Mosso (A.) Un Venin dans le Sang des Murénides. 8vo. *Turin* 1888. The Author.

Pole (W.), F.R.S. The Life of Sir William Siemens, F.R.S. 8vo. *London* 1888. The Executors of Sir W. Siemens.

Wallace (R.) India in 1887. 8vo. *Edinburgh* 1888. The Author.

November 30, 1888.

ANNIVERSARY MEETING.

Professor G. G. STOKES, D.C.L., 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 balances carried from the preceding year, amounted to £25,125 18*s*. 6½*d*. on the General Account, and £17,884 0*s*. 7*d*. on account of Trust Funds, and that the total expenditure in the same period, including purchase of stock, amounted to £26,079 0*s*. 0½*d*. on the General Account, and £15,771 14*s*. 6*d*. on account of Trust Funds, leaving on the General Account an overdrawn balance of £953 1*s*. 6*d*., less £22 2*s*. 11*d*. petty cash in hand, and on account of Trust Funds a balance at the Bankers' of £2,112 6*s*. 1*d*.

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

The Secretary then read the following Lists :—

Fellows deceased since the last Anniversary (Nov. 30, 1887).

On the Home List.

Burrows, Sir George, Bart., M.D.
Campbell-Johnston, Alexander Robert.
Curling, Thomas Blizard, F.R.C.S.
Farre, Arthur, M.D.
François de Chaumont, Francis Stephen Bennet, M.D.
Frere, George Edward.
Godwin, George, F.S.A.
Gosse, Philip Henry.
Greenhow, Edward Headlam, M.D.
Griess, John Peter, F.C.S.
Hoskins, Samuel Elliott, M.D.
Key, Sir Astley Cooper, Admiral, G.C.B.
Maine, Sir Henry Sumner, K.C.S.I.
Morgan, Octavius S., M.A.
Spratt, Thomas Abel Brimage, Vice-Admiral, C.B.
Stewart, Balfour, M.A.

On the Foreign List.

Clausius, Rudolph Julius Emmanuel.
De Bary, Anton.
Gray, Asa.

Fellows elected since the last Anniversary.

Andrews, Thomas, F.R.S.E.
Balfour, Right Hon. Arthur James.
Bottomley, James Thomson, M.A.
Boys, Charles Vernon.
Church, Arthur Herbert, M.A.
Clarke, Alexander Ross, Colonel, R.E.
Greenhill, Prof. Alfred George, M.A.
Jervois, Sir William F. D., Lieut.-General R.E.
Lapworth, Professor Charles, LL.D.
Macdonald, Right Hon. John Hay Athole.
Parker, Professor T. Jeffery.
Poynting, Professor John Henry, M.A.
Ramsay, Prof. William, Ph.D.
Sudeley, Charles Douglas Richard Hanbury-Tracy, Lord.
Teale, Thomas Pridgin, F.R.C.S.
Topley, William, F.G.S.
Trimen, Henry, M.B.
Ward, Professor Henry Marshall, M.A.
White, William Henry, M.I.C.E.

On the Foreign List.

Becquerel, Edmond.
Kopp, Hermann.
Pflüger, Eduard F. W.
Sachs, Julius.

The President then addressed the Society as follows:—

In the month which intervened between our last anniversary and the end of the year, the Society lost four of its Fellows. In addressing the Fellows last year, I referred to the loss which science had sustained through the death of the illustrious Kirchhoff, and before three weeks were out, one followed him to the grave whose researches on the connexion between the emission and absorption of radiant heat and light were closely akin to those of Kirchhoff. I refer to Balfour Stewart, who, shortly after landing in Ireland, whither he had gone to spend the Christmas with his family, was suddenly carried off after only a few hours' illness, shortly after he had entered on his sixtieth year. His name is widely known on account of his scientific work in heat, magnetism, and solar physics. He has been a member of the Council, and the Rumford Medal of the Society was awarded to him for the particular research to which I alluded at the outset. The other three of our ordinary Fellows who died before the month was out were all far advanced in years. Two of them were eminent in the medical world, Sir George Burrows and Dr. Arthur Farre, both of whom served on our Council. Early in the year we lost one of our

Fellows, who, while not a man of science, was eminent in literature and jurisprudence. While our ranks are mainly recruited from men of science, we gladly welcome among us men who, like Sir Henry Sumner Maine, have proved their ability and earned their distinction in other branches of knowledge, whose connexion with us we look on as honourable to the Society, while, as the very fact of their joining us shows, they regard the Fellowship as honourable to themselves. Admiral Sir Cooper Key, who was highly distinguished as a naval officer, and was at one time Director of the Royal Naval College at Greenwich, was another who served on the Council. Philip Henry Gosse, who died at an advanced age, is well known for his charming popular works on natural history. These are some of the Fellows on the home list who died since the last anniversary; but, besides these, we have lost no less than three of our foreign members. Professor Anton de Bary, so well known for his researches on the cryptogams, and the eminent naturalist, Professor Asa Gray, who not very long ago was over in this country, both died in January. Comparatively recently we have lost Professor Clausius, so eminent as a physicist, especially in the department of thermodynamics.

The year of the Society, which terminates to-day, has shown no flagging in scientific activity. Since the last anniversary, thirty-three memoirs have been published in the 'Philosophical Transactions,' containing a total of 1,010 pages and 91 plates. Of the 'Proceedings,' nineteen numbers have been issued, containing 1,008 pages and 17 plates. In addition to this, a Monograph of the Horny Sponges, by Dr. R. von Lendenfeld, which was accepted for publication by the Council, and which when completed will extend to about 1,000 pages, is now nearly through the press.

A large amount of work connected with the Library has been done since the last anniversary. A special effort has been made to complete imperfect series of scientific periodicals, and by means of exchange, or by the generosity of our corresponding Societies, some hundreds of deficient numbers have been obtained. The Lists of Institutions entitled to receive gratis the 'Philosophical Transactions' and 'Proceedings' have also been carefully revised by the Library Committee.

