THE

JUBILEE

OF THE

CHEMICAL SOCIETY OF LONDON,

1891.

JUBILEE

OF THE

CHEMICAL SOCIETY OF LONDON.

Tho. Graham

THE JUBILEE OF THE CHEMICAL SOCIETY OF LONDON.

RECORD OF THE PROCEEDINGS

TOGETHER WITH AN ACCOUNT OF

THE HISTORY AND DEVELOPMENT

OF THE

SOCIETY,

1841—1891.

LONDON.

1896.

LONDON:
HARRISON AND SONS, PRINTERS IN ORDINARY TO HER MAJESTY.
ST. MARTIN'S LANE.

Chem

CONTENTS.

THE

JUBILEE CELEBRATION.

THE JUBILEE CELEBRATION.

Three meetings were held in celebration of the Jubilee of the Chemical Society, of these notice was given in a circular issued to all the Fellows early in 1891. The days selected were Tuesday, 24th February, and Wednesday, 25th February, these being as near as proved convenient to the day of the Preliminary Meeting (23rd February), at which the idea of forming the Society first took shape.

In the circular, above mentioned, it was stated that the first meeting of the Jubilee Celebration would be held at the Society of Arts, John Street, Adelphi; this place of meeting was selected as it was in these rooms that the Chemical Society was founded. The number of Fellows expressing their intention of being present proved, however, so great that a larger meeting room became necessary. Application was then made for the use of the theatre of the London University in Burlington Gardens, and this application was most kindly granted by the Senate.

The meetings actually held were as follows :—

An Afternoon Meeting

on 24th February, at 3 p.m., in the theatre of the London University. At this meeting addresses were delivered, and the delegates from other Societies received.

An Evening Reception and Soirée

on 24th February, at 8.30 p.m., in the fine Hall and suite of rooms belonging to the Worshipful Company of Goldsmiths, who not only placed their rooms at the disposal of the Society, but gave most efficient aid in preparing the exhibition of Apparatus and Specimens, and took upon themselves all the incidental expenses.

A Dinner

on 25th February, at 7 p.m., at the Hôtel Métropole, the President in the chair.

THE AFTERNOON MEETING.

ADDRESS

DELIVERED BY THE PRESIDENT,

DR. W. J. RUSSELL.

WE meet to-day to celebrate the fifty years' existence of our Society, a time, if measured by the progress which our science has made, equal to centuries of former ages, but which in years is so brief a space that we have, I am happy to say, with us to-day some of those who were present and who took an active part in the foundation of the Society, and I need hardly say with how much interest we shall listen to their reminiscences of the time and circumstances connected with the birth of our Society.

I would, by way of introduction, say a few words, first, with regard to our Society, and afterwards with regard to the state of chemistry in England when our Society was founded. We boast, and I believe rightly, that our Society holds the distinguished position of being the first which was formed solely for the study of chemistry. Chemistry and physics, twin sisters, had hitherto always dwelt together, and many were the societies, both in this country and abroad, devoted to their joint study and development.

In London there was the Royal Society, which had hitherto received the most important chemical papers; there was also the Society of Arts, which is 110 years old, and the British Association, which is 10 years senior of our Society. In Manchester the Literary and Philosophical Society had been founded and actively at work since 1781; and we admit that our neighbours at Burlington House, the Astronomical, Antiquarian, Linnean and Geological Societies are all our seniors: they had a distinct individuality and literature of their own, which called them into existence some 40 to 80 years before the commencement of our Society. Small private chemical societies, no doubt, existed; they are the natural forerunners of a large society, and become merged into it. The Chemical Section of the British Association, which is an ephemeral and peripatetic Chemical Society, had existed from the founding of that body. If we turn to other countries, we find that much as our science had been cultivated on the continent, it did not until later times engross a whole society to itself; the French Chemical Society not having been formed until 1857, and the now great Berlin Chemical Society not until 1868. Our interest, however, at the moment is rather in the growth of chemistry in this country than in what occurred elsewhere.

To-day we may learn how it came about that the first Chemical Society was established in England. I may however state that the reason for our meeting depends on the official record that on the 23rd of February, 1841, twenty-five gentlemen "interested in the prosecution of Chemistry" met together at the Society of Arts to consider whether it be expedient to form a Chemical Society. Of the twenty-five who then met I am happy to say three are present—Sir W. Grove, Sir L. Playfair and Mr. Heisch, and Mr. W. J. Cock is another of this band who is still alive but not present.

These twenty-five gentlemen appear without dissent to have come to the conclusion that it *was* expedient to form a Chemical Society, and appointed a committee of fourteen to carry this resolution into effect. So expeditious were they in their work, that in little more than a month the first general meeting was held, and the provisional committee brought forward a report embodying a plan for the constitution and government of the Society, and this plan as adopted remains essentially the same, save in one point, to the present day. I refer to the formation of a museum of chemical specimens; this project was abandoned some years ago. It is worth recording that at this first general meeting Thomas Graham was elected President; W. T. Brande, Esq., J. T. Cooper, Esq., J. F. Daniell, Esq., R. Phillips, Vice-Presidents; Arthur Aikin, Esq., Treasurer; Robert Warington, Esq., E. F. Teschemacher, Esq., Secretaries; Council—Dr. T. Clark, Rev. J. Cumming, M.A., Dr. C. Daubeny, T. Everitt, Esq., T. Griffiths, Esq., W. R. Grove, Esq., H. Hennell, Esq., G. Lowe, Esq., W. H. Miller, Esq., M.A., W. H. Pepys, Esq., R. Porrett, Esq., Dr. G. O. Rees. Also that the Society then numbered seventy-seven members. We hail Sir W. Grove, who is still among us, as being a most active member in founding our Society, for he was a member of the first Council, was present at the first meeting, and was a member of the provisional committee. I must here add to the official record, for it does not tell us how these twenty-five gentlemen "interested in the prosecution of Chemistry" were collected together at one time and place. Obviously some special force was required to build up this complicated molecule; that special force was embodied in and exercised by Robert Warington. By his activity and energy he brought about this meeting, and we can imagine how difficult and troublesome a work it probably was—how some of these gentlemen had to be instigated to action, others repressed, some convinced that the aim was desirable, others that it was feasible. But whatever the difficulties were, Mr. Warington succeeded, and to him we are indebted for the formation of our Society. Although he has passed away, he is ably represented here to-day by his son. The love for the Chemical Society has proved to be hereditary: Mr. Warington of to-day is a most active and valued member; is one of our Vice-Presidents; and, as our programme shows, is about to present to us records connected with the early history of our Society which are of great interest now and will become of increasing value as time goes on.

I turn now at once from these matters immediately connected with our Society to the consideration of what was being done in chemistry in this country fifty years ago. At that time public laboratories for the systematic teaching of chemistry did not exist in London. The number of real students of chemistry in this country was very small. They were looked upon by their friends as being eccentric young men, who probably would never do any good for themselves, and these few students found practical instruction in the private laboratories of some of the London teachers.

The practical teaching of chemistry appears to have been undertaken in Scotland much earlier than in England, for Dr. D. B. Reid held practical classes at the University of Edinburgh as early as 1832. Graham came to London from Glasgow in 1837, and until the opening of the Birkbeck Laboratory, in 1846, he had from time to time private students working in his laboratory. And so with the other teachers, who all had private or articled pupils. I doubt whether the pupils received much systematic instruction, but they gained an insight into laboratory work, saw how apparatus was put together, and how analyses were made. We have indeed to wait some years before public laboratories are established, for not till 1845 is the College of Chemistry opened, and this appears to have been really the first public laboratory in London, and its object, as stated by its founders, is "to establish a practical School of Chemistry in England." About the same time both University and King's College established laboratories. The Council of our Society recognised the importance of these occurrences in the Annual Report in 1847, saying that, "although an event not immediately connected with the Society, the Council has much pleasure in commemorating the late successful establishment in London of chemical laboratories expressly designed to further the prosecution of original research. The new laboratories of the College of Chemistry, and of the two older Colleges of the London University, now offer facilities for practical instruction and research not surpassed we believe in any foreign school."

While speaking of laboratories in London, I should however mention that the Pharmaceutical Society established a laboratory especially if not exclusively for its own students as early as 1843.

It was not till several years later, till 1850 and 1851, that the medical schools in London established classes of practical chemistry.

If we consult the scientific journals of the time immediately preceding the formation of our Society, we find it was by no means a period of chemical activity in this country, but rather a dull time, given more to the study and slow development of the science than to discovery. Methods of analysis, both organic and inorganic, had been much improved, and the dominant idea was the determination of the empirical composition of bodies, and the preparation of new compounds, whose existence was predicted by a study of Dalton's Atomic Theory. Graham, Kane, and Johnston of Durham were the leaders in scientific chemistry, and the authors of the most important chemical papers of the time. Graham had very lately published his notable paper on the constitution of salts, a paper which gained for him, some years after its publication, a Royal medal. Kane was an active worker and bold theorist, and at this time his reputation was much increased by a paper on the Chemical History of Archil and Litmus. Johnston was also a most active chemist. His contributions relate to many branches of the science, but especially to the chemical composition of minerals. In 1841, however, he is engaged on a long series of papers on the constitution of resins. He will probably be best known and remembered as an agricultural chemist. Faraday we can hardly claim as a chemist at this time, for he was then rapidly publishing his long series of Experimental Researches in Electricity. While speaking of electricity I should state that it was in 1840 that Smee described his battery, and the Society of Arts awarded him a gold medal for it. An important branch of our science was, however, coming into existence, a branch which has found many and successful investigators in this country. I mean photography. It was in 1840 that Herschel published in the *Philosophical Transactions* his elaborate paper on the chemical action of the rays of the solar spectrum, a paper in which he recognises a new prismatic colour beyond the violet, and chemical activity in the spectrum beyond the red, and besides discussing many other matters, establishes his previously discovered hyposulphite of soda as the best agent for the fixing of sun pictures. Fox-Talbot had previously given an account of Photogenic drawing, and claims that as far back as 1835 he took pictures of his house by means of a camera and chloride of silver paper, but it is not till 1838 that the Secretary of the Royal Society extracts from him a clear account of the details of his process, and it is in 1841 that he is granted a patent for improvements in obtaining pictures or representations of objects. Again in the following year Herschel publishes another paper of much importance. I can here only mention how actively this line of research was prosecuted by Robert Hunt, how many, ingenious, and interesting were the experiments he made, and how valuable was the account he afterwards gave of this subject in his "Researches on Light." Thus the work done in this branch of chemistry at the time of which I am speaking is certainly noteworthy, probably more so than in other branches of chemistry. In fact, of other advances in chemistry there is little to record, but I may mention that Clark's process for determining the hardness of water also holds its jubilee this year, for it was in 1841 that a patent was granted to Dr. T. Clark for a new mode of rendering certain waters less impure and less hard.

Not a single chemical paper appears in the *Phil. Trans.* for 1841, but there are two papers which were much discussed at this time, and although they were readily shown to be erroneous, still are interesting as indicating the chemical ideas of the day. One is by Robert Rigg, who is carrying on an experimental inquiry on Fermentation, which is termed "Additional Experiments on the Formation of Alkaline and Earthy Bodies by Chemical Action when Carbonic Acid is present"; it is published in the *Proceedings* of the Royal Society. The other is a paper by Dr. S. M. Brown, entitled "The Conversion of Carbon into Silicon," published in the *Transactions* of the Royal Society of Edinburgh.

With regard to the first paper, Mr. Rigg believes that he has demonstrated that when fermentation takes place, a great and direct increase in alkaline and earthy salts, viz., of potass, soda and lime, occurs, an increase varying from 15 to 19 times the original amount. Denham Smith, who has only very lately passed away, showed that the theory simply rested on inaccurate experiment.

The object of the other paper is to demonstrate that on heating paracyanogen, nitrogen is given off, leaving a residue of silicon. Dr. Breit and Mr. Denham Smith controverted this, and in a paper in the *Phil. Mag.* proved that the supposed silicon was simply carbon in a very incombustible state. So important an experiment was this alleged conversion of carbon into silicon considered to be at the time of its publication, that it attracted Liebig's attention, and in a letter to Dr. Playfair, which was communicated to the meeting of the

British Association at Plymouth, in 1841, Liebig says, he has repeated Dr. Brown's experiment on the production of silicon from paracyanogen, but has not been able to confirm one of his results.

As far as pure chemistry is concerned it was rather a time of repose. The beginning of the century had been a brilliant time for chemistry in England. Dalton had published his atomic theory; Davy had decomposed potash and soda, and had demonstrated that chlorine was an element; and Cavendish and Wollaston were then still at work. In fact the most important discoveries of that time were made in this country, but I fancy that during this later period a feeling grew up that the age of brilliant discoveries was over, and that, apart from the preparation of a few new compounds, the essential work of the time was analysis and the determination of the percentage composition of substances. Still much quiet study of the science was going on, as is indicated by the considerable demand which existed for good text books. Henry's, Turner's, Brande's, Kane's and Graham's Chemistry, all these, without mentioning others, went through numerous editions, and played a very important part in the spread of chemical knowledge in our country.

Another text book, which is interesting as showing how little organic chemistry was studied in this country, is Dr. Thomas Thomson's work on "Vegetable Chemistry." Dr. Thomson states in his preface that the object of the book is to lay before the British public a pretty full view of the present state of the chemistry of vegetable bodies; and further, he says, "that the ultimate analyses he gives have, with very few exceptions, been made upon the continent, and principally in Germany and France. British chemists have hardly entered on the investigation." Evidently then at this time organic chemistry had been but little studied in this country.

When our Society was founded, Thomas Graham was certainly the most distinguished chemist in England. He came to London in 1837 as professor of chemistry at University College, succeeding Edward Turner. The work he had already accomplished was of a high order, and he was now occupied in writing his book which appeared in 1842.

The book was an admirable account of the chemistry of the time; it contained a well arranged and clearly written introduction, describing the principles and latest discoveries in those branches of physics which bear most directly on chemistry. There was also an able and succinct account, probably the best which had then appeared in this country, of organic chemistry; and with regard to physiological chemistry, he states in the preface that he gives a "condensed view of the new discoveries in this department, which now enters for the first time into a systematic work on chemistry."

There are, however, indications that a knowledge of the discoveries and discussions going on on the continent only slowly reached this country. This is strongly insisted on in the *Phil. Mag.* of 1841, by Messrs. Francis and Croft, who state that "but little of what is done abroad, especially in Germany, seems to find its way into England, or at least until the lapse of some years." In proof of this statement they mention results lately published by Dr. Apjohn, Prof. Johnston and Dr. Golding Bird, all of which had been known on the continent some time previously. A valuable series of communications described as "Notes of the Labours of Continental Chemists," is afterwards communicated by these chemists to the *Phil. Mag.*, and continued for several years.

The visit of Liebig in 1837, when he attended the meeting of the British Association at Liverpool, must have given some stimulus to the study of organic chemistry in England, and we find that he undertook to report to the British Association on "Isomeric bodies," and also on "Organic Chemistry," and this great undertaking resulted in his two works, the one "Chemistry, in its applications to Agriculture and Physiolgoy," and the other, "Chemistry, in its applications to Physiology and Pathology." Both books were dedicated to the British Association, the first appearing in 1840, the second in 1842. It is very difficult for us now to realise the importance of these works, and properly to appreciate not only the large amount of new knowledge which they contained, but, what is of still greater importance, the novelty of treating such subjects in a truly scientific spirit. Gradually this treatment of the subjects became understood and appreciated, and people took a higher view of chemistry, and regarded it as a true science, and not merely as a study which might lead to useful results.

If then it be true that chemistry at this epoch was not rapidly progressing in this country, we naturally ask how it came about that our Society from its very foundation was so successful. The explanation is not difficult to find, nor doubtful, for we have only to turn from our own country to the continent and learn what is happening there. Liebig is at Giessen, Wöhler at Göttingen, Bunsen at Marburg, Dumas, Laurent, Gerhardt, and a host of distinguished and active chemists in France, and at this time even Berzelius and Gay Lussac are alive. Liebig, with his wonderful energy and ability, was powerfully advocating the theory of compound radicles, and was extending in every direction our knowledge of organic chemistry, and inspiring all who came within the range of his influence with a love for investigation. Dumas, at the same time, both as a chemist and a finished advocate, was advancing his views on substitution and chemical types. Laurent, and afterwards Gerhardt, were with conspicuous ability showing how these theories were to be extended and modified so as to assume a form which has even with the lapse of time been but little altered. Thus on the continent it was a time of wonderful activity; chemistry was every day becoming more of a true science, and the constitution as well as the composition of bodies was actively being discussed and investigated. This activity on the continent took time to reach and really affect us here. The older chemists thought the new theories were visionary and unsound, the simple theories of their younger days were being swept away, and only slowly did they realise the meaning of the newer form of their science; but the wave of progress could not be stopped, and in this country we had been ripening for the change. Clearly the immediate cause of this sudden increase of chemical activity in England was Liebig. His famous school had now been established for several years at Giessen, and if the older men in this country did not altogether put their trust in him, the younger men, breaking through all restraint, flocked from this country to his laboratory, there to become indoctrinated with his enthusiasm for the study of chemistry, and to learn how scientific investigation was to be carried on. At this epoch our Society was founded, and our Journal shows how successful Liebig's teaching was, how a new spirit was instilled into English chemistry, and how much valuable work his students did. Our Society gave them a ready means of publishing their discoveries, and a meeting place for discussion and mutual interchange of ideas. Thus do I explain the success which from the first has attended on our Society; and having now led you to this point I stop, for my part was merely to speak the prologue, and I leave the story of the development of our Society in other hands.

ADDRESS DELIVERED

BY

THE RIGHT HON. SIR LYON PLAYFAIR.

Mr. President, Ladies and Gentlemen,

It is a sad feeling that there are now living among us only five of the original founders of the Chemical Society. I am one of those five, and have therefore been selected to address a few words to you to-day. You have learned from the excellent discourse of our President that before 1841 chemistry was being both rapidly developed and rapidly evolved. New methods of research were being created; and organic chemistry had almost been created. There were many luminaries in the chemical firmament all over the world at that time, and if I mention a few names they will appear to many of you as mere milestones representing discoveries and progress, though they are names well known to the older members of the Society and the few founders who are left, as strong personalities with whom we connect much kindness, hospitality, and encouragement. Liebig was then *facile princeps* chemist of the world. He formed a school, and showed how to advance chemistry by original research. At that time, in 1841, the year of our foundation, his brilliant pupil Hofmann had scarcely risen above the horizon. Kopp and Bunsen had made researches, but were still young. There were in Germany names of the highest importance in our science; at Gottingen there was Wöhler, the dear friend of Liebig, and associated with him in his work. In Berlin there was Mitscherlich, the aristocrat of chemistry; there was Rose, the most lovable of our fraternity, who had raised analysis to a high platform by improving methods of research; there was Dove, the jolliest of companions, who had joined physics to chemistry; and lastly, there was Rammelsberg, who took mineralogy out of the domain of physics and made it part of the domain of chemistry. In France, at that time—I speak only of those whom I personally knew, and whose friendship has ever been valuable to me—there was a man who died only the other day, but who was a veteran even then and famous for his researches on the fatty bodies, Chevreul; there was Balard the discoverer of Bromine; there was Baron Thénard, the king among lecturers; there was Dumas the eloquent, who established the doctrine of substitutions; and there were other good workers who had not yet acquired the reputations which they afterwards gained—men like Pelouze, Fremy and Regnault. These were the great luminaries on the continent; but who had we at home? There was my old teacher, and to all old chemists devoted friend, Graham, who founded one of the first laboratories of research which existed in this country; who by his profound philosophical views did so much to promote the advancement of chemistry. At Manchester there was Dalton, who did as much for chemistry as Kepler did for astronomy. There was Faraday, that prince of electricians; my dear friend, Grove, who now sits beside me, who formulated the doctrine of the correlation of forces; and Joule, who discovered the mechanical equivalent of heat. These names show that the great science of chemistry was actively cultivated in our country. But it required association to bring the chemists together; it required association to encourage young men in research, and to give them that support which union among scientific men always adds to the promotion of investigation. Fifty years, gentlemen, is a long time in the history of an individual, but it is a mere mathematical point in the history of a science. We are sometimes told that chemistry is a modern science; that is not true. The moment that men's minds began to experiment on the constitution of matter, there was a science of chemistry. Tubal Cain was a chemist because he was skilled in brass and iron. Thales was a chemist when he declared that everything was made of water. Anaximenes was equally a chemist when he said that everything was made of air. Aristotle was a very advanced chemist when he got out four elements, fire, air, earth, and water. So chemistry has progressed from these days to the present time by the investigation of the laws which govern the combination of the elements, and by examining into the constitution of matter. Now chemists and microscopists have often been taunted with the fact that they are content to rely on those small particles of matter which we call atoms, and that they are narrow as men of science compared with astronomers, who sweep the skies and examine the motions of large masses of matter. But the astronomers have been obliged to take us into partnership. We have helped them to know the constitution of the stars, and we are now helping them to discover how new worlds are formed. It is unnecessary for me to detain you longer upon the subject of the progress of chemistry; for that has been ably done by the President. But I would like to hold out some encouragement with regard to the future of chemistry. There are periods of great activity in the progress of every science, and that has been manifested during the period terminating in our jubilee. When this Society meets to celebrate its centenary, what a different chemistry it is likely to be from the chemistry of to-day!

Already analysis has led to synthesis, yet we know very little with regard to the processes that go on in organic bodies. With regard to the elements, we are beginning to doubt what they are, and even to hope for their resolution. When we find such an important law as the one that the properties of the elements are periodic functions of their atomic weights, what a field is thrown open for investigation! It is a field of discovery the borders of which we have scarcely yet crossed. The motions of atoms may ultimately be known to us, and even the ultimate elements themselves. We call them elements still, because they have a certain fixity, and we are at present unable to decompose them. But recollect that sometimes there comes a man who changes the whole features of a science. What did Newton do for Astronomy? With one fell swoop he cleared away the vortices of Descartes and the tremendous system of "monads," "sufficient reason," and "pre-established harmony" of Leibnitz; and we may hope that during the next fifty years there will arise a chemical Newton, who will enable us to know far more than we now know, who may bring under one general law the motions of atoms, and even the rupture of those which we now call elements simply because they have acquired a fixity in the order of things, and are able to resist changes in the struggle for existence. Let us have hope in the future. Veterans like myself and my friend Grove will not live to see these great discoveries, but some of our younger men will participate in the chemistry of the future, and will look back with interest to the chemistry of the fifty years we are now celebrating. There is no heart here so cold as to doubt the rapid and continued progress of our science. I express my own thought, and I believe that I formulate the conviction of each person present, when I conclude in the words of Tennyson:—

> "And men through novel spheres of thought
> Still moving after truth long sought,
> Will learn new things when I am not.
>
> *   *   *
>
> "Thou hast not gained a real height,
> Nor art thou nearer to the light,
> Because the scale is infinite."

ADDRESS DELIVERED

BY

THE RIGHT HON. SIR W. R. GROVE.

Mr. President, Ladies and Gentlemen,

My qualification for being here this afternoon is not one of great distinction. It is that of old age, and the privileges of old age are such as nobody envies. With old age come impaired faculties, and one of its effects is loss of memory. When I promised to take part in this celebration I thought that I should have some reminiscences of my early connection with the Society to bring before you; but when I came to look up the subject I found that my recollections of it were but slender. So that although, as I have said, my main qualification is that of old age—a sort of survival of the unfittest—I am afraid that I shall not be able to assist you very much. Still I do remember some few incidents of the early formation of the Society. I do not remember who was the actual initiator of it; but the most active man in its formation was undoubtedly Professor Graham. There was a good deal of discussion as to who should be the first President of the Society. We were anxious to get a man of considerable distinction; and I spoke to Faraday. But he thought that he could do more good in research than in assisting in the construction of such a body; and so he declined the honour. Then the matter gradually advanced, until we got the names which appear in the charter of the Society as its original members. Among these names the only ones that I can now recognise are those of my old and good friend Sir Lyon Playfair, Professor Graham, and my own. After considerable discussion it was agreed that Professor Graham should be invited to become President, and he accepted. I think that Mr. Phillips' name was previously suggested, but he declined, and proposed Professor Graham. However, among the names I do not recognise more than those I have mentioned. I am surprised not to see one name among them. Perhaps he was then too young; but he afterwards took an active part in the Society. I refer to Jacob Bell, a very able, gentlemanly, and agreeable man, and also a good chemist. He was the means of introducing into this country the system of selling pure drugs. I could wish that my memory enabled me to tell you more about the origin of the Society; but I do not know that I can give you much information. There were of course discussions among the best chemists of the day. The name of Dalton has been mentioned by our President. I was present at the lecture which Dalton gave at the Royal Institution upon the atomic theory. He was then somewhat aged, of great simplicity of character, and thoroughly devoted to his subject. I well recollect the paper, and his drawings of atoms—little circles to represent atoms as minute spheres grouped together to show their action in uniting to form a molecule of a body. Illustrations were given of the combinations of nitrogen and oxygen, the spheres being arranged in symmetrical little groups around one central sphere. The most compact forms consisted of six spheres around one, for in that case they all touch, and thus pressed together give us a hexagon, as shown in the honeycomb, to the explanation of which a great deal of mathematics has been devoted. I have no doubt that it is caused by the pressure of the bees in crowding into the honeycomb; for each bee with closed wings being cylindrical or nearly so, and somewhat elastic, they convert the spherical cylinders which they make into hexagons by mutual pressure. Conversely you will find that pressure from without acts in the same way, as by winding a band round a bundle of soft clay tubes and gradually tightening it, the tubes become hexagons. I think the name atomic theory was an unfortunate one. We talk fluently about atoms as the smallest particles that exist, and chemists regard them as indivisible in the sense of being so hard as to be incapable of further division. To my mind the infinitely small is as incomprehensible as the infinitely great. I use the word incomprehensible advisedly. I do not say that you may not believe in the infinity of the universe; but we cannot comprehend it, we cannot take it in. And so with the atom. Therefore I think that it would have been better to have taken a different word—say minim—which would have been a safer term than atom. As it is, different people think differently as to what an atom really is. However, that was Dalton's theory, deduced from the definite proportions of combining bodies, which is now universally regarded as the keystone of the constitution of matter, enabling us to comprehend its combination into definite masses. After the elaborate survey you have just heard from our President, I will not attempt anything approaching to a summary of the chemical discoveries made during the lifetime of the Society (the more so as you can get them in the *Standard* of this morning, or at any rate a large number of them). There are two ways of regarding science: first, as seeking natural revelations; secondly, practically, as applied to the arts and industries. For my own part, I must say that science to me generally ceases to be interesting as it becomes useful. Englishmen have a great liking for the practical power of science. I like it as a means of extending our knowledge beyond its ordinary grasp, leading us to know more of the mysteries of the universe. The little we can see of it even telescopically is a mere nothing, while what we call an atom is gigantic if its divisibility is infinite.

The spectroscope has been discovered during the lifetime of this Society; and I ought to have been its discoverer. I had observed that there were different lines exhibited in the spectra of different metals when ignited in the voltaic arc; and if I had had any reasonable amount of wit I ought to have seen the converse, viz., that by ignition different bodies show in their spectral lines the materials of which they are formed. If that thought had occurred to my mind, I should have discovered the spectroscope before Kirchoff; but it didn't. I cannot recall to my mind any further points sufficiently interesting to speak to you about. Alphonse of Castile is reported to have said that if he had had the making of the universe he would have done it much better. And I think so too. Instead of making a man go through the degradation of faculties and death, he should continually improve with age, and then be translated from this world to a superior planet, where he should begin life with the knowledge gained here, and so on. That would be to my mind, as an old man, a more satisfactory way of conducting affairs. However, it is not so, and we must put up with things as they are. I have been sometimes reproached for having to a great extent given up science for my profession. I need not say that I should have preferred the former. But the necessities of a then large family gradually forced me to follow a more lucrative pursuit. I have said that I prefer contemplative science to science applied to the Arts; we are overdone with artificial wants, and life becomes in consequence a constant embarrassment. But there is one practical problem which I would venture to urge upon the attention of the members of this Society: and that is that they should endeavour to prevent the existence of London fogs even under a constitutional and representative Government.

Dr. G. D. Longstaff, an Original Fellow of the Society, had been announced as one of the speakers in the printed Programme of this meeting, but was unable through illness to be present.

PRESENTATION OF THE JUBILEE ALBUM

BY

MR. R. WARINGTON.

Mr. President, Ladies and Gentlemen,

It fortunately happened that my father preserved various papers relating to the formation of the Society; these have been arranged and bound, and my pleasant task is now to present them to the Society. In this book we have the original letters written by gentlemen in answer to the invitation sent out by my father before the primary meeting of the 23rd February, and to the more extensive circular sent between the 23rd February and the general meeting on the 30th March, 1841. To make the collection more complete, we have endeavoured to add portraits of some of the Original Members. The portraits are, of course, copies, but the whole of them have been taken in platinotype; I trust, therefore, that they will remain a permanent record of the founders of the Society. There were seventy-seven Original Members. We have seventy letters, and forty-four portraits: rather more than half these portraits have been executed by Professor Thomson, of King's College. Before sitting down I should like to give a rough analysis of these seventy-seven Original Members, and to show where they came from. Forty of them were resident in London. Scotland claims the largest share of the remainder, fourteen, and of those fourteen eight belonged to Glasgow. Next in order stands Lancashire, which sent five Original Members. Nearly all the principal towns in the country contributed. We have, for instance, Members from Oxford, Cambridge, Durham, Newcastle, Hull, Leeds, Bristol, Stockport, Plymouth, Taunton, Dublin and Belfast. In London, the lecturers of all the medical schools, except the London Hospital, joined the Society, as well as the Professors of Chemistry at the Royal Institution, University College, and King's College, and the Professor of Experimental Philosophy at the London Institution. We thus had all the principal teachers of chemistry in the Metropolis. Looking through the list we see that the original Members were of very various occupations.

We find among them not only teachers, analysts, and manufacturers, but also the physician, the engineer, and the "gentleman of scientific tastes." Our Society was thus comprehensive in its scope; all who desired to assist the progress of science were invited to join. There is one very pleasing thing in this collection of letters, that is how cordially the idea was received by nearly everybody. The Society could only have arisen from the readiness to co-operate which existed among chemists at that time. At this late hour I will say no more, but ask you to accept the Album, hoping that it will remain a permanent record of the origin of the Society, and of the men who founded it.

The PRESIDENT, in receiving the Album, said: I shall have great pleasure in asking the Society to accept this interesting and valuable gift. It will, I am sure, be a cherished one among all our treasures. It will be a permanent proof of your own good feeling towards the Society; and, more than that, a permanent record of what your father has done.

THE JUBILEE ALBUM.

(THE TITLE PAGE)

ALBUM

CONTAINING

LETTERS AND PAPERS

RELATING TO THE

FORMATION AND EARLY HISTORY

OF THE

CHEMICAL SOCIETY,

WITH

PORTRAITS

OF

MANY OF THE ORIGINAL FELLOWS.

PREFACE.

This Album was presented to the Chemical Society on the occasion of its Jubilee Meeting, held in the Theatre of the London University, Burlington Gardens, on February 24th, 1891.

The Album contains various printed papers relating to the formation and early history of the Society; also the Letters received by Mr. R. Warington previously to the Preliminary Meeting on February 23rd, and previously to the First General Meeting on March 30th, 1841, from persons who had been invited to join the Society. The Papers and Letters were preserved by Mr. R. Warington, the originator and first Secretary of the Society, and are contributed by his eldest son.

The Album also contains the Portraits of forty-four of the Original Members of the Chemical Society. It has unfortunately proved impossible to obtain portraits of all of the more eminent Original Members. The copies placed in the Album have been executed in platinotype, in the hope that they will remain permanent representations of the men who founded the Society. A large number of the copies have been prepared by Professor John M. Thomson, of King's College, one of the present Secretaries of the Society, assisted by Mr. Herbert Jackson.

The arrangement of the Album is in the main chronological. It commences with the Letters received before the Preliminary Meeting of February 23rd. These are followed by the printed Account of this Meeting, and by the Circular immediately issued inviting persons to join the Society. Next comes the Letter of Sir J. F. W. Herschel, from which it appears that he had been asked to become the first President of the Society. Then follows the amended Report of the Provisional Committee, received at the First General Meeting on March 30th, and succeeding this are the names of the seventy-seven Original Members who were then enrolled.

The main part of the Album is devoted to the Original Members; these are taken as far as possible in alphabetical order. The year of their birth and death is given whenever this is known, with the position which they occupied at the time when they joined the Society, and the office, if any, which they subsequently held in the Society. In a majority of cases the Letters they wrote when accepting the membership of the Society and their Portraits are also given. Letters are wanting in the case of many of the residents in London; these probably in many cases communicated verbally with Mr. Warington. Where letters do not exist, an autograph signature has been, as far as possible, supplied.

After the space devoted to the Original Members comes a Letter of Acceptance from Dr. W. Gregory, which arrived after March 30th. Then follow some Letters received before March 30th from persons who declined membership; several of these afterwards joined the Society. The Album concludes with the Card announcing the first meetings of the new Society, with an example of early Balloting Papers, and with the first printed List of the Members and their addresses. A few pages are placed at the end for Portraits of Original Members which may afterwards be obtained.

It may be well to note that the Society had the name of the Chemical Society of London up to its incorporation by Royal Charter in 1848, when it took the title of the Chemical Society, and its Members were henceforth called Fellows.

R. Warington.

February 24th, 1891.

CONTENTS.

34. Portrait and letter of Thomas Graham, M.A., F.R.S., President, 1841-43 and 1845-47.
35. Letter from John Joseph Griffin.
36. ,, Thomas Griffiths.
37. Portrait and signature of William Robert Grove, F.R.S.
38. ,, letter of Charles Heisch.
39. Signature of Henry Hennell, F.R.S.
40. ,, Frederick Robert Hughes.
41. Letter from Thomas Hetherington Henry, F.R.S.
42. Portrait and letter of William Herapath.
43. ,, ,, Thomas Charles Hope, M.D., F.R.S.
44. ,, ,, Percival Norton Johnson.
45. ,, ,, James Finlay Weir Johnston, M.A., F.R.S.
46. ,, ,, Henry Beaumont Leeson, M.A., M.D., F.R.S.
47. ,, signature of George Dixon Longstaff, M.D., Vice-President, 1853-57 and 1874-77.
48. Portrait and signature of George Lowe, F.R.S.
49. Letter from Robert MacGregor, M.D.
50. ,, Charles Macintosh, F.R.S.
51. Portrait and letter of John Mercer, F.R.S.
52. ,, ,, William Hallows Miller, M.A., F.R.S.
53. Letter from Thomas Moody.
54. ,, David Mushet.
55. Letter from Thomas L. Pearsall.
56. Portrait and letter of Hugh Lee Pattinson, F.R.S.
57. ,, ,, Frederick Penny, Ph.D.
58. Portrait of William Hasledine Pepys, F.R.S.
59. ,, and signature of Richard Phillips, F.R.S., Vice-President, 1841-44 and 1846-49; President, 1849-51.
60. Portrait and signature of Lyon Playfair, F.R.S., K.C.B., Vice-President, 1850-54; President, 1857-59.
61. Portrait and signature of Robert Porrett, F.R.S., Treasurer, 1843-57; Vice-President, 1857-62.
62. Portrait and letter of George Owen Rees, M.D., F.R.S.
63. ,, ,, Thomas Richardson.
64. Letter from D. Boswell Reid, M.D.
65. ,, Ollive Sims.
66. Portrait and letter of Joseph Denham Smith.
67. ,, ,, John Stenhouse, F.R.S., Vice-President, 1857-60, 1864-74 and 1875-78.
68. Letter from Edward Solly, jun., F.R.S.
69. Signature of Maurice Scanlan.
70. Portrait of John Tennant.
71. ,, and letter of Edward Frederick Teschemacher, Secretary, 1841-42; Foreign Secretary, 1842-47.
72. Portrait and letter of Thomas Thomson, M.D., F.R.S., Vice-President, 1844-46.
73. Letter from Robert Dundas Thomson, M.D., F.R.S.
74. Signature of Wilton George Turner, Ph.D.
75. Portrait and Signature of Robert Warington, F.R.S., Secretary, 1841-51; Vice-President, 1851-55 and 1862-66.

76. Portrait and letter of William West, F.R.S.
77. Letter from James Lowe Wheeler.
78. ,, John Wilson.
79. Portrait and letter of George Wilson, M.D.
80. ,, ,, Philip Yorke, F.R.S., Vice-President, 1852-53; President, 1853-55.
81. Letter from William Gregory, M.D.
82. Letters declining the Membership of the Society from—

James Apjohn.	James D. Forbes.
John T. Barry.	J. Prideaux.
Henry Burton.	P. M. Roget.
Arthur Connell.	John Taylor.

Charles Woodward.

83. First Card of Meetings.
84. Early Examples of Balloting Papers.
85. First printed List of Officers and Members of the Chemical Society (1843).

APPENDIX.

86. Portrait group of J. T. Cooper, R. Phillips, and W. T. Brande.
87. ,, of J. J. Griffin.
88. ,, R. Taylor.
89. ,, W. Ferguson.

ADDRESS

ON THE DEVELOPMENT OF CHEMICAL THEORY SINCE THE FOUNDATION OF THE SOCIETY.

DELIVERED BY

PROFESSOR ODLING.

Mr. President, Ladies and Gentlemen,

I have been asked, as one of the oldest officials of the Chemical Society, to take a part in this afternoon's proceedings, and I have somewhat rashly undertaken—what may be considered almost a conjuror's feat—to compress into the short space of some fifteen minutes, an account of the most salient advances that have been made in chemical doctrine during the last fifty years. I would begin by reminding you that whereas the material triumphs of chemistry are in everybody's mouth, its no less extensive and remarkable achievements in the world of ideas can necessarily be estimated only by the esoteric few. Happily, in chemistry, we find that doctrine and application go side by side; and if, on the one hand, we recognise that the development of modern chemical industry is in large measure a direct outcome of laboratory investigation, we are bound to admit, on the other hand, that industrial chemistry has well repaid the obligation by furnishing the investigator with hosts of new and varied bodies, offered to him, moreover, in the most bountiful abundance. Now it is by the number, and variety, and profusion of substances submitted to his examination that the chemist has had forced upon him a sense of the inadequacy, and I might even say groundlessness, of some of his most cherished convictions. He has had suggested to him new and enlarged views of chemical constitution, and has had afforded him the means of putting his views, both old and new, to the test of rigid proof; and I think I may venture to say this much of our modern chemical doctrines, that they do repose upon a wider and sounder basis of proof, that they are the results of a broader, more general, and more thoroughly tried induction than was ever before attainable. It was observed rather more than a century ago, by one of the fathers of our science, the immediate predecessor of Lavoisier, Dr. Black, that the chemist studied the effects, or, as we should now say, the phenomena, of heat and mixture, with a view to the improvement of the arts and of the knowledge of nature. Nowadays we find that the investigation of the secrets of nature has almost revolutionised the chemical arts, and conversely that the development of the chemical arts has afforded the investigator the means of unfolding some of the most recondite secrets of nature. But, in the short space of time at our disposal, which particular developments of chemical doctrine shall I venture to bring under your notice? Among the multiplicity of important investigations and conceptions, on the great majority of which I am disabled from bestowing even a passing remark, there are two or three which stand pre-eminently forward, and about which, on an occasion of this kind, it behoves me to say a few words, and you to give a few moments' consideration. I will first direct your attention to the progress that has been made in organic synthesis, or in the artificial production of bodies commonly furnished to us by the animal and vegetable kingdoms. Now although, in connection with this subject, the first step in advance was made long, long ago by Wöhler, and later on a second step by Kolbe, I think we may date the recognition of synthetic chemistry, as a definite and productive branch of chemical work, at about the year 1854; and I need scarcely remind you that this branch of science is pre-eminently associated with the name of Berthelot, one of our distinguished foreign members. Into this department of work, in which Berthelot was the pioneer, and for a long time the assiduous cultivator, other chemists have not hesitated to venture. Nor have they found it unattractive or unfruitful. To such an extent indeed has synthetic chemistry been cultivated, that nowadays not a few of the well recognised and most highly characterised products of the vegetable kingdom—the active principle of the oil of wintergreen, the colouring matters of the madder plant and of the indigo plant—are actually produced on an industrial scale by processes of organic synthesis, to which practically Berthelot first showed us the road. And, diverting our attention from subjects of present industrial application to other fruits of the same seed-time, we can scarcely forbear on this occasion calling to mind the recent admirable work of Emil Fischer on the artificial production of the sugars. With the artificial production of sugars, and fats, and organic acids, and vegetable colouring matters, and hosts of animal products, we say good-bye altogether to the long-cherished idea of Vital Force, to the long entertained belief that these products, and others met with in the animal and vegetable kingdoms, were not formed by any of our ordinary chemical agencies, but that their construction and constitution were, indeed, the manifestation of some mysterious vital force, without the exercise of which their production was an impossibility. With regard to our altered notions on the subject of organic synthesis, I think we may say that the ideas of chemists have undergone not so much a large development as a positive revulsion.

Another set of facts, and of ideas developed *pari passu* with those facts, are connoted to us by the now familiar word dissociation. And just as the department of organic synthesis is specially identified with the name of Berthelot, so do we find that the phenomena of dissociation are specially identified with the name of his now deceased compatriot and fellow-worker, Ste. Claire Deville. But at the same time, we of this Society are not likely to forget that the pioneer instance, and still the most remarkable instance, of dissociation was that first observed by one of our own founders, whom we are much gratified to see among us to-day. Need I tell you that I refer to Sir William Grove, who gave, at the meeting of the British Association at Southampton, I think, in 1846, an account of his observations upon the decomposition of water-vapour, exposed to a high temperature by means of the electric spark or incandescent platinum? And I need scarcely remind you how, years afterwards, this particular experiment was made the subject of a searching investigation by Bunsen, who showed, as the result of an estimation of the pressures exerted at the moment of an explosion, that at certain high temperatures one-half, and at yet higher temperatures only one-third, of the mass of the constituents of water could exist combined in the form of water-vapour. We cannot but consider the important bearing which these phenomena have had upon the fundamental doctrines of Ampère and Avogadro; and upon our notions of the state of matter as existing at high temperatures. But our modern ideas of dissociation go far beyond this. We have to consider not only the dissociation brought about by exposure to heat, but the dissociation resulting from an almost unlimited extension or tenuity of substance, and more particularly the extension which results from the solution of bodies. Here we have opened up to us so profound a modification of our views of many departments of chemical science that they may almost be referred to as entirely novel. Our views, for instance, on the subject of the solution of salts, of liquid diffusion, of osmotic pressure, and of electrolysis, have undergone a fundamental transformation. Our early ideas in connection with several of these subjects were, we are proud to remember, associated more particularly with the name of our first President, Graham; while the subject of electrolysis at once calls to our memories the revered name of Faraday; who, although he declined the offer made to him of the Presidency of this Society, nevertheless, in his devotion to those other branches of physical science in which his greatest distinctions were achieved, never lost sight of the interests of chemistry, and never ceased to appreciate the advantages afforded to that science by the institution of this Society, and continued year after year to be one of the most constant attendants at our anniversary meetings. It is, however, in connection especially with the dissociation of bodies by heat, as bearing upon our study of matter existing at high temperatures, that this subject of dissociation has excited the highest interest. And, in connection with the state of matter existing at high temperatures, how is it possible for us not to make reference to the most brilliant and far-reaching chemical discovery of the present age?—I mean the discovery by Bunsen and Kirchoff, in 1859, of spectrum analysis, and of all that in chemistry alone, disregarding other branches of science, is involved in that discovery or has resulted therefrom. Notwithstanding the inferences that had been drawn from the analyses of meteorites, it nevertheless remains true that by this discovery of spectrum analysis chemistry was first promoted, so to speak, from its position as a mere terrestrial science, and rendered in practical effect a cosmic science. Then for the first time the chemistry not only of the members of our own solar system, but of the more distant orbs and nebulous matter of the firmament, was brought within the ken of the chemist, and submitted to his rigid examination.

But even limiting our attention to mere terrestrial chemistry, how important have been the advances that have resulted from this discovery, more particularly in the modifications introduced into our conception of the nature and mutual relationships of the elements! The very number of the new additions made to the list of elements has contributed largely to our knowledge of their relationships to one another. Further than this, the discovery has led to conceptions, and given encouragement to trains of research into the composite or non-composite nature of the elements themselves, and to their modes of evolution. Whether or not we consider as sufficiently demonstrated the conclusions drawn on this subject by several of our own most distinguished Fellows, we must all admit the interest and importance of the investigations to which they have been led, and of the views they have propounded. Now, in connection with the study of the nature of the elements, we are naturally led to the consideration of the modes and forms of their combinations with one another, the question of their combining ratios, and of the particular respect in which their combining ratios are associated with or dependent upon their intimate nature. The proposition of this question and the answer to it, so far as unfolded, constitute indeed the characteristic advance in chemical doctrine that has been made within the period of the existence of the Society. I think that if any chemist were asked to say in a sentence what is the great difference which characterises the chemistry of the present day from that of fifty years ago, he would say that it consists in the difference of ideas which are now entertained on the subject of chemical constitution. And if he were further asked to say upon what advances in chemical doctrine the remarkable progress of general chemistry during the last fifty years has been mainly due, he would say that that progress depended on the advances made and the transformation effected in our views of chemical constitution. This is a very enticing subject, and one upon every detail and consecutive step of which I should be only too pleased to dilate. But the inexorable demands of time forbid me, and I can therefore only just glance at the course of exposition which, when I first undertook to deliver this address, I made up my mind to follow. I should have adverted for a minute or two to the substantial though not absolute agreement between the logical development of our present ideas and their historical development; that notwithstanding occasional divergencies of the one from the other—consequent on the zigzag wanderings of the historical development—they have followed on the whole the same lines. I should then have pointed out the novelty and importance of the idea of the determinability of the relative weights of bodies which react with one another—the determination, that is, of the relative reacting unit weights of bodies—initiated in the first instance by Laurent and Gerhardt. These chemists, while they availed themselves freely of the ideas of Liebig on compound radicles, of Dumas on chlorine substitutions, of Graham on polyacidic acids, of Brodie on homogeneous combination, of Williamson on the compound ethers, and of Wurtz and Hofmann on the compound ammonias, nevertheless based their ideas to a large but incomplete extent upon the physical law of Avogadro and Ampère; and the second step in advance I take to be the complete extension of this particular view by Cannizzaro and by Wurtz, both of them our Faraday lecturers in succession to one another. It was they who first insisted upon the extension to every instance whatsoever of the general proposition that the weights of the reacting units of chemical substances are identical with the relative weights of the physical molecules; and it is to the demonstration and absolute acceptance of this view that we owe one of the greatest generalisations that our science has experienced during the last fifty years. Passing from the establishment in this way of the relative weights of the reacting units, we come to the revision of atomic weights, conducted for the first time upon a definite principle—the principle that the atomic weight of an element is the lowest particular relative weight of that element which is found to exist in any well defined reacting unit or physical molecule. With the determination in this way of the atomic weights of the elements, it was soon found that the elements themselves were capable of classification into monads, diads, triads, and so forth, by virtue of a special property appertaining to them,—a property which, looked at from one point of view, constitutes their desmicity or combining power, and looked at from another point of view, constitutes their valency or replacing power. It is scarcely necessary to point out how largely the recognition of this property was, from the poly-combinative point of view, contributed to by the introduction of Gerhardt's types of decomposition, and by Frankland's highly appreciated researches on the organo-metallic bodies; while I too may claim some little for myself as having contributed to the exposition of this property chiefly from its other or poly-valency aspect.

The revision of atomic weights, as expressive of intra-molecular proportions, and the associated classification of the elements according to their adicities, led in due course to two remarkable conceptions. In one direction it was perceived, by Newlands first, and some time after him—with great detail, great grasp of principle, great conviction and determination—by Mendeléef, that the elements one and all were not irrelative to one another, but that the entire series were associated with one another in such manner that the order of their atomic weights constituted in some sense the order of their properties, or, as Sir Lyon Playfair has just said, that their properties were a periodic function of their atomic weights. In another direction, this property of the elements led in the acute mind of Kekulé to a most far reaching conception of chemical combination—a conception which has had the greatest influence upon our ideas—namely, the law of chemical combination by the mutual saturation of adicities. The extension of his views on this subject, more especially in relation to the benzenes and their derivatives, has laid the foundation for an entirely new development of the fundamental laws, so to speak, of organic chemistry. We are no longer content with the notion of constituent groupings or radicles, but base our ideas of chemical constitution upon the often complex relationship of constituent elementary atoms. The conception put forward by Kekulé has further opened the way to a study of what, only within the period of the existence of the Chemical Society, can be regarded as having become a definite subject of inquiry, the phenomena of isomerism. Our early view of the subject was that it was of but little importance, having reference to an out-of-the-way occurrence met with only now and then. It is now recognised as a fundamental problem of chemical combination, the resolution of which, so far as it has been resolved, constitutes one of the greatest triumphs of modern organic chemistry. In referring to the success which has attended the efforts of those apostles of chemical doctrine who have made this subject their particular consideration, it would be impossible to pass over the views initiated by Le Bel and Van't Hoff, which have afforded so large a contribution alike to our knowledge, and to our powers of realising and explaining the causes of isomerism, more especially as manifested by differences of behaviour in respect of rotatory polarisation. Lastly, I should have attempted to discuss with you the bearings of these modern views—of views arrived at by due course of development during the lifetime of our Society—upon the original atomic theory of Dalton. And, whatever may be our notions as to material particles, may we not say with truth that the progress of scientific chemistry for the last fifty years has been, in the main, an outcome of the doctrine of chemical combination propounded with such marvellous sagacity by John Dalton, now some eighty years ago?

The PRESIDENT said that this brought the historical part of the business to a conclusion, but there remained some other items of interest to deal with, in connection with which he would first call upon Dr. Evans, the Treasurer of the Royal Society.

SPEECH BY

Dr. JOHN EVANS

ON BEHALF OF

THE ROYAL SOCIETY.

No one can regret more sincerely than I do the absence of the President of the Royal Society, who, but for an important engagement in another part of the country, would have been here to-day. I have also to express my regret that we have no written address to present. But it was thought that the attendance of a deputation, consisting of the Treasurer and the two Secretaries of the Society, and their speaking to you face to face, would be as agreeable to you as a mere written address. The interest which is taken by the Royal Society—the oldest society in this country—in all chemical matters is, I think, well known to all of those here present. I see many familiar faces here to-day as members of this Society who assist us in our councils, and I hope that I see also the faces of many others who will in time become members. As the parent not only of the Chemical Society, but of all the various other learned societies, the Royal Society naturally takes a great interest in the advancement of each particular branch of science for which it has been found expedient to form special societies; and we should have been wanting in our duty to our offspring if we had not been present to celebrate the fiftieth birthday of the Chemical Society. We recognise the utility of chemistry in every possible way. We from time to time award our medals on the recommendation of the Council to distinguished chemists; and we have moreover the Davy medal, which is given at intervals of two years for some chemical discovery, and the recipients of which have generally been of English rather than of foreign origin. Of all the branches of science which come within the purview of the Royal Society, perhaps chemistry is the principal; for there is hardly any branch of exact science to which chemistry does not lend its aid. There is the connection between physics and chemistry, and between astronomy and chemistry, which has been pointed out by previous speakers. We know too how extremely necessary some knowledge of chemistry is if we wish to keep pace with modern geology and mineralogy; and even for other purposes, for agriculture, for botany, and even for physiology, a knowledge of chemistry is necessary; while, on the other hand, some knowledge of those minute organisms which produce such terrible effects by their action on other bodies, is of use to those studying chemistry. We have recently been brought into closer connection with chemical research by the foundation of the Lawes' Trust. Sir John Lawes invested £100,000 for the carrying out of the agricultural experiments at Rothamsted, with which his name is associated, and several members of the committee of management are nominated by the Royal Society. Chemistry has two aspects. You have that aspect which Sir William Grove has told us that he admires, the pure examination into the laws of nature; and you have beyond that the application of the results of those investigations to the advancement of human happiness and convenience. It is in this last department that I think some of the greatest advances of modern chemistry have been made. Not only in the aid rendered to manufactures, but even in respect of art and decorative objects, the results of some of our modern chemical discoveries have been far reaching beyond what could have been expected. Who would have thought that out of a mere refuse the coal tar colours would have been formed? Who would have thought that the flavours of the choicest fruits could have been artificially produced by the chemist? I might say that nowadays it is difficult to say whether any article of food has been produced by nature, or is not in some degree due to the art of the modern chemist. This day has been to a great extent one of personal reminiscences; and I may say that I find the results of the institution of a Society like this are brought home to me by contrasting the position of a young man entering upon a business in which a knowledge of chemistry is necessary to-day, with what it would have been before the foundation of this Society. At that time one had to struggle to obtain a smattering of knowledge in order to avoid falling into egregious ignorance. But to-day, if a youth is going into a position in which chemistry is necessary, so far from being hampered by a deficiency of information, he finds himself overwhelmed by the amount of knowledge which he has to master before he can hope to succeed in business. I will not dwell on this; there are other addresses to come; but will conclude by congratulating you, in the name of the Royal Society, on your brilliant past, and wish you God-speed for a more brilliant future.

The President: I beg to thank you, Sir, for the kind and eloquent words which you have addressed to the Society through me. We look upon our Society as an offshoot of yours, and can only hope that we may do as good work in the future as has been done in the past by the Royal Society.

ADDRESS OF THE

PHARMACEUTICAL SOCIETY.

"The President, Vice-President, Council and Professors of the

Pharmaceutical Society of Great Britain

most heartily congratulate the

Chemical Society of London

on the completion of the fiftieth year of its existence. The pleasure with which we offer our congratulations is enhanced by the circumstance that the Pharmaceutical Society of Great Britain likewise celebrates its Jubilee this year, the Pharmaceutical Society having been founded on April 15th, 1841, under the Presidency of William Allen, F.R.S. We also recall with satisfaction the fact that some of the most valued members and officers of the Pharmaceutical Society have been members and officers of the Chemical Society.

"The promotion of the Science of Chemistry, especially in its applications to Pharmacy, has ever been an important duty of the Pharmaceutical Society, its Royal Charter having been granted to it in the year 1843 for, among other purposes, that of 'advancing chemistry.' The year after its foundation the Society inaugurated a Chair of Chemistry, to which Dr. Fownes, then the assistant of Thomas Graham, first President of the Chemical Society, was elected as the Society's first Professor of Chemistry. Professor Fownes was succeeded by Dr. Redwood, who successively filled the offices of Secretary, Treasurer and Vice-President of the Chemical Society.

"Not only has the Pharmaceutical Society insisted on the possession by those who practice Pharmacy of a competent knowledge of Chemistry, but it has recently equipped a special laboratory for researches in Chemistry, more particularly in its relation to Pharmacology.

"We are fully cognizant of the powerful influence exerted by the progress of Chemistry on the arts and manufactures, and we recognise with pride the large share which the Chemical Society of London has taken in the advancement and dissemination of Chemical Science.

"Finally, we would express the hope that the spirit of co-operation which has so long animated the members of the two Societies may long continue, and thus promote, to the advantage of mankind, the extension of Chemical Knowledge.

"(Signed for the Council),

"Michael Carteighe, President;
"Alex. Bottle, Vice-President;
"Robert Hampson, Treasurer.

"T. Redwood, "Emeritus Professor of Chemistry; "John Attfield, "Professor of Practical Chemistry; "Wyndham R. Dunstan, "Professor of Chemistry;	Professors.

"Richard Bremridge. Registrar."

SPEECH BY

M. GAUTIER,

PRESIDENT OF THE SOCIÉTÉ CHIMIQUE DE PARIS.

C'est toujours un nouveau regret pour moi, quand je me retrouve à Londres, de ne pas suffisamment parler la langue Anglaise, et de ne pas me mettre en plus intime communication avec vous. C'est un regret plus vif encore en cette occasion.

Quelle que soit la différence de nos institutions et de nos mœurs, quels que soient aussi les révolutions et les évènements qui nous ont politiquement séparés, l'on peut dire que rien n'est parvenu à diminuer l'estime et l'amitié particulière que professent les savants de notre pays pour ceux du vôtre. Ce sentiment très vif, très persistant, qui est antérieur au commencement de ce siècle, et qui, je le sais, est partagé par vous, tient à diverses causes.

Ce que nous estimons dans les savants anglais : c'est l'originalité de leurs conceptions et de leurs méthodes; c'est la portée et la tendance pratique, aussi bien que théorique, de leurs recherches et de leurs découvertes; c'est la conscience avec laquelle sont faits et publiés leurs travaux, sans hâte et avec mesure; c'est l'équité de leurs jugements, leur loyauté vis-à-vis de leurs confrères étrangers; c'est l'hospitalité généreuse qu'ils offrent dans leurs journaux aux travaux des autres pays.

De cette hospitalité anglaise nous en avons une forme très sensible aujourd'hui, et nous vous remercions de la grâce avec laquelle vous nous recevez dans vos familles, et nous invitez à vos fêtes.

Les plus illustres de nos chimistes français auraient voulu venir célébrer ici le jubilé du cinquantenaire de la fondation de votre célèbre Société Chimique, mais le moment de l'année était peu favorable, et je vous exprime tous les regrets de M. Pasteur, dont la santé quoique un peu affermie, est si précieuse qu'elle peut laisser à tous quelque inquiétude; de M. Berthelot, retenu par la commission d'études qu'il préside au Sénat ou au ministère, et qui prépare en ce moment un travail sur l'organisation de l'Enseignement en France; de M. Friedel, très fatigué, et qui regrette bien de ne pas s'être mis à notre tête. Mais tous se joignent à vous de cœur pour célébrer la fête de votre cinquantenaire, comme l'ont fait avec moi les autres membres de la Commission française, MM. de Clermont, Haller et Combes.

La Société Chimique de Londres a été le modèle et la grande sœur de la Société Chimique de Paris. C'est ici que son fondateur, M. Wurtz, est venu se rénseigner, et c'est au Président actuel de cette Société qu'incombait le devoir, l'honneur, et le plaisir de se mettre à la tête de la Commission française venue pour vous apporter en cette occasion l'expression de l'estime et de l'admiration que nous professons pour vos plus illustres savants, et des souhaits cordiaux que nous faisons pour que l'avenir de votre Société ressemble à son passé.

Translation of M. Gautier's Speech.

Whenever I am in London it is to me always a matter of regret that I cannot speak English proficiently, and that I cannot enter more intimately into intercourse with you. I especially regret this on the present occasion.

Whatever difference there may be in our institutions and customs; whatever revolutions and events may have separated us politically; it may be affirmed that nothing has ever occurred to diminish the esteem and hearty friendship which scientific men in our country experience towards those in yours. This active and persistent sympathy, anterior to the commencement of the century, which you, I know, reciprocate, has its origin in a variety of causes.

What we esteem in English men of science is the originality of their conceptions and methods; the range, and practical as well as theoretical tendency of their researches and discoveries; the conscientiousness with which their work is carried out and published in a deliberate methodical way; the equity of their judgments and their loyalty to foreign colleagues; and the generous hospitality which their journals afford to researches from other countries.

We have here to-day a striking illustration of English hospitality, and we thank you for the kindness with which you receive us into your families and invite us to your festivities.

Our most distinguished French chemists would wish to have been present at this celebration of the Jubilee of the foundation of your celebrated Chemical Society fifty years ago; but the time of year is not a favourable one, and I have to express regret on behalf of M. Pasteur, whose health, although in a measure re-established, is so precious that we all feel some anxiety still; on behalf of M. Berthelot, who is kept away by the Commission on Education over which he presides in the Senate or at the Ministry, and which is engaged in preparing a report on the organisation of instruction in France; and on behalf of M. Friedel, who is much in need of rest, and greatly regrets that he is unable to place himself at our head. But all are with you in spirit in celebrating your fiftieth anniversary, as are all who are associated with me as members of the French deputation, MM. de Clermont, Haller, and Combes.

The Chemical Society of London has been the model and elder sister of the Chemical Society of Paris. It was here that M. Wurtz, its founder, came to gather information; and it is to its President that the duty, honour and pleasure now falls of placing himself at the head of the French commission here with the object of giving expression on this occasion to the esteem and admiration in which we hold your illustrious men of science, and to our cordial wishes that the future of your Society may resemble its past.

ADDRESS

OF THE

GERMAN CHEMICAL SOCIETY.

Unter den zahlreichen gelehrten Körperschaften und wissenschaftlichen Vereinen, welche heute, dankerfüllt und Glückwünsche darbringend, an den Vorstand der

CHEMICAL SOCIETY OF LONDON

herantreten, darf und will die

Deutsche Chemische Gesellschaft

nicht fehlen.

Es war ein grosser und für die Entfaltung der chemischen Wissenschaft, nicht nur in Grossbritannien sondern weit über dessen Grenzen hinaus, fruchtbringender Gedanke, welcher heute vor einem halben Jahrhunderte eine kleine Anzahl britischer Forscher und Freunde der Forschung,—aber keinen Geringeren als Thomas Graham an der Spitze—veranlasste, zu einer festgegliederten chemischen Gesellschaft zusammenzutreten mit der Aufgabe, durch regelmässig wiederkehrende Sitzungen, durch Errichtung einer Bibliothek und durch Begründung einer Zeitschrift unsere Wissenschaft nach Kräften zu fördern.

Die Bildung der Chemical Society war keine vereinzelte Erscheinung. Die altehrwürdige Royal Society, deren Denkschriften bislang der Gesammtbeobachtung auf dem Gebiete der Naturkunde offengestanden hatten, war gegen die Mitte des Jahrhunderts nicht mehr im Stande, den mächtiger und mächtiger anschwellenden Strom der Forschung in sich aufzunehmen, und wie sich grossgewordene Colonien von dem Mutterlande trennen, ohne desshalb die Fühlung mit demselben zu verlieren, so hatte nachgerade ein Zweig der Naturwissenschaften nach dem anderen hinreichend an Umfang und Bedeutung gewonnen, um, ohne sich aus dem grossen Verbande der Royal Society völlig loszulösen, gleichwohl auf Begründung einer eigenen Heimstätte Bedacht zu nehmen.

Schneller als der Mehrzahl der so gebildeten naturwissenschaftlichen Zweiggesellschaften ist es der Chemical Society vergönnt gewesen, sich gedeihlich zu entfalten.

Schon seit Jahren waren zahlreiche chemische Arbeiten nur noch in oft schwer zugänglichen Schriften der in den grösseren Städten des Landes bestehenden Vereine erschienen; kleinere oft sehr werthvolle Mittheilungen, in localen Blättern von geringer Verbreitung veröffentlicht, waren für grosse Leserkreise, man könnte fast sagen, verloren gegangen. Durch Begründung ihrer Zeitschrift hatte die Gesellschaft die Veröffentlichung chemischer Beobachtungen in eine neue Bahn geleitet, in welche nunmehr ein Jeder einlenkte, dem es darauf ankam, die Frucht seiner Arbeit den Fachgenossen schnell und sicher zur Kenntniss zu bringen. Die zunächst in zwangloser Folge erscheinenden "Memoirs" hatten sich bald in eine regelmässig veröffentlichte Vierteljahrsschrift verwandelt, aus welcher die nun bereits eine stattliche Reihe von Bänden füllenden Monatshefte hervorgegangen sind.

Mit dem Umfang und der Bedeutung ihrer Zeitschrift hielt das Wachsthum der Gesellschaft, hielt die Steigerung ihres Ansehens in allen Kreisen gleichen Schritt; in der That, schon nach kurzer Frist war die Chemical Society of London für die Strahlen des chemischen Lebens im ganzen Lande ein Brennpunkt geworden, in welchem sich die Liebe und die Begeisterung für die chemische Wissenschaft in jungen wie in alten Herzen jeder Zeit auf's Neue entzündeten.

Aber der Einfluss, welchen die Begründung der Chemical Society auf die Entfaltung unserer Wissenschaft geübt hat, sollte sich bald weit über die Grenzen des Britischen Reiches geltend machen. In dem raschen Emporblühen der Gesellschaft waren die Vortheile, welche jedem Einzelnen aus der Wirksamkeit eines die Gesammtinteressen einer Genossenschaft vertretenden Vereins erwachsen, so unverkennbar hervorgetreten, dass die Bildung chemischer Gesellschaften welche änhliche Ziele verfolgten, wie die Londoner, auch in anderen Ländern nicht lange auf sich warten liess. Heute giebt es kaum mehr einen Culturstaat, in dem sich die Fachgenossen nicht zu einer Gesellschaft, welche auf die Chemical Society of London als Vorbild blickt, geeint hätten. Selbst in dem fernen Westen, ja in dem fernsten Osten hat das chemische Vereinsleben bereits Wurzel geschlagen.

Auch in unserem Vaterlande ist—nun schon seit Jahren—ein solcher Verein in's Leben getreten, und dieser Verein—die Deutsche chemische Gesellschaft—ist heute stolz und glücklich, die ältere Schwester an ihrem Ehrentage mit freudigem Zurufe zu begrüssen. Wohl drängt es uns, in diesem Festgrusse vor Allem der Dankbarkeit Ausdruck zu leihen, welche unser Verein der Chemical Society als Körperschaft für ihre tiefgreifende Förderung unserer Wissenschaft schuldet. Allein in den Dank, welchen wir der Körperschaft gegenüber bekunden, mischen sich heute bei nicht Wenigen unserer Vereinsgenossen unauslöschliche Erinnerungen an edle Mitglieder der Chemical Society, an Viele, die uns leider bereits entrückt sind, aber auch an Viele, die wir froh sind noch auf der Höhe des Lebens zu wissen. Der germanische Wandertrieb hat die jungen deutschen Fachgenossen nach Vollendung ihrer Studien jederzeit mit Vorliebe über den Canal geführt, und die gastliche Aufnahme, welche sie an den Ufern der Themse, zumal im Schoosse der Chemical Society, gefunden haben, ist Vielen unvergesslich geblieben. An den Versammlungsabenden der Gesellschaft und namentlich in den gemüthlichen Nachsitzungen, in denen die Gesinnung guter Kameradshaft schnell zum Ausdrucke gelangt, sind mehrfach freundschaftliche Verhältnisse angeknüpft worden, aus welchen die Betheiligten unberechenbaren Gewinn für's Leben gezogen haben. Wohl durften wir daher in unserem heutigen Festgrusse dieser persönlichen Beziehungen gedenken; sind sie ja doch gerade bei der Bildung der Deutschen chemischen Gesellschaft oft genug in den Vordergrund getreten, und haben sie doch auch unserem Vereine, insbesondere in den ersten Jahren nach seiner Gründung, vielfach die Wege geebnet!

