

The Inauguration of the Institute of Physics.

THE inaugural meeting of the new Institute of Physics was held on Wednesday, April 27, in the rooms of the Institution of Civil Engineers. The creation of a new institute was first suggested about four years ago, and in the interim the scheme has been most carefully deliberated over and developed, and it received the sanction of the Board of Trade in November of last year. The object of the institute is specially to look after the professional interests of physicists, to set up and require from its members a high standard of professional conduct, and in other ways to forward the development of physics. It is thus intended to play the same part for physics that the Institute of Chemistry and various engineering bodies do for the cognate subjects. Its founders look forward to the foundation of a central building in which the various societies that participate with it can be housed and their libraries assembled so as to become more accessible than at present. It is not likely that this part of the scheme can come to fruition at any early date; the possibility may, however, rapidly develop now that the public has been called in to inaugurate the institute.

The chair at the meeting was taken by the president, Sir Richard Glazebrook, who in opening it outlined the aims of the promoters. He then called upon Sir J. J. Thomson to address the assembly. Sir Joseph, speaking on behalf of those interested in physics, pointed out that the institute had become necessary on account of the increased number of men and women who now earn their livelihood in one capacity or another in connection with physics. This necessity is evidenced by the fact that in the first year of its existence it has secured 300 members out of the 800 or 1000 persons that are available even when school-teachers are counted. This support is sufficient to justify the recognition of physics as an independent profession. The institute is intended to act as a bond of union. Chemistry (a branch of physics) has long been recognised professionally. The need for a similar recognition of physics has become urgent owing to the establishment of numerous research institutions, especially in connection with industry.

Sir Joseph Thomson indicated that the connection of physics with its applications was accidental, although there have been great developments on the material side. His recollection went back to fifty years ago; the laboratories in existence then were few and sparsely populated. The Cavendish Laboratory had been decided upon, but had not been started. The estimated cost of it was only 6300*l.*, though this estimate was, in fact, exceeded. It was then a reckless and a dangerous thing to make physics the business of one's life, and, in consequence, this course was confined to enthusiasts whose delight in research more than compensated for the deficiencies in their salaries. There were probably fewer than a hundred physicists in all, but the list included such names as Kelvin, Stokes, Maxwell, Crookes, and Osborne Reynolds. Yet work in a laboratory in those days had some advantages. There were fewer students, even though there was less apparatus; now there are twelve induction coils and twenty students wanting them. In these circumstances the director of a laboratory has to exercise the functions of a league of nations in the maintenance of peace. At that time also committees were sporadic rather than chronic, as at present.

The rapid growth of laboratories connected with

various industries and with schools and new universities has created a demand for men which exceeds the supply. In Sir Joseph Thomson's opinion, physics now offers to any competent man a livelihood, though there is small hope of its providing him with a fortune.

There is an increased belief in the use of physics in industry. Sir Joseph Thomson suggested that though it is undoubtedly a good thing to have a physicist in the laboratory, there is a need also for one in the works itself where articles are manufactured in large quantities. This need he illustrated by the case of an article in general use for which the English design is better than the German, and the article itself is superior when it is made in the old-fashioned way by skilled workmen; but when it is manufactured by automatic processes on a large scale (*i.e.* by mass production) the article is very inferior to the German.

Sir Joseph Thomson considers that the scarcity of physicists is likely to continue, for the supply is not adequate to the demand. The number of first- and second-class honours men in 1916 were fewer than five hundred when engineers, chemists, and the higher type of medical men are all included in the estimate. The needs of schools had to be supplied out of this number. It is difficult to see how the insufficiency of eligible men is to be rectified. Each man must undergo at least one year's training in research in order to develop his character, to increase his independence of thought, and to develop his resource, critical power, and enthusiasm—to raise him, in fact, from intellectual adolescence to intellectual manhood. But this means another year at college, involving additional expense that must be faced. This expense is met in part by fellowships and post-graduate studentships, which, however, are insufficient. But lately a Committee of the Department of Scientific and Industrial Research has awarded grants to students in training. Thirty-seven such grants have been awarded by the Committee.

Research is also expensive for the university; the present increase in cost is horrible. Research is as much a part of the work of the university as education. Much more money is now available than formerly, and we should be grateful to a Government for what it does in this direction.

Sir Joseph Thomson directed attention to the vast increase in the amount of work that is now done. The number of papers that were abstracted in the *Beiblätter* in 1873 was 400 for the whole world; in 1913 this was increased to 2700. It may be a question whether pioneer work has increased in the same proportion as routine work, but still it has certainly been accelerated to a very great extent. In examining discoveries the physicist requires, not that truth shall be beauty, but that it shall be in accordance with the laws of Nature. To judge this, a period of suspense is needed; this period is shortened when the number of laboratories and workers is large. It results that even pioneer work has been helped by the appliances which are now available.

In conclusion, Sir Joseph Thomson emphasised that, together with all the developments taking place in response to the stimulus of industry, he saw no disposition to undervalue research undertaken without any thought of industrial applications. Scholarships had been given by the Committee already mentioned for the most abstract researches in pure mathematics. The intellectual harvest is even a higher reward than

increased comfort and convenience. He congratulated the Institute of Physics in being formed to aid intellectual development.

