November 30, 1881.

ANNIVERSARY MEETING.

THE PRESIDENT in the Chair.

The Report of the Auditors of the Treasurer's Accounts on the part of the Society was presented, by which it appears that the total receipts during the past year, including a balance of £1,195 5*s.* 1*d.* carried from the preceding year, amount to £8,020 3*s.* 8*d.*; and that the total expenditure in the same period, including purchase of stock, amounts to £5,760 19*s.* 1*d.*, leaving a balance at the Bankers' of £2,241 11*s.* 8*d.*, and £17 12*s.* 11*d.* in the hands of the Treasurer.

The thanks of the Society were voted to the Treasurer and Auditors.

The Secretary read the following Lists:—

Fellows deceased since the last Anniversary.

On the Home List.

Addison, William, M.D.
Beaconsfield, Benjamin Disraeli, Earl of, K.G.
Bigsby, John Jeremiah, M.D.
Billing, Archibald, M.D.
Caithness, James Sinclair, Earl of.
Colvile, Right Hon. Sir James William, Knt.
Currey, Frederick, M.A.
Davis, Joseph Barnard, M.D.
Egerton, Sir Philip de Malpas Grey, Bart.
Gould, John, V.P.Z.S.
Greswell, Rev. Richard, M.A.
Gunn, Ronald Campbell, F.L.S.
Hatherley, William Page Wood, Lord.
Johnson, The Very Rev. George Henry Sacheverell, M.A.
Jones, Thomas Rymer.
Lloyd, Rev. Humphrey, D.D.
Luke, James, F.R.C.S.
Mallet, Robert, C.E.
Rolleston, George, M.D.
Stanford, John Frederick, M.A.
Stanley, The Very Rev. Arthur Penrhyn, D.D.
Stenhouse, John, LL.D.
Thornton, Henry Sykes, M.A.

On the Foreign List.

Chasles, Michel.

Change of Name and Title.

Lindsay, Lord, *to* Earl of Crawford and Balcarres.

Fellows elected since the last Anniversary.

Ayrton, Prof. William Edward.
Bates, Henry Walter.
Bristowe, John Syer, M.D., F.R.C.P.
Christie, William Henry Mahoney, M.A.
Dickie, Prof. George, A.M., M.D., F.L.S.
Gladstone, Right Hon. William Ewart, D.C.L.
Grant-Duff, Right Hon. Mountstuart Elphinstone.
Kempe, Alfred Bray, B.A.
Macalister, Prof. Alexander, M.D., Sec. R.I.A.
McLeod, Prof. Herbert, F.I.C., F.C.S.
Phillips, John Arthur.
Preece, William Henry, C.E.
Samuelson, Bernhard, M.I.C.E.
Stoney, Bindon Blood, M.A., M.I.C.E.
Traquair, Ramsay H., M.D.
Watson, Rev. Henry William, M.A.
Wright, Charles R. Alder, D.Sc.

On the Foreign List.

Daubrée, Gabriel Auguste.
Marignac, Jean Charles Galissard de.
Nägeli, Carl.
Weierstrass, Carl.

The President then addressed the Society as follows:—

On the occasions of our anniversary our first glance is usually retrospective, in memory of those once among our numbers, but now surviving only in their works. On our home list we have this year lost more than a score of Fellows. On the foreign list we have lost but one; that loss will however be severely, if not so widely, felt.

In Michael Chasles mathematicians recognise a geometer of unusual powers, who, having devoted a long life to his favourite study, has left an extensive and characteristic train of researches behind him. But a larger circle of friends recognised in him a great and good man, beloved by all who knew him, and respected beyond the range of his personal acquaintance. As a pure geometer he belonged to a class of mathematicians for which the Academy of Sciences of Paris has long been justly celebrated; but whose numbers appear liable to a perceptible fluctuation, perhaps partly owing to the brilliant opportunities and the varied fascinations which modern algebra offers to the student. Eminent in a nation which has always been intolerant of obscurity in Science, he showed in a remarkable degree how much might be elicited through precision of thought and by clearness of exposition from a few well-selected and fertile ideas. Such, for instance, proved to be the consideration of Anharmonic Ratios, the principle of Correspondence, and the method of Characteristics. Whether in the latter he had struck a vein so completely out of the range of the analyst, as he himself supposed, may perhaps be still claimed as an open question;

but certain it is that he showed the fertility of the method by continuing to deduce from it an apparently inexhaustible flow of theorems, even after the more serious part of his mathematical work had been done. And there is little doubt that long after the time when many subsequent works have fulfilled their purpose, and have fallen into a natural oblivion, his "Aperçu Historique," his "Géometrie Supérieure," and the fragment of his "Traité des Sections Coniques," will be regarded as classics in the library of the mathematician.

Turning to the home list, the remark made in my last address, viz., that our losses had been mainly among our older Fellows, might be repeated with even more emphasis on the present occasion. Of the twenty-two who have died during the intervening period nine had reached the age of three score and ten, eight that of four score, and one, Dr. Billing, had attained his ninety-first year.

In Lord Beaconsfield and Sir James Colvile we have lost two distinguished members, elected under the statute which gave a new definition of the privileged class a few years ago. Lord Hatherley will be recollected as having served on our Council within recent years, and as having often given us very useful advice on subjects requiring the sound judgment of an experienced mind. Although Lord Hatherley would doubtless have been elected, as a member of the Privy Council, under the statute above mentioned, it is perhaps worth remark that he was elected under statute previously existing, and that his fellowship dated from the year 1833.

The late Dean of Westminster furnishes another instance of the wise exercise of a power which the Royal Society has always reserved to itself, notwithstanding the changes made in 1847, of electing from time to time men of eminent distinction in other avocations of life than those of strict science. Of Dr. Stanley's attainments and merits in those other directions it is not my province to speak; and, indeed, it is the less necessary that I should do so, for they were so many and so varied that in one way or other they were known to all. But he was conspicuous, both among the members of his own profession and among many others who have neither predilection nor training for actual science, for his genuine and honest sympathy with its principles and its objects, and with the labours of those who cultivate it.

In Dr. Lloyd, whose age was coeval with the century, and who was a fellow-worker with Herschel, Whewell, Peacock, and Sir W. R. Hamilton, we seem to have lost one of the links which connected us with a past generation. While himself no mean mathematician, he was distinguished especially in the sciences of optics and of magnetism. In the subject of optics he had the rare opportunity of supplying the experimental verification of Sir W. R. Hamilton's brilliant geometrical conclusions on the configuration of the wave-surface; and it was largely due to his patience, his delicacy of touch, and

his almost instinctive sagacity, that the phenomena of conical refraction were first made visible to human eye. In magnetism he assisted in the formation of the great survey of the globe, initiated by Sir E. Sabine, and as director of a magnetic observatory in Dublin he made valuable contributions to the subject. His scientific remains, brought together in one volume, have been a welcome addition to the library both of the mathematician and of the experimentalist. His interest in science and in its promoters was active throughout his long life; and those on whom the honorary degree of LL.D. was conferred at the late meeting of the British Association in Dublin, will always cherish as a pleasant reminiscence the fact of having received it at his hands.

Dr. Bigsby was one of the earlier cultivators of Geology. Some of his first studies were made at a time when the subject was hardly a science; but in attaining the advanced age of eighty-nine he lived to see it what it has since become. He founded a medal at the Geological Society, of which he was for many years a member.

We are again reminded of the progress which has been made in science, and in the cultivation of it during the present generation by the fact that until the last day of last year we could reckon among our Fellows Dr. John Stenhouse, one of the surviving founders of the Chemical Society.

On the subject of our property there is little change to report. Further investments have been made in due course on account of the Fees Reduction Fund. The sale of the Acton estate has not yet been completed, but a deposit is in hand, and a half-year's interest on the balance has been received.

The Charitable Trusts Bill, which was introduced into Parliament last session, and which would have affected our interests had it not been for a clause introduced by our Fellow the Marquis of Salisbury, specially exempting the Royal Society from its operation, was withdrawn.

The collection of portraits in the possession of the Society has been enriched by the addition of a portrait of Sir Joseph Dalton Hooker, painted by John Collier, Esq., at the expense of a considerable number of our Fellows, who were desirous of expressing their sense of the important services rendered by Sir Joseph to the Society, and at the same time of securing a permanent memorial of their late President. It is to be hoped that advantage may be taken of any suitable occasions that may arise from time to time of adding to our gallery of historical records of the great men whom we have reckoned among our Fellows.

The Fellows will learn with satisfaction that the first part of the new edition of our library catalogue is published. This part, consisting of 232 pages, contains the Transactions, Proceedings, and Journals published by Societies and Institutions in nearly all parts of the world;

and also the observations, reports, and accounts of surveys which are to be found in our library. As our Library Committee has always devoted great attention to securing by exchange or by purchase publications of this class, and as the main strength of our library consequently lies in our collection of them, the part in question will form the most important section of the entire catalogue.

Progress has also been made in the more voluminous portion of the catalogue, viz., that of the general collection of scientific books, of which thirteen sheets, extending to the letter C, are printed off, or are in type. It may fairly be hoped that before our next anniversary the whole will be published.

The last part of the Philosophical Transactions for 1880 was published in March of the present year, completing a volume of nearly 1,100 pages, with upwards of fifty plates. Of the Transactions for 1881, Parts I and II have already appeared; from which an early publication of Part III may be anticipated.

Of the Proceedings, vol. 31 was published in June, and vol. 32 at the end of October.