Aber wenn sich auch unser Verein im frohen Vollbewusstsein gedeihlicher Entfaltung in erster Linie gedrungen fühlt seinem Vorbilde in Dankbarkeit zu huldigen, so ist est ihm nicht minder Bedürfniss, der Gesellschaft, welche heute ein halbes Jahrhundert ruhmvoll durchmessen hat, auf der Schwelle eines neuen Lebensabschnittes mit den aufrichtigsten Glückwünschen entegegenzutreten.

Die Chemical Society of London ist—Niemand kann es leugnen—zu guter Stunde in's Leben getreten! Im Laufe der fünfzig seit ihrer Gründung verflossenen Jahre sind in rascher Folge auf allen Gebieten der Chemie und der angrenzenden Wissenschaften glänzende Errungenschaften zu verzeichnen gewesen, wie sie, auch nur entfernt vergleichbar, kein anderer gleichbegrenzter Zeitraum aufzuweisen hat, und an vielen derselben ist die Chemical Society in hervorragender Weise betheiligt gewesen. Möge es nun—wir wüssten keinen schöneren Glückwunsch, den die jüngere Schwester der älteren an ihrem Jubeltage darbringen könnte—möge es nun, wenn wieder fünfzig Jahre entrollt sein werden, der Gesellschaft vergönnt sein, auf eine ähnliche Reihe bahnbrechender Entdeckungen zurückzublicken, und möge dann ihr Antheil an denselben bei fernen Enkelgeschlechtern dieselbe aufrichtige Bewunderung erwecken, welche heute bei der Rückschau auf die fünfzigjährige ruhmreiche Vergangenheit der Chemical Society of London ihren Verdiensten um die Entfaltung unserer Wissenschaft von den Zeitgenossen gezollt wird!

FRONTISPIECE OF THE ADDRESS FROM THE GERMAN CHEMICAL SOCIETY.

Translation of the Address from the German Chemical Society.

The *German Chemical Society* cannot and shall not be absent from among the numerous learned bodies and scientific associations, which, full of gratitude, will to-day approach the Council of the *Chemical Society of London* to offer their congratulations.

It was a bold conception, which contributed much to the development of chemical science, not in Great Britain alone, but also far beyond its borders, whereby a small number of British investigators and lovers of investigation—at their head no less an one than Thomas Graham—were led half a century ago' to unite in formally constituting a Chemical Society, having for its object the advancement of our science by means of regular meetings, the foundation of a library, and the establishment of a journal.

The foundation of the Chemical Society was not an isolated occurrence. Towards the middle of the century the venerable Royal Society, of whose publications all branches of natural knowledge had heretofore availed themselves, became no longer able to cope with the evergrowing current of research; and as colonies on attaining their majority separate from the mother country without thereby losing touch with it, so one branch after another of natural science had grown sufficiently in importance, without entirely severing its connection with the Royal Society, to consider its establishment in a home of its own.

The Chemical Society had the good fortune to develope more rapidly than the majority of the branch scientific societies founded under such circumstances.

For years previously chemical researches had appeared in publications, often difficult to procure, of associations existing in the principal towns of the country; smaller, often very valuable, communications published in local papers enjoying a limited circulation were, it may almost be said, lost to general readers. By the establishment of their journal, the Society had given a new direction to the publication of chemical observations, which was at once followed by every one who wished to bring the results of his labours quickly and with certainty to the knowledge of his fellow workers. The memoirs, which were at first published at irregular intervals, soon took the form of a quarterly journal, and this in time gave place to monthly parts, which are now comprised in an imposing series of volumes.

The growth of the Society kept pace with the growth in size and importance of its journal and with the general increase of its reputation; so that, in fact, the Chemical Society of London soon became a centre of the chemical life of the country, where love of chemical science and enthusiasm were at all times kindled in the hearts of both young and old.

But the influence which the foundation of the Chemical Society exercised on the development of our science, was soon to make itself felt beyond the limits of Britain. The rapid growth of the Society afforded so clear a proof of the advantages which all derived from the activity of an association representing the common interests of a profession, that it was not long before Chemical Societies, having aims similar to those of the London Society, were established in other lands. At the present day there is scarcely a town where culture prevails, in which the chemists have not united to found a society on the model of the Chemical Society of London. And not only in the far west, but also in the far east, corporate life has taken root among chemists.

Such an association came into existence a good many years ago in our country also, and this association, the German Chemical Society, has to-day the pride and happiness to offer its hearty congratulations to her elder sister on the occasion of her Jubilee. Especially are we impelled to give utterance in our congratulations to the gratitude which our association owes to the Chemical Society as a corporate body, for having so thoroughly promoted the interests of our science. But while expressing our thanks to the corporation, not a few among our colleagues will call to mind imperishable remembrances of honoured members of the Chemical Society, remembrances of many we sorrowfully number among the departed, but of many also we are glad to know are still in the bloom of life. Our young German chemists, led by the Teutonic love of travel, have frequently been attracted across the channel on completion of their studies, and the hospitable reception accorded them on the banks of the Thames, and especially in the Chemical Society, is not forgotten by many. At the evening meetings of the Society, and especially at the pleasant gatherings after the meetings, where the sense of good comradeship soon gained expression, friendly relationships have frequently been established which have in after life been of inestimable value to those concerned. Well may we therefore refer to these personal considerations in offering our congratulations to-day, for have they not frequently become prominent during the time when the German Chemical Society was being established, and have they not often served to smooth the way in our association, especially in its earlier years?

Happily conscious of its successful development, our association, however, not only feels impelled in gratitude to revere its model; it is equally desirous of meeting the Society, which has existed with distinction during half a century, on the threshold of a new period of life, with the most hearty good wishes.

The Chemical Society of London undeniably came into existence at a happy moment. In the course of the fifty years which have elapsed since its foundation, brilliant achievements in every branch of chemistry and the allied sciences have been recorded in quick succession, as in no other period of equal duration, and in many of these the Chemical Society has been prominently concerned. We know of no better wish which the younger can offer to the older sister on her Jubilee, than that the Society may be privileged, when another fifty years have rolled by, to look back upon a similar series of pioneering discoveries, and that the share which it has had therein may arouse in the minds of distant descendants the same cordial admiration which is now felt for the Chemical Society of London by its contemporaries, who look back upon the past fifty years of its distinguished existence, with full recognition of the services which it has rendered in promoting our science.

ADDRESS OF THE RUSSIAN PHYSICO-CHEMICAL SOCIETY.

Translation forwarded with the original Russian Address.

"The Russian Physico-Chemical Society,

at the Imperial University of St. Petersburg,

To the London Chemical Society.

"The Russian Physico-Chemical Society sends to its oldest brother Society, the London Chemical Society, its most heartfelt congratulations on the fiftieth anniversary of its foundation. An unbroken chain of glorious names of British Chemists is a certain pledge that in the future, as in the past, England will retain its foremost place at the head of scientific progress to the glory of universal science and the welfare of mankind.

"President: D. Mendeleef.
"Secretary: N. Menshutkine.

"St. Petersburg.
"*February*, 1891."

ADDRESS OF THE VEREIN ZUR WAHRUNG DER INTERESSEN DER CHEMISCHEN INDUSTRIE DEUTSCHLANDS.

Hochverehrte Herren!

Am Ehrentage der Chemical Society of London, welcher verwandte Körperschaften von Nah und Fern sich heute glückwünschend nahen, will auch der Verein zur Wahrung der Interessen der Chemischen Industrie Deutschlands, einem tiefempfundenen Drange genügend, Dank, Theilnahme und den Wunsch weiterer gedeihlicher Fortentwickelung aussprechen.

In der Chemie sind reine Wissenschaft und Technik untrennbar verbunden und auf einander angewiesen.

Wie die wissenschaftliche chemische Forschung hervorgegangen ist aus der Beobachtung alltäglicher Vorgänge, so steht auch andererseits unsere heutige chemische Industrie auf den Schultern theoretischer Meisterwerke, von denen keine geringe Zahl im Schoosse der Chemical Society entstanden, gereift und hochherzig der gesammten chemischen Welt zugeführt worden ist.

Gross ist ihre Fülle, zu gross die Zahl der mit ihnen verknüpften Forschernamen, als dass wir es versuchen könnten, hier auch nur einige von ihnen ausdrücklich hervorzuheben.

Aber dankbar wollen wir der Thatsache gedenken, dass die Grundlagen der heutigen chemischen Theorien, welche auch der Technik zu Gute gekommen sind, in erster Linie von Mitgliedern der Chemical Society geschaffen wurden, die dem heutigen Feste in voller Frische beiwohnen.

Wie manche Bereicherung verdankt nicht die Chemie der Metalle Ihren Mitgliedern, wie wichtig ist die Lehre von den osmotischen Vorgängen für die chemische Technik geworden!

Die chemische Grossindustrie ist auf englischem Boden erwachsen, von Angehörigen der Chemical Society ausgebaut und lebensfähig erhalten worden. Die Paraffin-industrie, welche ja auch bei uns in Deutschland eine bleibende Stätte gefunden hat, verdankt ihre Begründung nun schon entschlafenen schöpferischen Geistern, die auch um Entstehung und Förderung dieser Gesellschaft sich verdient gemacht haben.

Zahlreich sind die in den Spalten Ihres Journals aufbewahrten Untersuchungen über die Natur der Kohlehydrate, über die Chemie der Gährungsgewerbe, und voran in Ihren Reihen haben die vielen Männer gestanden, denen die glänzende Industrie der Theerfarben ihre Entstehung verdankt, eine Industrie, in der heute noch englische und deutsche Forschung Schulter an Schulter stehend bahnbrechend und fördernd wirksam ist.

Mit einer glänzenden öffentlichen Thätigkeit hat die Chemical Society of London zu allen Zeiten die anspruchslosere, aber nicht minder werthvolle Wirksamkeit persönlicher Anregung und fördernden Meinungsaustausches zu verketten verstanden.

Wer von den Unsrigen das Glück gehabt hat, neben der deutschen auch der englischen Industrie anzugehören, der weiss mit Dankbarkeit zu erzählen von Freundschaft und neidloser Anerkennung, von reger Förderung und schätzbaren Rathe, die ihm in den stolzen Räumen von Burlington House in reicher Fülle zugeflossen sind.

Mit berechtigtem Stolz zählt sich auch der Verein zur Wahrung der Interessen der chemischen Industrie Deutschlands zu den Freunden der Chemical Society of London und weiss keinen besseren Glückwunsch am Ehrentage derselben darzubringen, als den, dass auch in aller Zukunft freudiges Zusammenwirken der englischen und deutschen chemischen Forschung und Technik fortbestehen möge.

Der Vorstand
des Vereins zur Wahrung der Interessen
der Chemischen Industrie Deutschlands.
(gez.) J. F. Holtz.

Translation of the Address.

On the occasion of the Jubilee of the Chemical Society of London, to which allied societies from far and near to-day offer their congratulations, the Association for the preservation of the interests of German Chemical Industry, feels impelled also to participate, in order that it may express its gratitude and the wish for the further prosperous development of the Society. In chemistry, pure science and its technical applications are inseparably connected and interdependent. While scientific chemical researches have originated in the study of changes of daily occurrence, the chemical industries of the present day are based on theoretical masterpieces, not a few of which, originating in the Chemical Society, have been perfected and magnanimously placed at the disposal of chemists at large. The names of the investigators connected with you are too numerous to permit of special reference to any of them; but we thankfully recall the fact that the foundations of the chemical theories of the day, which are also of service in technical chemistry, were in the first instance laid by members of the Chemical Society who are present at to-day's festival in full enjoyment of their faculties.

How numerous are the additions which the chemistry of the metals owes to your members. How important is the doctrine of atomic changes to technical chemistry.

Chemical manufacture grew up on English soil, and has been extended and its vigour maintained by the supporters of the Chemical Society. The paraffin industry, which has also become permanently established in Germany, owes its origin to the inventive genius of men who also were active in originating and promoting this Society.

In the pages of your Journal numerous researches are recorded on the nature of the carbohydrates, and on the chemistry of fermentation; and the men have stood prominent in your ranks to whom the coal tar colour industry owes its inception—an industry which at present English and German researches are actively engaged side by side in pushing forward.

The Chemical Society has always understood how to combine with its brilliant public activity the less pretentious but none the less valuable office of promoting personal intercourse and interchange of opinion. Whoever among us has had the privilege of taking part in English as well as in German industrial work can speak with gratitude of the friendship, the unselfish recognition, the active assistance and valuable advice which have been so liberally accorded to him in the magnificent rooms of Burlington House.

The Verein zur Wahrung der Interessen der Chemischen Industrie Deutschlands is justly proud to number itself among the friends of the Chemical Society of London, and knows of no better wish that it can express to it on its Jubilee than that the friendly co-operation of English and German chemical research and industry may be continued throughout the future.

The Council of the Verein zur Wahrung der Interessen der Chemischen Industrie Deutschlands.

(Signed) J. F. Holtz.

THE SOIRÉE.

CATALOGUE
OF THE
APPARATUS AND SPECIMENS EXHIBITED.

William Gilbert, M.D.,

Author of *De Magnete*, founder of the Science of Electricity, hysician to Queen Elizabeth. Born at Colchester, 1540; died, 1603.

A Portrait-Medallion, executed in clay from the engraved portrait of Dr. Gilbert, in the studios of the City and Guilds' Technical College, Finsbury, by E. Dunkerley, student, and electrotyped in copper in the electrical laboratory of the College, by E. Rousseau. Upon the surface of the copper medallion, a layer of metallic cobalt was then deposited by the process invented by Prof. Silvanus P. Thompson.

Exhibited by Professor Silvanus Thompson.

Ambrose Godfrey Hanckwitz, F.R.S.

(A.D. 1660–1741.)

PHOSPHORUS.

This specimen was prepared about the year 1680, by the alchemist. Ambrose Godfrey Hanckwitz, F.R.S., in Robert Boyle's laboratory in Southampton Street, Covent Garden, and is reputed to be a part of the first specimen prepared in this country. For nearly two centuries it remained in the possession of the firm of Messrs. Godfrey and Cooke, which Hanckwitz founded, and in 1876 was presented by them to the Museum of the Pharmaceutical Society.

At the time when this phosphorus was prepared Hanckwitz was Boyle's assistant, and he obtained it from urine by the method described in Boyle's posthumously published paper (Phil. Trans. 1693). For many years subsequently Hanckwitz was the only manufacturer of the substance in Europe. He claims to have been the first to obtain the element in a solid "glacial" form (*phosphorus glacialis urinæ*). In the account (Phil. Trans. 1733) which he gave of his method to the Royal Society in 1733, it is stated "An operator that is not well versed in the degrees of fire, and does not know how and when to take away these oils apart, will have nothing but a volatile salt and fetid oil, and get at least only a little unctuous opaque phosphorus; such as the famous Kunckel, Dr. Krafft, and Brandt did, as they acknowledge in their writings, but not our hard transparent phosphorus."

Engravings.

Two engraved Portraits of Hanckwitz, dated 1718 and 1738 respectively.

Three engravings of Robert Boyle's Laboratory in Southampton Street, Covent Garden, where Hanckwitz worked. One of these shows the furnaces and retorts used in the preparation of phosphorus. After Boyle's death this laboratory passed into the possession of Hanckwitz, and until the year 1862 was occupied by Messrs. Godfrey and Cooke, who constantly used the original furnaces. The Roman Catholic Church in Maiden Lane, Covent Garden, now stands on the site of the laboratory.

Exhibited by Professor Dunstan.

Sir Isaac Newton, P.R.S.

Cupellation Furnace, said to have been used by Sir Isaac Newton when Master of the Mint.

Exhibited by the Science and Art Department, South Kensington.

E. W. Scheele,

1742–1786.

Balance in a pocket case, which belonged to Scheele, who gave it to his pupil Orfila.

Exhibited by Professor W. H. Corfield.

Hon. Henry Cavendish, F.R.S.

Balance used by Cavendish in his chemical and physical investigations.

Exhibited by the Council of the Royal Institution.

Sir Humphry Davy, Bart., P.R.S.

Balance used by Davy and Young at the Royal Institution.

Galvanic Battery used by Davy in the discovery of Potassium and Sodium.

Specimens which illustrate the experimental development of the Miners' Safety Lamp as left by Davy at the Royal Institution.

Exhibited by the Council of the Royal Institution.

Thomas Young, M.D., F.R.S.

Slide Rule for Chemical Equivalents, constructed for Young.
Exhibited by the Council of the Royal Institution.

John Dalton, D.C.L., F.R.S.

Apparatus employed by John Dalton in his Researches.

The apparatus employed by John Dalton in his classical researches, whether physical or chemical, was of the simplest and even of the rudest character. Most of it was made with his own hands, and that which is exhibited has been chosen as illustrating this fact, and as indicating the genius which with so insignificant and incomplete an experimental equipment was able to produce such great results.

Manuscript Book containing an account of some of his experiments in his own handwriting.

Two home-made Barometers used by Dalton, consisting of simple siphon tubes with bulbs. One has probably been used for tension experiments.

Graduated glass tube attached to a bottle of india-rubber, probably used in his researches on the absorption of gases in water.

Two phials containing iodine.

Eudiometer.

Gas receiver.

Graduated funnel used probably as gas receiver.

Exhibited by the Council of the Literary and Philosophical Society of Manchester.

Sir John Herschel, D.C.L., F.R.S.

First known Photographs on Glass taken on precipitated silver chloride, by Sir J. Herschel (Slough, 1839).

"Having precipitated muriate of silver in a very delicately divided state from water very slightly muriated, it was allowed to settle on a glass plate; after 48 hours it had formed a film thin enough to bear drawing off the water very slightly by a siphon, and drying. Having dried it, I found that it was very little affected by light, but by washing with weak nitrate of silver and drying, it became highly sensible. In this state I took a camera picture of the telescope on it. Hyposulphite of soda then poured cautiously down washes away the muriate of silver and leaves a beautiful delicate film of silver representing the picture. If, then, the other side of the glass be smoked and black-varnished, the effect is much resembling daguerreotype, being dark on white as in nature, and also right and left as in nature, and as if on polished silver."—(Sir J. Herschel; MS. Journal of Chemical Experiments.)

Exhibited by Professor A. S. Herschel.

Frame of Early Specimens of the Cyanotype and other Photographic Processes.

Exhibited by the Science and Art Department, South Kensington.

Photograph of the Solar Spectrum taken by Dr. Draper; given by him to Sir John Herschel.

Exhibited by W. Crookes.

J. J. Berzelius.

Medallion of Berzelius in Selenium. From the Museum of the Pharmaceutical Society. This was given by Heinrich Rose, of Berlin, to Dr. Theophilus Redwood, then Professor of Chemistry to the Pharmaceutical Society, and one of the early Secretaries of the Chemical Society.

Exhibited by Professor Dunstan.

A portion of the identical Seleniferous deposit in which Berzelius discovered Selenium.

Exhibited by W. Crookes.

Michael Faraday, D.C.L., F.R.S.

Solutions of Gold illustrating the various effects arising from the visibility of Gold in a chemical state of division.

Apparatus used by Faraday in the earliest experiments on the liquefaction of gases.

Bar of Heavy Glass, made and used by Faraday in the discovery of the rotation of the plane of polarisation in the magnetic field.

Specimen of Benzol.

Specimen of Carbon Tetrachloride.

Exhibited by the Council of the Royal Institution.

Thomas Graham, F.R.S.,

First President of the Society, 1841.

Apparatus employed by Thomas Graham, Professor of Chemistry in University College, and afterwards Master of the Mint, in his principal researches between the years 1834 and 1866.

This series is interesting as showing the simplicity of the appliances with which he discovered laws and facts that have proved of such great importance.

Tubes with discs of graphite and of hydrophane employed by Graham in experiments on the Diffusion of Gases.

The apparatus employed for ascertaining the Diffusion rates of Liquids (Bakerian Lecture, 1849).

Osmometers, or apparatus employed in Graham's researches on "Osmotic Force."

Apparatus employed in experiments on Liquid Diffusion applied to analysis and dialysis.

Apparatus by which Graham studied Capillary Liquid Transpiration in relation to chemical composition.

Tube Atmolyser, or instrument for the Separation of Gases by diffusion.

Barometrical Diffusiometer, used for the investigation of the Molecular Mobility of Gases.

Apparatus employed in experiments on Absorption and dialytic separation of Gases by Colloid Septa of metal or of india-rubber.

The penetration of metals by gases was studied by the aid of metallic tubes, of which the Palladium tube shown, is an original one.

Exhibited by Professor Roberts-Austen.

Palladium Medal struck by Graham at the Royal Mint, and charged by him with hydrogen. Presented by Graham to the late Dr. Matthiessen.

Exhibited by the President of the Society.

Sir B. C. Brodie, Bart., F.R.S.,

Secretary 1850-1854;

President of the Chemical Society 1859-61.

Apparatus used in Researches on Ozone, and the Action of Electricity on Gases, 1860-1872.

Induction Tube for producing Ozone.

Gas Holder for preserving Electrized Gas over concentrated Sulphuric Acid.

Measuring Pipette. Vol. 290-8 c.c. To deliver a constant volume of Electrized Gas.

Absorption Bulb and Aspirator for measuring residual Gas after absorption of Ozone (calibrated at each of the glass points).

Exhibited by Professor Odling.

J. H. Gladstone, F.R.S.,

President 1877-1879.

Hydrate of Turpentine, recrystallised from water. 1846.

Cotton Xyloidin. 1847.

Hydrosulphate of Menthol. 1865.

Cœruleine, a blue substance found in many essential oils.

J. H. Gladstone and the late Alfred Tribe.

Aluminium Ethylate, an alcohol substitution product capable of distillation.

$C_{13}H_{10}O$, Phenyl Ketone produced by heating Phenylate of Aluminium.

$C_{15}H_{12}O_2$, from a Ketone obtained from paracresylate of Aluminium.

$C_{15}H_{14}O$, Cresyl Ketone produced by heating paracresylate of Aluminium.

$C_{15}H_{14}O$, Ketone produced by heating Thymolate of Aluminium.

$C_{15}H_{14}O$, the above sublimed.

$C_{20}H_{14}O$, Naphthyl Ether, obtained from Naphthylate of Aluminium.

Isodinaphthyl from α Naphthylate of Aluminium.

Chryseudiene from β Naphthylate of Aluminium.

α Benzylene obtained from Benzyl Bromide.

β Benzylene obtained from Benzyl Bromide.

The Original Copper-zinc Couple.

The Dry Copper-zinc Couple and its constituents.

The Original Air Battery.

Early form of the Air Battery.

Dr. Gladstone and W. Hibbert.

Para Caoutchouc obtained by precipitation.

Penang Caoutchouc obtained by precipitation.

$C_{10}H_{15}Br_5$, action of Bromine on Caoutchouc.

Exhibited by Dr. Gladstone.

Warren de la Rue, D.C.L., F.R.S.,

President 1867–1869 *and* 1879–1880.

Photographs of the Moon. One of the earliest applications of photography to celestial physics.

Specimen Cells of the great battery of 15,000 Cells, used by de la Rue and Müller in their researches on the electrical discharge in gases.

Spark Micrometer, for measuring the relation of potential and striking distance.

Tubes used in the study of the electrical discharge in rarefied media.

Voltameter used in connection with the great battery.

From the de la Rue Collection in the Royal Institution.

Exhibited by the Council of the Royal Institution.

Tyrosine from Cochineal.
Carminic Acid.
Nitrococcusic Acid.

Exhibited by Dr. Hugo Müller.

Edward Frankland, D.C.L., LL.D., F.R.S.,

President 1871–1873.

1. *Eudiometer, and Calibration Table.*
In this eudiometer Ethyl was first analysed.

Jour. Ch. Soc. 1850, p. 263.

Exhibited by the Science and Art Department, South Kensington.

2. *Isolation of the Organic Radicals, and conception of their hydrides as a class.*

Ethyl-Butane.
Ethylic hydride; Ethane.

Jour. Ch. Soc. 1850, p. 263.

3. *Digester* used in the production of Organo-metallic Compounds, and for chemical reactions under heat and pressure.

Jour. Ch. Soc. 1850, p. 297.

4. *Organo-metallic Compounds.*

Zinc-ethyl $ZnEt_2$.
Stannic Ethodimethide $SnEt_2Me_2$.

5. *The first Regenerative Gas Burner.* An intermediate glass (broken) caused the air to pass close to the innermost glass before it reached the flame.

Ure's Dictionary, Vol. II, p. 562, 1854.

6. *Artificial Human Milk.* Prepared by the partial removal of casein from and addition of milk sugar to cow's milk.

Manchester Guardian, Dec., 1854.

7. *Substitution of* $'N_2''$ *for* C^{IV} *in Organic Compounds.*
Cupric Dinitroethylate

$$2\begin{matrix}'N_2''EtO\\'N_2''EtO\end{matrix}(CuO_2),\ OH_2.$$

Phil. Trans. 1856, p. 59.

8. *Influence of Atmospheric Pressure on the Rate and Light of Combustion.*
The six candles burnt for one hour on the summit of Mont Blanc.

Jour. Ch. Soc. 1861, p. 168.

9. *Organo-boron Compounds.*

Boric Ethide BEt_3.

Jour. Ch. Soc. 1862, p. 363.

10. *Source of Muscular Power.*

Thompson's apparatus used in the determination of the Potential Energy in various articles of food.

Phil. Mag. 1866, Series 4, Vol. XXII, p. 182.

Exhibited by the Science and Art Department, South Kensington.

11. *Simple Apparatus for Gas-analysis.*

Jour. Ch. Soc. 1868, p. 109.

12. *Apparatus used for the Combustion of Hydrogen and Carbonic Oxide under great pressure.*

Proc. Roy. Soc. 1868, p. 419.

13. *Thermometric Observations in the Alps.*

Black box in which water was boiled by the unconcentrated sun's rays at Davos, Dec. 22nd, 1873. The plain thermometer in the box rose to 221° Fahr.

Proc. Roy. Soc. 1874, p. 317.

14. *Self-registering Maximum Solar Thermometer.*

This is essentially a differential air thermometer, one bulb of which is blackened and exposed in vacuo to the solar rays upon a white ground, the other bulb is freely exposed to the air beneath the shade of a white arch. The difference in temperature is read off upon an arbitrary scale attached to the capillary limb of the inverted syphon, the maximum height attained by the mercury in this limb being registered in the usual manner.

Proc. Roy. Soc. 1882, p. 331.

Dr. Frankland and Dr. Kolbe.

15. *Transformation of Cyanogen* (CN) *into Oxatyl* (COHo).

Caproic Acid from AyCy.

Mem. Ch. Soc. III, 1847, p. 386.

16. *Polymerisation of Ethylic Cyanide.*

Kyanethine $N_3(CEt)_3$.

Jour. Ch. Soc. 1848, p. 69.

Dr. Frankland and Mr. Duppa.

17. *Organo-mercury Compounds.*

Mercuric amylide HgAy_2.

Jour. Ch. Soc. 1863, p. 420.

18. *Transformation of the Acetic into the Acrylic Series of Acids.*

$$\text{Ethylcrotonic Acid} \left\{\begin{array}{l} \text{CEt}''\text{Et} \\ \text{COHo} \end{array}\right.$$

$$\text{Cupric ethylcrotonate} \left\{\begin{array}{l} \text{CEt}''\text{Et} \\ \text{CO} \\ \text{CO} \\ \text{CEt}''\text{Et} \end{array}\right. \!\!\!\!\!\!\!\!\!\!\!\!\! \quad\quad\quad (\text{CuO}_2)$$

Jour. Ch. Soc. 1865, p. 133.

19. *Synthesis of Esters.*

$$\text{Ethylic diethacetoacetate} \left\{\begin{array}{l} \text{COMe} \\ \text{CEt}_2 \\ \text{COEto} \end{array}\right.$$

$$\text{Ethylic diethacetate} \left\{\begin{array}{l} \text{CEt}_2\text{H} \\ \text{COEto} \end{array}\right.$$

Jour. Ch. Soc. 1866, p. 395.

20. *Synthesis of Ketones.*

$$\text{Diethylated Acetone} \left\{\begin{array}{l} \text{CEt}_2\text{H} \\ \text{COMe} \end{array}\right.$$

Jour. Ch. Soc. 1866, p. 395.

21. *Synthesis of Acids of the Acetic Series.*

$$\text{Ethacetic (Butyric) Acid} \left\{\begin{array}{l} \text{CEtH}_2 \\ \text{COHo} \end{array}\right.$$

obtained by the successive action of sodium and ethylic iodide on ethylic acetate.

Jour. Ch. Soc. 1866, p. 395.

22. *Synthesis of Acids of the Lactic Series.*

$$\text{Ethylic diethoxalate} \left\{\begin{array}{l} \text{CEt}_2\text{Ho} \\ \text{COEto} \end{array}\right.$$

$$\text{Diamyloxalic acid} \left\{\begin{array}{l} \text{CAy}_2\text{Ho} \\ \text{COHo} \end{array}\right.$$

Phil. Trans. 1866, p. 37.

Dr. Frankland and Dr. Armstrong.

23. *Eudiometer for the Determination of Nitrogen in Nitrates and Nitrites.*

Jour. Ch. Soc. 1867, p. 102.

24. *Analysis of Potable Water.*
Tube charged for combustion of water residue.
Jour. Ch. Soc. 1868, p. 77.
Exhibited by Dr. Frankland.

Sir Frederick Abel, K.C.B., D.C.L, D.Sc., F.R.S.,
President 1875-77.

1. Specimen of Guncotton prepared according to prescription of Schönbein, by F. A. Abel, Aug., 1846, in the Royal College of Chemistry.
2. Specimens illustrating researches on the stability of Guncotton, 1863–5.
3. Sample of Guncotton manufactured by Hall & Son, 1846, buried after explosion at the Works until 1864.
4. Preparations of Nitroglycerine and of Guncotton (Glyoxiline), 1867.
5. Specimens of Granulated Guncotton, 1876.
6. Specimens of Compressed Guncotton, Abel's system.
7. Guncotton Slab fired through from a Martini-Henry Rifle without being exploded.
8. Guncotton Slabs perforated by the electric discharge without ignition.
9. Explosion Vessel, used in Researches on Guncotton, 1865–8.
10. First Explosion Vessel used in Abel and Noble's Researches on Fired Gunpowder, &c., 1871–80.

Note.—Largest powder-charge exploded in the vessel, $2\frac{1}{4}$ lb.; pressure developed, 43 tons per square inch; largest guncotton charge exploded, 14 oz. In larger vessels of the same model 22 lb. of powder have been exploded, and guncotton has been detonated with developments of nearly 70 tons pressure per square inch.

11. Vacuum Bomb used in Researches on the Combustion of Gunpowder and Gungotten in rarefied atmospheres, 1867.
12. Specimens of "Cordite," the new smokeless powder.
13. Photographs showing the 6-inch quick-firing gun fired with black powder and with Cordite (smokeless powder).

Exhibited by Sir F. A. Abel.

Sir Henry Roscoe, M.P., F.R.S.,
President 1880–82.

A complete series of Specimens of Vanadium compounds:—
Vanadium Ore.
Roasted ,,
Ammonium Vanadate.

Vanadium Trisulphide.
„ Disulphide.
„ Pentasulphide.
Silver Hypovanadate.
Sodium „
Hypovanadic Tetrachloride.
„ Disulphate
Lead Hypovanadite.
Aqueous Solutions of—
Vanadium Dioxide.
„ Trioxide.
„ Tetroxide.
„ Pentoxide.
„ Dichloride.
„ Trichloride.
„ Tetrachloride.
Vanadyl Trichloride.
Di-vanadyl Monochloride.
Lead Meta-vanadate.
Ammonium Meta-vanadate.
Vanadium Mono-nitride.
„ Trioxide.
„ Pentoxide.
„ Silicon-alloy.
„ Platinum-alloy.
Vanadous Sulphate.
„ Oxidibromide.
„ Trichloride.
Vanadyl Trichloride.
Vanadium Tetrachloride (decomposed).
Vanadium Dichloride.
Potassium Anhydro-vanadate.
„ „ Chromate.
Vanadium Metal.
„ Pentoxide.
„ Nitride.
Barium Hypovanadate.
Vanadic Vanadate.
Ammonium Magnesium Phosphate.
(From Berzelius's Vanadium.)

Meta-vanadic Acid.
Sodium Anhydro-vanadate.
Ammonium Hypo-vanadate.
Hypovanadic Hydrate.

Thallium Tetra-vanadate.
,, Deca-kai-vanadate.
,, Hexa- ,, ,,
Silver Octa- ,, ,,
Meta-vanadic acid.
Ammonium Vanadate.
,, Vanadite.
Vanadium Sesquioxide.
Artificial Vanadinite.
Ammonium Meta-vanadite.
Sodium Ortho-vanadite.
Silver ,, ,,
Sodium ,, ,, (Fused mass).
,, Pyro-vanadate.
Lead ,, ,,
Sodium Octa Vanadate.
Barium Pyro-vanadate.
Silver ,, ,,
Vanadyl Dichloride.
Calcium Di-vanadate.
Sodium Vanadate-vanadite.

Exhibited by Sir H. E. Roscoe.

J. H. Gilbert, LL.D., F.R.S.,

President 1882–83.

Dr. Gilbert having been engaged with Sir J. B. Lawes in the conduct of the Rothamsted Investigations from 1843 up to the present time, sends the following illustrations of some of the lines of inquiry undertaken :—

Apparatus used in an investigation by Messrs. Lawes, Gilbert, and Pugh, in the years 1857, 1858, 1859, and 1860, to determine whether plants assimilate free or uncombined nitrogen. The plants were grown in ignited pumice or soil (with plant-ash added), either with no other supply of combined nitrogen than that contained in the seed sown, or with the addition of known and limited quantities of combined nitrogen; and they were supplied with washed air, and washed carbonic acid. The conditions of growth were, therefore, those of sterilisation; and there was, under such conditions, no gain from free nitrogen, in the growth of either Gramineæ, Leguminosæ, or other plants.

Plate of Gramineous plants grown in 1857 and 1858; and Coloured Photograph of coloured scale drawings of Leguminous plants grown in 1860.

Three enlarged Photographs of Leguminous Plants grown in Experiments in 1889, on the Question of the Fixation of Free Nitrogen; in some cases with sterilisation, and in others with microbe-seeding of the soil. With suitable microbe-infection of the soil, there was abundant formation of the so-called "*Leguminous nodules*" on the roots of the plants, and there was, coincidently, very considerable fixation of free nitrogen. The evidence at present at command points to the conclusion, that the free nitrogen is fixed in the course of the development of the organisms within the nodules, and that the resulting nitrogenous compounds are absorbed and utilised by the higher plant.

Coloured Drawing, by Lady Lawes, of the Rothamsted Rain-gauges. For the purpose of accurate measurement of the rain, and of obtaining sufficient quantities for analysis, a large gauge of one-thousandth of an acre area has been in use since the beginning of 1853; also an ordinary funnel-gauge of 5 inches diameter; and these are represented in the Drawing. An 8-inch "Board of Trade" copper gauge has also been in use since January, 1881. The funnel portion of the large gauge is constructed of wood lined with lead; the upper edge consisting of a vertical rim of plate glass, bevelled outwards. The rain is conducted by a tube into a galvanised iron cylinder underneath, and when this is full it overflows into a second cylinder, and so on into a third and fourth, and finally into an iron tank. Each of the four cylinders holds rain corresponding to half an inch of depth, and the tank an amount equal to 2 inches. Each cylinder has a gauge-tube attached, graduated to read to ·002 inch, but which can be read to ·001 inch. Small quantities are transferred to a smaller cylinder with a gauge-tube graduated to ·001, or one-thousandth of an inch.

Coloured Drawing, by Lady Lawes, of the Rothamsted Drain-gauges. The three "drain-gauges," each of one-thousandth of an acre area, for the determination of the quantity and composition of the water percolating respectively through 20 inches, 40 inches, and 60 inches depth of soil (with the subsoil in its natural state of consolidation), have been in use since September, 1870, that is for a period of more than 20 years. The gauges were constructed by digging a deep trench along the front, gradually undermining at the depth required, and putting in plates of cast iron (with perforated holes) to support the mass. The iron plates were then kept in place by iron girders, and the ends of the plates and of the girders supported by brickwork on three sides. Trenches were then dug bit by bit round the block of soil, which was then enclosed on each side by walls of brick laid in cement. Below the perforated iron bottom a zinc funnel of the same area as the soil was finally fixed, and the drainage water is collected and measured in galvanised iron cylinders, with gauge-tubes, as in the case of the rain.

Photograph of a case (now in the Science Museum, South Kensington), illustrating the influence of different manures on the botanical composition of the Mixed Herbage of Permanent Grass-land.

A set of bound volumes of Rothamsted Memoirs, &c., published 1847–90, inclusive. Also the annual *Memoranda* for 1890.

Book of Drawings and Plans of the *Lawes Testimonial Laboratory*, Rothamsted, Herts.

Exhibited by Sir J. B. Lawes and Dr. Gilbert.

W. H. Perkin, Ph.D., F.R.S.,
President 1883–85.

Dinaphthylguanidine.
Bromacetic acid.
Dibromacetic acid.
Dibromacetamide.
Glyoxylic acid (crysd. $C_2H_4O_4$).
Calcium glyoxylate.
Diethyl tartrate.
,, diacetotartrate.
,, benzoyltartrate.
Diacetoracemic anhydride.
Diethyl diacetoracemate.
Dibromosuccinic acid.
Tartaric acid (inactive, from argentic dibromosuccinate).
a-Azoamidonaphthalene.
Mauveine. *The base of the mauve dye. The first of the coal tar colours; discovered in* 1856.
Mauveine Hydrochloride.
,, Hydriodide.
,, Sulphate.
,, Acetate.
,, Carbonate.
Nitrate of Parasafranine.
(Prepared from Mauveine.)
Salicylaldehyde (salicylal).
,, and acetic anhydride.
Coumarin (from Tonka bean).
,, (artificially prepared).
Propionic coumarin.
Butyric ,,
Valeric ,,

Chlorocoumarin.
Tetrachlorocoumarin.
Bromo ,,
α Dibromo ,,
β ,, ,,
Coumarilic acid.
Potassium coumarilate.
Baric sulphocoumarilate.
Bromopropionic coumarin.
Anthracene.
Anthraquinone.
α Dibromanthraquinone.
β ,, ,, ,,
Barium disulphoanthraquinonate.
Monochloranthracene.
Di ,, ,,
Monobrom ,,
Di ,, ,,
Dichloranthracene and Picric acid.
Sodium disulphodichloranthracenate.
Strontium ,,
Barium ,,
Anthraflavic acid.
Diacetylanthraflavic acid.
Barium anthraflavate.
Isoanthraflavic acid.
Anthrapurpurine (sublimed).
Triacetylanthrapurpurine.
Alizarine (sublimed).
Acetylalizarine.
Diacetyl ,,
Brom ,,
α Nitro ,,
α Amido ,,
Phenylacrylic acid (cinnamic acid).
,, ,, crotonic acid.
,, ,, angelic ,,
Cumenylacrylic acid.
,, ,, crotonic acid.
,, ,, angelic ,,
Sodium cumenylcrotonate.
Methylparoxyphenylacrylic acid.
,, ,, ,, acrylate of methyl.
,, ,, ,, crotonic acid.

α Methylorthoxyphenylacrylic acid.
β ,, ,,
β ,, crotonic acid.
β ,, angelic ,,
Barium β Methylorthoxyphenylacrylate.
Cinnamonylacrylic acid.
,, crotonic ,,
Isobutenylbenzene.
,, dibromide.
Isopropylallylbenzene.
Isobutenylvinylbenzene (Iso butenyl cinnamene).
Parallylanisoïl (anisoïl, made artificially).
Orthoallylanisoïl.
Butenylanisoïl.
Isobutenylanisoïl.
Vinylbenzene (cinnamene), polymerized.
Vinyl-p-anisoïl ,,
Vinyl-o-anisoïl ,,
Vinylisopropylbenzene ,,
Orthoisobutenylphenol.
Acetomalic anhydride.
Maleic anhydride (obtained by distillation of the above).
Chlorofumaric acid.
Amidofumaramide.
Potassium chloromaleate.
Ethyl chloromaleate.
Diphenyleneketone-oxide.
Nitrophenyldiazobenzeneacetonitrile.
,, ,, ,, toluene ,,
Tritolylenetriamine.
Tolyltriparalolylenetriamine.
Butyrylphenol.
Propionylphenol.

Exhibited by Dr. Perkin.

Dr. Hugo Müller, F.R.S.,

President 1885-87.

Warren de la Rue and Hugo Müller.

Emodin.
Chrysophan.
Original Resin of *Ficus rubiginosa*, in which the Sycocerylic Acetate was discovered.
Sycocerylic Acetate.
,, Alcohol.

Hugo Müller.

Chlorinated Derivatives obtained by the Iodine process :—
- Dichlorbenzene.
- Quatrichlorbenzene.
- Hexachlorbenzene.
- Malonic acid from Cyanoacetic acid.
- Methyl-Pyrocatechin, or Guaiacol, from Wood Kreasote.
- Methyl-Homo-Pyrocatechin, from Wood Kreasote.
- Homo-Pyrocatechin.
- Inosite, from Cochineal.
- Guanine Hydrochlorate, from Cochineal.
- Quercite, from the leaves of *Chamaerops humilis.*
- Cocosite, a substance resembling Inosite, from the leaves of several species of Cocoanut Palm.

Exhibited by Dr. Hugo Müller.

W. Crookes, F.R.S.,

President 1887–89.

THE SELENIOCYANIDES, 1851.

1. Original specimen of Seleniocyanide of Potassium.

2. Seleniferous deposit from the Sulphuric Acid Chambers at Tilkerode. From this deposit the Selenium used in the above research was prepared.

3. Residue left on distilling crude Selenium prepared from the above deposit. On examining this residue in the Spectroscope a sharp green line was seen, which was afterwards proved to be due to a new element, Thallium.

THALLIUM AND ITS COMPOUNDS, 1861.

4. Thallium, pure metallic, in vacuo.
- ,, oxide.
- ,, peroxide.
- ,, chloride.
- ,, sesquichloride.
- ,, bromide.
- ,, iodide.
- ,, sulphide.
- ,, cyanide.
- ,, sulphocyanide.
- ,, sulphate.
- ,, nitrate.

Thallium carbonate.
,, acetate.
,, oxalate.
,, picrate.
,, chlorate.
,, perchlorate.
,, chromate.
,, bichromate.
,, tartrate.
,, bitartrate.
,, benzoate.
,, potassium tartrate.

5. A prism of thallium glass, in which thallium replaces lead. Sp. gr. 4·75. Refractive index for the D line 1·751.

6. Crookesite, from Skrikerum, Norway. A selenide of thallium, copper and silver.

Thallium	17·25
Copper	45·76
Silver	3·71
Selenium	33·28
	100·00

7. Thalliferous Pyrites, from Millom, Cumberland.

8. Thalliferous Flue Dust, from Sulphuric acid works using thalliferous pyrites. (*a*) From Allhusen's Works, Newcastle. (*b*) From the Washington Chemical Works, Durham.

Repulsion resulting from Radiation, 1873.

9. Original Apparatus used in this investigation.

Pith ball balance in air, and in vacuo. The balls in air are apparently attracted, and in vacuo are repelled if a flame is brought near them.

Pith discs suspended horizontally.

Platinum bar suspended in tube of hard glass. This was heated to a high temperature while exhaustion was proceeding to show that the repulsion does not depend on the presence of moisture.

Glass rods with mica ends in vacuo of various degrees of perfection.

Torsion balance to measure the force with which the blackened disc is repelled when exposed to radiation.

Pith bars with mirrors attached suspended (*a*) in air, (*b*) in vacuo. The blackened end of (*a*) is attracted, and that of (*b*) repelled when a flame is brought near them.

The Radiometer, 1875.

10. The first Radiometer.

11. Early forms of Radiometers.

12. Lecture form of Radiometer.

13. Radiometers in which the source of heat is a platinum spiral inside the tube, which is heated by an electric current.

14. Radiometers with vanes coated with different materials.

15. 16. Radiometers showing a different action according to whether heat or light falls on them. Certain bodies are more affected by luminous radiations than by the heat rays, while others are affected in the inverse order. If pairs of these substances, in fine powder, are painted on alternate sides of the vanes of a radiometer, the rotation will be in one direction if the light of a candle is allowed to shine directly on them, and in the opposite direction if the light is first filtered through a plate of alum or a cell of water. One of these radiometers has its vanes coated on alternate sides with persulpho-cyanogen and copper oxalate, and the other radiometer has its vanes coated with chromic oxide and copper tungstate.

17. Radiometer with vacuum gauge attached.

18. First Radiometer made to investigate the effect of the shape of the vanes. The corners are turned up.

19. Radiometers in which the opposite sides of the vanes are of different shapes or are differently presented to the glass envelope:—

Vanes inclined to the arms.
Very thin mica vanes.
Thicker mica vanes.
Cone-shaped vanes.
Cylindrical vanes.
Cup-shaped vanes.

20. Apparatus in which the source of heat is a platinum wire.

21. Radiometers furnished with movable mica or metal screens, which can be jerked into different positions relatively to the vanes.

22. Double Bulb Radiometer to investigate the effect of the dimensions of the bulb. The vanes can be balanced in either bulb.

23. Radiometer to show that, if the vanes are held at rest by means of a magnet, the bulb, if free to move, will rotate.

24. A Spiral Radiometer of roasted mica blacked on the upper side.

25. A four-armed Metallic Radiometer with deep cups, bright on both sides.

26. A four-armed Radiometer, the vanes consisting of mica cups, bright on both sides.

27. A four-armed Radiometer having clear mica vanes. The direction of motion being determined by the angle formed by the mica vanes with the inner surface of the glass bulb.

28. A vertical Radiometer, made with eight discs of mica blacked on one side, and the whole suspended on a horizontal axis which works in two glass cups. The motion of the radiometer is assisted on each side by driving vanes of aluminium blacked on one side.

Application of the Radiometer to Photometry.

29. Apparatus showing variations in the intensity of light on a divided scale.

Otheoscopes or Instruments in which the driving surface is not the glass of the bulb, but an interior disc, or surface which becomes heated.

30. Otheoscope.—A four-armed fly carries roasted mica vanes, and is mounted in an exhausted glass bulb like a radiometer. Fixed to the side of the bulb are three plates of clear mica, equidistant from each other in a vertical plane, but oblique to the axis. A candle brought near the fixed plates generates molecular pressure, which, falling obliquely ou the fly, causes it to rotate.

31. Otheoscope.—A large horizontal disc, revolving by the molecular disturbance on the surface of inclined metallic vanes, which are blacked on both sides in order to absorb the maximum amount of radiation.

Molecular Physics in High Vacua, 1878.

Original Apparatus used in this investigation.

32. Apparatus to show the Dark Space round the Negative Pole. When the spark from an induction coil is passed through an ordinary vacuum tube, a dark space is seen round the negative pole. The shape and size of this dark space do not vary with the distance separating the poles; nor, only very slightly, with alteration of battery power, or with intensity of spark.

33. Apparatus to show the Green Phosphorescent Light of Molecular Impact. At very high exhaustions the dark space becomes so large that it fills the tube, and when German glass is used the sides are beautifully illuminated with a greenish-yellow phosphorescent light.

34. Apparatus to show the Conveyance of the Molecular Streams to a Focus. The plate covered with calcium sulphide is furnished with a scale on which the "focal length" of the curved electrode is indicated.

35. Apparatus to show that the Paths of the Molecules are straight lines.

36. Apparatus to show the Projection of Molecular Shadows.

The rays exciting green phosphorescence will not turn a corner, but radiate from the negative pole in straight lines, casting strong and sharply-defined shadows from objects which happen to be in their path. The best and sharpest shadows are cast by flat discs, and not by narrow-pointed poles; no green light is seen in the shadow itself, no matter how thin or whatever may be the substance from which it is thrown.

37. Apparatus to show Shadow of Object which is interposed in the Paths of the Molecules. The molecules which pass the aluminium cross make the glass phosphoresce so that a shadow of the cross appears.

38. Apparatus in which the Negative Pole is a Coin; the device is reproduced on the glass by the phosphorescence excited by the molecular streams.

39. Apparatus to show that the line of phosphorescent light excited by a molecular stream in a plate covered with calcium sulphide is deflected by a magnet, thereby proving that the paths of the molecules are affected by the presence of a magnet.

40. Apparatus to show the Mechanical Action of Projected Molecules. An actual material blow is given by the impinging molecules. A small vaned wheel being used as an indicator, by appropriate means the molecular shadow of an aluminium plate is projected on the vanes. When entirely in the shadow the indicator does not move, but when the molecular stream is deflected so that one half of the wheel is exposed to molecular impact it rotates with extreme velocity.

41. Paddle-wheel which can be rotated in either direction according as the molecular stream is directed to its upper or lower vanes by a magnet.

42. Electrical Radiometers. The vanes revolve when connected with the negative pole of an induction coil. At low exhaustions a velvety violet halo forms over each side of the vanes. On increasing the exhaustion the dark space widens out. On further exhaustion, the dark space on the metallic side touches the glass, when positive rotation takes place.

43. Apparatus to show the Focus of Heat of Molecular Impact. Great heat is evolved when the concentrated focus of molecular rays from a nearly hemispherical aluminium cup is allowed to fall on a strip of platinum-foil, the heat sometimes exceeding the melting point of platinum.

44. A disc is supported by a carbon rod resting on carbon supports which form a microphone. If a telephone be included in the circuit, the movement of the disc produced by the impact of a beam of light can be detected by the sound produced by the microphone.

45. Apparatus with Idle Poles to test the Electrification of Bodies interposed between the poles in the molecular stream.

46. Apparatus to test the effect of the Electrification of a Neighbouring Conductor on the molecular streams.

47. Apparatus to Investigate the Shadow of a Vibratory Pendulum.

48. Apparatus with two Negative Poles. When one negative pole only is used lines of light are produced in the phosphorescent plate by the molecular streams. When both are employed simultaneously the lines shift in such a direction as to prove that the molecular streams repel each other.

Radiant Matter, 1879.

Original apparatus used in this investigation.

49. Vacuum Tube, with exploring pole, used in investigating the electrical condition of a highly exhausted tube when electrically excited.

50. Apparatus to show the action of the electrified walls of a vacuum tube on the stream of Radiant Matter, projected from the negative pole. In the wide part of the tube the stream of Radiant Matter follows its normal course straight from the negative pole, but in the narrow part of the tube, so great is the attraction of the walls that the molecular stream widens out till it covers the whole screen.

51. Apparatus showing that the radiant molecules behave differently in a vacuum just short of non-conducting to what they do in an ordinary high vacuum.

52. Apparatus showing the return of the exhausted molecules after having been shot off from the negative pole. The charged molecules pass through a small hole in a glass diaphragm, and turn a mill by their impact. The returning molecules passing through another hole turn a second mill.

Apparatus to show that *Radiant Matter* is not *Radiant Electrode Matter.*

53. Apparatus showing that all the phenomena of Radiant Matter, such as projection of molecular shadows, mechanical energy, production of heat, and phosphorescence can be produced in tubes without inside electrodes.

54. Apparatus used in experimenting on the Electrical Resistance of High Vacua.

55. Double vacuum tube of different electrical resistance. One side containing carbon, and the other side containing yttria.

56. Apparatus showing that the resistance of vacuum tubes is dependent on the material surrounding the poles.

Phosphorescence in High Vacua, 1879.

57. Apparatus to show the Phosphorogenic Properties of the Molecular Stream. Substances known to be phosphorescent under ordinary circumstances shine with great splendour when subjected to the negative discharge in a high vacuum.

58. Apparatus with cylindrical electrode to show phosphorescence produced in glass.

59. Apparatus with corrugated electrode. The molecular streams from the projections interfere and produce a pattern on the glass.

60. Tubes for the production of phosphorescence by means of the molecular stream on calcium sulphide.

61. Diamonds, various, in vacuum tubes. Under the influence of the induction spark these diamonds phosphoresce of different colours, according to their origin. Thus, Cape diamonds usually phosphoresce blue; Brazilian diamonds phosphoresce red, orange, blue and yellow; Australian diamonds phosphoresce yellow, blue and green.

62. Diamonds mounted in enamel. When subjected to the molecular stream they phosphoresce with blue, yellow, green or apricot-coloured light.

63. Rubies. These stones phosphoresce with a brilliant red light.

64. Mixed stones which phosphoresce with various colours. The collection includes Diamonds, Rubies, Garnet, Topaz, Phenakite and Spodumene.

65. Topaz.—Phosphoresces blue.

66. Sapphire.—Phosphoresces green.

67. Spinel.—Phosphoresces with a crimson light.

68. Phenakite. — Usually phosphoresces blue. Occasionally a crystal is found which phosphoresces yellow.

69. Pectolite.—Phosphoresces of a straw colour.

70. Calcite.—Phosphoresces of an orange colour.

71. Phosphorescent Calcite from Branchville, S. Carolina. When heated in air it has the curious property of glowing strongly with a golden-yellow light. In the Radiant Matter Tube this phosphorescence is very brilliant.

72. Spodumene.—Phosphoresces of a yellow colour. A phosphorescing crystal of Spodumene has all the internal light cut off with a Nicol prism when the long axes of the Nicol and the crystal are parallel.

73. Dolomite.—A granular form from Utah. When scratched with a knife or struck with a pick it emits so strong a phosphorescent red

light that the miners call it Hell-fire Rock. In the Radiant Matter Tube it glows with a fine red light.

74. Zirconium Oxide, Calcined.—Phosphoresces with a bluish-white light.

75. Strontium Oxide, Calcined.—Phosphoresces with a fine blue light.

76. Glucinum Oxide, Calcined.—Phosphoresces with a faint blue light.

77. Calcium Sulphide.—Phosphoresces blue, yellow, green or red according to the mode of preparation.

78. Zinc Sulphide. (Sidot's hexagonal blende.)—This is the most brilliantly phosphorescent body yet met with. In the vacuum tube it begins to phosphoresce at an exhaustion of several inches below a vacuum. At first only a green glow can be seen; as the exhaustion gets better a little blue phosphorescence comes round the edges. At a high exhaustion, on passing the current, the green and blue are about equal in brightness, but the blue glow vanishes immediately the current stops, while the green glow lasts for an hour or more. Some parts of a crystalline mass of blende, which, under the action of radiant matter, glow of a bright blue colour, give a green residual light when the current ceases; other parts which glow blue become instantly dark on stopping the current.

Electric Lighting by Incandescence, 1881.

79. Structureless cellulose for carbon filaments.

80. Incandescent electric lamps, with structureless carbon filaments.

81. The smallest electric lamp, diameter 3·8 mm. weight 1·9 grams. 7·4 volts, 0·6 ampère, I. C.P.

Radiant Matter Spectroscopy, 1883.

Apparatus and specimens illustrating this investigation.

82. Alumina in the form of a precipitate or crystallized as the Ruby, phosphoresces of a rich crimson colour, and when the light is examined in the spectroscope it is seen to consist essentially of one sharp line in the red.

83. Yttrium Sulphate.—Phosphoresces with a golden-yellow light. Examined with a spectroscope gives a remarkable discontinuous spectrum.

84. Samarium Sulphate.—Phosphoresces with a red light, and gives a spectrum composed of three broad bands.

85. Specimens of Rare Earths and their Salts.

Ceria.	Niobic acid.
Ceric oxalate.	Philippic (?) formate.
Decipia.	Tantalic acid.
Didymia.	Terbia.
Didymic oxalate.	Thoria.
,, sulphate.	Thoric oxalate.
Erbia (rose-coloured).	,, sulphate.
Gadolinia ($Y\alpha$).	Ytterbia.
Lanthana.	Yttria.
Lanthanic oxalate.	Zirconia.
Thulia (with erbia).	

86. Specimens of Yttria from the following minerals:—

Gadolinite.	Hielmite.
Samarskite.	Sipylite.
Xenotime.	Arrhenite.
Monazite.	Fluocerite.
Euxenite.	Clèvite.

Specimens of Minerals containing Rare Earths.

87. Gadolinite. The largest known crystal in the world. It weighs 40 lbs., and contains nearly 50 per cent. of Yttria.

88. Samarskite. Various specimens.

89. Allanite. A very large specimen.

90. Thorite and Orangeite in crystals.

91. Eudyalite.

92. Orthite.

93. Alvite.

94. Rhabdophane.

95. Fergusonite.

96. Columbite.

97. Hjelmite.

Genesis of the Elements, 1886.

98. A Model Lemniscate Curve, illustrating the Presidential Address delivered before the Chemical Society, March 28th, 1888.

Elements and Meta-Elements, 1889.

Specimens illustrating the Presidential Address delivered before the Chemical Society, March 21st, 1889.

99. Vacuum tubes containing new earths separated from Yttria by continued fractionation. Under the influence of molecular bombardment, these earths phosphoresce brightly, and give spectra consisting essentially of one or two bright lines.

100. The following table gives the mean wave-length of certain definite absorption-bands or lines in the phosphorescent spectra of presumably new elements which have been separated from the earth yttria by fractional precipitation, repeated many thousand times:—

Position of lines in the spectrum.	Mean wave-length of band or line.	Provisional name.
Absorption bands in violet and blue	443 475	$D\alpha$ $S\beta$
Bright lines in		
Deep blue ..	482	$G\alpha$
Green ..	564	$G\gamma$
Citron ..	574	$G\delta$
Yellow ..	597	$G\epsilon$
Orange ..	609	$S\delta$
Red ..	619	$G\zeta$
Deep Red ..	647	$G\eta$

Exhibited by Mr. Crookes.

George Fownes, F.R.S.,

Secretary 1842–1848.

Oil of Bran.

This is a portion of the oily liquid obtained by distilling bran with diluted sulphuric acid, from which, in the year 1845, Fownes, the first Professor of Chemistry to the Pharmaceutical Society, isolated a substance which he called "furfurol" (*furfur*, bran, and *oleum* oil) (Phil. Trans. 1845).

Furfurine.

This derivative of furfurol, isomeric with furfuramide, was discovered by Fownes, by whom the present specimen was prepared.

Furfurine Nitrate.

Specimen prepared by Fownes.

Exhibited by Professor Dunstan.

Edward Daniell, F.R.S.,

Professor of Chemistry in King's College.

Cell of Daniell's Original Battery.

Daniell's Constant Battery (large cells).

Daniell's Gas Battery.

Daniell's Hypometer on Air Pump Receiver.

Daniell's Original Pyrometer, with iron case for heating substances in.

Exhibited by the Council of King's College, London.

Thomas Thomson, F.R.S.

Chemical Balance, which originally belonged to Professor Thomas Thomson, F.R.S.

Exhibited by Professor J. M. Thomson.

Thomas Andrews, F.R.S.,

Late Professor of Chemistry in Queen's College, Belfast.

Collection of Apparatus used by the late Dr. Andrews in his researches :—

1. Six straight Tubes used in experiments on Ozone.
2. Two bent Tubes employed for the same purpose.
3. Two Tubes used in attempts to liquefy the "permanent" gases.
4. A compression Apparatus used in his experiments on the continuity of the liquid and gaseous states.
5. The first Apparatus with which Andrews worked on this subject. (The compression screw and the tube containing carbonic anhydride are not the original ones.)
6. A Tube ready calibrated for the above.
7. A Wooden Curve Model, showing the changes of volume which carbonic anhydride experiences under different conditions of temperature and pressure.
8. A Calorimeter used in determinations of the heat of combination.

Exhibited by Professor Letts, Queen's College, Belfast.

Later and perfected forms of Apparatus used by Andrews in his researches on the critical point of gases and liquids.

Exhibited by the Science and Art Department, South Kensington.

James Prescott Joule, D.C.L., F.R.S.

Model of the Calorimeter used by him in the determination of the Mechanical Equivalent of Heat.

Exhibited by the Science and Art Department, South Kensington.

Walter Weldon, F.R.S.,

Some time Vice-President of the Society.

Complete model of a plant for his chlorine process.

Exhibited by the Science and Art Department, South Kensington.

Dr. Edward Schunck, F.R.S.,

Sometime Vice-President of the Society.

Indirubin, crystallised.—The red colouring matter always formed by decomposition of indican along with indigo-blue, with which it is isomeric; probably identical with the indigo-red of Berzelius. Dyes red or rather purple, using the same process as that employed for dyeing blue with indigo-blue.

Chrysammic Acid.—First obtained by the action of nitric acid on aloes in 1841. Is a nitro compound of a di-oxyanthraquinon. Magnesium chrysammate is the most beautiful of its salts.

Magnesium chrysammate.

Anthraruflavic Acid and Iso-anthraflavic Acid.—These are isomerides of alizarin which are formed during the process of the artificial production of the latter. As they are not in the least tinctorial their presence is not desirable, and their formation is prevented as much as possible.

Anthrarufin.—Another isomeride of alizarin formed by the action of sulphuric acid on meta-oxybenzoic acid.

Flavopurpurin.—A trioxyanthraquinon formed by suitable means from anthraflavic acid. It is used in dyeing. The corresponding purpurin from iso-anthraflavic acid is Dr. Perkin's anthrapurpurin.

Tribromflavopurpurin.

Diacetylflavopurpurin.

Phyllotaonin.—Remarkable as being the first derivative of chlorophyll obtained in well-defined measurable crystals. All products previously obtained from chlorophyll were either amorphous or merely crystalline. Ethyl-phyllotaonin and methyl-phyllotaonin are pretty bodies, the solutions of which show a distinct absorption spectrum.

Ethyl-phyllotaonin.

Methyl-phyllotaonin.

Exhibited by Dr. Schunck.

William Francis, Ph.D., F.L.S., F.C.S.

Liebig's Combustion Furnace and Potash Bulbs for organic Analysis. The first specimens brought to this country from Giessen, by Dr. Francis, in the year 1842.

Coloured Daguerreotype, Portrait of Dr. W. Francis, by Beard. This was one of the first ever taken, and was made at the same time as that of Mr. Robert Warington.

Exhibited by Dr. Francis.

Robert Warington, F.R.S.,

First Secretary of the Society.

The Jubilee Album, containing the Letters received by Mr. Warington in reply to the circular inviting persons to become Members of the proposed Chemical Society, with various printed papers relating to the formation and early history of the Society, and Portraits of 44 of the Original Members.

The Obligation Book of the Chemical Society, containing the signatures of Fellows on joining the Society. On page 1 are the signatures of 53 Original Fellows.

Early Photographs of W. T. Brande, M. Faraday, G. Fownes, T. Graham, W. Gregory, Justus von Liebig, R. Phillips, and R. Warington.

Early Daguerreotype, by Beard, one of the first taken in London. Portrait of R. Warington.

Berzelius' Filter Paper. Portion of a parcel sent to Dr. E. Turner before 1837.

Dalton's Graphic Formulæ, published 1835.

Exhibited by Mr. R. Warington.

George Matthey, F.R.S.

Platinum snuff box. The lid stamped to show the ductility of the metal; made about the year 1816, by the late P. N. Johnson, F.R.S., founder of the firm of Johnson, Matthey & Co., and used by him until his death in 1864.

Another, made in St. Petersburg about the year 1830.

Platinum Coin or Medal, made in St. Petersburg, 1826.

Nugget of Native Platinum, found in the Ural district very early in the present century. Weighs 166 ounces.

Specimen of Jacotinga from the Brazils, in which the greater portion of the palladium was found associated with the gold dust obtained from it.

Specimens of the six metals of the platinum group, namely, platinum, palladium, rhodium, ruthenium, iridium, and osmium.

Exhibited by Mr. George Matthey.

The Society was much indebted to Dr. Edmund Atkinson for arranging the exhibits and drawing up the above Catalogue.

PORTRAITS

OF

Past Presidents of the Chemical Society.

T. Graham	1841–1843	1845–1847
A. Aikin	... ...	1843–1845
W. T. Brande	... ...	1847–1849
R. Phillips	... ...	1849–1851
C. Daubeny	... ..	1851–1853
P. Yorke	... ...	1853–1855
W. A. Miller	1855–1857	1865–1867
L. Playfair	... ...	1857–1859
B. C. Brodie	... ...	1859–1861
A. W. von Hofmann ...	... ...	1861–1863
A. W. Williamson	1863–1865	1869–1871
W. de la Rue	1867–1869	1879–1880
E. Frankland	... ...	1871–1873
W. Odling	... ...	1873–1875
F. A. Abel	... ...	1875–1877
J. H. Gladstone	... ...	1877–1879
H. E. Roscoe	... ...	1880–1882
J. H. Gilbert	... ...	1882–1883
W. H. Perkin	... ...	1883–1885
H. Müller	... ...	1885–1887
W. Crookes	... ...	1887–1889

ROBERT WARINGTON,
First Secretary of the Society.

HENRY WATTS,
Editor of the Journal, and Librarian of the Society.

G. LONGSTAFF,
Founder of the Longstaff Medal.

JUSTUS VON LIEBIG,
Sometime Foreign Member.

D. MENDELÉEF,
Foreign Member.

Frame of Early Photographs.

Exhibited by Mr. John Spiller.

THE DINNER.

MENU.

Huîtres au Citron.

Chablis.

POTAGES.
Consommé à la d'Orléans. Crême d'Orge à l'Allemande.

Dry Sherry.

POISSONS.
Saumon, Sauce Hollandaise. Eperlans Frits, Sauce Tartare.

