the present ruins. They lived by a rude kind of farming, growing maize, beans, and melons; their women had some skill in pottery. They seem to have used their underground Kivas as places where they carried on a constant round of tribal ceremonial. They lived a retired life, and were little influenced by foreign culture. The ruins have now been carefully restored under the supervision of Dr. Fewkes, whose report, fully illustrated, gives an excellent account of a strange forgotten race.

LOW-TEMPERATURE RESEARCH AT THE ROYAL INSTITUTION.[1]

A SUMMARY of the work carried on with the aid of the Hodgkins Trust is, by the authority of the managers, incorporated in the Proceedings of the Royal Institution every seven years. Like the preceding report, which chronicled the solidification of oxygen, the liquefaction of fluorine, and the liquefaction and solidification of hydrogen, the essay in which the achievements of the years 1900 to 1907 are described by Prof. Armstrong is again concerned mainly with low-temperature investigations.

No fewer than thirty-five original publications are referred to, the main feature running through them being the discovery and use of the charcoal vacuum, a practical advance only less important than the introduction of vacuum vessels in the manipulation of liquefied gases. At the temperature of liquid air the absorption is from six to thirty-four times as great as at 0°, and depends but little on the pressure, so that very high vacua can be produced. The density of the occluded gas is substantially that of the liquid, 0·06 against 0·07 for hydrogen, and 0·17 against 0·15 for helium. Owing to their slight absorption by charcoal at −185°, the presence of hydrogen and neon in air can be detected readily by connecting a vacuum tube with a vessel containing charcoal cooled in liquid air; if the gas be enriched by starting with a larger quantity and submitting it twice to condensation by cold charcoal, the spectrum of helium can also be detected.

The fact that helium is not condensed by charcoal at −185° was made use of by Prof. Onnes in the experiments which culminated in the liquefaction of helium, the one gas which had resisted all attempts to liquefy it at the commencement of the period under review; only by this means was it possible to maintain the purity of the helium and to ensure that the circulation of the gas could be maintained undisturbed by condensation of solid hydrogen and solid air. The indebtedness which he owed to Sir J. Dewar's discoveries was fully and generously acknowledged by Prof. Onnes in recording this great achievement.

ANNIVERSARY MEETING OF THE ROYAL SOCIETY.

THE anniversary meeting of the Royal Society was held as usual on St. Andrew's Day, Tuesday, November 30, when the report of the council was presented, and an address was given by the president, Sir Archibald Geikie, K.C.B. An account of the main subjects that occupied the attention of the council during the past year is given in the report, from which extracts are here subjoined. Other matters mentioned in the report have been referred to already in these columns.

[1] Low-Temperature Research at the Royal Institution of Great Britain, London, 1900–7. Essay by Prof. H. E. Armstrong, F.R.S. II. The Charcoal Vacuum Septenate. Pp. 63. (Hodgkins Trust, 1909.)

REPORT OF THE COUNCIL.

Results of the National Antarctic Expedition.

The only part of the physical observations of the National Antarctic Expedition, of which the Royal Society undertook the preparation and publication, that remains to be completed is the second volume on meteorology, which is now in progress. It will consist chiefly of synchronous charts of sea-level pressure, with winds and temperatures, over the greater part of the southern hemisphere. It will thus embody, not only the results of the observations made by the *Discovery*, but information derived from many other sources. The preparation of these charts is in the hands of the Meteorological Office under Dr. Shaw. It is anticipated that this laborious task will be completed in time to allow the volume to be published next year.

Glass-workers' Cataract.

The inquiry into the disease known as glass-workers cataract, instituted at the request of H.M. Government, and referred to in the last report, has been pursued during the year by the committee appointed by the council. The scheme of operations drawn up by the committee includes experimental research in the laboratory, and also investigations at some of the principal glass manufactories, with the view of obtaining data of the processes of glass-manufacture and of the incidence of the disease among operatives. Some progress has been made in this latter branch of the inquiry, but the work of the committee has been hindered by the refusal of certain glass manufacturers to allow the committee to visit their works. The experimental researches in the laboratory are proceeding.

The National Physical Laboratory.

The need for increasing accommodation is greatly felt in several departments. This is specially the case in the department of metallurgy, referred to by Lord Rayleigh in his address last year. With regard to this the executive committee of the laboratory report:—

"Investigations of very real importance have to be declined, because of the need of appliances, and the general scale of the arrangements is much too small. A site is available for a new metallurgical laboratory adjoining the chemical laboratory, and it is highly desirable that during the coming year active steps should be taken to secure the necessary funds. The committee commend this need to metallurgists interested in furthering investigations into the application of science to the practical treatment of metals and to other problems of importance."

