SCIENCE

VOL. 100 FRIDAY, JULY 14, 1944 NO. 2585

SCIENCE: A Weekly Journal devoted to the Advancement of Science. Editorial communications should be sent to the editors of SCIENCE, Lancaster, Pa. Published every Friday by

THE SCIENCE PRESS

Lancaster, Pennsylvania

Annual Subscription, $6.00 Single Copies, 15 Cts.

SCIENCE is the official organ of the American Association for the Advancement of Science. Information regarding membership in the Association may be secured from the office of the permanent secretary in the Smithsonian Institution Building, Washington 25, D. C.

ADDRESS OF THE PRESIDENT OF THE ROYAL SOCIETY[1]

By Sir HENRY DALE, G.B.E.

THE council's report, covering the period of a year ending September 30, makes mention of the scientific mission to Australia now completed by our Foreign Secretary, Sir Henry Tizard, whom we are glad to welcome on his return. The report does not extend, however, to the later departure for India of our secretary, Professor A. V. Hill. The Government of India, through the Secretary of State, asked the Royal Society to depute a distinguished scientist to visit India for consultation on scientific matters, and in particular to advise on scientific and industrial research in relation to measures of post-war reconstruction and on the coordination of such plans in India with corresponding activities here and elsewhere. We felt that our proper response to such an invitation was to let India have a man of the highest qualification from our own fellowship; and I feel confident that the fellows will approve of our action in releasing for the necessary period our senior secretary, who is also one of our research professors, to enable him to accept this important mission. I ask you, further, to send from this meeting a message to Professor Hill of good wishes for the full success of his undertaking and of hope that one of its results will be to strengthen the bonds of understanding and true comradeship between our Indian colleagues and the men of science of this country. In that connection I ought further to report to you a step which I have taken, with the approval of the council, and for which I have not found any precedent in our records. It was brought to my notice that of the six distinguished Indian men of science who are at present on the roll of our fellows only two have hitherto been able to present themselves here in order to subscribe the obligation in our charter book and to be admitted according to the statute. It seems certain that the war will create still further difficulty and delay for the attendance here of the other four, and I have accordingly

[1] Delivered at the 281st anniversary meeting, November 30, 1943.

commissioned Professor Hill to take with him to India a sheet of suitable parchment on which the fellows' obligation is inscribed, and on which signatures can be taken for eventual incorporation in the appropriate page of the charter book, unless opportunity should earlier present itself for our colleagues to visit us here and sign directly in the book itself. I have nominated Professor Hill as a vice-president and, under Statute 42, have deputed him to perform on my behalf our simple ceremony of admission. We hope that he may be able to do this at the meeting of the Indian Science Congress. It seems fitting to take this unusual opportunity thus to complete the reception into the circle of our fellowship of all the Indian men of science whom the society has elected. During Professor Hill's absence the council have invited Dr. Salisbury to act as biological secretary, and we are grateful to him for consenting to give us this help in the emergency.

Last year we devoted this anniversary meeting to a simple celebration such as the war conditions allowed of the three hundredth anniversary of the birth of Isaac Newton. We have noted with appreciative interest that other countries also marked the tercentenary year by paying homage to our Newton's memory. Particular mention is due to the commemorative meetings held, under the tremendous stress of war, not only by the Moscow Academy of Sciences, but also in a number of other scientific centers of Soviet Russia, one as far away as Novo-Sibirsk. The council's report mentions the gift which we have sent to the Soviet Academy of Sciences of Moscow, in recognition of this union with our colleagues of Soviet Russia in commemorating one of the greatest scientific achievements of all time, as in the present devotion of all that science can give, in both our countries, to the winning of this war for freedom.

Not since 1941 have I addressed the society from this chair, at its anniversary meeting, according to regular custom. Only a week after we met here in 1941, the United States of America had become our ally; less than a year later came a turning-point of the war, with Stalingrad and El Alamein; and now the end seems no longer to be in doubt, though we can not tell how long it may be in coming. I think that it is proper now to claim for science its due share in the achievements which have created the present prospect, in such vivid contrast with that of two years ago. Science in the countries of our great alliance has been devoted without reserve during these two years to the winning of the war; in this country it had been so already for the two years which preceded them. No longer are the allies straining now to overtake a lead gained by the enemy in years of stealthy preparation; the lead is rather on our side. If such things could be weighed and measured, I believe that we should find the alliance to be as far ahead of our enemy in the present volume of our united war researches, and in the brain power of the highest class now concentrated upon them, as in the more readily ponderable output of war material by our industries. And no more than our armed forces or our factories can science afford to relax or to divide its effort until the total victory has been won, without which we can have no faith in the world's future. The increasing certainty of the end, however, imposes upon us with a growing urgency the duty of looking also to that future and to the part which science must play in the nation and the world when peace returns.

