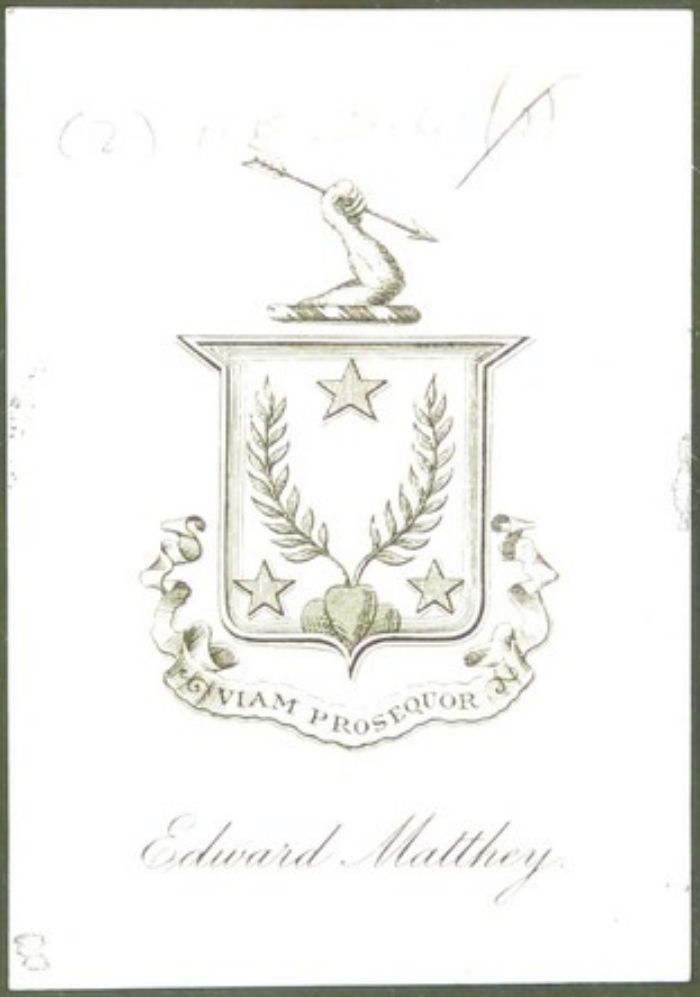
Register of the Associates and old students of the Royal College of Chemistry, the Royal College of Mines and the Royal College of Science; with historical introduction and biographical notes and portraits of past and present professors / [Sir Theodore Gervase Chambers].

ROYAL COLLEGE OF CHEMISTRY
ROYAL SCHOOL OF MINES
AND
ROYAL COLLEGE OF SCIENCE



Edward Matthey.

REGISTER

OF THE

ASSOCIATES AND OLD STUDENTS

OF

THE ROYAL COLLEGE OF CHEMISTRY,

THE ROYAL SCHOOL OF MINES,

AND

THE ROYAL COLLEGE OF SCIENCE.

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THE ROYAL COLLEGE OF SCIENCE AND ROYAL SCHOOL OF MINES,
SOUTH KENSINGTON.

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WITH

HISTORICAL INTRODUCTION

AND

BIOGRAPHICAL NOTICES AND PORTRAITS

OF

PAST AND PRESENT PROFESSORS.

BY

THEODORE G. CHAMBERS, Assoc. R.S.M.

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PREFACE.

A FAIRLY complete Register of the old students of the *Royal School of Mines* has for many years been kept in connection with the annual Old Students' Dinner; but it was not until the formation of the Students' Union in the spring of 1889 that a general Register of all old students was started. In 1889 Messrs. Briscoe, Streatfeild and Coultas, began the labour of collecting information about those students who had been at what was then called the "*Normal School of Science and Royal School of Mines.*" In 1892 Mr. Shepherd, Secretary of the Union, took up the work, and drafted a scheme for the completion of the Register, a description of which may be found in the Magazine for October 1892. Unfortunately the books containing the information collected up to this period were mislaid, and have never been found.

Towards the end of the session 1892-3, the committee who, under Mr. Shepherd, had charge of the Register, found it impossible to devote sufficient time to the matter. A meeting was therefore held on June 6th, 1893, to consider how the work should be carried on; and the present editor, Mr. Theodore G. Chambers, offered to continue the task. Since this date, progress has been continuous, though necessarily slow. Sub-committees were formed in 1893, consisting of Messrs. Barnett, Starling, Forsyth, More, and Holiday; and in 1894, of Messrs. Dunkerley, Brame, and Ferguson. The successive Secretaries of the Students' Union—Messrs. C. H. Sidebotham and J. B. Chambers,—also rendered valuable assistance in sending out circulars and generally aiding the work.

Towards the end of 1895 it was considered that sufficient information had been collected to warrant the issue of a first edition of

the Register. Its publication was placed in the hands of a committee composed of Messrs. Bennett H. Brough, Assoc. R.S.M. (Secretary of the Iron and Steel Institute); H. G. Graves, Assoc. R.S.M. (Permanent Secretary of the Old Students' Dinner Committee); J. G. Lawn, Assoc. R.S.M. (Late Instructor in Mine Surveying, Royal School of Mines); C. H. Sidebotham, Assoc. R.S.M. (Late Secretary of the Students' Union); J. B. Chambers (Secretary of the Students' Union, 1896); J. W. Hinchley, Assoc. R.S.M. (Editor of the *Royal College of Science Magazine* and *Journal of the Royal School of Mines*); and Theodore G. Chambers, Assoc. R.S.M., as Secretary and Editor.