In December last, Mr. Arthur Soper was engaged as a special Assistant to continue the formation of the Shelf-Catalogue, and the revision of the Catalogue of MSS., and for other work. The Shelf-Catalogue of the Upper Library is now completed—a work involving the re-arrangement or removal to the lower storeys of several thousands of volumes. Considerable progress has been made in collating and cataloguing the Archives and other manuscripts belonging to the Society, and an instalment of slips have been written towards a Catalogue of the Miscellaneous Literature in the Library.

In the course of this work many duplicate scientific books, and literary works of little value to the Society, have been thrown out, and these have been presented, by order of the Council, to the libraries of the Universities and some of the chief Scientific Societies.

The cataloguing of the titles of scientific papers for the decade 1874 to 1883 is now complete, and the work is ready for the press. The amount of matter is estimated to require, if printed, three quarto volumes of the usual size. The extraction of the titles, the preparation of the work for the press, and the correction of the proofs of this work, which is really of international importance, have all along been done at the sole charge of the Royal Society; but the printing of the volumes which have already been published has been done at the Stationery Office, by authority of the Lords of the Treasury, and the proceeds of the sale have been paid in to the Treasury. The Council have applied to the Lords Commissioners of Her Majesty's Treasury to sanction the printing of the last decade in a similar manner, and it is hoped that the application may be favourably entertained.

In the year 1882 a change was made in the amount and mode of administration of the Grant, which for a considerable time before had been voted annually by Parliament for scientific research. Since that year the annual grant has been one of £4,000, which has been administered by the former Government Grant Committee, with the addition of certain *ex-officio* members, mostly the Presidents of certain scientific Societies. Meetings of this large Committee, consisting usually of about 50 members, have been held twice a year, the various applications for aid from the Grant to enable the applicant to carry out investigations explained by him having been previously discussed in meetings of three, or latterly two, Sub-Committees, into which the whole Committee was divided, and then been submitted to the General Committee for confirmation or modification.

In the discussion of these Grants, the Government received the benefit of the gratuitous services of a large number of men of the highest distinction in science. In the large Sub-Committees, however, it necessarily happened that of the members present only a fraction would be likely to be conversant with the particular branch of science to which any particular application belonged; and the Council thought that the time of the members might be economised, and at the same time a more efficient discussion of the Grants secured, by arranging the applications under a number of sub-divisions, and assigning the discussion of these to a corresponding number of Boards formed out of the General Committee. It was thought that a good deal of the discussion of the applications in the several branches might be carried on by correspondence among the members of the respective Boards, so that one or two meetings of each Board might suffice. If some trouble were thus saved to the members of the

Committee in regard to personal attendance at long meetings, there would probably be more expenditure of time in the way of correspondence, and it was thought that one meeting of the General Committee in the year would in most cases suffice. To meet pressing cases in the interval, it was suggested that a limited sum might be placed by the General Committee at the disposal of the Council of the Royal Society. There are further provisions for forming a reserve fund of not more than £2,000 to meet special objects involving unusual expenditure, and for holding in reserve out of the money available for any one year enough to meet annual grants of limited amount made for a period not exceeding three years, the future grants being contingent on the receipt by the Committee of satisfactory evidence of progress in the inquiry. The new regulations, of which I have merely given a slight sketch, have been communicated to the Treasury, and will come into operation next year.

The Krakatoa Committee have now completed their work, and the volume which is the outcome of their labours is in the hands of the public. It has been favourably noticed in more than one quarter. The Society is much indebted to those Fellows and other gentlemen who discussed and reported on the different subjects into which the whole inquiry was divided, and to Mr. Symons, who was the first to propose that the materials should be collected, and to whose unwearied labour as Chairman of the Committee, director of the correspondence, and editor of the volume, the successful accomplishment of the undertaking is largely due. A comprehensive and digested account of that extraordinary volcanic explosion, remarkable both for its magnitude and the striking disturbances and other phenomena attending or following it, is now placed within easy reach of the ordinary reader, and will go down to posterity, whereas, had the various accounts remained in their isolated form, they would many of them have perished, and the remainder could not have been brought together without a most laborious search. It must be a great satisfaction to my predecessor in this chair to remember that he urged upon the Council the importance of collecting the facts before the materials should have become dissipated, and while the freshness of men's recollection of the event kept up a lively interest in all that belonged to it.

The Royal Society is in possession of some important standards for the safe keeping of which we are responsible. Parliamentary copies of the standard yard and standard pound have been entrusted to our custody; and we have also a standard measure of length known as Sir George Schuckburgh's scale, with reference to which the length of the seconds' pendulum for Greenwich has been determined by Kater and Sabine. This length, as determined by experiment, has been defined with reference to the interval from the 0 to the 39 and

40-inch graduations on the scale; but no exact comparison has hitherto been made between the length of this portion of the scale and the national yard, and such a comparison is no easy matter. It happens that Commandant Deforges has been engaged in determining the length of the seconds' pendulum at Greenwich with reference to the French standard metre; and just before his return to Paris he came to our meeting, and offered to take charge of the scale, bring it with him to Paris, and there determine the length of the part of the scale used by Kater and Sabine with reference to the metre, for doing which he has all the requisite appliances; and as we know the ratio of the metre to the yard, the length of the seconds' pendulum as determined by Kater and Sabine would thus be known accurately with reference to the standard yard. It seemed to me that so important a scale should hardly be sent away, even though in the care of so experienced a physicist, without the authority of the Council, and without an outer case being made for its box, which there was not time to get ready. The authority of the Council has since been obtained, and it fortunately happens that one of the assistants at the Greenwich Observatory is going to Paris, who will take charge of the scale. Thus by the kind proposal of Commandant Deforges, we may shortly hope to have an authentic comparison of the length of the seconds' pendulum as measured by Kater and Sabine with the standard English yard.

At the time of the anniversary last year, some of the reports of the observers who went to Grenada to observe the Total Solar Eclipse of August, 1886, had been sent in, and I mentioned that it seemed desirable, for convenience of reference at a future time, that the different reports should come out together, instead of being published in a scattered form, provided at least that the waiting for the later reports should not cause too much delay. I regret to say that the completion of the reports has been delayed in part by the illness of one of the observers, but I have every hope that they will all be in by Christmas, and I do not anticipate that any long time will elapse before they will be in some form in the hands of the public.