From different influential quarters, as from the Parliamentary and Scientific Committee and from the Federation of British Industries, we have had important pronouncements on the urgent need for national enterprise and national spending on higher education in science and technology, and on the encouragement of research in the applications of science to industry. No body of scientific men will need arguments to convince them that we must think in such matters on a scale, not merely larger, but of a higher order than any with which we have hitherto been familiar. Before the last war Germany had led the world in such development, and between the wars we saw the United States of America move swiftly into the lead. Soviet Russia, starting with a background almost bare of such organization, and with a population largely illiterate, but with leaders having a clear vision of what science was to mean for the modern world, has now shown us what a miracle of scientific education and technical development can be wrought in a quarter of a century. Can it be doubted that another great ally, China, when freed from her long agony of war, will rapidly establish her claim also to high rank among the great nations of the world now in the making? Surely it is clear that, if we are to hold our proper place alongside such great new civilizations, built right from their foundations on modern science, we must ourselves face the problem of giving to science its proper place in the fabric of our own, without grudging or hesitation.

We of the Royal Society shall certainly give enthusiastic endorsement to any movement in that direction. From its beginning to the present day our society has always taken a lively interest in the applications of science to the general enrichment of human life, and the enlargement of the means of human happiness. One of the expressed objects of the extension, in recent years, of the number annually elected into our fellowship, was the maintenance of that interest, under the growing pressure for recognition of achievements in the more fundamental and academic ranges of science. We shall certainly welcome, then, and join

in advocating a great expansion of the nation's support of applied science, whether through the Government's research councils concerned with researches bearing on industry, medicine and agriculture, or through departments concerned with the uses of science for defensive preparations in peace time and for other national interests, or with the training of recruits for research by grants of public money to the universities. I think that it can properly be claimed that we knew here, even before the belief attracted a wider support and conviction, that a modern nation, as certainly as a well-organized modern industry, depends for success upon generous and far-seeing expenditure on scientific research and on the recruitment of first-rate ability to its service, and risks failure and disaster by parsimony and a narrow vision of its responsibilities in these directions.

The response of our national scientific reserves to the demands of war might suggest that our national deficiency hitherto has been chiefly in provision for the applications of science, and that fundamental researches in this country have lacked less in opportunity and encouragement. Here too, however, if we make comparison with other countries, I think that we shall be obliged to conclude that our discoverers, as great as any, in a world era of great discovery, have often had to do their work in spite of a paucity of equipment and accommodation which would hardly have been conceivable elsewhere. That is a difficulty and a disparity which, unless some action is taken, will certainly increase with the growing demands of fundamental researches for elaborate and costly items of equipment. Recent discoveries have made such available and necessary, at a rate which the war-time concentration of research will even have accelerated. Money to procure and to install it will become ever more essential to work on the general front of scientific progress. The society's council, having considered a memorandum by certain of its fellows on the prospective needs of fundamental researches in physics, have already appointed a committee to consider the position in detail. It seems unlikely that other departments of fundamental science, when news of this decision reaches their representatives, will wish the society to assume that the needs of physics, even if more obvious than some others, are unique in their importance and urgency. With so many interests and authorities now directly concerned for applied science, we can hardly doubt, indeed, that it is to-day a primary duty and mission of the Royal Society, as of the related societies having more special and restricted aims in science, to aid and to encourage researches which seek the advancement of knowledge without immediate reference to its use, though with a clear conviction that such progress is often a necessary condition of practical advance, or even the most direct way towards it. Care for the practical fruits of the tree of knowledge was never, indeed, so urgent as to-day; but the tree will wither unless we take care also that the roots have nourishment and room for spreading.

The mention of this last necessity brings me to the problem of the need of the Royal Society, and the more pressing need of one, at least, of our neighbor societies here, for accommodation more worthy of their national importance. The matter has more than once been under discussion in the past, and has recently been a matter of renewed concern to the society's officers. With the efficient help of our assistant secretary, Mr. Griffith Davies, we have been making, in this connection, a survey of the records dealing with the different homes of the Royal Society, from its foundation down to recent years. I think that on another occasion, when more time is available, the society may like to hear a review in greater detail of this aspect of our history, which has many points of interest. To-day the mention of a few of these must suffice.