Although, as I remarked last year, we are more concerned with the quality than with the quantity of the communications made to the Society, it may still be interesting to carry on the table of the number of papers presented per annum to a tenth year. It stands as follows:—

1872	.. ..	99	papers received.
1873	.. ..	92	,, ,,
1874	.. ..	98	,, ,,
1875	.. ..	88	,, ,,
1876	.. ..	113	,, ,,
1877	.. ..	97	,, ,,
1878	.. ..	110	,, ,,
1879	.. ..	118	,, ,,
1880	.. ..	123	,, ,,
1881	.. ..	127	,, ,,

These 127 papers include one from Mr. Brooks of Baltimore, two from Professor Helmholtz, and one from Captain Mannheim, of the École Polytechnique, Paris. On reference to the papers themselves it will be noticed that several prominent men are carrying on with vigour the series of researches on which they have been, in some cases for years, engaged. Among them there may be mentioned, in physics, those of Professors Liveing and Dewar, and of Mr. Lockyer, on the Spectra of Terrestrial Substances and of the Sun; those of Professor Hughes on minute Interactions of Electric Currents and Magnetism; those of Mr. Crookes on High Vacua; and those of Mr. H. Tomlinson on the effect of Stress and Strain on the action of Physical

Forces. Mr. G. H. Darwin continues his already classical memoirs on the mechanical history of the solar system; and Captain Abney has opened out to view, by photographic means of his own invention, a part of the spectrum of the sun and of other bodies, beyond the red, hitherto invisible; and last, but not least, Professor Tyndall in his Bakerian Lecture has given an account of his researches on the action of free Molecules on Radiant Heat, and its Conversion thereby into Sound. In Biology, I may mention the investigations of Mr. Romanes on nerve systems; those of Professor Ferrier on the connexion between special portions of the brain and special motor organs of the animal system; those of Mr. Parker on the Skull of the Batrachia, and of Professor W. C. Williamson on the fossil plants of the Coal-measures. Among the newer subjects, the experiments of Dr. Young and Professor George Forbes on the velocity of light of different colours have naturally arrested considerable attention, for several reasons and especially because the conclusions thence deduced, if ultimately established, would fundamentally modify our views of the constitution of the luminiferous ether.

For several years past I have been able with much satisfaction to report that there had been no change in the staff of officers of the Society. I much wish that I could have done so again. But the longer a capable man lives and is available, the more will work accumulate on his hands; and the time at last comes when something must be given up, lest, in the multiplication of avocations, powers which might otherwise have been devoted to some great and good purpose, and on operations not within the grasp of everyone, should become dissipated among a variety of objects. A feeling that life must not be spent merely in running hither and thither, and a desire that it should be something better than a mere feat of mental agility exhibited in passing rapidly from one occupation to another, doubtless operated in leading Sir Joseph Hooker to resign the Presidentship; and a similar feeling has recently led to the resignation of the Secretaryship by Professor Huxley. That this loss is great will be felt by every Fellow of the Society; it will be more keenly felt by his brother Secretaries and the Treasurer, but most of all by your President. Connected as I have been with him through a series of years by ties of office in the Society, by bonds of friendship and trust as thorough as can exist between man and man, I cannot but miss for a long time to come his ever willing support, his sound counsel and advice, and the cheery manfulness with which he would always address himself to any business however difficult, uninviting, or heavy.

The post is one which it is not easy to fill. Many qualifications go to make up a good Secretary; and although none of us so "despaired of the republic" as to doubt that a good successor would be found, we still felt some anxiety until we were in a position confidently to

recommend a name for your consideration. Professor Michael Foster's great scientific attainments, his administrative powers as shown in founding the great School of Biology at Cambridge, the confidence with which he inspires all around him, alike point him out as a man eminently fitted for the post. It would indeed have been agreeable to your President to have had one of the principal Secretaries resident in London; but the means of communication are now so different from what they formerly were, that questions of distance almost disappear; and it is certainly not without its advantages that the two principal Secretaries, if not resident in London, should reside in the same city.

In the course of the spring of the present year, Sir Joseph Copley, the present representative of the Founder of the Copley Memorial, explained in a visit to the President his wish to "provide in perpetuity a yearly bonus of £50, to be given to the recipient of the Copley Medal." As the donor's views on the terms of the gift were completely made up, and were not offered for discussion by the Society, or otherwise open to modification, the Council decided to accept the offer in the spirit in which it was made, and on the terms prescribed. In accordance with this, Sir Joseph transferred a sum in Consols sufficient to provide for the bonus proposed. This acceptance will not in any way affect the adjudication of the Medal, nor, it is to be hoped, the high estimation in which that award has always been held.

The period of five years during which the experiment of the Government Fund of £4,000 per annum was to be tried, has now expired. In a former address I have expressed opinions gathered from many of the Fellows of the Society, and have indicated my own. The President and Council have now, at the request of the Department of Science and Art, through which the vote is made, drawn up a report on the question, based upon the experience gained up to the present time, and have made suggestions with a view to a modified arrangement for the future. The Society will be duly informed of the result of those communications. In the mean time it may not be out of place to remind the Fellows that a statement of all grants made within the year is published in the report of our anniversary proceedings.

The Report of the Challenger Expedition, of which mention was made last year, is in the course of publication; and three volumes have now appeared. Copies of these have been presented by the Treasury to our library. Volumes II and III refer to the curious forms of life found in what Sir Wyville Thomson has called the "Abysmal Region," and are copiously illustrated with lithographs. The interest which attaches to this publication is evinced by the fact that the first edition of the second volume is already exhausted. A second edition of it is in the course of printing. The Fellows will

doubtless have observed, that the printing of the text and the execution of the plates are maintained at the same high standard as that exhibited at the outset.

Among other scientific publications of the year, I may mention the third volume of Roscoe and Schorlemmer's work on Chemistry, Mr. Balfour's work on Comparative Embryology, and Mr. Darwin's on Vegetable Mould.

In December last the Council authorised the loan of the "Philosophical Transactions" from one of our complete sets, five volumes at a time, to the Delegates of the Oxford University Press, for the preparation of a Philological English Dictionary, under the editorship of Dr. Murray. It is hoped that this loan will contribute to the completeness of the work in respect of scientific terms. Forty-one volumes have been already utilised in this way.

Towards the close of last session a communication was received from the India Office enclosing a copy of a report and memorandum, on Pendulum Observations, by Major Herschel, and asking the advice of the President and Council thereon. Subsequently there followed another communication from the same office, enclosing a copy of a letter from the same officer, with an extract from a letter to him from Mr. Peirce of the United States Coast Survey. These documents were referred to a Committee consisting of Sir George Airy, Professor J. C. Adams, and Professor Stokes.

The Report of that Committee was forwarded to the India Office; the following extracts from it contain those parts which refer to the main scientific questions raised:—

"The object in referring these documents to the Royal Society was to assist the India Department in coming to a conclusion as to what, if anything, might yet be required in order to render the pendulum operations which have been carried out in connexion with the great trigonometrical survey of India reasonably complete as an important contribution towards the determination of gravity all over the earth.

"At present the stations which have been directly connected with the Indian stations are confined to Aden, Ismaïlia in Egypt, and Kew; and no one of these has been differentially connected with any of the chains of stations that have hitherto been used in the determination in this way of the figure of the earth, though Kew is now a station at which an absolute determination has been made. We think it would be a reasonable expectation on the part of the scientific public that the Indian group of stations, which have already been connected with Kew, should be differentially connected with at least one chain of stations which are so connected with one another, and which have been employed in the determination of the figure of the earth.

"We approve accordingly of the suggestion that gravity at Kew

should be compared, by means of invariable pendulums, with gravity at another station belonging to another group. Greenwich has been named as such a station.

"In connexion with this subject, we would refer to the suggestion, which has been brought before us, made by Mr. Peirce, of the United States Coast Survey, that Major Herschel should swing the same two pendulums that were used in India, first at Kew and then at Washington.

"As Washington is, or shortly will be, connected differentially with a large chain of stations widely distributed in America and elsewhere, we think that the value of the Indian series would be decidedly increased by being connected with one of the American stations, such as Washington. We think, however, that its connexion through Kew with one of the older series should not on that account be omitted.

"The observations required for the purpose of these connexions are such as certainly can be made, and have been made, by existing methods; and the labour of making them, which will be approximately in proportion to the number of stations at which the pendulums will have to be swung, is only a fraction of that already incurred on the Indian stations, and the three which have been included in the same group with them."

In October last a letter was received from the Treasury asking the opinion of the President and Council respecting arrangements for observing the Transit of Venus in 1882. Under the advice of a Committee appointed for the purpose, it was recommended that a special Committee of the Royal Society should be appointed to decide upon the observations considered essential, and to advise Her Majesty's Government as to the best method of carrying them out. In conformity with this advice, and at the request of the Treasury, a Committee was appointed to draw out a scheme of stations, and of the constitution, strength, and equipment of the observing parties, and to frame an estimate of the total cost. The Committee reported recommending the adoption of certain stations in South Africa, the West Indies, Australia, and New Zealand, and the Falkland Islands; and they at the same time added other particulars, and furnished an estimate of the whole, adopting in the main the recommendations of that Committee; the Treasury then requested the President and Council to nominate an Executive Committee, by which (accounting to the Treasury) any vote of Parliament for the purpose of these observations might be administered; and under whose advice the observers and assistants might be selected and appointed. In compliance with this request the following Fellows were nominated as an Executive Committee, viz., the President, Professor J. C. Adams, Sir G. Airy, Mr. Hind, Sir G. Richards, Professor H. J. Smith, and Mr. Stone. That Committee is now con-

tinuing its labours, and has appointed its member, Mr. Stone, of the Radcliffe Observatory, Oxford, directing astronomer of the expeditions; and under him the selection of instruments, as well as the training of the observers, will be made.

With a view of making the observations ultimately as comparable as possible, the Committee, at an early stage, put itself, through the Foreign Office, into communication with the corresponding Commissions in foreign countries, on the subjects of the instructions to be given to the various observers; and a draft set of instructions, drawn up for this purpose, was circulated for comment and suggestion.

Moved perhaps in some degree by this action, the Government of France took advantage of the assemblage of scientific men collected in Paris for the Electrical Congress and Exhibition, to summon a Congress of Astronomers, having especially in view a consensus of arrangements for the observation of the Transit. This Congress met in Paris on the 5th of October, under the auspices of the Minister of Public Instruction. M. Dumas was appointed President; MM. Foerster and Weisse, Vice-Presidents; MM. Tisserand and Hirsch, Secretaries. The various countries of Europe were represented; but it was a matter of much regret that no representative from the United States of America was present. Mr. Stone attended on behalf of the British Committee. I must here express my regret at having been unable to attend in person to support our Directing Astronomer, who made the journey at much inconvenience to himself; but I should at the same time add that my absence in no way diminished the effectiveness of Mr. Stone's counsels, which proved of great service in promoting a unanimity in the views finally adopted by the Congress.

