comet described an orbital arc of more than 340°. The ellipse deduced by Kreutz from observations to November 14 assigns a period of 843 years; that by Fabritius, from observations to March 3, one of 823 years; but we may soon hope to see the result of a definitive discussion of the whole series of observations.

THE ANNIVERSARY MEETING OF THE ROYAL SOCIETY

THE Anniversary Meeting of the Royal Society took place as usual on St. Andrew's Day, November 30, when the President, Prof. Huxley, delivered his address; after which the Fellows elected the officers of the Society for the year, whose names we have already given in NATURE, Nov. 8, p. 43. The following is Prof. Huxley's address:—

It will be as much in consonance with your feelings as it is with my own that the first sentences of this address should give utterance to our sense of the calamity which befell us during the recess.

On June 27 our honoured and loved President, William Spottiswoode, fell a victim to that cruel malady, typhoid fever, which is at once the scourge and the reproach of modern civilisation; and we were bereaved of a chief of whom all those who had the highest interests of this Society at heart hoped that he would continue for many a year to discharge the responsible and laborious duties of his office with that broad intelligence, that faithful diligence, that inexhaustible patience and courtesy, which were so characteristic of the man.

Every one of the Fellows of the Society in whose hearing I speak knows that these are no words of conventional eulogy, as of a customary epitaph. But it is only those of us who worked with our late President in the Council, or as officers of the Society, who are in a position fully to appreciate his singular capacity for the transaction of business with clear judgment and rapid decision, and yet with the most conscientious consideration of the views of those with whom he was associated.

And I may add that it is only those who enjoyed Mr. Spottiswoode's intimate friendship, as it was my privilege to do for some quarter of a century, who can know how much was lost when there vanished from among us that rare personality, so commingled of delicate sensitiveness with marvellous self-control, of rigid principle with genial tolerance, of energetic practical activity with untiring benevolence, that it always seemed to me the embodiment of that exquisite ideal of a true gentleman which Geoffry Chaucer drew five hundred years ago:—

> ". . . He lovede chyvalrye,
> Truthe and honour, fredom and curtesie.
>
> . . . . . .
>
> And though that he was worthy he was wys,
> And of his port as meke as is a mayde.
> He never yit no vilonye ne sayde
> In al his lyf unto no maner wight.
> He was a verray perfight gentil knight."

It is not for me to pass any judgment upon Mr. Spottiswoode's scientific labours; but I have the best authority for saying that having occupied himself with many branches of mathematics, more especially with the higher algebra, including the theory of determinants, with the general calculus of symbols, and with the application of analysis to geometry and mechanics, he did excellent and durable work in all; and that, in virtue of his sound and wide culture, his deep penetration, and the singular elegance with which he habitually treated all his subjects, he occupied a place in the front rank of English mathematicians.

The interment in Westminster Abbey of one who, though compelled to devote a large share of his time to business, was a born man of science, and had won himself so high a place among mathematicians, was doubtless grateful to us as men of science; it could not but be satisfactory to us as Fellows of the Royal Society that, on the rare occasion of the death of our President in office, the general public should show its sympathy with our bereavement; yet as men I think it is good to regard those solemn and pathetic obsequies as the tribute which even our busy, careless, cynical, modern world spontaneously pays to such worth and wisdom, to such large humanity and unspotted purity as were manifested in the "very perfect gentle knight" who so well represented the chivalry of science.

The total number of Fellows deceased during the past year amounts to twenty; a large inroad upon our ranks in mere numbers, an exceptionally severe mortality if we consider the scientific rank of many names in the death-roll. Almost at the same time with Mr. Spottiswoode's untimely death we lost, at the ripe old age of ninety, a very distinguished Fellow and former President of this Society, Sir Edward Sabine. It is said that the average age of Fellows of the Royal Society is greater than that of any body of men in Europe; and it is certainly a remarkable fact that one who so long presided over us in this generation should, as a man of thirty years, have been the contemporary of Sir Joseph Banks, who became our President more than a century ago. And nothing can give a more striking exemplification of the gigantic progress of physical science in modern times than the fact that the discovery of oxygen by Priestley, and that of the composition of water by Cavendish, fall within the period of Sir Joseph Banks's presidency, while Black's work was but a score years earlier. We are as it were but two Presidents off the budding of modern chemistry, as of many another stately growth of the tree of natural knowledge.

Sir Edward Sabine's long services to this Society, first as Treasurer and then as President, deserve more than a passing allusion; but for a due appreciation of them, no less than of his great labours in terrestrial magnetism, I must refer you to our obituary notices.