The time is well within our recollection when the occurrence of the solar prominences seen in total eclipses first attracted the attention of astronomers, and when, for observations bearing on their nature, we had to wait for the rare and brief glimpses which, clouds permitting, were afforded by total eclipses. Now, however, thanks to the method of observation devised independently by Lockyer and Janssen, they may be studied at any time. It would obviously be a great advantage if a similar study could be made of the corona; for though we cannot expect to obtain a picture of it equal to that which may be got during a total eclipse, yet if a fairly good picture could be obtained from time to time, we might thereby be enabled to learn

more about the history of its changes than could be got by observations extending over a lifetime if restricted to total eclipses. Some observations were made during the partial phases of the last total eclipse with the view of throwing light on the prospect of success. Notwithstanding the unpromising nature of the results obtained, I have reason for hoping that the desired object may yet be accomplished.

In addressing you last year, that year which will be memorable as the Jubilee of the reign of our beloved Sovereign, I alluded briefly to the progress which science had made in the last half century, and ventured to indicate one or two directions in which it seemed to me possible that a very great addition to our physical knowledge might some day be reached. I will not to-day venture to look so far ahead; but the mention of a total eclipse leads me to refer to some theories now before the scientific world which are likely to undergo full discussion and further examination in the near future, with the probable result of a pretty general agreement as to their acceptance or rejection.

It is now many years since Dr. Huggins discovered the peculiar character of the spectra of the nebulæ, spectra which he found to consist mainly of bright lines, indicating that what we see is an incandescent gas. The natural supposition to make at the time was that those distant masses of matter consisted of incandescent gas, of which the luminosity was in some way kept up, probably as a result of condensation. But the researches of Mr. Lockyer, as described by him in the Bakerian lecture which he delivered last spring, and in part in a previous paper communicated shortly before the last anniversary, have led him to take a different view of the constitution of nebulæ. According to the theory advanced by him, the mass of a nebula consists mainly of meteorites, which are constantly coming into collision here and there; and the glowing gas the existence of which the spectroscope reveals, is merely a portion of the matter, volatilised by the heat of collision. According to the former view therefore, the nebula consists of glowing gas, not yet condensed into a solid or liquid form, possibly in a condition even more elementary than that of the so-called elements that we know on earth; according to the latter it consists mainly of discrete portions of solid matter, and the glowing gas does not consist of the same matter permanently glowing, but is continually supplied afresh by fresh collisions.

A similar theory is applied to explain the self-luminosity of the nucleus, and sometimes the very root of the tail, of comets. A comet is regarded as a swarm of meteorites, moving in orbits not greatly differing from one another; and as the swarm approaches the sun collisions become more frequent, and individually more potent, from an increase in the velocities differential as well as absolute; and

a portion of matter is volatilised and rendered incandescent. As to the tail, the theory long ago suggested by Sir John Herschel has always seemed to me by far the most probable of those that have been advanced, namely, that it is due to the propulsion of excessively attenuated matter, owing to a repulsive force, probably of electrical origin, emanating from the sun. This view seems to be adopted both by Mr. Lockyer and Dr. Huggins; and the latter gentleman in an earlier Bakerian lecture has suggested a new theory of the corona—the corona as distinguished from the prominences—namely, that it is projected from the sun by molar forces due to the tremendous state of turmoil, in which we have very strong reason for believing that the matter composing the sun exists, but of matter actually propelled from the sun by a repulsive force in the manner of the tails of comets.

Daring as some of these speculations may appear to be, there seems a great deal to recommend them, and the whole subject is one of extreme interest at the present day.

But I must not take up your time longer by dwelling on so special a subject; I proceed to matters more particularly connected with the occasion on which we are assembled.

The Council have awarded the Copley Medal of the year to my predecessor in this chair, Mr. Huxley, for his investigations on the morphology and histology of vertebrate and invertebrate animals, and for his services to biological science in general during many past years. These subjects lie so entirely out of the range of my own studies that I need hardly say that in attempting to give some idea of the more salient features of his investigations I am dependent upon the kindness of biological friends.

During the fifteen or twenty years which preceded the publication of Darwin's famous work, the 'Origin of Species,' the views and methods of comparative anatomists underwent a most marked change. Without that change biologists would have been far less prepared to accept Mr. Darwin's work, and, what is even more important, would have been unprepared to make use of that work as a light enabling them to carry on the remarkable researches which have so brilliantly characterised the progress of biology during the last quarter of a century. That change was effected chiefly by the labours first of Johannes Müller, and subsequently of Huxley in this country, and of Gegenbaur in Germany. The labours of these men opened out the right road of morphological inquiry. It is not, perhaps, too much to say that Mr. Huxley's treatment of his subject in his 'Morphology of Cephalous Mollusca' was to many young morphologists little short of a revelation, and all his other works of the same period, such as that on the hydrozoa and on tunicates, and latter still his treatment of the vertebrate skull and skeleton, and arthropoda produced in varying degree a like effect.

Closely allied to, or rather forming part of, his morphological labours are his numerous palæontological researches, carried out for the most part while he was palæontologist to the Geological Survey, researches characterised by the same clear morphological insight, researches which have been as profitable to animal morphology as useful to the geologist. The most important are perhaps those on the remarkable reptiles of the Elgin Sandstones and on the Dinosauria; but many others have great value, and his Anniversary Address to the Geological Society, in 1870, made its mark.

Though his career has been in the main that of a morphologist, he has through the common ground of histology given considerable help to physiology. An early paper by him 'On the Cell-Theory,' did much to clear away erroneous notions concerning the relations of structure to the actions of living beings. His article on 'Tegumentary Organs' was a great step onward as regards both morphology and histology, and still remains a classical work; while, by other papers and in various ways, he has contributed to the progress of histology and physiology.