Two Committees were appointed (1) for the selection of stations; (2) for a discussion of methods of observation.

As the British stations had been already chosen and did not admit of material alteration, the first of these Committees did not directly concern us. But, judging from the number of observations contemplated to be made in South America by foreign expeditions, it seems not impossible that the party which we had proposed for the Falkland Islands might be advantageously transferred to some other locality, so as to strengthen the parties requiring support, for example, in Australia.

As regards the discussion of methods, the draft instructions drawn up by the British Committee, and especially the definition of contact to be observed, strongly insisted upon by Mr. Stone, were in the main adopted. The following are the principal points agreed upon :—

With a view to uniformity of method of observation, it is necessary that instruments of nearly the same aperture, 6 inches, should be used, also that the observations of contact should be made in a field of just sufficient brightness to allow of the clear separation

of two threads at one second of arc apart when seen projected on the sun with a power of 150. The times corresponding to the internal contacts should be defined as follows:—

At Ingress.—"The time of the last appearance of any well-marked and persistent discontinuity in the illumination of the apparent limb of the sun near the point of contact."

At Egress.—"The time corresponding to the first appearance of any well-marked and persistent discontinuity in the illumination of the apparent limb of the sun near the point of contact."

It is a point of primary importance that all the observers shall, as far as possible, observe the same kind of contact; and it is therefore desirable that the times recorded for contacts should refer to some marked *discontinuity* in the illumination of the sun's limb about which there cannot be a doubt, and which may be supposed to be recognisable by all the observers. If a pure geometrical contact is alone seen, there can be no doubt about the time which should be given; but, if haze is noted, it should be haze nearly as dark as the outer edge of the planet; and if a ligament is seen, it should be nearly as dark as the outer edge of the planet.

A further proposal was made to establish a Central Bureau in Paris to receive and discuss the observations, and to enter upon other work more or less directly connected with the determination of solar parallax. But, as this question was not contemplated in the instructions given to our representative, and indeed exceeded the powers of the British Committee, no definitive resolution was passed on the subject.

On the subject of the longitude of a point in Australia, to which I made allusion in my address last year, as important for the observations of the Transit of Venus, I have lately received a letter from Mr. Todd, of the Observatory, Adelaide, from which the following is an extract: "With regard to the determination of Australian longitudes: as it is understood that Lieut.-Commander Green, U.S.N., will call at Port Darwin to determine its longitude by signals from Singapore on the one side, and with the Adelaide Observatory on the other, I have taken no further steps for going to Port Darwin as previously arranged. I shall take all the necessary observations here, and exchange signals with Lieut.-Commander Green over my overland telegraph; and, in conjunction with Messrs. Ellery and Russell, make fresh determinations of the difference of longitude between Adelaide, Melbourne, and Sydney."

Since our last anniversary, Sir George Airy, the late Astronomer Royal, having completed his eightieth year, and nearly half a century of office, has retired. Of his services to science, and to this Society as President, and in other ways, the time to speak has happily not yet arrived. His great intellectual powers are in fact in no way impaired,

and so far from having brought his period of activity to a close, he hopes to employ his well-earned leisure in completing a favourite work, the Numerical Lunar Theory.

His successor, Mr. Christie, from his long experience in the Royal Observatory, will combine a thorough training in the remarkable organisation and methodical administration for which his predecessor was so conspicuous, with the full vigour of life, and an active interest in the more modern developments of astronomy, in which he is already distinguished.

The future of the Royal Observatory is a subject on which the mind of Sir George Airy often exercised itself, and to which he alluded more than once in his Reports to the Board of Visitors. With his fundamental proposition that, observational astronomy, in its bearing on the improvement of navigation, must always be its main line of work, every one must agree. Over and above this, the expressed wish of the Board of Visitors, and the practice of the last few years, have already sanctioned the addition to the ancient duties of the Observatory of some of those long and systematic series of observations, such as that of the solar protuberances, and the motion of the fixed stars in the line of sight as shown by the spectroscope, which are beyond the scope of an amateur, and above the power of any individual astronomer, however devoted to his work, to permanently maintain. How far it may be desirable to continue magnetic and meteorological observations beyond the necessities of an astronomical observatory, are questions which will doubtless engage the attention of the present director. The main question must be, what distribution of these branches of study among Greenwich, Kew, and other establishments, will in the end best conduce to the progress of science. And with a view of giving full scope to the judgment and skill of the present and future holders of the office the Board of Admiralty have, as I understand, decided to consider a revision of the terms of the Royal Warrant under which the appointment is made.

This year has been signalised by the meeting of a most important scientific congress—the International Congress of Electricians, held at Paris. The recent developments of the practical applications of electricity rendered the occasion favourable both for organising a special exhibition devoted solely to this branch of science, and also for assembling the electricians of all countries.

The general purpose of this Congress was to discuss, and, if possible, to settle, some of the numerous difficulties which perplex both the physicist in his studies and the constructor in his work.

But chief among the subjects proposed to, and undertaken by, the Congress was that of fixing a system of electrical measures for international adoption.

Perhaps in no subject is the necessity of uniform system of standards so striking as in electricity. This science, both in its practical applications, such as telegraphy, and in the great natural problems of terrestrial magnetism and atmospheric electricity, refuses to recognise any artificial divisions of the surface of the globe, whether ethnological or political. It rarely happens, in operations undertaken on so large a scale as the study of electricity and its industrial applications, that an opportunity presents itself of arranging for concerted and harmonious action through a period extending to a distant future. Before a branch of industry has attained sufficient importance to claim international recognition, it has usually gone through the process of considerable development in different countries; and in each of these developments it has often received a stamp of local character which makes it difficult to reduce the whole to one uniform system. But in the case of electricity there were fortunately present special circumstances which facilitated the adoption of uniform standards. Foremost among these was the fact that the development of its practical applications, in other departments than telegraphy, were so recent that it was not too late to legislate for it as though it were but just about to begin. Secondly, the international character of telegraphy, and the fact that the manufacture of its apparatus had always been confined to the great centres of civilisation, had both tended to limit the number of existing systems of measurement, and prevented that multiplicity of standards which would certainly have arisen had such manufacture been carried on in numerous and in isolated localities. But by far the most important influencing circumstance was the happy idea due to the British Association of adopting standards based on absolute measures. The Association did not allow the idea to remain barren; but, through the instrumentality of its Committee on Electrical Standards, it gave to the world the admirable units of the Ohm, the Volt, and the now re-christened Weber; and the eminent men who formed that Committee may now point with honourable satisfaction to the fact that the Electrical Congress decided unanimously to recommend for universal acceptance those units which that Committee so early adopted.

With the single exception of the unit of current which, in order to avoid an ambiguity in the signification of Weber, receives the title of Ampère, the names are left substantially without change.

The adoption of these units for international use is to be preceded by a new and more careful redetermination of the ohm at the hands of the great physicists of all nations. And it is intended that this redetermination shall result in a standard for general adoption. Thus electricity will be the first of the practical sciences to be freed from all difficulties due to local standards; and it is to be hoped that this example may be followed in other sciences concerned with practical life.

The following are the actual resolutions adopted by the International Congress of Electricians at the sitting of September 22nd, 1881:—

1. For electrical measurements, the fundamental units, the centimetre (for length), the gramme (for mass), and the second (for time), are adopted.

2. The Ohm and the Volt (for practical measures of resistance and of electromotive force or potential) are to keep their existing definitions, 10^9 for the Ohm, and 10^8 for the Volt.

3. The Ohm is to be represented by a column of mercury of a square millimetre section at the temperature of zero Centigrade.

4. An international commission is to be appointed to determine, for practical purposes, by fresh experiments, the length of a column of mercury of a square millimetre section which is to represent the Ohm.

5. The current produced by a Volt through an Ohm is to be called an Ampère.

6. The quantity of electricity given by an Ampère in a second is to be called a Coulomb.

7. The capacity defined by the condition that a Coulomb charges it to the potential of a Volt is to be called a Farad.

The remainder of the work of the Congress consisted mainly of the discussion of various interesting questions bearing upon electricity; and although these did not in many cases issue in precise recommendations, yet they were not altogether devoid of practical results. The questions which chiefly attracted its attention were those of terrestrial magnetism and earth-currents, atmospheric electricity, and the more practical but perplexing question of lightning conductors. In all these matters the need of close and continuous intercourse between the observers of different nations was strongly felt; and the Congress passed resolutions recommending combined action both in the way of observations carried on simultaneously and with like apparatus, and also of frequent if not continuous telegraphic communication of the results of these observations. The organisation of so extensive and perhaps so costly a system of combined observations must depend to a great extent on the various Governments, and also on the goodwill and generosity of the great telegraphic companies; but it is much to be wished for the sake of science, that some progress in that direction may soon be effected. The present state and prospects of electro-physiology also received careful discussion, but the difficulties of the subject precluded any definite conclusions. The same was the case with the question of photometry as applied to the intense light with which electricity furnishes us. Resolutions recommending the adoption of certain provisional photometric standards were passed; but these only evidenced the strong feeling that prevailed in the Congress, that some new departure must be made, and that a new standard

of illumination (such as perhaps the glow of platinum on the point of fusion) must eventually be adopted for electric lights.

I have described the more important of the results of the deliberations of the Congress. Perhaps, however, the most important of all (with the exception of the choice of electrical units) will prove to have been the impetus given to electrical science by the interchange of ideas that took place among the leading physicists of all nations, and the light that was thrown on the various problems which came under discussion in the meetings of the Congress.