By the unexpected death of Prof. Henry John Stephen Smith the University of Oxford lost one of the most distinguished, as he was one of the most influential, among those who have guided its destinies during this generation, and a capacity of the first order, not yet weakened by the touch of time, has disappeared from the ranks of the foremost mathematicians of Europe.

As Chairman of the Meteorological Committee, Prof. Smith rendered invaluable services to that body; and we have all a grateful recollection of the readiness with which his knowledge and sagacity were brought to our aid in Council and in Committee.

For the rest, I dare add nothing to that which has been said of him by our late President in that just and loving appreciation of his friend, which is now touched with a sadder gravity and a deeper pathos.

It is difficult to say of Prof. Smith whether he was more remarkable as a man of affairs, of society, of letters, or of science; but it is certain that the scientific facet of his brilliant intelligence was altogether directed towards those intelligible forms which people the most ethereal regions of abstract knowledge. In Sir William Siemens, who but the other day was suddenly snatched from among us, we had a no less marked example of vast energy, large scientific acquirements, and intellectual powers of a high order, no less completely devoted, in the main, to the application of science to industry.

I believe I am expressing the opinion of those most competent to judge, when I say that Sir William Siemens had no superior in fertility and ingenuity of invention; that hardly any living man so thoroughly combined an extensive knowledge of scientific principles with the power of applying them in a commercially successful manner; and that the value of his numerous inventions must be measured, not merely by the extent to which they have increased the wealth and convenience of mankind, but by the favourable reaction on the progress of pure science which they, like all such inventions, have exerted, and will continually exert.

Time permits me to be but brief in alluding to the remainder of our long list of deaths. But I may not omit to mention that we have lost a distinguished mathematician in Prof. Challis; in Mr. James Young, a chemist whose skilful application of theory to practice founded a new industry; in Mr. Cromwell Varley, an ingenious inventor; in Lord Talbot de Malahide, a warm friend of science and a zealous promoter of archæological research; in Mr. Walker, an eminent engineer; in Mr. Howard, an eminent quinologist; and in the Rev. Dr. Stebbing, an accomplished and amiable man of letters, who for very many years filled the honourable, but not very onerous, office of Chaplain to the Society.

And it would ill become us, intimately connected as this Society always has been, and I hope always will be, with the sciences upon which medicine bases itself, to leave unnoticed the decease of the very type of a philosophical physician, the venerable Sir Thomas Watson.

Two well-known names have disappeared from among those of the eminent men who are enrolled upon our foreign list; the eminent physicist, Plateau, and the no less distinguished anatomist and embryologist, Bischoff.

I now beg leave to bring under your notice a brief general review of the work of the Society during the past year.

The papers printed in the *Transactions* for 1882 and 1883 will occupy two volumes, of which three parts, containing 1038 quarto pages and fifty-two plates, have already been published. Two parts more, to complete 1883, will shortly be published.

The *Proceedings*, which steadily increase in size from year to year, amount during the past year to 780 octavo pages, with four plates and numerous engravings.

You are aware that nothing is printed in the *Proceedings* or in the *Transactions* except by the authority of the Council, which, in the latter case, calls in the assistance of at least two carefully-selected and independent referees, by whose advice it is in practise, though not necessarily, guided. I am inclined to think that Fellows of this Society who do not happen to have served on the Council, are little aware of the amount, or of the value of the conscientious labour which is thus performed for the Society by gentlemen whose names do not appear in our records. And I trust I may be forgiven for stepping beyond precedent so far as to offer our thanks for work which is always troublesome and often ungrateful; but, without which, the contributions to our pages would not maintain the high average of excellence which they possess.

Among the points of importance, by reason of their novelty or general significance, which have been laid before us, much interest attaches to the result brought out in Prof. Osborne Reynolds's "Experimental Investigation of the circumstances which determine whether the motion of water shall be direct or sinuous, and of the law of resistance in parallel channels;" which shows that when the conditions of dynamical similarity are satisfied, two systems, involving fluids treated as viscous, may be compared (as regards their effects) even when the motions are unstable; and that if any one of the two systems is in the critical state separating stability from instability, so will be the other.

