

ORIGINAL RESEARCH.

ADELAIDE UNIVERSITY  
PROFESSORS.

WHAT THEY HAVE DONE.

A few days ago there appeared in The Register a copy of a letter written by Professor Bragg to the Chancellor of the Adelaide University (Sir Samuel Way) in response to a series of questions propounded by the latter. The communication, which attracted considerable attention, contained, among many striking comments, the following:—"It is only fair to add that this University of Adelaide has fully maintained the traditional university attitude toward research. Every professor has made important contributions to human knowledge." As soon as an opportunity offered, a reporter waited upon Professor Bragg at the Grange, where he is spending the vacation, pointed out that South Australians would be glad to learn something of the actual research work which has been performed by the members of the University staff, and suggested that he should amplify the remark made in his letter. With that unflinching courtesy which at all times distinguishes him, the genial authority on radio-activity readily accepted the invitation. He said:—

—A Justification.—

"You ask me, in effect, to justify the statement which you have quoted. I will gladly do as you wish; for, after all, the people of South Australia have a right to require from the University of Adelaide, to the maintenance of which they subscribe, an account of the extent to which their University has attained to one of the noblest of university ideals—that of contributing to the thought and the knowledge of the world. My one regret is that I can only speak with any completeness of the work which has been done in those subjects with which I am myself connected. At this time of the year my colleagues are mostly out of my reach; and it must be remembered that whatever I can say about their work would have been much more ample and correct if I had had opportunities of communicating with them. From the very beginning the University of Adelaide has been known in the scientific world. Of all the textbooks on hydrodynamics, the best is that of Professor Lamb, the first preface of which was dated from Adelaide. This subject deals with the motions of masses of water, with waves and tides, and the movements of ships in the sea, and numbers of other important problems. When I was a Cambridge student, and glanced often at the title page of this book, I used to be quite fascinated by the 'Adelaide, South Australia,' which was printed thereon. I wondered what sort of place it was, what sort of conditions they were under which the book was written, and whether there would ever be any chance of my obtaining a position like that of Professor Lamb. Perhaps this was the reason why, when I was given only a few minutes to decide whether I would apply for his vacant chair, I walked off to the telegraph office without hesitation. The 'Hydro-dynamics' is a much more comprehensive book now than it was then, but its foundations were laid in this State. Some years ago Mr. R. W. Chapman, then mathematical lecturer here, carried out a work which also dealt with tides. Aided by Capt. Inglis, of Port Adelaide, he investigated the movements of the water on this coast, and in particular the strange phenomenon of the 'dodging tide.' The laborious analysis was successfully completed, and the results are of considerable practical value. An exceedingly interesting addition was made to the general knowledge of tidal effects, and the work was well received by expert judges—e.g., by Darwin, of Cambridge, with whom Mr. Chapman and Capt. Inglis were in communication. A number of other scientific contributions have been made by Mr. Chapman since that time. These treat principally with problems of mining engineering, but I do not know the details sufficiently well to describe them. Yet I may say, I trust without any breach of confidence, that he is at present engaged in two labours which are sure to lead to issues of value; one, the investigation, theoretical and practical, of the strength of wire ropes for hauling purposes, the other the writing of a textbook containing the results of his experience as a teacher and as a mining expert.

—Radio-Activity.—

"In regard to my own contributions to mathematics and physics, they have been, for the most part, concerned with the new subject of radio-activity. During 1903 I was engaged in a comparison of the results then known with each other, hoping to find the material for a suitable address to section A of the Science Association which was to meet in Dunedin in January, 1904. I found that a number of strange effects could be correlated by the adoption of a simple but rather startling hypothesis. This was that the so-called 'a' (alpha) rays were to be treated as projectiles shot off from the radium atoms with tremendous speed, penetrating all other atoms which they encountered, and flying over a definite 'range.' Hitherto all writers, though knowing them to be material, had not taken this simple view. The idea of a 'range' was quite new, and the conception that any atom could be traversed by an alpha particle or helium atom, as it was supposed to be, would have horrified any writer of 20 years ago. It was one of the incontrovertible principles of older physics that two atoms could not occupy the same space at the same time. Yet I felt sufficiently sure of my views to include them in the Dunedin address. On returning to Adelaide I learned that Mr. Barr Smith had given £500 to the University wherewith to buy scientific apparatus. With my share I obtained some radium and other requisites for an experimental test of the new ideas. The results were satisfactory beyond all expectation. Not only was my original position confirmed, but a number of other new and important truths came to light. To attempt a description of them, however, would be to write a scientific paper. Even yet I am far from the completion of all the investigations to which these first experiments led the way. Indeed, the lode is widening as I go deeper. There were some extremely anxious and impatient months until news began to come in of the confirmation of the results by other workers. But within a year or two they were completely accepted, and had formed the starting point of many other investigations. In particular Professor Rutherford, of Montreal, had used them as the basis of his famous experiments on the mass and the electrical charge of the alpha particle. Dr. Hahn, now of Berlin, had employed my methods in the investigation of the radioactive properties of thorium. Dr. Levin, of Gottingen, in examining polonium; Dr. Godlewski, of Cracow, in his work on actinium; McClung, of Montreal; Bronson, of Yale; Adams, of New York; and Kucera, of Prague, had confirmed the results, or used the methods in various ways. Our own student, Mr. Kleeman, went home to Cambridge, and branched off on lines of his own. He has since published a number of valuable papers. Since the original discoveries the work has gone on satisfactorily, so that two or three papers have issued from this University each year, giving the results obtained up to date; and I trust there may be more to follow. In accordance with the courteous procedure adopted by scientific workers, it is recognised that the University of Adelaide is working in certain directions, and the field is left fairly clear. One of the most distinguished physicists of the day actually wrote to me, with a kindness impossible to forget, asking what particular lines I proposed to follow, as he would endeavour to direct the energies of his research students into other channels. I could only answer that this University would not stand in any one's way, and proffered to take its chance. This is somewhat egotistical, I fear, but I cannot help making it so. For I want you to understand that, as regards mathematics and physics alone, the statement in my letter is justified. Thousands of students read Professor Lamb's book, and with respect to radio-activity, which is so earnestly studied on account of the revelations which it is making relative to the minute yet all-powerful forces of the atoms, every writer and every student must take prime account of the work done here, since it is fundamental to the subject. I am speaking as a South Australian to