I cannot conclude this imperfect sketch of this important Congress better than by quoting the eloquent words of M. Dumas at the conclusion of its sittings:—"Greek mythology, in its happy personification of the forces of nature, placed the winds and the waves under the direction of divinities of the second rank; it made the celestial representative of light its god of poetry and of the arts; and by an admirable forethought, it reserved lightning for Jupiter. Science and industry have long since laid their hands on the forces which air and water have placed at the disposition of man. Steam, animated by fire, has enabled him to overcome many obstacles and to rule the waves. Light has no longer any secrets from science, and the arts are daily multiplying its marvellous applications. But there remained one labour to accomplish; namely, to wrest lightning itself from the hands of the ruler of the gods, and to bend it to the needs of humanity. This is the feat which the nineteenth century has now accomplished, and of which this Congress is the evidence and the witness. This feat will mark an epoch ever memorable in history; and, amid the turmoil of politics and of questions which agitate the human mind, it will be recognised as the characteristic feature of our era. The nineteenth century will be the century of electricity."

After the Congress, one of the most remarkable events during the present year has undoubtedly been the Electrical Exhibition in Paris. I do not of course purpose to describe it, as many of our Fellows visited it; and full descriptions have reached us through various channels. One point, however, must have struck those who examined any considerable number of the objects; and this I mention, not as in any way disparaging them, but rather as illustrating the stage to which electrical science has attained; namely, that while the assemblage of instruments and appliances was in every way remarkable, and while very great ingenuity and skill had been expended on their contrivance and construction, yet the amount of novelty in the principles involved was comparatively small. Of new combinations, improved methods, and adaptations in detail there was abundance. Some of them even removed former inventions from the category of curiosities to that of instruments for practical employment; or enlarged their sphere of utility from that of the laboratory

to that of everyday use. But such is the mass of fruitful matter which science has furnished to the mechanician and constructor, that we might almost wish, from the point of view of the latter, that they may have time to work out more fully than has yet been done, the results of science, before they are called upon to elaborate any fresh materials.

It is now proposed to repeat as far as may be, this Exhibition, at the Crystal Palace; and the energy with which the proposal has been taken up, and the response with which it has met in many quarters, appear to justify sanguine expectations of its success, at all events from a practical and popular point of view. From the side of science, it would doubtless have been far more interesting to look forward to a fresh Exhibition, either here or elsewhere, of the progress of electricity after an interval of two or three years. But there is nothing in the present undertaking to interfere with the more advanced project, if, after some such period as that indicated, circumstances should prove favourable. In the meantime, it must be remembered that there are very many persons to whom the Paris Exhibition would have proved both interesting and instructive, but who, from one cause or another, were prevented visiting it. Besides this, there are not a few commercial, and even municipal, bodies desirous of adopting some of the modern applications of electricity, but who would be more ready to avail themselves of them after a personal inspection of the instruments and of their mode of action. From this point of view the Exhibition may fairly be expected to give considerable impulse to the adoption of electrical appliances in fresh quarters.

But even over and above this practical aspect of the undertaking, there may still have been at the epoch of the Paris Exhibition, some results on the eve of achievement, some remedies for defects, sufficient to transform a doubtful into a certain issue, or even a failure into a success; some steps which may open out new questions, or serve as a departure for new investigations in the subject of electricity. If such should be the case, even science may derive substantial benefit from the proposed undertaking.

But the present year has been rendered generally remarkable, amongst other things, by the multiplicity of its Congresses. Apart from those which are concerned with subjects not coming under the head of "Natural Knowledge," there have been held the annual meetings of the British Association, and of the Iron and Steel Institute; the International Medical Congress, in London; the special Congresses on Electricity and on the Transit of Venus, in Paris (mentioned above); that on Geography in Venice; that on Geology in Bologna, and others.

Among all these, the International Medical Congress which this

year met in London, stands conspicuous. The work of that meeting showed that the study of medicine by the real workers is, in every part, even the most practical, pursued in a thoroughly scientific spirit; that facts are industriously collected, and patiently grouped and compared; and that conclusions are, if sometimes hastily drawn, yet very cautiously accepted. And there was ample evidence that help, whether in apparatus or in knowledge, is eagerly accepted from all the other sciences whether their range be far from, or near to, the biological. In short, in the opinion of those best qualified to form a judgment, it is not too much to say that the whole tone of the proceedings of the Congress, though chiefly concerned with practical questions, was, in the best sense, even in the sense which the Royal Society would give to the term, scientific.

Several of the societies meeting annually, or at longer periods, have organisations which, during the intervals between two successive meetings, do useful work. But in all cases the meetings form the most prominent, if not the most important feature of their life; and, speaking particularly of the meetings themselves, the question has more than once been raised whether they continue to justify the efforts necessary to bring them about. It has been argued that, so many are the scientific periodicals in every civilised country, that all the papers of importance communicated to the meetings would under any circumstances be published in some place or other. Again, it has been urged that, so numerous are the centres of science, so many the means of communication both between places and between persons, that the necessity for these gatherings has, in the natural course of events, become superseded. The time which such meetings and the preparation for them involve, and the trouble which they entail on men already burdened with much work, have also been pleaded on the same side, and objections have been taken on the ground of the useless and irrelevant matter which is too apt to crop up on these occasions. These arguments are certainly not without weight; but there is still another side to the question. It is, indeed, quite probable that all the more important papers would be published even if the meetings never took place at all. But at these meetings there are usually a number of communications, many, but not all, of local origin, the production of which has been stimulated by the meeting itself; and a fair number of these may be reckoned on the side of gain. Again, it is true that the original idea of a parade or march past of science, valuable enough when the provinces heard or saw little of science, has become less important now that provincial centres are to be found in almost every large town in the country. Nevertheless, the mere presence of some of the leading men stimulates dormant powers and encourages rising aspirations; and this perhaps all the more the case for the very reason that science and scientific names are no longer unknown. That

most of the leading men have opportunities of meeting from time to time, and for scientific purposes, is certainly true; but that they should meet also on occasions when science is not too formal, is a thing which has its uses. And a concurrence of minds more numerous and more diversified than usual is sure to be fruitful of results. The whole advantage of these meetings, however, depends ultimately and fundamentally on the presence of a strong scientific element, which, from its own mere dignity and character, will repress all that is unworthy and will leaven the whole lump. Acting on this principle as a scientific duty, many good men have attended these meetings; and although they may have approached them with some degree of reluctance, few who during their attendance have taken their fair share in the proceedings, have come away without having derived a more favourable impression than that with which they entered.

Of such gatherings, the late meeting of the British Association at York was, if I may be permitted to express an opinion, a pattern and exemplar. And although it cannot be expected that in every year there will be so strong a muster as on the occasion of the fiftieth anniversary, yet all well-wishers of the Association must feel that it has entered upon its second half century with vigour and with dignity, and that it now remains only for its future supporters to maintain the high standard with which it has been handed down by those who have gone before.

It may be a matter of regret, although doubtless inevitable, that the same causes which have affected the social, the intellectual, the industrial, and the political life of our generation, and have made them other than what they were, should affect also our scientific life; but, as a matter of fact, if science is pursued more generally and more ardently than in former times, its pursuit is attended with more haste, more bustle, and more display than was wont to be the case. Apart from other reasons, the difficulty, already great and always rapidly increasing, of ascertaining what is new in natural science; the liability at any moment of being anticipated by others, constantly present to the minds of those to whom priority is of serious importance; the desire to achieve something striking, either in principle or in mere illustration; all tend to disturb the even flow of scientific research. And it is perhaps not too much to say that an eagerness to outstrip others rather than to advance knowledge, and a struggle for relative rather than for absolute progress, are among the dangerous tendencies peculiar to the period in which we live. I do not, of course, for one moment mean to imply that this tendency universally prevails; for in Science, as well as in other pursuits, I believe that the best of the present would well stand comparison with the best of the past, and that there are nowadays men in the mid-stream of life who are as little affected by the eddies and back-waters with which they are sur-

rounded as were the giants of former days. Nevertheless the danger is a real one and is to be met with at every turn.

But the part of Cassandra is neither agreeable to the player nor welcome to the audience; nor is it indeed necessary that I should play it; for, even although what I have said be true, it is still, I trust, not the whole truth. I have already spoken of noble exceptions; but, although noble exceptions may go far to redeem the character of a nation or of a period, and example may have influences of which we hardly dream, yet for a general remedy I am more inclined to look to the natural course of events, and to what is often loosely spoken of as "things curing themselves." Such a cure may perhaps come about somehow on this wise. So multitudinous are the workers in every science, so numerous are the channels through which their discoveries are chronicled, that it is becoming every year more difficult for even the learned and the well read to say what is and what is not new, or what has not been published before. Claims for novelty must, therefore, as time goes on, be put forward with greater and greater diffidence. The only originality that can be safely claimed will be originality on the part of the investigator; and the question of absolute priority must be left to the verdict of time and of that sifting process by which ultimately all discoveries will find their proper places in the Temple of Science.

When this stage is reached, and we are even now approaching it, the fever of to-day may in a great measure subside and give place to a more tempered, although still fervent, glow of aspiration. The eagerness and haste to which we have become almost accustomed may be chastened by the reflection that questions of priority are not to be settled by a mere stroke of the pen, and that in the comparison of rival claims the question of the quality of work will undoubtedly arise and become interwoven with that of priority. And so, in the end, it may come to pass that a half-understood experiment or a hastily drawn conclusion may avail less than ever for establishing a reputation, and that, even for the purpose of winning the race, it may be worth while to spend sufficient time in laying sure foundations and in building a superstructure commensurate with that on which it stands and well proportioned in all its parts.

The transference of the Natural History Collections of the British Museum to the new building at South Kensington is still in progress. It is hoped that the building for the specimens preserved in spirits, as well as the fittings for the zoological department, will be so far completed as to allow of the moving of that department during the autumn of 1882. The lighting of the reading room by Siemens' lamps is so far satisfactory, that it has been decided to keep that room open in future until 8 P.M., instead of 7 P.M. This change, it is hoped, will prove to be of substantial service to a large class of readers.

The Institution founded in 1851, under the title of the Government School of Mines and Metropolitan School of Science applied to Mining and the Arts, for the instruction of students in those branches of Science which are indispensable to the Miner, the Metallurgist, the Geologist, and the Industrial Chemist, has this year been organised afresh, and, under its new title of the Normal School of Science and Royal School of Mines, adds to its former functions the training of teachers for the Elementary Science Classes under the Science and Art Department, the multiplication of which, in recent years, is a significant indication of the rapid spread of scientific instruction throughout the country.

