THE IMPERIAL COLLEGE OF SCIENCE AND TECHNOLOGY

THE Imperial College of Science and Technology came into existence as the result of the federation of three colleges already established in South Kensington, namely, the Royal College of Science, the Royal School of Mines and the Central Technical College of the City and Guilds of London Institute. One of these, the Royal College of Science, and in particular its Chemistry Department, may be said to have originated in the Royal College of Chemistry which was opened in George Street, near Oxford Street, in October 1845 (see p. 524). Thus although the Imperial College of Science and Technology was not incorporated by royal charter until 1907, this year is appropriately regarded as the centenary of the College, and it was marked by a great gathering in the Albert Hall on October 26, attended by their Majesties the King and Queen, the Chancellor of the University of London (the Earl of Athlone), and the Vice-Chancellor (Prof. D. Hughes Parry).

Lord Rayleigh, chairman of the governing body of the Imperial College, surveyed briefly some of the activities of the College; his full address is printed elsewhere in this issue (p. 520). His Majesty the King, whose words were broadcast by the B.B.C., then spoke:

THE Queen and I have listened with special interest to the account which Lord Rayleigh has given of some aspects of the work of the Imperial College since its foundation. His position as a former professor and as chairman of the governing body qualify him to speak of this subject.

We have heard something of the way in which the College has carried out the intentions of those who shaped it. I speak now as its Visitor, and as its Visitor I recall the interest taken by my family, not only in the Imperial College since its foundation in the reign of King Edward VII, but in its three constituent colleges ever since the first beginnings which we celebrate this evening. The Royal College of Chemistry, at its inception in 1845, had as its president my great-grandfather, Prince Albert. He showed the same concern for the well-being of de la Beche's School of Mines, and as president of the Royal Commissioners for the Exhibition of 1851 he gained for science and the arts that great site on which, with other institutions, the Imperial College now stands.

It is, I think, now generally accepted that the idea of the great International Exhibition of 1851 was started by the Prince Consort personally, and that he took a large share in carrying it out. At the time, it had to face serious opposition in the Press, and while a Royal Commission took formal responsibility, the industrialists hung back and did not give the necessary support. The Prime Minister, Lord John Russell, had anxious consultations with his colleagues, and as a result it was arranged that Dr. Lyon Playfair should become a 'special commissioner'. The Prince had some slight acquaintance with Playfair and, before appointing him, means were found to improve it. Eventually the Exhibition was a financial success, and left a large surplus in the hands of the Commissioners, which they spent (mainly at the instance of the Prince and Dr. Playfair) in purchasing the South Kensington site.

Lyon Playfair, the Queen bids me remind you, bore the name of her family, with which he was connected through his mother, Margaret Lyon: and indeed his school holidays had been largely spent in the manse at the Queen's old home, Glamis Castle. As Lord Rayleigh remarked in passing, he heads the distinguished list of your professors of chemistry, having held that position in the Government School of Mines, prior to its incorporation with the Royal College of Chemistry.

But while it is interesting thus to recall the past, my own concern as your Visitor is with the Imperial College of to-day, and as your Visitor I take pleasure in the contributions it has made to total victory. Lord Rayleigh has touched on some in the fields of applied entomology and preventive medicine, and I am well aware that he could—had time allowed—have pointed to equally impressive victories won by your other departments in other fields. I know that the success of our D-day invasion was in great part due to engineers trained in your City and Guilds College, and I know, moreover, that Imperial College has contributed to victory not only by research but by its training of men who go from it to all parts of my Empire. Thus we have heard much, lately, of uranium; for rare materials such as this, no less than for commoner sources of power like coal and oil, the search goes on unceasingly throughout vast areas, and many of those who carry it out have received their training in the Royal School of Mines.

Justifiably we take pride in the achievements of British science and technology during these last years of total war. But with that pride is mingled apprehension, as we reflect on the ever-increasing power that science is giving to a world so prone to use power for evil ends. The atomic bomb, especially, gives food for sombre thinking: it greatly reduced the toll of human lives in the war now ended, but dare we hope that this new discovery will henceforth be controlled for the general weal? I say to you students here assembled—men and women who will soon be going out from Imperial College to your work in the world—on you and others of your generation rests a burden of responsibility greater than men of science have known before; not only to apply your knowledge and training to the service of mankind (that has been done, and well done, by generations that have preceded you), but so to act in the light of that knowledge and training that science may not again be used to destroy.

Dr. R. V. Southwell, rector of the Imperial College, made the following reply:

It falls to me to render to Your Majesty—speaking both for staff and students—most hearty thanks that you, our Visitor, have been pleased to grace this celebration with your royal presence. That Her Majesty has been pleased to accompany you completes our happiness—and gives, perhaps, especial gratification to women members of a college in which, though at all times outnumbered, they have never seen themselves as a 'forlorn hope'. Thrice within living memory we have had proof of royal interest in the growth of our constituent colleges: never before have we been favoured with the presence both of our King and Queen.