Last December, Dr. Huggins presented a note on "A Method of Photographing the Solar Corona without an Eclipse," which had so far proved successful, under the unfavourable circumstances in which he had put it in practice, as to lead to the hope that, under better conditions of atmosphere and elevation, the corona might be photographed, from day to day, with so much accuracy as to preserve a clear record of the changes which it undergoes. And, as the photographs taken during the eclipse at Caroline Island show a condition of the corona, intermediate between those exhibited by Dr. Huggins's photographs at periods antecedent and subsequent to the Caroline Island observations, there is reason to believe that this hope is well based, and that a new and powerful method of investigation has been placed in the hands of students of solar physics.

Lord Rayleigh and his sister-in-law, Mrs. Sidgwick, have made a very elaborate determination of the relation between the ohm and the British Association standard of electrical resistance.

With respect to those branches of knowledge on which I may venture to offer an opinion of my own, I may say that, though our records show much useful and praiseworthy work in biological science, the only event which appears to me to call for special remark is the opening of an attack upon a problem of very great interest, one which, in fact, goes to the root of the question of the fundamental unity of the two great embodiments of life—plants and animals.

The well-known phenomena presented by many plants, such as the sensitive plant and the sun-dew, our knowledge of which was so vastly extended by Darwin, abundantly prove that the property of irritability, that is, the reaction of a living part, by change of form, upon the application of a stimulus to that part, or to some other part in living continuity with it, is not confined to animals.

But, in animals, the connection of the part irritated with that which changes its form is always effected by a continuity of more or less modified protoplasmic substance, and reaction takes place only so long as that continuity is unimpaired; while, hitherto, the protoplasmic cell-bodies of plants have appeared to be isolated from one another by the non-protoplasmic cell-walls in which they are inclosed.

It is as if, in the one case, there was a continuous bond of conducting substance between the point of irritation and the point of contraction; while, in the other, there was a chain of pellets of protoplasmic substance, each inclosed in a coat of a different nature.

Now, Mr. Gardiner, in his paper "On the continuity of the Protoplasm through the Walls of Vegetable Cells," brings forward evidence, based chiefly upon the careful use of special reagents, that, in the sensitive cushions of certain plants and in other situations, the vegetable cell-wall is pierced by minute apertures, and that these are traversed by threads of protoplasm, which connect the cell-body of each cell with those of its neighbour, and thus establish, as in animals, a continuity of protoplasmic substance between different parts. Other observers are working at the same subject, and we may hope that, before long, great light will be thrown upon many hitherto puzzling questions in vegetable physiology.

The Committee of the Royal Society, in the hands of which the Lords of the Treasury have placed the administration of the funds devoted to the publication of the work of the *Challenger* expedition, report that, under the careful and vigorous direction of Mr. Murray, this great undertaking is making rapid progress.

Mr. Murray informs me that thirty-eight reports have, up to this time, been published, forming eight large quarto volumes, with 4195 pages of letterpress, 488 lithographic plates and other illustrations. Thirty-four of these memoirs are on zoological, four on physical subjects. Nine reports are now nearly all in type, and some of them partly printed off. These will be published within three months, and will form three zoological volumes, with 230 plates and many woodcuts, and one physical volume, with many diagrams and maps; this latter volume will contain the report on the composition of ocean water, the specific gravity and temperature observations.

A considerable part of the general narrative of the cruise is now in type, and nearly all the illustrations are prepared. The narrative will extend to two volumes, and it is expected they will be ready for issue in May or June, 1884.

The work connected with the remaining forty-two special reports is, in most instances, progressing satisfactorily. Portions of the manuscript for three of the larger memoirs have been received and put in type, and the manuscript of many others is in a forward state. For these memoirs, 386 lithographic plates have been printed off and delivered to the binders; 404 others are now on stone, and the drawings for many more are being prepared. It is estimated that the whole work connected with the Report will be completed in the summer of 1887.

In his Address, last year, the President gave the Society a full account of the changes which had taken place in the administration of the Government Fund—technically termed a grant in aid of this Society—though, as you are aware, the Royal Society, while willingly accepting the burden and the responsibility of administrator of the aid granted by the State to science, is in no sense pecuniarily benefited by the grant.

A somewhat novel and extremely useful employment has been given to part of the fund by deciding to defray the expenses of adequately skilled persons who have undertaken to visit distant countries for the purpose of investigating certain interesting biological questions on the spot, and of procuring and transmitting to observers at home specimens prepared and preserved by those refined modern methods which can be satisfactorily carried out only by persons who are well versed in the practice of such methods.