Early in our career the interest of the Crown in the society, and perhaps a recognition of a duty to provide accommodation for it, were signified by King Charles the Second's grant of Chelsea College and its estates, as set forth in our third charter of 1669. The property proved, alas, for various reasons, to be much more a burden than an asset, and Christopher Wren, in 1682, with the council's approval and recorded gratitude, sold it back to the King for £1,300. Meanwhile an opportunity for the society to acquire a house of its own, built to the designs of Hooke and Wren, on a piece of land granted by Henry Howard from the grounds of Arundel House, had not become effective. The society, therefore, remained for fifty years from its foundation a tenant of rooms in Gresham College, till in 1710, when Isaac Newton was president, it acquired the house in Crane Court, off Fleet Street, which was its home for another sixty-eight years. In 1778, thanks to the personal interest in our affairs of King George III, the friend of our great president of those days, Sir Joseph Banks, the society was granted quarters in Somerset House. Therewith the obligation of the state to provide us with housing was for the first time definitely accepted, "in generous recognition by the Sovereign of the services which science had rendered to the state," as Banks stated in his address of 1780. The records show that the accommodation in Somerset House was regarded from the first as inadequate, even though our requirements had been reduced by the transfer of our "Repository of Rarities" to the British Museum. The rooms, on the other hand, can be seen from prints

of the period to have had a pleasant dignity, and the society remained in them for nearly eighty years.

Towards the middle of the nineteenth century, a movement arose to secure new and better accommodation for the Royal Society, and at the same time for the other principal scientific societies then existing—the Linnaean, Geological, Astronomical and Chemical Societies. As early as 1847 a memorandum was presented to our council by the newly founded Philosophical Club, a more seriously minded secession from, or rival to, the Royal Society Club of those days, formed under the same influences as those which had just carried the revised method of electing our fellows. The club presented proposals for bringing the major scientific societies under one roof, centralizing and coordinating their libraries without any attempt at fusion, providing three or four meeting rooms of different sizes, for use by the societies in common and in turn, and, in general, making better provision for the interests common to all without any impairment of their independence in rules, traditions, procedures or property. When those of us who have been considering present-day needs look at this memorandum, presented in 1852, we can not but admire the foresight and wisdom of our mid-Victorian predecessors.

An opportunity of housing the scientific societies thus, as a community of cooperative but substantially independent units, was actually presented in the same year, 1852, by the offer of accommodation in new buildings then being planned on the estate at Kensington Gore, acquired with the proceeds of the 1851 Exhibition. We begin to see the benevolent interest of the Prince Consort in our concerns. Kensington Gore, we must remember, in those days of horse transport, was still on the rural margin of the suburbs; and, in gratefully declining the offer, the Royal Society and its associates urged upon the Government the desirability of housing the scientific societies centrally and, if possible, under a single roof. The acquisition by the Government, some years earlier, of Burlington House and its grounds, extending from the Piccadilly frontage through to the street which is now named Burlington Gardens, seemed, indeed, to have provided the ideal opportunity for giving effect to such a plan. The Prince Consort, with a vision of the future meaning of science far in advance of his time, privately urged the five scientific societies to press their claim to the site. It had been understood, indeed, that the primary intention of the Government in buying Burlington House had been to provide accommodation for the learned societies. Lord Wrottesley, then our president, personally canvassed the Government, making it clear "that the desire of the chartered societies for juxtaposition and for the Burlington House site was unabated." Failing that, he indicated, they would be glad to be lodged in the buildings then occupied by the Royal Academy, that is, in what is now the National Gallery. The danger of a rival claim had become clear, and had, indeed, been mentioned to the Royal Society by the Prince Consort. It appears that the Government had already made some kind of commitment to the Royal Academy, so far as the mansion of Burlington House was concerned. It would take much too long to discuss even what is known of the rival lobbyings of those days. It must suffice for this occasion to recall the results, and to lament the fact that a magnificent opportunity was lost, which would have given London a scientific center worthy of the nation's achievement. We can not blame our predecessors, who probably did all that was possible; nor can we grudge their success to our friends of the Royal Academy, who are in no way to blame for taking what was offered to them. If the Government, indeed, had then used Burlington House and its grounds to discharge only these two, of the obligations to which they were to some degree committed, the needs both of the scientific societies and of the Royal Academy could still have been handsomely met, and adequate scope for future development could have been insured to both. The mansion itself with the wings of this front courtyard, already scheduled for rebuilding, could, for example, have been allotted to one, while the other of the two claimants could have had a new building, with frontage at the north end of the gardens, and ample space for extension southwards over them, to meet increasing needs and new developments. The Government, however, used Burlington House first to satisfy a third obligation which it had accepted, to house the University of London, then only a degree-giving body requiring space chiefly for the periodical examination of large numbers of candidates. Then in 1858, the continued pressure of the scientific societies and the Government's own desire to recover the rooms in Somerset House, led them to offer the use of Burlington House to the Royal Society, subject to the condition that for the time, and pending rebuilding on the sites round this courtyard, the Linnaean and Chemical Societies should be accommodated with us in the mansion, and that the University of London should still be able to use the large rooms in it for examinations. It is curious to reflect that this temporary arrangement gave to the Royal Society and its associates their only opportunity to this day, even to share the use of a room suitable for a meeting of more than very modest dimensions.