Niersteiner.

ENTRÉES.
Médaillons de Volaille à la Princesse. Ris de Veau à la Provençale.

G. H. Mumm & Co. Extra Quality, Extra Dry.

RELEVÉS.
Selle de Mouton de Galles. Jambon Braisé au Champagne.

Deutz and Geldermann's Gold Lack.

LÉGUMES.
Haricots Verts Sautés. Pommes de Terre Dauphine.

RÔTI.
Cailles Rôties au Cresson.
Salade.

ENTREMETS.
Pouding à la Rossini. Crême Rubanée.

Fine Champagne Liqueur Brandy.

Canapés Norvégiens.

Bombe à la Vanille. Gâteaux Condé.

DESSERT.

Cantenac. Cockburn's Old Bottled Port.

Café Noir.

Johannis Natural Mineral Water.

TOASTS.

By the President.

1. Her Most Gracious Majesty The Queen.

2. Their Royal Highnesses The Prince and Princess of Wales and the other Members of the Royal Family.

3. The Jubilee of the Chemical Society.

By the Most Honourable The Marquis of Salisbury, K.G., F.R.S.

4. Prosperity to the Chemical Society, coupled with the name of The Rt. Hon. Sir Lyon Playfair, K.C.B., F.R.S.

By the Chairman of the Society of Arts.

5. Science and Industry, coupled with the name of Sir Henry Roscoe, M.P., F.R.S.

By Prof. E. Frankland, F.R.S.

6. The Delegates of Foreign Chemical Societies, coupled with the names of M. Gautier and Dr. Will.

By Sir Frederick Abel, K.C.B., F.R.S.

7. Our Foreign Members and Our Visitors, coupled with the names of Prof. Victor Meyer and Sir Andrew Clark, Bart.

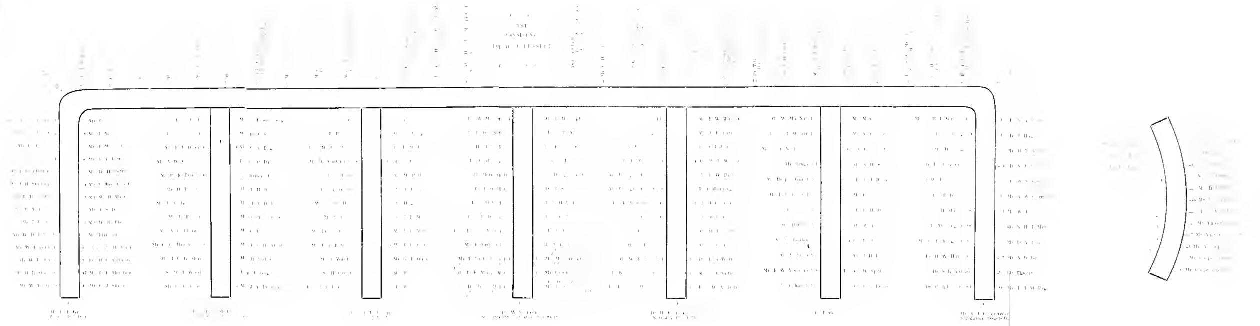
By the President of the Pharmaceutical Society.

8. The Presidents, Past and Present.

CHEMICAL SOCIETY

JUBILEE DINNER,

WEDNESDAY, FEBRUARY 25th, 1891.



THE SPEECHES.

The following telegrams were read from the Chair early in the evening:—

From the American Chemical Society: "American Chemical Society sends congratulations on fiftieth anniversary. Our dinner in honour of event prevented by death of the Chairman."

From the Oxford University Junior Scientific Club: "The President and members of the Oxford University Junior Scientific Club tender their hearty congratulation to the President and Fellows of the Chemical Society on the auspicious occasion of their Jubilee."

In proposing the first toast, "*The Queen*," the President said: No words of mine are needed to recommend this toast. I would simply say, that I believe that when the history of the reign of Queen Victoria comes to be written, the historian will find nothing more characteristic of it than the progress of science during that time. The Society is fortunate in having been born in such a reign; for although history may tell us of certain branches of industry being stimulated by war, still it is in a time of peace that science is truly and fully developed.

The toast having been loyally drunk, the President next gave "*Their Royal Highnesses the Prince and Princess of Wales and the rest of the Royal Family*," and in doing so said: There is a member of the Society present who had the honour of teaching the Prince of Wales chemistry many years ago. On the same authority I may tell you that the Prince was well pleased with the effect which that instruction had on him. And I am sure you will take it as merely one of the many instances of the Prince's good judgment, that he on many occasions consults distinguished Fellows of our Society, and follows their advice.

The toast having been drunk with the usual honours, the President then proposed, "*The Jubilee of the Chemical Society*," in the following terms:—

There have been twenty-one Presidents of our Society, and I am happy to say nine of them are here to-night, but I doubt if any former President, living or dead, was ever placed in so embarrassing a position as I am at the present moment. I have a scientific Prime Minister on my right, a learned Attorney-General on my left, and over two hundred Fellows of our Society before me, all expecting an appropriate after-dinner speech, treating of the Jubilee of our Society, a history of fifty years' scientific progress, made entertaining, and delivered in fifteen minutes. I pray that, if I fail, you will, while condemning me, think of the difficulty of my position.

I would endeavour to sketch very briefly, and only in broad outline, one or two of the important changes and developments with which our Society has been intimately connected. We claim to be the oldest Chemical Society; and we claim that it was our Society which proved, fifty years ago, that Chemistry was even then a sufficiently important branch of science to be separated from other subjects, and to require a Society to itself. Following our example, France, Germany, America and Russia, have now established large societies, which devote themselves solely to chemical science, but all of them are of recent date as compared with our Society. Our Society had the good fortune to be born exactly at the right time, and as it grew and strengthened so did the work it had to accomplish increase. The chief cause at least of this increase of work was the enthusiasm for chemical study which Liebig was infusing into the whole of the scientific world. His great school at Giessen attracted students from all parts, and he communicated to them his own enthusiasm for investigation, and indicated the lines to be followed and the methods to be adopted. It is no exaggeration to say, that in the two hundred papers which he published, there are important discoveries in every department of chemistry.

This school of investigation was really a new feature in chemistry. Public laboratories did not exist in England at this time, and apparently it was but slowly that a clear knowledge of what was going on at Giessen reached this country. The older chemists thought Liebig revolutionary and unsound, but at last some of the younger men, more daring than the rest, ventured to Giessen, and the records of our Society bear evidence of the result: a new life was infused into chemistry in England. A scientific revolution occurred, and, like other revolutions, it was brought about by agitators—these young men who had been to Giessen—and if I read correctly the history of these times, the earliest and most active of the agitators was a student who had been on intimate terms with Liebig, and had become thoroughly imbued with his enthusiasm and love of science, and by name was Lyon Playfair; he was clearly the great scientific agitator of the time; I found this assertion on the records which he has left in the scientific journals of the age. He went to the North of England and agitated there; he told the calico printers of Manchester they did not understand their business, that they wasted their colours, and that economy and brilliancy of colour and material would be ensured by their studying Dalton's "Atomic Theory." If they did not at first think much of his reasoning, they were convinced by his experiments. Evidently he felt how important it was for this country that scientific principles should be more directly applied to new arts and manufactures, and that the study of chemistry as a pure science should be encouraged by every possible means. I say this, for I find recorded investigations by him on milk and butter, and that he is telling the "practical man" what to do. He became the great exponent in this country of Liebig's investigations in physiological and agricultural chemistry, translating and interpreting, with a lucidity worthy of his master, the great discoveries which were so rapidly being made at Giessen.

This was not however sufficient work to engross his whole time and energy, for in the very earliest days of our Society, linked with that great man Joule, he is carrying on a most elaborate and valuable series of researches on atomic volumes and specific gravities. In 1847 he publishes with Bunsen a memorable research on the gases from iron furnaces; and, still later, discovers a new class of salts, the nitroprussides. From the chair which I have the honour to occupy, he passes to Edinburgh, and worthily fills the historic chair of Chemistry in that University. Of late years, if I may trust other than scientific records, social questions have engaged his attention, and if we have lost him as a scientific investigator, the State has benefited by his ability and practical knowledge.

I do not know of anything which more clearly indicates that this Giessen spirit had reached England than the founding of the College of Chemistry, which took place in 1845. It certainly exercised a very important influence on the study of chemistry in this country; it became a small Giessen in Oxford Street. Still it was not an easy matter to establish such a college. Liebig himself was consulted, and gave us Hofmann. A better selection could not have been made; and I have only to appeal to any of his former pupils, and many are here to-night, to confirm my statement that the ability, energy and enthusiasm of Hofmann was but little, if any, less than that of his great master Liebig. It became now no longer compulsory on students of chemistry to seek instruction in other countries, and quickly Hofmann was surrounded by a band of able workers, who have proved themselves to be among the most distinguished of British chemists. Thus it came about that chemistry was vigorously studied in this country, and the number of investigators which formerly was so few now became many, and papers of interest and importance flowed into our Society, so that in 1847 the Journal, which had hitherto only appeared at long and irregular intervals, now became a Quarterly Journal issued with regularity.

While looking to Giessen as the immediate and most direct cause of the increase of chemical activity in this country, we must not be forgetful of what was going on elsewhere. Dumas, Laurent and Gerhardt were carrying on warm discussions with regard to the theory of types and the constitution of organic bodies; and we have to wait only a few years to find former Presidents of our Society among the most distinguished discoverers of the day. Brodie's paper on the constitution of fats and waxes, Frankland's papers on the isolation of organic radicles, and Williamson's brilliant work on the much discussed theory of etherification, are investigations which must always be looked on as among the most important of the time.

Our Society for several years had the good fortune of having Dr. Odling as a Secretary, and it was greatly owing to his ability and striking power of exposition, that the Society did such good service to science by affording opportunity and encouragement for discussing the fundamental changes which at this time were being introduced, and have since proved to be of such great value to chemistry.

I would also remind you that our Society has played a very important part in another history: it is that of a simple hydrocarbon which Faraday, who we are proud to remember was a Fellow of our Society, discovered as far back as 1825, and to which he gave the simple formula of C_2H. The compound seemed to have no very striking properties, and no one seems to have troubled themselves much about it till 1848, when Mansfield, in a remarkable paper, spoke well of it, and showed how it could be obtained in abundance from coal tar. Since then no substance has played a more distinguished part in scientific and in manufacturing chemistry than this hydrocarbon, benzene. Innumerable chemists have experimented with it; innumerable manufacturers have used it for all kinds of purposes, and although it has willingly adapted itself to many very trying circumstances, it has always maintained a very marked and decided character of its own: rather than be forced into union with other substances it will allow itself to be bit by bit torn to pieces, and its body built up of new material, so that its best friends can hardly recognise it. It has however already had a glorious life, and is still but young. It taught Kekulé to theorise, and he in return gave it a ring. If it has thus learnt how it can change away its body and appear with attributes so new, so brilliant in colour, and so useful, well may it be proud of its capabilities and of its numerous offspring, and I doubt not glories in the fact that great as these changes are which it can undergo, it has not lost its identity, but that a day of resurrection may occur when it may return along the path it came and be again the simple hydrocarbon benzene.

Every one knows that it was our former President, Dr. Perkin, who first showed how colours were to be won from coal tar, and that the discoverer of mauve led the way in the formation of an industry which is now gigantic in extent, and will ever be remarkable for the rapidity with which it grew. Till 1856 mauve did not exist, and it is to be remembered that its discovery arose from a purely scientific investigation. On looking back then fifty years, I think the chemist may be proud of the power he has gained over nature, how his careful study of the constitutions of compounds has enabled him to build them up from their constituent parts. In 1841 so little progress had synthetical chemistry then made, that vital force was still considered as necessary for the formation of all true animal and vegetable compounds, and my colleague, Sir W. Savory, tells me that he remembers hearing one of the founders of our Society teach his class that they might as well attempt to make the petal and perfume of a rose as to prepare an organic substance in the laboratory. How different is the story we have now to teach, for there hardly remains a single class of organic compounds which is not represented by substances which are purely laboratory products, and even the chemical manufacturer competes with nature, and distances her in cheap and rapid production of new compounds. This synthetical branch of our science gives a striking answer to the question, what has the chemist done during the last half century?

Turning for a moment from the constitution of compounds to the simpler substances, the elements, how greatly have our views changed with regard to them. When our Society began they were a number of disconnected forms of matter with, in many cases, only an approximate atomic weight, which suggests nothing except that the element should be decomposed and done away with as soon as possible, whereas now they have become a connected phalanx, related closely to one another, and indicating by their weight a personal history which we have only lately learnt to read—a history which is still only in its first edition. Among those who have specially helped to bring about these changes we claim Newlands as one of our Fellows, and Mendeléef as our friend and foreign member. It seems to give great antiquity to our Society that nearly twenty years had to elapse after its foundation before Kirchoff and Bunsen published their celebrated work on "Chemical Analysis by Spectrum Observations." When we consider what has arisen from this work, what a wonderful and fruitful means of extending our knowledge was here indicated, we feel that of all lines of research which have arisen during the life of our Society, none has led to such unexpected and remarkable results as Spectrum Analysis, and that it has been said with truth, that the spectroscope is the most important invention of the latter half of this century, and certainly the names of Crookes and Roscoe will always be intimately connected with that branch of science.

I feel that I cannot pass from these matters with only a simple mention of the name of Bunsen. If he had done nothing else than teach us spectrum analysis, great would be the debt of gratitude which chemists would owe to him, but every branch of our science has felt his power, and has benefited by his discoveries. The earliest volumes of our transactions contain the records of his work on Cakodyle, a masterpiece of research. The investigation on the gases from iron furnaces before alluded to became the basis of exact gas analysis. Mineralogical and analytical chemistry have received most important extensions and improvements from him, and in later years we owe him not only spectrum analysis, but much other valuable work in physical chemistry. We claim him as one of the earliest of our foreign members, and there is an interesting note in the record of the proceedings of our Society for 19th April, 1842: it is that Dr. Bunsen's new galvanic arrangement was exhibited and described. We chemists gladly share spectrum analysis with the physicist; it is a field from which so much is to be gleaned that we must work together shoulder to shoulder; and as in former times paucity of knowledge joined in the same society physics and chemistry, and the first increase of knowledge separated them, so now does a still greater increase in our knowledge bring them into yet closer connection, and all hard lines of demarcation fade away.

With regard to the work of the present day, the dominant feeling is the impossibility of keeping abreast with the times, and of following and appreciating the vast amount of work which is every day being accomplished. So much crowds upon the student, that for a moment he may sigh for the placid and comparatively uneventful life of fifty years ago; still who would really desire to go back to a time when a comprehensive account of chemistry could be contained in a couple of volumes; when nature had the sole prerogative of making organic substances, and when only coarser methods of investigation existed. A Jubilee does this good: it makes us at least for a moment look back and see what has been accomplished, and along what lines our labour has been most fruitful. How little could the twenty-five chemists who founded this Society fifty years ago, have imagined what our knowledge of to-day would be, and to-day we are equally unable to predict the chemistry of fifty years to come; but what we can with certainty predict is that great and rapid as the progress of our science has been during the last half century, still more rapid and still more important will be its progress in the time to come.

The MARQUIS of SALISBURY then proposed, "*Prosperity to the Chemical Society*," coupled with the name of the Right Hon. Sir Lyon Playfair. His Lordship said:—

I have been, though most unworthy, selected to propose this toast. In vain I pleaded that it would be better in the hands of somebody who knew something about the subject, but those to whom I pleaded were hard hearted and would hear no excuse. I must therefore proceed, hoping that my distinguished friend who sits next me [Sir Lyon Playfair] will supply that element of knowledge which perhaps you will find missing on the present occasion. What naturally strikes me is the importance—the enormous importance—of the science which you cultivate to the community as a whole. Some hundred years ago, the President of a celebrated tribunal, who was a man of rather advanced opinions, informed Lavoisier that a Republic had no need of chemists. But though a man of advanced opinions he was behind his age. It was the beginning of a time when chemistry more and more, as each decade rolled by, asserted its vital importance to every class and every interest of every community in the world. I thought—if it is possible to pass any criticism upon the learned and able and most interesting discourse to which we have just listened—I thought that our President was a little too apologetic for chemistry in the early part of the century. Annals which contain the names of Davy and Faraday have no reason to be ashamed. But from my point of view—from the social point of view—chemistry undoubtedly has this claim, that it is one of the most powerful agents that has moved the world. But that is common-place. There is no need for me to tell you what Roger Bacon and Volta have done in the history of the world. But it seems to me that as an educational instrument playing upon the minds of the community it is one of the most valuable that we possess, because more than any other science it is brought into close communion with pure, real fact. Science is a word that is elastic; and in our days we hear many definitions of it. We hear something of the scientific imagination, a most valuable quality, which I would be the last to depreciate; only I think that, like many valuable concentrated essences, it ought to be indulged in only in small quantities. When there is a proportion in its admixture similar to that which Falstaff observed in his mixture of bread and sack, you feel a desire for more of the solid nutriment, and less of the stimulating spirit. But chemistry has an enormous deal of bread and very little sack; it has a large amount of solid fact, and comparatively little of scientific imagination. For the chemist can always be certain of his discoveries; all he has to do is to repeat the experiment, and there is no doubt of his discovery. But when a man discovers what happened fifty millions of years ago, it is not easy to ascertain the exact accuracy of his discovery: and when he discovers all that is going on fifty billions of miles from us, although there may be much probability in what he teaches, still its certainty is not the same in character with the certainty of the man who can go back to his laboratory and repeat the experiment which he has made. I should say that astronomy is largely composed of the science of things as they probably are; geology consists mainly of the science of things as they probably were a long time ago; but chemistry is the science of things as they actually are at the present time. Now the application of a science of that kind to the national mind by constant familiarity with its teachings, by constant knowledge of its achievements, is of the highest human value. It teaches the mind the immortal difference between guessing and knowing. And the farther chemistry goes on, and the more it asserts the superiority of its ways and canons in all departments of human thought, so far shall we drive guessing to a distance and be satisfied with nothing but what we can know.

But my task is to say something about the Chemical Society, and perhaps the most suitable course I can pursue, following the Chairman, is to take the other side from what he took, because that will at least give variety to our proceedings, and will also give you an opportunity of testing the superior value of his remarks. Now he dilated much, and most fitly and justly, upon the enormous value from a material point of view which chemistry has been to society in the rapid development which has marked the present reign. I am far from disputing its splendid services to the people of all Europe during that period. But I do not think that it is for the purpose of securing those services that this Society exists. My Right Honourable Friend Sir Lyon Playfair did quite right to go to Manchester and stir them up there and teach them their business, and he was a benefactor of mankind in doing so. But when that impulse had been given, you may trust the self interest of mankind to be sure that the material interests of chemistry will not suffer in the race. But there are other aspects of chemisty, higher aspects, which it is the function of a Society such as this to protect. It is your duty to keep up its intellectual spirit, to teach that not only those things which are demanded by the interests and industries of this country shall be cultivated, but those things also which carry us nearer to the essences of truth. I am not going to carry that pretension too far. We are beings of a mixed character, and our pursuits must bear a trace of the mixture which we give to them. I am not going to imitate the Oxford Professor of my youth, who said that the one thing he valued in the system of quaternions was the certainty that it could never be defiled by any utilitarian application. But still you will observe that the industrial part of chemistry has been that which has received the highest development. Our distinguished President gave us a touching and pathetic history of what I may call the loves and the vicissitudes of benzene. But why is benzene so famous? Why is she lifted up among so many of her compeers who appear in the chemical lists with formulas as imposing and with histories quite as difficult to follow? It is because the products drawn from benzene, or at least from coal-tar, have had the good fortune to produce colours which catch the female eye. Therefore it is that benzene is famous. But I plead for her humbler sisters who have produced no colours, but the study of whom may yet be steps to the discovery of mighty laws and phenomena which may interest the world. And this, in my humble judgment, is one of the advantages of this Society, that it tends by bringing men of different researches and pursuits and different intellectual qualifications together, to prevent the science from becoming, as it has been called, the mere "handmaid of industry," and ensures that its higher claims shall secure recognition from its votaries.

And now I must say a word about the future. Our President has prophesied great things, and is imbued with a just confidence as to the future that awaits us. I believe that there is plenty of room for discovery in the future, and that our forefathers have by no means monopolized the glory that our descendants may win. I rather feel as an outsider—looking at what science is and has achieved—that it is like an Alpine prospect in the early morning, when you see here and there a few peaks bathed in light, but separated from each other by depths and chasms of the unknown. And that is what we all of us feel who look with very little skill or very superficially at the history of science in our own days. It seems evident to me that chemistry is entering upon a new stage, in which it may win splendid victories and learn things of which our forefathers never dreamed. Perhaps it will be best to describe the difference between chemistry as it is now and as it was when I was a young man. In those days the atom reigned supreme; but now the atom has been dethroned, and the bacillus reigns in its stead. But that means that you are approaching with more and more chance of solving it the vast problem that separates organic and inorganic nature. Your President has claimed that nature has no longer the monopoly of creating organic substances. That is true; but nature does still a great many things that you cannot do. And still less can you tell me the reason of the vast difference between organic and inorganic nature. You are all of you familiar with the tremendous vegetable poisons, which produce the most fearful and astounding effects upon the human frame; but if I asked you to explain their effects you would show me formulæ showing that they consisted of the most vulgar and commonplace elements, but giving no explanation of the tremendous powers they assume. I am an agriculturist, and a disciple of Dr. Gilbert and others. We compass sea and land in order to get manure to make our products grow. And what is manure? It is an impure form of the carbon and nitrogen in which those products are bathed in the circumambient air every day of their lives. I trust that the chemistry of the future may tell us why we have to go to Chili, and why we cannot take them from the air around us. I believe that these and other problems are now approaching nearer to their solution than ever they were before, because we have seen chemistry grapple more closely with the mysteries which separate organic and inorganic life. I believe that in the future, some fifty years hence it may be, in this or some other room, the President of the Chemical Society of that day will congratulate the Associates of that Society on victories and on achievements of which we cannot now dream the nature. And I am quite sure that when he does so he will attribute no small share of that progress to the existence and labours of the Chemical Society.

Sir Lyon Playfair, in responding, said:—

I quite understand that the reason for selecting me for the honour of acknowledging the toast of "The Chemical Society," is the privilege of old age, and of my having been one of its first members. But I am sure that you will agree with me, that we owe a debt of gratitude to the noble Marquis. He has, as Prime Minister, to bear the weight and responsibility of this great empire, and it is a proud fact that he has recognised so much the influence and the benefits of chemistry as to honour us by appearing here this evening to propose this toast. If Lord Salisbury had not unfortunately become a great statesman, and had followed the inclination of his own mind, he would have been a great chemist. The education of the upper classes in this country has for a long time been too restricted. Science has not formed that element in education which is so necessary for its progress, and I trust now that the universities, and the various institutions throughout the country, which are doing so much for the advancement of science, will produce great results in the future. But we cannot but regret that the education of the past has not given to us that amount of hereditary talent which our old families possess, and which they have generally given to the benefit of the State. It must be recollected, however, that we have had in the past several instances of descendants of noble families becoming great scientists. We all remember that the famous Boyle was called "the father of modern chemistry and brother of the Earl of Cork";

and he showed us in his work that we must not trust to authority, but must use acumen as a means of demonstration in all questions brought before us. It was a great delight to me to see in the exhibition at the Goldsmiths' Hall yesterday, those interesting instruments which Boyle used in his researches. There was another member of a noble family whom we are always glad to claim as a master among chemists: I mean Cavendish, who discovered the composition of water. He did much more than that, however, for he taught us that all experiments should be made with absolute accuracy as regards weight and measure. But what am I to say in answer to this toast? It is a large and important subject. I recollect it fifty years ago. I am glad to say that not many of you have such an antique recollection of our science as that. The changes that have taken place in the science during that time have been vast indeed. Of course, our main object is to study chemical affinity, to understand the relations of the elements, and the families into which they group. One of the results of fifty years' advance in chemistry is that you have introduced a great deal of profligacy into the elements. When I was young we always taught that oxygen was the universal lover, and joined freely with almost every body, while nitrogen was a confirmed bachelor, and could only be put into union under great difficulty. But now, how completely this is all changed. Oxygen is now a respectable bigamist; while nitrogen, which acts so meekly in the atmosphere, when it gets out of it becomes a terrible polygamist, for it takes three and sometimes even five conjugates at a time, and produces bodies of a remarkable character. I have two friends, one of whom, Hofmann, is not here, but the other, Dr. Perkin, is, and they have done very much to corrupt the morality of the nitrogen of my youth. They have not only taught us what it can do in the way of conjugates, but have shown it to be a most fickle body, from whom you may take one conjugate and readily replace it by another, and thus produce most remarkable compounds. Sometimes they carried their efforts so far that nitrogen became apparently ashamed of itself, and blushed as rosanilin or became scarlet as magenta, and even, when moved by strong emotion, became purple as mauve. Occasionally chemists have tried to get nitrogen back to good habits, to be content with more simple conjugates, and to be content with fewer elements in combination. But see how it revenges itself. Curtius and Radenhausen have lately described a most extraordinary compound, azoimide, in which three atoms of nitrogen unite with one atom of hydrogen. This was most unfair, for three atoms of nitrogen ought to have at least nine atoms of hydrogen. But they compelled it to do with one, and what is the consequence? They had to make it take the form of a liquid, and when in that condition it exploded with such violence as to break every glass vessel in the laboratory, and I am sorry to say injure one of the persons who tried to force it into this unnatural union. I have therefore some right to complain that the respectable nitrogen of my youth has become a most profligate element under your tuition. And what shall I say of carbon? How different was the carbon of 1841 from the carbon which we now know. At that time we knew of course that it was contained in all organic bodies, and Liebig had in a way determined the constitution of the bodies into which it entered, but then we did not require to puzzle ourselves with those fearful complications of diagrams and graphic methods by which we now represent the affinity of carbon for various substances. These methods are very difficult for the pupil to follow, and I am sure that if Cullen, who invented the system of chemical diagrams, could come to life again, and see the wonderful methods by which chemical combinations are now represented, he would ask to go back to his grave again and rest. Chemical substances now have such astounding properties. If there are two bodies which I thought I knew most thoroughly they are the quiet and respectable compounds called in my old professional days carbonic oxide and carbonic acid. But the respectable quiet carbonic oxide of 1841 was shown the other day by Mond to run away with nickel in the state of a gas—a quiet stable element like nickel! And then when it was followed in hot pursuit by raising the temperature a few degrees, it dropped the nickel like a hot potato. Well, I am speaking of the changes which strike a man looking backwards, and comparing the chemistry of his day with that of the present time. But though I have been chaffing in an after-dinner speech, do not think that I do not appreciate the vast progress that has been made in the discoveries relating to the valency of the elements. That has been the great distinguishing feature of modern chemistry. There is a great future before the chemistry of this country; and when the centenary of this Society takes place, the members will look back not without respect to the efforts we made in the first fifty years of the Society's existence. In conclusion, I must again thank Lord Salisbury for having honoured us on this occasion in the midst of his great and incessant duties, to show his appreciation of a science in which he has often laboured, and the value and importance of which he has recognised in the excellent speech before us.

Sir Richard Webster (speaking as President of the Society of Arts) then proposed, "*Science and Industry*," coupled with the name of Sir Henry Roscoe. In doing so, he said:—

I thank my friend Dr. Armstrong very sincerely for having preserved my incognito so long by the way in which my name as the proposer of this toast has been placed. But I fear that it must have been a disappointment to many chemists to find that the unfortunate individual who was to follow three such speeches as we have listened to, was a lawyer, with no claim to any chemical or technical knowledge. I admit that it is a great satisfaction to the Society of which, for the time being, I am the representative, to be allowed to take part in these proceedings, and to join in the congratulations given to the Chemical Society. We remember with some pride that it was in the rooms of the Society of Arts that the Fellows of the Chemical Society first met together, and in the address which I had the pleasure of delivering last November, I predicted that the prosperity and increase of the Society was such that it would overflow the rooms which we had ready for its reception in John Street, and would require a larger habitation in which to assemble. I have one qualification for proposing the toast entrusted to my care, and it is this, that having been doomed to represent in language of my own the ideas of other people, I have a most passionate admiration for original research. Therefore I can honestly, and with enthusiasm, propose the toast of, "Science and Industry," as to which I wish to address to you a few words. There is one name closely connected with my profession which I should like to mention in connection with this toast, because it is a name which always commands respect in this Society: I refer to Sir William Grove, one of the five remaining Original Fellows of the Society. I have known him from my childhood, have read his works, and have had personal experience of his great scientific knowledge. It is therefore a matter of congratulation to me that I am permitted to remind you of his name in connection with the work of the Society, he having been among the pioneers of its formation. We have heard most interesting and instructive speeches from the President, from Lord Salisbury, and from Sir Lyon Playfair, and it would be utterly impossible for me to attempt, in connection with this toast, to add anything to the stores of scientific knowledge that were conveyed in those speeches. No, gentlemen, it occurs to me that I had better confine myself to a more humble theme, and tell you from personal experience of the way in which scientific knowledge sometimes affects scientific lawyers. I am able to give you from my experience an instance of the effect of scientific knowledge, and its absence, upon a very distinguished man; and though the story is absolutely true, and there are witnesses present who could attest its correctness, it has never been before referred to. Many years ago, when a very young man, I was retained by a rash client to endeavour to persuade one of our greatest Chancellors, Lord Cairns, to grant a patent in connection with some red dyes of diabolical names. I had a moderate fee, and I endeavoured for several days and nights to master the subject. I was getting haggard, and the day of hearing was approaching. A distinguished chemist who sits not far from me had the misfortune to know that his case was going to be represented by this young counsel. He came to my chambers, and found me hopelessly ignorant. What did he do? With the benevolent and kindly feeling which always characterises the actions of chemists, he sat down and dictated to me exactly what I was to say to the Lord Chancellor. I remember well that his lesson lasted about an hour and a half. I hope that my friend, who well remembers the incident, and who is not looking at me now, will not reveal any of the secrets of the prison house. At the end of the hour I said: "Doctor, I am saturated; if a single drop more of this dye enters into my constitution, there will be some chemical reaction." Being a humane man, he appreciated the position. He put me into a four-wheeled cab; I sat on the back seat, he on the front one, and as we went along he closely watched me to see if there were any signs of effervescence beyond the gentle distillation of a few drops of perspiration. Well, we went down before the great Lord Chancellor, and he listened to me with a countenance of astonishment, but with that kindness and that marvellous condescension which I shall remember to my last day, while I delivered a most admirable lecture before him. I do not remember much about it now, for, as a rule, ites and ets and ates jumble themselves together in my head, but when I tell you that I spoke for twenty minutes upon the isomeric changes of the compounds of the dinaphthylaminealphabeta-acids, I think you will be of opinion that I did credit to my instructor. But, gentlemen, I have not told you of this incident, gratifying as it is to me, for the purpose of anything in connection with my career, but to show the effect of that lecture upon the Lord Chancellor. Having gazed at me with astonishment, he said to me — I believe I can quote his words exactly — "Mr. Webster, your client may have his patent. But I can only trust that if any litigation should arise respecting the matter, the tribunal before which it is conducted will retain its reason at least until the end of the proceedings." Gentlemen, not one word of that incident is romance. It is an incident in my career as a young barrister, and will enable you to understand why I have such admiration for science. Now, gentlemen, I have to couple with the toast the name of a distinguished past President, Sir Henry Roscoe. Every one must of course have admired the way in which the Prime Minister called your attention to what I may call the original work of such a Society as this, as separate from its useful work in connection with the industries of the country. But I cannot help reminding you of that which has always struck me as being very important, whether we are dealing with the dye industries or any other. We know that the chemist is absolutely essential, and is the only man who can guide the manufacturer to the successful production of the derivatives he desires to get. If I turn to engineering, and if such an eminent engineer as my friend who sits next me [Sir J. Coode] desires to know the quality of the steel and iron he intends to use, he goes to the chemist. And if I refer to electricity, there are many in this room who know how the researches of the chemist go hand in hand with those of the electrician. In this connection I ask you to honour the name of Sir Henry Roscoe. For he can devote himself when necessary to original research, and yet at the same time can bring to bear in practical utility the researches he has pursued in connection with education in manufacturing industries, and the practical utilisation of the knowledge he has gained at Owens College, Manchester. The manufacturers of the North know his services, and we in the South are glad to recognise his great position. I am proud therefore to couple his name with the toast. I have a secret to tell you concerning him. It is very seldom that I tell secrets, but I cannot retain this one long, and if I do not tell it now it will leak out in some other channels. Sir Henry Roscoe has not finished his scientific career. He is about to embark on an investigation of the greatest interest and difficulty, and some danger. You are probably aware that some interesting attempts have been made to exclude fogs from the House of Commons. I wish it was only fogs that had to be excluded. But in the course of these investigations I am told that there is supposed to have been discovered a remarkable collection of microbes. To the determination of the number, genus and character of these microbes, and the dangers which the members are likely to undergo by their intrusion into the House, Sir Henry Roscoe is going to devote his personal attention. You will honour him additionally on this account, knowing that few if any are better qualified to pursue that interesting occupation.

Sir Henry Roscoe, in responding, said: The task which I have to perform in returning thanks or responding to the toast of "Science and Industry," so admirably proposed by the Attorney-General, who appeared rather in his scientific than in his legal character, is one of some difficulty, and one which might occupy a very great length of time. For it seems to me that it might entail a discourse on the progress of civilisation during the last fifty years. For has not science during that time remodelled entirely every condition of life, while man himself remains much as he was? We read that Horace, when advised by his physician to take the waters of Clusium (as any dyspeptic might be advised to-day by his physician), wrote to ask about the water supply of the place, and having, I presume, received satisfactory information (especially with regard to the presence of those microbes to which my Right Hon. friend has just alluded), went to the baths, as we do now.

But science has annihilated both space and time as regards communication between man and man. How insignificant do political changes appear compared with the changes which science has wrought in the world! Look where we will, in every department of human knowledge and activity, in all climes, and throughout all classes of society, we see the beneficent action of science. There is not an industry which does not owe its success—nay, even its existence—to the application of scientific principles. For after all, science is nothing more than organised common sense. It is needless on the present occasion, and in the midst of so many Fellows of the Society, to enlarge upon the varied benefits which chemistry has conferred upon industry. We know that those benefits are widely acknowledged, and that as the years roll on the benefits which industry will receive from chemistry will be greater, and will be even more generally felt and acknowledged. But how is this union of science and industry, of theory and practice, to be made more fruitful? Only, as Lord Salisbury has told us, through a more thorough system of scientific instruction, and an appreciation of the fact by all classes, that practice without science and without theory is unpractical, and that industrial progress without science is impossible. England has happily become at length aware of this great fact. The word technical education has become world wide; and we see the necessity of scientific education in order that we may preserve our national supremacy. But public attention has yet to be awakened to the importance, the necessity, of fostering and stimulating the higher stages of science. That the master should be highly educated, that he should be perfectly abreast of the progress of the science upon which his industry depends, is more important than that the artizan or workman should know the principles of the art which he practises. It is to the master rather than to the man that we must look for those improvements and discoveries by which alone industry can be rendered permanent. It is the pride of such societies as our own to develop this higher scientific training by the encouragement of original investigation. To enlarge the boundaries of our knowledge of nature is the first step towards rendering the appreciation of that knowledge available for the practical benefit of mankind and of our country. Where would chemical industry now stand if it had not been for the labours of Dalton? if he had not pointed out the laws upon which chemical combination depends; if Liebig had not laid clearly before us the principles on which organic chemistry is founded? Could then Perkin have established the coal tar colour industry? Could Graebe and Liebermann have discovered alizarin, Bayer artificial indigo, or Fischer prepared sugar in his laboratory, if it had not been that the ground had been prepared for them by those who had investigated the theory more thoroughly? Gentlemen, there is no fact, however unimportant apparently, which is recorded in the transactions of our Society which may not become at some day or other a starting point for the application of science to industrial improvements. Of this we have abundant evidence in the past history of our science. Well aware then that the progress of the chemical industries, so important to our national welfare, depends on the advances made in the regions of pure science, the Fellows of the Society in whose name I speak look back with satisfaction to the work which they have done, and with confidence to that which still lies before them.

The next toast, "*The Delegates of Foreign Chemical Societies*," coupled with the names of M. Gautier and Dr. Will, was proposed by PROFESSOR FRANKLAND, who said :—

I have been asked to propose the next toast, and I can only regret that it has not fallen into hands which would have treated it better, and into a throat less affected by this London fog. However, I have no doubt that the toast which I have to submit to you will be most cordially received by every scientific worker in this room. It is the health of the representatives of Foreign Chemical Societies whom we have the great gratification of seeing take part in these Jubilee festivities. The Chemical Society of London, whilst justly proud of the position of *alma mater* to all the Chemical Societies of the world, can hardly perhaps claim to have exercised much parental care even during the infancy of her offspring. They did not in fact require it. They started at once into the state of full manhood, which is said to have become the fashion amongst the children of the present age. But whilst she was not required in their rearing, the Chemical Society of London has never ceased to take interest in their progress. Her eldest child, the Chemical Society of Paris, has attained the respectable age of thirty-three years, whilst her German sister, of which I have the privilege to be an honorary member, has not yet seen, I believe, five-and-twenty summers. I am not sure whether this exceedingly vigorous child was not smuggled into Germany by our friend Hofmann, whose absence we so much deplore. At all events the circumstances are very suspicious. You know that Professor Hofmann is a past President of the parent Society. You know that he left this country in the year 1865; that he was one of the most active members of our Society during the twenty years he spent in London; and we first hear of the German Chemical Society in the following year, and he was the first President. Were he now here, we should probably make him confess. Then, beside those two societies which have sent representatives to us this evening, we have also a delegate from the Verein zur Wahrung chemischer Industrien in Germany, and we have also received messages of congratulation from many other Societies—from the Physico-Chemical Society of St. Petersburg, and from the Chemical Societies of Vienna, Frankfurt, and Wurtzburg, in Germany; while you have heard here the telegram sent by the American Chemical Society. In the progress of all these Societies we take a deep interest; and the papers read at their meetings, as you know, are abstracted, and faithfully placed before our members in our Journal. At this inclement season, and during the prevalence of our world-renowned fog, it was scarcely expected that many—even if any—delegates would be sent to us. But we are honoured by the presence of representatives, as I have said, from three of them. From the Chemical Society of Paris we have M. Gautier, M. Combes, M. Haller, and the Messieurs de Clermont; and I think you will agree with me that the Chemical Society of Paris has done its duty. From the Deutsche chemische Gesellschaft we have Dr. Will and Victor Meyer, and from the Verein zur Wahrung chemischer Industrien in Germany we have Dr. Holtz. It would be impossible at this late hour to enter upon any account of the chemical work which these distinguished men have done. It is known, at any rate the bulk of it is known, to most of you. You all know Gautier's researches on the nitriles, and the ptomaïnes. You know Dr. Will's investigations of the derivatives of gallic acid; I fear that his energies will now be directed to the investigation of smokeless powder, but let us hope that it will be for peaceful purposes. Of Professor Meyer's work I need not speak. You all know his beautiful nitro-compounds of the alcohol radicles, and his process for determining the vapour density of gases and liquids. But the operations of the Society represented by Dr. Holtz are not so well known. I can tell you at all events one of the effects which have followed from the operations of this Verein. Thirty years ago the value of the chemicals annually exported from Germany amounted to between two and three million marks; now the value amounts to 238 million marks. Now I fear Lord Salisbury will deprecate this commercial aspect of chemistry. But nevertheless I venture to think that he will approve my advising our chemical manufacturers to take note of it.

M. Gautier responded as follows:—

Monsieur le Président, my Lord, Messieurs—

Lorsqu'il y a trente années, un peu plus peut-être, je commençais à étudier, avec M. Chancel, le successeur de Gerhardt à Montpellier la chimie de ce temps, les noms de Davy, Graham, Dumas, Liebig, Berzelius, revenaient sans cesse, et l'on nous apprenait alors comme des nouveautés, devenues classiques, les belles recherches de Williamson sur l'éthérification et de M. Frankland sur les composés organo-métalliques. J'étais loin de m'attendre alors à l'honneur qui m'est échu ce soir de répondre à M. Frankland, et de lui répondre dans son pays même, dans cette hospitalière et heureuse Angleterre : heureuse de ses libertés et de ses progrès, et qui peut être fière entre autres choses de pouvoir compter parmi ses savants des hommes tel que le noble lord qui a bien voulu assister à cette fête, Lord Rayleigh et le duc d'Argyll lui-même.

A cet honneur très grand, et dont je rapporte tout le prix à mon pays et au vôtre, permettez que je réponde par un vœu : celui de pouvoir nous retrouver tous, tous ceux qui sont autour de cette table, et sans qu'il en manque un seul, nous retrouver à Paris lorsque nous célébrerons à notre tour le cinquantenaire de la fondation de notre Société chimique. Elle dâte de 1858, et par consequent c'est dix-sept années au moins que je demande au ciel qu'il soit accordé à chacun de nous. Nul ne me contredira je l'espère. Nous essayerons alors de vous recevoir avec les mêmes sentiments de cordialité et d'hospitalité.

Messieurs, la science, qu'elle le veuille ou non, poursuit deux buts, et arrive à deux résultats distincts.

Elle étudie les faits, et essaye d'en deviner les lois, de les généraliser, d'en tirer les applications nécessaires au bien-être de la communauté des hommes ; c'est là ce qui constitue le fond matériel et scientifique de notre civilisation moderne.

Mais la science est aussi un moyen indirect de pacification et d'union entre les hommes.

Des fêtes telles que celle-ci en sont la preuve sensible. Elles permettent de tendre la main à ceux qui resteraient des indifférents ou des émules, elle fait se connaître et s'estimer personnellement des hommes qu'auraient restés à certains égards peut-être des indifférents.

Par nos publications, nos ouvrages, nos cours publics, nous possédons un nouveau moyen d'être utiles à ce même point de vue et de jouer un rôle de pacification. De ce moyen, croyez-le, les savants français ne s'en font pas faute. Je vous ai dit hier mon sentiment en ce qui touche vos compatriotes. Qu'il me soit permis, puisque l'occasion s'en présente, de le dire aussi aux savants allemands. Nous professons tous le culte scientifique qui est dû à leur travaux, et nous rendons justice à cette savante et travailleuse Allemagne, des idées de qui nous sommes souvent tributaires.

C'est ainsi que la science permet peu-à-peu de faire entrer la pacification dans les esprits. Les peuples peuvent échanger leurs obus sur les champs de bataille, ils ne peuvent pas ne pas échanger aussi leurs idées, et de ce dernier échange naît tôt ou tard l'estime mutuelle qui précédera, je l'espère, bientôt peut-être, le règne de la raison et de l'équité.

Messieurs, l'on a dit que la science n'a pas de patrie ; c'est dans ce sens qu'il faut l'entendre, et c'est dans cette pensée que sous l'égide de l'hospitalité anglaise, et à propos de cette fête pacifique, je lève mon verre, et bois à l'union des hommes de bonne volonté de tous les pays pour la science et pour le bien général.

Translation.

When thirty years or so ago I commenced the study of chemistry under M. Chancel, the successor of Gerhardt at Montpellier, the names of Davy, Graham, Dumas, Liebig, and Berzelius occurred over and over again, and the beautiful researches of Williamson on etherification and of Frankland on organo-metallic compounds, which have since become classical, were then brought under our notice as novelties. Little did I then expect that the honour would fall to me this evening of replying to Dr. Frankland, and of replying to him in his own country, in this hospitable and happy England: happy in its liberty and in its progress, and justly proud among other things that it is able to count among its men of science men like the noble lord who has been so good as to assist at this celebration, Lord Rayleigh, and the Duke of Argyll.

In acknowledgment of this great honour, which I owe entirely to my country and yours, allow me to reply by expressing a wish that all, without exception, who are collected around this table may meet in Paris when we in our turn celebrate the jubilee of our Society. It dates from 1858, and consequently I ask heaven to grant each of us at least seventeen years of life. No one I think will disagree with me. We will then endeavour to receive you with the same sentiments of cordiality and hospitality.

Gentlemen, science, whether she wish it or no, pursues two ends and arrives at two distinct results. She studies facts, and essays to divine the laws underlying them, to generalise from them, and to apply them to the welfare of the community. It is this which constitutes the material and scientific basis of our modern civilisation.

But science is also an indirect means of promoting peace and union among nations. Celebrations such as the present are the proof of this. They offer the opportunity of reaching out the hand to those who have heretofore been indifferent if not rivals, and they enable men to become acquainted and to personally esteem one another who would otherwise perhaps have remained indifferent.

We have, from the same point of view, by our publications, our books, and our public lectures a new means of being useful and of playing the part of peacemakers. French men of science, believe me, will not fail to make use of this. I told you yesterday of my views regarding your countrymen. Allow me, as the opportunity now offers, also to express them to German men of science. We all pay the respect to their labours which they deserve, and we render justice to the learned and laborious German of whose ideas we often avail ourselves.

Thus it is that science little by little brings into the mind the idea of peace, for although nations may exchange bullets on the field of battle, they cannot resist also exchanging ideas; and from this latter exchange, sooner or later, will arise that mutual esteem which, let us hope at no distant date, will precede the reign of reason and equity.

Gentlemen, it has been said that science knows no country; this is what the saying means; and with this idea, under the ægis of English hospitality, and on the occasion of this pacific feast, I raise my glass and drink to the union of men of goodwill of all nations for the advancement of science and for the general good.

Dr. WILL next spoke in the following terms:—

Herr Praesident, my Lords, meine Herren:—

Gestatten Sie, dass Ich zunächst Herrn Prof. Frankland meinen herzlichsten Dank ausspreche für die freundlichen Worte mit welchen er uns soeben begrüsst hat. Es ist ein schönes Vorrecht der Wissenschaft, dass ihre Arbeit und ihre Erfolge international sind, dass die Grenzen sprachlich oder politisch getrennter Länder für sie keine Schranken bilden. Wo immer auf diesem Gebiete gesät und geerntet wird, die Früchte sind für alle ohne Einschränkung zugänglich; so sind die zahlreichen neuen Gebiete des Wissens welche in unermüdlicher Forschung seit fünfzig Jahren von den Mitgliedern der Chemical Society erschlossen worden sind ein unschätzbares Gemeingut der wissenschaftlichen Welt aller Nationen geworden. Da ist es denn natürlich, dass an dem Jubelfeste, welches Ihre Gesellschaft nach fünfzigjährigem Bestehen feiert, nicht nur die Chemiker dieses Landes, sondern auch die Forscher der übrigen Nationen lebhaftes Interesse zeigen, dass sie von allen Seiten herbeigeeilt sind um dankbar ihre Glückwünsche darzubringen. Wir, Herr Holtz und Ich sind von dem Vorstand der deutschen chemischen Gesellschaft hierhergesandt, deren Praesident, Aug. Kekulé, und deren Vice-Praesident, A. W. von Hofmann, durch unaufschiebbare Berufspflichten zu ihren Bedauern verhindert sind heute hier zu erscheinen. Beide, zumal Ihr einstiger Praesident, A. W. von Hofmann, haben uns aufgetragen Ihnen die herzlichsten Grüsse zu übermitteln. Die deutsche chemische Gesellschaft und die Chemical Society of London sind durch mannigfache Freundschaftsbande an einander geknüpft. Unsere Gesellschaft ist stolz darauf eine namhafte Anzahl von Mitgliedern der Chemical Society unter unsere Ehrenmitglieder und Mitglieder zählen zu dürfen. Ich möchte der Gesinnung der deutschen Chemiker gegenüber ihren englischen Collegen in dem

Wunsche Ausdruck geben, dass das freundschaftliche Verhältniss beider Gesellschaften fortdauern möge und dass Ihre Gesellschaft weiter blühen und wachsen möge zum Wohle unserer Wissenschaft.

Translation.

Mr. President, my lords and gentlemen :—

Allow me first to thank Professor Frankland most heartily for the friendly words of greeting which he has just addressed to us. It is a true privilege of science that its labours and their fruits are international; that it is in no way limited by the frontiers of countries separated by language or politically: wherever in its territory seed is sown and the harvest is gathered, the crop is at the disposal of all without restriction. The numerous new regions of knowledge which have been opened up by the researches of indefatigable workers among the members of the Chemical Society during the past fifty years are shared as an invaluable possession by the scientific world at large; hence it is a matter of course that on the occasion of the Jubilee which your Society now celebrates after fifty years of existence, not only the chemists of this country but also those of other nations are interested, and have hastened here from all quarters to gratefully offer their congratulations. We—Dr. Holtz and I—are sent here by the Council of the German Chemical Society, whose President, Aug. Kekulé, and Vice-President, A. W. von Hofmann, are, to their regret, prevented by unavoidable official duties from attending to-day. Both, especially your former President, von Hofmann, have commissioned us to convey to you their most hearty greetings. The German Chemical Society, and the Chemical Society of London, are united by many bands of friendship. Our Society is proud to number many who are Fellows of the Chemical Society among its Honorary and Ordinary Members. Allow me to give expression to the feeling which animates German chemists towards their English colleagues, by wishing that the friendly relations of the two societies may continue, and that your Society may flourish and grow for the benefit of our science.

Sir Frederick Abel then proposed: "*Our Foreign Members and our Visitors*," coupled with the names of Professor Victor Meyer and Sir Andrew Clark, Bart., in the following terms :—

It is some little consolation to me at this period of the evening, when the company is highly supersaturated with speeches, to feel that the toast intrusted to me presents some little originality, and some little indication also of the application by our learned secretaries of recent scientific researches to the construction of toasts. For mine is a diad toast, since I have not only to deal with our foreign members, but with our visitors also. Now, gentlemen, it is one of the greatest sources of pride to the Chemical Society, that but few years elapsed before its work became so thoroughly known and respected in neighbouring countries that eminent men were anxious to become associated with us; and it was not long before we found that the desire to be an honorary Fellow or Foreign Member of the Chemical Society was ardently entertained by the most prominent workers in chemical science abroad. For many years we have numbered among our Foreign Members men most eminent in chemical work. We regret greatly that circumstances have prevented many of our men of science, whom we delight in as fellow members, from attending this gathering and this celebration of our Jubilee. But we have a worthy representative of the work of our Foreign Fellows—a man whose work and teachings it will always be our delight to follow—I refer to Victor Meyer. Turning to the second part of my toast, I had prepared, shortly before coming here, a most eloquent oration on the application of recent scientific research to the advancement of medicine, thinking that I should see the eminent President of the Royal College of Physicians on the left of the President, ready to respond. But though I deeply regret his absence, I am not sorry that the few words I have to say with regard to the second portion of the toast are thus diverted into another channel. I think you will all agree with me that one of the greatest encouragements we meet with in connection with our work and its application to useful purposes, is the encouragement we meet with in all directions from large bodies connected with commerce and industry, and especially those large bodies connected with this great city of London. One of the earliest indications of the active interest taken by our citizens in scientific work, and of their desire to help men of science in their labours, was the response—the cheerful response—which we received to our applications to the great Guilds of the City of London, to assist us in establishing a fund for the promotion of chemical research. And not long after that fund was established these guilds joined in establishing what has already proved to be one of the greatest works of the country in connection with the advancement of science, the great Technical Institute of the City and Guilds of London. All of us know that our labours are appreciated by those who see and feel their application in the arts; but it is an especial pleasure to know that we work hand in hand with bodies who thoroughly appreciate us and have the means of assisting us in our work. The City and Guilds of London Institute has already risen to be the great university of technical education in this country; and it is a great pride and pleasure to feel that we have a representative of one of the foremost Guilds of London, which has been in the van of helping not only the Society but technical education generally in this country. And so I have great pleasure in associating with the second part of my toast the Prime Warden of the Goldsmiths' Company.

PROFESSOR VICTOR MEYER responded in the following words:—

Herr Praesident, meine Herren—

Dankbar bewegt durch die zahlreichen Beweise der Sympathie, welche Sie allen auswärtigen Theilnehmern dieses Festes in so reichem Masse zu Theil werden liessen, spreche ich Ihnen im Namen der Gäste den tiefgefühltesten Dank aus.

Wenn ich, als eines der jüngeren foreign members der Gesellschaft, für Diese das Wort ergreife, so finde ich meine Legitimation in dem Umstande, dass ich zugleich im Namen von zwei hervorragenden Ehrenmitgliedern zu sprechen die Ehre habe, welche, gleich wie ich, in Heidelberg wohnen. Bei meiner Abreise von Hause haben Bunsen und Kopp mir aufgetragen der Gesellschaft in ihren Namen die aufrichtigsten Glückwünsche darzubringen und auszusprechen, wie sehr sie an dem Blühen der Gesellschaft Antheil nehmen, wenngleich Alter und Gesundheitszüstand sie nötigen fern zu bleiben.

Indem ich in diesem Kreise Heidelbergs und besonders Bunsens gedenke, drängt sich mir der Gedanke auf welche herrlichen und für die Wissenschaft nutzbringenden Wirkungen aus den Beziehungen zwischen dem grossen deutschen Forscher und seinen englischen Schüler und Freunden hervorgegangen sind. Ich brauche nur den Namen Prof. Franklands zu nennen, und den meines Nachbars zur Rechten, Sir Henry Roscoe's. Der eine gab in seinen klassischen Untersuchungen über die Organometalle gewissermassen die Krönung des Gebäudes zu welchem Bunsen durch seine Kakodylarbeiten den Grundstein gelegt hatte; hierdurch und durch seine bahnbrechenden Ideen über den Begriff der chemischen Valenz erstattete er Deutschland und der gesammten Wissenschaft das Kapital an empfangener Anregung mit reichen zinsen Zurück. Der Andre, dessen Untersuchungen über das Vanadin ein leuchtendes Denkmal wissenschaftlicher Forschungsmethode bilden, wurde zugleich der Schöpfer jener trefflichen Lehrbücher welchen auch der deutsche Student noch heute mit Vorliebe seine chemischen Kenntnisse entnimmt.

Zu zahlreich sind die Beziehungen zwischen englischer und deutscher chemischer Arbeit, als dass ich ihrer gedenken könnte. Aber wer möchte heut an dieser Stelle und in diesem Kreise nicht daran erinnern dass Kekulé seinen grossen Gedanken über die Wertigkeit der Elemente und deren Verknüpfung hier in London gefasst hat als er—heimkehrend von einem anregenden Abend bei meinem Nachbar zur Linken, seinem Freunde Dr. Hugo Müller—tief in Gedanken versunken, hoch oben auf dem Omnibus träumend durch die Strassen der Weltstadt fuhr. Wer möchte nicht daran erinnern, dass unser

Meister A. W. von Hofmann—eines der ältesten Mitglieder dieses Vereines—den Plan zur Organisation der grossen deutschen Schwestergesellschaft unzweifelhaft unter dem Eindrucke der Erfahrungen gefasst hat, die er hier in London und in diesem Vereine gesammelt hatte. Und indem er diese Gesellschaft als eine deutsche, aber zugleich als eine solche von völlig internationalem Charakter gestaltete, trug er in erfolgreichster Weise dazu bei die chemischen Arbeiter aller Nationen zusammenwirken zu lassen, und ihr Werk zu einem gemeinsamen Ganzen zu gestalten. Diese internationalen Aufgaben pflegt auch die Chemical Society von London in hervorragendem Masse—mit welchem Erfolg, das drückt heut die begeisterte Theilnahme der fremden Vertreter und foreign members der Gesellschaft in beredten Worten aus. Möge die Chemical Society, neben allen ihren anderen schönen Aufgaben auch in Zukunft ihre völkerverbindenden Ziele in so erfolgreicher Weise anstreben wie bisher, möge sie blühen und gedeihen als eine Pflegstätte der Wissenschaft, für ihr Vaterland vorerst, aber nicht minder für alle Völker welche sich im friedlichen Wettbewerb wissenschaftlicher Arbeit verbündet wissen.

Translation.

Mr. President and Gentlemen—

Touched by the numerous proofs of sympathy which you have so liberally accorded to all foreign participators in this celebration, let me on behalf of the guests express our warmest thanks to you. If I, who am one of the younger foreign members of the Society, speak on their behalf, a justification is to be found in the fact, that at the same time I have the honour to speak in the name of two highly distinguished foreign members who, like myself, are resident in Heidelberg. As I left home, Bunsen and Kopp both commissioned me to offer you in their names the sincerest good wishes, and to say how much they are interested in the prosperity of the Society, although age and health compel them to remain at a distance.

In mentioning Heidelberg, and especially Bunsen in this assembly, I am at once reminded of the glorious consequences so fruitful to science which have arisen from the connection established between the great German investigator and his English pupils and friends. I need only mention the names of Professor Frankland and that of my neighbour on my right, Sir Henry Roscoe. The one, by his classical researches, on organo-metallic compounds, gave as it were the crown to the edifice, of which the foundation stone was laid by Bunsen in his investigations of cacodyl; and by the publication of these researches as well as of his pioneer ideas on the conception of chemical valency, he repaid with full interest to Germany and science at large the capital of encouragement which he had received. The other, whose investigation of vanadium is a luminous example of the method of scientific investigation, also became the creator of those admirable text books, from which the German student even at the present day derives by preference his chemical knowledge.

The relations existing between English and German chemical investigation are too numerous to mention. But here in this circle who does not remember that his great conception of the valency of the elements, and of the manner in which they are connected, occurred to Kekulé, as, buried in thought, he rode home on the top of an omnibus through the streets of the great metropolis, after spending an inspiriting evening with my neighbour on my left, his friend Dr. Hugo Müller. Who does not remember also that our master, A. W. von Hofmann—one of the oldest members of this association—undoubtedly based the plan on which the great German sister Society was organised, on the experience which he gained here in London in your Society; and that by conferring on this Society a truly international as well as a German character, he successfully ensured the co-operation of the chemists of all nations, and the complete unification of their work. The Chemical Society of London has also given special attention to international questions, and the enthusiastic participation of foreign representatives and foreign members of the Society is to-day eloquent evidence that it has done so with success. May the Chemical Society, in addition to its other useful functions, fulfil in the future as successfully as in the past its office of uniting nations; may it flourish and prosper as a home of science for its own nation in the first place, but none the less also for all nations which are confederated in the friendly rivalry of scientific labour.

The Prime Warden of the Goldsmiths' Company, Mr. George Matthey, in responding to the toast proposed by Sir Frederick Abel, said:—

I feel rather diffident in rising to respond for the visitors, knowing that I take the place of a gentleman who could have done it much better. Still, I feel glad to have the opportunity of saying that the City Companies, especially that to which I belong, take a great interest in the branch of education which we are considering to-night. We are alive to the fact that progress is the order of the day, and that the funds given to us, and which we have husbanded, cannot be better expended than in the cause of technical education. In connection with that, we were extremely glad to have the opportunity of lending our Hall yesterday. A more interesting exhibition I have not seen for many years. Nothing could well be more interesting than to see Davy's lamp, and the various other things which show us what has been done in the progress of chemistry during the last fifty years. With regard to chemistry generally, we ought to recognise that it does a great deal for us in the way of protecting people against adulteration of their water and food. We have been told by the President, that chemistry has done much in the past to conquer the forces of nature; and I had intended to say something about our technical progress, but that has been taken out of my hands by the Attorney-General. But I may say that the chemist of the present day, and the immediate future, will give attention to that subject, and that we may see some important improvements connected with it. I thank you on behalf of the visitors for the kind way in which you have received this toast. I consider it a great honour to be present to-night; and so far as my Company is concerned, we feel that anything we can do for the advancement of science is a feather in our cap, and we shall be glad to do all that is in our power.

The toast of "*The Presidents, Past and Present*," was proposed by the President of the Pharmaceutical Society, Mr. M. CARTEIGHE, in the following words:—

I do not quite understand on what principles you, Sir, and your colleagues have done me the honour of asking me to propose this toast; and when I remind you that it is from the point of view of hospitality and cordiality *the* toast of the evening—important as all the previous toasts have been—you will agree with me that it is an honour indeed that has been conferred upon me. But I felt, when I received the communication from the Secretary that I was privileged to propose the toast, that it was possible that I had been described in the programme as one of those Original Fellows who have been mentioned, and of whom only two are present to-night. I do not think that I can offer anything original for your consideration, but I can show you that it is for the Pharmaceutical Society which I represent an especial honour to be called upon to propose the toast of the past and present Presidents of the Chemical Society. The past Presidents are mentioned in this toast in the first place probably from a feeling of veneration and respect, and secondly from a feeling of regard on the part of those who had the duty of preparing the programme of such an important gathering as this. But I am sure it will accord best with your feelings if I regard the speeches which have preceded as reflecting lustre upon all the past Presidents of the Chemical Society, and confine myself to associating with this toast the name of your excellent President Dr. Russell. I remember, Sir, that when I was your pupil, and the pupil of a distinguished past President associated with you, that in the Birkbeck Laboratory of University College I had the great honour of having a chat with the first President of this Society, the illustrious Graham, and having shown to me, and being requested by him to examine the first specimen of pure glycerine which appeared in commerce. I well remember the delight of that eminent man when he first showed that triumph of an original chemical process. I shall never forget, Sir, the debt I owe to you for the chemical knowledge which I was able to acquire in those days. We were associated at University College with a large number of men whose chief object was not the gaining of scientific and chemical knowledge for its own sake, but the gaining of knowledge for the purpose of direct application to the useful arts. We had associated with us a number of pupils sent there by a Government Department with that object. Needless to say that some of the work we did was more or less affected by their proximity. But if the Fellows will remember what took place during the memorable period between 1856 and 1860, they will bear me out that from that College Professor Williamson and others sent out the results of researches of the highest character, which have had their effect on the progress of chemical knowledge throughout the world. In those days we were made enthusiastic, not by Hofmann, but by a philosopher not present to-night. We were enthusiastic on one special branch of chemical work, need I say that I refer to the classical work of Gerhardt and Laurent, of which Williamson and Odling were the great exponents in this country? I take it that it is because of my association with you in that laboratory, and because I represent a large body of men who, though not chemists in the sense in which the distinguished men here present are all chemists, are still in their modest way propagating the advancement of chemical knowledge, that the honour of proposing your health has devolved upon me. I would remind you that not a few of the distinguished Members of this Society have began their careers in the ranks of pharmacy. Gentlemen, I ask you to drink this toast with all the heartiness due to your President. No one in the past has held that post, and no one in the future can hope to hold it, who is not a distinguished man of science. I feel certain that the President of the Chemical Society of the future, as of the past, will always be a man who possesses not only abilities of the highest order in abstract science, but those other qualities of direction which are so necessary in a President. I appeal to you therefore to drink this toast with extra acclamation, because I think that the manner in which he, with the assistance of his colleagues, has performed the work of this Jubilee celebration, reflects the highest honour upon himself and them. His personal qualities, you who are his colleagues know as well as I do. You know that he possesses that breadth of view and that warmth of heart which attracts men of various calibres, which welds all together in one harmonious whole. I believe that the progress of chemical science—as of all other science, fostered as it is in this country by the growth of sectional societies—is largely due to the personal influence of the man who is at the head of affairs. And I believe that the term of office which your President has fulfilled with so much lustre to himself and so much credit to the Society, will be the years which in after time he will regard as the happiest of his life. I must not trespass any more on your time, but will ask you, upstanding and with three times three, to drink the toast I have the honour of proposing, especially emphasising the latter part of it, that of the President of this banquet.

The President on rising to respond was received with great applause. He said :—

There have been two-and-twenty Presidents of the Chemical Society, and however much they may have differed on theoretical questions, I am sure they would all be unanimous on this one of returning to you, Mr. Carteighe, their very best thanks for the kind words which you have used in regard to the Presidents, and to you, gentlemen, for the kind way in which you have received this toast. With regard to the present occupant of the post, I cannot but think that much that has been said has been prompted by feelings of old friendship. I can only say that he feels that it is a very great honour indeed, an honour which he will remember all his life, to have been allowed to preside at this banquet; and further that he feels that he was not fully justified in accepting this chair on this occasion. However, he thanks you all very sincerely for the kind way in which you have received the toast, and for all the kind things which have been said of him.

HISTORY

OF THE

DEVELOPMENT OF THE SOCIETY.

THE FOUNDATION

OF

THE CHEMICAL SOCIETY.

It is obvious that a public association for the study and furtherance of any particular science will be formed only when those who study and those who apply that science have become sufficiently numerous to form a considerable body, and when the science itself has developed to such a degree that the field of investigation has become sufficiently wide to accommodate many workers, and sufficiently fruitful to encourage them to attempt greater and more united efforts. The early scientific societies never confined themselves to one branch of science. Our own Royal Society is an example of the wide range of subjects which it was necessary to include during the childhood of science in order to supply enough material to sustain the interest of the Society's meetings.

The fact that the first society which took chemistry as its only subject of study originated in London, undoubtedly speaks well for the enterprise of English chemists; but the character of our chemists can hardly be credited as being the sole cause of the priority of England in this matter; it is surely to be expected that the largest city in Europe would be the first to require a special organisation for chemical science, and the first to command the means for effecting such an organisation.

To attempt a sketch of the state of chemistry in Great Britain or in London for the years immediately preceding the formation of our Chemical Society would be a task of much difficulty, and is scarcely needed for the purpose now in view. It may suffice to say that the teaching of chemistry was chiefly in the hands of the medical schools, and that but little instruction in practical chemistry was to be obtained at public institutions. It was as private pupils, and as assistants, that the working chemists in those days generally received their practical training. Investigations in pure chemistry were communicated to the Royal Society or to local philosophical societies, and were published in the Transactions of these societies or in the *Philosophical Magazine*. Investigations in applied chemistry were occasionally brought before the Society of Arts, and were published in their Transactions.

Notwithstanding the disadvantages under which they laboured, there were in Great Britain at the time of the formation of our Society a considerable body of chemists eminent as teachers, and more or less also as investigators. The class of chemists engaged in superintending technical operations was then a much smaller proportion of the chemical world than it has since become, but the importance of scientific knowledge for the direction of manufactures was rapidly growing in estimation. The profession of the consulting chemist and analyst was as yet only in its infancy. The better educated of the chemists of this time frequently possessed the degree of M.D.; fifteen of the original members of our Society are in this category. This was a natural result of the fact that so large a proportion of the chemical teaching was given in medical schools.

