

A fault which might be remedied in future issues is the omission of any scale of distances or parallels of latitude and longitude from the charts.

The rainfall charts have been compiled from data extending over twenty to forty years, with a few stations with only fifteen years' record, indicating that, meteorologically at any rate, Australia is no longer in relative infancy. During the summer months, when the variation of temperature is most rapid near the south coast, the rainfall is greatest on the north and north-east coasts, and the isohyets are closest together in these regions. The distribution gradually changes, and during the winter months the rainfall and its variation are greatest in the south and south-east districts. The change in the position of the isohyets from month to month is very regular; the motion is similar to that of a pendulum, the distribution in the warm months being at one end of the swing and that in the cold months at the other.

In New South Wales, at Forbes, near the centre of gravity of Australia's population, and not far from the site of the new Federal capital, there is practically no variation in the rainfall from month to month; each month has about 2 in. of rainfall. Utilising this fact and the regularity of the change for other regions, the Commonwealth Meteorologist has constructed a rainfall "clock." Isohyets of appropriate shape are drawn on a card placed beneath another card with the outline of Australia cut out of it. The lower card is rotated about an axis through Forbes, and as it moves the rainfall distribution for different months appears, the appropriate positions for each month being shown by an index mark. The remarkable regularity which renders possible this simple device leads the Commonwealth Meteorologist to suggest that Australian meteorology may be of such importance for general investigations as to warrant the establishment of observatories there, internationally supported and controlled.

E. G.

THE RESEARCH DEFENCE SOCIETY.

THE Research Defence Society held its annual general meeting on Tuesday, June 24, at the Royal College of Physicians. The chair was taken by the president of the society, Sir David Gill, and there was a very large attendance. The speakers were:—Bishop Frodsham, founder of the Australian Institute of Tropical Medicine; Sir Thomas Barlow, president of the Royal College of Physicians; Lord Cromer, Sir Hugh Bell, and Mr. Waldorf Astor. The report, presented by Mr. Sydney Holland, chairman of committee, gave a good account of the society's work during the past year with special reference to the campaign against anti-vivisection shops. It stated also that the council of the Royal Society for the Prevention of Cruelty to Animals is sending out a referendum to all the members of that society. The point is, whether it was right or wrong to reject Lord Chylesmore from the council of the Royal Society for the Prevention of Cruelty to Animals on the ground that he is a vice-president of the Research Defence Society. Seeing the advantages which animals have gained from experiments on animals, and the many restrictions placed on experiments on animals in this country, we think that a man may very properly hold office in both societies; and we are glad that Lord Cromer and Sir Hugh Bell spoke very strongly on this point.

Mr. Waldorf Astor, in an admirable speech, referred to the good news, this week, that the Government has allotted 57,000*l.* annually to research in relation to tuberculosis, and has appointed the Committee and the Advisory Council for this great work. Sir Thomas

Barlow spoke of that unity of purpose which is between the men of science and the men in practice: how the doctor and the surgeon are indeed guided and helped by the physiologists and pathologists. Bishop Frodsham spoke of the Christianity of all work done, carefully and wisely, for the relief of suffering humanity; and, as Bishop of North Queensland, he has seen more than most of us of the misery caused by certain obscure tropical diseases, and has done more than most of us to alleviate it. Thus the subject which the Research Defence Society exists to popularise was presented from diverse points of view. Take what point of view we will, it is a subject of national importance.

THE BELFAST MEMORIAL TO LORD KELVIN.

THE statue of Lord Kelvin which has been subscribed for by the citizens of Belfast was unveiled by Sir Joseph Larmor, M.P., F.R.S., on Thursday last, June 19, in the presence of a large and distinguished gathering. The Chancellor of the Queen's University (the Earl of Shaftesbury, K.P.) presided, and the attendance included the Lady Mayoress of Belfast, the Vice-Chancellor of the Queen's University of Belfast, members of the Senate of Queen's University, and many of the leading citizens of Belfast.

In the course of his remarks, the chairman said that from the time of the death of Lord Kelvin the wish was uppermost in his (Lord Shaftesbury's) mind—as indeed he felt sure it was in the mind of everyone present—that there should be erected within the city of Belfast a fitting memorial to a man whose fame had gained for him a paramount position in the city of his birth and in the city with which he and his family were so intimately connected, as well as in the whole world. That day they were to see the consummation of their aspirations, and he offered his warmest thanks to Sir Joseph Larmor, who had so kindly come to perform the unveiling ceremony.