The executive committee have nominated a special committee to raise the necessary funds for extension in this and other directions.

The most important event of the year, however, has been the work of construction of the national experimental tank, given to the laboratory with great generosity by Mr. A. F. Yarrow; this work is now well advanced. In April last Mr. Yarrow wrote to the secretary of the Institution of Naval Architects directing attention to the importance of such a tank, and offering to present a sum of 20,000*l.* on the understanding—

(1) That a tank of the most modern character can be established for a sum not exceeding 20,000*l.*, and that it be established at the National Physical Laboratory.

(2) That suitable provision be made, both as regards staff and means, for conducting research work, as well as for experimental investigations of a confidential character which private firms may desire, and for which they would pay suitable fees.

(3) That a sufficient sum be provided to ensure that the tank be efficiently carried on for a period of not less than ten years. This provision might take the form either of an endowment or of guaranteed subscriptions from shipbuilders and ship-owners.

Mr. Yarrow's letter continues:—"I believe that an adequate provision for maintenance would involve not less than 2000*l.* a year; that is to say, a total guarantee fund of 20,000*l.* would be required to maintain the efficient working of the tank for the above period."

In accordance with Mr. Yarrow's suggestions, a committee was formed by the Institution of Naval Architects to study the practicability of the scheme and the raising

of the maintenance fund. Towards the end of the year this committee informed the executive committee of the laboratory that about half the funds required had been promised, and that it was anticipated that the remainder would be forthcoming in due course; they also asked for an expression of the views of the executive committee and a statement of the conditions under which the tank could be worked as a department of the laboratory. The executive committee replied that if the guarantee fund were now raised to at least 1200*l.* a year, and if the experimental tank committee would undertake to continue their endeavours to increase it further with the view of research, the executive committee would be willing to take the responsibility for the expenses of working the tank in accordance with Mr. Yarrow's proposal. The governing body of the laboratory have thus made themselves responsible for an expenditure which may amount to 800*l.* per annum for ten years, and will receive in return the fees which are expected to come from tests carried out for ship-builders. On his part, Mr. Yarrow has paid over cash and securities to the value of at least 20,000*l.* to the treasurer of the Royal Society, and the president and council have conveyed to him the cordial thanks of the society for his most generous action.

During the year the executive committee have also, at the request of H.M. Government, undertaken important and onerous responsibilities on the scientific side of the experimental study and improvement of the conditions governing artificial flight.

International Catalogue of Scientific Literature.

The whole of the seventh annual issue of the catalogue has been published with the exception of D (chemistry), M (botany), O (anatomy), P (anthropology), and Q (physiology). These five volumes, as well as several volumes of the eighth issue, are in the press.

The International Council of the Catalogue, which had held meetings previously in 1900, 1904, and 1907, met again this year on June 3 and 4 in the rooms of the Royal Society.

The International Council made arrangements with the view of diminishing the cost of production of the catalogue, and also passed the following resolution:—

"That the regional bureaus be requested to confer, before April, 1910, with scientific workers in their several countries, so that any opinions and proposals of those to whom the catalogue is of consequence may be laid before the International Convention in 1910."

At the meeting of that convention important decisions must be made regarding the future of the catalogue; accordingly, the council of the Royal Society has appointed a committee to consider and report upon their relation to this undertaking.

Research on Tropical Diseases.

The investigations of the action of drugs upon trypanosomes, referred to in previous council reports, have been continued under the direction of a subcommittee, and accounts of the principal results of these investigations have been published from time to time. The latest progress report, by Mr. H. G. Plimmer and Captain Fry, "On the Experimental Treatment of Trypanosomiasis," appeared in Proceedings, B, No. 549, October 9.

During the present year the inquiry into sleeping sickness in Uganda has been actively pursued by the Royal Society's commission, which left England in October, 1908, under the direction of Colonel Sir David Bruce. Three papers on the work of the commission have been received from him during his stay in Uganda, and have been published in the Proceedings, viz.:—(1) "*Trypanosoma ingens*, n.sp."; (2) "The Development of *Trypanosoma gambiense* in *Glossina palpalis*"; (3) "A Note on the Occurrence of a Trypanosome in the African Elephant."