The readiness with which the idea of a Chemical Society was taken up by the majority of the chemists in Great Britain, shows that the conditions necessary for forming such a Society were already present. In many cases local scientific societies or clubs already existed, partaking sometimes of a social character, and one of these was apparently in some measure preparatory to the Chemical Society. Here the future originator of the Chemical Society tried his "'prentice hand" at improvement and organisation, and from this Society a group of eight or nine gentlemen joined the Chemical Society when it was started. I allude to the Mathematical Society of Spitalfields. This Society originated in the last century; the date of 1788 is stamped on a curious old token which served as a badge of membership, and was shown at the entrance to the meeting room. At the beginning of the present century the Society was an important and numerous body, and included a number of exiled Huguenots among its members. Its meetings were held in Crispin Street, Spitalfields, where it possessed a library of miscellaneous character. The number of members in the Society afterwards considerably diminished, and the character of the meetings deteriorated, but in the decade preceding the formation of the Chemical Society an attempt was made to renew and improve it. I have in my possession the cards announcing the meetings and the subjects of the lectures from October, 1838, to December, 1840. The Society met, apparently, on every Saturday throughout the year; the first Saturday in each month was reserved for original communications, the remaining meetings were devoted to lectures. The lectures announced during the two years just mentioned embraced a wide range of natural science, with some mechanics and antiquities. Out of sixty-six lectures fourteen were purely chemical, and ten others on subjects cognate with Chemistry. On the card for 1838-39 the names of the lecturers have been filled in. They include the following original members of the

Chemical Society: E. W. Brayley, T. H. Henry, M. Scanlan, and R. Warington. W. J. Cock, W. Ferguson, and R. Porrett were also members of the Mathematical Society, and original members of the Chemical Society, and J. T. Cooper comes probably in the same category. P. J. Chabot was a member of the Mathematical Society, and joined the Chemical Society in 1841, though after 30th March.

The Spitalfields Mathematical Society came to an end in 1845; the nineteen members then remaining were made members of the Astronomical Society, which acquired the library and other property of the old Society. Quite recently some of the chemical books in the old library have been presented by the Astronomical Society to the Chemical Society.

There are two circumstances which helped to determine the formation of the Chemical Society in 1841. The preceding year had seen the commencement of the penny postage, and this fact undoubtedly gave an impetus to all attempts at organisation requiring much correspondence. The year 1841 was also part of a short period of leisure in the life of my father. Between 1839 and 1842 he held no official position, and was at liberty to turn his energies in any direction which he might desire. It is probable that neither before nor after this period would he have attempted the serious task of uniting the chemists of Great Britain and Ireland in one Society.

The objects which my father had chiefly in view in seeking the formation of a Chemical Society are stated very simply in a few words which he addressed to the Society on 15th December, 1851, after his retirement from the Secretaryship, upon an occasion which I will mention by-and-by. I quote the words from notes in my father's handwriting:—

"The part I have taken in the formation of the Society has been attended with many feelings of pleasure, inasmuch as I trust it has helped forward the cause of Science. It was a part taken up during a short period of leisure, from a feeling which I found, on conversing with others, was generally entertained—that such a Society was much needed, not only to break down the party spirit and petty jealousies which existed, but to bring Science and practice into closer communication, and to bring the experience of many to bear in discussing the same subject. I therefore resolved to use my best endeavours that such a Society should be formed. For this purpose, at the beginning of the year 1841 * I commenced an active canvass

* In the obituary notice of Mr. Warington, *Journal Chemical Society*, 1868, xxxii, Mr. de la Rue says that "about the year 1839 Mr. Warington canvassed for the formation of the Chemical Society." Mr. de la Rue was a very old and intimate friend of my father, it therefore seems likely that the canvass commenced in a less formal way at an earlier date than 1841.

among the London chemists and lecturers, and finding my endeavours cordially responded to in almost every case, I applied to the Council of the Society of Arts, through Mr. Aikin and Mr. Horsman Solly, for permission to hold the preliminary meeting in their rooms. This was acceded to in the handsomest manner, and I proceeded on the 19th February to call the meeting of 23rd February, from which period the short history attached to our laws carries the subject forward."

Six letters in reply to the invitation to attend the meeting of 23rd February will be found in the Jubilee Album. Mr. H. F. Talbot writes that in his opinion Chemistry is an insufficient subject to engage a Society, and suggests the addition of Electricity.

The account of the first meeting on 23rd February stands thus in the first minute book of the Society:—

"1841, Feb. 23rd, Society of Arts, John Street, Adelphi.—A meeting of gentlemen, convened by Robert Warington, was held in the rooms of this Society for the purpose of taking into consideration the formation of a Chemical Society. Present: A. Aikin, Esq., Dr. Thos. Clark, [W.] J. Cock, Esq., J. T. Cooper, Esq., D. Cooper, Esq., Thos. Everitt, Esq., Wm. Ferguson, Esq., J. P. Gassiott, Esq., Professor T. Graham, W. R. Grove, Esq., Henry Hennell, Esq., T. H. Henry, Esq., C. Heisch, Esc., G. Lowe, Esq., [W. H.] Miller, Esq., Apsley Pellatt, Esq., Richard Phillips, Esq., Dr. Lyon Playfair, Robert Porrett, Esq., Dr. G. O. Rees, E. Solly, Esq., J. Tennant, Esq., E. F. Teschemacher, Esq., Dr. R. D. Thomson, Robert Warington, Esq.

"Mr. R. Phillips moved that Professor Graham do take the chair.

"On the motion of Mr. J. T. Cooper, Robert Warington was requested to act as Hon. Secretary *pro tem.*

"It was then put from the chair, and carried unanimously—That it is expedient that a Chemical Society be formed.

"Moved by Dr. Thos. Clark, and seconded by Dr. R. D. Thomson—That the following gentlemen constitute a Provisional Committee for carrying this resolution into effect:—Messrs. A. Aikin, W. T. Brande, H. J. Brooke, J. T. Cooper, J. Cumming, J. F. Daniell, Thos. Everitt, Thos. Graham, W. R. Grove, H. Hennell, G. Lowe, R. Phillips, R. Porrett, R. Warington.

"Proposed by Robt. Warington, and duly seconded—That the thanks of the meeting be given to the Society of Arts for the very liberal and handsome manner in which they had allowed Mr. Warington the use of their rooms for the purposes of the meeting.

"The thanks of the meeting were moved by [Mr.] J. P. Gassiott to Professor Graham for his kindness in taking the chair."

The Provisional Committee thus appointed proceeded to issue the following circular:*—

* One of the original circulars will be found in the Jubilee Album.

"Sir,

"On the 23rd of February last a meeting was held of gentlemen desirous of uniting themselves for the purpose of forming a Chemical Society. At that meeting the following gentlemen were appointed as a Provisional Committee for carrying this object into effect:—

A. Aikin.	J. F. Daniell.	G. Lowe.
W. T. Brande.	T. Everitt.	R. Phillips.
H. J. Brooke.	T. Graham.	R. Porrett.
J. T. Cooper.	W. R. Grove.	R. Warington.
Rev. J. Cumming.	H. Hennell.	

"I am desired by that Committee to invite you to join this Society as an original Member, and to support it with your active co-operation.

"I am also to request a reply to this communication before the 23rd instant, and should this answer be in the affirmative, that you will, if possible, attend the first meeting of the Society on the 30th March, in the rooms of the Society of Arts, John Street, Adelphi.

"I remain, your obedient Servant,

"ROBERT WARINGTON,

"*Hon. Secretary, pro tem.*

"PROPOSED OBJECTS.

"The promotion of Chemistry and those branches of Science immediately connected with it, by the reading, discussion and subsequent publication of original communications.

"Also the formation of a Chemical Library and Museum.

"Proposed annual subscription for Members resident within twenty miles of London, £2, beyond that distance £1."

Sixty-four letters in reply to this circular will be found in the Jubilee Album; of these fifty-four express the intention of the writer to join the Society, and ten contain refusals. Among the latter is one of considerable interest from Sir J. F. W. Herschel. It appears from this letter that he had been offered the first Presidency of the Society. He declines, on the ground of his imperfect acquaintance with chemistry, and his numerous other engagements.

Mr. J. Prideaux declines to join unless the Society undertakes to publish regular reports of the work done by foreign chemists. The importance of this branch of the Society's work was thus early recognised.

The letters of assent are very cordial, and are many of them from eminent chemists. The group of London chemists who were now the active promoters of the Society is, however, scarcely represented in these letters. This is of course quite natural. Their consent to the proposed Society was already given, and they were in frequent verbal communication with each other.

The final act in the formation of the Society was the General

Meeting held on 30th March, at which the Society was formally constituted. The original minutes of this meeting are as follows:—

"March 30th, 1841. Society of Arts, John Street, Adelphi.

"Moved by R. Phillips, Esq., seconded by Robt. Porrett, Esq., that Professor Graham do take the chair.

"The minutes of the previous meeting, held Feb. 23rd, 1841, were read and confirmed.

"The Report of the Provisional Committee was brought up, and having been read, and the various clauses discussed, was adopted with amendments."

Amended Report of the Provisional Committee.

"That the Society be designated the CHEMICAL SOCIETY OF LONDON.

"That this Society is instituted for the advancement of Chemistry and those branches of science immediately connected with it.

"For this purpose periodical meetings of its members shall be held for the communication and discussion of discoveries and observations relating to such subjects, an account of which shall be published from time to time by the Society in the form of Proceedings or Transactions.

"That the formation of a Library of works relating to its proper subjects, of a Museum of Chemical Preparations and Standard Instruments, and the establishment of a Laboratory of Research, are also ulterior objects of the Society.

"That the Society consist of Ordinary Members, Foreign Members and Associates. The Government of the Society to be vested in the Ordinary Members only.

"That all persons who have received the printed circular of the Provisional Committee inviting them 'to join the Society as original members, and support it with their active co-operation,' and who shall have given their assent so to do on or before the 30th March, 1841, shall be the first ordinary members of the Society.

"That the ordinary members shall elect out of their own body, by ballot, a President, four Vice-Presidents, a Treasurer, two Secretaries, and a Council of twelve, four of whom may be non-resident, by whom the business of the Society shall be conducted.

"That after the appointment of the Officers and Council, every candidate for admission shall be proposed according to a form of recommendation agreed upon, subscribed by three members of the Society, to one, at least, of whom he shall be personally known, and such certificate shall be read and suspended in the Society's rooms or place of meeting for three successive nights of meeting.

"That the method of voting for the election of Members shall be by ballot. The ballot to take place at the meeting at which the certificate is read for the fourth time. The election shall not be valid unless twelve or more members ballot. When three-fourths of the Members balloting shall be in favour of the candidate, he shall be elected a Member of the Society; but when fewer than three-fourths of the Members balloting shall be in favour of the candidate, he shall not be elected a Member.

"That the Annual Contribution to be paid by ordinary Members, resident within twenty miles of London, be £2, due on each successive 30th of March, and payable in advance for the current year. That for ordinary Members, resident beyond twenty miles of London, the Annual Contribution shall be £1.

"That no admission fee shall be required of those Members who join the Society during the first yearly session.

"That Foreign Members and Associates shall be recommended to the Society by the Council, and shall not be required to contribute to the funds of the Society.

"That Foreign Members shall be balloted for at the next meeting after that at which they are recommended for election.

"That Associate Members be elected for a period of Three Years; that they be thereafter eligible as Ordinary Members, or may be re-elected Associate Members.

"That the Ordinary Meetings of the Society be held on the Tuesday of every second week, at 8 o'clock in the evening precisely, from the beginning of November until the end of May.

"That the Rooms of the Society of Arts, John Street, Adelphi, be the place of meeting for the Society, until more convenient and fitting accommodation can be found.

"Moved by Mr. J. T. Cooper, seconded by Mr. E. Solly—That this Report as amended be adopted by the Society. Carried unanimously.

"The following Gentlemen were then submitted to the Society by the Provisional Committee as Officers and Council for the ensuing year, and were unanimously elected: *President*—Professor Graham. *Vice-Presidents*—W. T. Brande, Esq., J. T. Cooper, Esq., Professor J. F. Daniell, Richard Phillips, Esq. *Treasurer*—Arthur Aikin, Esq. *Secretaries*—E. F. Teschemacher, Esq., Robt. Warington, Esq. *Council*—Dr. Thos. Clark, Professor J. Cumming, Dr. C. Daubeny, Thos. Everitt, Esq., Thos. Griffiths, Esq., W. R. Grove, Esq., Henry Hennell, Esq., G. Lowe, Esq., Professor W. H. Miller, W. H. Pepys, Esq., Robt. Porrett, Esq., Dr. G. O. Rees.

"The names of the gentlemen who had given their assent to become original Members, to the number of seventy-five,* were then read.

"Proposed by Mr. P. Gassiott, and duly seconded—That Mr. Cooper do take the chair. It was then moved by Mr. Gassiott—That the thanks of the Society are due, and are hereby given to Professor Graham, for the zeal he has already manifested in forwarding the interests of the Society.

"The Society adjourned until Tuesday, 13th April."

There is one circumstance that was apparently connected with this first general meeting which is not recorded upon the minutes, namely, the signing of the obligation book by the members present. The first page of our obligation book contains the signatures of fifty-three of the original members of the Society; besides the names of two foreign members, there are no other signatures on this page, though there is room for more. Mr. Charles Heisch, one of our surviving original members, writes to me:—"I was present on 30th March, 1841, but beyond the fact that it was determined to form the Society, and that all present signed a book, engaging to promote the interests of the Society by every means in their power, I have no very distinct recollection of what took place." Sir Lyon Playfair writes: "I have a dim recollection that the members of the Chemical Society

* The names of seventy-seven original Members are given in the *Proceedings of the Chemical Society of London*, p. 1 (bound with the first volume of Memoirs). The difference in these numbers is apparently due to the fact that some letters of acceptance written before 30th March were received after that date.

signed the book at the first meeting." The only evidence against this view is that the original rules contain nothing about the signing of an obligation, this was added to the rules at the first anniversary meeting on 30th March, 1842. The practice of signing an obligation clearly, however, existed at a much earlier date, for at the Council meeting held on 11th May, 1841, it is resolved—"That every member in order to be entitled to have a voice at any meeting of the Society must also have signed the obligation."

The original obligation ran as follows:—

"We, the undersigned, do hereby engage that we will endeavour to promote the interests and welfare of the Chemical Society of London, and observe its Orders and Bye-laws, so long as we shall continue members thereof."

The first signature after the obligation is that of Robert Warington, then follow Thomas Graham and J. T. Cooper; the subsequent names do not seem to follow any particular order. It is most probable that all the signatures of original members on this page were not entered at the first meeting.

The Society has always recognised the prominent part which my father took in its formation. At the anniversary meeting held on 30th March, 1851, when Mr. Warington retired from the secretaryship, a committee was appointed to make arrangements for presenting him with a testimonial. The presentation took place at a meeting of the Society at the Rooms in Cavendish Square on 15th December, 1851. The testimonial consisted of a service of plate, which was presented by Professor Graham. The coffee pot bore the following inscription: "This coffee pot, with a service of plate, was presented to Robert Warington, Esq., by the Fellows of the Chemical Society, in testimony of their appreciation of his indefatigable exertions in promoting the welfare of the Society, which he was mainly instrumental in founding, and of his unremitting zeal in the discharge of the duties of Honorary Secretary for a period of ten years."

It was in reply to Professor Graham that my father gave the brief account of the origin of the Chemical Society which has been already transcribed in an earlier part of this paper.

Mr. Warington's success in the preliminary organisation, and afterwards in helping the Society forward during the years when its members were few,* and the results of British Chemistry were small, was largely due to his genial temper, and to an enthusiasm which regarded every contribution to chemical fact as of real interest. With this happy disposition were associated methodical business habits. It was to qualities of this kind, rather than to eminence as a chemist, that my father owed his fitness for the work which he carried out.

R.W.

* For many years "twelve" was a quorum for the election of new members.

BYE LAWS AND CHARTER.

BYE LAWS ADOPTED AT THE ANNUAL GENERAL MEETING, 1842.

OBJECTS OF THE SOCIETY.

THE CHEMICAL SOCIETY OF LONDON is instituted for the advancement of Chemistry and those branches of Science immediately connected with it, for the communication and discussion of discoveries and observations relating to such subjects: The formation of a Library of scientific works and of a Museum of Chemical Preparations and Standard Instruments, are also ulterior objects of the Society.

Constitution and Government of the Society.

The Chemical Society of London shall consist of Ordinary Members, Foreign Members, and Associates.

The Ordinary Members shall elect, out of their own body, according to the following Rules, a President, four Vice-Presidents, a Treasurer, two Secretaries, a Foreign Secretary, and Council, by whom the business of the Society shall be conducted.

I.—*Duty of the President.*

To preside at all Meetings of the Society and Council. To take the Chair at all ordinary Meetings of the Society, at eight o'clock precisely, and to regulate the order of the proceedings.

A Member shall not be eligible as President of the Society for more than two years in succession, but shall be re-eligible after the lapse of one year.

II.—*Duty of the Vice-Presidents.*

To preside at all Meetings of the Society in the absence of the President, by rotation or otherwise, as they may agree among themselves.

One of the Vice-Presidents shall retire annually.

III.—*Duty of the Treasurer.*

The Treasurer shall receive all money due to the Society, and shall pay such sums as may be ordered by the Council. He shall keep an account of such receipts and payments, in which donations and money received for composition of annual payments shall be entered separately from the ordinary revenues of the Society, and he shall produce the same at all Meetings of the Council. The Treasurer shall pay all money received by him into the hands of the Society's banker, retaining a sum not exceeding £30 for the payment of current expenses. The principal of all donations for specific purposes, and the composition of Members, shall be placed at interest.

IV.—*The Secretaries*

Shall attend all Meetings of the Society and Council, take minutes of the proceedings, and produce and read them at the ensuing Meeting; read the scientific papers presented to the Council, if requested by the authors; and conduct the correspondence of the Society.

V.—*The Auditors*

Shall be elected by the Council by ballot, at the first Meeting of the Society, in March. They shall audit the Treasurer's account, and produce their Report to the Annual Meeting of the Society, to be held in March. They shall have the power of calling for all necessary accounts and vouchers. No Member of the Council shall be eligible as an Auditor.

VI.—*Council.*

The business of the Society shall be conducted by the President, Vice-Presidents, Treasurer, Secretaries and a Council of *twelve* Members, four of whom may be non-resident, and at all Meetings of the Council *five* shall be a quorum. Four Members of the Council, three of whom must be resident, and one non-resident, shall retire annually, and four new Members shall be elected in their places.

The Council shall hold their ordinary Meetings on the day of the ordinary Meetings of the Society. Extraordinary Meetings may be called by the President upon a requisition to him duly signed by three Members of the Council, or at his own discretion, when he shall direct the Secretaries to issue special summonses for the occasion. The ordinary mode of decision on questions before the Council shall be by show of hands, unless a ballot shall be demanded. Any Member who shall be personally interested in the question before the Council, shall retire during the consideration and discussion of the same.

The Council shall present and cause to be read to the Annual Meeting, a Report on the general concerns of the Society for the preceding year; and such Report, or the substance thereof, shall be printed under the direction of the Council, for distribution among the Members.

All modifications of laws shall be proposed by the Council, but shall not take effect unless confirmed by the Society at a subsequent Meeting.

VII.—*Annual Meeting.*

An Annual General Meeting of the Society shall be held on the 30th day of March, at 8 o'clock p.m., or, that day being a Sunday, on the 31st, for the election of officers for the year ensuing, and for receiving the Report of the Council on the state of the Society.

Notice of the Annual Meeting shall be given from the Chair, at the two preceding ordinary Meetings of the Society, and also upon the cards of the ordinary Meetings.

VIII.—*Election of Officers.*

All officers of the Society shall be annually elected. The mode of their election shall be by ballot, according to the Forms No. 4 and No. 5 in the Appendix.

The Council, at the second ordinary Meeting in February, shall declare the names of the Vice-President, and the four Members of the Council whom they recommend to retire, and propose to the Society the names of a Vice-President and four Members to supply their places in the Council; they shall also declare the names of the officers that they recommend for election. In the event of any Member of the Society being desirous of proposing other names than those recommended by the Council, he may communicate a written list of the same to the Secretary, on or before the first ordinary Meeting in March, and the same shall be read from the Chair, and publicly suspended in the Society's rooms, with the list recommended by the Council.

IX.—*Ordinary Meetings of the Society.*

The ordinary Meetings of the Society shall be held on the first and third Mondays of every month, from the beginning of November until the end of May. The Chair shall be taken at 8 o'clock precisely. The ordinary course of business shall be as follows:—1st. The names of the visitors, and of the Members by whom they are introduced, shall be announced from the Chair. 2nd. The Minutes of the proceedings of the previous Meeting shall be read, and submitted for confirmation. 3rd. The presents made to the Society since their last Meeting shall be announced from the Chair and exhibited. 4th. The list of candidates shall be read, and the ballot for the election of Members shall take place. 5th. Scientific communications shall be read and discussed. 6th. The titles of papers ordered for reading at the next Meeting shall be read.

X.—*Extraordinary Meetings of the Society.*

An extraordinary Meeting of the Society may be summoned at any time by the President, on a requisition from the Council or from ten Members of the Society. Notice shall be given of such Meeting at a previous ordinary Meeting, or by a circular addressed to all the resident Members.

XI.—*Of the Members.*

The Society shall consist of ordinary and Foreign Members, and of Associates.

The Annual Contribution to be paid by ordinary Members, resident within twenty miles of London, shall be Two Pounds, payable in advance for the current year; and if resident beyond that distance One Pound. The subscription of Members shall be calculated from the Lady-day or Michaelmas preceding their election.

Foreign Members and Associates shall be recommended to the Society by the Council, and shall not be required to contribute to the funds of the Society.

Resident Members may compound for their future Annual Subscriptions by the payment of Twenty Pounds; non-resident Members by the payment of Ten Pounds.

Every Candidate for admission shall be proposed according to a form of recommendation (see No. 1, Appendix), subscribed by three Members of the Society, to one, at least, of whom he shall be personally known; and such certificate shall be read and suspended in the Society's rooms, or place of meeting, for three ordinary Meetings. The method of voting for the election of Members to be by ballot. The ballot to take place at the Meeting at which the certificate is read for the fourth time. The election shall not be valid unless twelve or more Members ballot. When three-fourths or more of the Members balloting shall be in favour of the Candidate, he shall be elected a Member; but when fewer than three-fourths of the Members balloting shall be in favour of the Candidate, he shall not be elected a Member.

The Secretary shall address to every person elected into the Society, the day after his election, a printed copy of the Letter (No. 2 Appendix), and of the Obligation (No. 3 Appendix), together with a copy of the Laws of the Society, a List of the Members, and a Card announcing the days on which the Society will hold its Meetings during the season.

Foreign Members shall be balloted for at the next Meeting after that at which they are recommended for election.

Associate Members shall be elected in the same manner as ordinary Members, but for a period of three years only; they are eligible thereafter as ordinary Members, or may be re-elected Associate Members.

Foreign Members and Associates shall not be required to sign the Obligation until present at a Meeting of the Society.

The ordinary Members shall have the right to be present and to vote at all Meetings of the Society, to propose Candidates for admission into the Society, and shall be entitled to a copy of the Transactions, to be forwarded to them free of expense. They shall also be entitled to the use of the instruments and books in the Society's collection, under such restrictions as the Council shall deem necessary. They shall have the privilege of personally admitting two visitors to ordinary Meetings of the Society, whose names shall be entered in a book kept for that purpose, together with the name of the Member admitting such visitor.

Foreign Members and Associates shall possess all the above-named privileges of ordinary Members, excepting those of proposing Candidates and voting.

The property of the Society shall be vested solely in the ordinary Members.

The Subscription to the Obligation shall be considered as distinctly implying the acquiescence of every Member elected into the Society in all the Rules, Regulations and Laws thereof.

Any Member who intends being absent from the United Kingdom during the space of one year, shall, upon previously giving to the Secretary notice in writing of his intention, be exempted from the payment of his Annual Contribution during such absence.

XII.—*Withdrawing and Removal of Members.*

Whenever it shall be proposed to remove any Member from the Society, the same shall be done by a Resolution of Council, which shall be read at three successive Ordinary Meetings, and be suspended in the intervals in the Society's room of meeting; and at the last of the said Meetings the proposition shall be balloted for, and if three-fourths of the Members balloting shall vote for such Member's removal, he shall be removed from the Society accordingly. The ballot shall not be valid unless twelve or more persons vote.

All Members who shall be in arrear of their Annual Subscription for more than two years, such subscription having been duly applied for, shall receive notice from the Council, that unless the same shall be paid within three months, their names will be liable to be removed from the List of Members.

No Member shall be considered to have withdrawn from the Society until he shall have paid his arrears, and given a written notice of his intention to resign to one of the Secretaries.

XIII.—*Scientific Papers.*

All scientific papers shall be submitted to, and approved by, the Council, previously to their being read at the Ordinary Meetings of the Society. They shall be read in the order in which they have been received, unless the Council shall otherwise direct; and the discussion of the subject of each paper shall immediately follow the reading thereof, and may be resumed after the reading of the abstract at the following Meeting. The papers and illustrative drawings to be considered the property of the Society, unless the authors shall stipulate to the contrary.

Authors shall be at liberty to read their own papers.

XIV.—*Publications.*

The Transactions of the Society shall be published at intervals, as the Council may think fit; they shall consist of a selection from the papers which have been read at the Meetings of the Society; such selection to be made by the Council. If any paper of importance is communicated during the recess, the same may be ordered for publication by the Council without being read to the Society.

The price of additional copies of the Transactions to Members of the Society shall not exceed three-fourths of that which shall be charged to the public.

The authors of such papers as may be published by the Society shall be entitled to twenty copies of their own communications free of expense.

XV.—*Library.*

The books in the possession of the Society shall be allowed to circulate among the Members, under such regulations as the Council may deem necessary.

XVI.—*Collection of Chemical Preparations and Standard Instruments.*

Chemical Preparations and Instruments in the possession of the Society may be examined by the Members in the Society's rooms, but they shall not be removed without the permission of the Council.

CHEMICAL SOCIETY.

(No. 1.)

Form of Certificate of Recommendation.

being desirous of admission into the CHEMICAL SOCIETY OF LONDON, WE, the undersigned, recommend him as a proper person to become thereof.

18

From personal knowledge. From general knowledge.

Proposed

Ballot to take place

In case of Foreign Members or Associates, the words "the Council" are substituted for "We the undersigned."

(No. 2.)

Letter notifying the Election of a Member.

SIR,

I have the honour to inform you that on the______________ day of__________________you were elected a Member (Foreign Member or Associate) of the Chemical Society of London; and I beg to transmit you a copy of the Laws, &c.

According to the Regulations of the Society, you are required to return the accompanying Obligation, duly signed, to the Secretary, and to pay the Annual Contribution for the current year,______ Pound, to the Treasurer before admission.*

I have the honour to remain,

Your most obedient Servant,

Secretary.

(No. 3.)

Obligation to be signed by Members, &c., on their Admission.

I, the undersigned, do hereby engage, that I will endeavour to promote the interests and welfare of the Chemical Society of London, and observe its Laws as long as I shall continue a Member thereof.

(Signed)

* In the case of Foreign Members and Associates this paragraph will be omitted.

(No. 4.)

Balloting List for the Election of Officers.

CHEMICAL SOCIETY OF LONDON.

March, 18 .

BALLOTING LIST

For the Election of Officers.

Present Officers.		*Officers Proposed.*
	President.	
	Vice-Presidents.	
	Secretaries.	
	Foreign Secretary.	
	Treasurer.	

If you wish to substitute any other name, in place of that proposed, erase the printed name in the second column, and write opposite to it in the third, that which you wish to substitute.

(No. 5.)

Balloting List for the Election of the Council

CHEMICAL SOCIETY OF LONDON.

March, 18 .

BALLOTING LIST

For the Election of the Council.

Present Council.	*Names of Members proposed to be Elected as the New Council.*

If you wish to substitute any other name, in place of that proposed, erase the printed name in the second column, and write opposite to it in the third, that which you wish to substitute.

CHARTER.

The Society continued to meet regularly, from time to time, and published Memoirs and Reports of their Proceedings, which at the close of the year 1847 amounted to three volumes.

As the Members of the Society at this time amounted to between 200 and 300, it appeared desirable that steps should be taken for obtaining a Charter of Incorporation; and, at the Anniversary Meeting for 1848, a Resolution was passed—

> "That it be recommended to the Council for their consideration, whether it would be for the interests of the Society to procure a Charter of Incorporation."

In pursuance of this Resolution the Council made the necessary inquiries, and a Special Meeting of the Society was summoned on the 22nd of May, 1848, to receive their Report, in which the Council advised the Society to make application to Government for a Charter. The Report was adopted by the Meeting, and it was resolved—

> "That this Meeting do authorise the Council to take the necessary steps for procuring a Charter of Incorporation."

Application was therefore made to the Government authorities in due form, and the Royal Assent having been obtained, the Society was incorporated under the following Charter.

Charter.

Victoria, by the Grace of God of the United Kingdom of Great Britain and Ireland, Queen, Defender of the Faith, to all to whom these presents shall come greeting. Whereas William Thomas Brande, of our Mint, Esquire, a Fellow of the Royal Society and of the University of London, and others of our loving subjects, did in the year 1841 establish, and are now Members of, a Society known by the name of the Chemical Society, for the general advancement of Chemical Science, as intimately connected with the prosperity of the manufactures the United Kingdom, many of which mainly depend on the application of chemical principles and discoveries for their beneficial development, and for a more extended and economical application of the industrial resources and sanatory condition of the community: And Whereas it has been farther represented to us that the same Society has, since its establishment, sedulously pursued such its proposed object, by holding meetings at stated periods, at which new discoveries have been brought under discussion, and the results made known to the public in a series of Transactions from time to time published by the said Society, and that distinguished individuals in foreign countries have availed themselves of the facilities offered by the same Society for communicating important scientific and practical discoveries made abroad, and that thus a useful interchange of valuable information has been effected: And Whereas the same Society has hitherto been supported by donations and annual and other subscriptions and contributions to its funds, and has expended and continues to expend considerable sums of money in the publication of its Transactions, in aid of which objects a Library of scientific works, and also a Museum of chemical preparations and standard instruments are in course of being formed: And Whereas, in order to secure the property of the said Society, and to extend its useful operations, and at the same time to give it a more permanent establishment among the scientific institutions of our kingdom, We have been besought to grant to the said William Thomas Brande, and to those who now are or shall hereafter become Members of the said Society, our Royal Charter of Incorporation for the purposes aforesaid :—

Now know ye, that we being desirous of encouraging a design so laudable and salutary of our especial grace, certain knowledge, and mere motion, have willed, granted, and declared, and do by these presents, for us, our heirs and successors, will, grant, and declare, that the said William Thomas Brande, and such others of our loving subjects as now are Members of the said Society, or shall from time to time be elected Fellows thereof, according to such regulations or bye-laws as shall be hereafter framed or enacted, and their successors shall for ever hereafter be, by virtue of these presents, one body politic and corporate by the name of The Chemical Society, and for the purposes aforesaid and by the name aforesaid shall have perpetual succession and a Common Seal, with full power and authority to alter, vary, break, and renew the same at their discretion, and by the same name to sue and be sued, implead and be impleaded, answer and be answered unto in every court of us, our heirs and successors, and be for ever able and capable in the law to purchase, receive, possess, hold, and enjoy, to them and their successors, any goods and chattels whatsoever; and also to be able and capable in the law (notwithstanding the statutes of mortmain) to take, purchase, possess, hold, and enjoy to them and their successors, a hall or house and any such messuages, lands, tenements, or hereditaments whatsoever, as may be necessary for carrying out the purposes of the Society, the yearly value of which, including the site of the said hall or house, shall not exceed in the whole the sum of £3,000, computing the same respectively at the rack-rent which might have been had or gotten for the same respectively at the time of the purchase or acquisition thereof; and to act in all the concerns of the said body politic and corporate for the purposes aforesaid, as fully and effectually to all intents, effects, constructions, and purposes whatsoever, as any other of our liege subjects or any other body politic in our United Kingdom of Great Britain and Ireland, not being under any disability, might do their respective concerns; AND WE DO HEREBY GRANT our especial licence and authority unto all and every person and persons, bodies politic and corporate otherwise competent, to grant, sell, alien, and convey in mortmain, unto and to the use of the said body politic and corporate and their successors, any messuages, lands, tenements, or hereditaments, not exceeding such annual value as aforesaid:

AND OUR WILL AND PLEASURE IS, AND WE FURTHER GRANT AND DECLARE, that there shall be a General Meeting or General Meetings of the Fellows of the said Society, to be held from time to time as hereinafter mentioned, and that there shall be a Council to direct and manage the concerns of the said body politic and corporate, and that the General Meetings and the Council shall have the entire direction and management of the same, in the manner and subject to the regulations hereinafter mentioned: BUT OUR WILL AND PLEASURE IS that at all General Meetings and Meetings of the Council the majority present and having a right to vote thereat respectively shall decide upon the matters propounded at such Meetings, the person presiding therein having, in case of an equality of numbers, a second or casting vote:

AND WE DO HEREBY ALSO WILL, GRANT, AND DECLARE, that there shall be a President, Vice-Presidents, a Treasurer, and Secretaries of the said body politic and corporate, and that the Council shall consist of the President, Vice-Presidents, Treasurer, Secretaries, and not more than twelve nor less than eight other Fellows of the said Society: AND WE DO HEREBY FURTHER WILL AND DECLARE, that the said WILLIAM THOMAS BRANDE shall be the first PRESIDENT of the said body politic and corporate, and the other persons now being the Vice-Presidents, Treasurer, Secretaries, and other Members of the Council, shall be the first Members of the Council of the said body politic and corporate, and shall continue such until the election of Officers shall be made in pursuance of these presents:

And we do hereby further will and declare, that it shall be lawful for the Fellows of the said body politic and corporate hereby established to hold a General Meeting once in the year or oftener, for the purposes hereinafter mentioned, namely, that the President, Vice-Presidents, the Treasurer, the Secretaries, and other Members of the Council, shall be chosen at such General Meeting; and that the General Meetings shall from time to time make and establish such bye-laws as they shall deem to be useful and necessary for the regulation of the said body politic and corporate, for the admission of Fellows, the election of Associates, and of Honorary and Foreign Members, and for the management of the estates, goods, and business of the said body politic and corporate, for fixing and determining the number of Vice-Presidents, Secretaries, and the number of the other Members of the Council as aforesaid, and the time and manner of electing the President, Vice-Presidents, Treasurer, Secretaries, and other Members of the Council, and the period of their respective continuance in office; and such bye-laws from time to time they shall or may alter, vary, or revoke, and shall or may make such new and other bye-laws as they shall think most useful and expedient for the said body politic and corporate, so that the same be not repugnant to these presents or to the laws and statutes of this our realm, and shall and may also enter into any resolution, and make any regulation respecting any of the affairs and concerns of the said body politic and corporate that shall be thought necessary and proper:

And we do further will and declare, that the first such General Meeting as aforesaid for the election of officers shall take place within twelve calendar months from the date of these presents, and that the present rules and regulations of the said Society, so far as they are not inconsistent with these presents, shall continue in force until the same shall be altered by a General Meeting:

And we further will, grant, and declare, that the Council shall have the sole management of the income and funds of the said body politic and corporate, and the appointment of an Assistant-Secretary, Librarian, Curator, and such other officers, attendants, and servants as shall in the discretion of the Council be deemed necessary or useful for the said Society, as also the entire management and superintendence of all the other affairs and concerns thereof, and shall and may, but not inconsistent with or contrary to the provisions of this our Charter, or any existing bye-law, or laws and statutes of this our realm, do all such acts and deeds as shall appear to them necessary or essential to be done for the purpose of carrying into effect the objects and views of the said body politic and corporate; Provided always, AND WE DO WILL AND DECLARE, that the Council shall from time to time render to a General Meeting a full and particular account of all such their proceedings as aforesaid, and that it shall be lawful for every Fellow of the said Society to see and examine the accounts of the receipts and payments of the said body politic and corporate:

AND WE FURTHER WILL, GRANT, AND DECLARE, that the whole property of the said body politic and corporate shall be vested, and we do hereby vest the same, solely and absolutely, in the Fellows thereof, and that they shall have full power and authority to sell, alienate, charge, and otherwise dispose of the same as they shall think proper; but that no sale, mortgage, incumbrance, or other disposition of any messuages, lands, tenements, or hereditaments belonging to the said body politic and coporate, shall be made, except with the approbation and concurrence of a General Meeting:

AND WE DO HEREBY FURTHER WILL AND DECLARE, that the service of the President, Vice-Presidents, Treasurer, Secretaries, and other Members of the Council, shall be honorary, and that it shall not be lawful for them, or any of them, to receive any pecuniary payment for their attendance or other services in or about the affairs of the said body politic and corporate, and that no dividend, gift, division, or bonus in money, shall be made out of the funds of the said body politic or corporate, unto or among any of its Fellows:

AND WE LASTLY DECLARE it to be our Royal will and pleasure, that no resolution or bye-law shall on any account or pretence whatsoever be made by the said body politic and corporate in opposition to the general scope, true intent, and meaning of this our Charter, or the laws or statutes of our realm; and that if any such rule or bye-law shall be made, the same shall be absolutely null and void to all intents, effects, constructions, and purposes whatsoever. IN WITNESS whereof we have caused these our Letters to be made Patent. WITNESS ourself at our Palace at Westminster, this Second day of November, in the 12th year of our reign.

By Writ of Privy Seal,
EDMUNDS.

L.S.

In accordance with the preceding Royal Charter, the Chemical Society consists of Fellows, Honorary and Foreign Members and Associates.

The Fellows elect, out of their own body, according to the following Rules, a Council consisting of a President, four or more Vice-Presidents, a Treasurer, two Secretaries, a Foreign Secretary, and twelve other Fellows, by whom the business of the Society is conducted in conformity with the following bye-laws.

BYE-LAWS IN FORCE IN 1891.

I.—*Of the Election, Admission, and Payments by Fellows.*

THE method of voting for the election of Fellows shall be by ballot.

Every Candidate for election into the Society as a Fellow thereof shall be proposed according to a form of recommendation (see No. 1 Appendix) subscribed by not less than five Fellows of the Society, to three, at least, of whom he shall be personally known; and such certificate shall be read at three Ordinary Scientific Meetings, and be suspended in the Society's rooms or place of meeting until the Candidate has been duly balloted for.

That in the case of candidates resident abroad unable to obtain the before-mentioned number of signatures, the Council shall have power to accept a certificate, signed from personal knowledge by one Fellow of the Society, and to recommend its presentation for ballot.

Ballots shall take place at Ordinary Scientific Meetings, and those Candidates shall be balloted for whose certificates have been read at two previous Ordinary Scientific Meetings, and again on the evening of the ballot.

The election shall not be valid unless thirty-two or more Fellows vote; but if an insufficient number of votes be recorded, the particular Candidate or Candidates put up for Ballot shall be again balloted for at the next Meeting or Meetings. When three-fourths or more of the Fellows who vote are in favour of the Candidate, he shall be elected a Fellow; but when less than three-fourths of the Fellows who vote are in favour of the Candidate, he shall not be elected a Fellow. The result of the ballot shall be ascertained by two Scrutators and one of the Secretaries, and declared by the Chairman.

The Fellow thus elected shall sign the following obligation, and return it to the Secretary:—"I, the undersigned, do hereby engage that I will endeavour to promote the interests and welfare of the Chemical Society; that I will observe its laws, and to the utmost of my power, maintain its dignity, as long as I shall continue a Fellow thereof." This obligation records his acquiescence in all the Rules, Regulations, and Laws of the Society, and pledges him to their due observance.

The formal admission of Fellows shall take place after the reading of the Minutes at Ordinary Scientific Meetings of the Society.—After the reading aloud by one of the officers of the prescribed form of obligation, the Fellow to be admitted shall subscribe his name to the obligation in the Charter-book, and be introduced to the Chairman, who, taking him by the hand, shall say:—"Mr. ———, I do, by the authority and in the name of the Chemical Society, admit you a Fellow thereof."

Every Fellow shall have the right to be present and to vote at all Meetings of the Society; and to propose Candidates for admission into the Society; and he shall be entitled, so long as his annual subscription be not one year in arrear, to one copy of the annual publications of the Society. He shall also be entitled to the use of the instruments and books in the Society's collection, under such restrictions as the Council may deem necessary. He shall have the privilege of introducing two visitors to the Ordinary Scientific Meetings of the Society, whose names shall be entered in a book kept for that purpose, together with the name of the Fellow introducing such visitors.

Every Fellow, previous to his admission, shall, within three months from the date of his election, pay an admission fee of Four Pounds, and either his first annual subscription, or a life composition fee, otherwise his election shall be void; power to extend this period of three months being, however, reserved to the Council.

The annual subscription to be paid by Fellows shall be Two Pounds; excepting that those Fellows residing more than twenty miles from London, who shall have been elected before the 1st day of January, 1860, shall pay One Pound. The subscriptions of Fellows shall become due on the 1st day of January in every year.

If, however, a Candidate be elected during the month of November or December, he shall not be called upon to pay any annual subscription for the current year, and shall not be entitled to receive the publications of the Society for that year.

The life composition fee shall be Twenty Pounds, excepting that those Fellows residing more than twenty miles from London, who shall have been elected before the 1st day of January, 1860, may compound by the payment of Ten Pounds.

II.—*Of Honorary and Foreign Members.*

Honorary and Foreign Members shall be recommended to the Society by the Council. They shall be nominated at one Meeting of the Council, and shall be balloted for at some subsequent Meeting of the Council, and if the majority of those voting are in favour of any Candidate, he shall be proposed by the Council to the Society at a subsequent Ordinary Scientific Meeting, and be balloted for at the Ordinary Scientific Meeting of the Society following that at which he was recommended for election according to the Rules for the election of Fellows.

The number of Honorary and Foreign Members shall not exceed forty. The Honorary and Foreign Members shall not be required to contribute to the Funds of the Society. Each shall receive a copy of the annual publications of the Society.

III.—*Of Associates.*

Associates shall be recommended to the Society by the Council, and shall be balloted for in the same manner as Fellows. They shall be elected under the same conditions, but for a period of three years only, at the expiration of which time they may be again recommended for election.

Associates shall pay an annual subscription of One Pound. They shall have the ordinary privileges of Fellows, but shall neither vote in the Society nor propose Fellows, nor shall they be entitled to a gratuitous copy of the annual publications of the Society, but they shall have the option of paying an annual subscription of Thirty shillings in place of One Pound, for which higher subscription they shall be entitled to a copy of the Society's Journal, in addition to the ordinary privileges of Fellows, with the exceptions hereinbefore specified.

IV.—*Withdrawing and Removal of Fellows and Associates.*

Any Fellow who at the period of the Annual General Meeting of the Society in March shall have left his subscriptions unpaid for two years, reckoning from the 1st of January preceding, such subscriptions having been applied for by Circular No. 4 in the Appendix, and no reason satisfactory to the President and Council having been assigned for their non-payment, shall cease to be a Fellow of the Society, and have his name removed from the Society's List accordingly: Provided, nevertheless, that on a solicitation for re-admission being addressed to the President and Council by a person so circumstanced, the case of such person shall be considered by the Council, who may, if they see fit, reinstate him as a Fellow of the Society, upon his paying up the arrears of his subscription, or a life composition fee.

Any proposition to remove a Fellow or Associate from the Society, for other causes than the non-payment of subscriptions, must be made by the Council. It shall be read at any Ordinary Scientific Meeting of the Society, and at the like Meeting next ensuing the proposition shall be balloted for, and if three-fourths of the Fellows voting shall vote for the removal of such Fellow or Associate, he shall be removed from the Society accordingly.

The ballot shall not be valid unless forty or more persons vote.

V.—*Election of President, Officers, and Council.*

All Officers of the Society shall be elected by ballot at the Annual General Meeting, in March.

At the second Ordinary Scientific Meeting, in February, the Chairman shall declare: 1st. The names of the two Vice-Presidents who it is proposed should retire, either from the Council, or, in the event of one of them being nominated to the Presidency, from the Vice-Presidency. 2nd. The names of four ordinary Members of the Council who it is proposed should also retire. 3rd. The names of the President and Officers recommended for election to office during the ensuing year, including the names of two new Vice-Presidents selected either from the existing Council, or from the General body of Fellows. 4th. The names of four new ordinary Members, recommended for election to the Council, or in the event of two ordinary Members of Council being nominated to the Vice-Presidency, of six new Members, or in the event of one ordinary Member of Council being nominated to the Vice-Presidency, of five new Members.

Two lists, according to the Forms Nos. 5 and 6 in the Appendix, with the names of the Fellows recommended for election as official and ordinary Members of Council, and having each a blank column opposite for such alterations as any Fellow may wish to make, shall be prepared by the Secretaries. These two lists shall be read from the Chair at the first Ordinary Scientific Meeting in March, and, on or before the day of Meeting, shall be suspended in the Society's rooms and circulated among the Fellows.

In the event of any Fellow proposing some other name or names than those recommended by the Council, and communicating his proposal in writing, duly signed by himself, to one of the Secretaries before the second meeting in March, the same shall be read from the Chair, and be publicly suspended in the Society's rooms with the list recommended by the Council.

On the day of Election, two Scrutators shall be nominated by the Chairman, with the approbation of the Meeting, to assist the Secretaries in examining the lists. Each Fellow voting shall deliver his list to one of the Scrutators, and the name of the Fellow so voting shall be recorded by one of the Secretaries. The names of those reported to the Chairman by the Scrutators as having the majority of votes of the Fellows present, for filling the offices of President, Vice-Presidents, Treasurer, Secretaries, and Council, shall then be announced from the Chair as elected to serve for the ensuing year.

In the event of votes being recorded for the same Candidate, both as an Officer and as a Member of Council, the votes recorded for him as an Officer shall, in the case of his not being elected an Officer, be added to those recorded for him as a Member of Council, and the total number of votes shall be counted as votes for the Council.

VI.—*Of the President.*

The President shall preside at the Meetings of the Society and of the Council, and shall regulate the order of the proceedings.

No Fellow shall be elected as President of the Society for more than two years in succession, but he may be re-elected after the lapse of one year.

In case of a casual vacancy the Council shall name a Vice-President to exercise the powers and perform the duties of President.

VII.—*Of the Vice-Presidents.*

In the absence of the President, the Chair shall be occupied by one of the Vice-Presidents, or, in the absence of any Vice-President, by a Member of Council or some other Fellow.

Fellows who have filled the office of President at any time since the formation of the Society, shall be proposed by the Council for election as Vice-Presidents, and this proposition shall be renewed every year, excepting when any such Vice-President is again nominated to the Presidency. There shall be six other Vice-Presidents who have not filled the office of President, of whom two shall retire from the Council every year, unless one of the outgoing Vice-Presidents be nominated to the Presidency, when only one other Vice-President shall retire.

VIII.—*Of the Treasurer.*

The Treasurer shall receive all money due to the Society, and shall pay such sums as may be ordered by the Council. He shall keep an account of such receipts and payments, in which donations and money received for composition of annual payments shall be entered separately from the ordinary revenues of the Society, and he shall produce such account at any Meeting of the Council, when required.

The Treasurer shall pay the moneys received by him into the hands of the Society's banker, retaining a sum not exceeding £100 for the payment of current expenses.

The Treasurer shall, on the first day of January annually, send to every Fellow of the Society who has not compounded for his annual contribution, a printed copy of the Intimation contained in No. 3 in the Appendix; and in making up his Accounts in the month of March of every year for the examination of the Auditors, he shall present a list of all Fellows whose subscriptions are then in arrear.

At the second Ordinary Scientific Meeting of the Society in February, three Auditors shall be elected by the Society by show of hands, unless a ballot be demanded. They shall audit the Treasurer's Account and shall forward their Report to the Council at least one week before the Annual General Meeting of the Society. They shall have the power of calling for all necessary accounts and vouchers. No Member of the Council shall be eligible as an Auditor.

IX.—*Of the Secretaries.*

There shall be two Secretaries and a Foreign Secretary. The duties of the Secretaries shall be—1st. To attend, one or both, at all Meetings of the Society and of the Council. 2nd. To take Minutes of the proceedings, and to read them at the ensuing Meeting. 3rd. To read all Scientific Communications to the Society, or abstracts thereof, that are not read by their respective authors. 4th. To address to every person elected into the Society a printed copy of the Letter No. 2 in the Appendix, and of the Obligation, together with a copy of the Bye-Laws of the Society, a List of the Fellows, and a Card announcing the days on which the Society holds its Meetings during the Session. 5th. To prepare and circulate the Balloting Lists of the Council. 6th. To conduct the home correspondence of the Society. A book shall be kept in the charge of the Secretaries, containing a copy of the Charter and Laws of the Society, with the form of Obligation to be subscribed by each Fellow. The several duties to be performed by each Secretary to be arranged by the Council.

The Foreign Secretary shall conduct the foreign correspondence of the Society.

X.—*Of the Council.*

The business of the Society shall be conducted by a Council, consisting of the President, the Vice-Presidents, the Treasurer, the Secretaries, and twelve other Fellows, not fewer than eight of whom shall, at the time of election, be resident within twenty miles of London. Annually four of the twelve ordinary Members of Council (three at least of whom must be resident Members) shall retire from the Council, and four new Members shall be elected to supply their places. At all Meetings of the Council five shall be a quorum.

The Council shall hold their Ordinary Meetings at least once a month, from November to June inclusive, on one of the days of the Ordinary Scientific Meetings of the Society. Notice of the time of holding each Meeting of the Council shall be forwarded by one of the Secretaries to each Member of the Council at least two days previous to that on which such meeting is to be held, but the non-receipt of such notice by any Member of the Council shall in no way invalidate the proceedings of the Meeting.

Extraordinary Meetings of the Council shall be called by the President upon a requisition to him, signed by three Members of the Council, or at his own discretion, when he shall direct the Secretaries to issue summonses for the occasion.

The ordinary mode of decision on questions before the Council shall be by show of hands, unless a ballot be demanded. Any Member of the Council who shall be personally concerned in the question under consideration, shall retire during the discussion and determining of the same.

At the Annual General Meeting, the President shall present a Report on the state of the Society during the past twelve months.

Before any new Bye-Law, or alteration of the existing Bye-Laws, be brought before the Society by the Council, it shall be proposed at one Meeting of the Council, and considered and approved of at a subsequent Meeting.

The Council shall have the power of appointing and of removing the Assistant Secretary, Librarian, Curator, or other paid Officers of the Society.

XI.—*Ordinary Scientific Meetings of the Society.*

The Ordinary Scientific Meetings of the Society shall be held twice in every month, from November to June inclusive, except in the month of January, when the Society shall meet once only; the specific days and hours of meeting to be determined by the Council. The ordinary course of business shall be as follows, subject, however, to the control of the Chairman for the time being:—1st. The names of the Visitors, and of the Fellows by whom they are introduced, shall be announced from the Chair. 2nd. The Minutes of the proceedings of the previous Meeting shall be read and submitted for confirmation. 3rd. New Fellows shall sign the obligation book, and shall be admitted by the Chairman. 4th. Presents made to the Society since its last Meeting shall be announced from the Chair. 5th. The certificates of Candidates for election shall be read. 6th. Scientific communications shall be read and discussed. 7th. The titles of papers ordered for reading at the next Meeting shall be announced.

XII.—*Annual General Meeting.*

An Annual General Meeting of the Society shall be held on the 30th day of March, or on some day in March near that time, and at such an hour as the Council may determine, for the election of Officers, &c.

XIII.—*Extraordinary Meetings of the Society.*

An Extraordinary General Meeting of the Society shall be summoned at any time by the President, on his receiving a written requisition to do so from the Council, or from twenty Fellows of the Society. Notice shall be given of such Meeting at a previous Ordinary Scientific Meeting, or by a circular addressed to all the resident Fellows. The President shall have the power of calling an Extraordinary General Meeting.

XIV.—*Of the Reading and Publication of Scientific Papers.*

The Secretary shall mark upon each paper sent to him, the date on which he received it from the author, and also the date upon which it was read to the Society. These papers shall, as far as expedient, be read in the order in which they are received, and the discussion of each paper shall immediately follow the reading thereof, unless the Chairman for the time being shall otherwise direct. The discussion of any paper may, on a resolution of the meeting to that effect, be resumed at the following Meeting. Authors may read their own papers, by permission of the Chairman.

All papers communicated to the Society, with their illustrative Drawings, shall become the property of the Society, unless stipulation be made to the contrary; and authors shall not be at liberty, save by permission of the Council, to publish in English the papers they have communicated, until such papers, or abstracts of them, have either appeared in the Journal of the Society, or have been returned to the author.

The Journal of the Society shall be published at intervals to be determined by the Council. It shall consist of such of the papers which have been read at the Meetings of the Society, or of abstracts of them, as the Council may determine, together with abstracts of papers published in other Journals.

If any paper of importance is communicated during the recess, the same may be ordered for publication by the Council, without being read to the Society.

The authors of such papers as may be published by the Society shall be entitled to fifty copies of each of their own papers free of expense.

XV.—*Library.*

The books in the possession of the Society shall be allowed to circulate among the Fellows and Associates, under such regulations, and with such exceptions as the Council may deem advisable.

XVI.—*Common Seal and Deeds.*

The Common Seal of the Society shall remain in the custody of the President. Every Deed or Writing to which the Common Seal is to be affixed, shall be passed and sealed in Council.

CERTIFICATES, LETTERS, AND BALLOTING LISTS IN USE IN 1891.

No. 1.

Chemical Society.

Certificate of a Candidate for Election.

The attention of the candidate in whose favour this certificate is made out is specially directed to the fact that, if elected, he will be required to sign the following obligation prior to his admission into the Society:—

> Obligation.—I, the undersigned, do hereby engage that I will endeavour to promote the interests and welfare of the Chemical Society, that I will observe its laws, and to the utmost of my power maintain its dignity, as long as I shall continue a Fellow thereof.

Name ______________________________

Usual Place of Residence ______________________________

Designation or Occupation ______________________________

Qualifications.* ______________________________
____
____
____

being desirous of admission into the Chemical Society, *we, the undersigned, propose and recommend him as a proper person to become a* Fellow *thereof.*

* Directions for filling up the Certificate are given on the other side.

Dated this ____________ *day of* ________________ 18 .

From Personal Knowledge.	From General Knowledge.

Proposed on __________

To be Balloted for on ____________________

Elected ____________ 18 .

____

President.

Directions for filling up the Certificate of a Candidate.

Under "Qualifications" should be given a concise statement of the Candidate's contributions to Chemical Science, as Investigator or Author, or of his position and past experience as Lecturer, Teacher, Assistant or Student, or in connection with Analytical or Manufacturing Chemistry.

If the Candidate's qualifications are not included under any of the above heads, the reasons for his desiring admission to the Society should be stated.

The Certificate must be signed by *five* or more Fellows, of whom *at least three* must certify their recommendation from *personal* knowledge.

No. 2.

Letter notifying the Election of a Member.

Sir,

I have the honour to inform you, that on the day of you were elected a Fellow of the Chemical Society. I herewith transmit you a copy of the Bye-laws, &c.

According to the Regulations of the Society, you are required to return the accompanying Obligation, duly signed, to the Secretary, and to pay the Collector,
the Admission Fee of £4, and the annual Contribution for the current year, £2, before admission.*

I have the honour to remain,

Your obedient Servant,

____________________ *Secretary.*

No. 3.

Annual Circular Letter of Treasurer.

January 1, 18

Sir,

I have the honour to inform you that your Annual Contribution of £______ to the Chemical Society for the year______, is due.

If paid by Post-Office Order, it should be drawn on the Post-Office, London, made payable to the Collector, and enclosed to him (____).

I have the honour to be,

Your obedient Servant,

____________________ *Treasurer.*

* In the case of Honorary Members, Foreign Members, and Associates this paragraph will be omitted.

No. 4.

Annual Circular Letter of the Treasurer to Fellows who are two years in arrear of their Subscriptions.

January 1, 18

Sir,

I have to inform you that your Subscription of £2 to the Chemical Society for the current year is now due, and that you are also in arrear of your subscription for the two preceding years ________ and ________.

I have also to inform you that, if your arrears, amounting to £4, are not paid on or before the 30th of March next ensuing, you will, in accordance with the IVth Bye-law, cease to be a Fellow of the Society, and your name will be struck off from the list.

Payments can be made by Cheque or by Post-office Order, drawn on the Post Office, London, in favour of the Collector, ,
Burlington House, Piccadilly.

I am, Sir,

Your obedient Servant,

________ *Treasurer.*

[*Issued by authority of the Council.*]

No. 5.

Balloting List for the Election of President and Officers.

CHEMICAL SOCIETY.

March, 18

BALLOTING LIST

FOR THE ELECTION OF OFFICERS.

Present Officers.	*Officers Proposed.*	
PRESIDENT.		
VICE-PRESIDENTS.		
SECRETARIES.		
FOREIGN SECRETARY.		
TREASURER.		

If you wish to substitute any other name, in place of that proposed, erase the printed name in the second column, and write opposite to it, in the third, that which you wish to substitute.

[*Issued by authority of the Council.*]

No. 6.

Balloting List for the Election of Ordinary Members of Council.

CHEMICAL SOCIETY.

March, 18

BALLOTING LIST

FOR THE ELECTION OF ORDINARY MEMBERS OF COUNCIL.

Present Members.	*Names of Fellows proposed.*	

If you wish to substitute any other name, in place of that proposed, erase the printed name in the second column, and write opposite to it, in the third, that which you wish to substitute.

ABSTRACTS OF THE OFFICIAL RECORDS OF THE SOCIETY,

Drawn up by PROFESSOR ARMSTRONG.

MEETING PLACES, 1841-91.

The Chemical Society at first held its meetings at the house of the Society of Arts, John Street, Adelphi, where it was established on 30th March, 1841; but as early as 26th July in the same year, Messrs. Graham, Everitt and Warington were appointed a sub-committee to arrange as to a place of meeting for the Society, with powers to engage rooms, &c. In October, arrangements were concluded with the Westminster Literary and Scientific Institution for the use of their Theatre, with ante rooms, at 47, Leicester Square.

From the Report of the Council read at the First Anniversary Meeting, it appears that the Society was led to abandon the accommodations offered by the Society of Arts from some anticipated inconveniences from restriction to experimenting.

But the change gave little satisfaction. Although, as stated at the First Anniversary Meeting, the quarters were not expensive—the rent paid was at the rate of £25 per annum!—they were liable to objections, among which were the want of a Council Room and of any place of deposit for the property of the Society, sufficient to prevent their being permanently retained. From a Minute of 8th March, 1842, it appears that it was resolved that the Secretary do notify, by letter, to the Committee of the Westminster Institution the determination of the Council to hold the meetings of the Society elsewhere if the theatre is not better heated; and on 28th March Mr. Aikin was empowered to inquire as to the possibility of the Society again holding their meetings at the Society of Arts. In the May following it was resolved to apply to the Society of Arts for the use of their Committee Room, &c., for the meetings of the Society for the next session. That the outcome of the application was satisfactory is clear from the statement in the 1843 Report of the Council, that "At the conclusion of last session the Council made a new arrangement with the Society of Arts for the use of two rooms for their meetings, and a place of deposit for the property of the Society. These arrangements, they have reason to believe, have given general satisfaction to the Members."

In 1844 the Council reported that "The arrangement by which, on the payment of a moderate rent, we are accommodated with rooms for our use at the house of the Society of Arts, continues to be satisfactory to both parties, and especially to ourselves, as we have not only acquired a convenient habitation, but have avoided those expenses included in the word establishment so often ruinous to young societies."

"Our domestic arrangements with the Society of Arts continue to our mutual satisfaction," is the statement made in 1845; and there is a similar expression in the Report of the following year.

Nothing is said on the subject in 1847; but meanwhile the Society had become dissatisfied with the accommodation afforded by the Society of Arts, and in February Mr. de la Rue had proposed that the Secretary be requested to inquire to what extent and on what terms accommodation could be afforded by the College of Chemistry—opened but a short time previously—for the meetings of the Society. A month later Mr. Warington reported that the College of Chemistry, in consequence of requiring their principal room as a reading room for their subscribers, would not be able to accommodate the Society. Dr. Playfair, Mr. de la Rue and Mr. Warington were then appointed a Committee to inquire for accommodation for the Society. In June the Secretary read a letter from the Botanical Society respecting the accommodation which they could afford the Chemical Society at their rooms in Bedford Street; but after an interview with the Secretary of the Society of Arts, it was resolved that the Secretary be instructed to write to the Society of Arts to ascertain what additional accommodation could be granted to the Society, and at what additional expense. At the meeting of the Council after the vacation in November, 1847, a letter having been read from the Society of Arts requiring an additional rental of £15 per annum if the Society should hold its meetings in their large room, it was resolved that the Society do not consider it expedient to accede to the proposals of the Society of Arts respecting the large room.

For a time no further steps were taken, probably owing to the fact that the attention of the Council was engaged in other directions. At the Anniversary Meeting in 1849, however, having announced that a Charter of Incorporation had been granted to the Society, the President made the following statement: "One other subject only suggests itself as requiring mention upon the present occasion, and it is one which, from time to time, has engaged the anxious attention of your Council, but which each successive session renders more pressing, and at present calls for the speediest adjustment which is securely attainable. I mean that having established our *name*, we should next think of a fit *local habitation*, and should endeavour to obtain possession not only of a meeting room capable of affording us adequate and comfortable accommodation, but associated with a room for the reception of our books and chemical preparations, and also for the meetings of the Council. These desiderata are not easily attainable, but they will not be lost sight of by the Council."

At the following meeting of Council, in April, Messrs. Graham, Playfair and Warington were requested to act as a committee to consider the subject of a more eligible place of meeting. In October Mr. Warington reported certain rooms which he had seen fitted for the meetings of the Society; and on 3rd November the Council met at 142, Strand, and having considered the terms, agreed to accept Mr. Chapman's offer of two rooms there at £55 a year.

Shortly after this, the first indication occurs of an effort being made to obtain adequate accommodation not only for the Chemical, but also for other Chartered Societies in London, the Minutes of 4th February, 1850, comprising an entry that "A letter having been read from Mr. Grove, it was resolved that the Council of the Chemical Society view favourably the proposal to procure a building for the meeting of the Chartered Societies of London, and will be glad to co-operate with other societies for this purpose, and that the President be requested to communicate this resolution to Mr. Grove."

The rooms in the Strand evidently gave scant satisfaction, as on 15th July, 1850, Messrs. Graham, Redwood and Brodie were appointed a Committee to inquire respecting better accommodation for the Society's meetings; but this Committee appears to have been unsuccessful, as another Committee, consisting of Professor Graham, Mr. Brodie and Dr. Playfair, was appointed on 31st March, 1851, to consider how far it might be practicable to obtain rooms for the Society in a public building by association with other societies, or by other means.

On 7th April this Committee reported that two propositions had been brought under the notice of the Committee. One related to an arrangement for holding the meetings of the Society in the house of the Linnean Society. . . . The other was to rent a suite of apartments, consisting of two rooms, at No. 5, Cavendish Square, part of the premises of the Polytechnic Institution, for which the rent asked was £120 a year. The Committee recommended that these rooms be taken at the rent specified, and that inquiries be made with the view of meeting with some other Society to which the rooms might be occasionally let.

The rooms in Cavendish Square were accordingly rented, and at the next Council, the Treasurer, the two Secretaries and Mr. de la Rue, were appointed a Committee "to take such steps as they deem expedient for the sub-letting and furnishing of the Society's rooms."

In the Annual Report read in 1852 the President speaks of the Society as "established in a locality more worthy of its high position, and capable of affording those accommodations for the reception of its Members, and for the display of its library and of its collections, of which it has long felt the want." He then proceeds: "The advantages of the present abode need not indeed be particularised in addressing Members, upon the recollections of most of whom the deficiencies of our former locality must be vividly impressed."

In the course of this address the President, Professor Daubeny, considers the effect of the establishment of the Society on the communication of papers on chemical subjects to the Royal Society, and then proceeds to say: "Yet, although there is good ground for believing that the establishment of this Society, so far from damaging the interests of the Royal, has rather tended to advance them, serving as it has as a feeder to that great original trunk of information; and although it is true that the spirit of the age, no less than the extension of the fields of research in each department, calls imperatively for a multiplication of scientific institutions throughout the country, it affords at the same time no argument against their juxtaposition. Indeed, any arrangement which should effect this object with respect to the chartered scientific institutions of the capital would have much to recommend it, not only on the ground of economy and convenience—inasmuch as one set of accounts might then do the work of several societies, and one meeting-house serve the purpose, perhaps, of the whole number so brought together—but also in materially promoting the object which each of us has in common, by facilitating the intercourse between men engaged in different departments of inquiry, and by removing some of the obstacles that impede their mutual co-operation, thus rendering the same service to the metropolis which the British Association for the Advancement of Science professes to do with reference to the provinces. Whilst therefore I congratulate you, as indeed I have already done, on the additional conveniences afforded by our present suite of apartments over our last, I would still more heartily hail the day which should see all the principal chartered societies of the metropolis under a common roof, pursuing their separate labours indeed independently, but at the same time deriving mutual support and assistance from their contiguity, exercising no paramount jurisdiction, but moving forwards in harmony and concert as becomes the federal members of the great republic of science."

This pronouncement is accounted for by the following entry on the Minutes of 15th March, 1852:—

"A communication from the Philosophical Club was presented by Professor Graham, and read, as follows:—

"'*Private.*

"'Sketch of a Memorandum proposed to be submitted to the Earl of Rosse:—

"'1. It is believed by many Fellows of the Royal Society that the general interests of science would be materially benefited by bringing together the Societies cultivating the different branches of natural knowledge, and their respective libraries, under one roof, leaving to each Society as at present its independent action, and the independent conduct of its own affairs, but simply placing them *in juxtaposition.*

"'2. The accommodation required for this purpose would be a suite of apartments to contain the different libraries; three or four meeting-rooms of different sizes in which the Societies might hold their meetings on different days; and apartments for the housekeeper, and such other person as would be required for the care of the house.