But however important Mr. Huxley's original contributions to the advancement of our scientific knowledge have been, we should form a very inadequate idea of his benefits to the cause of science if we did not bear in mind also his singular ability and effectiveness as an expositor of science to the people, and the powerful influence he has exerted in the improvement of the teaching of biology in its widest sense in this country. Indeed, it is not too much to say that the remarkable improvement which has taken place within the last few years must be ascribed either directly or indirectly to his influence, and has been in many cases due to his initiation.

The Rumford Medal has been awarded to Professor Pietro Tacchini for important and long-continued investigations, which have largely advanced our knowledge of the physics of the sun.

Professor Tacchini occupies a foremost place among those who have paid special attention to the physics of the sun. Since 1870 he has unceasingly observed, first at Palermo, and afterwards at Rome, the solar prominences. The information at our disposal at the present time, both as regards their distribution, their spectra, and the changes which take place in them, and their connexion with other solar phenomena, rests to a large extent upon his individual efforts. His memoirs on this subject are very numerous. He has been engaged in the observation of four total solar eclipses, and from some of the phenomena therein observed has drawn the important conclusion that many of the so-called prominences are really descending currents.

A Royal Medal has been awarded to Sir Ferdinand von Mueller for his long services in Australian exploration, and for his investigations of the flora of the Australian continent.

For more than forty years von Mueller has been working, without intermission, at scientific botany and its practical illustrations. As a botanical traveller and collector, he has, to quote the words of Sir Joseph Hooker, "personally explored more of the Australian continent than any other botanist, except Allan Cunningham." No one has investigated the Australian flora and the geographical distribution of its components with so much perseverance and success, and no one has enriched our herbaria, laboratories, and gardens with materials for study to so great an extent. The eleven volumes of the 'Fragmenta Phytographiæ Australiæ' contain the descriptions of a great series of new plants, and the unrestricted communication of his collections and observations to the late Mr. Bentham rendered possible the preparation of the 'Flora Australiensis,' in seven volumes, the only account of the vegetation of any large continental area which has at present been completed.

He has especially devoted himself to the elucidation of the most difficult, though most characteristic groups of the Australian flora; and as a result of his labours in this direction, his 'Eucalyptographia' may be more particularly mentioned, a work which will always be the standard of nomenclature for the intricate genus *Eucalyptus*. Of a similar character are his descriptions and illustrations of the 'Myoporineous Plants of Australia,' and his 'Iconography of the Genus *Acacia*.' To him is also due the foundation of the Government Herbarium at Melbourne, the first great botanical collection formed in the southern hemisphere, and the future centre of all scientific work on the Australasian flora.

A Royal Medal has been awarded to Professor Osborne Reynolds for his investigations in mathematical and experimental physics, and on the application of scientific theory to engineering.

Professor Reynolds was among the first to refer the repulsion exhibited in that remarkable instrument of Mr. Crookes's, the radiometer, to a change in the molecular impact of the rarefied gas consequent upon the slight change of temperature of the movable body due to the radiation incident upon it; and in an important paper published in the 'Philosophical Transactions' for 1879, he deduced from theoretical considerations the conclusion that similar phenomena might be expected to be observed in bodies surrounded by a gas of comparatively large density, provided their surfaces were very small. He verified this anticipation by producing on silk fibres, surrounded by hydrogen at the atmospheric pressure, impulsions similar to those which in a high vacuum affect the relatively large disks of the radiometer.

In an important paper published in the 'Philosophical Transactions' for 1883, he has given an account of an investigation, both theoretical and experimental, of the circumstances which determine whether the

motion of water shall be direct or sinuous, or, in other words, regular and stable, or else eddying and unstable. The dimensions of the terms in the equations of motion of a fluid when viscosity is taken into account involve, as had been pointed out, the conditions of dynamical similarity in geometrically similar systems in which the motion is regular; but when the motion becomes eddying it seemed no longer to be amenable to mathematical treatment. But Professor Reynolds has shown that the same conditions of similarity hold good, as to the average effect, even when the motion is of the eddying kind; and moreover that if in one system the motion is on the border between steady and eddying, in another system it will also be on the border, provided the system satisfies the above conditions of dynamical as well as geometrical similarity. This is a matter of great practical importance, because the resistance to the flow of water in channels and conduits usually depend mainly on the formation of eddies; and though we cannot determine mathematically the actual resistance, yet the application of the above proposition leads to a formula for the flow, in which there is a most material reduction in the number of constants for the determination of which we are obliged to have recourse to experiment.

There are various other investigations of Professor Reynolds's which time would not allow me to enter into, and I therefore merely mention his investigation of the relation between rolling friction and the distortion produced by the rolling body on the surface on which it rests, that of the effect of the change of temperature with height above the surface of the ground on the audibility of sounds and his explanation of the effect of lubrication as depending on the viscosity of the lubricant.

The Davy Medal has been awarded to Mr. Crookes for his investigations on the behaviour of substances under the influence of the electric discharge in a high vacuum.

Mr. Crookes's remarkable series of researches which conducted him to the invention of the radiometer led him to work with excessively high vacua. In connexion with this he found that an electric discharge in such vacua is capable of exciting effects of phosphorescence apparently quite different in their origin from those produced in the ordinary way by such discharges. The latter are clearly referable to the action of the ethereal undulations which are propagated from the seat of the discharge. But the former involve in some way the effect of the actual transference of the molecules of ponderable matter. These phenomena, in the hands of Mr. Crookes, opened up a new means of discrimination between different bodies, and he has applied them as a test for the discrimination of groups of rare earths, not yet fully investigated. The test went hand in hand with processes of chemical separation. But here a great difficulty

presented itself. So very closely allied in their chemical properties are the members of the groups, that it was only by an excessively tedious and laborious system of fractional precipitation that Mr. Crookes was able to effect a pretty fair separation. Even still, the separate existence of some members of the groups is more or less problematical. It is for these most painstaking researches that the medal has been awarded.