Mr. Adam Sedgwick has thus been enabled to proceed to the Cape of Good Hope for the purpose of completing our knowledge of the singular genus *Peripatus*, so well studied by Prof. Moseley, and afterwards by our lamented Fellow, Balfour; and Mr. Caldwell, similarly aided, is now in Australia, devoting himself to the elucidation of the embryology of the marsupial quadrupeds of that region, a subject of which at present we know little more than was made known in the *Transactions* of this Society half a century ago by Prof. Owen.

It certainly was high time that British science should deal with a problem of the profoundest zoological interest, the materials for the solution of which abound in, and are at the same time almost confined to, those territories of the Greater Britain which lie on the other side of the globe.

Many years ago the late Mr. Leonard Horner communicated to the Society the results of a series of borings which he had caused to be made in the upper part of the delta of the Nile, with a view of ascertaining the antiquity of the civilisation of Egypt. Since that time Figari Bey, an Italian geologist in the service of the Egyptian Government, made and published the results of a large series of borings effected in different parts of the delta, but his work is hardly on a level with the requirements of modern science.

It has been thought advisable therefore to take advantage of

the presence of our troops in Egypt in order to carry out a series of borings across the middle of the delta, in the full expectation that such borings, if made with proper care and carried down to the solid rock, will afford information of the most important character, and will throw a new light upon the natural and civil history of this unique country. I am glad to say that the representations which the President and Council made to the War Office on this subject were most favourably received, and that instructions were at once sent to the officer commanding the Engineers to undertake the operations which they recommended. I trust that, before long, information will reach us which will be of no less interest to the archæologist than to the geologist.

While I am speaking of Egypt, I may perhaps be permitted to express a regret that the admirable energy of the Government in taking measures to make the recent advances of medical science available during the late outbreak of cholera in that country, was not extended beyond the purely practical side of the matter, or, perhaps, not so far as the practical side in the proper sense; for until we know something about the causes of that terrible disease, our measures for prevention and for cure will be alike leaps in the dark.

Those who have looked into the literature of cholera may, perhaps, be disposed to think that a new search after its cause will add but another to the innumerable wild hypotheses which have been set afloat on that topic; and yet devastating epidemics, like the pebrine of the silkworm, so similar in their fatality and their apparently capricious spread, that careful investigators have not hesitated to institute a detailed comparison of the phenomena of this disease with those of cholera, have been proved by Pasteur to be the work of microscopic organisms; and hardly less fatal epidemics, such as splenic fever, have been traced to similar agencies. In both these cases, knowledge of the causes and of the conditions which limit the operation of the causes, have led to the invention of effectual methods of cure. And it is assuredly, in the present state of science, something more than a permissible hypothesis, that the cause of cholera may be an organic living *materies morbi*, and that the discovery of the proper curative and prophylactic measures will follow upon the determination of the nature and conditions of existence of these organisms.

If this reasoning is just, it is certainly to be regretted that the opportunity of the outbreak of cholera in Egypt was not utilised for the purposes of scientific investigation into the cause of the epidemic. There are able, zealous, and courageous young pathologists in this country who would have been willing enough to undertake the labour and the risk; and it seems a pity that England should leave to Germany and to France an enterprise which requires no less daring than Arctic or African exploration, but which, if successful, would be of a thousand times more value to mankind than the most complete knowledge of the barren ice wastes of the Pole or of the sweltering barbarism of the equator.

It may be said that inquiries into the causation of cholera have been for some years conducted in India by the Government without yielding any very definite result. But this is perhaps rather an argument in favour of, than against, setting fresh minds to work upon the problem.

In December last year the President received from the Lords of the Treasury a letter, addressed to their Lordships by the Lords of the Committee of the Privy Council on Education, recommending to the favourable consideration of the Treasury a memorial from the Solar Physics Committee, suggesting the organisation of an expedition for the purpose of making observations during the solar eclipse of May 5, 1883; and the President was requested to communicate his views upon the subject to the Treasury.

After careful consideration, the President and Council reported in favour of the projected expedition; but they added that they did so on condition of its being possible to find some one, whose position in the scientific world would command the confidence of the public, to take charge of the expedition. Unfortunately, for one reason or another, none of the men of science who fulfilled this condition were able to go; and, at the meeting of Council of January 18, the projected expedition was abandoned. The President was, however, requested to place himself in communication with the American authorities, and to ascertain from them whether a photographer and assistant could be allowed to accompany their expedition to Caroline Island. On doing so, he at once received an invitation for two observers; who were accordingly sent out, their expenses being defrayed, partly by a contribution from the Government grant, and partly by a special sum of 500*l.* provided by the Treasury.