The accommodation requisite for practical teaching being inadequate in all cases and totally wanting in respect of many of the classes, in the Museum of Practical Geology in Jermyn Street, and in the Royal College of Chemistry in Oxford Street, all the instruction, except that in Mining, has been transferred to the Science Schools at South Kensington. The staff of Professors and Lecturers has been increased, and provision has been made for the teaching of various important subjects, such as Mathematics, Drawing, Botany, and the Principles of Agriculture, which were either omitted, or insufficiently represented, in the original programme of the school.

Under its new organisation, the Normal School of Science and Royal School of Mines will not merely supply from among its associates persons highly qualified to apply the principles of science to the Mining, Metallurgical, Chemical, and Agricultural industries of the country, and properly trained science teachers; but, through the exhibitions attached to the yearly examinations of the Science and Art Department, it will place within reach of promising young students in all parts of the country, whose means do not enable them to obtain the benefits of a University education, such a training as will enable them to turn their natural abilities to account for the advancement of science and the improvement of its applications to industry. Under the latter point of view, the instruction given in the Normal School of Science will lead up to the special technical training of the Central Institute of the Guilds of the City of London.

Under the auspices of the City and Guilds of London Institute, further progress has been made during the past year in the promotion of Technical Education. It will be remembered that the work at present undertaken by the Institute embraces the establishment of a Technical Science School in Finsbury, a Technical Art School in Kennington, a Central Institution or Higher Technical College in Kensington, the subsidising of existing institutions, affording facilities for Technical Instruction and the encouragement of existing classes in the manufacturing centres by the grants paid to teachers on the results of the Technological Examinations.

In May last the foundation stone of the Finsbury College was laid by H.R.H. Prince Leopold, and the new building, which will afford accommodation for the teaching of applied Chemistry, Physics, and Mechanics, will be finished early in next year. Notwithstanding the inadequacy of the present temporary accommodation, large numbers of students have availed themselves of the instruction afforded. The principles of Electric Lighting and Transmission of Power, the making of Electrical Instruments, Coal Tar, and Spirit Distilling have been the subjects that have been chiefly studied during the past session.

Since October the classes that were previously conducted by the Artizans' Institute have been transferred to the Finsbury College.

The Institute has under its consideration the establishment of a School for Applied Art in connexion with the Finsbury College. Acting on the general principle that every Technical School of this kind ought to provide, in addition to the general course of instruction, as applicable to different industries, special courses applicable to the staple industry of the district, the Council of the Institute are contemplating the establishment of classes in the Finsbury College adapted to the educational requirements of those engaged in Cabinet-making. With this object it will be necessary to attach a School of Design to the College.

The influx of pupils to the studios in Kennington have induced the Council to vote a sum of money for the extension of the building in which the Art School of this district is conducted. These new buildings are nearly completed, and will afford accommodation for classes in Modelling, Design, and Wood Engraving.

The building of the central institution, which is to be in the first place a school for the training of technical teachers, has been commenced. The first stone was set in July last by H.R.H. the Prince of Wales, who is now the President of the Institute. The plans of this building show accommodation for the teaching of the different branches of Physics in their application to various industries, of Chemistry as applied to trade purposes, and of Mathematics and Mechanics in their application to Engineering. A good engineering school, containing workshops, well supplied with machinery and collections of mechanical instruments and models, such as exist in numerous Continental cities, seems likely to be obtained for London on the completion of this building.

This Institute has done much towards the encouragement of technical instruction in provincial towns, where it is most needed, by its system of annual examinations. In the examination held in May last 1,563 candidates presented themselves, in 28 subjects, from 115 centres, and of these 895 passed. A close connexion is being established between the several technical schools which are being now opened in Lancashire and Yorkshire, and the City and Guilds of London

Institute. The demands made upon the Institute by Chambers of Commerce in different parts of England satisfactorily indicate the usefulness of this part of the Institute's work.

The programme of Technological Examinations for 1881–82, just issued, shows 32 subjects in which examinations may be held, some of which are divided into four or five branches, so that they may be better adapted to individual industries. Whilst attention has in this way been given to the details of different trades, the attempt has been made to secure from candidates passing the Institute's examinations a general knowledge of the principles of their subject and of the relation of closely connected industries with one another.

In order to secure in future efficient teachers, the Council of the Institute have determined after March next not to register as teachers any persons except those who have passed the Institute's Honours Examination, or such as already possess special or distinct qualifications.

The interest which the subject of technical education is beginning to arouse has led to the appointment by the Crown of a Commission to inquire into the education of the industrial classes in England and in other countries; and the City and Guilds of London Institute is represented on this Commission by Professor Roscoe, who, as President of the Chemical Society, occupies a seat on the Executive Committee, and also by Mr. Philip Magnus, its director and secretary. The Commissioners are at present engaged in making a tour of inspection in France, a section of them having already visited some of the principal technical schools and factories in the north of Italy.

In Meteorological Science the present year has been marked by the publication of an important work,* by Professor Wild, of St. Petersburg, on the Temperature of the Russian Empire, embodying, in charts and tables, a great amount of information, hitherto either inaccessible or existing only in scattered memoirs, relating to the meteorology of the vast tracts of Northern Asia. As an interesting particular result it may be mentioned that Professor Wild has transferred the "Siberian pole of cold in winter" from the neighbourhood of Jakutsk to a point somewhat further north, lying on the Arctic Circle in (about) E. longitude 125°. At this centre of maximum cold, round which the isotherms lie in fairly regular ovals, the mean temperature in January sinks as low as −54° Fahrenheit, the mean temperature at Jakutsk being 11° higher. In close relation to the phenomena exhibited by these charts, Professor Wild, in St. Petersburg, has been led to study the connexion between areas of permanent high or low mean pressure on the one hand, and areas of permanent high or low mean temperature on the other; and he has found this

* "Die Temperatur Verhältnisse des Russischen Reichs," St. Petersburg, 1880.

connexion to be of the same kind as that known to exist in the case of the shifting areas of high or low pressure, and high or low temperature, which determine the changes of weather. M. Léon Teisserenc de Bort, in Paris, has also investigated the same subject.

The Meteorological Office has completed during the year two works of some interest, which are now ready for immediate publication. The first consists of tables of the Rainfall of the British Isles, prepared at the request of the Council of the Office by Mr. G. J. Symons, F.R.S. These tables include the monthly results recorded at 367 stations in the United Kingdom, being all those for which it was possible to obtain series of observations maintained continuously during the last fifteen years. The second is a volume of charts (with an introduction and explanations) illustrating the meteorology of an ocean district specially important to seamen—that adjacent to the Cape of Good Hope. Some points of novelty are presented by the charts. For example, a new form of "wind-rose," invented by Mr. F. Galton, F.R.S., has been employed, which offers some theoretical advantages over those previously in use, being intended to represent, with geometrical precision, the probability (deduced from the observations) that, in a particular place and at a particular season, a wind blowing between any two given points of the compass will be experienced. Again, for the first time in marine meteorology, the wind observations have been "weighted" with the view of neutralising the tendency to over-estimate the frequency of adverse winds, which has been found to affect meteorological charts injuriously. The work brings into clear relief the most interesting physical feature of the district—one indeed already well known—the intermingling of hot and cold water, brought by the Agulhas and the South Polar currents respectively, and supplies strong evidence for the belief that this intermingling has a large share in producing the atmospheric disturbances so common in the region in which it occurs.

In my Address to the Society in 1879, I stated that an International Conference of a semi-official character had been held, with the view of establishing for one complete year a circle of meteorological observations round the Arctic regions of the globe. Notwithstanding the lamented death of Lieutenant Weyprecht, the gallant young discoverer of Franz Josef's Land, by whom the proposal had been originated, it would seem that the efforts of the Conference are likely to be crowned with success. The following stations have already been undertaken by different Governments: Point Barrow and Lady Franklin's Bay in Smith's Sound, by the United States; West Greenland, by Denmark; Jan Mayen, by Austria; Mossel Bay and Spitzbergen, by Sweden; Bossekop, by Norway; Nova Zembla, by Holland; the Mouths of the Lena, by Russia. The Conference has also been led to hope that the Canadian Government may re-

institute observations at Fort Simpson, and that the Government of France may organise a simultaneous meteorological expedition to Terra del Fuego. It is arranged that the observations should begin as soon as possible after August 1, 1881, and should continue to September 1, 1883.

In astronomy, Mr. Gill has completed his discussion of the extensive series of heliometer measures of the parallax of Mars, which he made at Ascension in 1877, and has deduced the value 8″·78 for the solar parallax, corresponding to a mean distance of 93,080,000 miles from the earth to the sun. A value of the solar parallax has also been derived by Mr. D. P. Todd, from the American photographs of the transit of Venus, 1874. The result for the parallax is 8″·883, corresponding to a mean distance of 92,028,000 miles.

A valuable contribution towards the determination of the moon's physical libration has been made by Dr. Hartwig. From a series of 42 measures made with the Strassburg heliometer he derives values for the physical libration and for the inclination of the moon's axis, substantially confirming the results found by Wichmann, and recently by Professor Pritchard.

An addition to the small list of stars which have been found to have a measurable parallax, has been made by Dr. Ball. He finds that the star Groombridge 1618, which is remarkable for its large proper motion, has a parallax of about one-third of a second, so that it is to be considered one of the sun's nearest neighbours. Dr. Ball has also redetermined the parallax of the double star 61 Cygni, his result being 0″·468, which agrees more nearly with Struve's value than with Bessel's.

The Cape catalogue of upwards of 12,000 stars is the outcome of Mr. Stone's labours during nine years, as Her Majesty's Astronomer at the Cape, and is the most important catalogue of stars which has yet been formed in the southern hemisphere. Another important contribution to stellar astronomy has been made by Professor Newcomb, who has recently prepared a catalogue of the places of nearly 1,100 standard stars compiled from the best authorities.