In presenting the Register, the Publishing Committee wish to express their thanks to the Professors and Old Students of the School who have responded to the invitation to contribute information. Unfortunately, it has not been found possible to obtain for publication the names, addresses, and other particulars, of all old students who have attended a full course in any subject, and have presented themselves for examination; and the Committee will be much obliged if their attention is called to any such omissions, in order that the missing names may be included in subsequent editions.

Should the present edition of the Register meet with approval, it is intended to make periodical revisions, bringing it up to date; such further editions being issued every two or three years, in pamphlet form, at a reduced price.

In order to add interest to the Register, an introductory section has been included, giving an Historical Account of the Royal College of Chemistry, the Royal School of Mines, and the Royal College of Science; together with Biographical Notices of the Past and Present Professors.

LONDON,
November 1896.

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THE ROYAL SCHOOL OF MINES, AND THE ROYAL COLLEGE OF SCIENCE.

IT was in the year 1832 that Sir Henry De la Beche obtained the **1832** sanction of the Board of Ordnance "to affix geological colours to the maps of Devonshire and portions of Somerset, Dorset, and Cornwall." This was the first step in the foundation of the Geological Survey of Great Britain. Two years later the work received further official recognition in a definite grant of £300 a year from the Treasury towards its expenses, and De la Beche, having been given the assistance of two or three officers of the Ordnance Survey, was nominated Director of the "Ordnance Geological Survey."

About the year 1835, whilst conducting the work of the Survey, De la **1835** Beche was forcibly impressed with the opportunity which was thus afforded of illustrating the useful applications of Geology, He suggested to Mr. Spring Rice (afterwards Lord Monteagle), then Chancellor of the Exchequer, that a collection should be formed and placed under the charge of the Office of Works. The proposed collection was to contain "specimens of various mineral substances used for roads, in constructing public works or buildings, employed for useful purposes, or from which useful metals were extracted"; and it was to be arranged "with every reference to instruction." * The suggestion was favourably received, and its object effectually supported by the officials of H. M. Woods, Forests, and Works, and by Sir Francis Baring, then Secretary to the Treasury. Apartments for the housing of the collections were allotted by the Chief Commissioner, Lord Duncannon, in February 1837, and De la Beche was asked to carry out his proposal of **1837** establishing a "Museum of Economic Geology." The house selected for the purpose was No. 6, Craig's Court, an unpretentious building with

* De la Beche, Inaugural Discourse, Jermyn Street, November 6th, 1851 (*Records of the School of Mines and of Science applied to the Arts*, vol. i. part i.: London, 1852).

a fifty-feet frontage upon the south side of a quiet, dismal little yard between Old Northumberland House and Scotland Yard. The various collections, already made, were transferred to these rooms, and by the year 1839 the Museum was in fair working order. Mr. Richard Phillips, F.R.S., a distinguished analytical chemist, was appointed curator, and "a laboratory was attached to the Museum, in which analyses of soils, minerals and other substances, were made on very moderate terms, under regulations which had for their object the diffusion of correct scientific knowledge to all persons desirous to obtain the same."*

The Craig's Court Museum also became the place of deposit for the Mining Records, when that Office was established in 1839, owing to urgent representations to the Government from an influential committee of the British Association. This establishment had been first proposed by Mr. Thomas Sopwith, in a paper entitled "Suggestions on the Practicability and Importance of Preserving National Mining Records," read before the British Association in 1838. The idea had been taken up by the Marquis of Northampton and by Sir Henry De la Beche; and the Museum of Economic Geology was selected as the most suitable head-quarters for the office.† In the following year (1840) Mr. T. B. Jordan, of Falmouth, formerly secretary of the Royal Polytechnic Society of Cornwall, was appointed Keeper of the Mining Records; and the plans and sections, the models of mines and machinery, and the workshop below the Museum, were also placed under his superintendence. The aim of the Mining Record Office, and its connection with the Museum, is best shown by quotations from Dr. Buckland's Presidential Addresses to the Geological Society in 1840 and 1841.

"To the Keeper of the Mining Records will be assigned the duty of arranging the documents which may be transmitted to him from all parts of the kingdom, by any engineers, mineral surveyors, and proprietors of mines and coal works, who may be willing to send them; particularly maps, sections, and underground plans, which will record the state of each mine, when it is abandoned, for the information of those who, at a future period, may be disposed to bring it again into operation. This office will be accessible to all persons interested in obtaining the information it will afford."‡

"Here will be also large collections of models illustrative of machinery used in mines, as well foreign as British; so that not only will the British miner be enabled to compare the machinery employed in different parts of his own country, but he will also find that adopted in foreign countries. It is understood that any one desirous of making drawings of these models, for the purpose of erecting machinery from them, will be permitted to do so under proper regulations.