"'3. The advantages which have followed from the establishment of special Societies for the cultivation of particular branches of science are now universally admitted. By the proposed juxtaposition the advantages derivable from concentration would be combined with those derived from separate and independent action. The intercommunication of the cultivators of allied branches would be facilitated and promoted. The libraries of the different Societies, whilst maintained, as now, distinct, would become, by being brought under one roof, virtually part of a general library of science, and would be available for reference in a far greater degree than in their present dispersed state. The expense of separate establishments, now borne by the different Societies, might also be very considerably diminished.

"'4. It is understood that the Earl of Rosse is now in communication with Her Majesty's Government respecting an increase or exchange of accommodation for the Royal Society. It is submitted to his Lordship, in the event of his coinciding generally in the opinion expressed in this memorandum, whether it may not be desirable to take this opportunity of bringing under the consideration of Government the expediency of exchanging the accommodation now afforded to the several scientific Societies for one which, whilst generally equivalent in magnitude, would admit of their juxtaposition, and would thus be much more conducive to the advancement of science, and more suitable to the position which science should occupy in the metropolis.' "

On the motion of Professors Graham and Miller it was unanimously resolved, "That the Chemical Society concurs entirely with the opinions expressed in the foregoing minute of the Philosophical Club respecting the advantages to the general interest of science of the *juxtaposition* of the different scientific Societies. The Chemical Society would therefore gladly avail itself of suitable accommodation in a public building for its meetings and library, and would unite with the other Chartered Societies in any application to Government to promote the object expressed in the memorandum of the Philosophical Club laid before them."

A plan of a proposed new building was laid before the Council in June, 1852, together with a note from Dr. Quain, Secretary to the Pathological Society, inquiring whether, in the event of such a building being established as a private undertaking, the Chemical Society would be likely to become tenants in conjunction with other Societies. It was resolved, however, that the subject could not then be entertained. Later in the month the President was authorised, on behalf of the Society, to co-operate with the Royal Society in urging the Government to provide suitable accommodation for the meetings, &c., of the different scientific Societies.

In December, 1852, the President brought under notice of the Council the following minutes of the Royal Society:—"At a special meeting of the Royal Society, held 26th November, 1852, the Earl of Rosse, President, in the chair, the Council of the Royal Society having heard reports to the effect that ground has been purchased at Kensington Gore, for the purpose of accommodating the Societies cultivating natural knowledge, which are now provided with apartments in Somerset House and elsewhere in the metropolis, and for other practical objects connected with practical science and the industrial arts; while they deem it right to acknowledge the interest which Government has thus manifested in the promotion of science, desire to state their conviction that the locality referred to would be exceedingly inconvenient and unsuitable for the purposes of the Royal Society and of the other Societies allied to the Royal Society in the cultivation of natural knowledge. They wish at the same time to express an opinion which is strongly felt that it would tend greatly to the advancement of science, and would be more suitable to the position which science should occupy in the metropolis, if the several Societies referred to were brought together in one central locality, and, if possible, under a single roof."

"And they request the Earl of Rosse, President of the Royal Society, respectfully to lay this their opinion before the head of Her Majesty's Government.

"Resolved:—That a copy of these minutes be communicated without delay to the four Metropolitan Chartered Societies for the promotion of natural knowledge."

At the meeting of the Council in January it was resolved, on the motion of Professor Miller and Colonel Yorke:—"That the Council of the Chemical Society, in acknowledging the receipt of the minute of the Royal Society communicated to them by their President at the last Council meeting, desire to state their cordial concurrence in the views it embodies, and also to express their readiness to aid in promoting a practical scheme for the juxtaposition of the scientific Societies. They are also decidedly of opinion that a removal of their library and place of meeting to Kensington would be seriously detrimental to the interests of the Chemical Society."

Professor Daubeny in his Presidential address delivered shortly afterwards, refers to his remarks made a year previously as to the advantages that might accrue from the juxtaposition of the different Chartered Societies. He then says: "My opinions with regard to the desirableness of such an arrangement have since that period by no means undergone a change; nor am I aware that in expressing the above sentiments on the occasion referred to, I said anything in which the great body of the Society over which I presided would not at the time have heartily concurred. Nevertheless since we last met circumstances have transpired with respect to the views of Government in relation to the mode of carrying out the object alluded to, to which I confess myself as little able to assent as any other of our Members can be.

"It appeared from certain remarks which fell from the late Chancellor of the Exchequer, in a speech delivered by him in the course of the preceding session, that it was then in the contemplation of Government to purchase a piece of land at Kensington Gore, partly under the expectation that the chartered scientific Societies of the metropolis would accept as a boon the offer of any suitable suite of apartments which might be there erected at the public expense as being a mode of realising a project in which it was presumed that they all entertained a common interest.

"Now, as a general repugnance was felt throughout the Societies referred to to a removal to so distant a locality, it seemed necessary that whilst we expressed, as in duty bound, our acknowledgments for the liberal disposition towards science evinced by Her Majesty's

Government, we should at the same time, one and all, in order to prevent misapprehension, intimate our dissent to the particular scheme by which our interests were thought to be consulted. And with regard to this Society in particular, I am persuaded that the difficulty which most of our Members would find in resorting to so remote a part of the suburbs for the purpose of attending our meetings, would greatly counterbalance any advantage that might accrue from the gratuitous supply of apartments, even if by so doing we could hope to bring about that general juxtaposition of scientific bodies which we are all agreed to consider as desirable.

"But it could not be forgotten that three at least of the Societies included in this proposed arrangement are already provided with gratuitous accommodation in a central part of London, and are therefore less likely even than ourselves to consent to a removal to a more distant locality.

"Without therefore presuming to anticipate what may be deemed convenient or advantageous hereafter, when perhaps the tide of population may roll westward, and the facilities of communication between distant parts of the metropolis may be increased, the Council deemed that they were not stepping beyond their proper functions in protesting at the present time against the contemplated removal, and with this intent directed me, as their President, to state to the Royal Society, in reply to a minute of the Council of that body having reference to this proposition, 'That, whilst they are ready to aid in promoting a practicable scheme for the juxtaposition of the said scientific Societies, they are decidedly of opinion that a removal of their library and place of meeting to Kensington would be seriously detrimental to the interests of the Chemical Society.'

"It will give me sincere pleasure to find either that this or some future Government may be sufficiently alive to the importance of physical science, and sensible of the disadvantage under which it struggles in this country through the dispersed state of the Societies formed for its cultivation, to provide us all with some central and convenient establishment, where we can pursue our labours in common. But until this day arrives let us be encouraged by recollecting what our predecessors in the same field have accomplished without such extraneous aid, and what it may be possible therefore for us also to achieve by our own unassisted efforts."

In the Report read at the next anniversary meeting, in 1854, it is stated that "the Council would have been glad to have had it in their power to report something positive to the Fellows on a subject of much interest to this as well as to other scientific Societies in this metropolis, viz., their juxtaposition in some central position, under one roof, and free of rent. Although the Council cannot state that any material progress has been made in the settlement of this question, which the disturbed aspect of public affairs has probably assisted to keep somewhat in abeyance, yet from all the Council have been able to learn, there is good reason to hope that the object will be eventually attained, and a building allotted in a situation which will satisfy the wants of the different Societies."

Nothing was accomplished, however, during the next two years; in fact, no reference to the subject again occurs until 5th May, 1856, when there is the following minute: "The President reported the result of some communications which had passed between the Treasury, the Royal Society, and the officers of the chartered scientific Societies, with reference to the juxtaposition of these Societies at Burlington House." And it was resolved: "That the President of the Society be requested to express to the Royal Society the desire of the Chemical Society to be placed in juxtaposition with the Royal Society, and that he have full power to negotiate either with the Royal Society or the Treasury, so as to bring about so desirable an object."

The Report read by the President, Professor Miller, in 1857, contains the following full account of the negotiations which culminated in the transference of the Society to Burlington House in that year: "The past year has been an important one in the history of the Chemical Society, since during that period the Society has become more intimately associated with the Royal Society, and has received apartments from Government in Burlington House conjointly with the Royal and Linnean Societies."

"It is well known to a large number of our Fellows, that for some years past the principal scientific bodies in London have been pressing upon the attention of the Government the importance of the juxtaposition of these bodies in a convenient and central locality; and as the result of these efforts, the Government last spring entered into communication with the Presidents of the learned Societies then located in Somerset House, offering them rooms in Burlington House in exchange for those which they then held. The Geological and Astronomical Societies considered that the accommodation they already possessed was preferable to that offered at Burlington House, and declined the proposal. Application was then made by the Royal Society to the Government for enlarged accommodation for themselves, and for the Chemical and Linnean Societies; in reply to which application the following letter was addressed by the Secretary of the Treasury to the President of the Royal Society :—

"Treasury Chambers,
"22*nd May*, 1856.

"My Lord,

"I am directed by the Lords Commissioners of Her Majesty's Treasury to acquaint your Lordship, with reference to the views set forth in your letter to the Duke of Argyll of the 30th ult., which has been laid before this Board, that Her Majesty's Government are not at present in a position to enable them to state any definite views with respect to the project for the juxtaposition of the principal scientific Societies in a building to be erected in a convenient and central locality.

"I have to state that their Lordships are, however, prepared so far to concede to the views advanced by your Lordship on behalf of a large number of persons connected with science, as to allow the temporary location of the Linnean and Chemical Societies, in conjunction with the Royal Society, in the present building of Burlington House, on the following conditions, viz. :—

"1. That the removal of the Royal Society from Somerset House shall not prejudice the position of the other Societies located in that building in regard to the terms on which they are permitted to occupy their present apartments.

"2. That the Royal Society shall be put in possession of the main building of Burlington House, on the understanding that they will, in communication with the Linnean and Chemical Societies, assign suitable accommodation therein for those bodies.

"3. A common library to be formed for the use of the three Societies, on the understanding that suitable arrangements shall be made for the admission thereto, for purposes of reference and study, of men of letters and science, on orders given by Fellows of the three Societies.

"4. The Societies to be allowed the use of the Hall which it is proposed to construct in the west wing of Burlington House, at such times as it may not be required by the Senate of the University of London; it being distinctly understood that this permission is to be so exercised as not in any way to interfere with the convenience of the University.

"5. The Collection of Portraits belonging to the Royal Society to be hung on the walls of the proposed Hall, and to be open to the inspection of the public, under such regulations as may be convenient, and subject especially to the proviso in the preceding clause.

"6. That the adoption of this temporary arrangement shall not in any respect be held to weaken the claim of the Royal Society to permanent accommodation.

"I have the honour, &c.,

(Signed) "JAMES WILSON."

"*To the President of the Royal Society.*"

Upon the receipt of this letter some further communications passed between the President of the Royal Society and the Secretary to the Treasury; and at a meeting of the Council of the Royal Society held on the 30th of May, 1856, the President stated that he had intimated to the Secretary of the Treasury that, in his opinion, the Council would understand the third condition in the foregoing letter as implying the mutual access to the three libraries by the Fellows of the three Societies for the purpose of reference and study, but not as altering in any respect the ownership or custody of the several Libraries; and that in future, as heretofore, the loan of the books of any of the three libraries should be confined to the Fellows of that Society to which they belong.

The President further stated that Mr. Wilson assented to the above explanation of the Minute, so far as it relates to the formation of a common Library.

In conformity with the instructions contained in the letter from the Secretary of the Treasury, communications were entered into with the Presidents of the Chemical and the Linnean Societies, and the following Minute (of 18th December, 1856) of the Council of the Royal Society, was communicated to the President and Council of the Chemical Society. The Minute is the Report of the Proceedings (at a meeting held on the 5th December, 1856) of the Committee appointed to carry out the arrangements required for the removal of the Society to Burlington House. It relates to the apportionment of rooms. Dr. Miller then proceeds to say that "at the closing meeting of last session I took the opportunity of stating that these offers (of rooms) had been acceded to on the part of the Council of the Chemical Society, and that preparations would be made for the removal of the Society to their new apartments at as early a period as was practicable. The Council were in hopes that it might have been possible to hold the present Anniversary Meeting in Burlington House, but it was found that this could not be done without incurring considerable expense in preparing temporary fittings. There can, however, be no doubt that all the arrangements will be completed in time for the opening of the next session in the November of the present year.

"The Council cannot forbear congratulating the Society upon the manner in which the Fellows generally have testified their interest in the proposed removal; the liberal manner in which they have subscribed towards the expenses incurred for fitting up their new apartments will, it is expected, render it unnecessary to trench upon the ordinary funds of the Society upon this occasion.

"Mr. de la Rue, who has kindly undertaken the office of Treasurer to the Removal Fund, reports that a sum of £327 7*s.* 6*d.* has been subscribed for the purpose above stated."

On 4th May, 1857, the Secretary reported to the Council that the rooms in Burlington House would be furnished in time for the meeting of the Society to be held there on the 1st of June.

At this meeting a proposition was laid before the Council that after the removal of the Chemical Society to Burlington House, the meetings of the Society should be held on the same evenings as the meetings of the Royal Society, and it was resolved: "That the President be requested to convene an Extraordinary Meeting of the Society to be held on Monday, the 18th of May, prior to the Ordinary Meeting of that day, and that it be proposed to such Meeting to alter the Eleventh Bye-Law of the Society so as to admit of the Ordinary Meetings of the Society being held on Thursdays instead of Mondays."

The Extraordinary Meeting was held, pursuant to notice, Dr. Lyon Playfair, President, being in the Chair. The above Minute of the Council having been read by the Secretary, it was moved and seconded: "That the first and second sentences of the Eleventh Bye-Law be expunged, and that the following sentences be substituted:—

"'The Ordinary Meetings of the Society shall be held twice in every month, from November to June inclusive, except in the month of January, when the Society shall meet once only. The specific days and hours of meeting to be determined by the Council.'"

This motion was carried after an amendment:—"That the Meetings of the Chemical Society be held on Mondays, in accordance with its original Bye-Law XI," had been negatived.

While in the occupation of rooms at the Polytechnic Institution, the Society had sub-let its rooms to the Ethnological, Meteorological, and Microscopical Societies. The following correspondence is of interest as an indication of the policy pursued by the Society after its removal to Burlington House:—

"Communication addressed to the President of the Chemical Society by the Secretary of the Treasury.

"TREASURY CHAMBERS,
"16*th November*, 1857.

"SIR,

"I am directed by the Lords Commissioners of Her Majesty's Treasury to transmit to you the enclosed copy of a letter from the President of the Ethnological Society, dated the 12th instant, requesting Her Majesty's Government to give their sanction to the Chemical and Linnean Societies to enable them to accommodate one or more of the sister Societies with the use of their meeting room; and I am to state with reference to the arrangements existing for the occupation of Burlington House, that my Lords will be glad if the wish expressed by Sir James Clark on the part of the Ethnological Society can be met, as it appears that the accommodation required cannot in any way interfere with the use of the rooms in question by the existing Societies.

"I am, Sir, &c.,
(Signed) "JAMES WILSON."

Copy of Letter from Sir James Clark.

"BROOK STREET,
"12*th November*, 1857.

"MY DEAR SIR,

"When the Royal Society, by desire of the Government, gave up their apartments in Somerset House, they received, as you know, rooms in Burlington House in return for those which they had vacated. Two other scientific Societies, the Chemical and Linnean, were given apartments in Burlington House at the same time, on the understanding, however, I believe, that they were to be considered temporary, giving them no claim for permanent accommodation. The Government, in bringing these Societies together, evidently considered that they were furthering the progress of science.

"By the existing arrangements, the Chemical and Linnean Societies have each a separate room in which their general meetings are held, and they have each another room for their libraries. The Linnean Society have also additional rooms for their botanical collection. These two Societies meet in the evenings once a fortnight during the season, that is their meeting rooms are used solely for these evening meetings twice a month.

"Some of the other Societies, who were not so fortunate as to obtain rooms in Burlington House—the whole building being otherwise fully occupied—applied to the Chemical and Linnean Societies for permission to hold evening meetings in their general meeting rooms, believing that such permission would not in any way incommode these two Societies. The meetings of these other Societies would not be held oftener than once a fortnight. They would be confined to the general meeting rooms and, of course, held on different nights. It was thought that this arrangement would only be acting in accordance with the liberal spirit of the Government in bringing the Scientific Societies together. The Royal Society has shown their feeling on the subject by giving permission to the Geographical Society to hold their evening meetings in their rooms. I think, Sir, you will agree with me that nothing tends more to the promotion of Science than the mutual interchange of ideas of men devoted to the cultivation of science; and that in this metropolis, where the distances from any central place render frequent personal intercourse difficult, anything that can facilitate the meeting of scientific men should be favoured as much as possible.

"I cannot doubt, Sir, from the interest which you showed in bringing the Royal and other Societies together, that the arrangement to which the letter refers will meet your approbation. If so, I hope you will be good enough to give the sanction of the Government to the Chemical and Linnean Societies to enable them to accommodate one or more of the sister Societies with the use of their meeting rooms.

"I enclose a minute of the Council of the Linnean Society to an application from the Ethnological Society, of which I have the honour to be the President, by which you will perceive that Society does not feel at liberty to permit any other Society the use of their meeting room.

"I beg to apologise for troubling you at such length, but I thought it necessary to explain the matter fully, and prevent any misunderstanding. I will only add, that as the time is quite arrived for issuing the cards of the meetings, I should feel greatly obliged by your early attention to my request.

"I remain, dear Sir,

"Faithfully yours.

"JAMES CLARK."

"To James Wilson, Esq.,

"*Secretary to the Treasury.*"

The following copy of resolution passed by the Council of the Linnean Society, which had been forwarded by the Secretary of that Society, was read:—

"Resolved—1. That the Council being strongly impressed with the difficulties which stand in the way of giving accommodation to various Societies in their rooms in Burlington House, do not consider it desirable for them to entertain the question without an understanding with the Royal and Chemical Societies; and that it is desirable that a conference between the officers of the three Societies to consider the question should be held at as early a period as possible.

"2. That a copy of the above minute be made to the Council of the Royal Society, and also to the Council of the Chemical Society, at their meeting this evening."

The foregoing communications having been duly considered, it was resolved: "That the officers of the Chemical Society be appointed to meet the officers of the Royal Society and of the Linnean Society as proposed in the resolution of the latter Society."

This committee presented the following report:—

"BURLINGTON HOUSE,
"*December* 11th, 1857.

"A meeting of the officers of the Royal, Linnean and Chemical Societies was held here this day at 2 p.m.; present—The Lord Wrottesley, P.R.S.; Thomas Bell, Esq., P.L.S.; Dr. Lyon Playfair, P.C.S.; Dr. W. B. Carpenter, Registrar of the University of London; Major-General Sabine, Treas. R.S.; Dr. Boott, Treas. L.S.; Dr. Sharpey and Professor Stokes, Treas. R.S.; Professor W. H. Miller, For. Sec. R.S.; Mr. Busk, Sec. L.S.; Dr. Odling, Sec. C.S.

"The resolutions of the Council of the Royal, Linnean and Chemical Societies appointing the conference were read.

"In answer to questions from Lord Wrottesley, Professor Bell, on behalf of the Linnean Society, pointed out the inconveniences that would arise from the occupancy by other Societies of the Linnean Society's meeting room, but stated that if these inconveniences could be overcome he would be willing to permit some other Society to use the room, if it were distinctly understood that such permission was altogether a matter of favour, and liable to be withdrawn at the pleasure of the Linnean Society.

"Dr. Playfair, on behalf of the Chemical Society, assented to the views of Mr. Bell.

"Lord Wrottesley observed that the Council of the Royal Society was opposed to any permanent occupation by other Societies of the rooms in Burlington House now devoted to the Royal, Linnean and Chemical Societies.

"Major-General Sabine alluded to the expenses which the three Societies had incurred in furnishing their rooms, and suggested that any Societies from this time forward permitted to use the rooms should defray any extra expenses incurred in heating, lighting, cleaning, &c.

"Professor Miller advised that the contribution should be received in such a form as to avoid incurring any liability to poor rates.

"The three following resolutions were then proposed by Dr. Playfair, seconded by Professor Bell, and carried unanimously:—

"'1. That, while the Societies now occupying the main building in Burlington House would be glad to see the juxtaposition of scientific Societies further promoted by the concentration of such Societies on the ground purchased by the Government at Burlington House, the premises now occupied by the three Societies in the main building are not more than sufficient for their own wants, and that any permanent use of the meeting rooms by any other Society would be highly inconvenient.

"'2. That the three Societies can only grant the merely temporary use of their meeting rooms to other selected scientific Societies having kindred pursuits when that use can be accorded without inconvenience to the objects of the Societies now in occupation.

"'3. That under the principles laid down in the foregoing resolutions the applications now made to the Linnean and Chemical Societies be referred to their respective Councils to be dealt with.'

(Signed) "WM. ODLING,
"Secretary to the meeting."

On the motion of Professor Williamson and Mr. Alfred Smee it was resolved: "That the resolutions passed at the meeting of the Royal, Linnean and Chemical Societies, and now read, be adopted by the Council of the Chemical Society."

A motion to grant the use of the library and meeting room to the Ethnological Society was negatived.

From the references made in the anniversary addresses in 1858 and 1859 it is clear that the new arrangements gave satisfaction. Thus, in 1858, we read:—

"The late President of the Society, at the last anniversary, explained the arrangements then in progress for giving to the Chemical Society adequate accommodation in Burlington House. Since that time the Society has taken possession of the rooms in that house placed at its disposal by the Government under a common arrangement with the Royal and Linnean Societies. The expense of removal from the former rooms in Cavendish Square, and the cost of fittings in the present apartments, have not entailed a charge upon the funds of the Society, having been met by a voluntary subscription of the Fellows. The day of meeting was changed from Monday to Thursday, in order that the Chemical Society might meet on the same days as the Royal and Linnean Societies. The advantage of this change has been obvious, not only to the Fellows of our own, but also to those of the other two Societies, their meeting rooms having been made readily accessible to all who felt interested in any particular paper which might be read in either of the Societies in question."

In 1859 it was stated in the Report of the President and Council, that, "During the past year the meetings have taken place regularly at Burlington House on the first and third Thursdays in the month; and, judging from the large attendances, the Council, after two years' experience, have every reason to be satisfied with the change of locality and day of meeting, whereby the Fellows of the Chemical Society are brought into association with those of the Royal and Linnean Societies."

It is not until 1874 that any reference is again made in the anniversary Report to the Society's apartments. As early as June, 1859, however, the following communication was read to the Council:—

"OFFICE OF WORKS, &c.,
"*5th May*, 1859.

"SIR,

"Messrs. Banks and Barry, architects, having been instructed by this Board with the preparation of plans for the appropriation of the site of Burlington House and grounds, and having been instructed by the Board to ascertain, previously to their doing so, the extent of accommodation which would be required by the Societies and other learned bodies now enjoying the use of apartments in Burlington House and Somerset House, in the event of new buildings being erected for them in those grounds, I am directed by the First Commissioner of Her Majesty's Works, &c., to request that you will be so good as to give these gentlemen the necessary information upon the point referred to, so far as regards the Chemical Society, upon their applying to you for the purpose.

"I am, &c.,
(Signed) "ALFRED AUSTIN,
"*Secretary*."

In May, 1864, the President, Treasurer and Secretaries were appointed a committee to confer with the Royal Society respecting the proposed building for the Royal Academy on the ground attached to Burlington House, and to take such steps in relation thereto as they may think necessary.

In November, 1866, the President drew attention to the resolution taken by the Government to give up Burlington House to the Royal Academy, and read the following letter from Mr. Austin to Dr Odling:—

"OFFICE OF WORKS, &c.,
"25th *August*, 1866.

"SIR,

"The proposed appropriation of Burlington House for the Royal Academy has rendered necessary the consideration by the Government of the accommodation to be provided for the Chemical Society, and the other learned bodies who now have apartments there. The First Commissioner is about to take the advice of Messrs. Banks and Barry upon the subject, and will instruct them to confer with the Council of the Chemical Society. I am therefore to request that you will be good enough to move the Council to give these gentlemen such information as they may require.

"I am, Sir, &c.,
(Signed) "ALFRED AUSTIN,
"*Secretary.*"

The President also read the following letter from Messrs. Banks and Barry:—

"1, WESTMINSTER CHAMBERS,
"9th *October*, 1866.

"*To the President of the Chemical Society.*

"DEAR SIR,

"We have the honour to apprise you that we have received a communication from the First Commissioner of Works that, following up the intention of the Government in 1858, he has appointed us Architects on behalf of the Board to carry out the necessary arrangements for the proposed accommodation of certain learned and scientific Societies now accommodated partly at Burlington House and partly at Somerset House, in new buildings suggested to occupy a part of the space between Burlington House and Piccadilly; and requests us to place ourselves in communication with each such Society in order to ascertain the space they may severally require, and prepare a block plan showing how the requisite accommodation can in our opinion be provided.

"The Chemical Society being one of those to be accommodated, we should feel greatly obliged if you will inform us as nearly as possible the number of rooms you would desire to have, their respective areas, and, approximately, the dimensions which would suffice.

"It may be some assistance to you to know in doing this the similar information your Society supplied to us in 1859, and we have placed side by side the accommodation we had proposed to provide in the plans submitted by us in that year to the First Commissioner. In doing so, however, we feel it necessary to remark that sanction was never given to such plans or the amount of space they proposed, and further that the space now available is considerably less than was the case then.

"We would lastly desire to ask whether, with a view of economising space generally, there would be any objection to a meeting room being provided which could be used by agreement at different days and hours for the meetings of other of the Societies to be accommodated as well as the Chemical Society. Awaiting your reply,

"We have, &c.,

(Signed) "BANKS AND BARRY.

"*Architects.*"

In reference to the proposal that the various Societies should use the same room on different evenings, a strong feeling was expressed that the Societies would suffer by no longer being able to meet one another in the evening after the conclusion of their several meetings.

The Officers of the Society, with the late Treasurer, were constituted a Building Committee, which should report to the Council that day fortnight.

The Report of this Committee, which was read and approved by the Council on 15th November, 1866, was submitted in the form of the following letter:—

"CHEMICAL SOCIETY, BURLINGTON HOUSE,

"GENTLEMEN, "*15th November*, 1866.

"I have the honour to reply to your letter addressed to me as President of the Chemical Society on the 9th of October, in which you request to be informed as nearly as possible of the number of rooms which the Chemical Society would desire to have in the new buildings which the Government propose to erect for the accommodation of certain scientific Societies, as well as their respective uses, and, approximately, the dimensions of the rooms which would suffice.

"In the schedule which accompanied your letter, you gave us the dimensions of the rooms which we at present occupy, as well as those which you proposed to allot to us in 1859. The Society has nearly doubled its numbers since that period, and has added largely to its library.

"The accommodation proposed to be given to the Society at that date, as specified in the schedule, is certainly not more extensive than it would need, and if space were at your disposal we should be inclined to ask more rather than less.

"We should require, first, a *Meeting Room*. Our present meeting room, 25 feet by 20, is quite inadequate. It is generally full to overflowing, and the seats are inconveniently crowded together.

"Secondly, a *Council Room*. This is at present 20 feet by 20, and is sufficient for the purpose.

"Thirdly, a *Committee Room*, adjoining which should also be one to be used for the storage of 'Transactions.' A room 16 feet square would answer this purpose.

"Fourthly, a *Library*. The present is inconveniently small, and part of the books have to be placed in a passage. A room of about 35 by 30 would be sufficient. It would be convenient that the Committee Room No. 3 should communicate with the Library.

"Fifthly, *Cloak Room*, *Closet*, and *Retiring Room*.

"Sixthly, *Porter's Offices*.

"In reply to your question whether there would be any objection to a meeting room being provided which could be used by agreement at different days and hours for the meetings of other of the Societies to be accommodated as well as the Chemical Society, I have to inform you that it would not be consistent with the present mode of working the scientific Societies that any such arrangement should be adopted. Several of the Societies meet on the same evening for the purpose of mutual consultation and communication after the business is over.

"I regret that so long an interval has elapsed since the receipt of your letter, but no time has been lost since the session commenced in bringing the matter before the Council of the Society after its re-assembling.

"I have, &c.,
(Signed) "W. Allen Miller."

In January, 1867, the President gave an account of the accommodation that is likely to be offered to the Society in the building about to be erected. It appeared that each Society was to have a room in which its own members may have tea after their meeting, but that the Royal Society would not have a room large enough to accommodate the members of the three Societies. It was proposed and carried that the Secretary should communicate with the Linnean Society, and make a representation either conjointly or separately to the Royal Society in favour of pressing for such accommodation as should make possible the meeting of the three Societies as heretofore.

In November, 1867, Mr. Forbes stated that it has been felt to be an objection that in the new building to be erected for the scientific Societies it is not proposed that there should be any direct communication between the rooms of the Royal Society and those of the Chemical Society, and suggested that an application be made to the Board of Works requesting that such communication should be provided. The wishes of the Royal Society in the matter appearing to be doubtful, it was thought that the intercession of those Fellows of the Chemical Society who are also Fellows of the Royal Society might be of service. The Secretary was desired to furnish the President with a list of those who are Fellows of both Societies.

At the next Council it was proposed and carried that the President and Secretaries be authorised to draw up a letter to the Council of the Royal Society, expressing the wish of those Fellows of the Chemical Society who are also Fellows of the Royal Society that a proper communication be made between the apartments of the two Societies.

Some correspondence on the subject took place with the Royal Society, and every effort was made to secure the provision of a communication between the apartments of the two Societies; but unsuccessfully.

The proposed provision for the Society not being in all respects satisfactory, in June, 1868, the President and Secretaries were authorised to represent to Messrs. Banks and Barry the views of the Council respecting the future accommodation of the Society, and in the case of the arrangements with the architects not being satisfactory, to memorialize the First Commissioner of Works on the subject. They were further requested to communicate with Messrs. Banks and Barry and the officers of the Geological Society, with a view to obtaining a more central part of the building about to be erected contiguous to the portion assigned to the Royal Society.

In July Dr. Odling reported that the President and he had had an interview with Messrs. Banks and Barry, and had represented to them the views of the Council. In reply Messrs. Banks and Barry stated that the desired alterations in the position of the Chemical Society's block was impracticable; but that they had arranged with the Geological Society that the room on the ground floor cut out of the Chemical Society's block should be restored to the Chemical Society.

The tracings of the plans were laid before the Council, and the plans formally approved.

In April, 1872, the Council considered the plans of the new apartments provided for the Society in the front of Burlington House. The question as to the source from which the payment for the necessary fixtures and furniture should be made was discussed, and it was resolved that the President and Secretaries be a Committee to communicate with Messrs. Banks and Barry, and with the Board of Works, in order to ascertain to what extent the Board of Works will furnish the new rooms with the necessary fittings, and whether they will undertake to remove, alter and fix the bookcases and other fixtures in the present meeting room.

At the second April meeting the question of the appropriation and fittings of the new apartments was considered, and the Council adjourned to see the apartments. It was decided on the spot that the meeting room should be on the first floor and the library on the second floor; also that the seats in the meeting room should be arranged with two side gangways. It was understood that the smaller room adjoining the meeting room should be fitted up as a laboratory or preparation room.

In April, 1873, the Officers, Mr. de la Rue and Mr. Harcourt, were appointed a committee to confer with Mr. Riddle (Clerk of the Works) with regard to the fittings for the Society's new rooms; also to consider what furniture it will be necessary for the Society to purchase, and on this point to report to the Council at a future meeting.

On the report of this committee being read on 17th July, it was resolved that a sum not exceeding £1,000 be placed at the disposal of the committee for the fitting up and furnishing of the new rooms.

On 30th March, 1874, the Secretary was authorised to arrange with the Clerk of the Works for having another entrance made into the meeting room.

In the anniversary Address delivered in 1874, Professor Odling refers to the entry of the Society into its new rooms in the following words:—

"I can hardly allow this occasion to pass without congratulating the Society upon its entering into possession of the premises in which we now meet. In our commodious new library, in our journal room, tea room, committee room, council room, and offices our gain is incontestable, and our new acquisition altogether most satisfactory. On the other hand, it cannot be denied that the meeting room is in some respects not entirely successful. The ventilation and illumination, though greatly improved, are still not wholly satisfactory; but on this point, I think, we may look forward to achieving before long an unquestionably good result. A more serious matter is the difficulty of access to and departure from the seats at the back of the meeting room, and the want of space between certain of the seats themselves. All I can say on this point is that the Council were not unaware of these inconveniences, and are giving them their best consideration, with the view to remedy them as far as possible, and that here also considerable improvement may shortly be anticipated.

"Our preparation room for experimental illustration of the matters brought before the meetings of the Society is still incomplete and unfurnished. The Council look forward, however, to its contributing hereafter in a very important degree to the interest and value of our meetings. Chemistry has to do so largely with phenomena which can in one sense or other be observed, and that can only be fully appreciated by one kind or other of observation, that any means of facilitating or affording the possibility of observation of the new phenomena and results brought forward at our meetings must be of the greatest advantage, and one of the strongest justifications of our coming together.

"In congratulating the Society upon its removal to these premises, I think I ought to put on record in a formal way the extent of obligation due from the Society to its permanent officers, whose exertions in the matter at the close of our last session and throughout the vacation were most continuous, serious and indefatigable. Moreover, the thanks of the Society are due to Mr. Barry, the Architect, and Mr. Riddle, the Clerk of the Works, for their ever ready attention to the requirements of the Society as expressed by its officers, and for their endeavour in every way to carry out the Society's wishes.

"One further point in connection with our removal, too serious to be passed over in silence, is the expense thereby incurred, on which the Treasurer will give you some detailed information. Although the bookcases in the library, the gas fittings and some other fixtures were provided for the Society by Government, and although all that was useful in our old rooms, including the historic seats which for so long formed part of the Royal Society's Rooms at Somerset House, has been made available here, nevertheless the expenses incurred have been very heavy. I believe, however, that they have been advantageously incurred, and I am sure that they were carefully considered. For every large item contracts were obtained, and by the pains taken and care exercised, more especially by Dr. Russell and the Treasurer, a saving of no inconsiderable amount was effected for the Society."

It may be here opportunely stated that the table and seats were arranged at right angles to the face of the building overlooking Piccadilly, the table being at the east end, the majority of the seats being placed on an inclined plane. so that there was very little head space at the back of the room.

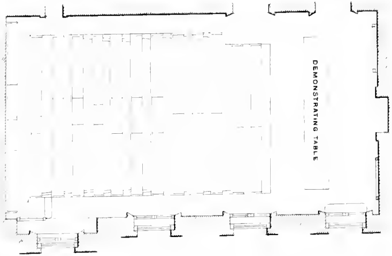
The dimensions of the several rooms at the disposal of the Society are as follows:—

	Length.		Width.		Height.
Tea room	24′ 6″	×	18′ 0″		-
Library	43′ 6″	×	24′ 0″		
Meeting room	43′ 6″	×	24′ 0″	×	15′ 6″
Laboratory	24′ 6″	×	18′ 0″		–
Staircase	23′ 6″	×	13′ 0″		
Council room	23′ 6″	×	19′ 0″		
Secretary's room	17′ 0″	×	18′ 0″		

In 1876 the President, in the anniversary address, said that he must congratulate the Fellows upon the very decided improvements which had been effected in the illumination, as well as in the comfort of the meeting room and of other rooms of the establishment, consequent upon important alterations in the character and arrangement of the gas fittings, adding, "When I inform the Fellows that the improvements accomplished are the results of persevering experiments spontaneously undertaken by our much valued Senior Secretary, Mr. W. H. Perkin, and that he has most unostentatiously defrayed the by no means inconsiderable outlay incurred in frequent alterations and the provision of new fittings, I feel confident that they will desire a hearty expression of thanks to be conveyed to Mr. Perkin for this practical proof of his interest in the welfare of the Society and the well being of its Fellows."

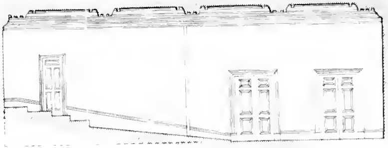
In 1883, during the recess, the apartments were cleaned and re-decorated at considerable expense.

When the electric light became popular, it was felt that its introduction into the Society's rooms would be of great advantage, especially on account of the deficient ventilation of the Council and Meeting rooms. Inquiries were made whether the Royal Society, which at an early period acquired a private installation, would undertake to supply current to the Chemical Society; as the meeting of the former body took place on Thursday afternoons it was thought that it would not be difficult to arrange for the use of their plant in the evening, but the terms proposed were not considered satisfactory. The matter therefore remained in abeyance until 1892, when the St. James's Company carried leads along Piccadilly; it was then determined to introduce the electric light throughout the building, excluding the porter's quarters in the basement. As all attempts to improve the ventilation of the meeting room had failed in making it

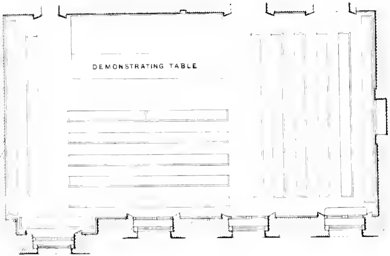


PLAN AS IT WAS, 1874-1892

I

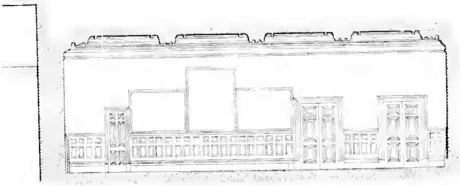


SECTION AS IT WAS, 1874-1892.



PLAN AS ALTERED, 1892

II



SECTION AS ALTERED, 1892.

a satisfactory place of assemblage, it was decided to rearrange the seating, &c. The inclined plane was therefore removed and the floor relaid level over the whole room. The table was placed on a slight raised platform between the doorways opposite the windows, and the seats were arranged partly facing it, and partly at right angles to it at either end. Large openings were made into flues in the walls, and powerful gas burners were placed in these flues. The plans were made, under the direction of the Committee appointed by the Council, by Mr. Martin L. Saunders, Architect, under whose supervision the whole of the constructional work was carried out during the recess. The arrangement of the meeting room before and after the alterations were made is exhibited in Figs. I and II. Whereas formerly the room accommodated 144 persons seated, it will now seat 157 persons.

At the same time additional shelving was provided in the library, and the rooms were re-decorated throughout. The electric light installation was carried out under the supervision of Mr. W. E. Ayrton, F.R.S., Professor of Physics at the City and Guilds of London Institute Central Institution. An electric light lantern by Newton was provided for use at the meetings, the surface of the wall at one end of the room being prepared as a screen. The improvement thus effected has been generally regarded as very great, and well worth the heavy expenditure it involved.

Since the Society has occupied its premises in the modern Burlington House, a number of *cognate* bodies have regularly met in its rooms, paying a due proportion of the cost of lighting, warming and attendance; these bodies are—

The Society of Public Analysts,
The London Section of the Society of Chemical Industry,
The Institute of Chemistry,
The Institute of Brewing.

Summarising the places of meeting of the Society during the past fifty years, they are as follows:—

1. Society of Arts, 1841.
2. Westminster Literary and Scientific Institution, Leicester Square, 1841–42.
3. Society of Arts, 1842–49.
4. Chapman's, 142, Strand, 1850–51.
5. Polytechnic Institution, Cavendish Square, 1851–57.
6. Old Burlington House, 1857–73.
7. New Burlington House, 1874–91.

PRESIDENTS,

1841-91.

	Years of Office.
T. Graham	1841-43
A. Aikin	1843-45
T. Graham	1845-47
W. T. Brande	1847-49
R. Phillips	1849-51
C. Daubeny	1851-53
P. Yorke	1853-55
W. A. Miller	1855-57
L. Playfair	1857-59
B. C. Brodie	1859-61
A. W. Hofmann	1861-63
A. W. Williamson	1863-65
W. A. Miller	1865-67
W. de la Rue	1867-69
A. W. Williamson	1869-71
E. Frankland	1871-73
W. Odling	1873-75
F. A. Abel	1875-77
J. H. Gladstone	1877-79
W. de la Rue	1879-80
H. E. Roscoe	1880-82
J. H. Gilbert	1882-83
W. H. Perkin	1883-85
H. Müller	1885-87
W. Crookes	1887-89
W. J. Russell	1889-91

Portraits of the Past Presidents of the Society.

At the suggestion of the Treasurer (Dr. W. J. Russell) the Council determined in 1882 to institute a series of permanent Carbon photographs of all the Past Presidents of the Society, and strongly to recommend that the series be continued in the future.

The portraits of the eight Presidents no longer living were taken from Daguerreotypes obtained from their respective families; and considering the difficulties arising from the imperfect nature of many of these pictures, the results obtained by Mr. Cowan the photographer may be considered very satisfactory.

The series has been continued to the present time, and now consists of 21 portraits.

VICE-PRESIDENTS,

1841-91.

	Years of Election.
Abel, F. A.	1866-67
Andrews, T.	1876-78
Brande, W. T.	1841-46
Brodie, B. C.	1856-58
Brown, A. Crum	1881-83, 90
Cooper, J. T.	1841-49
Crookes, W.	1876-78, 85, 86
Crum, W.	1863-67
Daniell, J. F.	1841
Daubeny, C. G. B.	1853
Debus, H.	1871-73
De la Rue, W.	1855-57, 65, 66
Dewar, J.	1880-82, 86, 87
Faraday, M.	1842
Field, F.	1877-79
Foster, G. C.	1888-90
Frankland, E.	1860, 68, 70
Gilbert, J. H.	1868-72, 75-77, 79-81
Gladstone, J. H.	1867-69, 74-76
Graham, Thomas	1843
Griess, P.	1882-84
Harcourt, A. V.	1873-75, 80-82
Hartley, W. N.	1890
Hofmann, A. W.	1863
Howard, D.	1886-88
Jones, H. Bence	1853-55, 58-63
Liveing, G. D.	1883-86
Longstaff, G. D.	1853-56, 74-76
Mallet, J. W.	1888-90
Maskelyne, N. S.	1878-80
Matthiessen, A.	1870
McLeod, H.	1887-89
Miller, W. A.	1848-52
Mond, L.	1887-89
Noad, H. M.	1869-72
Odling, W.	1869-72
Phillips, R.	1841-43, 46-47
Playfair, Lyon	1850-53
Porrett, R.	1858-61
Redwood, T.	1869-72
Reynolds, J. E.	1881-83, 89, 90
Roscoe, H. E.	1873-74, 77-79
Russell, W. J.	1872
Schorlemmer, C.	1887-88
Schunck, E.	1882-85
Simpson, M.	1872-74
Smee, A.	1859-64
Smith, R. A.	1878-80
Stenhouse, J.	857-59, 64-69, 71-73, 75-77
Thomson, T.	1844-45
Thorpe, T. E.	1884-86
Tilden, W. A.	1885-87
Voelcker, J. A.	1873-75, 83-84
Warington, R.	1851-54, 62-65
,, R. (jun.)	1889-90
Weldon, W.	1884-85
Williamson, A. W.	1854-57, 61-62
Yorke, P.	1852
Young, J.	1879-81

HONORARY OFFICERS, 1841-91.

TREASURERS.

	Years of Office.		Years of Office.
A. Aikin	1841-43	F. A. Abel	1869-75
Robert Porrett	1843-57	W. J. Russell	1875-89
Warren de la Rue ..	1857-65	T. E. Thorpe	1889-91
T. Redwood	1865-69		

SECRETARIES.

	Years of Office.		Years of Office.
E. F. Teschemacher ..	1841-42	W. Odling	1856-69
Robert Warington ..	1841-51	A. V. Harcourt	1865-73
George Fownes	1842-48	W. H. Perkin ..	1869-83
Edmund Ronalds.. ..	1848-50	W. J. Russell	1873-75
B. C. Brodie	1850-56	H. E. Armstrong.. ..	1875-91
T. Redwood	1851-65	J. M. Thomson	1883-91

FOREIGN SECRETARIES.

	Years of Office.		Years of Office.
E. F. Teschemacher ..	1842-47	F. A. Abel	1868-69
A. W. Hofmann	1847-61	H. Müller..	1869-85
E. Frankland	1861-68	F. R. Japp	1885-91

MEMBERS OF COUNCIL.

1841-91.

	Years of Election.
Abel, F. A.	1856-59, 62-65
Abney, Capt. W. de W.	1882-83
Anderson, T.	1852-55
Andrews, T.	1848-51, 61-64
Armstrong, H. E.	1873-74
Atkinson, E.	1868-71, 82-85
Attfield, J.	1874-77
Babington, B.	1844-45
Bassett, H.	1870-72, 90
Bell, J. L.	1867-69, 77-78
Bloxam, C. L.	1856-57, 71
Blyth, J.	1850-53
Brown, A. Crum	1872-73
„ F. D.	1881-82
„ H. T.	1883-86
Buckton, G. B.	1855-58, 65
Calvert, F. C.	1866-68
Campbell, D.	1852-56, 64-68, 72-76
Carnelly, T.	1884-88
Carteighe, M.	1878-81, 84-87
Chapman, E. T.	1869-70
Church, A. H.	1876-79, 87-89
Clark, T.	1841-42
Clowes, F.	1885-89
Cock, W. J.	1845
Collie, N.	1889-90
Crookes, W.	1866-69
Cross, C. F.	1890
Crum, W.	1846-49
Cumming, J.	1841
Daniell, J. F.	1842
Daubeny, C.	1841-43
Debus, H.	1863-66
De la Rue, W.	1845-47, 51-54
Dewar, J.	1874-76
Divers, E.	1873
Dixon, H.	1892
Dunstan, W. R.	1888-90
Duppa, B. F.	1865-73
Dupré, A.	1871-74
Everitt, Thomas	1841-44

	Years of Election.
Faraday, M.	1843-44
Ferguson, J.	1889-90
„ W.	1849-51
Field, F.	1860, 66-67, 70-72, 76
Fletcher, A. E.	1885-86
Forbes, D.	1867-70
Foster, G. C.	1865-68, 72-74, 85
„ M.	1873-75
Francis, W.	1860-62
Frankland, E.	1850-51, 58-59
„ P. F.	1887-88
Friswell, J. R.	1884-88
Gassiot, J. P.	1843
Gilbert, J. H.	1856-59
Gladstone, J. H.	1852-55, 61-62
Graham, C.	1880
„ T.	1851-52
Gregory, W.	1843-46
Griffin, J. J.	1848-50
Griffiths, T.	1841
Grove, W. R.	1841-42
Groves, C. E.	1877
Hadow, E. A.	1866
Hanbury, D.	1869
Hartley, W. N.	1877-79
Heaton, C. W.	1876-80, 88-89
Heisch, C.	1854-57
Hennell, H.	1841
Henry, W. C.	1855-58
Herapath, W.	1853-56
Hills, T. H.	1877
Hodgkinson, W. R. E.	1883-84
Hodson, E. A.	1865
Holzmann, M.	1870-71
Howard, D.	1875-78, 83-84
Hunt, R.	1846
Japp, F. R.	1882-84
Johnson, P. N.	1842-44
Johnston, J. F. W.	1842-45
Jones, H. B.	1848-52, 56-57
Joule, J. P.	1849-52
Kane, Sir R.	1845-47
Kinch, E.	1887-90

	Years of Election.
Lawes, J. B.	1862-65
Leeson, W. B.	1843-46
Letheby, H.	1866
Longstaff, G. D.	1850-52, 57-61
Lowe, G.	1841-42
Makins, G. H.	1862-63, 81-83
Marcet, W.	1859-61
Maskelyne, N. S.	1858, 75-76
Matthey, G.	1877-78
Matthiesen, A.	1862-64, 67-69
McLeod, H.	1871-73, 80-83
Meldola, R.	1883-86, 90
Mercer, J.	1858-60
Messel, R.	1884-87
Miller, W. A.	1847, 53-54
,, W. H.	1841-44
Mills, E. J.	1868-71, 75, 80-83
Mond, L.	1884-85
Morley, H. F.	1887-89
Muir, M. M. P.	1890
Müller, H.	1863-66
Newlands, J. A. R.	1886-87
Nicholson, E. C.	1864
Noad, H. M.	1857-60, 66-68
Normandy, A. R.	1860-63
O'Sullivan, C.	1882-85
Page, F. J. M.	1889-90
Pattinson, H. L.	1854-57
Pepys, W. H.	1841, 43-46
Pereira, J.	1847
Perkin, W. H.	1861-62, 68
Phillips, J. A.	1852-53, 75-77
,, R.	1844-45
Pickering, S. U.	1886, 89-90
Playfair, L.	1846-49
Plimpton, R. T.	1888-90
Porrett, R.	1841-42
Prestwich, J.	1869
Price, D. S.	1863
Purdie, T.	1888-90
Ramsay, W.	1886-88
Redwood, T.	1849-50

	Years of Election.
Rees, G. O.	1841-43
Reynolds, J. W.	1853
Riley, E.	1878-79
Roberts, W. C.	1879-81
Roscoe, H. E.	1860-63, 71-72
Russell, W. J.	1863-67, 70-71
Scanlan, M.	1846-47
Schorlemmer, C.	1881-84
Schunck, E.	1847-50, 59-62
Simpson, M.	1864-67, 69-70
Smee, A.	1857-58
Smith, J. D.	1844-45
,, R. A.	1870-72
Spence, P.	1873-74
Sprengel, H.	1872-75
Stenhouse, J.	1844-47, 51, 54-56, 61-63
Stevenson, T.	1872-74, 86-87
Taylor, T.	1853-54
Teschemacher, E. F.	1847-50
Thomson, J. M.	1880-82
,, R. D.	1855, 59
Thorp, W.	1879-82
Thorpe, T. E.	1879-82
Thudichum, J. L. W.	1879-80
Tidy, C. M.	1881
Tilden, W. A.	1878-80
Tuson, R. V.	1875-79
Tyndall, J.	1870
Valentin, W.	1876
Voelcker, J. A.	1857-60, 69-72
Wanklyn, J. A.	1867
Warington, R. (sen.)	1855, 59-61
,, R.	1874-75, 78-81
Way, J. T.	1854-56, 64
Wheeler, J. L.	1845-47
White, A.	1849
Williams, C. G.	1864-65, 68-69
Williamson, A. W.	1850-53, 58-60
Wilson, G.	1851-54
Wright, C. R. A.	1874-78
Yorke, P.	1842-43, 46-49

STATISTICS RELATING TO FELLOWS, 1841-91.

The Society originally consisted of Members, Foreign Members and Associates, a distinction being made between Members resident in London and Members resident in the country, or "non-resident" Members. The title of Fellow was introduced after the incorporation of the Society by Royal Charter. The distinction between resident and non-resident Fellows was continued until 1860, non-resident Fellows paying a smaller subscription.

The Associates originally paid no subscriptions, and merely had the right of attending the meetings; they were elected for three years only. It was afterwards resolved that Associates should pay an annual subscription of £1, without, however, being entitled to voting privileges or a gratuitous copy of the Society's publications. By paying 30*s.* they became entitled to the Society's publications. The number of Associates has always been small, and of late years, probably because the difference between the payment of a Fellow and of an Associate is so small, the Associateship has virtually fallen into oblivion.

It is worth noting that Kekulé was elected an Associate on 3rd April, 1854.

In the column headed deaths, withdrawals, &c., in the following list, the number first given indicates the number of deaths; the second, the resignations, and also those removed on account of non-payment of subscriptions, as it is probable that the majority of those who resign do so on account of unwillingness to pay the annual subscription. In earlier years there is no specific reference to the number removed on account of non-payment of subscriptions; the numbers given, as a rule, are taken from the Annual Reports. There are undoubtedly slight inaccuracies in some of these, but it is difficult to correct them owing to the paucity of records.

	Number of Fellows.	Associates.	Foreign Members.	Number Elected during Year.	Deaths.	Withdrawals.
1841 ..	77	—	—	41	—	—
1842 ..	118	6	3	25	2	7
1843 ..	134	10	3	20	1	4
1844 ..	149	15	4	32	2	1
1845 ..	178	13	6	18	4	7
1846 ..	185	9	6	14	—	3
1847 ..	196	6	7	22	5	5
1848 ..	208	7	9	29	2	11
1849 ..	224	3	9	12	2	—
1850 ..	221	2	20	15	2	5
1851 ..	229	—	20	24	3	5
1852 ..	245	—	20	16	2	18
1853 ..	241	—	20	13	7	—
1854 ..	247	—	18	17	3	—
1855 ..	261	8	18	9	3	11
1856 ..	256	9	20	22	0	9
1857 ..	269	14	23	30	5	17
1858 ..	277	13	24	34	3	6
1859 ..	302	9	24	26	3	3
1860 ..	323	12	30	26	3	4
1861 ..	342	10	30	30	3	9
1862 ..	360	14	30	43	2	4
1863 .	397	10	37	39	3	7
1864 ..	426	7	35	40	4	9
1865 ..	453	6	38	47	3	15
1866 ..	482	—	37	49	11	21
1867 ..	499	—	40	34	10	13
1868 ..	510	2	39	29	4	13

	Number of Fellows.	Associates.	Foreign Members.	Number Elected during Year.	Deaths.	Withdrawals.
1869 ..	522	2	38	41	6	6
1870 ..	551	3	36	42	6	5
1871 ..	582	—	34	59	13	4
1872 ..	624	1	32	76	10	8
1873 ..	682	—	32	70	12	7
1874 ..	733	—	31	84	9	7
1875 ..	801	—	31	103	8	15
1876 ..	881	—	30	65	16	14
1877 ..	916	—	36	49	9	18
1878 ..	938	1	35	61	5	13
1879 ..	981	1	34	77	14	10
1880 ..	1,034	1	33	91	10	19
1881 ..	1,096	—	31	95	11	5
1882 ..	1,175	—	29	104	9	23
1883 ..	1,247	—	37	119	19	24
1884 ..	1,326	—	36	84	18	32
1885 ..	1,360	—	32	111	16	27
1886 ..	1,428	—	31	110	13	48
1887 ..	1,477	—	30	109	11	41
1888 ..	1,534	—	37	140	23	37
1889 ..	1,614	—	36	145	15	46
1890 ..	1,698	—	33	114	17	41
1891 ..	1,754	—	32	—	—	—

OBITUARY NOTICES OF FELLOWS, 1841-91.

The presumed year of death is bracketted when not stated in the obituary notice. Volume of Journal in thick figures.

	Year of Death.	Reference to Obituary Notice.	
Abel, John Sangster	(1871)	**25**	342
Adie, Richard	(1880)	**39**	191
Allan, James	1866	**20**	386
Allen, Frederick	(1885)	**49**	342
Anderson, Thomas	1874	**28**	1309
Andrews, Thomas	(1885)	**49**	342
Apjohn, James	1886	**51**	469
,, Richard	1877	**33**	227
Arnold, Arthur Edward	1881	**41**	236
,, Edward	1872	**25**	342
Arnot, William	(1880)	**39**	190
Askin, Charles	1847	**1**	149
Atkinson, G. T.	1884	**47**	329
Bachhoffner, George Henry	1879	**37**	255
Baker, William	1878	**35**	265
Balmain, William Henry	1880	**37**	256
Barff, Frederick Settle	1886	**51**	471
Beaufoy, Henry	1851	**5**	159
Bell, Jacob	1859	**13**	167
,, James Wilson	1879	**37**	257
Berger, Capel H.	1868	**22**	iv
Bird, Alfred	1878	**35**	266
Blaikie, Adrian	1885	**47**	330
Bloxam, Charles Loudon	1887	**53**	508
,, Thomas	1872	**26**	773
Blyth, John	1871	**25**	343
Bowman, John Eddowes	1856	**9**	159
Brady, Henry Bowman	1891	**59**	452
Brande, William Thomas	(1865)	**19**	509
Brayley, Edward Wedlake	1870	**23**	292
Brazier, James Smith	1889	**55**	289
Brodie, Benjamin Collins	(1880)	**39**	182
Brooke, Henry James	1857	**11**	183
Brough, John Cargill	1872	**26**	774
Brown, Edwin Ormond	1885	**49**	344
Bruce, A. Cameron	1880	**39**	189
Burr, William Thomas	1874	**28**	1313
Burton, Cosmo Innes	1890	**59**	453
Calvert, Frederick Grace	1873	**27**	1198
Campbell, Dugald	1882	**43**	252
Carnelly, Thomas	1890	**59**	455
Carpenter, William Lant	1890	**59**	461
Chabot, Philip James	1868	**21**	xxxiv
Chapman, Ernest Theophron	1872	**26**	775
Charlesworth, Thomas	1876	**31**	493
Clapham, Calvert	1881	**41**	236
Clark, Thomas	1867	**21**	viii
Clements, George William Holliday	1885	**49**	345

	Year of Death.	Reference to Obituary Notice.	
Coleman, Joseph James	1888	55	290
Conington, Francis Thirkill	1863	17	435
Cooper, John Thomas	1854	8	109
Cowper, Charles	1860	14	350
,, Richard	1886	51	473
Crawhall, William	1849	3	98
Croft, Sir John	(1861)	15	493
Crum, Walter	(1867)	21	xvii
Cumming, Rev. James	1861	15	493
Dale, John	1871	25	344
,,	1889	57	446
Daniell, John Frederick	1844	M. 2	331
Daubeny, Charles Giles Bridle	1867	21	xviii
Dauglish, John	1866	14	511
Davey, Robert Roscoe Felix	(1883)	45	615
Davis, E. H.	1871	25	345
Davy, Charles	1873	27	1199
,, Edmund	1857	11	184
Deacon, Henry	1876	31	494
De la Rue, Paul Bienvenu	1876	31	496
,, Thomas	1866	20	387
,, Warren	1889	57	441
Desvignes, Frederick Charles	1876	31	495
Dircks, Henry	1874	28	1314
Donkin, W. F.	1883	55	292
Dowson, Edward	(1879)	37	258
Duffy, Patrick	1887	53	513
Duppa, Baldwin Francis	1873	27	1199
Eltoft, Thomas	(1880)	39	189
Evans, Henry Sugden	1887	51	475
Everitt, Thomas	(1845)	M. 3	141
Faraday, Michael	1867	21	xxi
Field, Frederick	1885	49	347
,, Henry	1888	55	293
Forbes, David	1876	31	496
Forrest, James	1884	47	331
Fownes, George	1849	2	184
Gassiot, John Peter	1877	33	227
Gerstl, Rudolf	1881	41	237
Glass, William	1879	37	258
Gossage, William	(1877)	33	229
Graham, John	1869	22	v
,, Thomas	1869	23	293
Gray, John	1882	43	252
Gregory, William	1858	12	172
Griffin, John Joseph	1877	33	229
Grosjean, John Joseph Beaumont Jeanneret	1882	43	253
Hall, Thomas	1877	33	230
Hadow, Edward Ash	1866	20	388
Hanbury, Daniel	1875	28	1314
Harcourt, William Venables Vernon	1871	25	348
Harris, William Harry	1873	27	1200
Harvey, Alexander	1876	31	499

	Year of Death.	Reference to Obituary Notice.	
Harvey, Robert	1883	**47**	331
Hatton, Frank	(1883)	**43**	257
Hay, William John	1873	**27**	1201
Hearder, Jonathan	1876	**31**	500
Hennell, Henry	(1842)	**Pr. 1**	52
Herapath, Thornton John	1858	**12**	171
,, William	1867	**21**	xxiv
,, ,, Bird	1868	**22**	vi
Higgin, James	1885	**49**	351
Hindmarsh, William Matthewson	1866	**20**	391
Hirst, George	(1886)	**51**	475
Hobler, Francis Helvetius	1876	**31**	501
Hobson, Arthur S.	1876	**31**	504
Hogarth, James	(1883)	**45**	615
Hope, Thomas Charles	1844	**M. 2**	330
Howard, Robert	1871	**25**	349
Hudson, Fearnside	(1866)	**20**	392
,, James William	1884	**47**	331
Huggon, William	1880	**37**	259
Humpidge, Thomas Samuel	1887	**53**	513
Hunt, Edward	1883	**45**	616
Hunter, John	1872	**26**	777
Hustler, William	1871	**25**	350
Hutcheson, John B.	1890	**59**	163
Inglis, Henry	(1842)	**Pr. 1**	52
Jennings, Francis Montgomery	(1884)	**47**	332
,, Thomas	1874	**29**	617
Jesseman, Alexander	1882	**43**	254
Johnson, Matthew Warton	1862	**16**	435
,, Richard	1881	**39**	188
,, Percival Norton	1866	**20**	392
Johnston, James F. W.	1855	**9**	157
Jones, Henry Bence	1873	**27**	1201
,, W. R.	1884	**47**	332
Joule, James Prescott	1889	**57**	149
Ladley, Rev. D. W.	(1880)	**39**	190
Lambert, Charles	1876	**31**	504
Lansdell, Mark J.	1884	**47**	332
Leeson, Henry Beaumont	1872	**26**	778
Letheby, Henry	1876	**29**	618
Lichtenstein, Maurice	1877	**31**	506
Lucas, Louis Arthur	1876	**31**	505
Macfarlane, J. F.	(1860)	**14**	349
Macgregor, James S.	1874	**28**	1317
Macintosh, Charles	1843	**M. 2**	109
Mackay, John	(1881)	**41**	237
Mansfield, Charles Blachford	1855	**8**	110
Marreco, A. Freire	(1881)	**41**	238
Matthews, Francis Cook	1874	**28**	1317
Matthiessen, Augustus	1870	**24**	615
Medlock, Henry	1875	**28**	1317
Meldrum, Edward	(1875)	**29**	619
Mercer, John	1866	**20**	395
,,	1879	**37**	260

	Year of Death.	Reference to Obituary Notice.	
Smith, William	1875	29	622
Southby, G R.	1886	51	476
Spence, Peter	(1883)	45	622
Spottiswoode, William	1883	45	628
Staples, Benjamin Charles	1872	26	782
Stark, Michael John	1875	28	1318
,, William	(1863)	17	436
Stenhouse, John	1880	39	185
Stewart, William Auld	1878	35	266
Stoddart, William Walter	(1880)	39	190
Stoikowitsch, Simeon	1866	20	397
Stone, Daniel	1873	27	1202
Storey, Joseph	1888	55	296
Sylvester, John	1852	6	155
Tarner, Alfred Pythian	(1871)	25	357
Tennant, James	(1880)	39	190
Tennent, John	(1867)	21	xxix
Teschemacher, Frederick Edward	1863	16	434
,, ,,	1877	33	234
Thomas, Sydney Gilchrist	1885	47	337
,, Thomas	1872	26	782
,, W. R.	(1881)	41	238
Thomson, Alexander Morrison	1871	25	357
,, James	(1850)	4	347
,, R. D.	1865	18	345
,, Thomas	1852	6	152
,, ,, Starkie	1847	1	151
Tilley, Thomas George	(1849)	2	188
Tribe, Alfred	(1885)	49	352
Valentin, William George	1878	37	260
Voelcker, John Christopher Augustus	1884	47	339
Waldie, David	(1889)	57	456
Wallace, William	1888	55	297
Walton, Jonathan Sparke	1881	41	238
Ward, Sykes W.	(1886)	53	518
Warington, George	1874	27	1203
,, Robert (sen.)	1867	21	xxxi
Watson, Henry Hough	1886	51	477
Watts, Henry	1884	47	342
Way, James Thomas	(1883)	45	629
Weldon, Walter	1885	51	480
West, William	1851	5	158
Wigner, George William	1884	47	344
Wilcock, Edgar	1883	43	255
Williams, John	1889	55	298
Willis, Arthur	1881	41	239
Wills, Thomas	1879	37	261
Wilson, George	1859	13	169
,, J. Chapman	1872	26	783
Winsor, William	1865	21	xxxiv
Wyndham, Thomas Heathcote Gerald	1876	31	510
Whipple, George	1871	25	358
Yorke, Phillip	1874	28	1319
Young, James	1883	45	630

FOREIGN MEMBERS,

1841-91.

In the first anniversary Address, the President stated that "in the selection of Foreign Members the Council has hitherto confined itself to the distinguished individuals who have directly assisted in forwarding the objects of the Society by contributing papers to be read at its meetings."

The first Foreign Member elected was Liebig (1st June, 1841), and it is noteworthy that the *first paper* communicated to the Society was one on "The Formation and Preparation of the Yellow Prussiate of Potash," by Professor Liebig, which Professor Graham read at the *first scientific meeting,* on 13th April, 1841; this is the first paper published in the *Proceedings.* An interesting discussion on this paper is briefly recorded in the Minutes having reference to the production and manufacture of the prussiate. Bunsen and Redtenbacher were elected later in the first session. In 1848, there were nine Foreign Members, one of these being Hofmann, who was elected in 1845; but in 1849, Hofmann became an ordinary Fellow, as recorded in the following entry in the Minutes of the Proceedings at the meeting on 3rd March, 1849 (*cf.* Quarterly Journal, II, p. 121): "Augustus W. Hofmann, Ph.D., was elected a Member of the Society." He had been elected Foreign Secretary two years before, in 1847.

During the Session 1849-50, twelve names were added to the list, making twenty in all, the limit being fixed at twenty-five. During the Session 1859-60, it was resolved to raise the limit to forty, but only six new names were added to the list. This limit has not hitherto been altered, and has only once been attained, viz., in 1867.

The statistics relating to Foreign Members are given in the table on pp. 186, 187.