To deserve that interest and favour has been and will be our aim. Your Majesty has spoken of our history, and of famous men that we delight to praise: though that history is short by English standards, it is a history of which we think we may be proud, and we believe that its last six years—when their story can be told—will not be judged unworthy of the years that have gone before; and because we think our College has contributed not unworthily to victory in war, we are hopeful that in years to come it will further no less worthily the ends of peace. Your Majesty is served with equal loyalty in diverse ways: our best service, as we believe, will be to spend our energies in promoting science and technology by study, teaching and research.

I have not thought it would be your pleasure to hear from me the tangled story of our evolution. Reviews that aim to be exhaustive are apt as well to be exhausting, and I would beg leave now for only one remark. It is a happy feature of that story that it starts from an act of Your Majesty's great-grandfather; its second chapter now begins with this mark of Your Majesty's favour. It was the Prince Consort who in 1845 presided over the council of that College of Chemistry from which, by a line occasionally devious, the Imperial College traces its descent; it was by his personal intervention that von Hofmann was secured to be its first professor; and it was he who in 1846 laid the first stone of its new building in Oxford Street: a stone that lies here, waiting to be again embodied in our chemistry buildings. It was his unsparing effort that ensured success for the Exhibition of 1851, and thereby the means of realizing his own far-sighted vision of a great metropolitan centre for the promotion of the sciences and arts. No college owes more to its founder than ours to him.

Had his wide views been general, our problems now would be less hard; for then on his splendid ground-site, buildings would have risen in ordered sequence, and Imperial College, chartered in 1907, would have been a federation of colleges that not only were adjacent in the fields of science but lay within the same London borough. As has turned out, though two have buildings that adjoin to form a well-placed whole (and here I would recall that the first stone of each was laid by Your Majesty's grandfather, as Prince of Wales in 1884 and in 1909 as King Edward VII), the third—our Royal College of Science—has its departments scattered widely. It is our hope that not many years will pass before it too has buildings that conform with an ordered plan; but the time has still to come, and as yet we have no place where we may beg Your Majesty to lay this stone, that it may rest from its wanderings. Yet we have craved that some record may remain within our College—to be seen by those that will come after—of Your Majesty's presence with us here; and to that end we have started to prepare a book, to tell of our College's origins, of its evolution in the hundred years now ended, and of what was done to mark this first centenary. It will tell as well of the appeal that we have made in recent months for funds wherewith to foster, in the future, a fuller and more corporate college life; and it will record the names of donors who have responded. We would beg Your Majesty to append your name to this record as our Visitor, so that men of our College may read, in years to come, of the signal favour shown to us this evening: favour for which all we who are here assembled tender to Your Majesties our humble and hearty thanks.

We print below some tributes to the influence of the Imperial College, which we have received from distinguished senior members of the College:

Sir Richard Gregory, Bt., F.R.S., Editor of *Nature*, 1919–39:

When I went to South Kensington in 1886 it was as a 'science teacher in training' at the Normal School of Science, now the Huxley Building of the Royal College of Science. As the original name signifies, the school was a place for the practical training of teachers in elementary science, so that they could conduct courses of instruction in day and evening classes under the Science and Art Department. In physics, the first year's work consisted almost entirely in the making of apparatus, from thermometers to galvanometers, with the necessary linear or angular graduations for measurements with them.

To those of us who intended to become science teachers, this course was admirably suited; for in those days few ready-made physical instruments were available in any schools. Vernon Boys, who was in charge of the physical laboratories, was thus able to impress upon hundreds of students the value of making use of the simplest materials in the art of experimentation, of which he was an acknowledged master throughout his life.

This was also the spirit of the completed course of physics (Parts II and III) which I took with Prof. Boys, while he was producing the extremely fine quartz fibres for use in physical instruments. Its purpose was not so much to load the mind with facts as to stimulate independence in methods of scientific research. While I was taking the advanced course, Prof. (afterwards Sir Arthur) Rücker was appointed to the chair of physics at the College, and it was he who began the developments of the subject to the high university standard in teaching and research for which the College is now world-renowned.

As one of the oldest students of the original Normal School of Science, I welcome this opportunity of paying grateful tribute for what it did to give us sound ideas on scientific methods and meanings. We were justly proud of the school in those days of Victorian science and were given additional honour when it became the Royal College of Science, and later a constituent part of the Imperial College of Science and Technology.