". . . . From all these the public may receive valuable, condensed, and gratuitous information as to the mode of the occurrence of minerals within the earth, the various

* *Account of the Museum of Economic Geology, etc.;* T. Sopwith, F.G.S. (Murray, 1843).
† The Mining Record Office was transferred to the Home Office in 1883.
‡ *Proc. Geol. Soc.*, vol. iii., p. 213 (February 21st, 1840).

methods of working mines, and the machinery by which coal and metallic ores are brought to the surface and fitted for the market. There will be also models illustrating the metallurgical processes, and samples of the various stages of these processes, and their final results." *

The Museum was opened to the public in 1841, and pupils received for instruction in Analytical Chemistry, Metallurgy, and Mineralogy. 1841

The following allusion to the Museum was made by Dr. Buckland:—

"Among the most important of these events we recognise, with gratitude and confident anticipation of great advantage, both to science and the arts, the establishment by Her Majesty's Government of an institution hitherto unknown in England—viz., a museum of economic geology. This is to be freely accessible to the public at stated periods, in the department of Her Majesty's Woods, Forests, and Public Works, for the express object of exhibiting the practical application of Geology to the useful purposes of life. . . . Information upon such subjects, thus readily and gratuitously accessible, will be of the utmost practical importance to the miner and the mechanic, the builder and the architect, the engineer, the whole mining interest, and the landed proprietors. . . . A well-stored laboratory is attached, conducted by the distinguished analytical chemist Mr. Richard Phillips, whose duty it is, at a fixed and moderate charge, to conduct the analysis of metallic ores and other minerals and soils submitted to him by the owners of mines or proprietors of land who may wish for authentic information on such matters. The pupils in this laboratory are already actively employed in learning the arts of mineral analysis and the various metallurgic processes. A second department in the Economic Museum will be assigned to the promotion of improvements in agriculture." †

Three years later the Survey was given its independence. Sir Robert Peel,—to whom De la Beche referred "as one of those to whom we have been most materially indebted for our progress," ‡—himself drew up the Treasury Minute, dated December 27th, 1844, transferring the Geological Survey from the Board of Ordnance to the Office of Woods, Forests, and Works, whose Chief Commissioner, the Earl of Lincoln (afterwards Duke of Newcastle) paid particular attention to the fostering of the Museum and Survey.

The Staff of the Geological Survey in the meantime had been gradually increased. In the year 1841, when Ramsay joined, there were but four assistants—W. T. Aveline, T. E. James, D. H. Williams, and J. Rees, besides Professor John Phillips, the head of the Palæontological department which had been recently added.

At the time that the Museum of Economic Geology and the Geological Survey were united under one Government department, the Staff consisted of Sir Henry De la Beche, Director-General; Andrew Ramsay, Director for Great Britain; Capt. James, R.E., Director for Ireland; Edward Forbes, Palæontologist; and Warington Smyth, Mining Geologist; while there were two laboratories, one under Mr.

* *Proc. Geol. Soc.*, vol. iii., p. 471; (February 19th, 1841).
† *Proc. Geol. Soc.*, vol. iii., p. 211.
‡ Inaugural Address, First Session of the Government School of Mines (Sir Henry De la Beche, *Records of the School of Mines*, vol. i., part i.).

Richard Phillips, the other under Dr. Lyon Playfair; and a department of Botany under Dr. Hooker.

When the building for the Museum had been allotted in 1837, presents of specimens came in from every direction. The rooms became choked with contributions, and an adjoining house—No. 5, Craig's Court, at that time the Earl Marshal's office—had to be secured. After the more complete union of the Museum with the Survey, through the continued liberality of the public and the judicious management of its guardians, even this increased accommodation proved insufficient to hold the specimens, and many of them were stowed away in Whitehall Yard. The need for greater space at length became so pressing that De la Beche urged the authorities to build the existing Museum of Practical Geology. The site between Piccadilly and Jermyn Street was selected in 1848, as the most suitable; and plans were designed for the Office of Woods and Works by Mr. J. Pennethorne, under the superintendence of Sir Henry De la Beche.