In connexion with his photometric researches, Professor Pickering has discussed the causes of the variability of stars of short period. Taking the various hypotheses which have been proposed, he finds that for Algol and stars of that type the hypothesis of an eclipsing satellite or cloud of meteors revolving round the star is the only one which satisfies the observed phenomena. In the case of β Lyræ and similar variables the fluctuations of light would be explained as due to rotation round the axis, the two hemispheres being of unequal brightness and the form more or less elongated. Professor Pickering has very carefully investigated the conditions in each individual case, and has brought together the most important facts bearing on the subject. It

may be mentioned that on Professor Pickering's initiative a committee of American astronomers has been formed to co-operate with European astronomers in selecting a series of stars to serve as standards of stellar magnitude.

The present year has been remarkable for the appearance of two bright comets simultaneously visible to the naked eye. The first comet was first seen in the southern hemisphere before its perihelion passage, and burst upon our view in its full splendour soon after perihelion. The most important point in connexion with this comet was that photographs of its spectrum were obtained by Dr. Huggins and Dr. Draper. The former found on his photographs two strong bright lines in the ultra-violet corresponding to a group in the spectra of compounds of carbon, and also a group of lines between G and *h* agreeing in position with another carbon-band. The photographs also showed a continuous spectrum extending from F to some distance beyond H, on which the dark Fraunhofer lines were seen—an indication that part of the light from comets is reflected solar light.

In the visible portion, the continuous spectrum was so bright when the comet was first seen after perihelion that it almost obliterated the ordinary cometary bands. These, however, became afterwards very conspicuous, and five bands were noted, which were found to coincide sensibly with the carbon-bands as given by the flame of the Bunsen burner. On the brightest band, three bright lines corresponding to three lines in the carbon-band were seen by several observers at Princeton, U.S. These observations show conclusively that the spectrum of this comet is identical with the first spectrum of carbon, and not with the second.

In the telescope this comet showed striking changes from day to day, and even, according to some observers, from hour to hour, and the head was remarkable for its unsymmetrical appearance. Another point of interest is that the orbit presents a remarkable resemblance to that of the great comet of 1807. As, however, the period of this latter was found by Bessel to be 1540 years, the question arises again, as in the case of the comets of 1843 and 1880, whether there are not two comets travelling along the same path.

The second bright comet was first discovered with the telescope, and gradually increased in brightness till it became visible to the naked eye, though by no means so interesting an object as the preceding comet. Besides these two bright comets, several telescopic comets have been discovered, raising the total for this year to eight. The last but one of these has proved to be a periodic comet, revolving in the short period of about eight years. It was discovered by an Englishman, Mr. Denning, being the first instance of such a discovery in this country for many years.

The work of the Royal Commission on Accidents in Mines during the past year has been of such great interest, both from a scientific and from a practical point of view, that I venture to note at length some notes upon it, furnished to me by our Fellow, Mr. Warington Smyth, the Chairman.

A preliminary report was presented before the end of the Session 1881, drawing attention, under the chief heads of the subject, to the facts and opinions elicited from the examination of a large number of competent witnesses.

Experimental inquiries, which will be the subject of a further report, have been instituted for the purposes of testing the various safety-lamps in use, as well as the numerous modifications recently proposed, and of determining the effect of coal-dust in causing or aggravating explosions. From time to time, also, experiments have been made with a view to substitute, in the breaking down of coal, some other means for the gunpowder-shots which have so often, by their flame, caused the ignition of fire-damp.

The presence of a powerful "blower" of natural gas at the Garswood Hall Colliery, near Wigan, with the facilities offered by the proprietors, induced the Commission to erect suitable apparatus for a long series of these trials, and now that it appears desirable to compare the results with what may be obtained in another district, and with a differently constituted fire-damp, the whole of the apparatus is in course of erection at a colliery in the Rhondda Valley, where a very permanent "blower" offers similar advantages.

In the course of the lamp experiments it came out very clearly, in confirmation of statements before made, that the greatly augmented ventilation in our larger modern collieries has put an end to the fancied security of the simple Davy and Clanny lamps. Their use in fact, unless they be protected by some farther contrivance, is attended with the most imminent risk when the velocity of a current liable to be rendered explosive, exceeds six feet a second. A high degree of importance thus attaches to the comparative trials of lamps in which the flame is sufficiently shielded against the impinging stream of air, and those which have the property when immersed in an explosive mixture, of rapidly quenching both the flame of the wick and of the burning fire-damp.

The terrible disaster which occurred in September, 1880, at the Seaham Colliery, drew more anxious attention than ever to the question of the part played by coal-dust, and a special reference having been made by the Secretary of State for the Home Department to Professor Abel, C.B., the experiments at Garswood Hall were largely extended. Some of the results were very remarkable; the proportion of fire-damp present with the air may be so small as to elude detection by the ordinary test of the carefully watched

flame in the safety-lamp, and yet the presence of dust in suspension will cause rapid ignition, or even explosion, in a degree varying with the proportion of gas and the velocity of the current. Dust was employed from different parts of the works of several collieries where it was suspected that this agent had borne a serious part in intensifying and spreading explosions; and it was found that some of the varieties were far more sensitive than others. Certain kinds of dust, in themselves perfectly non-combustible, were similarly tested, and proved to have an analogous effect in promoting explosion, even when the percentage of gas was exceedingly small.

It is obvious from these facts that under certain conditions it is very important that a satisfactory indicator of minute proportions of fire-damp should be employed; and the further experiments proposed to be carried out by the Commission will include a particular inquiry into this subject.

The question of the feasibility of the introduction of the electric light into the workings of a colliery has been partially solved. The Stanton Coal and Iron Company were induced by the Commission to make a trial of Mr. Swan's lamps in their Pleasley Colliery near Mansfield. Not only the inset and main road, but some of the "long-wall" faces of work, were brilliantly lighted in this manner. A second experiment of the same kind has been carried out at the Earnoch Colliery near Hamilton.

The use and abuse of explosives in mining operations has in the last few years formed a subject of much inquiry, especially with reference to the firing of shots in coal-seams liable to be invaded by fire-damp. A return to mere wedging in all cases, as proposed by some officials, would be to ignore the advance of science as well as the necessities caused by competition; and the Commission hopes by further examination, and especially by practical trials, to contribute useful information to the solution of a difficult but important question.

Among the applications of scientific apparatus, the employment of the ingenious protected lime-light lamp, and of the portable breathing arrangement of Mr. Fleuss, during the operations for re-opening of parts of the Seaham Colliery, deserves especial notice.

On the motion of Sir Frederick Bramwell, seconded by Dr. Allman, it was resolved:—"That the thanks of the Society be returned to the President for his Address, and that he be requested to allow it to be printed."

The President then proceeded to the presentation of the Medals:—

The Copley medal has been awarded to Professor Karl Adolph Wurtz, For. Mem. R.S. Professor Wurtz has, for many years past,

been one of the most distinguished leaders of the progress of chemistry, and is now the most eminent of active French chemists. The younger generation of French chemists were, for the most part, his pupils. His writings have been the medium by which most of the knowledge of the more modern theories of chemistry has been disseminated in France. His discoveries have been fruitful of the greatest results, not merely in the way of enriching the science with a knowledge of many previously unknown compounds and classes of compounds, but more especially in extending and improving our knowledge of the laws of chemical combination.

It was he who first discovered compound ammonias containing alcohol-radicals in the place of hydrogen—a family of compounds which has since acquired enormous development. It was he who first made those remarkable alcohols called glycols, and thus gave the key to the explanation of glycerine, erythrite, mannite, and the sugars. Many other discoveries of his might be quoted; but those who know the influence which these two have exercised on the progress of chemistry can feel no doubt that the author of them is deserving of the highest scientific honour.

A Royal Medal has been awarded to Mr. Francis Maitland Balfour, F.R.S. Mr. F. M. Balfour's investigations in embryology and comparative anatomy have placed him, thus early in life, in the front rank of original workers in these branches of science. His "Monograph upon the Development of Elasmobranch Fishes," published in 1878, embodies the results of several years' labour, by which quite a new light has been thrown upon the development of several important organs in the Vertebrata, and notably of the genito-urinary and nervous systems. More recently Mr. Balfour has published a most important work on "Comparative Embryology" in two large and fully illustrated volumes, which stands alone in biological literature, not only as an admirable and exhaustive summary of the present state of knowledge respecting the development of animals in general, but by reason of the vast amount and the varied character of the original researches which are incorporated in its pages.

A Royal Medal has been awarded to the Rev. John Hewitt Jellett, F.R.S., Provost of Trinity College, Dublin. Dr. Jellett is the author of various papers on pure and applied mathematics; but the award is more directly connected with his invention of the analyser, known by his name, and for the elaborate optico-chemical researches which he has made with it.

This analyser was introduced by its inventor into the instrument by which he has carried on his researches on the state of combination of mixed solutions, as evidenced by the changes in their power of rotating

the plane of polarisation consequent upon a change in the proportion of the active ingredients which enter into the solution. This is a problem towards the solution of which ordinary chemical methods can contribute but little. A single instance will suffice to give an idea of the nature of the results. It is known that quinine forms with many acids two series of salts, one having twice the quantity of acid of the other for the same quantity of base, while with other acids only the less acid salt has been obtained; so that the ordinary chemical methods fail to give evidence of the existence of the more acid salt. Now, by examining the rotatory power of a solution of a given quantity of base with different doses of acid, Dr. Jellett was able to obtain evidence of the existence of two, and but two, salts of the base, no matter whether the acid were or were not one which yields two crystallisable salts. A slight deviation in the amount of rotation when the more acid salt began to be formed in tolerable quantity, from what it ought to have been, on the supposition that the whole of the acid introduced was combined with the quinine, was naturally attributed to a slight partition of the acid between the base and the solvent, regarded as a feeble base; but the smallness of the deviation indicated that a solution of the more acid salt mainly existed as such, and that it was not, as some had supposed, decomposed into free acid and the less acid salt.

