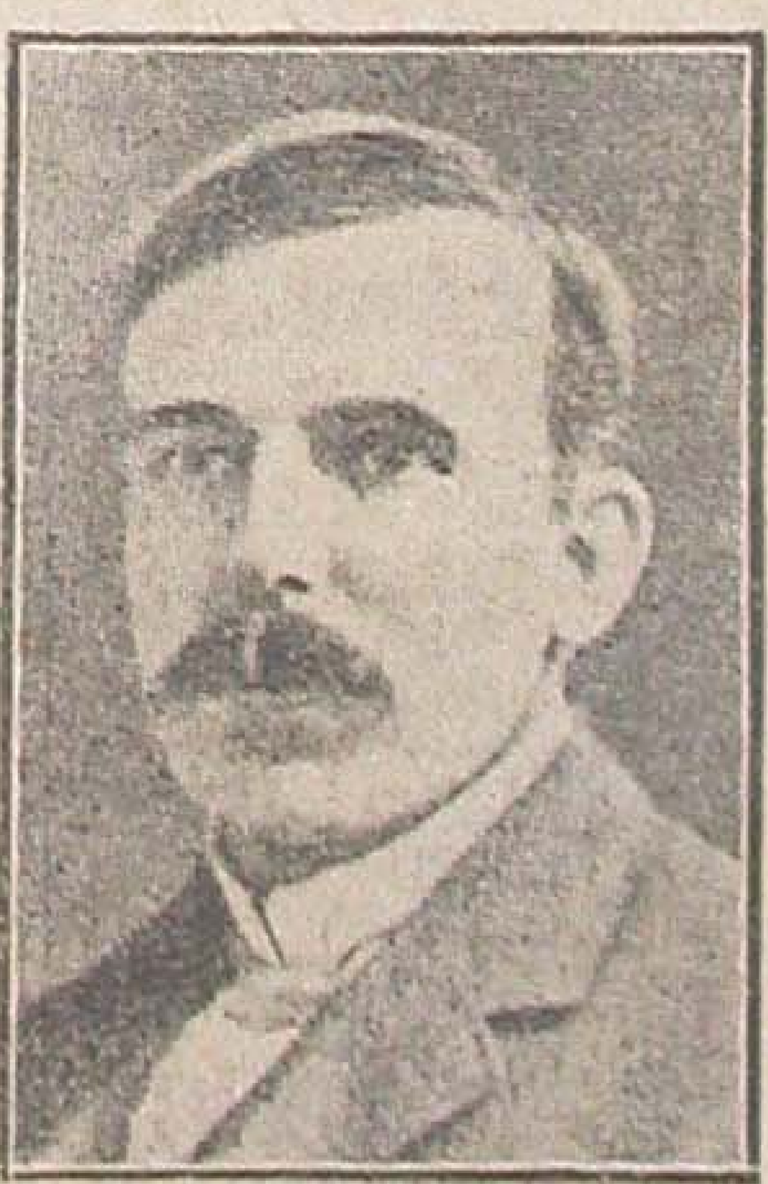
# A MASTER SCIENTIST.

## SIR ERNEST RUTHERFORD'S VISIT.

## A UNIVERSITY LECTURING TOUR.

**Sir Ernest Rutherford, who is recognised as Great Britain's master scientist, will arrive to-morrow on a lecturing tour under the auspices of the Australian Universities.**

The distinguished British scientist, Sir Ernest Rutherford, F.R.S., who is a native of New Zealand, will arrive in Adelaide by the Ascanius to-morrow, on a lecturing tour, organised by the universities of Australia, and on Thursday and Friday evenings he will deliver lectures on the structure of the atom in the Brookman Hall, School of Mines. This scientist, whose wonderful pronouncements are received with confidence throughout the scientific world, was born at Nelson, New Zealand, in 1871, and was educated at the Nelson College, where he gained a scholarship which carried him to the Cambridge University. There he obtained his



Sir Ernest Rutherford.