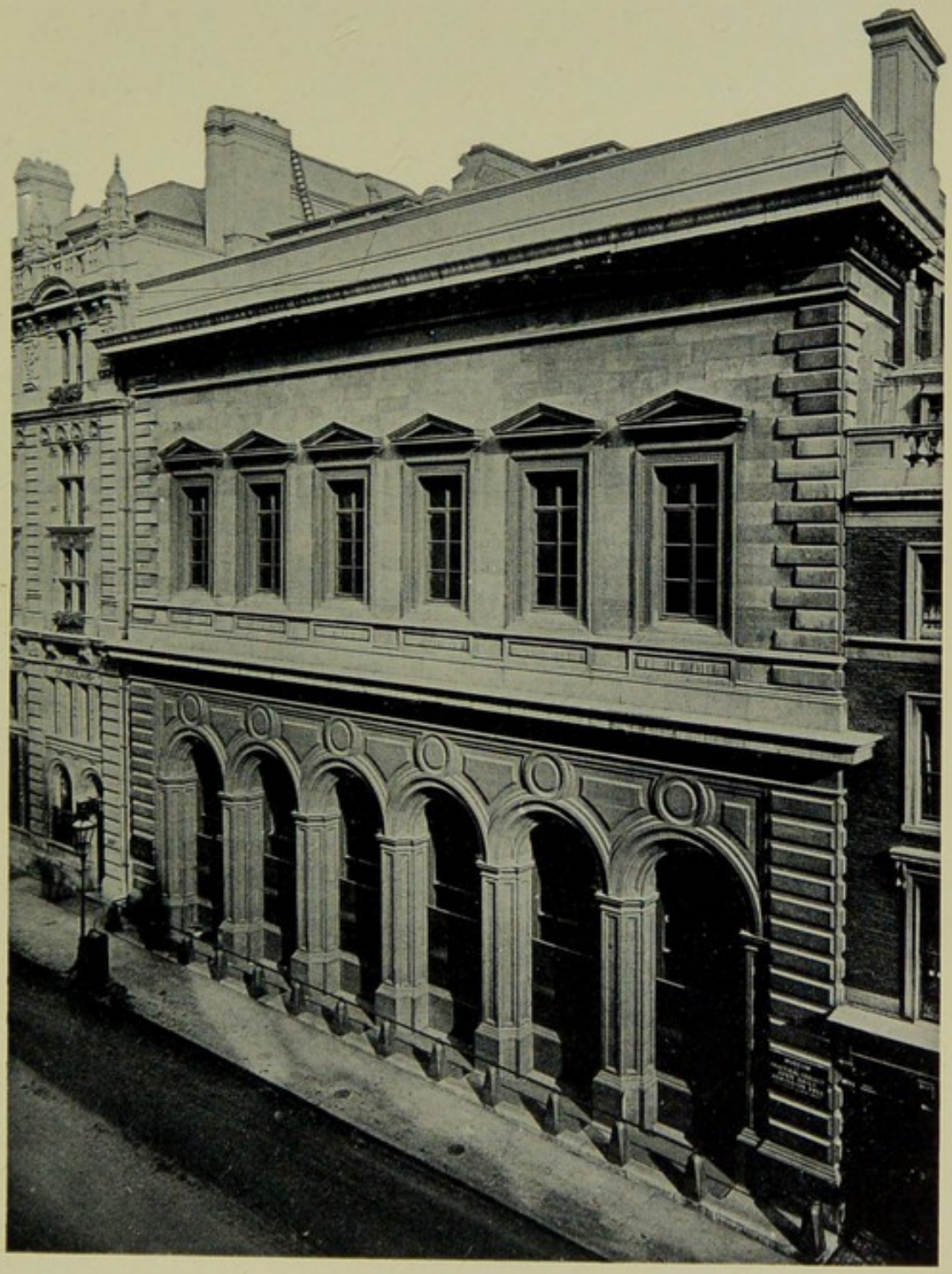
It was originally intended to utilise the valuable frontage on Piccadilly for shops; hence the six arches, and the absence of an entrance from the principal street. The rent which the public had to pay the Crown was calculated at £2000 a year, and it was estimated that the shops would bring in an income of £750 towards its reduction. During the progress of the building, Sir Henry De la Beche agitated against the shops. He pointed out that no provision had been made for a library, and that a good library was essential to the Museum. Finally Lord Carlisle, then Chief Commissioner, appears to have advised the abandonment of the shop scheme, which was agreed to by the Chancellor of the Exchequer, Sir Charles Wood (afterwards Lord Halifax).* The design of the Piccadilly front was, however, unaltered.

The planning and erection of the new edifice now occupied much of De la Beche's time and thoughts, and many were the consultations which he had with the various members of his Staff upon the arrangements.