The existence, or apparent existence, of so many earths of such close chemical relationship led Mr. Crookes to speculate on the possibility that after all the molecules of what is deemed a chemical element may not be absolutely alike, as chemists have almost universally believed, but only very approximately so, and that what is deemed the molecular weight of the substance may really be that of the average of its molecules. Should such groups exist, it is conceivable that by processes of very delicate chemical separation they might be split up again into sub-groups, the molecules of which still more nearly match one another; so that according to this view the number of groups into which an element, or what is deemed such, might be split up, not, be it observed, by any dissociation, but merely by a sorting of the molecules which are very nearly alike, may be somewhat indefinite.

Chemists will not probably be disposed to give up the idea of the perfect similarity of the individual molecules of elementary bodies; but it is surely legitimate for one who has worked so assiduously at these difficult separations to suggest, merely as a matter for chemists to think about, a possible view of the nature of elements different from that to which they have been accustomed.

The Statutes relating to the election of Council and Officers were then read, and Sir James Cockle and Professor Rücker 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.—Professor George Gabriel Stokes, M.A., D.C.L., LL.D.

Treasurer.—John Evans, D.C.L., LL.D.

Secretaries.—Professor Michael Foster, M.A., M.D.; The Lord Rayleigh, M.A., D.C.L.

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

Other Members of the Council.

Professor Henry Edward Armstrong, Ph.D.; Henry Bowman

Brady, F.G.S.; Charles Baron Clarke, M.A.; William Huggins, D.C.L.; John Whitaker Hulke, F.R.C.S.; Professor John W. Judd, F.G.S.; Edward Emanuel Klein, M.D.; Professor E. Ray Lankester, M.A.; Professor Herbert McLeod, F.I.C.; Sir James Paget, Bart., D.C.L.; William Pole, Mus. Doc.; William Henry Preece, M.I.C.E.; Sir Henry E. Roscoe, D.C.L.; Edward John Routh, D.Sc.; Professor Arthur William Rücker, M.A.; William James Lloyd Wharton, Capt. R.N.

The thanks of the Society were given to the Scrutators.

Balance Sheet, 1888.

Statement of Receipts and Expenditure from November 12th, 1887, *to November* 12th, 1888.

	£	s.	d.
To Balance at bank, 12th November, 1887		232	0	5
„ Balance in hand, Catalogue Account	14 9 7			
„ „ Petty Cash	3 16 4½	18	5	11½
„ Annual Contributions, 163 at £4	652 0 0			
„ 128 at £3	384 0 0	1,036	0	0
„ Admission Fees		30	0	0
„ Fee Reduction Fund, in lieu of Admission Fees and Annual Contributions		288	0	0
„ Rents:	£ s. d.			
Fee Farm, Lewes	18 14 5			
Mablethorpe Estate	63 5 10	82	0	3
„ Ground Rents		598	2	7
„ Dividends (exclusive of Trust Funds)		2,050	19	4
„ do. Jodrell Fund		151	5	4
„ Interest on Mortgage Loan		583	8	9
„ Sale of Transactions and Proceedings		594	6	5
„ Bonus on conversion of Consols		10	6	7
„ do. Reduced 3 per Cents		38	15	0
„ Sale of £4,133 6*s.* 8*d.* Consols (Converted)		4,086	16	2
„ do. £15,499 19*s.* 9*d.* Reduced 3 per Cents (Converted)		15,325	11	9
„ Bankers, Balance overdrawn		953	1	6
		£26,079	0	0½

	£	s.	d.
By Salaries, Wages, and Pension		1,675	3	8
„ Catalogue of Scientific Papers		165	11	4
„ Books for the Library		249	18	9
„ Printing and Advertising Transactions, and Separate Copies to Authors and Publisher	362 4 1			
„ Ditto Proceedings, Nos. 258 to 270	539 10 5			
„ Ditto Miscellaneous	113 8 1			
„ Paper for Transactions and Proceedings	499 15 2			
„ Binding ditto	50 17 1			
„ Engraving and Lithography	1,027 15 10	2,593	10	8
„ Soirée and Reception Expenses		109	1	4
„ Coal, Lighting, &c.	141 19 9			
„ Office Expenses	58 5 0½			
„ House Expenses	267 18 4			
„ Tea Expenses	18 3 5			
„ Fire Insurance	56 15 0			
„ Taxes	51 8 8			
„ Advertising	21 1 6			
„ Postage, Parcels, and Petty Charges	50 0 0			
„ Miscellaneous Expenses	195 14 6	861	6	2½
„ Law Charges		49	12	8
„ Electric Lighting, Installation		79	0	8
„ Lendenfeld Monograph (making with previous expenditure £296 9*s.* 2*d.*)		248	4	2
„ Purchase of £12,150 London and North Western Railway 4 per Cent. Guaranteed Stock		15,364	5	9
„ Purchase of £3,333 London and South Western Railway 4 per Cent. Preference Stock		4,097	2	10
„ Krakatoa Report, excess of expenditure over receipts to date		516	17	1
„ Eclipse Expedition (making with previous expenditure a total of £207 11*s.* 7*d.* in excess of receipts)		2	2	0
„ Carrington Donation		45	0	0
„ Balance on hand, Catalogue Account	£14 1 7			
„ Ditto, Petty Cash	8 1 4	22	2	11
		£26,079	0	0½

Trust Funds.

	£	s.	d.	£	s.	d.
To Balance at Bank 12th November, 1887:—						
General Account	986	12	0			
Fee Reduction Fund Account	176	4	6	1,736	10	11
Scientific Relief Fund Account	573	14	5			
„ Scientific Relief Fund, Dividends, Donations, and Sale of Stocks	7,768	5	11			
„ Donation Fund, Dividends, Sale of Stocks, &c., and Transfer from Handley Fund	6,768	3	6			
„ Rumford Fund, Dividends	90	10	6			
„ Bakerian and Copley Medal Fund, Dividends, &c.	74	15	3			
„ Keck Bequest, Dividends	23	6	6	16,147	9	8
„ Wintringham Fund, Dividends, &c.	46	15	3			
„ Davy Medal Fund, Dividends	32	2	1			
„ Gassiot Trust, Dividends, &c.	506	3	9			
„ Jodrell Fund, Dividends	151	5	4			
„ Fee Reduction Fund, Dividends	403	6	8			
„ Darwin Memorial Fund, Dividends, and Donation	277	14	11			
				£17,884	0	7