The second of these papers contains an account of an experiment carried out by the Commission, the results of which confirm the important conclusion arrived at by Dr. Kleine in German East Africa, that the tsetse-fly *Glossina palpalis* may be infective for a considerable period after the fly has fed on an infected animal. Previously it had been believed that the carrying of infection from a sleeping-sickness patient to a healthy person by the *Glossina palpalis* was a mechanical act, and that the power of transferring the disease was lost to the fly forty-eight hours after it had fed on an infected person. Dr. Kleine, however, has recorded observations of the fly remaining infective for much longer periods, extending up to sixty-six days, and now Sir David Bruce has reported further experiments, carrying the duration of infectivity as far as seventy-five days. This confirmation of Dr. Kleine's observations makes it necessary to revise previous conclusions on this point, the importance of which is obvious owing to its bearing on the nature of such preventive measures as have been hitherto attempted.

At the suggestion of Colonel Sir David Bruce, a conference, composed of medical (including veterinary) officers in British East Africa and Uganda, together with representatives of the administration of those protectorates, was held at Nairobi, in May, under the presidency of Sir David Bruce, to discuss and make recommendations as to preventive and remedial measures in regard to both human and animal trypanosomiasis.

Sir David Bruce is leaving Uganda this month, but arrangements have been made which will admit of the work of the commission being carried on after his departure.

Tyndall Donation.

During the current year Mrs. Tyndall, in pursuance of a wish expressed by her husband, the late Prof. Tyndall, has entrusted to the Royal Society the sum of 1000*l.*, to be administered at the discretion of the president and council for the purpose of encouraging and furthering research in all matters pertaining to mining, including such questions as ventilation, temperature, diseases incident to miners, and any other lines of scientific inquiry conducive to the improvement of mining and the lot of the miners.

PRESIDENTIAL ADDRESS.

In his presidential address, Sir Archibald Geikie referred first to the losses by death of distinguished fellows of the society since the last anniversary meeting. On the foreign list he had to record the decease of five men of wide reputation, namely, Albert Gaudry, Simon Newcomb, Anton Dohrn, Georg von Neumayer, and Julius Thomsen. The society also lost by death during the year the following fellows on the home list:—Daniel John Cunningham, David James Hamilton, Rev. W. H. Dallinger, Wilfrid Hudleston Hudleston, Harry Govier Seeley, Arthur Gamgee, Gerald Francis Yeo, Thomas William Bridge, Sir George King, Francis Elgar, Bindon Blood Stoney, George Gore, and William James Russell.

The special subject to which the president's address was devoted was the work in which the Royal Society is engaged. It is not commonly known that the weekly meetings and the publications to which they give rise, though they constitute the most important part of the labours of the society, so far as relates to the progress of discovery, form only a portion of a programme which is every year becoming fuller and demanding more time, thought, and funds for its accomplishment. Sir Archibald Geikie gave, therefore, a brief outline of the various directions in which the energies of the society are employed, in the hope that when some of the difficulties become more widely known, means may be found for adequately coping with them.

When the Royal Society was founded it was the only learned body in this country specially devoted to the prosecution of scientific inquiry, and such it continued to be for generations; but the rapid growth of science during the last century has shown that no single society can now serve to supply the needs of the whole vast field of investigation in every department of nature. Most of these departments, one after the other, have had special societies created for their exclusive cultivation, each of which records the progress of research in its own territory. At first the Royal Society, long accustomed to reign with

undisputed sway over the whole realm of natural knowledge, was disposed to look with disfavour on this multiplication of separate and independent institutions; but that time has long since passed away. Subdivision is now admitted to be necessary, and, if properly directed, even desirable. Hence this society, like a proud parent, now rejoices in the growth and energy of the increasing family which has grown up around her, while she in turn is regarded with respect and esteem by the various members of that family, among whom there is a general desire to be enrolled in her ranks.