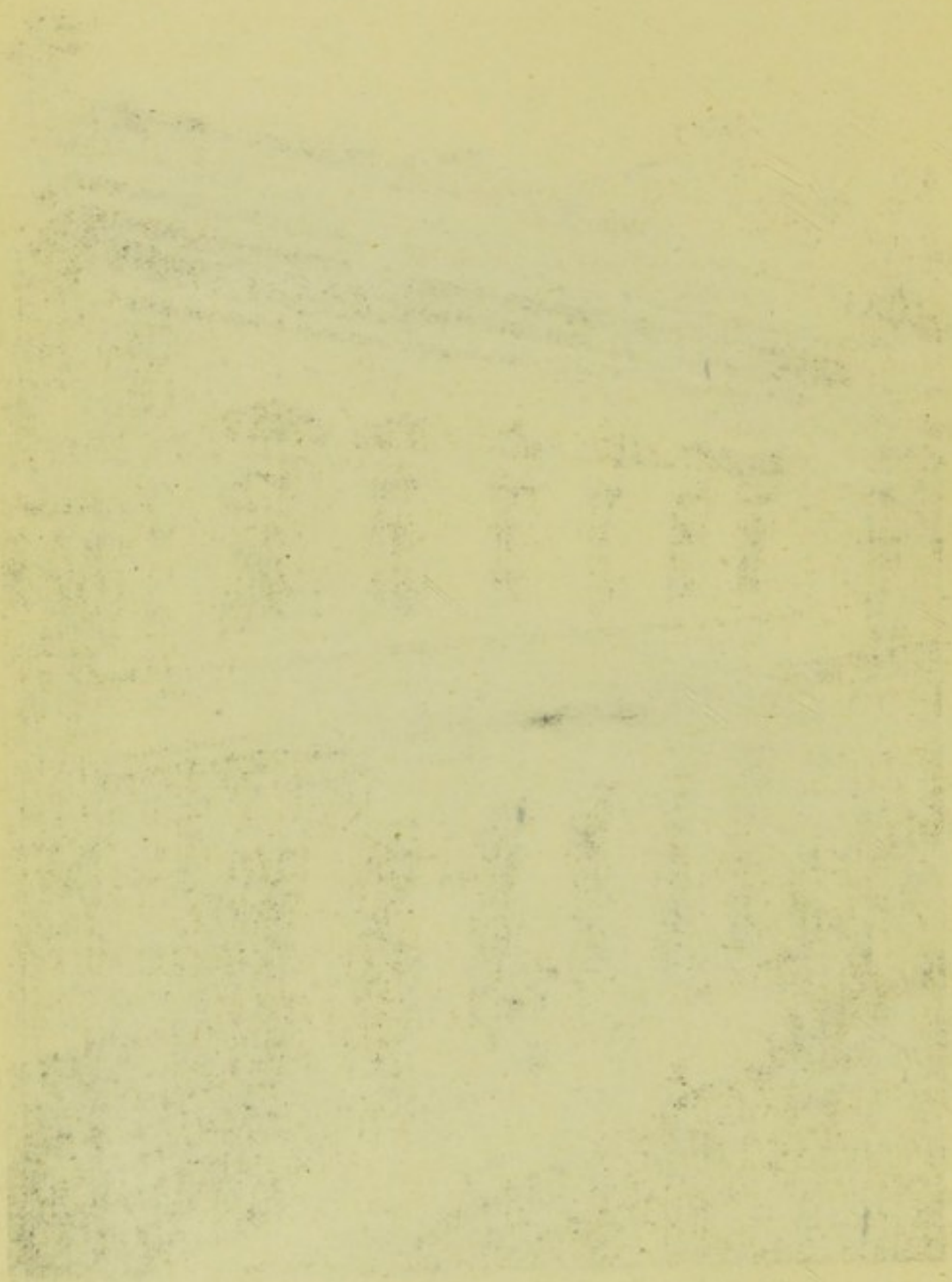
The Craig's Court household was transferred to Jermyn Street towards the end of 1849, and throughout the following year and during the spring of 1851, preparations were actively carried forward. Boxes and hampers that had been lying for years in Craig's Court were opened; cases were fitted up, and the arrangement of the fossils progressed rapidly under the superintendence of Edward Forbes.

As early as 1839, four years after the first collections were made for the Museum, the sanction of the Treasury had been obtained for the delivery of lectures, having for their object the advancement of geological

* Geikie's *Memoir of Sir Roderick I. Murchison*, vol. ii., p. 179.



THE MUSEUM OF PRACTICAL GEOLOGY, JERMYN STREET.
(LATE ROYAL SCHOOL OF MINES.)



science. Owing to the want of a theatre, these lectures, at that time, could not be given; but, with the new building, the provision of a training school for geological science became a main object. As the work went on, De la Beche, finding that he could carry the Government authorities with him, gradually developed and enlarged his scheme to embrace a general school for applied sciences.

At last, in 1851, the building was finished, and May 12th was fixed 1851
for the formal opening by Prince Albert, who from the beginning had taken great interest in the progress of the work. But for the gloom cast over the proceedings by the death of Mr. Richard Phillips, which took place the previous day, the ceremony was perfectly successful. There was a representative gathering of notabilities present, including most of the leading men of science in the Metropolis. Sir Henry De la Beche, in the name of the officers of the Institution, read an address, in which, after sketching the rise of the Museum of Economic Geology, he enlarged upon the educational value of the Institution and the instruction which it was intended to give in the school presently to be established. He added:—

"It has been deemed expedient to extend the lectures so as to embrace instruction of a character resembling that given in foreign schools of mines, and, while it should be adjusted to the wants of this country, should also have reference to the mineral wealth of the Empire at large. To your Royal Highness it would be needless to point out the bearings of mining schools of France, Saxony, Russia, and Austria, upon the mineral resources of those countries—the useless expenditure they prevent, and the real productiveness they promote." *

His Royal Highness, in replying, said:—

"I rejoice in the proof thus afforded of the general and still increasing interest taken in scientific pursuits; while science herself, by the subdivision into the various and distinct fields of her study, aims daily more and more at the attainment of useful and practical results. In this view it is impossible to estimate too highly the advantage to be derived from an instruction like this, intended to direct the researches of science, and to apply their results to the development of the immense mineral riches granted by the bounty of Providence to our isles and their numerous colonial dependencies. . . . It will always give me the greatest pleasure to hear of, and, as far as I am able, to contribute to the continued success of the Museum of Practical Geology." †

De la Beche's scheme for a school was now about to be realised. In the Report of a committee of the House of Lords in 1849, it had been observed that "among those best qualified to speak upon the point, a want appears to be felt of facilities for acquiring mining education, such as are provided by the mining schools and colleges established in the principal mining districts of the Continent, apparently with the most beneficial effects." ‡

* *Times*, May 13*th*, 1851. † *Ibid.*

‡ *Prospectus of the School of Mines and of Science applied to the Arts*: 1852.