In old Burlington House, then, we were established, and were to remain there with the Chemical and Lin-

naean Societies for some fifteen years; and an appearance of stability had at first been given to our occupancy by the mention of plans to build a new examination hall for the University of London on the western side of this quadrangle, and to allow the Royal Society to use this also for large meetings and for its gallery of portraits. Two later developments, however, dispelled any such hopes. In 1867 evidence came to the society, first through a statement in *The Times*, that the Government had decided, after all, to give the Royal Academy a permanent lease of Burlington House and the right to extend northwards by building over its gardens. At about the same time, and presumably in fulfilment of another commitment, the large building which now fronts on to Burlington Gardens was begun, to accommodate the University of London and its examinations, and was opened by Queen Victoria in 1870.

The scientific societies were not, indeed, to be homeless; but the only possibility now left was to accommodate them in the buildings planned to be erected round this front courtyard, where they have been ever since. The total space thus offered did, indeed, allow more room to each of the societies than it had previously enjoyed, even after the Society of Antiquaries, at the Royal Society's instance, had been included in the scheme. But the space now available could not easily be planned for the sharing of meeting rooms and general facilities, or for a central federation of the libraries, or for any of the features of the earlier plan which would have enabled the societies to function as independent members of a real scientific community. The scheme had an even more fatal defect. The plans were made on the assumption that the societies existing in the 1860's, with their respective dimensions and requirements at that date, would provide a pattern of the needs of science for all time, or at least for the life of buildings designed to mid-Victorian standards of permanence. Each of these societies, therefore, with the approval of our own we must admit, presented its separate claim and had it embodied in the solidity of the buildings we still inhabit, filling the available space completely and precluding any later expansion, rearrangement, or new admission to the circle thus finally closed. Societies which have changed but little in numbers or activities may have had little reason, even yet, to complain of the accommodation which they then acquired. For others, the allotment which had been regarded then as satisfying future needs for half a century at least, became obviously inadequate very much earlier.

In 1900 came news that the large building on the Burlington Gardens frontage was to be vacated by London University, and tentative inquiry was immediately made as to the possibility of allotting it to the Royal Society, on the ground that "the present rooms occupied by the society were rapidly becoming inadequate." The Government, however, had already decided to transfer the building to their Civil Service Commissioners, and it has continued to be dedicated to its original use for large-scale examinations, save for the later assignment of certain rooms in it to our much younger sister, the British Academy. It will be noted that the Royal Society was finding its quarters here inadequate as early as 1900, twenty-seven years after it entered them, and before there was even any prospect of the great expansion of its responsibilities and activities in recent years. Our accommodation is still the same to-day, after seventy years. Our walls can not find room to hang our important collection of scientific portraits, and our great library is badly overcrowded, even though we have parted with some of it to give better housing, for a time, to the remainder; and it continues, of course, to grow. Library pressure, in fact, is felt to varying degrees by all the societies here; and I think that it is still true, as some of our predecessors saw already in the 1850's, that no scheme will be able to deal with this problem efficiently, and to meet modern needs without disturbing historic associations, which does not include some kind of central coordination of libraries. The lack of a lecture or conference room, available in common for larger meetings, and well equipped with modern resources for projection and demonstration, is another acutely felt need. There are greater needs and anomalies, however, than any of these common ones. Of all the societies here the Chemical Society, which was originally satisfied with the poorest allotment of rooms, has undergone the greatest expansion. In the 1860's it had a membership of some 450; it now has about 5,000. Its library, of great importance to all workers in chemistry, whether fundamental or applied, has so burst the bounds of its accommodation, that a part of it is deposited in the crypt of a neighboring church; and the Chemical Society's meeting room is in every way unsuitable, and inadequate to the meanest conception of the regular needs of a society of its standing and numbers. Apparently our predecessors of the 1870's did not see much future for chemistry. On the same evidence, they did not foresee any future for physics at all. The Physical Society did not then exist; by the time it was born there was no room for its admission, and the State has never offered it a home. The same is true of other societies formed later to deal with functional aspects of biology and other new fields of knowledge. For most of their meetings these newer societies use and need the facilities available in academic and research institutions.