Sir Joseph Larmor then delivered an address, of which the main part is subjoined:—

I am deputed to represent on this occasion a company of subscribers, our fellow-citizens, who have thought it right that the genius of Lord Kelvin, and the great activities which kept him in the forefront of the advance of physical science in an age in which it has transformed the world, should receive permanent commemoration in the city of his birth and parentage, in the community among whom he passed the early years of his life, and to whom, in his later years, he put in an almost passionate claim that he belonged. We do not forget how profoundly he was moulded by the great city of Glasgow, with which his active career was so conspicuously associated. The intimate conferences from his early manhood with the pioneers of industrial development such as that city has possessed ever since the days of James Watt—discussions along the lines of unfolding problems of mechanical power, of naval construction, of the art of navigation—were just what was required to develop the student and natural philosopher into his other aspect, more familiar to the world at large, as the prophet and guide in the utilisation of the vast opportunities opened up, for the practical convenience of life, by modern scientific discovery. By no amount of mere natural ingenuity, after the manner of an inventor or a man of affairs, could anyone have attained to this position; an essential condition was sustained intellectual discipline such as Lord Kelvin enjoyed from his early years.

Fortunate in his home training, here and at Glasgow, under the careful and most competent direction of his father, he had completed the excellent general education which the University of Glasgow then afforded at an age when, in our leisurely days, he would still have been a schoolboy. He was thus able, like many a Scotch and Irish student before and since, to enjoy to the full the opportunities for advanced study, for initiation into the flowing tide of knowledge, which the University of Cambridge has always afforded to those who have known how to search for them with self-reliance and sincerity. And he had the good fortune to be able to combine serious studies, in a noteworthy degree, with active and fruitful relaxation; for he was one of the founders of the University Musical Society, and at the same time a prominent and successful oarsman. Thus he was not tempted to blunt his intellect, even temporarily, by early over-exertion; and though the examiners were not able to assign him the first place in the race for degrees over the limited prescribed course, even that was prejudged, for they were well aware, as one of them expressed it, that there was a man among the candidates they were to test whose pens they were scarcely qualified to mend. By the continued forethought of his father he passed on from Cambridge to Paris, then the chief centre of mathematical and physical science; he arrived provided with ample personal introductions, so that the diary which he sent home gives a most interesting account of the lives and activities of the investigators who were there at work in the middle of the last century. Young as he was, we can recognise that he moved among them on equal terms, and could impart as much as he gained. Inspection of his notebooks of this period, which fortunately have been preserved, and may in time be given to the world, shows that, as has been the case with so many men of genius, the main formative ideas came to him in early years. These rough records reveal that in his student time at Cambridge, or very soon after, he was already in effective possession of most of the advances which he gradually matured and made public during the next ten years: the period in which he was chiefly concerned with the theoretical side of electrical science. When, nearly twenty years ago, in the height of his fame, he took part in the centenary celebration of the Institute of France as one of its eight foreign associate members, he recalled his obligations to Paris and to her great men of fifty years before, in words of dignity and charm which sent a thrill of patriotic pleasure through the brilliant audience that he addressed. He was equally at home, and enjoyed equal affection and honour, among his compeers in Berlin, in Rome, in Washington; in fact, he had come in his later years to be venerated as embodying the universal ideal of the scientific spirit, transcending all limitations of nationality.

The fame and achievement of Lord Kelvin thus belong to all the world; yet we of Ulster have taken care to assert our special interest in his career. I am sure he would have cordially welcomed our claim that he is of ourselves. The connection of the Scottish universities, especially that of Glasgow, with the Ulster people has been intimate and prolonged. In the eighteenth century these great institutions were, owing to racial and religious affinities and geographical proximity, a main centre of our own higher education. But if we were thus under obligation to Scottish learning and intellect, there is also the other side of the account. In Francis Hutcheson, Ulster gave to Glasgow the pioneer of the Scottish school of philosophy, and one of the great names in the history of ethical speculation. Somewhat later we sent from Belfast to Glasgow and Edinburgh one who will

always be held in honour, as chief among the founders of modern chemistry, Joseph Black, the clear-sighted discoverer of latent heat and of fixed air, the congenial friend of Adam Smith, David Hume, and Lavoisier. In our own time we gave the great man whom we now commemorate, supreme both in unfolding the intellectual foundations of physical science and in stimulating its fertile applications in an age of which they have been the special characteristic.