After my student days, my direct association with the teaching of research was as an assistant to Sir Norman Lockyer in the Department of Astronomical

Physics and the Solar Physics Observatory. This determined my whole career, for in 1893 I became Sir Norman's assistant on the staff of *Nature* and succeeded him as Editor in 1919. With these early recollections in mind, and knowing the high scientific standing of the members of the staff of the Imperial College since my days, it would be almost a presumption for me to add my testimony to its greatness. I shall, however, always cherish in my heart the influence the College has had on my life, and entertain with pride the feeling that I once played a minor part in the work of a branch of this great centre of scientific learning and research.

DR. W. H. ECCLES, F.R.S., formerly professor of applied physics and electrical engineering, City and Guilds of London Technical College:

In the closing years of the nineteenth century, when I was admitted to the Royal College of Science, I found it a well-established and bustling community. Nearly all my fellow-students seemed to be remarkably mature and responsible beings who had already had experience in science-teaching, in works or in laboratories. They, rather than the staff, created the atmosphere of the College, which might be described as one of altruistic utilitarianism; many of them were reading science in order to assist industrial progress, each in his original walk of life. Moreover, the wise men who had made the College syllabuses had fostered this atmosphere in advance by ensuring that the instruction should be on a Baconian not a Platonic basis.

Active discussion with one's fellow-students showed that this strong orientation toward usefulness intensified the desire to read 'pure' science, a desire which merely gave expression to the spreading opinion that the important changes in industry would henceforth come from accurate measurement and the scientific method rather than from the method of the craftsman, and that new processes and even new industries could spring only from new scientific discoveries. Men like Armstrong, Judd, Huxley and Magnus had been preaching this doctrine for some twenty years, and had aided in setting up at South Kensington not only the Royal College of Science, but also the School of Mines and the Central Technical College of the City and Guilds of London Institute, all of which are now components of the Imperial College.

The gratitude I feel for my five years of opportunity at the Royal College of Science (plus occasional lectures at the Central) is deepened by the assessment I obtained there of the functions of science in the modern world. A new and broader meaning was given to the word 'technology' which, according to the dictionary, is the 'science of the industrial arts', but which now appeared to be 'science *for* the industrial arts, existing and to come'. If only there had been at the Royal College of Science research courses in the application of modern science to problems in nascent industries, I should have departed even more indebted to the College; as it was, I became one of Marconi's assistants and was launched on the practical world in that way.

Looking back at the careers of my contemporaries at the College, I find that nearly all of them took up the task of introducing science, in one way or another, into industrial affairs; I know of many who have done much for industry. May the modern Imperial College be increasingly successful in moulding such pioneers.

SIR WILLIAM JARRATT, formerly Comptroller-General of Patents, Designs and Trade Marks:

It is an appreciated privilege to be allowed to join the chorus of congratulations on the Imperial College centenary celebrations. During the years 1887–90, when I was a student at the College, the changes that were occurring included the amendment of the name and status of the Normal School of Science to the Royal College of Science, and I well remember my delight that my leaving certificate was signed by that great controversialist Huxley, the dean of the School and College, and by the founder and first editor of *Nature*, Sir Norman Lockyer, better known to readers of *Punch* as 'Noman Luckier'.

In those years research posts, either in industry or at universities, were not plentiful, and in consequence many students became science masters or took posts in the Civil Service such as Patent Office examinerships. With Government encouragement, however, the importance of research became increasingly recognized, and more students availed themselves of the opportunities to follow up scientific research. It is a matter for congratulation that during this development the College authorities have never ceased to recognize that side by side with scientific research, long-term or otherwise, the industrial development and the social conditions of Britain necessitate the application of the results of research, and that this industrial application is stimulated by a strong patent law such as we fortunately possess. The best results from scientific research can scarcely accrue to the State without some such form of guarantee to those enterprising industrialists who take financial risks in applying to industry the results of research.

As the years have passed it has been a pleasure to watch the steady development of the College and its increasing influence among the forces that have retained for Great Britain its position in the forefront of scientific progress. I desire to congratulate heartily the College authorities on their magnificent record.

CONTRIBUTIONS OF THE IMPERIAL COLLEGE TO THE CONQUEST OF DISEASE*

By the RIGHT HON. LORD RAYLEIGH, F.R.S.

ON an occasion like this it is natural to take stock of the work we and our predecessors have been able to accomplish since the first beginnings of the College a hundred years ago. But this work covers so wide a range, and so many different specialities in all branches, from physics and engineering on one side to zoology on the other, that in the course of a short address one cannot even glance at all aspects of it. Looking for some fairly comprehensive topic to which a good many of our departments had contributed, I was struck by the victories which had been won over the agencies of disease. It might appear at first sight that this was a matter of medical science, with the obvious comment that none of our departments deals with that subject. Important though the medical applications are, these investigations have been developed rather from the point of view of physics and chemistry. But there is no need to emphasize professional aspects of this kind.

* Introductory address for the Centenary Celebrations on October 25.