I am indebted to Mr. Lockyer for the following list of photographs taken by the observers:—

1. Six good photographs of the corona, exposures varying from two to sixty seconds, giving coronal detail from near the limb to end of streamers. That the limit of the corona has been photographed is shown by the manner in which the light of the sky has impressed itself on the plate.

2. Three large photographs showing the details of the corona close to the limb.

3. Good photographs of the spectrum of the corona, showing a great number of coronal lines and very faint Fraunhoferic lines.

4. Photographs taken on a moving plate in integrating spectroscope, from one minute before to one and a half minute after totality, showing the most prominent lines of the reversion spectrum. These lines belong mainly to hydrogen.

5. Photographs taken with first-order grating, before, during, and after totality. These show H and K, near the limb, throughout the whole of totality.

6. Photographs taken with a dense prism spectroscope before, during, and after totality. These photographs also give some of the prominent lines of the reversion spectrum.

7. Two photographs taken in the prismatic camera on plates sensitive to ultra-red rays. Results comparatively indifferent on account of the absence of prominences.

The arrangements made for obtaining a series of circumpolar observations in meteorology and magnetism were fully described in the Presidential address of last year. I am glad to be able to report that the English party, under Capt. Dawson, has successfully achieved its mission and has returned to this country. Capt. Dawson speaks very gratefully of the efficient assistance which he received from the Canadian authorities and from the Hudson Bay Company.

The responsibility for the transaction of the ordinary work of the Society rests with the Council and the officers, of whom the President is only one, and I may be allowed to say by no means the most important, the heaviest part of the burden of the executive resting upon the Secretarie. But your President is, in virtue of his office, a member of two public bodies whose functions in relation to science are of great importance; and I follow the excellent precedent set by my predecessor in considering it my duty to acquaint the Fellows of the Society with any occurrence, bearing on the interests of science, which has come under my cognisance, as a Trustee of the British Museum and as a member of the Council and Executive Committee of the City and Guilds Institute.

In the first-named capacity, I am glad to be able to announce that the transference of the vast zoological, botanical, geological, and mineralogical collections from Bloomsbury to the New Natural History Museum is now accomplished; and that it has been effected to the great credit of all concerned, with no greater mishap than the fracture of a bottle or two.

The advantages which will accrue to zoologists, botanists, and mineralogists from the re-arrangement of this vast assemblage of the objects of their studies, in such a manner as to be accessible to every investigator, cannot be over-estimated. The Natural History Museum at South Kensington is, in fact, a library of the works of nature which corresponds in value, in extent, and in the purposes to which it should be applied, to the vast library of the works of men which remains at Bloomsbury.

In making this collection of use to the world of science by the publication of complete catalogues of its contents, and of systematic monographs upon particular groups; and to the nation at large, by the composition of guide books calculated to afford the ordinary visitor an insight into the plan of the mighty maze of nature, the officers in charge of the Natural History collections have before them a task, the due performance of which, whatever their abilities, or their number, or their industry, will tax their energies to the utmost. It is in this way that, in the discharge of their proper duties, they may render services of the highest value alike to pure science and to the diffusion of knowledge among the people, out of whose resources the great institution to which they belong is supported. And I trust that no mistaken view of the functions of the officers of the Museum, which no more embrace oral instruction in science than those of the officers of the Library comprehend oral instruction in literature, may lead to the imposition of duties, foreign to their

proper business, upon the already overburdened staff of keepers and their assistants.

In Francis Bacon's apocalypse of science, the "New Atlantis," the Father of Solomon's House—he, whose countenance was "as if he pitied men,"—declares that the end of that foundation is "the knowledge of causes and secret motions of things, and the enlarging of the bounds of human empire to the effecting of all things possible."

I think that the Chancellor would have acknowledged the New Natural History Museum to be a goodly wing of such a House, devoted to the former of the objects which he mentions; but, it may be, that his practical mind, looking always to fruit, and caring for light chiefly as something essential to fruit-bearing, would have been even better satisfied with another building hard by, which has been devoted to the encouragement of those applications of science through which human empire is directly extended, by the well-directed munificence of the City and Guilds of London.

This building, destined for a central institution in which ample provision shall be made for thorough and practical training in so much of the principles and the methods of the physical sciences as is needful for those who aspire to take part in the development of arts and manufactures, has been completed at a cost of more than 70,000*l.*, while 20,000*l.* has yet to be spent upon fittings and appliances, and the working expenses, if the scheme is to be fully developed, cannot be estimated at less than 10,000*l.* a year.