Nevertheless, it is impossible not to perceive that the rise of all these younger societies has materially affected the position of the Royal Society in regard to the general advance of modern science. This society is no longer the general depository of the records of that progress in all its branches. So completely, for instance, do the Geological and Chemical Societies provide for the requirements of their respective fields of investigation that communications from these fields come now comparatively seldom before us. If one desires to follow the modern growth of geology or chemistry, one must turn for its record to the publications, not of the Royal Society, but of the two learned bodies that are specially devoted to the cultivation of these sciences. Nor can we see any reason why this process of devolution should not continue in the future. Hence, if the system of reading and publishing papers which has been in use here for so many generations is to be perpetuated without modification, there may come a day when every great department of natural knowledge will be provided with its own special society, and then we may ask in anticipation, what will be left for the meetings of the Royal Society? For myself I do not believe that such a time of impoverishment ever will befall us. We cannot, and would not if we could, do anything to prevent the foundation of fresh societies for sciences that have not yet been provided with them; but we may so adjust our programme as to bring it into harmony with modern conditions, and thus to maintain and extend the prestige and usefulness of the Royal Society. The danger to which I have referred, however, is by no means imaginary, and it should be faced before it has time to become serious.

Some years ago the society departed from the time-honoured practice of dealing with natural knowledge as one great subject, and now groups its papers in two separate series, one devoted to physical (A) and the other to biological (B) questions. It is undoubtedly a considerable convenience to have the memoirs in each of those two great divisions gathered together into a separate series of volumes. More recently the practice has grown up of introducing a similar principle in the grouping of papers to be read at the weekly meetings of the society. It was hoped that by taking the physical papers on one day and the biological communications on another a better attendance could be secured, especially of the representatives of each division. I cannot say that this arrangement has been attended with the success which was anticipated.

That there are some practical advantages in this separation of subjects cannot be gainsaid, and I would not for a moment seek to undervalue them; but I confess I am often led to consider this subject with feelings of regret and misgiving, and to ask myself whether the conveniences afforded by the subdivision are not more than compensated by the disadvantages that accompany them. Undoubtedly, the constantly quickening pace of the march of science makes it every year increasingly difficult for those whose lives are devoted to the active and engrossing prosecution of research in one special department of inquiry to keep in touch even with the broader features of the advance that is being made in other departments. We cannot be surprised that a man whose whole energies are absorbed in one line of study should neither care to listen to, nor to burden his library shelves with, papers in other lines, full of technicalities which he has had no time to master, and written, therefore, in a language which to him is more or less unintelligible. In this way the workers in widely separated fields of inquiry tend to be more and more completely isolated from each other.

But surely such isolation is a defect in our organisation which deserves serious attention. It cannot be for the general good of scientific progress that the eyes of an investigator should seldom or never be lifted from his own field of work, nor his ears be open to the reports of the advances made in other fields that lie outside his immediate interests. The wider his outlook, the greater must obviously be his capacity for judging of the general bearings of discovery in his own domain on other departments of research, and the broader and more intelligent will be his sympathies with the whole range of activity on which the continued march of natural knowledge depends.

The Royal Society is still the one great institution in this country which draws its members from the cultivators of every branch of science, and freely opens its publications to receive their communications of observation and discovery. It should thus be specially fitted to bring the workers on the two sides of science, physical and biological, into touch with each other. It has recognised, and in various ways endeavoured to discharge, its duty in this respect. In its Croonian and Bakerian lectures it has given to the world many masterly expositions of the progress of research in different branches of inquiry. It has likewise provided, by one of its standing orders, for occasional meetings devoted to the discussion of papers of general interest specially prepared for the purpose. Nevertheless, it may be urged that some more frequent and effective procedure might still be devised to lessen the evils of isolation and to make the work that is in progress in one section of the scientific domain more comprehensible in the others. It is futile to find fault with the technicalities of a science. These are its symbols and language with which its students cannot dispense; but without trying to provide for all the needs of the "man in the street," it is often possible to give the gist of an observation or a discovery in simple words that will convey a definite conception of what has been observed or discovered; and thus a subject which, when expounded in brief technical phraseology, repels men of another science, may yet be made interesting and suggestive to these same men.

It may be worthy of consideration whether in those branches of science which, having special societies of their own, are seldom represented by papers at our meetings or in our publications, some of their cultivators might not be invited from time to time to bring before the society reports of recent advances in their different fields of research. Would it not be practicable, for example, to find among the many distinguished chemists in our ranks a few who would be willing to present occasionally at our meetings, in language intelligible to a general audience of scientific men, an outline of the latest progress, present condition, and future problems of some section of their great science?