South Australians. Before leaving my own department, I must refer to the work of Mr. Madsen, who has just won the Doctor of Science degree on the merit of a research on a subject also connected with radio-activity.

—Natural History, Geology, Mineralogy, and Biology.—

"When I come to speak of the work done in other departments of the University, I am conscious of a lamentable incapacity to do it justice; but I will do what I can. I have only to mention natural history, and it will be at once remembered how much original work has been performed in this State by members of the University staff. A large proportion of what is known relative to the botany, the conchology, and the geology of our country is due to the late Professor Tate. Such knowledge, of course, has a use which is not merely local, but is part of a world scheme. Our present lecturer (Mr. Howchin) has made a number of important contributions to the geology of South Australia. His work on the Mount Lofty ranges is especially well known, and his discoveries and theories concerning glacial epochs in this State have interested geologists greatly. Professor David told me that they were eagerly discussed at the recent international congress of geologists in Mexico. In the important subject of mineralogy, which is of such special importance to Australia, much work has been done by Dr. Woodnough and by Mr. Mawson, who was recently chosen to be a member of the antarctic expedition. Perhaps I can best give an idea of the value of the contribution made by the University to biological science by recalling the fact that Dr. Stirling's work has been so widely recognised and so highly valued as to earn for him the Fellowship of the Royal Society. I dare not venture into many details, but there are some portions of his work to which I may allude in safety. One of these is the discovery of the diprotodon. From the remains discovered in Lake Callabonna, Dr. Stirling and his assistants have, with infinite skill and patience, pieced together, little by little, the strange but deeply interesting form that now stands in the Museum. The English scientific papers have recently published drawings of the skeleton and the probable appearance of the complete animal. Dr. Stirling also named and was the first to describe the curious marsupial mole, *Notoryctes typhlops*. He also named and described, as far as possible, the Callabonna fossil bird *Genyornis Newtoni*; and in many other ways he has contributed to the paleontology of South Australia. He was a member of the Horn scientific expedition, and wrote the report on anthropology, which brought to light several new features relative to the aborigines of South Australia. Dr. Stirling has also contributed largely to medical science. He has published several papers on hydatids, and was joint author with Dr. Verco of the article on hydatid disease in 'Allbutt's System of Medicine,' a publication in which there was a large amount of original research. Professor Watson has been responsible for a considerable quantity of research work, and is a well-known authority in Australia. It is a matter of keen regret to his friends and a loss to medical science that he has not been induced to write all that he has learnt.

—Chemistry and Literature.—

"Of the work of the chemical laboratories I am so little qualified to speak that I can only call attention to the many papers contributed by Dr. Rennie to the proceedings of our Royal Society and of the Science Association. Dr. Rennie and his assistant, Dr. Cooke, who obtained his degree on the merits of original research, have been good enough to join me in a special investigation of the effects of the alpha rays on pure gases. Our one trouble is that it moves so slowly, since the heavy pressure of teaching work leaves little leisure to the lecturers on the chemistry side. In the literary departments of the University there has been constant activity, particularly in recent years. Our former professor of law, Dr. Salmund, published a fine book on jurisprudence a few years ago. If I remember rightly it was not only accepted at once as authoritative by leading lawyers in England, but was chosen as a textbook by some of the principal universities. So also his book on torts was well received. I notice that on Thursday Mr. Justice Gordon made a highly appreciative reference to it in Court. Coming to the doings of the present members of our staff, within the past two years three big books have been published on the literary side, viz., 'The Austrian Theory of Law,' by Professor Jethro Brown, in 1906; 'The Structure and Growth of the Mind,' by Professor Mitchell; and 'Sir George Grey,' by Professor Henderson last year. If you apply to the authors when they return next month they may let you have the reviews of their books; but what I had in mind when I wrote my letter to the Chancellor was the originality of their work. I have no view of Professor Brown's book to quote from, but you will see in it an advertisement of his previous book, 'The New Democracy,' with this quotation from a reviewer in The Outlook:—"There is not a politician in England who would not be wiser for reading it." The advertisement of Professor Mitchell's book has this quotation