Having already been called upon to take an active part in the deliberations of the committees charged with the carrying out of this great work, I think I am justified in expressing the hope, and indeed the confident expectation, that, before long, this new Technical College will be in full activity; and that, for the first time in our history, there will be called into existence an institution in which, without leaving this country, masters, managers, and foremen of works will be enabled to obtain thorough instruction not only in scientific theory, but in the essential principles of practice; and a machinery will be created, by which the poorest working lad in a manufacturing town, if he have ability and perseverance, may be brought within reach of the best technical education that is to be had.

There can be no doubt that the founders of the Royal Society had prominently before their minds the intention of promoting the useful arts and sciences "that so (in the language of the draft of the preamble to the first charter, which is said to have been drawn up by Sir Christopher Wren) by laying in a stock, as it were, of several arts and methods of industry, the whole body [of the nation] may be supplied by a mutual commerce of each other's peculiar faculties, and, consequently, that the various miseries and trials of this frail life may be, by as many various expedients ready at hand, remedied or alleviated, and wealth and plenty diffused in just proportion to every one's industry, that is, to every one's deserts." It was the wish of King Charles the Second that all patents for inventions should be examined by the Royal Society; and, so late as the reign of George the Second, the Society actually performed this duty. The steam-engine itself may be said to have made its *début* before the Royal Society, when Savery exhibited his working model to the Fellows in 1699.

But the subsequent history of natural knowledge has shown that, as in the moral world, those who seek happiness through well-doing are less likely to obtain that reward than those who try to do well without thinking what may come of it; so, in the world of science, those whose vision is fixed on useful ends are often left poor and bare, while those who strive only after the advancement of knowledge, scatter riches along their path, for the whole world to pick up. The Royal Society has chosen the latter course, and I trust it may never swerve from it. But I think that our warmest sympathy is due to the efforts of those who translate the language of the philosopher into that of the workshop; and by thus ameliorating "the miseries and toils of this frail life," and "diffusing wealth and plenty," are executing that part of the first design of this Society, with which we, as a body, have long ceased to occupy ourselves.

It was not as your President, but as one of the Special Commissioners appointed by the Government, that I had some slight share in another considerable undertaking directed towards the improvement of industry. But the future of the fisheries is so closely connected with the advancement of certain branches of zoological science, that I may be permitted to advert to the great success of the International Fisheries Exhibition; and to express my belief that, in accordance with the intimation contained in the speech of H.R.H. the Prince of Wales at the closing of the Exhibition, there will grow out of it an organisation which will provide for the application of science to the improvement of the fisheries.

In conclusion, gentlemen, I think that it is proper on my own behalf, as it is certainly due to you, that I should advert to the exceptional circumstances which have brought about my present occupation of the Presidential office.

The eleventh section of the sixth chapter of the statutes provides for the occurrence of a vacancy in the Chair, whether by death or by resignation, as follows:—

"Upon any vacancy in the President's place occurring in the intervals of the anniversary elections, the Treasurer, or in his absence one of the Secretaries, shall cause the Council to be summoned for the election of a new President, and the Council meeting thereupon in the usual place, or any eleven or more of them, shall proceed to the said election, and not separate until the major part of them shall have agreed upon a new President."

This statute is substantially, and, to a great extent, verbally, identical with the twelfth section of the seventh chapter of the original statutes of 1663.

Before the present year, five occasions had arisen on which it became necessary to put the provisions of the statute into effect.

Sir Isaac Newton died while President in 1727; the Earl of Morton in 1768; Mr. West in 1772; and Sir Joseph Banks in 1820; while Sir Humphry Davy resigned in 1827. On each of these occasions a new President was at once appointed by the Council, endowed with all the privileges and powers of the office; and, like every other officer, however appointed, he vacated his office on November 30 following, when the Fellows sometimes elected him for the succeeding year, and sometimes did not.

These precedents were strictly followed on the present occasion. A Council had been summoned, in ordinary course of business, for June 28; but, as the President died on the 27th, it was deferred until the following Thursday, when it was supposed the interment would have taken place. In consequence of the delay inseparable from a public ceremony, however, it so happened that the funeral did not take place until noon of July 5; and I have known few sadder scenes than the gathering of the Council, fresh from the unclosed grave of their President, for the performance of the duty, imposed upon them by the statutes, of choosing his successor from their own number, before they should separate.