The Davy Medal has been awarded to Professor Adolf Baeyer, who was already known as the author of many masterly researches in organic chemistry, among which those on uric acid and on mellitic acid deserve special mention, before his latest and most remarkable discovery. The process for the artificial formation and manufacture of indigo is the result of long-continued efforts, directed by singularly clear and accurate views of the order and mode of combination of its constituent elements, and of the conditions requisite for obtaining reactions indicated by theory.

The Statutes relating to the election of Council and Officers were then read, and Mr. Kempe and Mr. McLachlan having been, with the consent of the Society, nominated Scrutators, the votes of the Fellows present were taken, and the following were declared duly elected as Council and Officers for the ensuing year:—

President.—William Spottiswoode, M.A., D.C.L., LL.D.

Treasurer.—John Evans, D.C.L., LL.D.

Secretaries.— { Professor George Gabriel Stokes, M.A., D.C.L., LL.D.
Michael Foster, M.A., M.D., LL.D.

Foreign Secretary.—Professor Alexander William Williamson, Ph.D., LL.D.

Other Members of the Council.

Francis Maitland Balfour, M.A., LL.D.; I. Lowthian Bell, F.C.S.; Sir Risdon Bennett, M.D.; Professor Thomas George Bonney, M.A.; Professor Heinrich Debus, Ph.D.; Alexander John Ellis, B.A.; Sir John Hawkshaw, M.I.C.E.; Thomas Archer Hirst, Ph.D.; William Huggins, D.C.L., LL.D.,; Professor Thomas Henry Huxley, LL.D.; Professor Joseph Lister, M.D.; Professor Daniel Oliver, F.L.S.; Professor Henry Enfield Roscoe, B.A., LL.D.; Warington W. Smyth, M.A.; Henry Tibbats Stainton, F.G.S.; Edward James Stone, M.A.

The thanks of the Society were given to the Scrutators.

The following Table shows the progress and present state of the Society with respect to the number of Fellows:—

	Patron and Royal.	Foreign.	Compounders.	£4 yearly.	£3 yearly.	Total.
Nov. 30, 1880 ..	4	47	236	225	25	537
Since Elected ..		+ 4	+ 1	+ 2	+ 14	+ 21
Since Compounded			+ 1	— 1		
Since Deceased ..		— 1	— 11	— 12		— 24
Nov. 30, 1881 ..	4	50	227	214	39	534

The Royal Society. Balance Sheet, 1881.

Statement of Receipts and Expenditure from November 26, 1880, *to November* 24, 1881.

	£	s.	d.
Annual Contributions, 221 at £4 ..... £884	1,001	0	0
„ 39 at £3 117			
Admission Fees	30	0	0
Fee Reduction Fund, in lieu of Admission Fees and Annual Contributions	189	0	0
Compositions	120	0	0
Rents	254	9	2
Dividends (exclusive of Trust Funds)	1,134	5	2
„ on Jodrell Fund	151	18	4
Interest on Mortgage Loan	585	17	6
Sale of Transactions and Proceedings	931	6	8
Donation from Miss Pipe towards the cost of Plates for Prof. Parker's Papers	105	0	0
Sale of land at Acton	450	0	0
Petty Repayments	3	3	10
Interest on purchase-money for Sale of Land at Acton	567	3	8
Sale of £666 13*s.* 4*d.* Consols	666	13	4
	£6,189	17	8

	£	s.	d.	£	s.	d.
Salaries and Wages				1,083	13	0
The Library Catalogue				181	15	3
Books for the Library				214	9	1
Printing Transactions, Parts II. and III. 1880, Parts I. and II. 1881, and Separate Copies to Authors and Publisher	625	15	5			
Ditto Proceedings, Nos. 207–214	377	12	7			
Ditto Miscellaneous	58	14	11	2,228	6	8
Paper for Transactions and Proceedings	290	8	0			
Binding ditto	192	5	11			
Engraving and Lithography	683	9	10			
Soirée and Reception Expenses				80	13	1
Coal, Lighting, &c.	88	18	2			
Office Expenses	23	9	11			
House Expenses	77	17	7			
Tea Expenses	18	9	11			
Fire Insurance	41	15	0	365	1	9
Taxes	39	2	6			
Advertising	18	9	0			
Postage, Parcels, and Petty Charges	38	4	2			
Miscellaneous Expenses	18	15	6			
Law Charges				190	6	8
Purchase of £600 Midland Railway 4 % Debentures				678	10	0
„ £525 14*s.* 0*d.* Consols				522	8	4
				£5,545	3	10

Trust Funds.

	£	s.	d.	£	s.	d.
Donation Fund Dividends	417	3	7			
Portion of Borneo Cave Exploration expenses returned	45	6	6			
Rumford Fund Dividends	67	19	0			
Wintringham Fund „	35	2	0	635	0	11
Copley Medel Fund „	34	6	3			
Davy Medal Fund „	32	4	10			
Croonian Lecture Fund—Rent from College of Physicians	2	18	9			
Balance at Bank, Dec., 1880	1,178	9	7	1,195	5	1
Do. on hand	16	15	6			
				£8,020	3	8

	£	s.	d.	£	s.	d.
Rumford Medal Fund	136	9	4			
Davy Medal Fund	32	11	0			
Wintringham Fund	35	5	0	215	15	3
Copley Medal Fund	4	11	2			
Bakerian Lecture	4	0	0			
Croonian Lecture	2	18	9			
Balance at Bank				2,241	11	8
Balances on hand, Catalogue Account	11	14	3	17	12	11
„ „ Petty Cash	5	18	8			
				£8,020	3	8

JOHN EVANS,
Treasurer.

Estate at Mablethorpe, Lincolnshire (55 A. 2 R. 2 P.), £110 per annum.
Estate at Acton, Middlesex (about 33 acres), £152 per annum (Contract for Sale sealed).
Fee Farm near Lewes, Sussex, rent £19 4*s.* per annum.
One-fifth of the clear rent of an estate at Lambeth Hill, from the College of Physicians, £3 per annum.
Stevenson Bequest. Chancery Dividend. One-fourth annual interest on £85,336, Government Annuities and Bank Stock (produced £482 18*s.* 9*d.* in 1880–81).

£21,000 { £14,952 12*s.* 3*d.* Reduced 3 per Cent. Annuities.
£6,047 7*s.* 9*d.* „ „ „ Handley Fund.

£15,000 Mortgage Loan, 4 per Cent.

£18,314 0*s.* 2*d.* Consolidated Bank Annuities, { being £14,861 19*s.* 1*d.* in name of the R. S., and £3,452 1*s.* 1*d.* in Chancery, arising from sale of the Coleman Street Estate.

£200 „ „ —The Gassiot Trust.
£403 9*s.* 8*d.* New 2½ per Cent. Stock—Bakerian and Copley Medal Fund.

£11,511 6*s.* New Threes { £6,328 11s. 2*d.* Scientific Relief Fund.
5,182 14*s.* 10*d.* Jodrell Fund.

£667 5*s.* 6*d.* India Fours.
£660 Madras Guaranteed 5 per Cent. Railway Stock.—Davy Medal Fund.
£10,000 Italian Irrigation Bonds.—The Gassiot Trust.
£1,396 Great Northern Railway 4 per Cent. Debentures—The Trevelyan Bequest.
£100 Metropolitan 3½ per Cent. Stock.—Scientific Relief Fund.
£1,550 „ „ —Fee Reduction Fund.

£7,000 London and North Western Railway 4 per Cent. Debentures. } „ „
Two Hundred Shares in the Whitworth Land Company, Limited. } „ „

We, the Auditors of the Treasurer's Accounts on the part of the Council, have examined these Accounts and found them correct; and we find that the Balance at the Bankers' is £2,241 11*s.* 8*d.*

W. SPOTTISWOODE, *Pres.*
G. G. STOKES, *Sec.*
T. G. BONNEY.
A. J. ELLIS.
H. T. STAINTON.

We, the Auditors of the Treasurer's Accounts on the part of the Society, have examined these Accounts and found them correct; and we find that the Balance at the Bankers' is £2,241 11*s.* 8*d.*

W. G. ADAMS.
J. T. BOILEAU.
H. CLERK.
P. M. DUNCAN.
R. H. SCOTT.

Trust Funds. 1881.

Scientific Relief Fund.

	£	s.	d.
New 3 ger Cent. Annuities	6,328	11	2
Metropolitan 3½ Consols	100	0	0
	£6,428	11	2

Dr. *Cr.*

	£	s.	d.		£	s.	d.
To Balance	100	1	8	By Grants	205	0	0
„ Dividends and Donation	190	0	7	„ Balance	85	2	3
	£290	2	3		£290	2	3

Donation Fund.

£6,339 0*s.* 1*d.* Consols.
The Trevelyan Bequest.
£1,396 Great Northern Railway 4 per Cent. Debentures.

	£	s.	d.		£	s.	d.
To Balance	330	2	0	By Balance	792	12	1
„ Dividends, and Balance repaid	285	4	10				
„ Transferred from Handley Fund	177	5	3				
	£792	12	1		£792	12	1

Rumford Fund.

£2,322 19*s.* Consols.

	£	*s.*	*d.*		£	*s.*	*d.*
To Balance, 1880	136	9	4	By Medals	59	12	0
„ Dividends, 1881	67	19	0	„ W. Huggins	76	17	4
				„ Balance	67	19	0
	£204	8	4		£204	8	4

Bakerian and Copley Medal Fund.

Sir Joseph Copley's Gift, £1,666 13*s.* 4*d.* Consols.
£403 9*s.* 8*d.* New 2½ per Cent.

	£	*s.*	*d.*		£	*s.*	*d.*
To Balance	76	9	0	By Gold Medal	4	11	2
„ Dividends	9	16	8	„ Bakerian Lecture	4	0	0
„ Dividend—Sir J. Copley's Fund	24	9	7	„ Balance	102	4	1
	£110	15	3		£110	15	3

The Keck Bequest.

£600 Midland Railway 4 per Cent. Debenture Stock.

	£	*s.*	*d.*		£	*s.*	*d.*
To Dividend, July, 1881	11	15	0	By Balance	11	15	0

Wintringham Fund.

£1,200 Consols.