Numerous memorials had been presented from the principal mining districts of the kingdom, urging the want of some similar establishment in this country to the mining schools which had long existed in France, Russia, Prussia, Spain, and other countries.

In consequence of these representations and of the enlargement of the Museum, the Government had determined to apply the resources of the Institution to public instruction in mining, and in the applications of science to the arts.

Negotiations followed between the officials of the Office of Woods and those at Jermyn Street. The opening of the Museum further attracted public attention to the subject, and during the summer of 1851 a definite curriculum of scientific training was arranged, and a special teaching staff organised, consisting of members of the Survey. Preparations were made for commencing a "*School of Mines and of Science applied to the Arts*" in the following November. Ramsay was appointed Lecturer on Geology; Warington Smyth on Mining and Mineralogy; Robert Hunt on Applied Mechanics; Lyon Playfair on Practical Chemistry; Percy on Metallurgy; and Edward Forbes on Natural History as applied to Geology and the Arts. De la Beche himself was made Director of the School.

"Rarely in any country, probably never in England, was a more brilliant and gifted staff brought together for teaching purposes than those who, under Sir Henry de la Beche, established a Mining School in London in 1851. Amongst the whole of them, as I can testify from memory, in the unanimous opinion of the students, Dr. Percy's lectures on Metallurgy, and Sir W. W. Smyth's on Mining, were pre-eminent for clearness, command of the subject, and the power of conveying information from the master to the learner."—W. T. BLANFORD.*

With such a staff of teachers and with the unequalled facilities offered by the Museum and its laboratories, it was hoped that the ensuing winter would bring up many students from the provinces, especially from those mining districts which had memorialised for the School. Mr. William Hopkins, speaking of the Institution in his Presidential Address to the Geological Society, said :—

"The Museum of Practical Geology cannot fail to exercise an important influence. The lectures will help to extend an abstract knowledge of Geology and the allied sciences, and cannot fail to afford useful aids to some of the most important material interests of the country. Perhaps no one of these great interests has suffered more from want of scientific knowledge than that of mining. In the vast extent of our mining products, the public only sees the result of that individual energy and enterprise which characterise our countrymen in all the practical pursuits of life, without seeing also the ignorance which, in so many cases, has formerly conducted, and the ruinous consequences which have often attended, such enterprises. Nor has this ignorance entailed heavy losses merely on a past generation. Its influence is strongly felt in the want of those records of former mining operations, which, if they existed,

* Presidential Address, February 1890; obituary notice of Dr. John Percy (*Quart. Journ. Geol. Soc.*, vol. xlvi., p. 47).

would be so invaluable to the miner of the present day. Evils of this nature have been already partially corrected by the wider diffusion of geological knowledge; but much still remains to be done to liberate mining interests entirely from the influence of real ignorance and pretended knowledge. I can conceive nothing more likely to effect this purpose than the establishment of this 'School of Mines.'" *

"*The Government School of Mines and of Science applied to the Arts*" was opened on November 6th, 1851, with an inaugural discourse from Sir Henry De la Beche. Introductory lectures were also given "On the Science of Geology," by Ramsay; "On the Relation of Natural History to Geology and the Arts," by Forbes; "On the National Importance of Studying Abstract Science with a View to the Healthy Progress of Industry," by Playfair; "On the Importance of Special Scientific Knowledge to the Practical Metallurgist," by Percy; "On the Value of an Extended Knowledge of Mineralogy and the Processes of Mining," by Smyth; and "On the Importance of Cultivating Habits of Observation," by Robert Hunt. All these lectures were published in the *Records of the School of Mines*, a journal which was instituted with the foundation of the School, but which unfortunately ceased after two volumes, in four parts, had been issued.

An extract from a letter to Ramsay, from Edward Forbes, will best describe the results of the first session of the School :—

"About the Museum and School of Mines; on the whole we have done as well as could be expected. There are seven *bona fide* matriculated students entered for the two years, and twenty or so occasionals, chiefly soldiers. Besides these we have a few ladies and philosophers whose tickets have been backed by one or other of us, so as to give them free admission to all the lectures. Add to these about a dozen pupils of the School of Design, who. according to resolution, are admitted free, on being recommended by their director. Playfair and I lecture to about fifty people so far, including some of our colleagues. I had fifty-eight yesterday at my lecture. The number appears to fluctuate, but we shall see. Hunt had thirty-six this morning, and that seems about his average. There are a few more occasional entries for Chemistry and Natural History than for Mechanical Philosophy. The audience is highly intelligent, both male and female, and the mining pupils seem an excellent class of young men. To some extent we are fighting with disadvantages, for the Woods and Forests, or rather Lord Seymour, do nothing to push us on; the districts that memorialised for mining schools have not sent a single pupil; and the uncertainty of the plans of the Exhibition people respecting the appropriation of the surplus, prevents men coming forward, and unhinges the public minds. Until that is settled, we don't know exactly where we are. All of us here are of accord that this should be the nucleus of any great economical college, such as is talked about, and that, if we don't form part of the plan, we must go to the wall. Lyell, as a commissioner, has had a private conversation expressly on the subject with me, and I dined quietly with Sir James Clark for the same purpose, Lord Ashburton being there. Both Lyell and Sir James entertain the right view on the subject. Lyell is especially anxious, as he considers himself pledged by his former writings to oppose the spending of the surplus money in architectural displays, and to maintain that it should be spent in endowments and scholarships. Our building enlarged (not in front, but in useful rooms at the sides) would fully serve all the purpose." †