But, above all, there is an aspect of scientific thought which, although fully recognised by the early fathers of the Royal Society, is too apt to be overlooked amidst the engrossing pressure of modern research. I allude to the philosophy of science. At intervals in the progress of scientific inquiry it is desirable to look at the subject from the philosophical side, and to seek for a correlation and synthesis of the various processes of nature which discovery has revealed. The mental vision required for this quest is not given to more than a few gifted minds; but we can count among the number of our fellows more than one admirably qualified by wide knowledge and rare powers of generalisation to present a connected view of the broader bearings of discovery in the scientific domain in which each is a master. Memoirs of this type will, I trust, continue to be laid before us, perhaps at more frequent intervals, thus upholding the renown of our Philosophical Transactions and sustaining the prestige of the society.

Had the Royal Society no other duties to discharge save those in connection with the preparation of its publications, it would, like other scientific societies, have work enough on hand fully to occupy its time and absorb its resources; but the performance of these duties fills up only part of its programme. In this respect the society differs from other learned bodies. It possesses a large and diversified field of activities about which most, even of our fellows, know little, and the world outside still less. Our Year-book, indeed, presents a formidable list of the public func-

tions which have devolved upon the Royal Society. That list, however, conveys no adequate idea of the varied and even exacting character of some of its items; but, over and above the functions therein enumerated, others of a less public kind make large demands upon the time and thought of many of our fellows.

For many years past the Royal Society has acted as a kind of board of advice to the Government of the country in matters wherein scientific knowledge is required. In this informal capacity the society has been requested to undertake the conduct of many inquiries in the public interest. It has been likewise entrusted with the administration of funds voted by Parliament for the promotion of investigation.

Requests are not infrequently made to the society by different Government departments for advice or cooperation in matters wherein expert scientific knowledge is required. For years past we have had a tropical diseases committee, which, in association with the Colonial Office, has been carrying on investigations into the nature and prophylaxis of some of the maladies incident to the human and animal populations of our colonies and protectorates in warm climates. A commission dispatched by this committee to Uganda has for some time been at work, under Sir David Bruce, studying the decimating scourge of sleeping sickness, while another commission, under the same committee, is busy in London searching experimentally for some drug that may be effective in the treatment of that terrible disease. A few years ago, at the joint instance of the War Office, Admiralty, and Colonial Office, we dispatched a commission to Malta to investigate the peculiar fever which had for so long a time reduced the effective strength of our garrisons and fleets in the Mediterranean. The observers were fortunate in soon discovering the source of the disease, and were able to point out the steps to be taken to cope with it. The result has been that this serious malady has now been almost entirely banished from the hospitals of Malta. At present another committee of the society is engaged, at the request of the Home Office, in studying the disease known as glass-workers' cataract. The India Office likewise applies to us for advice, and we have an "Indian Government Advisory Committee" and an "Observatories Committee," the duty of which is to consider the reports of various public departments in the great dependency, and to offer suggestions towards the improvement of their scientific operations.

Although the Royal Society administers annually a considerable sum of money, by far the largest part of the disbursements is ear-marked for various special applications, and cannot be employed for other objects. So far, indeed, as its general purposes are concerned, the society cannot be regarded as adequately provided. For nearly two hundred and fifty years it has continued to hold aloft the torch of science, but the constantly augmenting demands of modern progress make its task increasingly difficult of satisfactory performance. I have referred to the growing cost of our publications, and there are other parts of our organisation wherein the development of our work is hampered by the lack of funds. Men of science are seldom rich; it is therefore all the more gratifying to be able to record examples of the continuous generous liberality of our fellows; but it is hardly from our own ranks that we can look for any substantial addition to our resources. Perchance in the general community there may yet be found some men who may be led to see that, besides the various laudable objects that have hitherto claimed their care, the advancement of science is likewise an important public and educational interest, and that benefactions are not unworthily bestowed in enabling the Royal Society adequately to maintain the great work which it has inherited from the past.

MEDALLISTS, 1909.

Copley Medal.

The Copley medal is this year awarded to Dr. George William Hill, For.Mem.R.S. Now that Simon Newcomb is no longer with us, Dr. Hill occupies, beyond challenge, the first position in the great subject of dynamical astronomy.

His processes are not only marked by extraordinary originality, the result of high mathematical genius, but also in every case his methods and researches are directed towards practical astronomical ends. His supreme work is probably contained in his researches on the theory of the moon's motion, which has remained the great problem of gravitational astronomy ever since the time of Newton. Here his introduction and development of the principle of disturbed periodic orbits has given an entirely new direction to the science, culminating recently in the lunar tables of E. W. Brown, which mark an epoch in the practical side of the lunar theory.