	£	*s.*	*d.*		£	*s.*	*d.*
To Balance, 1880	35	5	0	By Payment to Foundling Hospital, 1881	35	5	0
„ Dividends, 1881	35	2	0	„ Balance	35	2	0
	£70	7	0		£70	7	0

Croonian Lecture Fund.

	£	s.	d.		£	s.	d.
To Balance, 1880	2	18	9	By Croonian Lecture	2	18	9
„ One-fifth of Rent of Estate at Lambeth Hill, payable by the College of Physicians	2	18	9	„ Balance	2	18	9
	£5	17	6		£5	17	6

Davy Medal Fund.

£660 Madras Guaranteed 5 per Cent. Railway Stock.

	£	s.	d.		£	s.	d.
To Balance	139	5	0	By Gold Medal	32	11	0
„ Dividends	32	4	10	„ Balance	138	18	10
	£171	9	10		£171	9	10

The Gassiot Trust.

£10,000 Italian Irrigation Bonds.
£200 3 per Cent. Consols.

	£	s.	d.		£	s.	d.
To Balance	130	18	6	By 2 Italian Bonds bought	214	5	0
„ Dividends	502	10	11	„ Payments to Kew Committee	496	13	8
„ Bonds drawn	234	10	0	„ Balance	157	0	9
	£867	19	5		£867	19	5

Handley Fund.

£6,047 7*s.* 9*d.* Reduced.

	£	*s.*	*d.*		£	*s*	*d.*
Dividends, 1881	177	5	3	By transferred to Donation Fund	177	5	3

The Jodrell Fund.

£5,182 14*s.* 10*d.* New 3 per Cent. Stock.

	£	*s.*	*d.*		£	*s.*	*d.*
To Dividends, 1881	151	18	4	By transferred to Royal Society General Account	151	18	4

Fee Reduction Fund.

£1,550 Metropolitan Consols 3½ per Cent
£7,000 London and North Western Railway 4 per Cent. Debentures.
Two Hundred Shares in the Whitworth Land Company, Limited.

	£	*s.*	*d.*		£	*s.*	*d.*
To Balance (1880)	88	13	1	By Transferred to Royal Society General Account (1881)	189	0	0
„ Dividends	412	14	0	„ Purchase of £250 Metropolitan Consols 3½ per Cent.	263	8	9
				„ Balance	48	18	4
	£501	7	1		£501	7	1

Account of the appropriation of the sum of £1,000 (the Government Grant) annually voted by Parliament to the Royal Society, to be employed in aiding the Advancement of Science (continued from Vol. XXXI, p. 110.)

1881.

	£	*s.*	*d.*
Professor Cayley, for Apparatus for the Kinematical Construction of Functions of a Complex Variable $x + iy$..	50	0	0
R. H. M. Bosanquet, for Balance of the cost of an Engine with Clock, Bellows, and other Appliances to be employed in the Solution of various Problems in Acoustics..	99	5	3
Professor W. G. Adams, for the Expense of procuring Photographs of Magnetic Tracings from various Observatories over the Globe, and for assistance in comparing and examining them, so as to arrive at a more exact knowledge of the Laws of Terrestrial Magnetism	200	0	0
A. Mallock, for completing the construction of the Room for the Diffraction Grating Ruling Machine	30	0	0
Rev. A. E. Eaton, to defray further the cost of Printing and Publishing a descriptive Monograph of the Ephemeridæ	120	0	0
G. E. Dobson, for an Examination of the Anatomical Structure, Systematic Position, and Geographical Distribution of the Species of the Order Insectivora, to be published in the form of a Monograph, illustrated with plates from original drawings by the Author	100	0	0
D. J. Hamilton, for a Research into the Topographical Anatomy of the Central Nervous System studied in relation to its Physiology	50	0	0
A. Frazer, for Apparatus for a Series of Experiments on Wind Pressure. (1) Rate of variation of pressure on different sized plates. (2) Pressure on perforated plates, and wire gauze disks. (3) Lifting power of air currents	25	0	0
	£674	5	3

Dr.

	£	*s.*	*d.*
To Balance on hand, Nov. 30, 1880.....	1,117	18	2
Grant from Treasury, 1881	1,000	0	0
Repayment.....	11	7	4
	£2,129	5	6

Cr.

	£	*s.*	*d.*
By Appropriations, as above.....	674	5	3
Printing, Postage, and Advertising	8	14	0
Balance on hand, Nov. 30, 1881	1,446	6	3
	£2,129	5	6

Account of Appropriations from the Government Fund of £4,000 made by the Lords of the Committee of Council on Education, on the recommendation of the Council of the Royal Society.

1880–81.

G. F. Rodwell, for continuation of his Experiments on the Anomalous Coefficients of Expansion of certain Iodides, Chlorides, and Bromides..... £30

A. Macfarlane, for extending his Researches into the Disruptive Discharge of Electricity 50

Professors Liveing and Dewar, for apparatus and materials required in continuing their Spectroscopic Investigations..... 200

J. N. Lockyer, for continuation of Researches on the Solar Spectrum 150

R. S. Marsden, for development of a new Theory for the Hardening of Steel, with special reference to the State of Carbon in Steel..... 15

J. Parry and A. E. Tucker, for aid in continuing Experiments on the application of the Spectroscope to the Analysis of Iron and Steel 100

A. Tribe, for continuation of Researches into Electric Distribution as manifested by that of the Radicles of Electrolytes .. 75

W. Crookes, for assistance in continuing Researches in Molecular Physics in High Vacua..... 200

Dr. T. Carnelley, for a Research on the Action of Heat on Substances under diminished Pressure, and the existence of Ice and other Bodies at Temperatures above their ordinary Melting Points 100

Professor W. N. Hartley, for payment of an Assistant, and the cost of Materials and Apparatus employed in his Investigations of the Ultra-violet Rays of the Spectrum 100

Professor O. J. Lodge, in aid of Researches, more especially into the Action of Light on the Conductivity and Residual Charge Phenomena of Glass and Electrolytes..... 100

Professor R. Grant, for the Expense of Printing a Catalogue of the Mean Places of 6,350 Stars, based on Observations made at the Glasgow Observatory 300

J. Glaisher, towards the Expense of Printing the Factor Table of the Sixth Million..... 150

R. McLachlan, in aid for continuation of his Researches on European Trichopterous Insects 25

Carried forward..... £1,595

Brought forward..... £1,595

Professor Duncan and P. Sladen, for the cost of an Additional Plate (*Comatulæ*) in their Monograph on Arctic Echinodermata 10

Professor Heddle, for continuation of a Research connected with the Scientific Mineralogy and Geognosy of Scotland: £100 for Analyses, and £100 for personal expenses in collecting Specimens..... 200

E. C. Rye, in aid of the Publication Fund of the Zoological Record Association..... 100

Dr. R. Braithwaite, for aid in publishing a work on the British Moss Flora..... 50

D. Mackintosh, for continuation of his Search for High Level Gravel and Sand with Marine Shells along the Northern and Eastern Slopes of the Welsh Mountains, and along the Western Slopes of the Pennine Hills..... 20

Professor Nicholson and R. Etheridge, jun., for Further Assistance towards the Publication of the Third Fasciculus of their "Monograph of the Silurian Fossils of Girvan, Ayrshire"..... 100

J. N. Langley, for an Investigation into the changes which take place in the Gland Cells of the Liver and Kidney during Secretion..... 30

J. S. Gardner, for assistance in working out more systematically than has yet been done, the Mull, Antrim and Iceland Tertiary Plant Beds..... 150

Professor W. T. Dyer, for aid in the preparation of an illustrated Monograph of Cycadæa..... 20

E. A. Schäfer, for payment of an Assistant in continuing his Histological and Embryological Investigations..... 50

Dr. G. Thin, for investigation of the Epithelium, and of the Lens and Retina in the Tadpole, and the Influence of Light on the Development of the Tadpole..... 25

Rev. J. F. Blake, for aid in preparing and publishing a work on British Fossil Cephalopoda..... 100

Dr. F. R. Japp, for an Investigation of the Reactions and Decompositions of the Quinones; with a view to throw light on the constitution of this Group of Compounds, and indirectly upon that of the Benzene Series generally..... 50

C. F. Cross, for materials to be used in the Extension of his Research into the Rehydration of Metallic Oxides..... 10

J. H. Collins, for continuation of Chemical, Mineralogical, Microscopical, and Stratigraphic Observations on, and Investigations of the Rocks of Cornwall..... 30

Dr. C. R. A. Wright, for continuation of Researches on the

Carried forward..... £2,540

Brought forward	£2,540
Determination of Chemical Affinity in Terms of Electromotive Force	200
C. E. Groves for Researches into Lichen Products and Derivatives obtained from Naphthalene now in progress, originally undertaken in conjunction with the late Dr. Stenhouse	200
R. Etheridge, jun., and P. H. Carpenter, for the Preparation of a Monograph of the Blastoidea, especially of British Species, with their Morphology	60
Dr. Fraser, for a Research on the Action of Medicines on the Heart and Peripheral Circulation	30
E. Neison, for continuation of Computations in the Lunar Theory	75
Dr. G. Gore, for Investigation of the Phenomena of Electric Osmose, the production of Electric Currents by Liquid Diffusion, and (probably) the Transmission of Electric Currents by Liquids	100
H. Tomlinson, for his Researches on the Influence of Stress and Strain on the Action of Physical Forces	100
Rev. J. Henslow, for Physiological Researches on the Transpiration of Plants, the effect of Coloured Light thereon, and to discover the different nature of Coloured Leaves by means of the Spectroscope	50
W. K. Parker, for assistance in his Researches into the Morphology of the Vertebrata	300
F. O. Bower, for a Research into the Minute Histology of Plants, more especially of *Welwitschia mirabilis*	100
W. Saville Kent, for the further prosecution of Investigations into the Structure and Life History of certain Lower Protozoa	100
C. Lapworth, for Investigation of the Lower Palæozoic Rocks of Scotland, and of the Family of the Graptolites	80
Spencer U. Pickering, for a Research into Molecular Combinations	50
	£3,985
Administrative Expenses	15
	£4,000