A national center of science, however, should be capable of progressive adjustment to changing needs, and we ought to be able to make new admissions, on a varying scale of allotment, to the central community of societies.

What, then, should we be doing to deal with the situation? Actions and decisions long past have imposed it upon us, and regrets and repinings over an opportunity lost more than seventy years ago will not help us to-day. We must admit, too, that our present quarters, with all their defects of elasticity, have provided a combination of central position with freedom from noise of traffic which might be hard to find again. Let me say, then, that the Royal Society's officers, having consulted with the officers of other societies here, and particularly of those whose needs are urgent or whose interests might be directly concerned, have not yet abandoned the attempt to find a solution which would not involve the removal of any from the Burlington House estate. If we fail in that direction—and there is no ground for optimism—the problem will remain, and the time is not one for neglect or postponement of action. On all hands we hear talk of reconstruction and see plans for the rebuilding of London. We can not expect another Christopher Wren—one of our original fellows and a leader in the science of his day; London missed that opportunity. It is natural and proper for the plans now being presented to make spacious and impressive provision in the new London for opera, drama, music and all the fine arts; and we shall surely join in a general welcome to any practicable scheme which can open the doors more widely to such cultural privileges, and enhance their dignity and worth in the eyes of London and of the nation. But I do not think that we must stand by and allow the claims of science again to go by default. A fear of overstatement, a passion for critical accuracy which is a part of the very spirit of science, may make us reluctant advocates. If necessary, however, we must be ready to remind all who may be concerned of the part which the British scientific effort has played, in making it possible now to plan at all, with confidence, for our own civic and national reconstruction. But for science, we may remind them, the very different plans which our enemies were so recently making for our future might already be taking effect. I have no doubt that the claim will be handsomely admitted; but we ought not to be too easily appeased with compliments and oratorical bouquets. The nation's opportunity, when peace returns, of enjoying the arts and the amenities of life will be dependent on its standards of health and prosperity, and these, in turn, ever more directly on science and its applications, as certainly as these are still needed to secure our national survival and victory in this war.

This ancient Royal Society of London, and those societies which have grown from it and round it in later years, constitute a scientific organism which is a national and imperial heritage, second to none in the world's esteem. Here are the roots of the spreading tree of science and technology, which should form a major component of our national contribution to the new world now in the making. Seventy years ago these roots were given only enough soil for the replanting then undertaken; they have long been badly pot-bound, and some parts of the root systems are threatened with strangulation, while others have appeared outside the pot. We can properly claim, I think, that the progressive needs of our scientific societies shall be given early consideration, in any new allotment which plans for reconstruction may allow. We ought to have a scientific center permitting them to coordinate their activities with economy, and giving room for change, expansion and organic growth by budding and division, in accordance with nature's law. I think that we have the further right to expect that the home of science in this capital city will have a dignity symbolizing its value to the nation and the empire, and enabling us to hold up our heads in the company of other countries, whose scientific academies, not more famous than ours, have so long been housed more worthily, and with a more generous recognition of their due place in an enlightened people's scale of cultural values.

OBITUARY

LEO HENDRIK BAEKELAND

WHEN Leo Hendrik Baekeland, honorary professor of chemical engineering, died on February 23, 1944, the faculties of Columbia University lost one of their most distinguished members; and the world lost one of its most eminent industrial chemists.

Dr. Baekeland was born on November 14, 1863, in the old city of Ghent in Belgium. After completing his studies in the Municipal Technical School in that city; he entered the University of Ghent in 1880, where he specialized in the study of chemistry. He immediately demonstrated a superior intellectual ability that enabled him to complete the requirements for the degree of bachelor of science in two years. This was followed by studies for the degree of doctor of science which was awarded maxima cum laude in 1884