B.A. degree in 1892, and his M.A. in the following year, with honors in mathematics and physics. In the latter branch of science Sir Ernest Rutherford has, by his valuable contributions, attained world-wide fame. In New Zealand he made some of the earliest experiments in wireless telegraphy, and upon going to the Cavendish Laboratories for Experimental Physics at Cambridge, of which he is the director, he continued these investigations, and was one of the first to send signals over a distance. When he entered Cambridge in 1895 the study of physics was on the eve of great developments. Rontgen rays were then discovered, and in France work was in progress which led to the announcement in 1898 by Monsieur and Madame Curie of their discovery of radium. At that time Sir J. J. Thom-

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son was director of the Cavendish Laboratory, and Sir Ernest Rutherford was associated with a coterie of brilliant physicists, who have notably distinguished themselves in modern physics, particularly in respect to its additions to human knowledge of the structure of the atom, and of the nature of light and other radiations. After spending some years at the Cavendish Laboratory, Sir Ernest Rutherford was appointed to the chair of physics at Montreal, where, in collaboration with Professor Soddy, he put forward an explanation of the changes which radium and other radio-active elements undergo. About the same time he established the nature of the alpha-rays which radio-active substances emit, and which he has since shown are a most wonderful means for investigating the structure of the atom.

### Structure of the Atom.

Returning to England, Sir Ernest Rutherford proved himself to have the power of inspiring others to make great discoveries. At Manchester he greatly influenced the investigations of two young men of genius—Moseley, an Englishman, who was killed on Gallipoli; and Bohr, a Dane. Moseley, in a classical investigation of the X-ray spectra, assisted to lay foundations upon which present conceptions of the structure of the atom are based. This was that all the elements have a similar electrical structure, consisting of a central positively charged nucleus, which increases by a constant amount in passing from one element to the next. Sir Ernest Rutherford had put forward, as a result of a study of the behaviour of the alpha-ray in its passage through matter, the view that atoms have a positively charged nucleus, and Bohr extended this conception of the structure of the atom by giving an account of the behaviour of the electrons which describe orbits round the nucleus. Bohr's theory has had a great influence on physics in recent years.

The Cavendish Laboratory has long been recognised as a centre of physical discovery and during the war, when Sir J. J. Thomson became master of Trinity College, Cambridge, Sir Ernest Rutherford succeeded him as Director. There the structure of the atom is being carried on in new directions. Some workers there have recently measured the velocity with which electrons are ejected from atoms under various kinds of stimuli, thus enabling the details of Bohr's theory to be worked out, and light to be thrown on the structure of the nucleus. It is clear that British scientists are holding their own in physics, and one of the foremost among them is a New Zealander. It may be mentioned that when Sir Ernest Rutherford took up the professorship of physics at Manchester, in 1907, students from America, France, Germany, Denmark, Russia, Italy, and Japan flocked to his laboratory. It was at Manchester that this distinguished scientist proved that the atom, instead of being something very solid, must have a very open structure, and he suggested that it must resemble a small planetary system, with a positively charged "sun" in the middle, with electrons, like tiny planets circulating round it. He has recently had the high distinction of receiving the Imperial Order of Merit.

Adv. 2.9.25

Mr. A. C. Garnett, who is a lecturer on psychology to the University tutorial classes in connection with the Workers' Educational Association, has recently had the degree of doctor of letters conferred on him by the University of Melbourne. He received his early education at Port Pirie, and later proceeded to the College of the Bible at Glen Iris (Victoria), to study for the Church of Christ ministry. While there he displayed such promise as a psychological student that he was encouraged to continue his studies after he had entered the ministry. He carried out the duties of pastor of the Northcote Church of Christ, Victoria, while studying for the degree of master of arts. After a short visit to China on missionary work, which he was compelled to abandon for family reasons, he came to Adelaide, and for about two years had charge of the Grote-street Church of Christ. Later he took charge of the Church of Christ at Enfield, at the same time delivering lectures to the Workers' Educational Association classes. Since the beginning of the year, however, he has been engaged as a full-time lecturer by the University, taking four psychology classes (including one at Murray Bridge), and one philosophy class every week. He is the son of Mr. F. Garnett, Chief Protector of Aborigines in South Australia.