Mr. A. J. Balfour, who as Lord President of the Council is concerned with the Department of Scientific and Industrial Research, was then called upon to extend a welcome to the institute. He expressed his deep gratification at being present. He represented the outside public who ought to have a deep interest in what was being done in the development of pure science and in industry. He was profoundly surprised that there was not hitherto an Institute of Physics. Physics is one of the most fundamental of all the sciences. That lacuna is now filled, and he rejoiced that it had begun under such favourable auspices. Reference had been made to the Department of Scientific and Industrial Research. The public knew little about its work—the public very seldom does know about the things which most deeply concern it. He confessed that when he saw great industrial disputes going on about the distribution of the results of industry he could not help thinking, "Why do not you devote half the energy and half the amount of money involved to increasing the power of man over Nature, which would increase the share and increase the total result to be divided among the members of the community, instead of devoting your energies to saying how the relatively insignificant amount we now produce is to be divided among the producers?" Mr. Balfour's memory went back to his Cambridge days and to the great Cambridge physicists who all in their several ways had made advances in physics which have changed our conception of the structure of the universe and increased our power of turning it to practical account. Mr. Balfour did not believe that mere expenditure of money, the mere growth of laboratories, or the mere multiplicity of students was going to produce a larger crop of men of genius. Genius comes of itself; no system of education yet discovered has been able to turn it out. The spirit bloweth where it listeth, and no organisation will increase the number of men at the very summit of the profession. He did not for a moment wish it to be thought that this remark settled the whole question. A large amount of work which does not in itself bring to maturity a great discovery is required if great discoveries are to be made, and this work can be increased by organisa-

tion and by the expenditure of money. The work that the Advisory Council has done in providing opportunities for research deserved all the praise which Sir J. J. Thomson had given to it. Unfortunately, the present impoverished state of the country has compelled a reluctant Treasury to cut down the sum at their disposal. No money gives, not only a greater spiritual return, but also a greater pecuniary return than the money devoted to research. It is impossible to carry on without more assistance than an impoverished State can afford or wealthy men seem inclined to contribute. Apparently these men do not realise what they might do.

Mr. Balfour said he was often surprised that the imagination of our great magnates was not stimulated by the idea that they could add to the wealth of the whole world by encouraging industrial research. There was nothing narrow about the results of an increase in physical knowledge. What is discovered in Cambridge or Paris or Japan is a gift to mankind. When he reflected, as he thought political economists were slow to reflect, on the prodigious changes which are made by discovery in the lot of mankind he was surprised at the lack of the spirit of liberality, at the imperfect realisation of the actual facts of the case, and at the fatal desire to see an immediate return. Discovery, however, lurks undeveloped for a generation; but the life of nations is a long life, and anything that adds to a knowledge of the physical world must, either sooner or later, in our own time or in that of our remote descendants, do something material for the life of mankind. The hope he had for the world was that by the growth of science and invention, instead of discomfort, comfort and leisure would be given to the community—at least, if the people learn how to use their leisure. That was the idea based upon the work of men who were engaged, as those present were engaged, in probing the secrets of Nature. If, as he believed, the institute they were inaugurating was going to assist in that great work, they might regard the day of this meeting as a red-letter day in the history of British science.

Votes of thanks were proposed by Sir W. H. Bragg, Sir Robert Hadfield, and Prof. C. H. Lees.

All information concerning the institute can be obtained from the Secretaries, 10 Essex Street, Strand, W.C.2.

The British Science Guild.

SCIENTIFIC DEVELOPMENT AND WORLD-WELFARE.

GR^{EAT} success attended the annual dinner of the British Science Guild, which was held at the Hotel Cecil on Tuesday, May 3, Lord Montagu of Beaulieu, president of the Guild, being in the chair. There was eloquent acknowledgment of the great part science has played in the country's progress, and keen insistence on the imperative need of its wider application to the stupendous problems of the future. The president, unfortunately, was suffering from the effects of a severe attack of laryngitis, and, although this affected the wonted vigour of his utterance, it is scarcely necessary to add that it did not lessen the value of his weighty observations.

After the loyal toasts had been duly honoured, the president, in proposing "Science and the Empire," said he thought it was quite clear that in whatever direction we looked, science, moderation, and balance of mind were wanted all over the world to-day more

than ever before. We had appeals to reason unheeded by great masses of people, we had attempts in other directions to set scientific laws and economic laws at defiance; and when there was an organisation like the British Science Guild, which could, at any rate, attempt to sum up the balance one side and the other, it seemed to him they would do less than their duty if they did not attempt to bring their case and their teachings before the public. Their thoughts were naturally centred on the great struggle that was going on in reference to one of the vital necessities of life—coal. They could not help realising that all these struggles meant an immense waste of power and wealth to the nation. Of course, if we used coal as we should, as every scientific man in that room knew, we should never burn it, for instance, in that most cheerful thing, the open grate. We knew that the smuts which covered our clothes and our buildings in