Our interest in Lord Kelvin has another aspect, namely, that in this city we have been in a very direct sense his scientific pupils. When some of us were students at the Queen's College, now the University, the chair of natural philosophy was held by Prof. Everett, who had come to us direct from service as Lord Kelvin's assistant in the University of Glasgow, and whose whole scientific activity and enthusiasm were directed towards the exposition of his master's fundamental work with which he had been thoroughly imbued in Glasgow; it was then fresh, and indeed largely in the making, and, it must be admitted, no easier for us (his students) to understand on that account. We had here, as professor of engineering, his elder brother, James Thomson, afterwards also given to Glasgow, a pioneer, greater than we then knew, in the consolidation of science with practice; the volume containing his scientific papers, recently published, bears witness to his ample share in the genius of the family, and to his intimate relations with Lord Kelvin. We had Thomas Andrews as professor of chemistry, whose profound scientific achievements, executed with modest apparatus of local construction, have shed permanent lustre on his native province. And not least, we had John Purser as professor of mathematics, a congenial scientific and personal friend of Lord Kelvin, at the same time in close contact with his own famous mathematical school of the University of Dublin, one of the choice minds of the time, who was wont to enchant those of us who could follow him by brilliant informal discourse about the problems of the day. The scientific work of Lord Kelvin was thus closely appreciated and studied among us here, as early as it could have been anywhere; he has been a permanent element in the intellectual life of the city of his early years, and on that account this local memorial, so spontaneously provided by his fellow-citizens, is a most appropriate tribute to his memory.

His name will pass down the ages as the outstanding guiding spirit of the period when the weapons of physical science were brought out of her secluded armoury, and turned to the reconstruction of our material civilisation. For we have now passed on rapidly from the age of steam into the age of electricity; we have had the good fortune to watch in our own day the progress of that subtle agency of silent power, until it has transformed most of the departments of industrial and social life. The dreams which were mixed with the wonder of the early electric discoverers have been more than accomplished. But this advance has become possible only by being the most conspicuous example of ordered and persistent scientific method that the world has seen. Every minute natural manifestation of electric agency, whether detected by the foresight of men like Faraday, or revealed in part by accident, has had to be accurately and closely analysed, as a prelude to eliciting its possibilities on an industrial scale. The method of true progress must have been impressed especially upon Lord Kelvin during those strenuous telegraphic years, when he was by force of circumstances dragged out of his study to battle with practical engineering difficulties—when, by submitting every phenomenon to that refined measurement and

calculation which alone can lead to long secure trains of prediction and adaptation, he transformed the problems of submarine telegraphy from a blind, impracticable tangle into an ordered science. That achievement proved to be the crucial step in preparation for the present age of electricity. His disinterested persistence, through many subsequent years, in the same self-appointed task of rational measurement of electrical quantities and their relations, with the aid of the colleagues whom his zeal enticed into the service, formed the preparation, in all essentials, for uninterrupted progress, as soon as opportunity came in the world of affairs for the larger industrial electric developments to be pushed on. When these immense engineering advances were in full evolution, he was growing old, but his eager foresight still dominated the practical field.

Only in one respect did he fall short, in the theoretical electric advance, when he arrested his fruitful trains of inference on the interconnections of these partially concealed agencies, in order to search strenuously during long years for their complete elucidation, in some form such as could be exhibited and probed in a mechanical working model. Through this partial lapse of faith, this logical reluctance to take risks in following up the incomplete clues offered by nature, it fell to the most illustrious of his pupils and disciples, Clerk Maxwell, with greater daring and temporary disregard of difficulties, yet ever stimulated and guided by his master's own most instructive and inspiring though halting efforts, to connect light and heat in close linkage with electricity and magnetism, and so embrace all branches of physical science in one compact synthesis. This has been the great fundamental achievement in physical science of our age, probably the greatest since Newton announced and developed the law of gravitation. With the eye of faith, waves precisely the same in kind as those of light, only vastly magnified in size, had thus already been familiar to the initiated for twenty years, with fully mental vision of their constitution and behaviour, flashing across space in electric pulses, when at length, by an accident such as comes only to the worthy, the crowning honour of first detecting their actual bodily existence was grasped by Hertz. Then, as is usual in such cases, once a practical start has been gained—the more recent advance in the practice of artificial flight is another example—development was pushed rapidly on in many hands, by theory and experiment working together, until phenomena that it had taken a quarter of a century for eager expert searchers to detect at all, have now become, in the form of wireless telegraphic signals, almost a commonplace of everyday life.

We can recall some of the personal qualities of the great man whom we here commemorate, his splendid unconscious humility, his gentleness, his keen interests and enthusiasm, and readiness to learn from every true worker and to help him onward, his patience in controversy combined with the tenacity that indicates seriousness of purpose. In the words transferred to him by Huxley, a stout opponent in more than one discussion, "Gentler knight there never broke a lance."