This work of Hill has been fruitful in new advances in many directions. His ideas have given rise, as developed by Poincaré and other investigators, to new departments of abstract mathematical analysis, while in the hands of Lord Rayleigh they have shed light on important and difficult problems of general mathematical physics.

His collected works have recently been published by the Carnegie Institution of Washington in four quarto volumes; the importance of their contents can hardly be overestimated. M. Henri Poincaré, in his introduction to these volumes, described Hill as "une des physionomies les plus originales du monde scientifique américain."

Astronomy owes to him new theories of the motions of the systems of Jupiter and Saturn, to which the whole of vol. iii. of his works is consecrated.

His shorter papers deal with nearly every problem in the lunar and planetary theories, with mathematical geodesy, and other subjects. All his work is characterised by its original points of view combined with practical aims, by maturity of thought, and high suggestiveness. It forms an index of the simplicity and aloofness of its author, who has been one of the main ornaments of astronomical science for more than a generation.

Royal Medals.

One of the Royal medals has been awarded, with the approval of His Majesty the King, to Prof. Augustus Edward Hough Love, F.R.S., in recognition of his numerous and important contributions to mathematics, and especially to mathematical physics. He has written many valuable papers on various branches of hydrodynamics, in particular on the theories of jets, of vortex motion, and of revolving gravitating masses of liquid. He is the author of a work on "Elasticity," now in its second edition, which is highly appreciated at home and abroad, and ranks as the standard treatise on the subject. In this he has incorporated various valuable researches of his own, which have appeared in the Philosophical Transactions and elsewhere. He has further investigated closely the circumstances of wave-propagation in air, in elastic solids, and in the electromagnetic medium, and has examined in particular the phenomena which present themselves at wave-fronts when the motion is discontinuous. More recently he has published remarkable papers on terrestrial physics, including a speculation on the origin of the present distribution of land and water, and an investigation of the precise extent of the inferences which can be drawn as to the internal constitution of the earth from the observed *data* relating to the heights of ocean tides of long periods, the lunar disturbance of level, and the approximate period of the small movements of the Pole over the earth's surface.

His Majesty has likewise approved of the award of the other Royal medal to Major Ronald Ross, F.R.S.

The name of Major Ross has become widely known on account of the important investigations which he has carried out on the life-history of the malarial organism and the means of preventing malarial infection. Following up a clue indicated by Manson, he began, in 1895, at Secunderabad, in India, in circumstances which entailed much difficulty and many delays, an investigation as to whether the malaria parasite, discovered by Laveran, passes part of its life-history within the body of a biting insect. After more than two years of fruitless experiments Ross discovered a stage of the human malaria parasite in the tissues of a mosquito (Anopheles) which had been allowed to feed on the blood of a malarial patient. In 1898 he proceeded to work out in detail the life-history of a malarial parasite found in sparrows and larks in India. He traced the complicated stages in the development of this parasite from its inception into the stomach of a gnat (*Culex fatigans*) which feeds on the blood of these

birds to its passage back into their blood through the secretion of the poison gland of the insect. At the same time he furnished conclusive experimental proof of the part played by the insect in propagating the infection. These fundamental observations have been confirmed and extended in various directions by other observers, both in the British Empire and elsewhere.

As a practical consequence of the discoveries of Ross and those who have followed in his footsteps, and of his own unceasing exertions and further investigations during the last few years, scientifically directed measures for the prevention of malaria have been initiated with striking success in many fever-stricken districts all over the world, and particularly within the British Empire. His investigations have also inspired similar work on the spread, by means of mosquitoes or other biting insects, of other formidable diseases, with the result that effective measures have been devised for preventing the spread of these diseases also.

Davy Medal.

The Davy medal has been awarded to Sir James Dewar, F.R.S.

Sir James Dewar has been a pioneer in the study of very low temperatures, their production, applications, and effects.