* Presidential Address, 1852 (*Quart. Journ. Geol. Soc.*, vol. viii., p. lxxix.).
† *Life of Edward Forbes*, by Wilson and Geikie, p. 492.

The small attendance of students during the first session was a disappointment to every one who was interested in the new School. It was expected that the mining districts at least would have sent pupils. The scheme of forming a great Mining School in London had failed to attain the success that had been anticipated. "Some attributed this result to the choice of London as the site of the school; some to the length and expensiveness, or to the too comprehensive character of the curriculum of study; while others again looked upon the whole school as an instance of arrested development until the arrangements, which had been liberally conceived, should be worthily carried out. To whatever cause it might be due, there was no doubt of the fact." Allowances have to be made for the difficulties of starting a new institution, but the disadvantages under which the School started continued for some time to hinder its further progress.

One of the earliest features of the new Institution was the organisation of evening lectures for artisans. In the spring of 1851, before the opening of the School six lectures had been delivered, and in the following year regular courses of instruction for certain evenings were arranged to be given by the professors. These lectures were very well attended, the tickets being so eagerly sought after that they were all sold within half an hour of their issue. These working men's lectures continue in connection with the Royal College of Science at the present time.

The second session of the Government School of Mines opened on
1852 November 3rd, 1852, with an introductory lecture by Dr. Lyon Playfair, on "Industrial Instruction on the Continent," in which, after giving details of the various systems of instruction pursued in foreign industrial institutions, he showed the necessity of similar teaching in this country. Amongst other remarks, he pointed out the evil which existed in pupils coming up to the Government School of Mines untrained in science, with the consequent loss of time in their having to learn the elements of science instead of its applications.*

The prospectus of this year—the first issued—shows that the necessity of enlarging the scope of the teaching at the School of Mines, to include more general scientific teaching, had already been realised. The following passage is extracted:—

"Although the intention always was entertained, as shown by the name of the School, to include instruction in the applications of science to the arts, various circumstances have occurred which have induced the professors to give prominence to this kind of instruction as well as to the mining education so much required by this country. A strong feeling on the part of the public has been manifested for the

* "Industrial Instruction on the Continent" (pamphlet) 8vo: London, 1852.

establishment of schools professing instruction in the arts. This feeling has found expression in memorials to the Commissioners of the Exhibition from Birmingham, Bristol, Hull, Nottingham, Sheffield, and other towns; and the Educational Council of this School have thought it expedient to enlarge the character of the instruction, so as to include the more important applications of the sciences professed by the lecturers to the arts and useful purposes of life. The Museum has in consequence been enriched with illustrative collections of the progressive stages of mineral manufactures, its foundation at present not enabling it to include the organic manufactures which are, however, illustrated by the lecture collections of the individual professors. . . .

"The laboratories and working rooms of the several departments are so arranged and organised that systematic studies in Chemistry, Metallurgy, Geology, Palæontology, Physics, Mineralogy, and Mining, may be entered upon with great advantage under the direction of the officers of the respective departments. The Museum itself is of an essentially practical character, and was primarily intended to bring science to bear on Geology in its application to the useful purposes of life; its officers were selected with a view to carry out the educational character of the Institution, recognised shortly after its formation by an official letter to the Chief Commissioner of Her Majesty's Woods, and sanctioned by the Lords of the Treasury. . . .

"The education contemplated in this School differs essentially from that given in colleges, where general education is the primary object. Although it is intended to give general Instruction in science, to those who may require elementary knowledge, still, the chief object of the Institution (to which everything else is made subsidiary) is to give a practical direction to the course of study, so as to enable the student to enter with advantage upon the actual practice of mining, or of the Arts which he may be called upon to conduct."*

With this second session of the School we come to an interesting epoch in its history. The Great Exhibition of 1851 had awakened the public desire of further increasing the facilities for acquiring knowledge in science and the arts. In the speech from the throne at the opening of Parliament in November 1852 (Lord Derby being Prime Minister and First Lord of the Treasury), Her Majesty said: "The advancement of the Fine Arts and of Practical Science will be readily recognised by you as worthy the attention of a great and enlightened nation. I have directed that a comprehensive scheme shall be laid before you, having in view the promotion of these objects, towards which I invite your aid and co-operation."