The Council did me the great honour of selecting me for the office; and now, on this next following St. Andrew's Day, my tenure, like that of the Treasurer and Secretaries, lapses, and it is for the Fellows of the Society to say who shall be their officers until the next Anniversary Meeting.

Having served several years, in another capacity, with three out of four of my present colleagues, and having every reason to believe that the Fellows of the Society, at large, see good reason to set the same high value upon the services of all of them as I do, I do not find myself able to imagine that you will fail to desire that those services shall be continued; but I have not the least difficulty in conceiving that the Fellows of the Society may think many of their number better fitted for the eminent place of the President than myself.

I should be extremely ungrateful to my colleagues of the Council, who have again honoured me by presenting me for election by the Fellows, if I were to let fall even a hint of the extent to which I share that opinion; but I think it may be permitted me to say that, should you think fit to give effect to it, there is no one who will more cheerfully acquiesce in your decision than I shall.

To a man like myself, who neither possesses, nor seeks, any other distinction than that of having done his best to advance knowledge and to uphold the dignity and the authority of science against all comers, the Presidency of this Society is the highest dignity which he can attain, whatever else may befall him.

But, gentlemen, as men of science, you know better than I can tell you, that there are things of more worth than distinction. I am within measurable distance of the end of my career; and I have long looked forward to the time when I should be able to escape from the distractions and perturbations of the multitudinous affairs in which I have been so long entangled, to that student life from which the Fates have driven me, but to which I trust they may, for a little space, permit me to return.

So that I am sure you will neither misunderstand me, nor mislike my directness of speech, when I say that, if it please you to believe that the interests of science and of the Royal Society will be advanced by maintaining me in the very distinguished position which I at present occupy, I will do my best to justify your confidence; but if, as may well be, you think that some other Fellow of the Society will serve these interests better, I shall, with a light heart, transfer to him the honourable burden, which I have already borne long enough to know its weight.

I now proceed to the presentation of the medals which have this year been awarded by the Council.

The number, the variety, and the importance of Sir William Thomson's contributions to mathematical and experimental physics are matters of common knowledge, and the Fellows of the Society will be more gratified than surprised to hear that the Council have this year awarded him the Copley Medal, the highest honour which it is in their power to bestow.

Sir William Thomson has taken a foremost place among those to whom the remarkable development of the theory of thermodynamics and of electricity in the last forty years is due; his share in the experimental treatment of these subjects has been no less considerable; while his constructive ability in applying science to practice is manifested by the number of instruments, bearing his name, which are at present in use in the physical laboratory and in the telegraph office.

Moreover, in propounding his views on the universal dissipation of energy and on vortex motion and molecular vortices, Sir William Thomson has propounded conceptions which belong to the *prima philosophia* of physical science, and will assuredly lead the physicist of the future to attempt once more to grapple with those problems concerning the ultimate construction of the material world, which Descartes and Leibnitz attempted to solve, but which have been sedulously ignored by most of their successors.

One Royal Medal has been awarded to Dr. T. Archer Hirst, F.R.S., for his investigations in pure geometry; and, more particularly, for his researches into the correlation of two planes and into the complexes generated by them.

The other Royal Medal has been awarded to Dr. J. S. Burdon Sanderson, F.R.S., for the eminent services which he has rendered to physiology and pathology; and, especially, for his researches on the electrical phenomena exhibited by plants, and for his investigations into the relation of minute organisms to disease.

In making this award, the Council desire not merely to recognise the merit of Dr. Burdon Sanderson's researches, especially those on the analogy between the electrical changes which take place in the contractile tissues of plants and those which occur in the like tissues of animals; but to mark their sense of the important influence which Dr. Sanderson has exerted upon the study of physiology and pathology in this country.

The Davy Medal has this year been again awarded in duplicate, the recipient being M. Marcellin Berthelot, Member of the Institute of France, and Foreign Member of the Royal Society, and Prof. Julius Thomsen, of Copenhagen.

The thermo-chemical researches of Berthelot and Thomsen have extended over many years, and have involved an immense amount of work, partly in the application of established methods to new cases, partly in devising new methods and applying them to cases in which the older methods were not applicable. Chemists had identified a vast variety of substances, and had determined the exact composition of nearly all of them, but of the forces which held together the elements of each compound they knew but little. It was known that certain elements combine with one another with great evolution of heat-forming products in which they are firmly united; while other elements combine but feebly, and with little evolution of heat. But the materials for forming any general theory of the forces of chemical combination were but scanty and imperfect.

The labours of Messrs. Berthelot and Thomsen have done much towards supplying that want, and they will be of the utmost value for the advancement of chemical science.