In the following list of Foreign Members, the names of deceased Members are printed in italics :—

	Date of Election.	
Baeyer, Adolph	1876	May 18
Balard, Antoine Jérôme	1851	January 20
Beilstein, F.	1883	February 1
Berthelot, M.	1860	March 1
Boisbaudran, Lecoq de	1888	February 2
Boussingault, Jean Baptiste Joseph Dieudonné	1849	June 18
Bunsen, R. W.	1842	February 1
Butlerow, Alexander Mikhailovitch	1876	May 18
Cahours, Auguste	1857	May 18
Cannizzaro, S.	1862	June 19
Cleve, P. T.	1883	February 1
Chevreul, Michel Eugène	1849	June 18
Cooke, Josiah P.	1876	May 18
Debray, H.	1883	February 1
Dessaignes, Victor	1864	April 21
Deville, Henri Sainte-Claire	1860	March 1
Dumas, Jean Baptiste André	1847	December 6
Erdmann, Otto Linné	1864	April 21
Erlenmeyer, E.	1883	February 1
Fehling, Hermann von	1864	April 21
Fittig, R.	1883	February 1
Fremy, Edmond	1860	March 1
Fresenius, C. Remigius	1844	November 4
Friedel, C.	1876	May 18
Fritzsche, Carl Julius	1860	March 1
Gay-Lussac, J. L.	1849	June 18
Gerhardt, Charles	1855	,, 4
Geuther, Anton	1888	February 2
Gibbs, Wolcott	1866	May 3
Gmelin, Leopold	1849	June 18
Heintz, William Heinrich	1876	May 18
Helmholtz, H. von	1883	February 1
Hoff, J. H. van't	1888	,, 2
Hofmann, A. W.	1845	March 3
Kekulé, A.	1862	June 19
Kolbe, Adolph William Hermann	1847	May 17
Kopp, Hermann	1849	June 18
Ladenburg, A.	1888	February 2
Landolt, H.	,,	,, 2
Laurent, Auguste	1849	June 18
Lehmann, Carl Gotthelf	1857	May 18
Liebig, Justus von	1841	June 1
Loewig, C.	1862	,, 19
Magnus, Heinrich Gustav	1855	,, 4
Malaguti, Faustino Giovita Mariano	1862	,, 19
Marignac, Jean Charles Galissard de	,,	,, 19
Mendeléef, D.	1883	February 1
Meyer, Lothar	,,	,, 1
Victor	,,	,, 1

	Date of Election.	
Mitscherlich, Eilhardt	1849	June 18
Mulder, Gerardus Johannes	1860	March 1
Nilson, L. F.	1888	February 2
Pasteur, L.	1862	June 19
Peligot, A.	1860	March 1
Pélouze, Jules Theophile	1849	June 18
Piria, Rafaelle	1856	„ 18
Rammelsberg, C. F.	1866	May 3
Redtenbacher, Joseph	1842	March 15
Regnault, Henry Victor	1849	June 18
Rose, Heinrich	„	„ 18
Schrötter, Anton	1856	„ 18
Schönbein, Christian Friedrich	1846	April 20
Stas, J. S.	1862	June 19
Strecker, Adolph	1856	„ 18
Thénard, Baron	1849	„ 18
Thomsen, Julius	1876	May 18
Weltzien, Karl	1866	May 3
Will, Heinrich	1843	April 18
Wislicenus, Johannes	1888	February 2
Wöhler, Friedrich	1849	June 18
Wurtz, Charles Adolphe	1856	„ 18
Zinin, Nicolaus	1862	„ 19

The following is a list of Foreign Members of whom obituary notices have appeared in the Society's publications:—

	Year of Election.	Year of Death.	Reference to Obituary Notice.	
Balard, Antoine Jérôme	1851	1876	**31**	512
Boussingault, Jean Baptiste Joseph Dieudonné	1849	1887	**53**	509
Butlerow, Alexander Mikhailovitch	1876	1886	**51**	472
Chevreul, Michel Eugène	1849	1889	**57**	445
Debray, H.	1883	1888	**55**	291
Dessaignes, Victor	1864	1885	**47**	309
Deville, Henri Sainte-Claire	1860	1881	**41**	236
Dumas, Jean Baptiste André	1847	1884	**47**	310
Erdmann, Otto Linné	1864	1869	**23**	306
Fehling, Hermann von	1864	1885	**49**	346
Fritzsche, Carl Julius	1860	1871	**25**	345
Gerhardt, Charles	1852	1856	**10**	187
Geuther, Anton	1888	1889	**57**	448
Gmelin, Leopold	1847	1853	**7**	144
Heintz, William Heinrich	1876	1880	**39**	181
Kolbe, Adolph William Hermann	1847	1884	**47**	323
Kopp, H.	1849	1892	**63**	775
Laurent, Auguste	1849	1853	**7**	149
Lehmann, Carl Gotthelf	1857	1862	**16**	433
Liebig, Justus von	1841	1874	**27**	1204
Magnus, Heinrich Gustav	1855	1870	**24**	610
Malaguti, Faustino Giovita Mariano	1862	1878	**35**	266
Mitscherlich, Eilhardt	1849	1863	**17**	440
Mulder, Gerardus Johannes	1860	1880	**39**	181
Pélouze, Jules Théophile	1849	1867	**21**	xxv
Piria, Rafaelle	1856	1865	**19**	512
Redtenbacher, Joseph	1842	1870	**23**	311
Regnault, Henry Victor	1849	1878	**33**	235
Rose, Heinrich	,,	1864	**17**	437
Schrötter, Anton	1856	1875	**29**	622
Schönbein, Christian Friederich	1846	1868	**22**	x
Stas, J. I.	1862	1891	**63**	1
Strecker, Adolph	1856	1871	**25**	353
Thénard, Baron	1849	1857	**11**	182
Weltzien, Karl	1866	1870	**24**	622
Will, Heinrich	1843	1890	**59**	466
Wöhler, Friedrich	1849	1882	**43**	258
Wurtz, Charles Adolphe	1856	1884	**47**	328

FINANCES.

Epitome of the Finances of the Society from 1841 *to* 1891.

Date.	Income.	Total Expenditure.	Expenditure on Journal.	Expenditure on Library.	Investments.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
1841–42.........	191 5 0	39 18 9	—	—	—
'42–43.........	161 0 0	38 1 5	—	—	—
'43–44.........	193 0 0	139 6 10	86 19 6	14 7 0	—
'44–45.........	206 0 0	190 14 1	140 17 1	16 4 3	—
'45–46.........	171 0 0	66 13 6	—	24 10 7	—
'46–47.........	247 16 5	312 15 0	248 13 3	18 17 10	—
'47–48.........	206 0 4	159 16 4	92 2 2	18 6 7	353 10 0
'48–49.........	596 6 9[1]	599 0 8	232 2 8	13 12 6	—
'49–50.........	506 7 10	291 6 0	179 6 3	16 19 11	—
1850–51.........	461 3 10	335 7 9	211 19 2	36 2 4	144 11 3
'51–52.........	451 9 10	623 6 8	220 19 2	55 18 4	—
'52–53.........	463 7 2	432 0 9½	153 2 6	24 8 3	—
'53–54.........	344 10 3	362 5 11	164 18 6	14 14 6	—
'54–55.........	322 0 9	395 7 9	172 4 2	28 16 0	—
'55–56.........	539 13 11[2]	476 15 3	181 18 6	77 16 0	—
'56–57.........	454 3 0	409 13 2	156 13 0	62 14 0	—
'57–58.........	651 6 0	387 17 11½	156 6 1	75 12 9	—
'58–59.........	778 10 0[3]	470 7 0½	226 1 0	19 0 0	191 10 0
'59–60.........	528 0 0	391 4 7	263 19 4	35 18 0	90 17 6
1860-61.........	582 13 2	531 5 10	294 3 2	69 9 8	46 18 9
'61–62.........	611 17 8	493 11 10	290 5 11	110 18 2	90 0 0
'62–63.........	747 6 11	641 10 0	368 2 8	98 5 8	184 0 0
'63–64.........	817 8 4	616 0 6	342 4 11	87 17 11	91 7 6
'64–65.........	872 8 6	619 17 0	418 10 6	36 0 4	89 17 6
'65–66.........	888 11 8	645 4 0	341 7 5	36 5 7	273 17 6
'66–67.........	1,086 7 2	608 10 0	359 7 5	75 14 3	438 2 6
'67–68.........	981 9 5	646 11 1	384 15 7	89 15 3	500 0 0
'68–69.........	1,122 19 8	843 14 2	529 13 9	127 4 11	329 12 4
'69–70.........	1,178 16 7	812 1 6	385 10 4	94 17 11	—
1870–71.........	1,401 6 0[4]	739 7 5	389 5 8	60 11 6	282 7 6
'71–72.........	1,630 5 0	1,378 11 8	1,081 18 6	74 15 8	—
'72–73.........	1,966 0 1	1,508 15 11	1,016 9 9	112 17 0	—
'73–74.........	2,164 2 0	2,455 10 9[5]	1,323 4 5	121 15 3	468 15 0
'74–75.........	2,158 14 1	2,698 19 4	1,304 5 7	268 3 5	—
'75–76.........	2,648 9 4	1,909 18 8	1,222 10 5	172 3 4	—
'76–77.........	3,454 7 5[6]	2,298 11 7	1,584 18 3	205 8 4	1,317 14 6
'77–78.........	3,319 6 7[7]	2,146 16 3	1,512 4 4	177 8 4	1,525 12 6
'78–79.........	3,440 18 4[8]	2,342 8 4	1,616 2 2	225 2 6	—
'79–80.........	2,720 6 6	3,034 16 1	1,870 9 8	601 12 2[9]	720 2 6
1880–81.........	2,916 5 2	2,641 0 6	1,688 11 10	441 0 9	—
'81–82.........	3,034 17 1	2,493 6 4	1,733 11 10	233 4 11	324 7 6
'82–83.........	3,073 5 1	2,769 8 1	1,944 13 3	307 9 10	530 0 0
'83–84.........	3,536 13 11	2,707 9 3	1,591 1 1	241 9 0	320 12 6
'84–85.........	3,568 19 11	3,283 13 2	2,198 14 4	440 8 7	770 0 0
'85–86.........	3,742 15 4	3,108 0 2	2,192 11 0[10]	408 11 1	324 15 0
'86–87.........	3,726 17 11	3,416 14 2	2,190 1 8	323 11 10	535 15 0
'87–88.........	3,896 12 10	3,194 1 4	2,257 5 9	365 7 10	331 2 6
'88–89.........	4,151 2 6	3,429 18 3	2,522 10 6	308 5 6	560 13 0
'89–90.........	4,375 3 3	3,578 18 8	2,488 2 10	420 8 11	593 12 6
1890–91.........	4,228 3 10	3,790 4 9	2,907 8 8	300 18 9	672 15 6

[1] This sum includes donations amounting to £99 13*s*. towards the expenses of the Charter, and £134 1*s*. 3*d*. realised by the sale of £150 3 per cent. Consols; the expenditure for the year includes £300 Charter expenses. Donations amounting to nearly £20 were received in 1849-51.

[2] This sum includes £135 4*s*. 3*d*. realised by the sale of £150 3 per cent. Consols.

[3] This sum includes £50 specially subscribed to the "Removal Fund."

[4] The income in this and the five following years includes amounts subscribed to the Monthly Report Fund by Fellows and by the British Association, viz., 1870-71, £220 8*s*.; 1871-72, £152 13*s*.; 1872-73, £257 17*s*.; 1873-74, £471 8*s*.; 1874-75, £340 5*s*.; 1875-76, £348 4*s*.

[5] The expenses on removal to the present apartments were in this year £627 5*s*. 5*d*., and in the next year £595 0*s*. 6*d*.

[6] This includes the Dircks Legacy of £840 5*s*.

[7] This includes the Lambert Legacy of £1,000.

[8] This includes the Ellis Legacy of £1,000.

[9] A large sum was spent in this and the next year in purchasing duplicate sets of important serials for circulation.

[10] The cost of the Proceedings is included in this and the following years.

THE RESEARCH FUND.

In the account of the origin of the Faraday lectureship mention is made of a suggestion put forward by Dr. Miller, on 19th March, 1868: "That a fund to be employed in aid of scientific research would be a fitter memorial and more serviceable to science. Such a fund would have to be independent of the funds of the Society."

The suggestion appears to have had important consequences, for, although no steps were taken to found a research fund in commemoration of Faraday, the minutes of 21st July, 1868, show that, immediately after approving of the recommendations of the Faraday lectureship committee, the Council proceeded to pass a resolution, "that the Society should make grants in aid of chemical research, and the question of the conditions under which such grants should be made was referred to a committee, consisting of the President (Mr. de la Rue), Dr. Miller, Dr. Williamson, Mr. Abel, Dr. Gladstone and Dr. Matthiessen."

This committee presented the following report on 3rd December, 1868:—

"Your committee recommend that a sum not exceeding £50 be voted annually from the income of the Society, to be appropriated for the purpose of conferring grants of money in aid of original research. The committee consider that, without actually limiting the sum to be granted at one time to any single applicant, it would be desirable, in the majority of instances, that the amount so granted should not exceed £10. The committee believe it to be advisable that these grants should not be limited to Fellows of the Chemical Society. The main object of the proposed measure being to afford aid to the younger workers in science, the committee do not anticipate that applications for assistance from the grant fund would be made by Fellows of the Royal Society. It should be understood that the results of the investigations carried on with aid from the grant fund are to be communicated in the first instance to the Chemical Society. It is recommended that a committee of not less than five members be appointed to report to the Council on all applications made for aid from the grant fund.

"It was agreed that this report be received, adopted, and entered on the minutes; that the report be read at the next meeting of the Society; and that an announcement of the substance of the resolution be printed on the cover of the *Journal*.

"It was resolved that the grant committee for the first year consist of the President, Dr. Miller, Dr. Williamson, Mr. Abel and Dr. Matthiessen. Also, that £50 be set apart for the year as the grant fund."

In March, 1870, "a brief discussion took place as to the grants proposed to be made in aid of chemical research," but there does not seem to have been much demand for assistance at this time, as the only reference to a grant occurs in the balance sheet presented in March, 1871, in which there is an entry of £10 credited to the Treasurer for a "money grant for original research." No grant was made during the next year, and sums of only £30, £10, and £10 were granted during the three following years.

In 1872, on 20th June, "a letter was read from Mr. T. Hyde Hills, suggesting the formation of a research fund, from whence the Council should make grants to chemists needing such assistance for the prosecution of original research, enclosing a cheque for £10 10*s*. as a first contribution, and offering to give a like sum for every £90 or guineas subscribed by others up to the amount of £500. It was resolved that the thanks of the Council be presented to Mr. Hills for his donation, and that he be informed that it is proposed to print on the cover of the Society's *Journal* a statement of his suggestions and offer."

At the next meeting, however (on 24th October), "it was resolved that the Secretary should ask Mr. Hyde Hills whether, as it appeared better to delay the attempt to raise by subscription a scientific research fund, he would wish the £10 10*s*. he had already contributed to be at once available, together with the £50 offered annually by the Society, for the promotion of scientific research, or would wish it reserved till a general subscription had been set on foot." In answer to this, on 7th November, "a letter was read from Mr. Hyde Hills, stating that the £10 10*s*. already contributed by him towards the proposed fund for scientific research was at the disposal of the Council. The remainder of the donation offered, consisting of four other sums of ten guineas, he would pay as originally proposed when the Council decided on making a permanent fund."

A few months later, on 20th March, 1873, "Mr. de la Rue brought under the notice of the Council a conversation which he had had with Dr. Longstaff, who called upon him and expressed his willingness to give a certain sum of money to the Society with a view of inaugurating a chemical investigation aid fund to be administered by the Council."

On 3rd February, 1876, Dr. Longstaff, who was then a member of the Council, "stated that he was willing to give £1,000 to the Society, to be invested and the interest expended in the promotion of chemical research, provided that another £1,000 could be raised and applied to the like purpose. A committee of the officers, with Dr. Longstaff, was appointed to take steps towards carrying out Dr. Longstaff's proposal, and the following circular was issued:—

"CHEMICAL SOCIETY,
"BURLINGTON HOUSE, PICCADILLY, W.
"*March*, 1876.

"DEAR SIR,

"I am instructed by the President and Council of the Chemical Society to request your consideration of a matter which they hope will elicit your interest and active co-operation.

"The advancement of chemical science, which constitutes the special object of the Chemical Society, may be promoted chiefly in two ways—

"1st. By facilitating the early acquirement by students of chemistry of a knowledge of the results of chemical research carried on in this and other countries.

"2nd. By affording direct assistance to workers in chemical science, with a view to encourage and facilitate their labours in experimental research.

"The Chemical Society has sought from the time of its foundation to aid in the first of these objects by the publication of original papers communicated to the Society; and, during the last five years, a special Guarantee Fund and liberal aid from the British Association for the Advancement of Science have enabled the Society to establish, on a firm footing, the publication of monthly abstracts of original papers published in this country and abroad on chemistry and allied branches of science.

"The Chemical Society has also recently endeavoured, as far as its funds would permit, to afford assistance to chemists undertaking original investigations, by the extension of its library, and occasionally by grants of small sums of money, when pecuniary aid was applied for. The limited resources of the Society have, however, restricted the number and amount of these grants within very narrow limits. In 1872 Mr. T. Hyde Hills placed at the disposal of the Chemical Society the sum of £10, as the nucleus of a fund for promoting original research; and offered, under certain conditions, made with the object of securing the co-operation of others, to contribute a like sum annually. This attempt of Mr. Hills to form a research fund was not, at the time, seconded. The Council have, however, recently received from Dr. G. D. Longstaff, one of the original members, the generous offer to place at the disposal of the Society the sum of one thousand pounds (£1,000) towards establishing a permanent fund for promoting the advancement of chemical science, on the condition that not less than an equal amount be subscribed for the same purpose.

"As the President and Council feel that such a fund would add much to the usefulness of their Society, and enable them to encourage still further the prosecution of chemical science, they are most desirous to secure to the Society the benefit of this munificent offer of Dr. Longstaff, and have therefore instructed me to ask your co-operation towards the attainment of this object.

"I remain, yours obediently,

"William J. Russell,
"*Treasurer*."

The first record of the successful prosecution of the labours of members of this committee appears on 26th October, 1876, when "The President" (Mr. Abel) "stated that he had been privately informed that the Goldsmiths' Company had voted £1,000 to the Research Fund of the Society."

On 21st December, 1876, the following "Report of the Longstaff Committee" was read to the Council:—

"The committee appointed 3rd February, 1876, to consider and act with regard to the offer of Dr. Longstaff to subscribe £1,000 towards a fund for aiding scientific research, on condition that not less than an equal sum be raised by the Society, beg to report that they have taken active steps to make the offer of Dr. Longstaff widely known.

"The accompanying letter was sent to all the Fellows of the Society and to others, especially to those engaged in chemical manufactures. Advertisements of the amounts subscribed and articles on the object of the fund have appeared in different papers. The result has been that the committee have received subscriptions to the amount of £1,042 7*s.*; this sum being exclusive of a donation of £1,000 from the Worshipful the Company of Goldsmiths, so that at the present time the sum of £2,042 7*s.* stands at the Society's bankers to the credit of the Chemical Society Research Fund. Dr. Longstaff informs the committee that he is prepared at once to transfer to the fund North British 4 per cent. preference stock to the amount of £1,000. Under the provisions of its Charter the Society can receive and administer this fund without the appointment of special trustees, or the drawing up of special trust deeds. The committee would therefore strongly recommend that this trust be accepted in the name of the Chemical Society, and be, with other moneys belonging to the Society, administered by the Council. The special object of the fund should be clearly stated, and the committee would define it as being a fund to aid and promote research in chemical science.

"They would further add that in their opinion (1) the income arising from the moneys invested, and from annual or other subscriptions to the fund, should be applied by the President and Council of the Chemical Society for the time being, in such ways as they shall consider most conducive either to the promotion of experimental research, or to the rewarding of meritorious investigation. (2) The dividends and subscriptions should be as nearly as may be annually expended in furtherance of the special objects of the fund. And the committee must here mention that Dr. Longstaff has made one stipulation in connection with the donation made by him to the Chemical Society, namely, that a gold medal of not less value than £20 be awarded triennially to the Fellow of the Society who, in the opinion of the Council, has done the most to promote chemical science by research. (3) That with regard to future donations to the fund, if they be given without restriction, the President and Council be at liberty either to invest such sums, or if they see fit to expend them either entirely or in part in carrying out the objects of the fund.

"In conclusion the committee would recommend that the Council, on behalf of the Society, do formally accept the fund and undertake to administer it for the objects above suggested.

"(Signed 21st December, 1876, on behalf of the committee.)

"F. A. Abel."

It was thereon resolved: "That the report of the committee appointed to consider the acceptance of Dr. Longstaff's gift of £1,000, and the formation of a scientific research fund, be received and adopted; and that the Council do accept the above trust as recommended in the committee's report, and do undertake to administer the funds for the objects therein suggested."

At the next meeting of Council, on 18th January, 1877, "Dr. Longstaff presented the transfer of £1,000 North British 4 per cent. preference stock; and it was resolved that a formal vote of thanks to Dr. Longstaff be engrossed on vellum and presented to him." The vellum was exhibited to the Council at the meeting on 1st February, 1877, the inscription thereon being as follows:—

"At a meeting of the Council of the Chemical Society, held at

Burlington House, London, on the 18th January, 1877, F. A. Abel, F.R.S., President, in the Chair, it was unanimously resolved:—

'That the thanks of the Society be presented to

DR. GEORGE DIXON LONGSTAFF,

an original member of the Society, and Vice-President, for the munificent donation of one thousand pounds made by him to the Society, with the object of establishing a permanent fund for promoting the advancement of Chemical Science.

(Signed) "F. A. Abel, *President.*

"W. H. Perkin
"Henry E. Armstrong
"Hugo Müller } *Secretaries.*"

On 19th April, 1877, the following final report of the Longstaff Committee was read:—

"The object of reappointing the committee after receiving their first report was, that another and more definite appeal for funds should be made to chemical manufacturers. Your committee, immediately on being appointed, drew up a circular (which is appended) and forwarded it directly, or, when possible, through the agency of a friend, to a large number of chemical manufacturers. The result has not been very satisfactory, as rather less than £100 is all that up to the present time has been received from manufacturers since the circular was issued; at the same time promises of aid have been received, which in time, your committee believe, will be redeemed.

"With the City Companies your committee have been very successful, and through the instrumentality of your late President, four more of these Companies have subscribed to the fund. The Drapers' Company have undertaken to subscribe 100 guineas a year for three years; the other Companies, viz., the Clothworkers', the Merchant Tailors', and the Mercers', have each simply made a donation of 100 guineas.

"The total sum which has been received up to this date is £359 14*s*. In addition to this, £124 4*s*. will be received in each of the next two years.

"Your committee are of opinion that the fund may be still increased very considerably, but that it is now time for a more permanent and larger committee to be formed, who shall have power to administer the funds according to the terms already agreed on.

(Signed) "F. A. ABEL."

Circular referred to in the report of 19th April.

"THE CHEMICAL SOCIETY,
"BURLINGTON HOUSE, PICCADILLY, W.,
"*February*, 1877.

"DEAR SIR,

"The Council of the Chemical Society issued a circular last March calling the attention of the Fellows of the Society, and of those directly interested in applied Chemistry, to a fund which they were raising for the purpose of aiding Chemical research. This fund originated with Dr. G. D. Longstaff, who undertook to present to the Society the sum of one thousand pounds (£1,000) on condition that a like sum was raised by the Society and invested with his gift, so as to establish permanently a Scientific Research Fund. The stipulated sum has been raised, and is, with Dr. Longstaff's gift, invested in the name of the Society. This fund, moreover, has been increased by the munificent gift of £1,000 from the Worshipful Company of Goldsmiths, so that it now amounts to a little more than £3,000; but the income arising from the investment of this sum, and from the few annual subscriptions, is obviously small, and is far from approaching the requirements of the case.

"The Council are convinced that much good work and many important results can be obtained by the judicious administration of a sufficiently important fund of the kind which they have established; especially do they look to the power it will give the Society of inducing men well qualified as investigators to undertake work which, in itself, is not remunerative, though of great importance to the development of Science, and also of aiding those who are already engaged in carrying on important investigations, but whose researches are either impeded or altogether stopped by want of pecuniary means.

"Both Dr. Longstaff and the Council naturally anticipated that this fund would be largely aided by donations and subscriptions from chemical manufacturers, and from those who have been extensively connected with Chemical industry—from those, in fact, who have been or are deriving large pecuniary returns from the applications of Chemical science, and who are therefore also directly interested in the development and improvement of chemical manufactures through the extension of chemical knowledge.

"From the accompanying list, however, it will be seen that the subscribers to the fund are principally scientific chemists, and that, with very few exceptions, chemical manufacturers have hitherto abstained from aiding this fund.

"The Council believe the cause of this to be that the nature and object of the fund, and even its very existence, have not been known to chemical manufacturers generally, and they have therefore directed me to forward to you this circular, and to express their earnest hope that you will aid them in increasing their Research Fund.

"I shall be happy to furnish you with any further information you may desire with regard to this fund, and also to receive any suggestions you may have to make with regard to its administration.

"I have the honour to remain, yours obediently,

"W. J. Russell, *Treasurer*.

"CHEMICAL SOCIETY RESEARCH FUND.

"LIST OF SUBSCRIPTIONS.

	£	s.	d.
Longstaff, G. D., M.D. ..	1,000	0	0
The Worshipful Company of Goldsmiths	1,000	0	0
Abel, F. A., P.C.S. ..	10	0	0
Andrews, T., M.D., F.R.S.	10	0	0
Atkinson, E., Ph.D. ..	5	0	0
Attfield, J., Ph.D... ..	10	10	0
Bain, Professor A... ..	2	0	0
Barnes, W. C.	20	0	0
,, W. H.	2	2	0
Bickerdike, W. E... ..	2	2	0
Brodie, B. C., Bart, F.R.S.	50	0	0
Bullock, Lloyd	3	0	0
Butt, E. N...	5	0	0
Carew, R. R.	5	0	0
Carnelley, T.	0	10	0
Carpenter, W. L.	5	0	0
Carteighe, J.	10	10	0
,, M.	10	0	0
Courtauld, J. (annual) ..	5	0	0
Crispin, W...	1	1	0
Davidson, W. (annual) ..	5	0	0
Davis, G. E.	1	1	0
Deacon, H., The late ..	50	0	0
De la Rue, W., D.C.L., F.R.S.	100	0	0
Estcourt, C.	1	1	0
Eve, H. W...	5	0	0
Field, J.	3	3	0
Forbes, D., The late, F.R.S.	10	0	0
Foster, M., M.D., F.R.S. ..	5	0	0
Gilbert, J. H., Ph.D., F.R.S.	5	0	0
Gladstone, J. H., Ph.D., F.R.S.	100	0	0
Griffin, W...	5	5	0
Groves, C. E.	5	0	0
Guyer, J. B.	2	2	0
Hartley, W. N. (for 4 years)	1	1	0
Herman, W. D.	1	1	0
Hills, Hyde	50	0	0
,, (2nd donation)	10	0	0
Holden, E...	10	0	0
Howard, D...	25	0	0
Jennings, F. M.	2	0	0
Keyworth, G. A.	1	0	0
Lansdell, M. J.	2	2	0
Liversidge, Prof. A. ..	5	0	0
Lockyer, W. J.	3	3	0
,, G.	5	0	0
Lindsay, T...	5	0	0
Makins, G. H.	5	0	0
Maule, G.	20	0	0
Müller, H., Ph.D., F.R.S...	10	0	0
Nicholson, E. C.	100	0	0
Noble, A., Capt.	10	0	0
Odling, W., F.R.S. ..	10	10	0
Oman, J. C.	3	0	0
Osler, Follett, F.R.S. ..	10	0	0
Packer, G. S.	1	0	0
Perkin, W. H., F.R.S. ..	50	0	0
Phillips, J. A.	10	0	0
Postans, A. W.	1	1	0
Price, A. P...	5	0	0
Reddrop, J.	2	2	0

	£	s.	d.		£	s.	d.
Richie, W. B.	5	0	0	Stevenson, J.	5	0	0
Ridout, R. H.	1	1	0	Teschemacher, E. F. ..	5	0	0
Rimmington, F. M. ..	1	1	0	Thomas, C...	5	0	0
Robbins, J...	5	5	0	Thomson, J. M. (for 2 years)	2	2	0
Roscoe, H. E., Ph.D., F.R.S.	10	0	0	Thorp, W.	5	0	0
Rowney, T. H., Ph.D. ..	5	0	0	Thudichum, J. L. W., M.D.	5	0	0
Russell, W. J., Ph.D., F.R.S.	10	0	0	Tuson, R. V. (annual) ..	1	1	0
				Voelcker, A., Ph.D., F.R.S.	10	0	0
Samuelson, B.	20	0	0	Watts, H., F.R.S... ..	1	1	0
Shore, T. W.	1	1	0	,, W. M., D.Sc. ..	5	0	0
Siemens, C. W., D.C.L., F.R.S.	20	0	0	Weldon, W. (annual) ..	5	0	0
				Williams, W. C.	1	1	0
Smith, J. Denham	20	0	0	,, J.	10	0	0
Smyth, J., jun.	1	0	0	Worsley, P. J. (annual) ..	10	0	0
Spratling, W. J.	1	1	0	Yates, R.	5	5	0
Stevenson, T., M.D. ..	5	5	0	Young, J., F.R.S.	100	0	0

"Chemical Laboratory,
"St. Bartholomew's Hospital, E.C.,
"31*st January*, 1877."

"W. J. Russell, *Treasurer*.

The report of the Committee having been adopted, a committee was appointed "to make general and special recommendations with regard to the Research Fund"; the committee to consist of nine Fellows, together with the Officers, it being provided that three members of the committee should retire each year.

The receipts and expenditure of the fund up to 1890–91 are exhibited in the appended statement :—

Years.	Donations and Subscriptions.			Investments.			Dividends.			Grants.		
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
1876.. ..	1,000	0	0	1,000	0	0	—			—		
1876-77 ..	2,333	13	0	2,050	0	0	—			—		
1877-78 ..	986	19	0	919	12	6	121	11	11	245	0	0
1878-79 ..	227	6	0	—			138	19	11	250	0	0
1879-80 ..	273	11	0	102	17	6	141	2	6	495	0	0
1880-81 ..	257	7	0	313	2	6	141	12	0	111	0	0
1881-82 ..	142	5	0	—			171	12	5	100	0	0
1882-83 ..	120	1	0	212	0	0	137	3	5	220	0	0
1883-84 ..	106	1	0	—			158	15	0	95	0	0
1884-85 ..	115	0	0	218	15	0	162	5	7	165	0	0
1885-86 ..	105	0	0	—			183	9	10	155	0	0
1886-87 ..	105	0	0	215	10	0	149	11	10	145	0	0
1887-88 ..	105	0	0	110	10	0	172	15	11	95	0	0
1888-89 ..	—			—			175	4	11	—		
1889-90 ..	—			—			175	10	0	100	0	0
1890-91 ..	—			445	10	6	182	6	6	60	0	0
	£5,877	3	0	£5,587	18	0	—			£2,136	0	0

The Drapers' Company continued their munificent donation of one hundred guineas yearly until 1887–88. Dr. de la Rue, who subscribed £100 in 1877, gave a like sum in 1878 and again in 1879; Dr. Gladstone, an original subscriber of £100, gave a like sum again in 1880; and Mr. Mond has recently presented £100 to the fund. The present income of the fund is derived from £4,400 invested in Metropolitan Board of Works $3\frac{1}{2}$ per cent. stock, and £1,000 invested in North British Railway 4 per cent. stock.

The total number of grants made has been 119, the sum granted being £2,941. It is known that satisfactory results have been obtained in the case of a large proportion of the researches on behalf of which grants have been made, and a very considerable number of valuable papers describing these results are printed in the Society's *Transactions.* The fund has undoubtedly been the means of imparting a considerable impetus to original inquiry among the Fellows.

List of Grants made from the Research Fund.

1877. Amount granted £245.

£50 to Dr. Wright: for the investigation of certain problems in chemical dynamics.

£25 to Mr. G. S. Johnson: for a research on double salts with potassium triiodide.

£25 to Mr. E. Neison: for a research on octyl compounds.

£25 to Mr. Carleton Williams: for a research on hydrocarbons containing the group isopropyl twice.

£10 to Mr. George Harrow: for a research on derivatives of acetoacetic ether.

£50 to Dr. Wright: for the continuation of his investigation of certain problems in chemical dynamics.

£25 to Dr. Armstrong: for a research on camphor and allied compounds.

£20 to Dr. Carnelley: for an investigation of the hydrocarbons diphenyl, ditolyl, &c.

£10 to Mr. P. Bedson: for an investigation of derivatives of phenylacetic acid and of the constitution of isatin.

£5 to Mr. J. K. Crow: for an investigation of the action of zinc ethyl on vanadium chlorides.

1878. Amount granted £195.

£50 to Mr. W. N. Hartley: for an investigation of the absorption of the ultra-violet rays of the spectrum by organic substances.

£30 to Dr. W. Ramsay: for determining the electric conductivity and resistance of solutions of salts at different temperatures.

£50 to Dr. Tilden: for an investigation into the chemical nature of the terpenes.

£10 to Mr. W. A. Henslowe: for an examination of certain reactions of brucine and strychnine.

£20 to Mr. W. Jago: for a research on the organic matter in sea-water.

£20 to Mr. F. Jones: for the investigation of boron hydride.

£15 to Mr. F. D. Brown: for the experimental study of the theory of fractional distillation.

1879. Amount granted £350.

£10 to Dr. C. A. Burghardt: for the investigation of the constitution of topaz.

£15 to Prof. Thorpe: for the investigation of abietene, the hydrocarbon of the nut pine.

£30 to Dr. Dupré: for the estimation of the organic carbon in atmospheric air.

£30 to Mr. W. Whitley Williams: for the elaboration of an improved method of organic analysis.

£25 to Mr. W. M. P. Muir: for the study of the chemical habitudes and physical constants of bismuth compounds.

£15 to Mr. J. M. Thomson: for experiments on the action of isomorphous bodies in exciting the crystallization of supersaturated solutions.

£50 to Dr. Wright: for the continuation of his investigations of certain problems in chemical dynamics.

£25 to Mr. F. D. Brown: for the continuation of his investigation of the theory of fractional distillation.

£30 to Mr. Bolas: for the preparation and investigation of alloys and compounds of chromium.

£20 to Dr. Japp: for the investigation of the action of the organo-zinc compounds on quinones.

£100 to Dr. Armstrong: for the determination of certain physical properties, especially the refractive indices of typical chemical compounds.

1880. Amount granted £255.

£100 to Mr. F. D Brown: for the determination of the vapour tensions of pure compounds and of mixtures.

£100 to Dr. Wright: for the determination of chemical affinity in terms of electrical magnitudes.

£10 to Mr. Kingzett: for the study of the atmospheric oxidation of phosphorus.

£25 to Mr. Watson Smith: for the investigation of the dinaphthyls and of the phenylnaphthalenes.

£20 to Messrs. Bailey and Munro: for the study of certain colorimetric methods of analysis.

1881. Amount granted £131.

£20 to Professor Carnelley and Mr. O'Shea: for the determination of the vapour density of certain compounds of beryllium.

£20 to Dr. Hodgkinson: for the investigation of the products of the action of sodium on ethereal salts of phenylacetic acid.

£6 to Dr. Marsden: for experiments on the production of boron hydride from a boron manganese alloy.

£5 to Mr. J. T. Brown: for the construction of a gas density apparatus.

£50 to Professor Thorpe: for the determination of the atomic weight of titanium and the examination of titanium minerals.

£20 to Dr. Hodgkinson: for the investigation of derivatives of acenaphthene.

£10 to Mr. E. H. Rennie: for the investigation of benzylphenol.

1882. Amount granted £125.

£100 to Dr. Wright: for the continuation of his research on the determination of chemical affinity in terms of electromotive force.

£25 to Messrs. Cross and Bevan: for the investigation of certain varieties of cellulose.

1883. Amount granted £195.

£25 to Dr. Rennie: for the further investigation of Australian sarsaparilla.

£25 to Mr. Shenstone: for the further investigation of nux vomica alkaloïds.

£15 to Mr. Watson Smith: for the investigation of a sublimate formed in the manufacture of aurin.

£25 to Dr. Tilden: for the investigation of the C_5H_8 hydrocarbons and the decomposition of terpenes by heat.

£10 to Mr. James: for the investigation of ethylene chlorobromide and its homologues.

£10 to Mr. A. B. Griffiths: for the examination of the influence of iron salts on the growth of plants.

£20 to Dr. F. G. Matthews: for the examination of the products of the distillation of amber.

£15 to Dr. Griffiths: for the continuation of his experiments on the influence of ferrous sulphate on the growth of plants.

£50 to Mr. Watson Smith: for the investigation of coke and blast furnace tars.

1884. Amount granted £75.

£25 to Mr. T. Turner: for the investigation of the influence of silicon on iron and steel.

£50 to Professor Humpidge: for the determination of the specific heat of solid elements.

1885. Amount granted £245.

£75 to Professor T. E. Thorpe: for the investigation of the relation between surface-tension and viscosity of liquids and their chemical nature.

£15 to Dr. A. B. Griffiths: for the continuation of his experiments on the use of ferrous sulphate as a manure.

£20 to Dr. J. W. James: for the study of the homologues of taurine.

£20 to Dr. Hodgkinson: for the continuation of his investigation of fluorene and its derivatives.

£10 to Mr. G. Stallard: for the examination of certain bromo-naphthalenesulphonic acids.

£20 to Mr. Thomas Turner: for the continuation of his experiments on the influence of silicon on the properties of iron and steel.

£25 to Dr. G. H. Bailey: for the examination of zirconium compounds with a view to the discovery of suitable means of determining the atomic weight of the element.

£50 to Dr. A. K. Miller: to investigate the products of the decomposition of solid paraffin by heat.

£10 to Mr. W. W. J. Nicol: in aid of an investigation of the nature of solution.

1886. Amount granted £170.

£25 to Professor E. H. Rennie: for the investigation of the sweet principle of *Smilax glycyphylla*.

£10 to Mr. A. R. Ling: for the study of the action of halogens on halogen nitro derivatives of phenols.

£20 to Mr. Gibson Dyson: for the further study of dicoumarine.

£5 to Dr. J. M. H. Munro: for the separation and study of the fluorescent substance in the testa of spurrey seed.

£10 to Mr. A. G. Perkin: for the study of the Indian colouring matter "Kamala."

£75 to Dr. W. H. Perkin, jun.: for researches on the synthetical formation of closed carbon-chains.

£25 to Mr. R. Warington: for the purchase of a microscope for the study of the micro-organisms in soil.

1887. Amount granted £95.

£25 to Professor E. H. Rennie: for the further study of the red colouring matter of *Drosera Whittakeri*.

£25 to Mr. Holland Crompton: for the study of the action of nitric acid on copper-zinc and copper-tin alloys with the object of determining whether the metals exist in combination or admixed.

£10 to Mr. C. H. Bothamley: for experiments on the use of dyes in photography, and especially on the sensitising action of the dye.

£25 to Mr. W. P. Wynne: for the determination of the nature of the products formed on oxidising nitric oxide by admixture with oxygen.

£10 to Mr. A. Wynter Blyth: for the study of the constitution of butter-fat.

1889. Amount granted £100.

£50 to Professor Meldola: for the investigation of the isomerism of mixed diazo-compounds.

£50 to Professor W. H. Perkin, jun.: for the continuation of his researches on the synthetical formation of closed carbon chains.

1890. Amount granted £60.

£15 to Dr. F. S. Kipping: for the synthesis of heptamethylene derivatives.

£25 to Messrs. Cross and Bevan: for the further prosecution of their experiments on the nature of cellulose.

P 2

£10 to Mr. E. A. Werner: for the study of thiocarbamide derivatives.

£10 to Messrs. Linder and Picton: for the continuation of their experiments on hydrosulphides.

1891. Amount granted £320.

£75 to Professor W. H. Perkin, jun.: for the further investigation of closed carbon chains.

£10 to Mr. A. E. Tutton: for the crystallographic investigation of double sulphates of rubidium and cæsium and metals of the magnesium group.

£10 to Mr. Sudborough: for the study of the action of nitrosyl chloride on unsaturated hydrocarbons.

£5 to Dr. Cook: for the study of the decomposition of bromates and iodates by heat.

£15 to Mr. W. Sinclair: for the study of tetramethylene ketones.

£10 to Mr. J. Stenhouse: for the study of trimethylene derivatives.

£10 to M. G. Young: for the study of derivatives of pentanetetracarboxylic acid.

£25 to Professor Munro: for the further study of nitrification.

£10 to Mr. G. H. Robertson: for the study of the electrolytic reduction of lead sulphate.

£10 to Dr. Ruhemann: for the continuation of an investigation of mucic acid.

£10 to Mr. A. R. Ling: for the study of halogen derivatives of quinone.

£15 to Dr. J. Walker: for the investigation of the composition of the vapours given off by mixed liquids.

£5 to Dr. Laycock: for an examination of the products of the dry distillation of bran with lime.

£10 to Dr. J. Leicester: for the further study of the action of orthodiamines on quinones.

£10 to Messrs. Linder and Picton: for an investigation of the different grades of solution.

£25 to Messrs. Cross and Bevan: for the continuation of their studies of cellulose.

£50 to Professor Smithells: towards the payment of an assistant for further experiments on the chemistry of flames.

£15 to Mr. Wynne: for the study of the quinolinesulphonic acids.

THE LONGSTAFF MEDAL.

THE following Fellows of the Society have been recipients of the Longstaff Medal:—

1881. Professor T. E. Thorpe.
1884. Mr. C. O'Sullivan.
1888. Dr W. H. Perkin.
1891. Professor F. R. Japp.

In presenting the medal to Professor Thorpe at the Anniversary Meeting in 1881, the President, Professor Roscoe, said: "I consider it a special privilege that it falls to my lot to present to you, as one of my oldest and most distinguished pupils, the first Longstaff Medal awarded by the Chemical Society for the best series of original investigations in chemistry published in England during the past three years, among which I may mention as the most important, your discovery of phosphorus pentafluoride; that of the occurrence of heptane in *Pinus sabiniana*, giving accurate determinations of its physical constants; and, lastly, the valuable contributions to physical chemistry in your researches on the relation between the molecular weight of substances and their specific gravities when in the liquid state. I trust that this recognition by the Chemical Society of your varied and successful labours will stimulate you to further efforts, and that before long the Society may be benefited by other communications from your laboratory."

In presenting the medal to Mr. C. O'Sullivan at the Anniversary Meeting in 1884, the President, Dr. Perkin, used the following words: "It gives me great pleasure to present to you the Longstaff Medal awarded to you for the important and laborious researches on the carbohydrates. The methods you have used for the purpose of getting an insight into the complicated structure of many of these compounds, by gradually breaking down the molecule and examining the resulting products, have thrown much light on their constitution. The methods of determining starch, and the investigation of the α- and β-amylan, the constituents of some cereals, are also subjects of considerable interest and utility. It is hoped that this recognition of your labours may encourage you in your work, and that, ere long, we may receive fresh communications from you.

"I feel there is a special interest connected with the award of this medal to-night, as this is the eighty-fifth birthday of our esteemed and highly valued friend, Dr. Longstaff. He is now one of the few remaining original members of the Society. We trust, however, that we may still be spared to see this medal awarded many times more, and also his desire realised in connection with this and in connection with the Research Fund, which he also founded, namely, that they may help to stimulate the love of research amongst our Fellows, and that important work may be done to promote the advancement of our science."

In speaking of the award of the medal to Dr. Perkin at the Anniversary Meeting in 1888, the President, Mr. Crookes, remarked that it was not often that an opportunity such as had fallen to Dr. Perkin's lot was so fully made use of, and that one who had been engaged in industrial pursuits undertook a research of such magnitude as that of which Dr. Perkin first gave an account to the Society in 1884. Addressing the recipient of the medal, he said: "I feel it a privilege that to my lot it has fallen to present to you the Longstaff Medal, in recognition of your interesting and important researches on the magnetic rotatory polarisation of compounds in relation to their chemical constitution. I hope that further examples of your investigations on this subject are in store for us, and that your example may stimulate us all, and especially the younger Fellows of the Society, to increased zeal and devotion in the extension of our science."

At the Anniversary Meeting in 1891, the President, Dr. Russell, speaking of the award of the medal to Professor F. R. Japp, said that he was sure that the Fellows would feel that the unanimous decision of the Council to award it to Professor Japp was eminently satisfactory. Professor Japp, during the last three years, either alone or in conjunction with others, had communicated eight papers to the Society; and all who were following the higher development of organic chemistry, knew how valuable to this branch of the science the carefully thought out papers of Dr. Japp had been. He only regretted that Dr. Japp was not there to receive the medal in person.

ABSTRACTS OF PRESIDENTS' ADDRESSES.

First Anniversary Meeting, 30th March, 1842.

Professor Graham, President, in the Chair. (Proceedings, p. 26.)

The Report of the Council, read by the President, refers to the satisfactory progress made during the year in establishing and organising the Society, which is stated to already contain a body of members sufficiently numerous to insure its stability, including nearly all the distinguished chemists of the country.

The state of the funds is referred to as satisfactory, but dissatisfaction is expressed with the accommodation afforded by the Western Literary and Scientific Institution. The publication of two parts of the Proceedings and Memoirs is mentioned, and the Report contains the following interesting passage showing that even at this early date the founders of the Society foresaw what its main function would be: "The Council is fully sensible that the utility of the Society, and its reputation in the scientific world, will mainly depend upon its publications."

After a reference to donations, the importance of having a suitable place of deposit for the property of the Society is mentioned. Then follows the Treasurer's statement, the simplest and briefest in the history of the Society, and the list of Officers and Council.

At this meeting, "The laws of the Society, as drawn up by the Council, were submitted to the meeting, and having been read and discussed, were confirmed, with amendments, and ordered to be printed for the use of the members."

Second Anniversary Meeting, 30th March, 1843.

Professor Graham, President, in the Chair. (Proceedings, p. 51.)

The Council in their Report, read by the President, congratulate their fellow members on the positive attainment of the principal objects for which they are associated, and it is said to be "now sufficiently evident that ample materials exist in England for a Chemical Society."

Two brief obituary notices of members are given, inaugurating a practice which was regularly followed during a long series of years.

The communications made to the Society during the session are referred to as "a contribution of some importance to the progress of the science, and the authors and other contributors are urged not to relax their exertions."

The presents of specimens, as well as of books, which had been received, are referred to, the Council calling attention to "this nucleus of a collection which has been formed, and which they hope will be rapidly increased by the exertions and the liberality of the members."

The condition of the Society's finances is referred to as highly favourable.

Third Anniversary Meeting, 30*th March*, 1844.

The President, Arthur Aikin, in the Chair. (Memoirs, &c., 2, 109.)

The Report of the Council, read by the President, is no longer impersonal, but rather a statement by the President. The condition of the Society is spoken of as satisfactory. The usual statistical statements are made, followed by an obituary notice of Charles Macintosh. Several of the papers read during the session are specifically mentioned, and the President then refers to the museum, stating it to be his wish to impress on the members the utility of the Society possessing as large a collection as possible of known chemical substances in their purest and most characteristic state.

The Treasurer's statement is followed by a list of Officers and Council for the ensuing year.

Fourth Anniversary Meeting, 30*th March*, 1845.

The President, Arthur Aikin, in the Chair. (Memoirs, 2, 329.)

The Report read by the President is this year numbered with the communications to the Society, under the title Annual Report of the Council. It is said that "Henceforth the Chemical Society will take its place among the other scientific institutions of the country; and as the rank which it will hold depends on the number and value of its published communications, a serious duty devolves on the Council to stimulate and encourage the zeal of the members by every means in their power." The Council here recognise that one most important means of effecting their object is to interpose no unnecessary delay in the publication of papers, and they state that "by pressing somewhat unreasonably on the time and goodwill of the Secretary," they have been able during the year to present to members six numbers of the Memoirs and Proceedings, consisting of forty communications, containing "investigations in many cases of great value in the departments of light and heat, of electro-chemistry, of inorganic and organic chemistry, as well as many practical details of interest and utility."

The "collection of characteristic specimens of chemical substances" is stated to have "received several additions during the last year, but many more are wanted to enable the Council even to begin to form a list of deficiencies; at present all that can be said is that contributions in this department are greatly desired, and will be very thankfully accepted."

Fifth Anniversary Meeting, 30th March, 1846.

The President, Professor Graham, in the Chair. (Memoirs, 3, 140.)

The Annual Report of the Council is this year again printed separately, and not numbered with the papers. It is entirely formal and very brief.

Sixth Anniversary Meeting, 30th March, 1847.

The President, Professor Graham, in the Chair. (Memoirs, 3, 344.)

In addition to the usual statistical information, an item of interest in the Report of the Council for this year is a reference to "the late successful establishment in London of Chemical Laboratories expressly designed to further the prosecution of original research." Also it is said that "The Council has also observed with interest that steps have been taken by the Royal Agricultural Society to obtain an extensive series of analyses of the ashes of plants."

Seventh Anniversary Meeting, 30th March, 1848.

The President, W. T. Brande, in the Chair. (Quarterly Journal, 1, 149.)

The Annual Report of the Council this year is almost entirely formal. There is a noteworthy passage in the reference to the communications published by the Society, viz., that "it is gratifying to observe that many have had their origin in the laboratories of University College and of the College of Chemistry." The establishment of these schools had been mentioned with satisfaction in the previous report. The issue of the Society's first regular publication, the Quarterly Journal, is recorded.

Eighth Anniversary Meeting, 30th March, 1849.

The President, W. T. Brande, in the Chair. (Quarterly Journal, 2, 184.)

The death of Berzelius is referred to as that of a man "justly celebrated throughout the scientific world, to whom chemists especially owe a heavy debt of gratitude and of respect." He was never a member of the Society, it having been the practice up to this time to elect as Foreign Members chemists of distinction who had contributed to the Society's Proceedings. The labours of the Council during the past year are spoken of as having been unusually important and directed to objects deeply involving the future condition of the Society, a statement having reference more especially to the *Charter of Incorporation* procured during the year at a cost of £330, towards which £132 is stated to have been subscribed by the *Members*—a term which henceforward almost disappears from the records, giving place as a rule to *Fellows*. The President's reference to the importance of this step is couched in the following prophetic terms:—

"The actual and prospective advantages thence accruing to the Society are various and important. We now take rank with the other *Chartered Scientific Societies*, and when we consider the zeal and energy which has already been displayed in promoting the views of this Society, and their important, popular and universal character, for who can deny the vast importance of chemical science, both pure and applied, or where can we find a department of knowledge having more immediate bearings upon other sciences, upon manufactures, upon the common and fine arts, upon agriculture, upon medicine, in short, upon the luxuries, comforts and necessaries of life; when, I say, all these things are considered, we may surely reasonably hope and expect that a Society aiming at the most dignified and useful objects, and embracing amongst its members many of the most celebrated chemists of the world, will not only prosper, but that its resources will increase, and its dominion be extended, till it vies with any other scientific establishment of the country. I therefore thought that we, your Council, are especially bound to congratulate the Society upon the steps which we have been enabled to take towards increasing our stability, extending our usefulness, and strengthening our claims upon the support and respect of our scientific brethren, and of the public at large."

The importance of now securing a fit *local habitation* for the Society is dwelt on by the President.

It is of interest that among the articles mentioned as presented to the Museum during the year, there was "a specimen of the first piece of platinum consolidated from the spongy state in England, and of the first piece of the same metal soldered with gold: by W. J. Cock, Esq."*

* With reference to this statement, Mr. George Matthey, F.R.S., has favoured me with the following account, corrected by Mr. W. J. Cock:—

Between the years 1800 and 1810, the late Mr. Thomas Cock was serving his apprenticeship to Mr. Allen the chemist in Plough Court. Some Colombian native platinum was brought to him, which he investigated, and produced the double yellow salt of platinum and ammonium, afterwards converting it into spongy platinum, which he heated and forged and got rolled into sheet, a portion of which was turned into a short tube and soldered with gold.

At the request of Mr. Allen, the process was shown to Dr. Wollaston, who

Ninth Anniversary Meeting, 30*th March*, 1850.

The President, Richard Phillips, in the Chair. (Quarterly Journal, 3, 97.)

The addition of twelve names to the list of Foreign Members is recorded in a very brief and formal Report.

Tenth Anniversary Meeting, 31*st March*, 1851.

The President, Richard Phillips, in the Chair. (Quarterly Journal, 4, 302.)

A Report of the Council is stated to have been read, but no account of it is published, the list of officers and Council elected at the meeting and the Treasurer's report being alone placed on record (*cf*. Journal, 4, 189).

Eleventh Anniversary Meeting, 30*th March*, 1852.

The President, Professor Daubeny, in the Chair. (Quarterly Journal, 5, 153.)

The establishment of the Society "in a locality (Cavendish Square) more worthy of its high position" is spoken of by the President, especially with reference to the advantages which it offers towards the formation of a Chemical Museum, numerous contributions to which appear to have been received from the Great Exhibition of 1851.

In the course of a brief obituary notice of Mr. William West, the President makes the following interesting reference to the British Association: "My own acquaintance with Mr. West dates as far back as the period when he formed with myself one of that little band of promoters or cultivators of science, who, obedient to the summons of Sir David Brewster, assembled at York, in the year 1831, and whilst there, in spite of the smallness of our numbers (which, however, besides the illustrious philosopher who first projected the meeting, included the names of Dalton, of Murchison, of Forbes, and of Sowerby), had the boldness to organise the scheme of that great

published it in his own name, and the discovery has ever since been associated with the name of Wollaston.

Mr. Percival Norton Johnson, F.R.S., of 79, Hatton Garden, about the year 1812-16, carried on the manufacture of platinum, and made the first platinum boiler for the concentration of sulphuric acid for the late Mr. Thomas Farmer, sulphuric acid manufacturer at Kennington Common.

Mr. William John Cock, second son of Mr. Thomas Cock, joined his uncle, Mr. J. N. Johnson, in the year 1834, afterwards becoming his partner in 1837, but was compelled from ill-health to give up business in 1845.

Mr. William J. Cock gave his first specimen of welded and gold soldered platinum to the Chemical Society, in the museum of which the specimen was placed, and which had been given to him by his father.

scientific association, which next year obtained its full development at Oxford, and has since been welcomed in almost every large city of the British dominions."

The effect of the establishment of the Society on the contribution of chemical papers to the Royal Society is considered, the President pointing out that instead of damaging it has rather tended to advance them. The following passage in this part of the Report affords an instructive picture of the views current so recently as forty years ago: "But such a feeling" (of jealousy on the part of the Royal Society) "cannot reasonably be entertained at the present moment, when chemistry has so enlarged its boundaries as to embrace within its compass the kingdoms of living as well as of inanimate nature. For without here pronouncing upon the difficult and much debated question as to the extent to which vital functions are influenced by chemical laws, it may be sufficient to establish the justice of my remark, if we recollect that an infinite variety of curious and important chemical products owes its origin to vital processes, in so far as the latter, by bringing together the particles of matter under conditions not imitable by art, do in fact supply us with a number of new principles to work upon, in addition to those furnished by the mineral kingdom; elements, indeed, inasmuch as they are the roots of new combinations, although themselves compounds, as being made up of bodies regarded by us as simple."

At this meeting the bye-laws were altered, so that Fellows who had served the office of President should be annually proposed for election as Vice-Presidents in addition to four other Vice-Presidents.

Twelfth Anniversary Meeting, 30th March, 1853.

The President, Professor Daubeny, in the Chair. (Quarterly Journal, 6, 147.)

A very brief Report of the Council, consisting of a statement of the number of Fellows, and of the Treasurer's report, is prefixed to the address, distinguished for the first time as the "anniversary address of the President," a title which its contents justify, it being the first real address delivered by a President of the Society. After referring to the Government project of housing the chartered scientific societies at Kensington Gore (*cf.* page 6), Professor Daubeny gives a highly appreciative notice of Dr. Thomas Thomson, terminating his remarks with the observation, "that the career of Dr. Thomson affords to the young chemist a cheering proof of the advances that may be made in Science, even under great original disadvantages, by an understanding, solid rather than brilliant, and marked more by sagacity and common sense than by genius and originality; provided only these powers of mind are, as his were, concentrated through life upon certain special objects, and are stimulated into exertion by no more selfish and ignoble principle than the pure love of scientific truth."

Mention is made of the occasional shortness of supply of papers at the meetings, followed by the noteworthy remark: "Our members, however, ought not to forget that this Society has the first claim to the services and contributions of those enrolled in it." The merits of the scientific principles involved in their researches are, it is pointed out, nowhere likely to be so satisfactorily or so fully canvassed as at the Society's meetings.

Professor Daubeny expresses regret that nothing should have been done during his Presidentship, either by himself or others, "towards simplifying and methodising the existing nomenclature of organic substances, which at present seems to proceed upon no fixed basis." He refers to a communication by himself to the British Association at Ipswich, in which the rules that existed, floating in the minds of the leading chemists, were stated, whereby, he might perhaps flatter himself, he had contributed somewhat "towards promoting that uniformity and consistency in the use of the terms selected for designating newly discovered compounds, which is, in many respects, so desirable." He had been induced to postpone the larger and more ambitious scheme which he had once contemplated, of enlisting the leading chemists of the country, and of the Society in particular, in the attempt to frame a general system of nomenclature which might embrace the whole of Organic Chemistry, from considering the unsettled state of certain fundamental questions upon which so much of the terminology as well as of the notation of organic bodies is necessarily dependent." The fundamental questions here referred to were those raised in Williamson's recently published paper on Etherification, in which, "instead of that fixity which was supposed to be involved in the very idea of a stable and definite compound, a constant movement amongst its particles" was assumed. Professor Daubeny expresses himself as entirely favourable to this view; indeed, claims to have put forward similar views in his work on the Atomic Theory, and refers also to the support which is afforded to it by geological observations. He then proceeds to say:—

"The theory, however, which in the case before us is built upon this postulate, requires for its adoption such a revulsion in our ideas with respect to the relations between ether and alcohol, as would involve in the end a new nomenclature, as well as a fresh method of notation. We should be called upon to alter the atomic weights of all the other elements by doubling the number of atoms of hydrogen assumed to be present in water; and instead of regarding ether simply as the oxide of an hydrocarbon, and alcohol as its hydrate, we should have to figure to ourselves the former as produced from water, by the replacement of one of its hydrogen atoms, and alcohol by that of both.

"Such a view of the composition of these and other allied bodies has indeed much to recommend it, and deserves, in my humble opinion, the attentive consideration of chemists; but it is one thing to receive a new theory with favour, and to entertain it with attention, and another to admit it so entirely into the category of established truths, as to mould all our other views in accordance with its principles.

"In framing a system of chemical nomenclature, therefore, at the present moment, we should neither be justified in ignoring the existence of theories which have already taken a certain hold upon the minds of eminent chemists, both in this and in other countries; nor could we venture to propose them as the basis of our scheme whilst still under discussion, and, perhaps, but imperfectly developed as yet, even in the minds of the individuals who have promulgated them."

These passages afford a most interesting insight into the state of knowledge and opinion among chemists so recently as 1853.

After a reference to Professor Way's important researches elucidating the problem relating to the absorbent power possessed by different soils with reference to manures, the President refers to his own views regarding certain volcanic problems, and then proceeds to discuss at some length Bunsen's observations on volcanic phenomena in Iceland, speaking of this chemist's memoirs on the subject "as an important present rendered by Chemistry to the sister science of Geology, and as a service too which those who turn away with indifference from researches of a more refined nature, lying strictly within the domain of pure Chemistry, would be likely to accept as an undeniable evidence of the extensive utility of our pursuits."

Thirteenth Anniversary Meeting, 30th March, 1854.

The President, Colonel Yorke, in the Chair. (Quarterly Journal, 7, 144.)

The Annual Report of the Council chiefly consists of lengthy obituary notices of two famous foreign members, Leopold Gmelin, the predecessor of Bunsen at Heidelberg, and Auguste Laurent.

The following noteworthy announcement is made in this Report:—

"In order to meet the feelings of many Fellows of the Society, to the effect that it was desirable to introduce into our meetings a little more life and general interest than could be elicited by the reading of the original communications addressed to the Society, the Council passed the following resolution in June last:—

"'In order to increase the interest of the Meetings of the Society, certain Meetings, not exceeding five in the year, shall, after the transaction of the ordinary business of the Society, be devoted to the delivery of discourses on matters connected with the progress of chemistry and which may be illustrated by experiment.'

"It is not proposed that these discourses shall be published in the Journal; but where new matter, either theoretical or experimental, is contained in them, such matter may, with the consent of the Council, be published in the form of an abstract or paper.

"It is proposed that after the discourse discussion shall be invited, and in cases in which the matter of the discourse is published in the Journal, explanations and remarks upon it, offered in discussion, may, with the consent of the Council, be appended."

The first lecture delivered (on 6th March, 1854) was by Professor Graham, on "The liquid condition of matter." "It was followed by an interesting discussion in which several eminent Fellows of the Society took a part." The Report states that, "judging from the result of this trial, the Council are justified in anticipating that the plan will realise their hopes," but the opportunity of upholding the ideal function of the Society is not lost, for we next read, "but the Council are desirous of impressing on the Fellows their opinion that the character and position of the Society must mainly depend on the value of the original communications which may be published in the Journal of the Society."

An interesting reference is made to an important alteration purposed by the Royal Society in the manner and nature of the publication of their Proceedings.

"The Royal Society proposes to publish these Proceedings once a month during the session; to send them free to all Fellows, and to other persons on payment of an annual subscription of five shillings; and they propose in addition to the matter heretofore published in the Proceedings to give, among other things, readable abstracts of papers which are to be, or which have been presented to other Societies, but not yet read, when communicated as usual through Fellows of the Royal Society. The design of the Royal Society includes some other particulars, and if carried out, it will render the Proceedings of the Royal Society the *compte rendu* of all the work done in physical and natural science throughout the country."

Shortly afterwards, a slip bearing the following notice was issued with the Journal:—

"The Council of the Chemical Society have made an arrangement with the Royal Society by which the Fellows of the Chemical Society will receive the Proceedings of the Royal Society from the commencement of the new series in the present year, *free of charge*. The Council call the attention of Fellows to the facility afforded by these

Proceedings for the early publication of scientific intelligence. Communications intended for them from Fellows of the Chemical Society may be made through the Secretary, B. C. Brodie, Esq., F.R.S. Publication of and notice in the 'Proceedings' will not preclude the subsequent publication of a more extended paper, either in the Journal of this Society or in the Royal Society's Transactions."

Signed for the Council,

Chemical Society,
5, Cavendish Square,
2nd Oct., 1854.

B. C. BRODIE,
Hon. Sec.

Fourteenth Anniversary Meeting, 30*th March*, 1855.

Dr. A. W. Williamson, Vice-President, in the Chair. (Quarterly Journal, 8, 109.)

The Report of the Council, this year, is of the briefest. The arrangement made with the Royal Society to supply the Proceedings free of charge, is gratefully referred to, and the attention of Fellows is called to the Library "as a place of deposit for curious works upon chemistry, and for pamphlets upon chemical subjects, which, collected are of great interest, but separately are often of little or no value to the possessor."

Fifteenth Anniversary Meeting, 31*st March*, 1856.

Dr. W. A. Miller, President, in the Chair. (Quarterly Journal, 9, 157.)

The Report of the Council is again very brief. At this meeting it was resolved that the number of Foreign Members shall not exceed twenty-five.

Sixteenth Anniversary Meeting, 31*st March*, 1857.

Dr. Miller, President, in the Chair. (Quarterly Journal, 10, 180.)

The Report of the President and Council this year refers to the past year as "an important one in the history of the Chemical Society, since during that period the Society has become more intimately associated with the Royal Society, and has received apartments from Government in Burlington House, conjointly with the Royal and Linnean Societies." The history of the negotiations which led to the change is somewhat fully entered into (*cf.* p. 4, *et seq.*).

After stating that it has not been usual for the President at the anniversary meeting to present any sketch of the progress of Chemical Science during the year, he briefly refers to several of the more important discoveries, ending as follows:—"One of our Fellows, Mr. Perkin, has afforded me the opportunity of bringing before you the results of a successful application of abstract science to an important practical purpose, as he has succeeded in obtaining from aniline a colour which rivals archil in brilliancy and equals indigo in solidity and durability. Specimens of this dye stuff are now upon the table, and it will be seen that its application to silk in particular furnishes results of great delicacy and beauty."

Seventeenth Anniversary Meeting, 30*th March*, 1858.

Dr. Lyon Playfair, President, in the Chair. (Quarterly Journal, 11, 183.)

The Report of the President and Council refers to the change made during the session of the day of meeting from Monday to Thursday, "in order that the Chemical Society might meet on the same days as the Royal and Linnean Societies." Otherwise it is of the usual formal character.

Eighteenth Anniversary Meeting, 30*th March*, 1859.

Dr. Miller, Vice-President, in the Chair. (Quarterly Journal, 12, 166.)

The Report of the President and Council is almost entirely formal, consisting of but little more than obituary notices. An alteration in the bye-law relating to the election, admission and payments of Fellows was made at this meeting, the annual contribution being raised to two pounds, and the life composition to twenty; also it was resolved to provide for the admission of forty, instead of twenty-five, Honorary and Foreign members.

Nineteenth Anniversary Meeting, 30*th March*, 1860.

Professor Brodie, President, in the Chair. (Quarterly Journal, 13, 165.)

The Report read by the President contains the noteworthy statement that "the Council have ever regarded the formation of a library of chemical works as one of the most important objects to which the funds of the Society could be devoted, and they are especially desirous to render it at all times accessible and serviceable to the Fellows. They believed that these ends would be promoted by the appointment of a permanent librarian. This office has been undertaken by Mr. Watts, a gentleman who is familiar with the literature of the Science." Mr. Watts held the office until his death in 1884.

Twentieth Anniversary Meeting, 30*th March*, 1861.

Professor Brodie, President, in the Chair. (Quarterly Journal, 14, 349.)

The only special item in the brief Report of the Council is a reference to a new catalogue of the Society's books, prepared by Mr. Watts.

Twenty-first Anniversary Meeting, 31*st March*, 1862.

Dr. Hofmann, President, in the Chair. (Journal, 15, 492.)