	£	s.	d.	£	s.	d.
By Scientific Relief Fund, Investments, and Grants	7,989	19	6			
„ Donation Fund, Grants, Investments, &c.	6,345	18	9			
„ Bakerian and Copley Medal Fund, Medal, and Gift	58	12	0			
„ Keck Bequest, Payment to Foreign Secretary	23	6	6			
„ Wintringham Fund, Payment to Foundling Hospital	34	17	4			
„ Croonian Lecture Fund, Payments	53	18	10	15,771	14	6
„ Davy Medal Fund, Gold Medals	32	4	6			
„ Gassiot Trust, Payments to Kew Committee	492	10	9			
„ Jodrell Fund, Transfer to Royal Society General Account	151	5	4			
„ Fee Reduction Fund, transfer to Royal Society General Account (1888)	288	0	0			
„ Darwin Memorial Fund, Expenses	301	1	0			
„ Balance at Bankers:—						
General Account	1,463	14	1			
Fee Reduction Fund Account	296	11	2	2,112	6	1
Scientific Relief Fund Account	352	0	10			
				£17,884	0	7

Estates and Property of the Royal Society, including Trust Funds.

Estate at Mablethorpe, Lincolnshire (55A. 2R. 2P.), rent £100 per annum.

Ground Rent of House No. 57, Basinghall Street, rent £380 per annum.

„ „ of 23 houses in Wharton Road, West Kensington, rents £253 per annum.

Fee Farm Rent, near Lewes, Sussex, £19 4*s.* per annum.

One-fifth of the clear rent of an estate at Lambeth Hill, from the College of Physicians, about £52 per annum, Croonian Lecture Fund.

Stevenson Bequest. Chancery Dividend. One-fourth annual interest on Government Annuities and Bank Stock (produced £666 18*s.* 1*d.* in 1887-88).

£15,000 Mortgage Loan, 4 per Cent.

£14,174 8*s.* 3*d.*, 2¾ per Cent. Consolidated Stock, being £10,722 7*s.* 2*d.*, namely:—

	£	*s.*	*d.*
Rumford Fund	2,322	19	0
Wintringham Fund	1,200	0	0
Gassiot Trust	350	0	0
Sir J. Copley Fund	1,666	13	4
Jodrell Fund	5,182	14	10

and £3,452 1*s.* 1*d.* in Chancery, arising from sale of the Coleman Street Estate.—General Purposes.

£403 9*s.* 8*d.* New 2½ per Cent. Stock.—Bakerian and Copley Medal Fund.

£1,000 India 3½ per Cent. Stock.—General Purposes.

£600 Midland Railway 4 per Cent. Debenture Stock.—Keck Bequest.

£5,660 Madras Railway Guaranteed 5 per Cent. Stock { General Purposes, £5,000. / Davy Medal Fund, £660.

£10,000 Italian Irrigation Bonds.—The Gassiot Trust.

£6,396 Great Northern Railway 4 per Cent. Debenture Stock { Scientific Relief Fund, £5,000. / The Trevelyan Bequest, £1,396.

£4,000 Metropolitan 3½ per Cent. Stock.—Fee Reduction Fund.
£7,000 London and North Western Railway 4 per Cent. Perpetual Debenture Stock.—Fee Reduction Fund.
£18,150 „ „ „ „ 4 per Cent. Consolidated Guaranteed Stock.— { £6,000 Scientific Relief Fund. / £12,150 General Purposes.
£5,000 North Eastern Railway 4 per Cent. Preference Stock.—General Purposes.
£5,000 London and North Western Railway Consolidated 4 per Cent. Preference Stock.—General Purposes.
£2,000 South Eastern Railway 4 per Cent. Debenture Stock.—Darwin Memorial Fund.
£4,340 South Eastern Railway 5 per Cent. Debenture Stock.—Scientific Relief Fund.
£3,333 London and South Western Railway 4 per Cent. Preference Stock.—General Purposes.
£5,030 Great Northern Railway Perpetual 4 per Cent. Guaranteed Stock.—Donation Fund.
£4,798 Lancashire and Yorkshire Railway 4 per Cent. Guaranteed Stock.—Handley Fund.

JOHN EVANS, *Treasurer.*

We, the Auditors of the Treasurer's Accounts on the part of the Council, have examined these Accounts and found them correct.

G. G. STOKES.
WILLIAM POLE.
GEORGE HENRY RICHARDS.

We, the Auditors of the Treasurer's Accounts on the part of the Society, have examined these Accounts and found them correct.

JOHN BALL.
JAMES COCKLE.
WILLIAM HUGGINS.
JOHN RAE.
G. J. SYMONS.

Trust Funds. 1888.

Scientific Relief Fund.

£6,000 L. & N.W.R. 4 per Cent. Consolidated Guaranteed Stock.
£5,000 Great Northern Railway 4 per Cent. Debenture Stock.
£4,340 South Eastern Railway 5 per Cent. Debenture Stock.

Dr.

	£ s. d.	£ s. d.
To Balance { Capital	286 12 9	
{ Income	287 1 8	
		573 14 5
„ Dividends, 1888		623 11 5
„ Annual Subscriptions		6 1 0
„ Curling Bequest		200 0 0
„ Sale of £7,000 New 3 per Cent. Annuities (converted)		6,938 13 6
		£8,342 0 4

Cr.

	£ s. d.	£ s. d.
By Grants		522 0 0
„ Purchase of £400 L. & N. W. Ry. 4 per Cent. Consolidated Guaranteed Stock		524 10 0
„ Purchase of £4,340 South Eastern Railway 5 per Cent. Debenture Stock		6,943 9 6
„ Balance in hand, Income	£388 13 1	
„ Less—Capital over-invested	36 12 3	352 0 10
		£8,342 0 4

Donation Fund.

£5,030 Great Northern Railway Perpetual 4 per Cent. Guaranteed Stock.
The Trevelyan Bequest. £1,396 Great Northern Railway 4 per Cent. Debenture Stock.