THE JAVA DISASTER

THE following letter from the Liverpool *Daily Post*, received from Capt. W. J. Watson, of the British ship *Charles Bal*, contains a graphic and interesting account of the recent terrible volcanic outburst in Sunda Straits. Capt. W. J. Watson was himself an eye-witness of what he describes. His vessel was actually within the Straits, and not far from Krakatoa when that island had become an active volcano:—

"*August* 22, 15° 30′ S., 105° E.—About 7 p.m. the sea suddenly assumed a milky-white appearance, beginning to the east of us, but soon spreading all round, and lasting till 8 p.m. There were some clouds (cumulus) in the sky, but many stars shone, and in the east to north-east a strong, white haze or silvery glare. This occurred again between 9 and 10 p.m., the clouds also appearing to be edged with a pinkish coloured light, the whole sky also seeming to have extra light in it, similar to when the aurora is showing faintly. On the 24th, in 9° 30′ S. 105° E., we had a repetition of the above. On the night of the 25th, standing in for Java Head, the land was covered with thick, dark clouds and heavy lightning. On the 26th, about 9 a.m., passed Prince's Island, wind south-west, and some heavy rain; at noon, wind west-south-west, weather fine, the Island of Krakatoa to the north-east of us, but only a small portion of the north-east point, close to the water, showing; rest of the island covered with a dense black cloud. At 2.30 p.m. noticed some agitation about the Point of Krakatoa; clouds or something being propelled from the north-east point with great velocity. At 3.30 we heard above us and about the island a strange sound as of a mighty, crackling fire, or the discharge of heavy artillery at second intervals of time. At 4.15 p.m., Krakatoa north half east, ten miles distant, observed a repetition of that noted at 2.30, only much more furious and alarming, the matter, whatever it was, being propelled with amazing velocity to the north-east. To us it looked like blinding rain, and had the appearance of a furious squall of ashen hue. At once shortened sail to topsails and foresail. At five the roaring noise continued and increased; wind moderate from south-south-west; darkness spread over the sky, and a hail of pumice-stone fell on us, many pieces being of considerable size and quite warm. Had to cover up the skylights to save the glass, while feet and head had to be protected with boots and southwesters About six o'clock the fall of larger stones ceased, but there continued a steady fall of a smaller kind, most blinding to the eyes, and covering the decks to three or four inches very speedily, while an intense blackness covered the sky and land and sea. Sailed on our course until we got what we thought was a sight of Fourth Point Light; then brought ship to the wind, south-west, as we could not see any distance, and we knew not what might be in the Straits, the night being a fearful one. The blinding fall of sand and stones, the intense blackness above and around us, broken only by the incessant glare of varied kinds of lightning and the continued explosive roars of Krakatoa, made our situation a truly awful one. At 11 p.m., having stood off from the Java shore, wind strong from the south-west, the island, west-north-west, eleven miles distant, became more visible, chains of fire appearing to ascend and descend between the sky and it, while on the south west end there seemed to be a continued roll of balls of white fire; the wind, though strong, was hot and choking, sulphureous, with a smell as of burning cinders, some of the pieces falling on us being like iron cinders, and the lead from a bottom of thirty fathoms came up quite warm. From midnight to 4 a.m. (27th) wind strong, but very unsteady, between south-south-west and west-south-west, the same impenetrable darkness continuing, the roaring of Krakatoa less continuous, but more explosive in sound, the sky one second intense blackness and the next a blaze of fire, mastheads and yardarms studded with corposants and a peculiar pinky flame coming from clouds which seemed to touch the mastheads and yardarms. At 6 a.m, being able to make out the Java shore, set sail, passing Fourth Point Lighthouse at 8; hoisted our signal letters, but got no answer. Passed Anjer at 8.30, name still hoisted, close enough in to make out the houses, but could see no movement of any kind; in fact, through the whole Straits we have not seen a single moving thing of any kind on sea or land. At 10.15 a.m. passed the Button Island one-half to three-quarters of a mile off; sea like glass round it, weather much finer looking, and no ash or cinders falling; wind at south-east, light. At 11.15 there was a fearful explosion in the direction of Krakatoa, now over thirty miles distant. We saw a wave rush right on to the Button Island, apparently sweeping right over the south part, and rising half way up the north and east sides. This we saw repeated twice, but the helmsman says he saw it once before we looked. The same wave seemed also to run right on to the Java shore. At the same time the sky rapidly covered in; the wind came strong