The Report, read by the President, opens with the statement that "the Chemical Society has come of age." The increase in number of names of Fellows on the roll, from 77 to 360, during the twenty-one years is referred to, and the position achieved by the Society is summarised in the following sentence:—"By the number of our body, by the value of its contributions to Science, by the increasing interest which our proceedings elicit, we have secured a respectable position in the world. We may look with some degree of satisfaction upon the achievements of our youth, and from the result of the past derive encouragement for the future."

The President briefly reviews the scientific work of the year, which he refers to as one of unprecedented activity, and, after giving a brief history of the publications of the Society, refers to the recent decision of the Council to issue a monthly instead of a quarterly Journal.

On 16th January of this year (1862) the following vote of condolence was put from the Chair and carried unanimously:—

"To the Queen's most excellent Majesty:

"May it please your Majesty: We, the President, Vice-Presidents, Council and Fellows of the Chemical Society, beg permission to approach your Majesty, and humbly express our great sorrow at the death of his Royal Highness the late Prince Consort, who during his life evinced a warm interest in the progress of the science to which our labours are devoted. We pray that the consolation and support of Almighty God may be vouchsafed to your Majesty under this severe bereavement, and that your Majesty may long continue to reign over your loyal and faithful people."

Twenty-second Anniversary Meeting, 31*st March*, 1863.

Dr. Hofmann, President, in the Chair. (Journal, 16, 432.)

In the Report read by the President, there is an eloquent reference to the benefits derived by the Chemical Society from the Exhibition held during the previous year, which not only gave it the opportunity of receiving the majority of its Foreign Members, but also led to the delivery of lectures by Sainte Claire Deville and Wurtz in their native tongue. The President refers to the innovation as involving the admission of a great principle: "In establishing once for ever these international chemical discourses at its meetings, the Chemical Society has loudly proclaimed the cosmopolitan character of science, and that henceforth it will look upon the several nations engaged in scientific pursuits as upon so many federal members of a great republic, united by the love of science and pledged by contributions to a common treasury, as it were, to uphold its cause and raise its dignity."

As in the previous Report, a brief but graphic review of the scientific work of the year is given. Finally the success is mentioned which had attended the issue of the Journal in monthly parts, and the establishment of a new series is recorded.

Twenty-third Anniversary Meeting, 31*st March*, 1864.

Dr. Williamson, President, in the Chair. (Journal, 17, 435.)

The Report read by the President is of a purely formal character.

Twenty-fourth Anniversary Meeting, 30*th March*, 1865.

Dr. Williamson, President, in the Chair. (Journal, 18, 344.)

As in the previous year, the Report read by the President comprises only the usual formal items.

Twenty-fifth Anniversary Meeting, 29*th March*, 1866.

Dr. W. A. Miller, President, in the Chair. (Journal, 19, 508.)

The Report read by the President is again of a purely formal character. It is noteworthy that the Proceedings for the year contain, under the date 16th November, 1865, a reference to an Extraordinary General Meeting, at which it was resolved "that authority be given to the Council to dispose of the Society's chemical specimens in such manner as they may see fit." It is remarkable that no reference to this occurs in the Report.

Twenty-sixth Anniversary Meeting, 30*th March*, 1867.

Dr. W. A. Miller, President, in the Chair. (Journal, 20, 385.)

Beyond the statements that the Council have it under their consideration to raise the standard of qualification for admission to the Fellowship, and that a committee had been appointed to examine into the state of the library with a view of rendering it more complete, the Report read by the President contains only the formal items.

Twenty-seventh Anniversary Meeting, 30*th March*, 1868.

Mr. Warren de la Rue, President, in the Chair. (Journal, 21, i.)

The Proceedings are this year prefixed to the Journal.

In the Report read by the President, the change in the bye-law relating to the admission of Fellows is referred to, and a brief account is given of recent discoveries of importance.

Among the names of deceased Fellows occur those of Thomas Clark, Walter Crum, Dr. Daubeny, Faraday, and Robert Warington, of whom obituary notices are given.

Twenty-eighth Anniversary Meeting, 30th March, 1869.

Mr. Warren de la Rue, President, in the Chair. (Journal, 22, i.)

The President, after a brief account of recent noteworthy discoveries, refers to the issue of a new catalogue of the library, and also to the completion during the year of Watts' Dictionary of Chemistry. He also announces that during the year the application of part of the funds of the Society in aid of original investigation had been sanctioned, and that the Faraday Lectureship and Medal had been founded, remarking of this latter that it "will tend to make us personally acquainted with the most distinguished of our foreign brethren."

Twenty-ninth Anniversary Meeting, 30th March, 1870.

Dr. Williamson, President, in the Chair. (Journal, 23, 290.)

In the report read by the President, reference is made to the delivery during the previous session by Dumas of the inaugural Faraday lecture, and of the acceptance by the Council of a munificent donation of palladium from Messrs. Johnson and Matthey, to be used for the preparation of the first ten medals. It is stated that arrangements had been made for the preparation of abstracts of the papers read at the meetings, and in some cases of the discussions, for transmission to such papers as desire to publish them. The publication by the Society of accurate reports of all chemical papers is brought under the notice of the Fellows, and a scheme is referred to involving the co-operation of the French Chemical Society (*cf.* p. 243).

Thirtieth Anniversary Meeting, 30th March, 1871.

Dr. Williamson, President, in the Chair. (Journal, 24, 609.)

The President congratulates the Fellows on the enlargement in the sphere of usefulness of the Society involved in the publication of Monthly Reports, the first of which he hoped to see in a few days. The publication of these reports renders the year perhaps the most memorable one in the history of the Society.

Thirty-first Anniversary Meeting, 30th March, 1872.

Dr. Frankland, President, in the Chair. (Journal, 25, 341.)

The President points out that to form an adequate estimate of the vitality of the Society, it is necessary not only to consider the expansion of the list of Fellows, but also, and indeed chiefly, the influence which the united efforts of the Fellows have exercised on the advancement of experimental science, *i.e.*, the number and value of the papers which they have been able to collect. He then calls attention to the fluctuations in the number of papers presented each year to the Society, and particularly to the small number contributed during the previous session. Discussing this lack of progress in discovery, he attributes it in great measure to the attitude of English universities towards original investigation, and their ignoring research in the granting of degrees. Great satisfaction is expressed with the manner in which the publication of abstracts of the chemical work of the world had been carried out during the year, the work being referred to as "an unexampled enterprise of which the Society may be justly proud."

Thirty-second Anniversary Meeting, 31st March, 1873.

Professor Frankland, President, in the Chair. (Journal, 26, 772.)

The President congratulates the Society on the increased activity of British chemists, as testified by the augmented number of papers communicated during the previous year. But he goes on to say: "It must not be for a moment imagined, however, that we have in this important matter taken the position which we undoubtedly ought to occupy as the nation holding the first place in wealth, trade, manufactures and State revenue." He subsequently expresses the opinion that, "until a profound change is made in the awarding of prizes and the granting of degrees in science in this country, we shall look in vain for any substantial improvement in the presentation of experimental investigation."

Thirty-third Anniversary Meeting, 30th March, 1874.

Professor Odling, President, in the Chair. (Journal, 27, 1198.)

After referring to the pecuniary assistance of chemical research afforded by the Society and other bodies, the President notes the occurrence of an event of importance in the history of the Society—its entry into possession of new premises (the present rooms) in Burlington House. Although the new acquisition is spoken of as "altogether most satisfactory," the meeting room is admitted to be in some respects not entirely successful, and its faults are clearly recognised. The President then discusses the financial position of the Society, pointing out that a considerable increase in the expenses is to be looked forward to. The necessity of the Council considering the propriety of continuing the arrangement with the Royal Society for the supply of its Proceedings is referred to, and the steps taken to increase the sale of the Journal are mentioned. The preparation of an index to the Society's Journal from 1841 to the end of the year 1872, by Mr. Watts, the editor, is recorded in this Report.

Thirty-fourth Anniversary Meeting, 30th March, 1875.

Professor Odling, President, in the Chair. (Journal, 28, 1308.)

After a reference to the Faraday lectureship, and to the delivery by Professor Maskelyne of a course of evening lectures in crystallography, the President points to the recently greatly increased activity of the Society. The enormous growth of chemical industry in its application to the manufacture of so-called organic products, and the application of chemistry to the detection of food adulteration are pointed to as evidence of the progress of chemistry in general. The financial position of the Society is again discussed, and the expectation expressed that the income will increase at such a rate that it will shortly be possible to dispense with extraordinary sources of supply, such as the grant of £100 a year from the British Association, and the special contribution of about £250 a year from Fellows, with the aid of which the publication of full abstracts had been undertaken.

Thirty-fifth Anniversary Meeting, 30th March, 1876.

Mr. F. A. Abel, President, in the Chair. (Journal, 29, 617.)

The Report this year is of unusual length, the affairs of the Society being very fully entered into. Commencing with a reference to the animated discussion raised by a recent lecture by Dr. Frankland on some points in the analysis of potable waters, and after recording gifts to the preparation room by Drs. Frankland and Longstaff, of a valuable bust of Professor Hofmann by Mr. James Duncan, and of a photograph of Dr. Anderson by his widow, the President discusses the cost of publishing the Journal, of which, he remarks, "we may justly say with pride that it now occupies a very prominent position among the most valuable scientific publications of the present day." He then states that, with a view of insuring the maintenance of the income of the Society on a satisfactory footing with reference to its increasing expenditure, the Council had decided (1) to raise the selling price of the Journal to £1 10*s*. annually; (2) to discontinue the gratuitous supply of the Proceedings of the Royal Society to Fellows; and (3) to recommend that the fee payable on admission to the Society should be raised from £2 to £4. He then proceeds to justify these recommendations, which, it may be added, were subsequently accepted by the Fellows.

He announces that the Society has received a legacy of about £900 by the will of a late Fellow, Mr. Henry Dircks.

After a reference to the effort made in 1872 by Mr. T. Hyde Hills to institute and maintain a small research fund, attention is called to a recent offer by Dr. Longstaff to place £1,000 at the disposal of the Society towards establishing a permanent fund, provided that an additional like sum be subscribed, and that the £2,000 be invested for that purpose. The advantage of accepting so munificent an offer is then dwelt on.

Finally the President calls attention to the Loan Collection of scientific apparatus to be opened at South Kensington, and to a recent offer of Mr. T. J. Phillips Jodrell to place £6,000 at the disposal of the Royal Society to ascertain by experiment to what extent the progress of original research is retarded in this country by want of public support.

Thirty-sixth Anniversary Meeting, 29*th March*, 1877.

Mr. F. A. Abel, President, in the Chair. (Journal, 31, 493.)

In the lengthy Report read by the President this year an unusual number of important topics come under notice. The financial position of the Society again receives special attention, mainly in consequence of the income having fallen considerably below the expected amount—a result attributed in a large measure to the unusual extent to which the blackballing of candidates had been carried during the year. The President very fully examines into the justice of the arguments of the advocates of the practice, and gives an account of the action taken by the Council in consequence; the report of a Committee appointed to consider and advise upon the mode of election of Fellows into the Society is appended to the address.

Reference is next made to the appointment, at a meeting of professional chemists early in the previous year, of a committee to confer with the Council of the Society with the view of ascertaining whether a scheme for the organisation of the profession of practising chemists could be carried out by the Chemical Society in conformity with the terms of its Charter. The President records the failure of the negotiations, and the subsequent establishment of an independent Institute of Chemistry.

The steps taken by the Council to resuscitate the grade of Associate are next referred to; these, it may be remarked. have not been attended with success.

The receipt of the Dircks' legacy, amounting to between £700 and £800, is recorded. Finally an account is given of the establishment of the Research Fund in accordance with Dr. Longstaff's stipulations, and the munificent donation to the fund of £1,000 from the Goldsmiths' Company, of one hundred guineas from the Merchant Taylors', and of a similar sum from the Clothworkers' Company.

Thirty-seventh Anniversary Meeting, 30th March, 1878.

Dr. Gladstone, President, in the Chair. (Transactions, 1878, 221.)

The President announces that the subsidence of the discussion on the proposals made for extending the functions of the Society had left the Council free to devote their attention to various internal reforms. The bye-laws had been most carefully considered, and the proposed modifications were in the hands of the Fellows. Although there were numerous verbal changes, the real alterations affected mainly the election of Fellows.

There had been an entire alteration in the constitution of the Publication Committee, it having been found impracticable to carry out the original intention that the committee should revise the work of the abstractors.

The adoption of a separate pagination for the papers published by the Society, and for the abstracts of papers published elsewhere, is recorded.

Reference is then made to the work done with the aid of the Research Fund; to the incorporation during the year of the Institute of Chemistry; and to the receipt of a legacy of £1,000 from the late Mr. C. Lambert.

Thirty-eighth Anniversary Meeting, 31st March, 1879.

Dr. Gladstone, President, in the Chair. (Transactions, 1879, 257.)

In previous years the report has been that of the President and Council. This year, in accordance with the revised bye-laws, it is the report of the President on the state of the Society.

The year is said to have been one of quiet prosperity. The receipt of another legacy of £1,000, bequeathed by Mr. Sidney Ellis, is announced.

Acting on the view that the library is essentially one of reference, the Council had resolved that no serial of which the Society did not possess a duplicate should be taken away from the rooms; duplicate sets of the more important serials were, however, to be obtained, so as to admit of these being circulated.

The issue is recorded of a series of instructions to abstractors, intended to secure uniformity of nomenclature; and the hope is expressed that these may not be without influence on the practice of authors.

Having pointed out that the Society exists for "the general advancement of chemical science," the President briefly draws attention to the manner in which these objects are being attained through the agency of the Research Fund, and of the Journal and library.

Thirty-ninth Anniversary Meeting, *30th March*, 1880.

Dr. Warren de la Rue, President, in the Chair. (Transactions, 1880, 247.)

The Report is but a brief one, the various directions in which progress has been made in the work of the Society being recorded, after which the President refers to a number of the more important subjects of inquiry which have engaged the attention of chemists during the year.

Fortieth Anniversary Meeting, *30th March*, 1881.

Professor Roscoe, President, in the Chair. (Transactions, 1881, 177.)

A comparison of the work accomplished by the Society during the previous twelve months with that of former years, is pronounced by the President to justify the statement that at no period of its history had it been so flourishing.

After briefly referring to the Society's publications and the Research Fund, the President calls attention to a few of the more important discoveries of the year.

Forty-first Anniversary Meeting, *30th March*, 1882.

Professor Roscoe, President, in the Chair. (Transactions, 1882, 229.)

The President refers at some length to the Faraday lecture delivered by Professor Helmholtz. He then records the establishment of the Society of Chemical Industry, and afterwards mentions the appointment by the Government of a Royal Commission on technical instruction, of which he had been chosen as a member. The proceedings of the Commission are briefly chronicled. Several of the important advances made during the year are then alluded to.

Forty-second Anniversary Meeting, *30th March*, 1883.

Dr. Gilbert, President, in the Chair. (Transactions, 1883, 224.)

This address is a lengthy one, the progress of the Society from its commencement being considered, with reference to the number of Fellows, the number of papers presented and lectures delivered, the publications, the library, the Research Fund and finances. The President then directs attention to the great advances of chemical education since the foundation of the Society. Having, when in America during the previous year, visited many of the laboratories, he recounts his experiences, and provides a comprehensive statement of the provision for scientific teaching in Canada and the United States.

Forty-third Anniversary Meeting, 31st March, 1884.

Dr. Perkin, President, in the Chair. (Transactions, 1884, 209.)

The President refers to the re-decoration of the rooms during the past year, the preparation of a new library catalogue, and the formation of a collection of autotype portraits of past Presidents on the proposal of the Treasurer (Dr. Russell). The Longstaff Medal is awarded to Mr. O'Sullivan. A number of the more striking discoveries of the year are briefly considered, and the President then calls attention at some length to the neglect of higher chemical teaching in this country.

Forty-fourth Anniversary Meeting, 30th March, 1885.

Dr. Perkin, President, in the Chair. (Transactions, 1885, 300.)

The usual statistical statement of the number of Fellows is followed by a reference to the exceptionally heavy losses experienced during the year, Four foreign Members having died; the Society having also to deplore the decease of Henry Watts, who has so long and faithfully served it as Editor of the Journal and as Librarian. The gift of a bronze bust of Dumas by Dr. de la Rue is announced. The publication of an official report of the proceedings at the meetings is commented on; and it is announced that it had been thought that it would be useful to hold occasional receptions so that Fellows might meet together; one had already been held, and appeared to meet with the approval of the Fellows. Some of the chief discoveries of the year are then briefly considered.

Forty-fifth Anniversary Meeting, 30th March, 1886.

Dr. H. Müller, President, in the Chair. (Transactions, 1886, 329.)

The President refers with satisfaction to the large number of papers communicated to the Society during the year, expressing the opinion that the extended opportunities which are being afforded to the younger generation of chemists, by the establishment of new laboratories, are likely to lead to a continuous and steadily increasing development in the pursuance of scientific chemical work in this country.

After considering the Society's publications and the library, he refers to the incorporation of the Institute of Chemistry by Royal Charter during the year. At the close of the address, he briefly points out the reasons why, in his opinion, scientific chemistry had not developed so rapidly in this country as in some others.

Forty-sixth Anniversary Meeting, 30th March, 1887.

Dr. H. Müller, President, in the Chair. (Transactions, 1887, 452.)

A further increase in the number of papers contributed to the Society during the year is chronicled; the address, like that of the previous year, is characterised by its hopeful tone. The President refers to the various directions in which inquiry is taking place, and to the boundless opportunities for research, and also briefly reviews the work of the year. He then speaks of the progress of Technical Education, and of the inauguration of the Central Institution of the City and Guilds of London Institute, and comments on the absolute need of a high scientific training for those engaged in manufacturing industries.

Forty-seventh Anniversary Meeting, 28th March, 1888.

Mr. W. Crookes, President, in the Chair. (Transactions, 1888. 474.)

The award of the Longstaff Medal to Dr. Perkin is chronicled. Having referred to the condition of the Journal, and of its supreme importance to chemical science in this country, the President raises the question—how far it is desirable that the same paper should be published in more than one journal, pointing out that in these days a paper published in English, French or German, is published to the entire scientific world. He then briefly considers the general position of chemical science, calling attention especially to the evil effects of competitive examinations, and to the lack of intellectual interest displayed by students generally. The slight public estimation which chemistry enjoys is also touched on, and regret is expressed that the University of London no longer deem chemistry an indispensable subject: that the licensing bodies of the medical profession have, by a recent regulation, allowed instruction in natural science to be obtained from any person, instead of limiting it to colleges and schools with recognised facilities for such teaching; and that a check has been given to the introduction of the teaching of chemistry and physics into schools by changes in the military examinations. The subject of "meta elements" is then very fully discussed.

Forty-eighth Anniversary Meeting. 21st March, 1889.

Mr. W. Crookes, President, in the Chair. (Transactions, 1889, 250.)

After giving the usual statistical information, the President refers to the protest against the examination system which had recently been published (in one of the monthly magazines). He takes the opportunity of protesting against the system of "sealed papers," and, after referring in unfavourable terms to the practice of publishing a paper in several different journals, places on record a recent resolution of the Council, that no memoir published elsewhere shall be published in the Society's Journal unless specially recommended by the Publication Committee and approved by the Council. A number of recent investigations of interest are referred to.

The President then gives a detailed account of his researches on the rare earths, and especially of his observations on the spectra they exhibit when rendered phosphorescent by electric discharges in high vacua. This part of the address is illustrated by numerous photographic plates of spectra.

Forty-ninth Anniversary Meeting, 27*th March*. 1890.

Dr. Russell, President, in the Chair. (Transactions, 1890, 426.)

Special attention is drawn to the state of the library and to the importance of its containing all books required to trace even in detail the growth and development of chemical science. The state of the Society's publications is then discussed, and a proposition referred to that the most fitting memorial which the Society could institute of its Jubilee would be the preparation of a complete subject catalogue of its Journal.

Attention is called to the fact that the anniversary meeting that day is held in the afternoon for the first time, in order to afford an opportunity to Fellows and their friends to meet at dinner in the evening. The hope is expressed that it will be found of advantage to the Society to perpetuate such an arrangement.

Notice is taken of a recent lecture by Professor Judd, and the value of such lectures on special subjects on the border land of chemistry is adverted to. A proposal to hold an extra meeting for the exhibition of apparatus is adverted to.

The remainder of the somewhat lengthy address is devoted to the consideration of the teaching of chemistry in ordinary and medical schools.

Fiftieth Anniversary Meeting, 25*th March*, 1891.

Dr. Russell, President, in the Chair. (Transactions, 1891, 434.)

The topics briefly touched on in succession are the state of the library and of the Society's publications; the award of the Longstaff Medal to Professor Japp; the recent celebration of the Jubilee; the abandonment of the proposal to publish a subject catalogue of the Journal, on the ground that the labour and expense of compilation would be more than the result would justify; and the exhibition of apparatus, at an extra meeting held during the past year.

Having at the outset of the Report pointed out that the financial state of the Society was not quite so satisfactory as it had been of late, partly on account of the increase during the year of the number of candidates blackballed, the President then discusses at considerable length the changes in the constitution of the Society since its formation, his remarks having special reference to the real object of the Society, the qualifications of candidates for the fellowship, and the conditions on which Fellows were admitted.

PUBLICATIONS, 1841-91.

At the second meeting of the Council, on 26th July, 1841, it was resolved:—To print (1) "in small type and paged with Roman numerals, *Proceedings* containing abstracts of all papers, except those published in full, and short communications of interest, with the donations to the Society, election of officers, members, &c.;" (2) "in larger type, and distinct paging, original *Memoirs* containing entire memoirs read before the Society and ordered for publication by the Council; also elaborate reports prepared by commission of the Society." Messrs. R. and J. E. Taylor were entrusted with the printing and publication of the Proceedings and Memoirs.

From the very outset, the Council were desirous of securing an entirely independent position for the Society, and at their first meeting resolved:—

"That if any paper be sent to the Society which the author may wish to publish in any Journal (other than that of the Society), it shall be compulsory, in such publication, to specify that the paper was read before the Chemical Society, together with the date of such reading, and the Society will not pledge themselves to publish such communication in their Proceedings or Transactions."

Subsequently, in May, 1843, it was resolved:—"That authors publishing their papers in foreign Journals, to specify the date of reading at the Chemical Society of London, or the Society not to publish."

From the commencement it was provided that the manuscript of all communications intended for publication in the Proceedings, &c., should be permanently retained by the Secretaries as the property of the Society.

That the rules thus laid down were at once acted on is proved by a minute of 15th August, 1842:—"Resolved, that the Council consider it inconsistent with the reputation of the Society, and not advisable, to publish the papers forwarded to them through Dr. L. Playfair, they having been read at the British Association meeting in Manchester, and having appeared in a condensed form in the local papers and periodicals of the day, before they were laid before the Chemical Society." Papers presented by Wöhler and Hofmann in 1850 were relegated to the notices from foreign Journals, having previously appeared elsewhere.

At first it was customary to directly indicate the date at which a paper was read; this was discontinued in 1843, when it was resolved to print the memoirs and proceedings in a continuous form; but as the papers, as a rule, were then printed after the account of the proceedings at the meeting at which they were read, the date was still indicated. Later on, when the notice of proceedings was appended to each quarterly part of the Journal, the date of reading was no longer indicated and, with rare exceptions, this has since been the practice. The question of attaching a date to the paper has several times been under discussion in the Council, and the conclusion has always been arrived at that it is undesirable, as such a practice would make it impossible to introduce alterations into the paper during its passage through the press unless every alteration were dated. For like reasons, it has been the practice to suppress any date attached by an author to a paper.

Memoirs and Proceedings, 1841-43.—In the years 1841-43, the Society published an octavo volume of *Memoirs* (258 pp.), together with a separate octavo volume of *Proceedings* (64 pp.). These were issued at irregular intervals, and were edited by the Secretary.

The *Proceedings* contain a statement of the proceedings at the meetings, and abstracts of the papers communicated to the Society which are not printed in the *Memoirs;* only the titles of papers printed in the *Memoirs*, and a reference to their place therein, are given in the *Proceedings*.

In the first volume of *Memoirs*, in which the date at which each paper was read is indicated, the first paper published is that read on 27th April, 1841; the date on the forty-second—the last in the volume—being 21st March, 1843.

The *Proceedings* is a record of the meetings of 23rd February, 1841, to 16th May, 1843, during which period eighty-four communications were made to the Society; abstracts of thirty-five of these are printed in the volume.

There is a separate index to each volume.

Memoirs and Proceedings, 1843-47.—After 1843, separate *Proceedings* were no longer issued, the volumes for 1843-45 (489 pp.) and 1845-47 (568 pp.) bearing the double title *Memoirs and Proceedings of the Chemical Society of London*, vols. ii and iii.

In these two volumes the accounts of the proceedings at the meetings, printed in small type, occur at intervals; these occasionally include a brief abstract of a communication or letter: a particularly interesting instance is the following (Memoirs, &c., II, 391):—

"May 5th, 1845.—The following papers were read: An abstract from a letter from Professor Bunsen, of Marburg, stating that he had undertaken some experiments on the direct formation of cyanogen from the union of the nitrogen of the air with carbon. Two experiments were made with carbonate of potash and charcoal from pure sugar, in iron tubes heated to whiteness, through one of which nitrogen was led, through the other carbonic acid. In the first experiment there was a yellow-red flame on igniting the gases, and which smelt strongly of cyanogen; there were also abundant vapours of cyanide of potassium: the contents of the tube gave upwards of 6 grammes of cyanide of silver free from chloride. In the second tube the gases were perfectly free from cyanogen, burnt with a full blue flame, and no cyanide of potassium could be detected in the mixture. The reason of previous failures was the absence of a sufficiently intense heat."

Communications of this character, printed as part of the proceedings, are not numbered; the papers printed in larger type, constituting the *Memoirs*, are, however, numbered consecutively throughout the three volumes of *Memoirs*, the second volume comprising numbers 85 to 148; the third, numbers 149 to 207. Volume ii covers the dates from 7th November, 1843, to 17th May, 1845; volume iii the dates from 3rd November, 1845, to 21st June, 1847.

Throughout these volumes, with but very few exceptions, the papers published *in extenso* are printed after the account of the proceedings at the meetings at which they were read.

The following note appended to a paper "On the Metamorphoses of Indigo," by Dr. August Wilhelm Hofmann, Assistant in the Giessen Laboratory, communicated to the Society on 3rd February, 1845, (*Memoirs*, &c., ii, 266), is historically of considerable interest:—

"I have had the pleasure of witnessing the care and accuracy with which the author of this paper has proceeded in making his observations and establishing his facts. It appears to me that he has produced a definite and irrefragable proof that the chemical character of a compound does not depend, as the electro-chemical theory supposes, upon the *nature* of the elements it contains, but solely on the manner of their grouping.—*Justus Liebig*."

Quarterly Journal, 1847-64, 14 Vols.—From the commencement of the session in November, 1847, the Society's work is recorded in a Quarterly Journal, a form of publication which was continued until the close of 1864. The origin of the Quarterly Journal, of which further volumes were issued, is explained in the following Preface to the first volume, dated 30th December, 1848:—

"Preface,—In order to promote the more speedy and regular circulation of the communications made to the Society amongst its members, the Council has resolved to publish the *Memoirs* and

Proceedings, which up to this time have appeared at irregular intervals, in the form of a Quarterly Journal. It has been resolved, that Notices and Abstracts of the more important papers upon Chemical Subjects, which may appear in foreign Journals, shall be appended to each number of this Quarterly Journal, and that the *January Number* for each year shall contain an alphabetical list of the heads of all Chemical Papers which have appeared during the year, both at home and abroad, up to the time of the publication of the Journal."

At the meeting in November, 1847, it was resolved:—"That the Committee for superintending the publication of the Journal, do consist of the President and Secretaries, *ex-officio*, and four other Members of Council, and that Messrs. Graham, Miller and Playfair be appointed as Members of this Committee."

This change also involved the appointment of an Editor. The first two volumes were edited by Edmund Ronalds, Ph.D., who became one of the Secretaries in 1848, then Lecturer on Chemistry at the Middlesex Hospital, and afterwards Professor of Chemistry in Queen's College, Galway, Ireland. Dr. Ronalds received an honorarium of £50 per annum. It is noteworthy that on the editor requesting information on certain points, it was resolved (January, 1848): "That the nomenclature and notation adopted be those of Professor Graham's Elements of Chemistry, and that the weights and measures be those of the authors, but where necessary, as in absolute quantities, to bracket the corresponding weight, &c., in grains or imperial measure. That the indications of the thermometer and barometer, where required, be given in brackets in degrees of Fahrenheit and inches of mercury."

On Dr. Ronald's resigning in November, 1847, Dr. Playfair proposed that a Committee should be appointed to act as editors, who should be responsible to the Council and the public for all matters connected with the publication of the Journal; but on the motion of Dr. Miller, it was resolved that the Journal should be edited by a paid editor, appointed by the Council, whose name should not appear, and who should be immediately responsible to a Publication Committee to be nominated annually by the Council from their own body. Messrs. Graham, Hofmann, Miller and Playfair were appointed a committee for this purpose. The Council, however, still continued to act as the Committee for papers, although they often ordered the reports to be forwarded to the Publication Committee, authorising them to act thereon without further sanction. The senior Secretary was put on the Publication Committee, *ex-officio*, in 1865.

Henry Watts was elected editor on 17th December, 1849, and retained this office until his death in June, 1884.

The Quarterly Journal was published for the Society by Hippolyte

Baillière. The first six volumes were printed by Schulze and Co., 13, Poland Street; vol. vii was printed by Wilson and Ogilvy, Skinner Street; vol. viii by Spottiswoode and Co.; and vol. ix by Harrison and Sons, who have since 1857 remained the Society's printers.

Many of the notices of papers in other Journals are of considerable length, especially those of papers published in the "Philosophical Transactions of the Royal Society," some of these latter being furnished by their authors. It is noteworthy also that a number of valuable official reports are printed in this section, *e.g.*, that on the alleged adulteration of pale ales by strychnine made by Professors Graham and Hofmann at the request of Messrs. Allsopp, and that on original gravities to the Board of Inland Revenue by Professors Graham, Hofmann and Redwood. There was much fluctuation in the number and length of the abstracts published. There is no doubt that the Editor and Publication Committee endeavoured to maintain the Journal of an approximately uniform size, and that when the amount of original matter at their disposal was considerable, they devoted but a brief space to abstracts, and *vice versâ;* they were also clearly influenced by the increase in the number of titles of papers occurring in other British and foreign Journals.

Monthly Journal, 1862-78.—The Quarterly Journal was discontinued at the close of 1861, and its place was taken by a *Monthly Journal.* The reasons for the change are stated by the President (Professor Hofmann) in the address delivered on 31st March, 1862, in the following words:—

"In strict accordance with these resolutions [see previous page], the Quarterly Journal of the Chemical Society was published up to the year 1860, when it was found convenient to discontinue the alphabetical list of the heads of chemical papers. In fact, this list, which when first published occupied not more than nineteen or twenty pages, had gradually expanded beyond legitimate proportions, filling in the last volume in which it appeared not less than 79 pages [actually 96] or one-quarter of the whole volume. By its discontinuance, a considerable amount of additional space was thus given for original communications and for abstracts, but it proved inadequate to the requirements of the Society. In 1860 and 1861 the improvement of the Journal had been repeatedly under the consideration of the Council; who ultimately decided that the Quarterly Journal should be replaced by a Monthly Journal, each number to contain two and a half sheets, whereby the annual volume will be raised from twenty-four to thirty sheets. *The rank a Society holds will always depend upon the number, value and rapidity of its publications.*

I believe therefore that the transition from a quarterly to a monthly Journal will be received with general approbation. Not only does this change secure to our contributors almost immediate publication, but it will enable us also henceforth to publish abstracts of all valuable chemical papers which are dispersed in the Proceedings and Transactions of the several learned Societies, in which they are not always easily accessible, and to make our Journal a sort of *Compte Rendu* of all the work done in chemical science throughout the country."

In the Presidential Address in the following year (1863), we read:—"The Journal in its new form . . . has given general satisfaction, all the anticipated advantages having been fully realised. The frequency and regularity of its appearance has secured to our contributors a rapidity of publication hitherto unknown in the history of the Chemical Society, while the increased number of sheets has enabled us to publish abstracts of all the important chemical papers scattered throughout the Proceedings and Transactions of the several learned Societies in Great Britain . . . Early in December last the Council decided to print henceforth 750 copies of the Journal instead of 600, which was the number formerly printed. Again, in the beginning of the year, it was agreed that the time had arrived for starting a new series, the publication of which, under the auspices of our indefatigable Editor, has actually commenced."

The volume, at the close of which the address from which these last remarks are taken is printed, is vol. i of the *New Series*, and vol. xvi of the entire series, and it is somewhat remarkable that the renumbering had not been commenced a year earlier when the Quarterly Journal was abandoned in favour of a Monthly Journal. The President's reference to the publication of Abstracts is also difficult to understand, as vol. xiv is the last in which Abstracts are published.

Vol. xv, the first of the new series, bears the names of the four members of the Committee of Publication, and also of the Editor, on its title page, the latter having been omitted in the Quarterly Journal.

After 1860, the account of the proceedings at the meetings, together with a list of donations to the library, was embodied in the annual report.

The functions of the Publication Committee were enlarged on the change being made from a quarterly to a monthly publication, in order as far as possible to prevent delay, the Council resolving:—

"That papers read before the Society be forwarded at once by the Secretaries to the Publication Committee, who shall be responsible for their examination and speedy publication, if thought suitable for publication.

"That any paper read before the Society which may be considered by the Publication Committee unsuitable for publication, be returned by them to the Council, with their report thereon.

"That any paper communicated during the recess may, by joint consent of the Secretaries and Publication Committee, be published in the Journal without being first read to the Society.

"That the Publication Committee be instructed to make the Journal of the Society as complete a representative as possible of the Chemistry of the United Kingdom."

In accordance with the last of these resolutions, British papers of importance published elsewhere, chiefly in the Philosophical Transactions, were occasionally reproduced or very fully abstracted during this period.

In 1867 Mr. Van Voorst became the publisher of the Journal.

Monthly Journal and Abstracts, 1871–77.—During nine years the publication of abstracts remained entirely in abeyance, but in the course of his Address to the Fellows at the Anniversary meeting on 30th March, 1870, the President, Professor Williamson, made the following remarks:—

"Another matter of considerable importance has been brought under the notice of your Council,* and has been by them referred to the careful consideration of a sub-committee, who will report to the new Council.

"The great activity of chemists in France and Germany leads to the publication of vast quantities of important matter in languages not easily intelligible to many of our members, and a feeling has been entertained for some time past that the progress of our Science and of its application would be greatly promoted by the regular publication in the English language of accurate reports of all Chemical papers. For many years past accurate reports of the kind have been published in Germany, first under the auspices of the great Berzelius, and latterly under those of Liebig and Kopp. The French Chemical Society have also added very greatly to the value of their Journal by publishing in it reports of a great number of important papers from various sources. I am happy to say that the eminent chemists who are at the head of that Society concur with us in desiring to publish reports combining the completeness of the *Jahresbericht* with a much greater celerity of appearance, and that our respective Members may have presented to them every month an outline of all that has been done in the Science since the last Report.

* Professor Williamson himself was the prime mover in this matter, and it was at his suggestion that a committee was appointed in March, 1869, to consider the question. This committee was composed of the following Fellows: Mr. Abel, Mr. de la Rue, Professor Frankland, Dr. Gladstone, Mr. Harcourt, Dr. Mills, Professor Miller, Dr. Müller, Professor Odling, Mr. Perkin, and Professor Williamson.

It appears that considerable facilities would be afforded for the preparation of such reports by a joint action of the two Societies, and our friends at Paris have expressed the utmost readiness to co-operate with us in this important matter. I hope at our next Anniversary meeting to be able to congratulate the Society on the commencement of a system of international working."

In the following year, at the Anniversary meeting, when Professor Williamson again delivered the address, he was able to state that "Your Council has made arrangements for carrying out the system of Monthly Reports which has been from time to time in contemplation. It was hoped that the Chemical Society of Paris might from the first co-operate with us in the preparation of these monthly reports, but circumstances beyond their control have prevented the sister Society from joining us in the beginning of this year. Deeming it undesirable to delay the commencement of the reports, your Council still look forward to the future co-operation of the Paris Society in their preparation.

"You are aware that the present available income of the Society was not considered to be sufficient to defray the additional expense of writing and printing these reports, and I have the pleasure of informing you that contributions to the extent of £1,175 have been promised by Members of your body towards supplying the deficit during the first five years of the appearance of the reports. The British Association has moreover granted us the sum of £100 for this year in aid of the undertaking. We hope that in five years the funds of the Society may have sufficiently increased to enable us to pay the whole expense of the reports, and that their publication will be valued by the Members of our Society, and will promote the advancement of our Science wherever the English language is read.

"The next number of our Journal, which I hope to see in a few days, will be the first to contain the monthly reports in addition to the original papers contributed to the Society."

The publication of *Abstracts of Chemical Papers published in British and Foreign Journals* was commenced at page 94 of the twenty-fourth volume (new series, vol. 9) of the Journal early in 1871, and has since been continued without intermission. Fifteen hundred copies were printed of the 1871 volume. There cannot be a question that this has been a work of the very greatest importance, second only to that accomplished by the establishment of the Society, and the consequent association of English chemists. No steps could have more directly promoted the main objects of the Society, as defined in Dr. Gladstone's Presidential Address in 1879, viz., the general advancement of chemical science.

The preparation of the abstracts was entrusted to a staff of paid abstractors chosen from among the younger Fellows, and it was proposed that their abstracts should be referred to members of the Publication Committee. This Committee was therefore greatly enlarged. The following Fellows were appointed in February, 1871, as a Committee to superintend the publication of the Journal and Reports:—

Physical Chemistry.—Dr. Atkinson, Professor G. C. Foster, and Dr. Gladstone.

Inorganic Chemistry.—Mr. Harcourt, Professor Roscoe, and Professor Williamson.

Analytical Chemistry.—Professor Bloxam and Dr. Russell.

Organic Chemistry.—Dr. Debus, Professor Frankland, Dr. Mills, Dr. Müller, and Professor Odling.

Mineralogical Chemistry.—Professor Maskelyne.

Agricultural Chemistry.—Dr. Gilbert and Dr. Voelcker.

Technical Chemistry.—Mr. Abel and Mr. Perkin.

Physiological Chemistry.—Dr. Marcet and Professor M. Foster.

Such a scheme, however, very soon proved to be unworkable, and the revision of the abstracts was left entirely in the hands of the Editor, Mr. Watts, with the most satisfactory results.

At the anniversary meeting in 1874, the President (Professor Odling) speaks of the Journal as continuing its career of usefulness, its value as the unique exponent of all chemical progress whatever being extreme and indisputable.

The attraction which it afforded led to such an increase in the number of Fellows, that in 1876, on the expiry of the five years for which extra funds had been forthcoming, the President, Mr. Abel, was in a position to state that the ordinary funds of the Society would be adequate to defray the cost of the Journal in its new form. In tracing the history of the Journal, the following extracts from his address, delivered at the Anniversary Meeting in 1876, are of special importance:—

"This reference to the Journal leads me to direct the attention of the Society to the present condition of this work, of which we may justly say with pride that it now occupies a very prominent position among the most valuable scientific publications of the present day. Since the important step was taken, five years ago, of increasing the value of the Journal to the Fellows and the chemical world generally, by including in it abstracts of chemical papers published at home and abroad, the size of the year's Journal has increased to dimensions somewhat inconvenient for those of a single volume. In 1870 the Journal numbered 440 pages, while since that year the number of its pages has ranged from 1,204 to 1,404 (in the last year). But even with this great expansion of the Journal, it has been impossible to keep pace, in the publication of abstracts, with the appearance of chemical papers in foreign journals, and this has been especially the case of late, in consequence of the increased space which has to be devoted in the Journal to the original communications made to the Society. Although the latter can only be a subject for congratulation, it is obvious that as the chief value to British workers in chemistry of the abstracts of foreign papers lies in their *speedy* publication, the importance which the Journal has acquired cannot be maintained, except by keeping pace, in that part devoted to abstracts, with continental publications. The Editor of the Journal, Mr. Watts (whose indefatigable zeal in the interests of the Society cannot be too warmly extolled) has represented to the Council that to keep the publication of abstracts up to the day necessitates a considerable permanent increase in the size of the Journal, the probable number of pages required to compose the year's publication, inclusive of the index, being about 1,600. Feeling convinced that there must be unanimity of opinion in the Society with respect to the importance of maintaining and, if possible, increasing the usefulness of the Journal, your Council did not hesitate to sanction this most desirable increase in its size, and taking into consideration the very obviously inconvenient dimensions even of the recent annual volumes, they decided that in future two volumes should be published annually. This permanent increase in the size of the Journal involves, however, a considerable addition to the annual cost of its publication (which, with the necessary increased editorial expenses cannot be estimated at less than £300) . . . . . Prior to 1871, the cost of publication of the Journal amounted to about £380 annually; in the last three years, the annual expenses connected with it have amounted to about £1,170. The cost of the Journal has, it need scarcely be stated, been met in part, during the past five years, by the special contributions of Fellows, amounting on an average to about £250 annually, and by the annual grant of £100 from the funds of the British Association. When first the extra contributions to the funds of the Society were sought, five years ago, it was predicted by the distinguished Past-President to whom the Society is indebted for the suggestion of placing the Journal upon its present footing, that at the termination of the limit fixed for the guarantee subscription, the ordinary funds of the Society would be adequate to defray the extra expenditure involved in securing this important benefit to its Fellows. That this prediction has actually been verified must be a source of great gratification to the Fellows of the Society."

Later in the Address it is stated that in order to insure the maintenance of the income of the Society on a satisfactory footing with reference to its increasing expenditure, the Council had decided among other things, "to raise the selling price of the Journal to £1 10*s*. annually."

Journal: Transactions and Abstracts, 1878-91.—In 1871, the Publication Committee, which hitherto had consisted of only four Fellows of the Society, was much enlarged, consisting at first of twenty and subsequently of twenty-two Fellows. It was, in fact, originally intended that leading members of the Society should revise the work of the abstractors: hence the Committee was made a large one, so as to represent all the different sections into which chemical papers might be divided. In practice, however, it was soon found that this plan was attended with great difficulties, and the work of revision necessarily fell into the hands of the Editor. The very largeness of the Publication Committee moreover lessened the feeling of responsibility in its individual members. In 1877, therefore, it was decided to reduce the number to the five officers of the Society with six other members.

In order to assist the Editor in the multifarious duties connected with the preparation of the abstracts, Mr. C. E. Groves was appointed Sub-Editor in March, 1878.

During the years 1871-77 inclusive, the papers read before the Society were not separated in the Journal, and consequently they became engulphed in a sea of abstracts. In 1878, therefore, a separate pagination was adopted for the papers read at the meetings, and for abstracts, so that at the end of each year the Society's work could be bound up as a separate volume of *Transactions*.

The Committee which initiated these changes also drew up rules for the guidance of abstractors, and a series of regulations for the use of the editors in the preparation of the Journal; at their recommendation also the remuneration given to the abstractors was rendered more adequate to the services required of them.

The following reference to the "Instructions to Abstractors" was made in 1879 by the President (Dr. Gladstone) in the Anniversary Address:—

"The importance of the abstracts which we now publish is universally recognised. In order to facilitate the publication of them, to economise space, and especially to reduce the confusion which arises from different kinds of nomenclature, a new series of instructions to abstractors has been drawn up; and it is hoped that the suggestions adopted, after much consideration by the Council of our Society, may not be without their influence upon the practice of authors themselves."

The educational effects of these instructions has undoubtedly been considerable, and the greater uniformity noticeable in accounts of English chemical researches during recent years is largely traceable to their influence: in point of fact, the training which the younger English chemists acquire as Abstractors for the Society's Journal, is of no slight value, and the Society may properly claim on this account that it has rendered a considerable educational service, and that it has done much to promote the literary studies of a large number of the more active of its Fellows.

Mr. Watts died on 30th June, 1884, having been Editor of the Society's publications during nearly twenty-five years. The following resolution was passed at the meeting of the Council a few days after:—

"That the Council learns with deep regret of the loss which the Chemical Society has sustained by the death of Mr. Henry Watts, Editor of this Journal and the Society's Librarian. In these capacities he has long and faithfully served the Society, and by his literary labours has rendered signal service in extending chemical knowledge. The Council desire to express their profound sympathy with Mrs. Watts and her family in the loss which they have just sustained."

On the death of Mr. Watts, Mr. Groves acted as Editor, and was formally appointed to that office in December, 1884, Mr. A. J. Greenaway being appointed sub-Editor of the Society's Journal. At this time the duties of the Editors were carefully considered and defined by a Committee whose report was adopted by the Council. Both this Committee and the Council laid great stress on the importance of publishing the Monthly Journal at the very beginning of the month, and of securing the prompt publication not only of original papers but also of the abstracts.

Some idea of the great labour involved in preparing and editing the abstracts, is afforded by the fact that in 1887 no fewer than 2,470 abstracts were published, occupying 1,351 pages of the Journal.

Proceedings, 1885-91.—In the first three volumes of the Quarterly Journal, the records of the proceedings of the meetings occur scattered throughout the volumes, the brief statement of the business transacted at a meeting being followed as a rule by the paper or papers read thereat: in a few cases, abstracts printed in small type of minor communications are included in these *Proceedings.* In 1851, and during several years afterwards, the accounts of the proceedings at the meetings from January to December were collected together and published at intervals, usually at the ends of three of the quarterly parts. In 1859, for the first time, the accounts of the proceedings during the whole year are printed together at the end of the volume; and although in 1860 they are again printed in three sections, in 1861 they are once more printed together, and this practice was followed during several years afterwards. The twentieth volume of the Journal contains only the proceedings from January to June; but in the next yearly volume the proceedings during the entire session, *i.e.*, from November to the June following, are recorded, and this practice was uniformly followed until the publication of any formal account of the proceedings in the Journal was abandoned in 1885.

In November, 1884, at a meeting of the Council, Mr. Horace Brown gave an account of a correspondence he had carried on with a number of country Fellows with reference to the publication of abstracts of the publications read, and of the discussions at the meetings of the Society, and on his motion it was resolved:—"That abstracts of proceedings, similar in character to those published by the Geological Society, shall be regularly prepared and circulated among the Fellows."

Such *Proceedings* have been regularly issued since the beginning of 1885. Besides abstracts of the papers read at the meetings, which have shortly afterwards been published in the *Transactions*, these Proceedings contain a considerable number of communications, either of a preliminary nature, or of such a character that their publication in this manner is sufficient. The reports of discussions have been confined to remarks which either supplement the information given in the papers, or serve to correct or criticise statements made therein. As the *Proceedings* also contain a record of all business transacted before the Society, they afford a faithful mirror of the Society's activity.

The following table gives the number of papers published each year, and the number of pages they occupy, and also information as to the publication of abstracts:—

	Records of the Society's Work. Number of Papers.	Number of Pages.	Number of Pages devoted to Notices of Papers in other Journals.	Number of Pages devoted to Titles of Papers in British and Foreign Journals.
Proceedings—				
1841–43	35	64	—	—
Memoirs—				
1841–43	42	258	—	—
Memoirs and Proceedings—				
1843–45	64	489	—	—
1845–47	59	568	—	—
Quarterly Journal—				
1848. Vol. i	29	347	82	20
1849. ,, ii	33	355	17	22
1850. ,, iii	32	302	124	39
1851. ,, iv	28	261	160	44
1852. ,, v	28	186	143	55
1853. ,, vi	23	208	121	52
1854. ,, vii	30	240	82	62
1855. ,, viii	15	109	205	62
1856. ,, ix	15	136	171	71
1857. ,, x	31	304	33	55
1858. ,, xi	21	282	45	79
1859. ,, xii	25	300	—	97
1860. ,, xiii	35	379	—	—
1861. ,, xiv	25	319	52	—
Journal (Monthly)—				
1862. Vol. xv	47	333	191 (10 papers)	—
Journal. New series—				
1863. Vol. xvi (Vol. i N.S.)	41	290	172 (8 ,,)	—
1864. ,, xvii	51	390	74 (3 ,,)	—
1865. ,, xviii	46	336	32 (3 ,,)	—
1866. ,, xix	41	382	152 (6 ,,)	—
1867. ,, xx	45	370	240 (4 ,,)	—
1868. ,, xxi	44	375	158 (4 ,,)	—
1869. ,, xxii	34	347	117 (4 ,,)	—
1870. ,, xxiii	33	369	79 (5 ,,)	—
Journal and Abstracts—				
1871. Vol. xxiv	28	202	1,074	—
1872. ,, xxv	32	304	900	—
1873. ,, xxvi	46	348	1,002	—
1874. ,, xxvii	50	253	1,040	—
1875. ,, xxviii	49	483	921	—
1876. { ,, xxix .. .. / ,, xxx .. .. }	56	421	1,351	—
1877. { ,, xxxi .. .. / ,, xxxii .. .. }	59	562	1,262	—
Transactions and Abstracts—				
1878. { Vol. xxxiii .. .. / ,, xxxiv .. .. }	61	568	1,093	—
1879. { ,, xxxv .. .. / ,, xxxvi .. .. }	84	839	1,168	—
1880. { ,, xxxvii .. .. / ,, xxxviii .. .. }	75	859	1,021	—

		Records of the Society's Work.		Number of Pages devoted to Notices of Papers in other Journals.	Number of Pages devoted to Titles of Papers in British and Foreign Journals.
		Number of Papers.	Number of Pages.		
Transactions and Abstracts—continued.					
1881.	Vol. xxxix.. ,, xl..	75	583	1,281	—
1882.	,, xli.. ,, xlii..	65	447	1,444	
1883.	,, xliii.. ,, xliv..	63	510	1,267	
1884.	,, xlv.. ,, xlvi..	57	721	1,562	—
1885.	,, xlvii.. ,, xlviii..	85	938	1,398	—
1886.	,, xlix.. ,, l..	85	877	1,190	—
1887.	,, li.. ,, lii..	88	844	1,256	—
1888.	,, liii.. ,, liv..	75	907	1,471	—
1889.	,, lv.. ,, lvi..	71	789	1,373	—
1890.	,, lvii.. ,, lviii..	71	1,121	1,616	—
1891.	,, lix.. ,, lx..	95	1,118	1,704	—

Proceedings.

	Papers communicated from Jan. to Dec.	No. of Pages occupied by Abstract and Notices.
1885	95	132
1886	120	137
1887	103	147
1888	97	122
1889	109	170
1890	104	178
1891	92	192

EDITORS OF THE JOURNAL.
1841-91.

Edmund Ronalds . . . . 1848-49.
Henry Watts ... . 1850-84.
Charles E. Groves .. .. 1885-91.

SUB-EDITORS.

Charles E. Groves ... ... 1878-84.
A J. Greenaway ... ... 1885-91.

THE LIBRARY.

THE library, which is now so important a feature in the Society, and contains over 10,000 volumes, is to be traced back to a minute of Council in August, 1842, when "the Secretary was empowered to obtain a bookcase for the use of the Society." Certain periodicals were ordered soon afterwards, and there are occasional references in the minutes to the ordering of books.

In March, 1849, a Committee was appointed to consider to what libraries, &c., it might be expedient to present the Society's Journal. This Committee recommended that the objects to be chiefly held in view were the dissemination of the researches undertaken by the Fellows as widely as possible; and the increase of the Society's library by obtaining in exchange the transactions of other scientific bodies. They furnished a list of certain Scientific Societies publishing memoirs, &c., public libraries and universities, and editors of scientific journals—in all under fifty—to whom they recommended that the Society's Journal should be presented.

In December, 1849, a Committee was appointed to consider and report to the Council on the duties of an Assistant Secretary and Librarian. Their report was presented in January, 1850, when Mr. Medlock was appointed to these offices. At the same meeting it was resolved that the library be opened immediately, and a Committee was appointed to report on the most advisable means of rendering the library efficient. From the report it appears that the library consisted of about 270 volumes of journals, and 60 volumes of miscellaneous works, and 100 pamphlets, &c. This Committee recommended that a sum of money should be voted annually for the library; and that an appeal should be made to Fellows both for subscriptions in aid of the library and donations of books. It was resolved to issue a circular embodying the substance of this report.* At the end of the year a catalogue was ordered to be printed, and additional bookcases were procured.

Mr. Medlock acted during only two years, and Mr. Wood, the collector, then had charge of the books until December, 1859, when

* A gift to the library of nearly 200 volumes, from Mr. J. J. Griffin, is recorded in the Journal for 1850, p. 412.

he resigned. A Committee was then appointed to consider the means of rendering the library more efficient, and on the recommendation of this Committee the Editor, Mr. Watts, was offered the charge of the library; he retained the office until his death.

On the appointment of Mr. Watts the issue of books was stopped, and the library closed for revision during a month; and he at once prepared a new catalogue, which was ordered to be printed in June, 1860. This was issued early in the following year.

A Library Committee was first appointed in April, 1866, and since then the management of the library has always been entrusted to the Librarian, acting under the orders of such a Committee. In 1866 £100 was placed at the disposal of the Committee, but subsequently it became the practice of the Committee, the Treasurer being always one of its members, to order such books as were considered necessary, the Council being appealed to only when an exceptional expenditure was considered desirable.

A new catalogue of the library was published in 1874.

In 1878, the Library Committee recommended a number of alterations in the library rules, which were adopted by the Council. One of these was that there should be no distinction made between town and country Fellows; and that, with certain exceptions, the books should be allowed to circulate amongst the Fellows generally. Previously it was not customary to issue books except to Fellows attending personally at the library, or their accredited representatives. But a more important recommendation was that which led to the purchase of duplicate sets of the chief chemical serials, so that one set might always be retained in the library for reference.

Much difficulty being experienced at times in recovering books from Fellows, the Council in 1881 consulted the Society's solicitors as to the steps that could be taken to enforce the return of books. The action taken by the Library Committee under the advice of the solicitors led to the return of all but two of the missing books.

On the decease of Mr. Watts, Dr. Thorne was appointed Librarian, in December, 1884, under a scheme of duties drawn up by a committee appointed in the previous July to consider the appointment of an editor, sub-editor, and librarian. He at once undertook the comparison of the catalogues with the library, and carried out a re-arrangement of the books.

At the time of his death, Mr. Watts was engaged in preparing for the press a subject catalogue of the library, based on the card catalogue which he had prepared a few years previously.

Mr. Warington did important service to the Society by undertaking to complete this catalogue and superintend its publication; it was issued in 1886. The Society is indebted to Professor McLeod for the index of authors' names attached to this catalogue.

According to a statement of the Librarian appended to the President's Address in 1890, the library then contained:—

3,082 volumes of systematic works,
5,667 volumes of journals,
1,135 volumes of duplicate journals for circulation,
1,450 pamphlets.

The present library is a room of the same size as the meeting room, and on the floor above it; the bookshelves occupy the whole of the wall space. A smaller adjoining room (also used as a tea room) is similarly fitted with shelves.

A statement of the expenditure on the library during the years 1841-91 is given on p. 197.

JOURNALS OF WHICH PARTS AND WHOLE VOLUMES MAY BE BORROWED BY FELLOWS.

American Chemical Journal.
American Journal of Science.
Analyst.
Annalen (Liebig's).
    Supplements and Registers.
Annalen der Physik und Chemie.
    Ergänzungs-Bände; Jubelband; and Registers.
Beiblatter zu den Annalen der Physik und Chemie.
Annales de Chimie et de Physique; and Tables.
Annales Agronomiques.
Berichte der Deutschen Chemischen Gesellschaft.
Biedermann's Centralblatt für Agrikulturchemie und rationellen Landwirthschafts-Betrieb.
Chemical News.
Chemisches Centralblatt.
Comptes-Rendus hebdomadaires des séances de l'Académie des Sciences.

Gazzetta Chimica Italiana.
Jahrbuch (Neues) für Mineralogie; Beilage Bände; and Registers.
Jahresberichte über die Fortschritte der reinen, pharmaceutischen und technischen Chemie, Physik, Mineralogie und Geologie; and Registers.
Journal of the Chemical Society.
Proceedings of the Chemical Society.
Journal de Pharmacie et de Chimie.
Journal of the Society of Chemical Industry.
Monatshefte für Chemie und verwandte Theile anderer Wissenschaften.
Pharmaceutical Journal.
Polytechnisches Journal. (Dingler.)
Proceedings of the Royal Society.
Recueil des Travaux Chimiques des Pays-Bas.
Répertoire de Chimie Pure; and Répertoire de Chimie Appliqué. Continued as the Bulletin de la Société Chimique de Paris.
Zeitschrift für Analytische Chemie; and Registers.
Zeitschrift für Krystallographie und Mineralogie; and Registers.
Zeitschrift für Physikalische Chemie.
Zeitschrift für Physiologische Chemie; and Registers.
Zeitschrift für Rübenzucker-Industrie.

LECTURES.

1841-91.

The following extract from the address delivered by the President, Colonel Philip Yorke, at the anniversary meeting on 30th March, 1854, gives a clear account of the origin of the practice of introducing lectures at the meetings:—

"In order to meet the feelings of many Fellows of the Society, to the effect that it was desirable to introduce into our meetings a little more life and general interest than could be elicited by the reading of the original communications addressed to the Society, the Council passed the following resolution in June last: 'In order to increase the interest of the meetings of the Society, certain meetings, not exceeding five in the year, shall, after the transaction of the ordinary business of the Society, be devoted to the delivery of discourses on matters connected with the progress of Chemistry, and which may be illustrated by experiment. It is not proposed that these discourses shall be published in the Journal, but where new matter, either theoretical or experimental, is contained in them, such matter may, with the consent of the Council, be published in the form of an abstract or paper. It is proposed that, after the discourse, discussion shall be invited, and, in cases in which the matter of the discourse is published in the Journal, explanations and remarks upon it offered in discussion may, with the consent of the Council, be appended.'"

The President then proceeds:—

"This resolution has as yet been carried into effect in one instance only, when the Society was indebted to Professor Graham for an able and elaborate discourse on 'The liquid condition of matter.' This was followed by an interesting discussion, in which several eminent Fellows of the Society took a part. Judging then from the result of this trial, the Council are justified in anticipating that the plan will realise their hopes; but the Council are desirous of impressing on the Fellows their opinion that the character and position of the Society must mainly depend on the value of the original communications which may be published in the Journal of the Society."

During the first decade lectures were very frequently delivered, but each subsequent decade shows a marked falling off in their number. As the original communications increased in number and importance, it became less necessary for the officers to make provision for the delivery of set lectures, and more customary for prominent Fellows desiring to bring subjects which they deemed to be of importance under the notice of the Society, to present them in the form of lectures; consequently a far larger proportion of the lectures delivered during later years are recorded in the Journal. During the last decade, when, owing to the increased activity of British chemists, there has been no occasion to provide lectures to fill up evenings which would otherwise have been blank, the lecturers have most frequently been specialists working in fields more or less beyond the ken of the professed chemist, and the main object has been to provide monographs affording a comprehensive survey of methods and results of inquiry in chemical borderlands. The lectures are very frequently alluded to in the anniversary addresses, and it is clear that the majority have been of considerable interest to those who have had the opportunity of listening to or reading them.

The following is a list of lecturers and their subjects:—

1	1854	March 6	Prof. GRAHAM. The liquid condition of matter.
2	,,	May 1	Dr. H. BENCE JONES. The quantitative examination of solutions of different varieties of sugar by Soleil's saccharometer.
3	,,	June 5	Dr. E. FRANKLAND. The technological history of wood as a raw material.
4	1855	March 19	Dr. W. A. MILLER. The action of water on lead.
5	,,	April 16	Mr. WARINGTON. The maintenance of a permanent balance between the animal and vegetable kingdoms in a medium of fresh or sea water.
6	,,	May 7	Dr. WILLIAMSON. Certain processes recently proposed for the decomposition of fats by water at high temperatures.
7	,,	May 21	Dr. GILBERT. The chemical statistics of the animal body.
8	,,	June 4	Dr. LONGSTAFF. The explosion at Gateshead in October, 1854.
9	1856	Jan. 21	Dr. W. A. MILLER. Some points in the practice of the assay of gold and silver.
10	,,	Feb. 18	Dr. A. W. HOFMANN. Some new bases containing phosphorus.
11	,,	March 17	Dr. J. H. GLADSTONE. Some laws of chemical combination.
12	,,	April 21	Prof. ABEL. Chemistry as applied to the manufacturing branches of the War Department.
13	1857	March 2	Prof. ABEL. A report on recent patents connected with the reduction and purification of iron and its conversion into steel.
14	,,	April 6	Mr. DUGALD CAMPBELL. The application of sewage to agriculture.
15	,,	May 4	Dr. ANDERSON. The alkaline products of the destructive distillation of animal matter.
16	,,	June 4	Prof. W. A. MILLER. The recent progress of electro-chemistry.
17	1858	April 15, May 6	Dr. ODLING. Atoms and equivalents (*Quarterly Journal* 11, 107).
18	,,	May 20	Dr. ANGUS SMITH. The air of towns.

19	1858	June 17	Dr. HOFMANN. Ammonia and its derivatives (*Quarterly Journal* **11**, 252; **12**, 62).
20	1859	Feb. 17	Dr. GILBERT. The composition of the animal portion of our food, and on its relations to bread (*Quarterly Journal* **12**, 54).
21	,,	March 17	Dr. E. SCHUNCK. The colouring matters of madder.
22	,,	April 21	Dr. DEBUS. Polyatomic alcohols.
23	,,	May 19	Prof. BRODIE. Graphite.
24	,,	June 16	Prof. WILLIAMSON. Gas analysis.
25	1860	April 5	Dr. THOMAS ANDREWS. Ozone.
26	,,	May 3	Dr. J. H. GLADSTONE. Circular polarisation (*Quarterly Journal* **13**, 254).
27	,,	June 7	Dr. FRANKLAND. Organo-metallic bodies (*Quarterly Journal* **13**, 177).
28	1861	March 21	Prof. WILLIAMSON. Thermodynamics in relation to chemical affinity.
29	,,	April 18	Prof. ABEL. The application of electricity to the explosion of gunpowder (*Quarterly Journal* **14**, 165).
30	,,	May 16	Mr. W. H. PERKIN. The colouring matters obtained from coal tar (*Quarterly Journal* **14**, 230).
31	,,	June 20	Dr. H. E. ROSCOE. The application of the induction coil to Steinheil's apparatus for spectrum analysis.
32	1862	April 3	Dr. DEBUS. The influence of the quantitative method on the development of scientific chemistry.
33	,,	May 1	Dr. THOMAS ANDERSON. The chemistry of opium.
34	,,	May 15	M. H. ST. CLAIRE-DEVILLE. Vapour densities.
35	,,	June 5	Prof. WURTZ. Oxide of ethylene considered as a link between mineral and organic chemistry.
36	,,	June 19	Dr. MARCET. The chemistry of digestion.
37	1863	March 5	Dr. GILBERT. The assimilation of nitrogen by plants (*J.* **16**, 100).
38	,,	May 7	Dr. LYON PLAYFAIR. The constitution of salts (*J.* **16**, 274).
39	,,	May 21	Mr. GROVE. Effects of intense heat on fluids (*J.* **16**, 263).
40	,,	June 4	Prof. BERTHELOT. Synthetic methods in organic chemistry (*J.* **17**, 37).
41	1864	May 5	Sir B. BRODIE. The organic peroxides theoretically considered (*J.* **17**, 281).
42	,,	June 2	Prof. G. G. STOKES. The detection and discrimination of organic bodies by means of their optical properties (*J.* **17**, 304).
43	,,	June 30	Mr. J. T. WAY. The philosophy of English agriculture.
44	,,	Dec. 15	Prof. WILLIAMSON. Chemical nomenclature and notation (*J.* **17**, 421).
45	1865	Feb. 2	Dr. HOFMANN. Lecture illustrations (*J.* **18**, 156).
46	,,	June 2	Dr. MILLER. Some points in the analysis of potable waters (*J.* **18**, 117).
47	1866	Feb. 1	Dr. GILBERT. The composition, value and utilisation of town sewage (*J.* **19**, 80).
48	,,	April 19	Prof. CAREY FOSTER. The thermal phenomena accompanying chemical action.

49	1866	June 7	Mr. A. VERNON HARCOURT. The observation of the course of chemical change (*J.* **20**, 460).
50	,,	June 21	Dr. DEBUS. The constitution of some carbon compounds (*J.* **19**, 17, and 256).
51	1867	Feb. 7	Dr. MATTHIESSON. Alloys (*J.* **20**, 201).
52	,,	June 6	Sir B. BRODIE. Ideal chemistry.
53	1868	Jan. 16	Dr. FRANKLAND. Water analysis (*J.* **21**, 77).
54	,,	Feb. 20	Mr. D. FORBES. Chemical geology (*J.* **21**, 213).
55	,,	March 19	Mr. CHANCE. The manufacture of glass (*J.* **21**, 242).
56	,,	May 7	Mr. C. W. SIEMENS. The regenerative gas furnace as applied to the production of cast steel (*J.* **21**, 279).
57	1869	Feb. 4	Dr. WALLACE. The chemistry of sugar refining (*J.* **22**, 100).
58	,,	March 4	Mr. C. TOMLINSON. Catharism, or the influence of chemically clean surfaces (*J.* **22**, 125).
59	,,	May 6	Mr. J. LOWTHIAN BELL. The chemistry of the blast furnace (*J.* **22**, 203).
60	,,	June 3	Dr. WILLIAMSON. The atomic theory (*J.* **22**, 328).
61	1870	March 3	Dr. GLADSTONE. Refraction equivalents (*J.* **23**, 101).
62	,,	April 21	Prof. ROSCOE. Vanadium (*J.* **23**, 344).
63	,,	June 2	Prof. ODLING. Platinum ammonias.
64	1871	May 4	Dr. VOELCKER. The productive powers of soils in relation to the loss of plant food by drainage (*J.* **24**, 276).
65	,,	June 1	Dr. DEBUS. Ozone.
66	,,	June 15	Sir B. C. BRODIE. An experimental inquiry as to the action of electricity upon oxygen.
67	1872	April 4	Dr. SCHORLEMMER. Chemistry of the hydrocarbons (*J.* **25**, 425).
68	,,	May 2	Mr. RILEY. The manufacture of iron and steel (*J.* **25**, 533).
69	,,	June 20	Mr. H. DEACON. Deacon's method of obtaining chlorine, as illustrating some principles of chemical dynamics (*J.* **25**, 725).
70	1873	March 20	Dr. C. W. SIEMENS. Iron and steel (*J.* **26**, 661).
71	,,	April 17	Dr. DEBUS. Heat produced by chemical action.
72	,,	May 15	Dr. H. E. ARMSTRONG. Isomerism.
73	1874	Feb. 19	Mr. J. BELL. The detection and estimation of adulteration in food and drinks.
74	,,	March 19	Prof. DEWAR. Dissociation.
75	,,	May 21	Dr. W. H. CORFIELD. The sewage question, from a chemical point of view.
76	1875	Feb. 18	Prof. CLERK MAXWELL. The dynamical evidence of the molecular constitution of bodies (*J.* **28**, 493).
77	1876	Feb. 17	Dr. FRANKLAND. Some points in the analysis of potable waters (*J.* **29**, 825).
78	,,	April 28	Dr. ANDREWS. Certain methods of physico-chemical research.
79	1877	March 1	Prof. T. E. THORPE. The theory of the Bunsen lamp (*J.* **31**, 627).
80	,,	April 5	Prof. N. S. MASKELYNE. The discrimination of crystals by their optical characters.