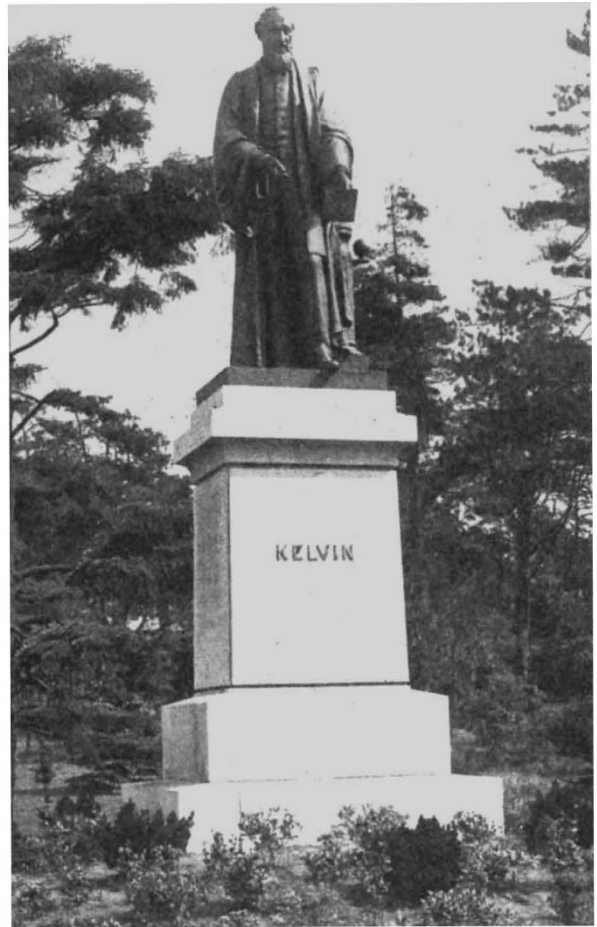
Sir Joseph Larmor, on concluding his address, said it was his privilege to ask Sir Robert Anderson to accept, on behalf of the city of Belfast, that memorial to one of the great men whom Belfast and the province of Ulster had given to the Empire.

Sir Robert Anderson said that he esteemed it a very high honour to be asked to occupy the place on that occasion of the Lord Mayor, and to take over from his townsmen the custody of that beautiful memorial. He could assure them for the Corporation

that the statue would receive every care and attention. He had no doubt that future generations would appreciate that memorial, not only as a work of art, but also for the influence it would exercise in stimulating students to try to emulate Lord Kelvin.

The Vice-Chancellor of Queen's University proposed that the best thanks of the subscribers be given to Sir Joseph Larmor for unveiling the memorial, and for his address. Proceeding, he referred in eulogistic terms to Sir Joseph Larmor's scientific work, and spoke with pleasure of the early association of Sir Joseph Larmor as a student of the Queen's College, Belfast. The proposal was seconded by Sir Otto Jaffé, and carried with acclamation.

At the close of these proceedings, the statue was unveiled by Sir Joseph Larmor amidst the applause of the assembled company. The ceremony concluded with a vote of thanks to the sculptor.



Lord Kelvin's statue, Botanic Garden Park, Belfast. Photographed by Mr. A. R. Hogg, Belfast.

Description of the Memorial.

The Botanic Gardens is one of the public parks of Belfast, and is situated about a mile and a half from the centre of the city. The position chosen for the statue adjoins the site of the new public museum which is shortly to be built.

The statue is the work of the well-known sculptor Mr. Albert Bruce-Joy. The figure itself is about 10 ft. high, and stands on a granite pedestal of about 13 ft. in height. As our illustration shows, the late

Lord Kelvin is represented standing erect. In the extended left hand there is a design of one of his discoveries—the adaptation of a gyroscope—and in the right hand is a pencil pointing to the drawing. By the side of the figure stands a representation of the Kelvin compass.

The inscriptions are as follows:—

The front of the pedestal bears the single word "Kelvin." On the right side is the following inscription:—

Sir William Thomson, Knt.,
Baron Kelvin of Largs,
P.C., O.M., G.C.V.O.,
Born in Belfast, 1824,
of Ulster Lineage.
Died at Largs, 1907.

Lies interred in Westminster Abbey.

The inscription on the left-hand side of the pedestal reads as follows:—

President of the Royal Society,
Chancellor of the University of Glasgow,
Following 53 years of service in the
Chair of Natural Philosophy.

Pre-eminent in elucidating
The Laws of Nature and in applying them
to the service of Man.

Memorial Tablets.