For many years he has worked continuously in this difficult domain, and his investigations have resulted from time to time in such achievements as the solidification of oxygen, the liquefaction of fluorine, and the liquefaction and solidification of hydrogen. His improvements in technique have been fundamental. By the construction of vessels in which thermal convection is avoided by the presence of a vacuous layer in their walls, he has enormously simplified the retention and manipulation of matter at very low temperatures. His application of the absorbent effect exerted on gaseous materials by charcoal at low temperatures has placed in the hands of chemists and physicists a most convenient and important method, not only for the production of high vacua, but also for the rapid separation of the constituents of gaseous mixtures. The modifications in the properties of matter at very low temperatures have been investigated, and remarkable results obtained, including the earliest exact investigations, jointly with Prof. Fleming, on the electric properties of insulators and of metals and alloys. The determination of the properties (critical points, boiling points, &c.) of refractory gases at very low temperatures has involved the practical downward extension of absolute thermometry, with the result that temperatures in the neighbourhood of the absolute zero can be determined correctly to within a degree. Lastly, recent measurements of the rate of formation of helium from radium salt, specially purified by Sir T. Edward Thorpe for his recent atomic weight determination, have provided exact molecular data, throwing light on the nature of the spontaneous disintegration of that very remarkable substance.

Hughes Medal.

The Hughes medal falls this year to Richard Tetley Glazebrook, F.R.S.

Dr. Glazebrook has for many years been closely identified with the construction, testing, and evaluation of electrical standards. Not only has he published important memoirs on these subjects, but, as secretary for a very long period of the Electrical Standards Committee of the British Association, and more recently as director of the National Physical Laboratory, he has taken a leading and responsible part in this type of scientific work and in conferences of international importance. It is thus specially fitting that he should be the recipient of the Hughes medal.

The anniversary dinner was held at the Hotel Metropole on Tuesday evening. Sir Archibald Geikie occupied the chair, and a large number of fellows and distinguished guests was present. In proposing the toast of "The Royal Society," Mr. Butcher, M.P., remarked that organised science presents the most signal example of cooperative enterprise in the things of the mind. Modern scientific research demands a host of humble labourers in every field. The hewers of wood and the drawers of water are as necessary as the men of genius. Like the builder of a mediæval cathedral, the obscure worker in the laboratory adds his stone to the fabric, and passes from sight; the individual is effaced, and the structure that slowly rises is the collective achievement of many forgotten workers and even of many generations, guided, however, by a few master minds. While art and literature bear the stamp of permanence, the movement of the sciences produces another kind of effect—that of progressiveness and limitless expansion. Yet, in spite of this irresistible forward movement, the man of science, like the artist, is aware that the ideal may still escape his grasp, and that the quest of truth still remains the search for something that must ever be pursued, that ever recedes, and never can be wholly attainable.

Replying to the toast, the president said that at its foundation every side of intellectual life seems to have been represented in the society. The non-scientific elements which so preponderated at the start were gradually reduced as years went on, but a wide and liberal view of the claims of admission continued to be taken, and the more distinguished in each generation in affairs, in literature, and in art were elected as fellows. This custom is still kept up, but with increasing stringency, until now the number of such persons is limited to two in every two years. There are some fellows who believe that the general interests of the society would be promoted by the introduction of a larger leaven of culture which is not scientific.

The Japanese Ambassador, responding to the toast of "The Guests," said it is barely forty years since Western science was transplanted into Japan on anything like an adequate scale. For the progress being made Japan owes an immense debt of gratitude to the scientific men of the West, and particularly to scientific men of Great Britain.

NOTES.

THE meeting of the Royal Irish Academy on Tuesday, November 30, was occupied by a commemoration of Charles Darwin, the date nearly coinciding with that of the publication of "The Origin of Species" fifty years before. The president, Dr. F. Tarleton, opened the proceedings, and the following short addresses were given on the influence of Darwin's work:—geology, Prof. G. A. J. Cole; geographical distribution of animals and plants, Dr. R. F. Scharff; zoology, Prof. G. H. Carpenter; botany, Prof. T. Johnson; anthropology, Prof. A. F. Dixon.

THE Washington correspondent of the *Times* announces that a recommendation is to be submitted to the Department of Commerce and Labour by the Bureau of Fisheries that the Government should bring about an international conference for the formulation of an international marine game law to protect from extinction seals, whales, walruses, and other sea mammals. The countries which would be invited by the United States to send representatives to the proposed conference are Great Britain, Russia, and Japan.

THE council of the Child-study Society has approached Prof. Karl Pearson, F.R.S., to assist its efforts to advance scientifically our knowledge of child-life. Prof. Pearson has drafted a schedule for studying the factors influencing the social life of the child, which he desires to have filled in by heads of families or by teachers intimate with families. The number in the family need not be large, but particulars of father, mother, and at least two children are required. The schedules are being distributed through branch secretaries of the Child-study Society, but it may be difficult in a short time to secure the number requisite