81	1878	Feb. 21	Mr. J. Y. Buchanan. Laboratory experiences on board the *Challenger* (*Trans.* 445).
82	,,	April 4	Mr. H. C. Sorby. The determination of the index of refraction of liquids by means of the microscope (*Trans.* 487).
83	,,	May 2	Mr. Sydney H. Vines. The chemical aspects of vegetable physiology (*Trans.* 375).
84	1880	March 4	Prof. T. E. Thorpe. The relation between the molecular weights of substances and their specific gravities when in the liquid state (*Trans.*, 141 and 327).
85	1882	Feb. 2	Prof. Odling. The unit weight and mode of constitution of compounds.
86	,,	May 4	Prof. Dewar. Recent developments of the theory of dissociation.
87	1883	May 17	Capt. Abney. Photographic action studied spectroscopically.
88	1885	Feb. 5	Prof. Frankland. Chemical changes in their relation to micro-organisms (*Trans.* 159).
89	1886	Feb. 4	Prof. Klein. Methods of bacteriological research, from a biologist's point of view (*Trans.* 197).
90	1888	Feb. 2	Prof. Rücker. The range of molecular forces (*Trans.* 222).
91	1890	March 20	Prof. Judd. The evidence afforded by petrographical research of the occurrence of chemical change under great pressure (*Trans.* 404).

THE FARADAY MEDAL.

On 30th March, 1869, "the Faraday Medal Committee presented a preliminary report, in which it was stated that, under the advice of the Master of the Mint, they had communicated with Mr. Leonard Wyon, and having ascertained that he had the materials at command for the production of a good likeness of Faraday, they had authorised him to proceed with its preparation."

On 8th April, "the Committee reported that the finished model of the portrait of Faraday for the obverse of the medal had been submitted to them, and that they had authorised him to proceed with the engraving of the die."

On 3rd June the design received from Mr. Wyon for the reverse of the medal was approved.

On 17th June "a letter was read from Messrs. Johnson and Matthey containing an offer to present to the Society an amount of palladium to form the Faraday medals for the next ten years of the value of £200. The offer was accepted, and a vote of thanks to Messrs. Johnson and Matthey carried by acclamation."

There was considerable delay in the preparation of the dies, owing to Mr. Wyon being engaged on work for the Royal Mint; impressions of the dies were exhibited at the Council on various occasions, and slight alterations were made; and it was not until 16th June, 1870, that "it was reported, on behalf of the Medal Committee, that they had had the medal of palladium struck on one side, and communicated to M. Dumas through the French Ambassador."

Unfortunately, the palladium has sufficed only for the preparation of six medals.

The following Fellows have been recipients of the Faraday Medal:—

1869. J. B. A. Dumas.
1872. S. Cannizzaro.
1875. A. W. von Hofmann.
1879. A. Wurtz.
1881. H. von Helmholtz.
1889. D. Mendeléef.

THE FARADAY LECTURESHIP.

Although not an original member of the Society, Faraday joined it during the first year, his name appearing in the Minutes of the meeting on 4th January, 1842, among those of the members elected on that day. He served on the Council during the Session 1844–45, and was nominated President in 1851, but declined on the score of health. On his death in 1867 (25th August), at the meeting on 7th November, Mr. Warren de la Rue, the President, being in the chair, a resolution was passed—

> "That the Fellows of the Chemical Society request their President to convey to Mrs. Faraday their deep sense of the loss which science has sustained in the death of her highly-distinguished and much-esteemed husband, and to express their heartfelt sympathy with her in her own great loss."

The Council Minutes of 21st November, 1867, contain an entry that—"It was proposed for consideration whether it might not be desirable to found a lectureship, to be called the Faraday Lectureship, by which a yearly lecture should be given to the Society by some foreign chemist of eminence."

At the next meeting of the Council, on 19th December, 1867—"Dr. Odling renewed the proposal to constitute a Faraday Lectureship, with the double object of providing the Society with a yearly lecture from some foreign chemist of eminence, and of commemorating the name of Dr. Faraday." Each member of the Council was invited to give his opinion on the proposal, after which it was proposed and carried *nem. con.*, "That a Faraday Lectureship be established, and that a Committee be appointed to draw up the regulations relating thereto; and also that the Committee consist of Dr. Matthiessen, Dr. Williamson and the officers of the Society" (Mr. de la Rue, Professor Redwood, Mr. Harcourt, Professor Odling and Professor Frankland).

On 20th February, 1868—"The regulations relating to the Faraday Lectureship, which had been drawn up by the Committee appointed for the purpose, were read, and it was resolved that the report of the Committee should be printed and circulated among members of Council."

On 19th March, 1868—"In reference to the proposed Faraday Lectureship, Dr. Miller suggested that a fund to be employed in aid of scientific research would be a fitter memorial, and more serviceable to science. Such a fund would have to be independent of the funds of the Society."

On 16th April, 1868—"Dr. Odling pointed out that there was no opposition between the proposal of Dr. Miller that a fund should be raised by subscription to be applied in aid of scientific research and that of a Faraday Lectureship, which had already received the approval of the Council. With reference to the question whether the sentences in the Charter forbidding any grant of money to be made to any Fellow of the Society might not hinder the Society from remunerating a lecturer who should be a foreign member, it was agreed to obtain the opinion of counsel."

On 4th June, 1868—"Dr. Odling read the case drawn up for the opinion of counsel as to the intent of certain passages in the Charter, and the opinion given upon it, which was as follows:—

"'The Chemical Society was incorporated in the year 1848 by a Royal Charter, which is printed in the accompanying pamphlet. It is desired to obtain advice as to the legality of certain payments out of the funds of the Society. The preamble of the Charter stated the publication of transactions to be one of the objects of the Society, and the preamble also alluded to the advantage of association with foreign chemists. The Society was made to consist of members existing at its date and of elected Fellows. There was to be a Council, with full powers, to consist of the President, &c., and not more than twelve nor less than eight other Fellows. There was to be an Annual General Meeting, with power to make bye-laws, for admission not only of Fellows but also of Associates and honorary and foreign Members. The Council were to appoint all requisite officers. The property of the Society was to be vested in the Fellows.'"

The last clause but one prohibits payments to Fellows as follows:—"And we do hereby further will and declare, that the service of the President, Vice-Presidents, Treasurer, Secretaries and other members of the Council shall be honorary, and that it shall not be lawful for them, or any of them, to receive any pecuniary payment for their attendance or other services in or about the affairs of the said body, politic and corporate, and that no dividend, gift, division or bonus in money shall be made out of the funds of the said body politic or corporate unto or among any of its Fellows."

"It has been suggested that this clause may be read as meaning that members of Council shall not be remunerated for their services, and that Fellows shall not receive dividends—but not necessarily that Fellows shall not be remunerated for services. The Editor of the Transactions is a Fellow but not a member of Council, and the Council wish to be advised whether he can lawfully be paid as Editor without ceasing to be a Fellow.

"It is proposed to found a Faraday Lectureship; there would be no permanent foundation, but only an annual payment to the year's lecturer, to be continued annually during the pleasure of the Council. The lecturer would probably be a foreign Member, or an Associate, or might be a Fellow.

"It is sometimes desired to reimburse a Fellow or an Associate his expenses out of pocket for travelling in order to give a lecture, or for other out-of-pocket expenses of a lecture.

"Sometimes also to advance money to be entirely spent by a Fellow or Associate of small means in some scientific investigation desired by the Council, or in materials or other outlay connected with such an object. It is possible also that the Council might wish to make some such payment as is above mentioned to an honorary or to a foreign member.

"The first three pages of the bye-laws as printed in the accompanying pamphlets regulate the election of Fellows, Associates and honorary and foreign Members.

"Your opinion is requested :—

"1. Whether it is lawful to remunerate the services of an Editor of transactions, being a Fellow but not a Member of Council, by a salary or other payment out of the funds of the Society.

"2. Whether it will be lawful to pay a Fellow or Associate, or an honorary or foreign Member (distinguishing them) for a Faraday or other annual lecture, to be continued during the pleasure of the Council.

"3. Or to reimburse a Fellow or Associate, or honorary or foreign Member, for actual expenses in travelling, or materials or otherwise for a lecture or other service to the Society.

"4. Or to advance money to be entirely spent by a Fellow or Associate, or honorary or foreign member of limited means in an investigation or other service authorised by the Society."

Opinion.—1. "The distinction between the Council and general body of Fellows as to remuneration is very clearly marked in the Charter. The members of Council are not to be paid even for any service. Nothing of the kind is said as to Fellows. The prohibition as to them points to that kind of division of the funds of a college which is made between the Fellows or some class of the Fellows of a college, and therefore no dividend, gift, division, or bonus in money can be made to the Fellows, or any of them in that character, or by reason of their being Fellows. But there is nothing to prevent a Fellow being *bonâ fide* employed to render some service to the Society and receiving a pecuniary payment for such service, provided he is not a member of Council."

2, 3 and 4. "If the Council are of opinion that it will be for the general advancement of chemical science, or will promote the application of chemical principles and discoveries for the beneficial development of the manufactures of the United Kingdom, or for the more extended and economical application of its industrial resources, or for improving the sanitary condition of the community, to establish and pay for a lecture, as suggested in the second question, or to reimburse expenses, as suggested in the third question, or to advance money, as suggested in the fourth question, I am of opinion that it is quite lawful so to do, and that no objection can be made by reason of the person so employed and paid, or reimbursed, or assisted, being a Fellow or Associate, or honorary or foreign member. I think it would, however, be desirable to have the previous sanction of a General Meeting to such an application of the funds of the Society.'

On 21st July, 1868—"The proposed Faraday Lectureship was again discussed, and the recommendations of the Committee as amended were agreed to. They were as follows:—

"'1. That a lecturer be appointed from time to time, as the Council may direct, but not oftener than once in any year.

"'2. That the appointment of Faraday lecturer be confined to foreigners and British colonists.

"'3. That the lecturer be required to deliver his lecture or lectures personally, at the time appointed, and give up to the Secretary of the Chemical Society the manuscript of his lecture for publication in the Journal.

"'4. That a medal be struck bearing the effigy of Faraday, and that a copy of the medal in bronze be given to the lecturer.

"'5. That an honorarium of £25 be also presented to the lecturer.'"

In his presidential address at the meeting on 30th March, 1869, Mr. de la Rue speaks of two resolutions as having been passed during the past year, "which cannot fail to promote the advancement of chemical science and to increase the influence of our Society . . . . . . the second, the founding of the Faraday Lectureship and medal, which will tend to make us personally acquainted with the most distinguished of our foreign brethren."

The appointment of the first lecturer was the outcome of considerable discussion. On 3rd December, 1868—"It was agreed, with reference to the foreign lectureship, that a Committee, consisting of the President (Mr. de la Rue), Dr. Williamson, Dr. Miller and Mr. Abel, should consider what names should be submitted to the Society."

On 17th December, 1868, the following report of this Committee was read:—

"The Committee appointed to consider the name of a chemist for the consideration of the Council, met on 10th December, 1868. There were present, Mr. Warren de la Rue and Dr. W. A. Miller. The following names were considered as those eligible: Baron Liebig, M. Dumas, M. De la Rive. That of M. Dumas was finally selected, and the Committee therefore recommend that M. Dumas be invited to accept the appointment of the first Faraday lecturer. Before applying formally to M. Dumas, the Committee would advise that that gentleman's sentiments in respect of its being agreeable to him and possible for him to undertake to deliver a discourse to the Chemical Society should be ascertained privately; they think that through the intervention of M. St. Claire Deville (who is on very intimate terms with M. Dumas) this could be done. In the event of M. Dumas accepting the Faraday Lectureship, the Committee suggest that application should be made to some institution possessing a good lecture room, for the loan of their theatre. The Committee venture to suggest that some steps might be taken to afford a fitting reception to so distinguished a chemist and a man who has attained so high a social position."

This report was adopted by the Council, and the President and Foreign Secretary were requested to communicate with M. Dumas. It was at the same time resolved, "That the President, Mr. Graham, Dr. Miller and Mr. Abel be a Committee for the purpose of obtaining a design for a Faraday medal, to be submitted to the Council."

On 21st January, 1869—"The President read a letter addressed by him to M. Deville, and Mr. Abel read M. Deville's reply, stating that he had communicated to M. Dumas the wish of the Council that he might be induced to be the first Faraday lecturer. In case of M. Dumas' acceptance, the President and Mr. Abel were commissioned to make arrangements for his reception."

On 18th February, 1869, the following reply to the invitation of the Council from M. Dumas was read:—

"14 *Fevrier*, 1869, *Paris*.

"Monsieur,

"Le plus grand honneur que je pouvois recevoir à la fin de ma carrière est celui que me fait la Société Chimique de Londres. Voir son nom associé à celui de M. Faraday par des juges aussi compétents que ceux qui la composent est tout ce qu'un savant peut ambitionner de plus haut; tout ce qu'un homme de bien peut désirer de plus favorable au jugement de sa propre vie.

"Je me rendrai donc avec reconnaissance à l'invitation de M. L Président et du Conseil de la Société.

"J'aurais voulu avant de vous répondre être en mesure de vous dire à quelle époque je serai libre de me rendre à Londres. Mais, je vois en ce moment par suite de mes devoirs publics que je ne pourrais pas le faire avec certitude.

"Je prie donc M. le Président et le Conseil de la Société de me permettre de le faire connaître seulement dans le courant du mois de Mars ou d'Avril. Je suis certain que je ne serai pas libre de m'absenter de Paris avant le mois de Mai et je puis seulement presumer que je pourrais me rendre à Londres au commencement de ce mois.

"Je suis obliger d'ajouter à mon grand regret que je demanderai à la Société la permission de m'exprimer en français devant elle, ayant à peine la possibilité de lire l'anglais et point celle de parler votre langue.

"Votre Société ajoutera cette indulgence aux bontés dont elle m'a comblé.

"Agréez, monsieur, l'assurance de ma plus haute considération.

(Signed) "J. B. DUMAS."

Arrangements were subsequently made for the delivery of the lecture in the theatre of the Royal Institution—of all places the most appropriate owing to Faraday's own lifelong association with the Institution. Moreover the Society has been indebted to the Managers of the Royal Institution for placing their theatre at the disposal of the Chemical Society on all subsequent occasions of the delivery of the Faraday lecture.

M. Dumas delivered his lecture on 17th June, 1869. Professor Williamson, in his presidential address delivered at the anniversary meeting on 30th March, 1870, refers to the lecture in the following words:—

"The most interesting incident in the history of the past year has been the delivery by M. Dumas of the inaugural Faraday lecture. It was, indeed, an impressive tribute to the memory of our great countryman which was paid by that noble veteran of science, and one of which the record ought to occupy a place of honour in our Journal. We still hope to receive from M. Dumas a manuscript of his classical discourse."

An account of the proceedings at the lecture is given in the *Chemical News* of 25th June, 1869, from which it appears that in introducing M. Dumas, the President, Professor Williamson, addressed the meeting as follows:—

"The Society is here assembled to inaugurate what would be inadequately described as a monument in honour of Faraday. The Faraday Lectureship has been founded by the Council of the Chemical Society in the hope that it will promote the advancement of human knowledge, and surely no higher tribute of respect could be paid to a great man than to do in his name what he would have loved best to see done. Now, among the arrangements which are made for the promotion of interchange of ideas—ideas which are so essential to those who are working in the investigation of nature—there is one particularly important defect and shortcoming. We have books and papers which circulate throughout the length and breadth of the civilised world, and in each country there are Societies where men meet together to consider and discuss questions relating to science, and to aid and encourage one another in various ways. But these books and papers give but the skeleton of a science without that life and interest which is imparted to facts when communicated by a discoverer himself. And, on the other hand, Societies, although they do much for the promotion of science, leave still more undone. It is an essential of truly philosophical work that questions be viewed from various sides; and those who have followed with any attention the recent history of our young science, must have been struck with the variety of lines of thought followed simultaneously by independent workers—lines of thought which finally converge in certain general truths; their convergence serving to corroborate the evidence of those truths, and to establish more perfectly the conclusions which are thus arrived at. Now, the greatest difficulty which is experienced, and the greatest defect which one observes, is this, that workers in one line of thought are too frequently ignorant, or insufficiently cognizant of what others are doing; and the defect shows itself chiefly between those who are working in different countries, more than between those who are working in the same country. Now, imagine that we could induce to come among us a man possessed of one of those master minds which forms a focus of light throughout science, and amongst all those who are interested in science: suppose that he were to tell us the thoughts which are uppermost in his own mind, and—best of all—that he were to make us for a time think with him in the very words of his own language: imagine that such a highly gifted man combined in his own person the genius of a discoverer, the breadth of intellect of a philosopher, and the lucid fluency of an orator. I am sure that you would agree with me, that his visit would inaugurate something which Faraday would truly have rejoiced to see. Imagine, I say, those things: accurately fix in your mind's eye the image of such a man—and Dumas is before you!"

M. Dumas then delivered the Faraday Lecture. The translation which follows is reprinted with some verbal amendments from the *Chemical News* of 2nd July, 1869; it is introduced here as it has not hitherto appeared in any of the Society's publications.

THE FIRST FARADAY LECTURE,

DELIVERED BY

M. DUMAS.

"Gentlemen,—You have desired that the memory of Faraday should be handed down to posterity; you have summoned together men of science, to unite in celebrating, in a solemn manner, his great and beneficent labours; and, calling upon France to take the lead in this solemnity, you have chosen me to be his eulogist, doubtless on account of the long and constant friendship with which Faraday honoured me.

I am the bearer of the acknowledgments of the scientific men of France, as well as my own. My country—I am proud to say it—can offer representatives of science much more worthy of your approbation than I am; but I know no one, at all events, who feels more deeply the sentiments of profound gratitude for the noble welcome which England is so accustomed to accord, nor do I know one who has a more sincere veneration for Faraday.

The name of your illustrious fellow countryman is not one which can be claimed by any single nation as its exclusive property; his researches and discoveries are as widely recognised in France, in Germany and in America as in England. Faraday belongs to the whole world. There is not a spot on this earth to which civilisation has penetrated, that does not claim the right of participating in th respect and gratitude you entertain for him.

Faraday was identified with the scientific movement of the first half of this century; he was one of its principal leaders, and drew in his train a whole host of thinkers, engineers, men of enterprise and capitalists. Ever contemplating the chaste beauties of nature, and searching into her most hidden recesses, this disinterested philosopher, this deep thinker, scattered broadcast on his path the seeds of the most extraordinary and unheard of results—such are the electric currents of Faraday which bear our messages, furrowing Europe, and traversing the Atlantic—such are those lights, rivalling the sun in brilliancy, which shine forth from our principal lighthouses; and it is even to the gases which he liquefied that hot countries owe the luxury of ice.

Pursuing truth only, he was yet able to satisfy, as if by accident, the boundless demands of a refined civilisation; and, whilst devoted to the ideal, he sowed the seed of riches, not for himself, for he despised them, but for the benefit of commerce, which has gathered the fruit.

Faraday is the type of the most fortunate and most accomplished of the learned men of our age. His hand, in the execution of his conceptions, kept pace with his mind in designing them; he never wanted boldness when he undertook an experiment, never lacked resources to ensure success, and was full of discreetness in interpreting results. His courage, which never flinched when once he had undertaken a task, and his caution, which felt its way carefully in adopting a received conclusion, will ever serve as models for the experimentalist.

In the study of Nature conjecture must be entirely put aside, and vague hypothesis carefully guarded against. The study of Nature begins with facts, ascends to laws, and raises itself, as far as the limits of man's intellect will permit, to the knowledge of causes, by the threefold means of observation, experiment and logical deduction. A long familiarity with the exact detail of phenomena can alone give to a man, as it did to Faraday, the right to be bold; but he is also, like Faraday, restrained, when he has a thorough appreciation of the limits of man's knowledge. It is two centuries ago since Europe received this system of philosophy from Galileo and Newton, characterised at that epoch by the establishment, in Germany, of the Academy of Naturæ Curiosorum, which represented the art of observation; in Italy, by the Academia del Cimento, the school of experimental science; and in England and France, by the Royal Society of London and by the Académie des Sciences de Paris, which adopted mathematical science as one of the means most conducive to the knowledge of truth in the domain which is accessible to us.

What an awakening for Europe! After two thousand years, she found herself again in the position to which she had been raised by the profound intellect of India, and the acute genius of Greece, by Aristotle, Plato, Archimedes, and their emulators, but from which, during those long ages, she was permitted to fall, while the work of the assimilation of races was being carried on under the political influence of Rome.

What would have been the result if the learning of the Greeks, continuing its development from the third century before Christ to our own days, had pursued its triumphant march without let or hindrance? We do not know; no more than we can forecast the material resources of the human race after twenty centuries, nor to what heights natural science will have risen, should no social revolution create a breach in its tradition or retard its progress.

Greek art presents inimitable models; Greek philosophy has forestalled the modern schools in all their fearless opinions; and Greek science, not less prolific, paved the way which Europe has followed after long hesitation.

It is not difficult to connect Leucippus, a contemporary of Alexander the Great, who first clearly enunciated the philosophical doctrine of atoms, and the illustrious physicist of Manchester, Dalton, who at the commencement of this century, founded, upon the basis of experiment, the atomic theory of modern chemists. Between these two points, so far removed, there is no intermediate link. Dalton is the son of Leucippus. Cuvier, too, whose inventive genius was greater than that of Aristotle, was the sole inheritor of his spirit of order, his love of method, and his strength of judgment. In the same manner we may ascend directly from Galileo and Newton, to Archimedes and Plato. The ideas of Faraday, also, on matter, atoms, force and motion, were those of a Greek philosopher. The Romans did not receive this inheritance from the Greeks; given more to practical pursuits, they did not recognise the fact that the latter owed their progress to pure theory.

Truth is so beautiful that it deserves every effort a man can bestow to attain it; it is so fruitful that it carries along with it its own recompense. By keeping the end in view, without occupying ourselves with particulars, we find the ordinary details of prosperity and riches fall into their proper places.

Has not the atomic theory of Dalton, in assigning limits to phenomena, renewed the whole art of chemistry? Has Lavoisier's theory of combustion ever ceased to direct agriculture, the useful arts, hygiene and therapeutics? Did not these two philosophers contemplate abstract truth in all its splendour, and after receiving it from above, was it not sufficient for them to cast their eyes upon the earth, to reflect its light, and to spread far and wide its fruitful and exhaustless seed?

Let us, then, continue faithful to the cultivation of science for its own sake, and trust, without anxiety, that it will bear practical fruit for itself. Our remembrance of the life of Faraday teaches us that moral truth, when implanted in a man's heart, develops, at the proper time, every virtue that life demands. His labours show us that the same holds good with scientific truth. At the proper time, it produces, along with many spontaneous fruits, all those discoveries which civilisation requires.

To a nation ambitious of becoming famous in history, it should be said "Despise conquest, abandon the pursuit of riches, and seek Truth, for by that your memory will be perpetuated." In like manner it may be said to a people who desire war or fear it, who wish to remain agriculturists, or seek the advantages of commerce: "Search for Truth; it will create your means of defence or attack, maintain the fertility of your plains, and furnish your manufactories with resources against competition." The princes of bygone times considered themselves enriched, and assured of prolonged youth, if they were able to retain an alchemist capable of making gold, and possessed of a panacea against mortality. The nations of the present day, better advised, seek the aid of chemistry, and place in its counsels their hopes of prosperity and honest gain: they know the value of artificial soda, chlorine, gas illumination, stearine candles, and aniline dyes, and are grateful for the labour and care which these discoveries have cost.

Everything must give way to the laws of Nature, and he alone who has mastered those laws can control her processes. But the mastery cannot be obtained without a struggle. The fable of Proteus is a true picture of the combat between man, eager for knowledge, and the stubborn guardian, charged with the protection of the secrets of destiny. Proteus changed himself into a thousand shapes before speaking, and yielded only to the hero who, far from being moved by his transformations, bound him with bands of ever increasing strength. Such is Nature herself, her answers are always truthful, but like the ancient shepherd of Neptune's flocks, before allowing Truth to shine forth, she arrays herself in the garments of error, or hides herself behind the phantoms of illusion, and will only assume her proper shape under the determined assaults of a resolute disciple of Science. This indomitable courage was possessed by Faraday in the highest degree.

The struggle for mastery is often prolonged. The whole life of a man does not suffice; the concurrence of many philosophers animated by the same idea, or even the labours of different generations devoted to one pursuit, are required for the attainment of success: hence the need of free associations for the cultivation of physical science, and laboratories where young men full of faith and ardour, working under one head, unite in the execution of such plans as he may invent or approve. Private study, which was perhaps best adapted to Faraday's temperament, but which prevented him from establishing a school, has been succeeded by the labours in common of learned societies, and work carried on simultaneously by pupils in the same laboratory. Enlightened countries at last comprehend that all scientific research is a battle to be won, and that every victory increases national power. Intelligent nations no longer deny to scientific men, worthy the name of captain, either arms for the contest, soldiers devoted to their cause, or subsidies for their maintenance. Science is no longer an unrecognised power, of which, nevertheless, much is expected; to-day, every government which does nothing for it must expect to be vanquished by rivals, and to receive the censure of posterity for its want of forethought.

When Christopher Columbus set out for the conquest of the New

World, did he not require ships, sailors, provisions and ammunition? How then can the new world of science be conquered without assistance?

For textile manufactures, there must be raw material, machinery, workpeople; the best workman in England, left to his own resources, would be unable to make an inch of cloth. It is the same with scientific discoveries; to weave the weft, there must be raw material, laboratories, apparatus, and reagents. The more eminent a scientific man may be, so much the more is he powerless to resolve unaided all the questions which arise in his mind, and to develop all the views suggested to him by those new aspects of Nature, which his penetration has laid bare.

How many *chefs-d'œuvre* might have been lost to us if Raphael, protected by an illustrious Pope, had not been the centre of a brilliant and devoted school, capable of sparing him the actual labour required to develop his ideas! What discoveries will be made when scientific masters of all countries, raised to their true position, are no longer limited in their resources, confined as to their means of execution, and obliged to do everything with their own hands?

The high position held by Faraday allows of such a comparison, and we may regret the loss of the discoveries which might have been added to those with which he has benefited the world, if, like Raphael, he could, or would, have founded a school. Learned societies formerly chose as a subject for their solemnities, an encomium on those monarchs or ministers whose protection they enjoyed. This meeting presents a spectacle more in conformity with the dignity of Science: Faraday indeed raised himself above his fellows like a prince, but as a prince of thought; he exercised his power like a minister, but as a prime minister of the power and forces of Nature.

His lifetime was an epoch of intellectual progress; and our immediate posterity will speak of such and such discoveries as having been made in Faraday's time; sure of being as well understood as if referring to events in history as being of the time of Elizabeth or Charlemagne.

But the life of Faraday is known to you, and you are familiar with his work. I cannot fail in rendering that homage to his memory which he himself would have liked best if, along with you, I review the progress of those sciences to which he was devoted.

Since the commencement of this century, three nations, animated with a noble spirit of rivalry—England, Germany and France—have been contending for the first place in the study of physical science. Warranted, by turns, in claiming superiority, no one of them has dreamed, for one instant, of abdicating its claims. From this generous strife, have sprung innumerable investigations, the boast of our age, which will imprint a character upon it in history.

I do not wish to review, nor even to point out, the advantages that these nations have received from the liberal hand of science, but simply to bring before our minds the acquisitions to our knowledge of matter and of force, to point out those fundamental ideas which have been brought to light, and to call to mind the part we must attribute to Faraday in this wonderful movement. I propose, then, to examine what we have learnt with regard to—Firstly, the nature of concrete matter; Secondly, the forces which it obeys; Thirdly, the nature of truly organised matter; Fourthly, the force which animates it.

The Greeks considered all matter divisible into four irresolvable elements, namely, earth, water, air and fire, which are concrete representations of the solid, liquid and gaseous states, and of heat. So far they were guided by their senses; but they were of opinion that, finally, matter was made up of inaccessible atoms, and that variety in the number or the arrangement of the latter accounted for all the variations in natural substances.

At the present day, with Lavoisier, we give the name of elements to all those substances which we cannot break up or resolve; but hold, with Dalton, that these elements are themselves made up of atoms which unite in different proportions, and with varying arrangements, to form different compounds.

To sum up, Matter can be resolved into substances which no longer admit of reduction, and these substances are the elements of modern chemists. Matter has only three forms, the solid, the liquid and the gaseous, which stand for the elementary substances of the Greeks. Matter is agitated by different motions, which may be all represented by one alone—heat—as all the rest may be transformed into it.

Lavoisier shows that there are substances which cannot be resolved into simpler ones, and these he calls elements; Dalton asserts that the latter combine in unvarying proportions, and he gives the name of atoms to these proportions reduced to their simplest form. May not the elements of Lavoisier be subject to decomposition in their turn? Cannot the methods recognised by Dalton be brought under a more general statement? Is not chemistry in the same state as astronomy when Kepler's laws alone were known, and is it not waiting for its Newton?

We are inclined to believe in the absolute simplicity of Lavoisier's elements when we consider—Firstly, that, since the commencement of civilisation, no power at man's disposal, no natural action observed by him, has been able to break them up; Secondly, that when converted into gas, their atoms occupy the same space as before; Thirdly, that in the solid state their atoms have the same volume when we deal with analogous elements; Fourthly, that in the last case their forms are identical, so that they can replace and displace one another mutually in their compounds, without any great change of properties; Fifthly, that the heat required by atoms for a change of temperature, is the same, no matter how they differ in weight; Lastly, that in order to separate them when united, any atom whatever requires the same amount of electricity as any other. But, with the exception of inalterability, all these properties, not excepting even the last, one of Faraday's greatest discoveries, are found in all compounds of the same order. We have, then, only a right to say that Lavoisier's elements are substances of the same order, and if it is said that they *cannot* be resolved, it is only because they *have not* been resolved.

We are inclined to think Lavoisier's elements further reducible from considering—Firstly, their number, which has risen in less than a century from thirty-one to sixty-five, and which grows rapidly; Secondly, their natural classification by families, the different members of which approach gradually, like terms in a continuous series; Thirdly, their indubitable analogy to organic radicals, which are compounds.

In this way, Faraday's idea, that the atoms composing simple substances are collections of centres of force diversely arranged, may be defended. Chemical atoms would be the starting point of the analysis; mechanical atoms its last stage.

However, the question has entered on another phase since the most recent discoveries. Natural philosophy has enabled us to determine the elements which are present in incandescent matter, by means of the character of the spectrum produced.

The fact that Lavoisier's elements have resisted for the millions of years that they have been on the earth all the efforts of Nature and of man to resolve them, is a characteristic of simplicity. Now we can say that these elements have resisted every effort at destruction in space as well as in time. We find in the sun, in the fixed stars, in the nebulæ, and in comets themselves—that is, both within our system and without our system—the elements which we have known on earth; we find the same metals, hydrogen, nitrogen, &c.

When we are taught by the beautiful discoveries of Janssen, Lockyer and Frankland, that the protuberances on the sun are only incandescent hydrogen, we ask, how shall it be possible to resolve this element if the temperature of the sun does not suffice for the purpose?

As far as man can go back in time, as far as man can reach by observation in space, the concrete elements of matter present the same character as Lavoisier's elements.

In their abstract forms, reduced to mere centres of force, these elements, if such be the name for matter in its final state, belong to an immense tract, and soar up into a region of thought, inaccessible to man both in space and in time.

An examination into the modifications which have taken place in our ideas on the subject of force, warrants us in going back to an age long before the commencement of the present, for from that time the changes in our ideas take their date. Then, matter used to be placed under the dominion of universal attraction, of motion, of light, of heat, of electricity, of magnetism, of chemical affinity, of cohesion, of the force of solution, of capillary attraction, and, later, of osmosis, &c. It was no longer the philosophy but the mythology of Greece that served as a model. Natural forces occupied the position with regard to modern science that the divinities of old did with respect to Olympus, and people came to attribute to the former, as they had done to the latter, distinct and inalienable personalities.

At the present day, we know that light and heat have many properties in common, that electricity can be changed into magnetism, and *vice versâ*, and that mechanical action can produce heat, magnetism, electricity, light. This correlation of physical force, as Grove calls it, the data for which were given by Ampère, Melloni, and before them by Sadi Carnot, and confirmed by the crucial experiments of Faraday, removes all doubt. These forces are different modes of motion, and all these modes of motion can be transformed one into the other.

The man with vulgar cravings sought for the transmutation of matter, and failed to find it; he had little care for the transmutation of force, the deep meaning of which none but the philosopher understood; and as a reward for the disinterestedness of the latter, the truth was revealed to him.

One of my most eminent fellow-labourers, one of my countrymen who has many friends here, and whom you have heard in this theatre, M. Henri Ste. Claire Deville, has just proved the existence of a close alliance between affinity and mere physical attraction, by the discovery of dissociation, which will influence the progress of chemistry materially. We cannot deny that there exists a close relationship between affinity on the one hand, and mechanical force on the other, when we see the decomposition of a body, such as marble when submitted to the action of a steady heat, come to a stand in the same way and from the same causes as the vaporisation of a liquid *in vacuo*. This is the first step that has been taken to bring chemical phenomena under the laws of mechanics, and to justify Newton's view that chemical attraction was a particular case of universal attraction.

Has not Graham, in turn, reduced to causes purely mechanical the manifold effects of diffusion, of osmosis, of capillarity? Has not this illustrious philosopher been led by his latest researches to render evident, not only the metallic character of hydrogen by a memorable discovery, but to seize the very moment at which the phenomenon of the mechanical condensation of a gas by a porous body changes into a truly chemical combination?

There remains, then, universal attraction, which acting on heavy bodies, guides the motion of the stars as well as that of the atoms; a motion which produces heat, light, electricity and magnetism.

The study of matter leads us to the knowledge of an ever increasing number of elements, and of simpler and simpler forces. Matter which was always believed to be susceptible of transmutation, has resisted the efforts of man; whereas physical forces which were considered to be beyond his reach are shown to be ephemeral, and change one into the other readily.

But what relation connects gravitation with the other forces in nature? We know not; and Faraday, who had meditated on this point all his life, and who has thrown such vivid light on all its surroundings, has not made one step towards the solution of the problem.

What is the cause of gravity itself? We know no more now than was known two hundred years ago, in Newton's time.

What is meant by organic matter? If one were influenced by the views of the old chemistry there would be no difficulty in replying. All organic matter originated in plants or animals; it was destructible by heat; it contained, generally, carbon and hydrogen, often oxygen, sometimes nitrogen. Thus it was a compound of which carbon formed the fundamental element, destruction by fire the chief characteristic, but which, above all, derived its organic character from the circumstances of its origin.

At that time, no one thought of confounding organic chemistry and mineral chemistry. At the present day, this fusion exists in all purely chemical substances; only the terms of this assimilation are not understood. We are dazzled by a quibble. My age, and the share I have had in this movement in science, compel me to state clearly my opinion, and to endeavour to put an end to the misconception.

The first studies we pursue on the chemical phenomena of life teach us that plants create, and animals destroy, organic matter. The sun appears as the agent by whose means this matter is produced, and combustion, by the air that animals breathe, as the process that destroys them, in order to restore their elements to the state of dead matter.

The chemical forces placed at the disposal of life, descending on the earth under the form of light, disappear by radiating into space under the form of heat. An equilibrium obtains between the vegetable and animal kingdoms for receipts and disbursements, represented by these two forms of motion—light and heat; and the amount of animal life which may be developed on the globe is measured by the amount of food that vegetable life prepares for it. The dark rays of heat appear to carry off from the earth that which radiant and brilliant light has spread over it.

On looking more closely into it, however, it was found that matter of organic origin was divided into two groups; one so rich in species that it surpasses all that has ever been imagined of the very numerous species of plants or animals described by naturalists; the other containing but a very few distinct species.

The first group constitutes the true organic species of chemists; that is to say, those which they have analysed, of which they have recognised the constitution, which they make by means borrowed from their own science, and of which they can, consequently, define the nature by analyses and syntheses.

Let us first attend to these compounds. At what moment can they be characterised as organic?

Their origin does not suffice. In fact, carbon, hydrogen, oxygen and nitrogen, can be obtained from plants or animals, but no one would imagine them to be anything but mineral elements.

Oxide of carbon, carburetted hydrogen, cyanogen, water and ammonia may occur as products obtained from the constituents of plants or animals without anyone thinking of reckoning these binary compounds as organic substances. But the early chemists gave this name to alcohol, to vinegar, to the essence of bitter almonds, to urea, for example. Now, if there is any fixed truth in science, it is this—alcohol, vinegar, essence of bitter almonds, urea, although proceeding from plants or animals, have never lived, and will never live; they are subordinate products of life; they are not necessary instruments of life.

With regard to them, chemistry need no longer hesitate. Such substances are formed in the same manner as mineral matter, they exhibit all the conditions of its composition, its structure and its properties. One circumstance alone distinguishes them, and that, even, is not absolute. Generally, mineral matter is formed of simple elements, directly united, although sometimes we find that certain composite groups may act like elements, and may replace them or be replaced by them in combinations without the latter changing their general character.

That which is the exception in mineral chemistry becomes the rule in organic chemistry. Lavoisier had the presentiment of this when he wrote—"Organic chemistry is the chemistry of compound radicals."

At this day, there is no longer any doubt. Cyanogen, cacodyle, and the metallic radicals of Frankland, are well known substances, offering all the chemical qualities of simple bodies, and nevertheless are compound.

The law of substitution admits of displacing and replacing one element by another, or even, if desired, by a compound radical, in all the organic compounds of chemists, without changing their type. The converse is also true: there is nothing to prevent the replacement of a compound radical by an element in a combination; and this change again does not alter the type.

Thus, the organic materials of which we speak are similar to mineral materials both in their nature and qualities: Firstly, they contain certain compounds which play the part of elements; Secondly, they are analogous to oxides, sulphides, chlorides; to acids, bases and mineral salts in all their properties; Thirdly, their radicals can replace the mineral elements, and be replaced by them; Fourthly, they can replace each other reciprocally.

Like dead matter, these materials are susceptible of crystallisation, and of volatilisation, without becoming decomposed; they form definite combinations, are incapable of life, and never have lived. They thus resemble mineral matter in every respect, and they differ from it only by having as their constituents compound radicals, whilst the mineral species are generally compounds of elements.

Analogies are apparent even in some of the numerical relations of the elements of mineral chemistry, and of the radicals of organic chemistry. These relations are manifest in both cases, for all elements which are capable of being arranged in series or natural families.

Thus, lithium, sodium and potassium, whose respective atomic weights are 7, 23 and 39, form a series of which the difference is 16. Magnesium, calcium, iron, whose respective atomic weights are 12, 20, 28, form a series whose difference is 8.

In the same way all organic radicals present the same relations. Methylium, ethylium, propylium, butylium, &c., give a series whose difference is 14, their respective atomic weights being 15, 29, 43, 57.

It seems natural to conclude from all this evidence, not that substances thus endowed and composed are organic because they are derived from organised beings, but rather that the elements of mineral chemistry may be complex. In any case, the assimilation of the two chemistries becomes more and more close.

This picture would be incomplete if we did not add a few more features.

The radicals of mineral chemistry formerly numbered 30, and the combinations recognised in nature raised the number of known bodies to some hundreds; at this day we count 65 elements, and some thousands of compounds or natural mineral species.

The chemist of the last century might study them one by one, and become acquainted with them all. Such is not the mission of the chemist of the present day; the species being realised, he tries to study them in groups; hypothetical species he tries to create. In nature, every element produces, on an average, eight or ten species. In the laboratory, every element may form thousands of the same order as the natural mineral species.

The contrast is still more striking in organic nature. The animals and plants which cover the surface of the earth are counted by hundreds of thousands, and yet their tissues and their juices, submitted to chemical analysis, resolve themselves into no more than a few hundreds of distinct chemical species. But the power of combination is such, among the special elements which form them, that new substances have arisen by thousands; and if we calculate the number of combinations of this kind which may be realised, it seems as easy to count the grains of sand on one of the great shores of the sea as to say what figures would represent the number of organic species which the chemist has yet to produce.

Thus mineral or organic species, counted formerly by hundreds, are now counted by thousands for the first, and by millions for the second.

Whence comes this fecundity in the formation of so-called organic substances? Many circumstances contribute to it: it results, in the first place, from the almost incalculable number of the compound radicals which can be realised; each of these being again able to give birth to a prodigious number of combinations. Organic chemistry thus counts a very great number of heads of tribes, and each tribe an infinite number of species. The latter, already numerous as simple radicals, are further multiplied by the consequences of Williamson's fertile discovery, who has taught us to unite two different radicals to each other, to bring them into a single system, and to produce with the latter compounds as numerous as were obtained from each of the isolated radicals. The first and fundamental discovery of Graham, on the triple functions of phosphoric acid, has been extended to the domain of organic chemistry,—for acids by Liebig, —for bases by Berthelot,—for alcohols by Wurtz. The result of this harmony of work, of which the vastness overwhelms the imagination, is that the atomic compounds with which we were chiefly engaged forty years ago, have not only been multiplied, but repetitions of known classes have been discovered. One might say, without forcing a metaphor, that we had visited and described all the rooms of the principal floor of the building; that Graham and Liebig have revealed to us the existence of a first and second story, in which were repeated all these arrangements; and that Berthelot and Wurtz have shown us that it was the same in the case of the basement, and in the cellars. Thus five times as many chambers, or species, may now be produced at pleasure.

But of all the sources of multiplication of substances with which organic chemistry is concerned, the most fertile is that of substitution: in fact, the discovery of the compound ammonias by Wurtz, and the researches of Hofmann which resulted from them, have produced a multitude of combinations, in which the atoms of hydrogen contained in ammonia are replaced by compound atoms performing the function of elements—that is to say, by organic radicals. If we apply the calculation to this special case, we even see that, with the known radicals employed to replace entirely, or in part, the hydrogen, or to replace each other mutually, we should henceforth be able to produce compounds derived from ammonia by hundreds of thousands or by millions.

How if we were to apply the same calculation, and the same provision to all the types?

There is yet more. The chemist is not now, as formerly, obliged to derive all the substances which he produces by these means from bodies yielded by animals and vegetables, he creates them at will; he no longer needs, for his starting point, the action of the sun's light on plants. When he wishes to produce organic substances, he obtains his force by employing heat, formerly regarded as the true means of destroying them.

Not that he has succeeded in directly uniting carbon, hydrogen, oxygen and nitrogen, so as to form organic substances; but, by the aid of heat alone, he first combines them two and two, and he thus forms carburetted hydrogen, carbonic oxide, cyanogen, water and ammonia. Afterwards, by subjecting these first compounds to the action of suitable substances, and by the necessary artifices, he succeeds in regenerating, little by little, all the definite compounds of organic chemistry.

There is not a chemist who has not performed syntheses of this character; but the most striking is that of urea, by Wöhler. The first which have been grouped in a systematic manner are those which have been carried out in Germany, by Kolbe; and of especial interest are those made in France, by Berthelot, who has worked at synthesis with great success, being the first to reproduce formic acid, and to combine directly carbon and hydrogen.

The function of the chemist changes, and becomes elevated. To his acquaintance with the numerous substances which his power evokes from the regions of the unknown, he owes his first attention to order, method, classification and nomenclature. But, once this primary duty is fulfilled, he contemplates the innumerable host of forms, raised by his conceptions, or realised by his hands; and he applies to mathematics for a definition of the harmonies of numbers therein revealed; to mechanics, for a statement of the laws which their structures obey, or those which determine the stability of the material systems which they represent.

The Bible tells us that when God had formed, from dust, all the beasts of the earth, and all the fowls of the air, he made them pass before Adam, and that the name given to each by Adam is its true name.

In presence of this new creation, not of animated beings—whose appearance on earth depends on a power superior to man's—but of the harmonious forms which chemistry reproduces at will, always like each other, and always distinct from all others, man might sometimes forget that he has to give names to the works of God, and only remember that he is naming the works of his own hands.

If the discoveries which we have witnessed during the last half century do not justify pride, they at least excuse it. But, to bring back man to the appreciation of truth, it suffices to tell him that—if he has become more expert in the art of observing, if he employs with more certainty the art of experimenting, if the logic proper to the sciences leads him more surely to the discovery of the laws of nature—he has not as yet advanced one step towards the knowledge of causes.

Let us consider, in particular, what he knows on the subject of the materials which his life sets in motion in its development, and the contrast will be striking.

If I question the physiologist, on the subject of these millions or milliards, of compounds, misnamed organic, which the chemist transforms, reproduces, or creates at pleasure, he will reply to the three following questions:—Are these compounds living?—No! Have they lived?—No! Are they capable of living?—No!

If I ask the chemist himself if these compounds belong to mineral chemistry—to the chemistry of dead matter—he will reply, Yes!

Organised matter, not capable of being crystallised, but destructible by heat, the only matter which lives, or has ever lived—this matter, a subordinate agent of the vegetating power in plants, of the motion and sensation of animals, cannot be produced by chemistry; heat does not give birth to it; light continues to engender it under the influence of living bodies.

Let us not be disturbed by a quibble. The ancients admitted that Nature alone produces organic matter, and that the art of the chemist is limited to transforming it. To-day we might, perhaps, pretend that chemistry is powerful enough to replace, in all respects, the forces of life, and to imitate its processes—let us, however, keep to the truth.

The ancients were mistaken when they confounded, under the name of *organic matter*, sugar and alcohol, which have never lived, with the living tissues of plants or the flesh of animals. Sugar and alcohol have no more share in life than bone-earth, or the salts contained in the various juices. These remnants, or rubbish of life, placed amidst organic matter, are true mineral species, which must be brought back to, and retained amongst, dead matter. Chemistry may produce them in the same sense that she manufactures sulphuric acid or soda, without, for all that, having penetrated into the sanctuary of life.

This subject remains what it was—inaccessible, closed. Life is still the continuation of life; its origin is hidden from us as well as its end. We have never witnessed the beginning of life; we have never seen how it terminates.

The existing chemistry is, then, all powerful in the circle of mineral nature, even when its processes are carried on in the heart of the tissues of plants or of animals, and at their expense; but it has advanced no further than the chemistry of the ancients, in the knowledge of life, and in the exact study of living matter; like that, it is ignorant of their mode of generation.

Where, then, is truly organised matter, or matter susceptible of organisation? What is its chemical constitution? What is its mode of production? What is its manner of growth?

Instead of myriads of species, one would feel disposed to recognise but eight or ten at most, if one may be allowed to consider elementary types of organisation as chemical species. Be this as it may, in the origin of beings which have life, we see cells appear, and in the heart of their types we find cells in place of organic elements, and still, beyond these, germs of cells.

In these cells, or in the spaces between them, we observe inert products, aliments, excretions, substances stored up. It is the cell, it is the germ which proceeds from life, which lives, which engenders life, and then dies. The substances which are contained in, or which surround these organs, are subordinate accidents, products rejected by organisation, or destined for its use, but distinct from life.

Every organised being is born of a germ; every plant from a seed; every animal from an egg. The physiologist has never seen the birth of a cell, excepting by the intervention or as the produce of a mother cell.

The chemist has never manufactured anything which, approximately or remotely, was susceptible of even the appearance of life. Everything he has made in his laboratory belongs to dead matter; as soon as he approaches life and organisation he is powerless.

Thus, for a century past, the empirical elements of matter have been recognised and separated; their combinations have been multiplied to infinity; physical forces have been brought back to a common origin—motion—and one has been at pleasure changed into the other; and yet—

Is the intimate nature of matter known to us? No! Do we know the nature of the force which regulates the movement of the heavenly bodies and that of atoms? No! Do we know the nature of the principle of life? No!

Of what use, then, is science? What is the difference between the philosopher and the ignorant man?

In such questions the ignorant would fain believe they know everything—the philosopher is aware that he knows nothing. The ignorant do not hesitate to deny everything; the philosopher has the right and the courage to believe everything. He can point with his finger to the abyss which separates him from these great mysteries,—universal attraction which controls dead matter, life which is the source of organisation and of thought. He is conscious that knowledge of this kind is yet remote from him, that it advances far beyond him and above him.

No! life neither begins nor ends on the earth; and if we were not convinced that Faraday does not rest wholly under a cold stone, if we did not believe that his intelligence is present here among us and sympathises with us, and that his pure spirit contemplates us, we should not have assembled on this spot, you to honour his memory, I to pay him once more a sincere tribute of affection, of admiration, of respect!"

At the conclusion of the lecture, a vote of thanks to M. Dumas was proposed by Professor Tyndall in the following words:—

"Fellows of the Chemical Society, Ladies and Gentlemen—It becomes my duty to ask you to return your best thanks to M. Dumas for the noble discourse which you have just heard; and I sincerely thank the President of our Society for giving me this opportunity of testifying to the respect and high regard which I personally entertain for our first Faraday lecturer, both as a man and as a philosopher. It is now, Sir [turning to M. Dumas] one and twenty years since, in company with the gentleman who now sits at my side, I first heard your voice. It was in your own *College de France*, and to this hour I have not forgotten the impression that you then made upon me with regard to your clearness, your power, and your eloquence as an expositor of scientific truth. You then, Sir, were celebrated as an investigator, and, as I thought, you were in the very blossom of your strength; but, Sir, I was wrong. You have this night shown a vigour and a depth and a capability of grappling with great questions, such as I doubt whether you possessed in equal vigour twenty-one years ago. You have to-night, Sir, grappled with some of the weightest questions which underlie both chemistry and physics, and which constitute, if I might be allowed the term, the very solder of the material universe; and you have, moreover, vindicated the claims of science to a higher recognition than that which may be fairly based upon the material results that flow from it. You have shown how it can connect itself with philosophy, and with the general culture of the human mind. Sir, the walls which here surround you are associated with immortal memories. For more than sixty years they have been accustomed to hear voices which have gone forth into all lands. They have heard the voice of the great Thomas Young, of Humphry Davy, and of Michael Faraday; and we, Sir, bid you welcome to the scene of their teachings and of their triumphs. We, Sir, wish with all heartiness that you may long preserve the vigour which you have here displayed to-night, employing it as you have just done, for the delight of your hearers, the honour of science, and the good of mankind."

Professor Odling, in seconding Professor Tyndall's motion, spoke as follows :—

"I feel it a great privilege, and at the same time a great difficulty, after the eloquent remarks of Dr. Tyndall, to second the vote of thanks to M. Dumas, which he has proposed. As an old officer of the Chemical Society I may say we all felt that we could not find a more fitting or more able inaugurator of the Faraday Lectureship than M. Dumas; but we also found that we could not find anyone more willing—I might say more desirous—to make the sacrifice of time and convenience that was demanded of him in order to do honour to the memory of that great man whose name we are this night met to commemorate. I think, however, that our vote of thanks to M. Dumas for his eloquent address, and for his coming over among us to deliver it, must not be lessened by the consideration that it was impossible for him to surprise us, or at any rate those of us who know him, by any display of eloquence and any display of kindness, however extreme. I call upon you then, with every mark of enthusiasm, once more to show M. Dumas how much you appreciate his kindness in coming among us, and how much you feel the honour of his presence, and the benefit to be derived from his most eloquent address."

The appointment of a second lecturer was taken into consideration in 1870.

Dr. Müller being asked on 1st December to write to Dr. Liebig, on 19th January, 1871, the Council were informed that—"In reply to the request of the Council to Baron Liebig that he would, if possible, deliver the Faraday lecture this year, the Foreign Secretary had received a letter, of which the following is a translation:—

"*Münich, 25th December*, 1870.

"My Dear Friend—

"I had already been informed by a letter from Professor Williamson that the Council of the Chemical Society has done me the honour to select me for the Faraday lecture, and he at the same time most kindly pressed me to accept this invitation, and to come to London for this purpose at some time most convenient to me.

"I should have been only too glad to avail myself of this opportunity to visit again the country which I love like my own Fatherland, in order to see once more the many friends who have given me so many proofs of their love and esteem. But, my dear friend, for the office for which you selected me you do not want an old man like myself, but one with a fresh intellect well up in the progress of our science, and himself an active contributor to the results of the latest great discoveries in chemical research—one who could bring home to the members of the Chemical Society the latest triumphs of our science.

"Since 1840 I have ceased to take an active part in the advancement of chemical science, having given my sole attention to agricultural chemistry and animal physiology, and consequently I am left behind in the knowledge of purely theoretical and experimental chemistry, which appear to me to be just the branches which at present are the most important ones, because in their development all the different problems are concentred.

"You ought, therefore, to choose for your Faraday lecturer one of the men who can assist in solving the problems of the present time, and not one who is already distanced by them, however ardent an admirer he may be.

"I send you for Professor Williamson and yourself the preface to my paper on 'Fermentation and the Source of Muscular Power,' in which I have attempted to explain my present point of view. With regard to the progress of chemical science, a close study of its history has given me a totally different opinion from that expressed by Berzelius, who thought his views the last step attainable in chemical science, beyond which one never should attempt to go. However, we passed on, and this appeared to him a personal offence, and he actually went so far as to consider me his enemy, so much so that all attempts on my part to reconcile him proved unsuccessful. I have come to the conclusion that all our theories are not the truth itself, but merely points of rest on the road of conquest of truth, and that we should be content if we have succeeded in gaining such a point for the champions of truth as will enable them to obtain from such vantage ground a view of what has been achieved, and what still remains to be accomplished. I wrote to Professor Williamson that—hardly recovered from a long and serious illness—I must at my age give up all idea of a journey to England, and I have requested him at the same time to express to the Council of the Chemical Society my sincerest thanks for the honour they have conferred upon me by selecting me for the Faraday Lectureship.

"I am, yours very sincerely,

(Signed) "J. v. LIEBIG."

On 2nd November, 1871—"The President (Professor Frankland) reported that he had endeavoured, but without success, to persuade Professor Bunsen to deliver the next Faraday lecture. It was resolved, that the President be requested to ask Professor Wöhler, and, failing him, Signor Cannizzaro, to give this lecture to the Society."

On 21st December—"The President announced that Professor Cannizzaro had consented to deliver the Faraday lecture during the present session."

The appointment of M. Dumas as first Faraday lecturer had the natural effect of imposing a very high standard, and therefore of confining the choice of a lecturer within very narrow limits. The foregoing references to the negotiations in connection with the appointment of the second lecturer clearly show this to be the case. In point of fact, the recommendation of the Committee, adopted by the Council, "That a lecturer be appointed from time to time, as the Council may direct, but not oftener than once in any year," has, in the course of the twenty years which have elapsed since the lectureship was founded, always been regarded from the high standpoint from which of necessity any action associated with the immortal name of Faraday must originate. So much has this been felt to be the case that it was resolved on 20th December, 1883, "That it is not desirable to continue the practice of arranging for the delivery of a

Faraday lecture at fixed intervals, but that lectures for which the Faraday medal may be awarded may be arranged for whenever a special occasion for such a lecture presents itself.

The following is a list of the lectures hitherto delivered:—

1869. Introductory lecture—delivered by M. Dumas, on 17th June.
1872. Considerations on some points of the theoretic teaching of chemistry—delivered by Professor Cannizzaro, on 30th May.
1875. The life-work of Liebig in experimental and philosophic chemistry—delivered by Professor A. W. Hofmann, on 18th March.
1878. The constitution of matter in the gaseous state—delivered by Professor Wurtz, on 13th November.
1881. The modern development of Faraday's conception of electricity—delivered by Professor Helmholtz, on 5th April.
1889. The periodic law of the chemical elements—by Professor Mendeléef—delivered on 4th June.

The *first lecture*, as befitted the occasion, was an oration of a general character commencing with an eloquent tribute of respect to Faraday's qualities and memory. M. Dumas then proceeded to examine what had been learnt with regard to the nature of concrete matter and the forces it obeys, and as to the nature of truly organised, as distinct from organic matter, and the force which animates it.

In the *second lecture*, which was also delivered in French (a translation by Mr. Watts is published in the Journal for the year 1872, 941–967), Professor Cannizzaro discussed the limits within which the exposition of general theories should be restricted in the teaching of chemistry, and on the form which should be given to the exposition. He insists on the absolute necessity of teaching the atomic and molecular theories, pointing out that—as expressed by Liebig in his letter to the author of the "Life of Dalton"—"all our ideas are so interwoven with Dalton's theory, that we cannot carry ourselves back to the times in which that theory did not exist." He then urged that it should be recognised that the corner stone of the modern theory of molecules and atoms is the theory of Avogadro, Ampère, Kroieng and Clausius on the constitution of perfect gases—that is to say, the hypothesis that these gases, at equal temperatures and pressures, contain in equal volumes equal numbers of molecules. The lecture is an amplification of this theme, and is an exposition of Professor Cannizzaro's method of teaching chemistry from the standpoint of Avogadro's theorem instead of starting from chemical criteria.

Professor Cannizzaro points out that in delivering the lecture, he had throughout kept in mind that the aim of chemical teaching is not only to enrich the memories of students with a certain amount of positive knowledge, but likewise to co-operate in their sound intellectual education, chemistry being indeed one of the sciences that are best adapted to this purpose, affording, as it does, the best opportunities for exercising all the faculties of the human mind and regulating its harmonious development.

The lecture is undoubtedly from an educational standpoint the most valuable of the series, and is one which may be studied by teachers and advanced students with great profit.

The *third lecture* is published in full in the Journal, 1875 (28, 1065—1140), together with a photographic portrait of Liebig and a facsimile letter from Liebig to Faraday written December, 1844, shortly after the first visit of the former to England.

Professor Hofmann had before him on the lecture table a most remarkable collection of the substances discovered or studied by Liebig, which had been prepared for the occasion in the Berlin laboratory.

At the outset the lecturer declared his conviction that Liebig's is the name and figure alone fitted to stand beside Faraday's in the representation of our century to future generations of mankind, and that hereafter they will be looked up to with such reverence as it is ours to offer to the mighty spirits of the past—to such giant figures as those of Galileo, Kepler, Newton and Lavoisier. Were we to consider merely the vast number and incalculable importance of the chemical facts established by Liebig, we should have to proclaim him one of the greatest contributors to chemistry at large that ever appeared; while of organic chemistry we could not hesitate to consider him the very source and fountain head.

Yet the discovery of chemical facts had been but a part, and not the greatest, of Liebig's memorable services. By his experimental studies on the correlation and mutual bearing of the facts he discovered, he was led to the conception of general laws which have shed a flood of light on chemical phenomena of all classes; illustrating no less the course of inorganic transformations than the nature of organic compounds and their activities—the field he especially cultivated. By the great types of composition which, under the names of *radicles*, he was the first to reveal, and by the general methods of research resulting from their recognition, he was enabled not only to trace with a sure and cautious hand the lines of his own lifelong progress, but to map the path of all contemporary research and shape the course along which, from age to age, so long as chemistry and the collateral sciences continue to advance, they must pursue their developments. It was he also who, while placing at our disposal the means, intellectual and material, of prosecuting our researches, was also the first to found in Europe the great institutions for chemical education by which our minds have been prepared and equipped to employ with advantage the keen weapons, theoretic and instrumental, provided by this great exemplar for our use. Liebig, in fact, when he became professor at the small University of Giessen, organised the first educational laboratory, properly so called, that was ever instituted. The foundation of this school forms an epoch in the history of chemical science. It was here that experimental instruction such as now prevails in our laboratories received its earliest form and fashion; and if at the present moment we are proud of the magnificent temples raised to experimental science in our schools and universities, let it never be forgotten that they all owe their origin to the prototype set up by Liebig half a century ago.

After speaking of Liebig's influence as a lecturer and a teacher in the laboratory, and to the inspiration bequeathed to us by his illustrious example, Professor Hofmann briefly notes that his labours in abstract science have also, like Faraday's, borne copious fruit in many of the useful arts. He then eloquently dwells at considerable length on Liebig's achievements in physiological chemistry. With regard to the laws of plant life, his researches threw ray after ray of brilliant light into depths where before the deepest obscurity had reigned. It was Liebig who traced the primordial conditions of the nutrition and growth of plants, and finally established their connection with the chemical composition of the soil in which they are rooted, and of the air in which their leaves are bathed, as well as with the imponderable forces, especially the sun's light and heat, under whose influence they live. Projecting his view still further in the same direction, he also traced the influence of physical and chemical laws in the second and higher division of biology, namely, that which relates to animal life, its laws and conditions, especially those of the nutrition and development of the animal body. Referring to his three works, "Chemistry, in its application to Agriculture and Physiology," published in 1840; "Organic Chemistry, in its application to Physiology and Pathology," published in 1842; and "The Natural Laws of Husbandry," published in 1862, the Faraday lecturer says: "In these three splendid works, each, if I may use the expression, a conqueror's battlefield, Liebig built up new kingdoms on the ruins of empires overthrown." Professor Hofmann takes occasion to point out that, although the conviction of the powerful impetus given to agriculture by Liebig has fairly taken hold of the public mind, his labours in the cause of physiology have not won him anything like the full meed of recognition which that part of his life work has so nobly earned. In support of this opinion he refers to Bischoff having reproachfully, but justly, exclaimed (in an address on Liebig's influence on the development of physiology): "I do not believe myself mistaken if I hold the opinion that there are not many among the younger generation of physiologists and medical men who know, or have even a distant notion, how great, I should rather say, how immense, the influence of Liebig's researches, of his writings and teachings, have been, and is still, not only on physiology and medicine, but on organic science at large. The majority enjoy the advantages gained, and rejoice in the progress, without being conscious of its author. They consider as self-evident the facts established by Liebig, the methods and principles of research diffused by his teaching. They believe that it cannot be otherwise, and care but little for him to whom science, and, with science, they themselves, are indebted for their present position."

To his survey of the general course and scope of Liebig's researches, Professor Hofmann adds an account of Liebig's work in pure chemistry; and finally, after considering his literary labours. gives some glimpses of his character.

The lecture is of extraordinary interest, thoroughly characteristic of its eminently gifted author, and an invaluable exposition of Liebig's marvellous and manifold abilities, from which the student may gain some understanding of the influence exercised by this remarkable man.

The *fourth lecture*, delivered in French by Professor Wurtz (*Transactions*, 1879, I), was devoted to the consideration of the constitution of gaseous matter, and is of a very general character, the earlier part having reference to the extension of Faraday's observations on the liquefaction of gases, the latter to the application of Avogadro's theorem, including the case of dissociable vapours.

As Pictet's experiments on the liquefaction of gases are very prominently noticed in the course of the lecture, it may be pointed out that now that it is known that the critical point of hydrogen had not at that time been attained, Pictet can no longer be credited with having liquefied and solidified hydrogen, and it is even doubtful whether the mist observed in Cailletet's experiments was not due to impurity in the gas.

In the *fifth lecture* (*Transactions*, 1881, 277), Professor Helmholtz dealt with Faraday's electrical researches, especially those relating to the nature of forces working at a distance, and of those acting between atoms; in this latter part of the lecture, the theory of definite atomic charges is very fully considered. Faraday's conception of the identity of the forces termed chemical affinity and electricity is emphasised, the lecturer stating his opinion that the facts leave no doubt that the very mightiest among the chemical forces are of electric origin.

The conceptions developed in this lecture have played a very important part during recent years in all discussions on electrolysis.

The sixth lecture was by Professor Mendeléef; in his absence a translation of the *sixth lecture* was read by the Secretary (*Transactions*, 1889, 634). This lecture is primarily of value from the insight which it affords into the history of the development of the "Periodic Law" by one who of all others has done most to develop the consequences of this all important generalisation, and also an account of the light which it sheds on the lecturer's views as to its applicability. After referring to the attention called by Dumas and others to relations underlying atomic weights, Professor Mendeléef makes the graceful admission "Analogies of the above order seemed quite accidental . . . Nevertheless the fruit was ripening, and I now see clearly that Strecker, De Chancourtois, and Newlands stood foremost in the way towards the discovery of the periodic law, and they merely wanted the boldness necessary to place the whole question at such a height that its reflection on the facts could be clearly seen."

There is an interesting reference in the lecture (p. 636) to the impression produced in 1860, at a meeting of chemists at Karlsruhe, by Cannizzaro's spirited advocacy of Avogadro's theorem, "at that time far from being generally recognised," and regarding which "no understanding could be arrived at."

Probably the most novel part of the lecture is that relating to periodicity among oxides both as regards chemical and physical properties. A valuable table is affixed to the lecture illustrating the periodic variation in the composition of the hydrides or methides and oxides of the elements.

HARRISON AND SONS, PRINTERS IN ORDINARY TO HER MAJESTY, ST. MARTIN'S LANE, LONDON.