It may be mentioned that the committee in charge of the memorial has made provision for the placing, in the Hall of Queen's University, of a brass tablet in memory of Lord Kelvin's brother, Prof. Sir James Thomson, who filled the chair of engineering in Queen's College, Belfast, from 1857 to 1873.

A brass tablet is also to be placed in the Common Hall of the Belfast Royal Academical Institution as a memorial to Lord Kelvin's father, Prof. James Thomson, who was professor of mathematics in the Belfast College from 1814 to 1832. In addition, a memorial plate to Lord Kelvin is to be placed in the City Hall, as well as a tablet upon the house in College Square East, Belfast, where Lord Kelvin was born.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

LEEDS.—Dr. H. S. Raper, lecturer in pathological chemistry in the University of Toronto, has been appointed lecturer in chemical physiology.

The chair of applied chemistry (chemistry of leather manufacture), which becomes vacant on October 1 by the resignation of Prof. H. R. Procter, will be occupied after that date by Dr. E. Stiasny. Dr. Stiasny has been assistant-professor in the department for the last four years, and was previously professor in the Imperial Institute for Leather Industries at Vienna.

The University has recently received a valuable addition to its scientific collections in the presentation by Mrs. A. H. Clarke, of Earl's Court, of the collection of Continental and exotic Macrolepidoptera made by her late husband. The collection enriches the entomological resources of the University by more than 12,000 specimens, all carefully set, arranged, and labelled, and to this Mrs. Clarke has generously added her husband's working library of entomological literature, itself a present of great value and utility. The University authorities wish it to be known, in conformity with Mrs. Clarke's desires, that, after the immediate work of arranging and cataloguing has been concluded, the collections will be available for reference by entomologists generally upon application to the professor of zoology at the University.

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LONDON.—The Senate on June 18 re-elected Dr. W. P. Herringham as Vice-Chancellor for a second year. Four new appointments were made to University professorships, including Mr. E. H. Lamb to the chair of civil and mechanical engineering, tenable at East London College, and Dr. C. G. Seligmann to a part-time chair of ethnology at the London School of Economics. The title of emeritus professor was conferred upon Sir William Ramsay. Lord Haldane was appointed Creighton lecturer for next session.

The D.Sc. degree has been granted to E. R. Watson, an external student.

An anonymous donor has offered 300*l.* towards the institution of a lectureship in palæobotany at University College.

THE prize distribution and conversazione of King's College, King's College for Women, and King's College Theological Department will be held at King's College, Strand, on Wednesday, July 2.

THE HON. MRS. RONALD GREVILLE, daughter of the late Mr. William McEwan, a munificent benefactor of the University of Edinburgh, has presented to the University Mr. McEwan's Edinburgh residence.

THE title of emeritus professor of engineering has been conferred by the governing body of the East London College (University of London) upon Prof. D. A. Low, professor of civil and mechanical engineering, who has served in that institution for twenty-six years.

THE prize fellowship of 120*l.* offered by the Federation of University Women has been awarded to Miss M. A. Whiteley, D.Sc. Dr. Whiteley is assistant-lecturer in chemistry at the Imperial College of Science and Technology, and is the author of several communications dealing with compounds of the barbituric acid series, and published in the Proceedings and Transactions of the Chemical Society.

THE West Riding of Yorkshire Education Committee has decided to include in the vacation course to be held during August at the Bingley Training College, a laboratory course of experimental science, with lectures and discussions, under the direction of Prof. A. Smithells. This course is intended for science teachers in secondary schools, and especially for those who teach the subject to girls and desire to acquaint themselves with methods of correlating it with domestic subjects. It will relate chiefly to the subject of combustion and will discuss general questions connected with the teaching of elementary physical science, with special reference to experimental work; provide examples of the teaching of science in relationship to the phenomena and appliances of daily life and especially of domestic life; and give a connected account of the modern science of combustion and the chemistry of flame. The course is open to all teachers of science on the payment of the fees. Full particulars can be obtained on application to the Education Department, County Hall, Wakefield.

THE Royal Commissioners for the Exhibition of 1851 have made the following appointments under their scheme of science research scholarships, upon the nomination of the universities and colleges mentioned. The scholarships are of the value of 150*l.* per annum, and are ordinarily tenable for two years:—University of Edinburgh, H. Levv; University of Glasgow, A. Gray; University of St. Andrews, R. F. Thomson; University of Birmingham, W. E. Garner; University of Bristol, F. G. Wilson; University of Leeds, H. Ogden; University of Liverpool, J. H. T. Roberts; University of London, W. B. Haines; University of Manchester, J. Chadwick; Armstrong College,