	£ s. d.	£ s. d.
To Balance		110 0 5
„ Dividends, 1888		289 6 11
„ Sale of £6,339 0*s.* 1*d.* Consols (Converted)		6,267 13 3
„ Bonus on ditto		15 17 0
„ Amount returned by Dr. Hirst		13 17 9
„ Transfer from Handley Fund		181 8 7
		£6,878 3 11

	£ s. d.	£ s. d.
By Grants		61 18 6
„ Purchase of £4,023 Great Northern Railway Perpetual 5 per Cent. Guaranteed Stock		6,283 10 3
„ Binding		10 0
„ Balance		532 5 2
		£6,878 3 11

Rumford Fund.

£2,322 19*s.* 2¾ per Cent. Consolidated Stock.

	£	*s.*	*d.*		£	*s.*	*d.*
To Balance	68	0	3	By Balance	158	10	9
„ Dividends, 1888	84	14	6				
„ Bonus on conversion of Consols	5	16	0				
	£158	10	9		£158	10	9

Bakerian and Copley Medal Fund.

Sir Joseph Copley's Gift, £1,666 13*s.* 4*d.* 2¾ per Cent. Consolidated Stock.
£403 9*s.* 8*d.* New 2½ per Cent. Stock.

	£	*s.*	*d.*		£	*s.*	*d.*
To Balance	105	2	7	By Gold Medal	4	12	0
„ Dividends, New 2½ per Cent. Stock, 1888	9	16	4	„ Sir J. D. Hooker—Sir J. Copley's Gift	50	0	0
„ Dividend—Sir J. Copley's Fund, 1888	60	15	5	„ Professor J. N. Lockyer—Bakerian Lecture	4	0	0
„ Bonus on conversion of Consols—Sir J. Copley's Fund	4	3	6	„ Balance	121	5	10
	£179	17	10		£179	17	10

The Keck Bequest.

£600 Midland Railway 4 per Cent. Debenture Stock.

	£	*s.*	*d.*		£	*s.*	*d.*
To Dividends, 1888	23	6	6	By Payment to Foreign Secretary	23	6	6

Wintringham Fund.

£1,200 $2\frac{3}{4}$ per Cent. Consolidated Stock.

	£	s.	d.		£	s.	d.
To Balance	34	17	4	By Payment to Foundling Hospital, 1888	34	17	4
„ Dividends, 1888	43	15	3	„ Balance	46	15	3
„ Bonus on conversion of Consols	3	0	0				
	£81	12	7		£81	12	7

Croonian Lecture Fund.

One-fifth of the clear rent of an Estate at Lambeth Hill, from the College of Physicians, about £52 per annum.

	£	s.	d.		£	s.	d.
To Balance, November, 1887	48	2	10	By Lecture—Professor H. G. Seeley	48	2	10
„ Ditto November, 1888	5	16	0	„ Assistants, Translating, &c.	5	16	0
	£53	18	10		£53	18	10

Davy Medal Fund.

£660 Madras Railway Guaranteed 5 per Cent. Stock.

	£	s.	d.		£	s.	d.
To Balance	77	3	6	By Gold Medals	32	4	6
„ Dividends, 1888	32	2	1	„ Balance	77	1	1
	£109	5	7		£109	5	7

The Gassiot Trust.

£10,000 Italian Irrigation Bonds.

£350 2¾ per Cent. Consolidated Stock.

	£	s.	d.		£	s.	d.
To Balance	38	7	6	By Payments to Kew Committee	492	10	9
„ Dividends, 1888	505	6	3	„ Balance	52	0	6
„ Bonus on conversion of Consols		17	6				
	£544	11	3		£544	11	3

Handley Fund.

£4,798 Lancashire and Yorkshire Railway 4 per Cent. Guaranteed Stock.

	£	s.	d.		£	s.	d.
To Dividends, 1888	181	8	7	By Purchase of £4,798 Lancashire and Yorkshire Railway 4 per Cent. Guaranteed Stock	5,994	8	11
„ Bonus on conversion of Reduced 3 per Cent. Annuities	15	2	4	„ Transfer to Donation Fund	181	8	7
„ Sale of £6,047 7*s.* 9*d.* Reduced 3 per Cent. Annuities	5,979	6	7				
	£6,175	17	6		£6,175	17	6

The Jodrell Fund.

£5,182 14*s.* 10*d.* 2¾ per Cent. Consolidated Stock.

	£	s.	d.		£	s.	d.
To Dividends, 1888	151	5	4	By transfer to Royal Society General Account	151	5	4

Fee Reduction Fund.

£4,000 Metropolitan 3½ per Cent. Stock.
£7,000 London and North Western Railway 4 per Cent. Perpetual Debenture Stock.

	£	s.	d.		£	s.	d.
To Balance	176	4	6	By transfer to Royal Society General Account (1888)	288	0	0
„ Dividends, 1888	408	6	8	„ Balance	296	11	2
	£584	11	2		£584	11	2

Darwin Memorial Fund.

£2,000 South Eastern Railway 4 per Cent. Debenture Stock.

	£	s.	d.		£	s.	d.
To Balance	504	17	7	By Westminster Abbey Fees	151	1	0
„ Dividends, 1888	77	14	11	„ Medallion—J. E. Boehm, R.A.	150	0	0
„ Donation	200	0	0	„ Balance, Capital £249 1 8 Interest £232 9 10	481	11	6
	£782	12	6		£782	12	6

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, 1887 ..	5	48	188	165	112	518
Since Elected ..	..	+ 4	+ 0	+ 3	+ 16	+ 23
Since Deceased ..	..	— 3	— 6	— 8	— 1	— 18
Nov. 30, 1888 ..	5	49	182	160	127	523

Account of the appropriation of the sum of £4,000 (the Government Grant) annually voted by Parliament to the Royal Society, to be employed in aiding the advancement of Science (continued from Vol. XLIII, p. 205).

1887–88.

	£
J. Murray, for an Examination of the Western Lochs of Scotland	400
W. G. Forster, for cost of a Seismograph to be used in a Research on the laws which regulate Earthquake Motion	75
F. R. Japp, for an Investigation of the Reactions of Ketones, Diketones, and allied compounds	75
Hon. R. Abercromby, for the Systematic Observation of British Thunderstorms	25
W. R. Dunstan, for the Investigation of the Reduction of the Nitro-paraffins and Alkyl Nitrites as effected by Ferrous Hydroxide	30
J. Croll, for books and payment of a Secretary to aid in completing a work on the fundamental principles which underlie the Doctrine of Evolution in its widest sense	25
H. R. Mill, to discuss the Observations of Temperature made by the Staff of the Scottish Marine Station in the Clyde-sea area	100
Dr. T. Lauder Brunton, for Investigations on the connexion between Chemical Constitution and Physiological Action	100
Carried forward	£830

Brought forward	£830
Dr. F. Warner, to complete apparatus for enumerating combinations of Movements in the Human Body	60
Dr. L. C. Wooldridge, for further Research on the Physiology and Pathology of the Blood	40
J. Beard, for further Research in Elasmobranch and Ganoid Development	80
A Committee of the Royal Society, for continuing the boring in the Delta of the Nile	500
W. H. Pendlebury, for an Investigation of a case of gradual Chemical Change, viz., that between Hydrogen Chloride and Potassium Chlorate	50
G. Massee, to prepare a Monograph of the Fungi belonging to the order Thelephorei	100
F. J. Smith, for a Research on the Acceleration Period of the Explosion, in tubes, of Gaseous Mixtures, and the point or points at which the explosion is propagated at its maximum velocity	50
R. Meldola, for a Research on Diazo-compounds	20
J. N. Lockyer, for Aid in providing a large Reflecting Telescope, and to pay an Assistant in a Research on the exact sequence of temperature phenomena in meteoric swarms	300
C. Piazzi Smyth, for Researches in Spectroscopic Measurement of Ultra Definition and Extreme Separation	100
C. V. Boys, to Investigate, if possible, the Heat sent to the Earth from the Stars, Planets, &c.	50
G. S. Johnson, for an Investigation into the Nature of the Bases (organic) in the Juice of Flesh	50
S. U. Pickering, for a full Investigation of the Nature of the Reaction taking place when Solutions are diluted with Water	100
A Committee of the Royal Society, for the Determination of the Relation between the Forces of Gravity at the Kew Observatory, and at the Royal Observatory at Greenwich	150
C. Davison, for the Observation and Recording of Earthquakes and Earth-tremors in the Midland Counties	80
E. Nevill, for continuing his Investigation of the Errors of Hansen's Lunar Tables	50
P. G. Tait, for a Research on the Duration of Impact and the Coefficient of Restitution	40
G. J. Symons, for completing the Construction of Recording Apparatus for the Study of the Barometric Oscillations which occur during Thunderstorms	25
Carried forward	£2,675

Brought forward	£2,675
G. J. Symons, for completing the Collection of Records of British Rainfall during the 17th and 18th Centuries	50
P. F. Frankland, for Payment of an Assistant in a Research on the Chemical Changes brought about by Micro-organisms	50
A. J. Herbertson and A. Rankin, for obtaining Photographs of Phenomena seen at Ben Nevis Observatory	25
Dr. Armstrong, for a Committee, for a Determination for certain solutions of the Variation in Electrical Resistance with concentration at different Temperatures	150
H. B. Dixon, for a Research on the Rate of Explosion of Cyanogen, Marsh-gas, Ethylene and Acetylene, with Oxygen and Diluents, and two other Researches	100
C. R. Alder Wright, for a Research on certain Alloys	50
C. A. Ballance and S. G. Shattock, for a Research on the Pathology of Cancer	50
Joseph Thomson, for an Expedition to the Atlas Mountains and the Southern Provinces of Morocco	100
A. C. Haddon, for an Investigation of the Fauna, Structure, and Mode of Formation of the Coral Reefs in Torres Straits	300
J. Beard, for Researches on Comparative Vertebrate Morphology, and especially on Ganoid Development	200
T. W. Bridge, for Investigating the Structure of the Air-bladder in certain Teleostean Fishes	25
A Committee, for continuation of Mr. Rattray's Monograph of the Diatomaceæ	100
R. Kidston, for continuation of his Investigations into the Distribution of the Carboniferous Flora	40
West Indies Fauna and Flora Committee, for further aid in sending a Collector to obtain Botanical and Zoological Specimens in the less known West Indian Islands	100
E. A. Schäfer, for further payment of an Assistant to aid in prosecuting a Research into the functions of the Nervous System, especially of the Cerebral Cortex	50
W. F. Denning, for further observation of Shooting Stars and their Radiant Points	30
W. K. Parker, for continuation of Researches into the Morphology of the Vertebrata	150
T. R. Jones, for further Elucidation of the Fossil Ostracoda	25
W. E. Hoyle, to complete the Anatomical Investigation of the Cephalopoda collected by the "Challenger"	100
	£4,370

Dr.	£	*s.*	*d.*		£	*s.*	*d.*	*Cr.*
To Balance, November 30, 1887 .	22	5	6	By Appropriations, as above	4,370	0	0	
,, Grant from Treasury	4,000	0	0	Salaries, Printing, Postage, Advertising, and other Administrative Expenses	88	18	0	
,, Repayments	617	0	6					
,, Interest on Deposit	29	11	11	By Balance, Nov. 30, 1888	209	19	11	
	£4,668	17	11		£4,668	17	11	

Account of Grants from the Donation Fund in 1887–88.

	£	*s.*	*d.*
Prof. T. R. Jones, for illustrations of his work on the Fossil Astracoda, £25. On account	6	18	6
Prof. Schäfer, to assist the investigation by Drs. Martin and Dawson Williams, on the Influence of Bile upon the Digestive Actions of the Pancreatic Juice	20	0	0
Prof. Lankester, to assist in constructing apparatus for the study of certain Medusæ.....	15	0	0
J. N. Langley, to assist Dr. Sherrington in researches on Histological Changes in the Nervous System	20	0	0
	£61	18	6