In December there was a change of Ministry, and Lord Aberdeen was returned to office. Early in the following year, however, the Lords of the Committee of Privy Council for Trade were desired by the First Lord of the Treasury to inquire as to the best means of giving effect to the announcement contained in the Queen's speech, and on March 16th, 1853, they reported on the matter to the Treasury. The following 1853
is extracted from Sir J. E. Tennent's letter of that date:—

"I am directed by the Lords of the Committee of Privy Council for Trade to request that you will inform the Lords Commissioners of Her Majesty's Treasury that

* *First Prospectus of the Government School of Mines and of Science applied to the Arts*: 1852.

my Lords have had under consideration, by desire of the First Lord of the Treasury, the question of the best means of carrying into effect, so far as this Department is concerned, the announcement contained in the speech delivered from the Throne at the commencement of the present session of Parliament. . . . My Lords can have no hesitation in stating that the time has now arrived when the consideration of the important question of supplying scientific and artistic instruction to the industrial classes of this country in a more systematic manner than has hitherto been possible, can no longer be postponed. The subject is one which assumes a more prominent position from day to day, and a recent and forcible expression of the public wants in reference to it will be found in the Surplus Report of the Royal Commissioners for the Great Exhibition of 1851. . . . From the communications which they (my Lords) understand have been addressed by deputations and otherwise to the Government School of Mines by places of great importance, such as Manchester, Birmingham, and Newcastle, their Lordships have every reason to believe that a cordial disposition will be shown to co-operate with the Government in promoting industrial science. . . .

"My Lords are of opinion that it will be necessary that, out of the existing materials, there should be formed a Metropolitan establishment, where the most perfect illustrations and models in both branches may be accessible to students sent up from the provincial schools, to pupils resident in the Metropolis and its neighbourhood, to training masters, and to the public at large. . . .

"Connected with this Metropolition establishment there should be a school of the highest class, in which pupils may obtain the best instruction at the completion of their course of training, in which all improvements suggested by experience may be adopted and made generally known; and from which, therefore, the most useful information may at all times be communicated to the provincial bodies in connection with it. . . .

"In conformity with the decision arrived at by the Government, my Lords have included in their estimate the following establishments, which it is proposed to unite in one department under the Board of Trade:—The Government School of Mines and of Science applied to the Arts; The Museum of Practical Geology; The Geological Survey; The Museum of Irish Industry; The Royal Dublin Society; and the Department of Practical Art, including the Provincial Schools of Design. . . .

"Connected with the Museum in Jermyn Street under the superintendence of Sir Henry de la Beche, the School of Mines and of Science applied to the Arts will continue to discharge its useful functions as the Metropolitan School of Industrial Science, with an enlarged sphere of usefulness from its new relation to the provincial schools; and as it is obviously desirable that the Secretary for Science to the general department should be well acquainted with the proceedings of the Metropolitan School of Science, my Lords propose that, Sir Henry De la Beche being Director of this school, Dr. Playfair, in addition to his other duties, should be its Vice-Director.* . . .

"It is but justice to Sir Henry De la Beche that he should no longer act gratuitously in the above capacity, but should, in addition to his present salary of £800, as Director of the Geological Surveys, receive a due acknowledgment of his services as Director of the Metropolitan School of Science. It is therefore proposed to assign to him a salary of £300, as such, making the total amount received by him £1,100. . . .

"Although their Lordships cannot doubt that the public utility of the Museum of Practical Geology, as respects the practical means of instruction and training which it affords, will, under the arrangements proposed in this letter, be considerably greater than has hitherto been the case, they are far from being insensible to the advantages already offered by it. It embraces a large and well-furnished museum, which is constantly being augmented by liberal donations from the public. It includes, not only raw mineral produce, but also numerous mining models and metallurgical illustrations, and extensive collections illustrative of the progress of the Geological Survey, as well as the higher applications of mineral products to the arts. Connected

* Dr. Lyon Playfair did not, however, take upon himself this office, as it was inconsistent with his appointment to the Secretaryship of the new Science and Art Department. *Evidence before Select Committee of House of Commons*, 1868. Answer 1064.

with it are the geological surveys of the United Kingdom, and these are used in combination with the Government School of Mines and of Science applied to the Arts, to which my Lords have referred under the name of the Metropolitan School of Science, as a means of practical instruction. The pupils of the School go under the respective professors into the field, where they are practically taught Geological Surveying, Mining, and Natural History. This advantage of actual field-practice gives a peculiar and important feature to the central school, which might be so arranged as to be extended to those pupils who might be sent to it from the schools in the provinces. . . . Lastly, there is the educational part of the establishment, which was originally instituted as a school of mines, in consequence of numerous memorials from the mining districts, but which has lately extended itself so as to embrace instruction in science applied to the arts. The important practical bearing which the objects of this school have upon the promotion of the science of Agriculture in this country also requires a special reference, the applications of Geology under it extending to Agriculture equally with mining and the arts. . . .

I am to request that you will move the Lords of the Treasury to favour my Lords, at their earliest convenience, with an expression of their opinion in reference to this important subject, and to the several arrangements contemplated in this letter." *

The result of this Report was a Treasury Minute from which the following is taken :—

"Write to Sir Emerson Tennent, and inform him that my Lords have had under their consideration his letter of the 16th inst. . . . submitting the expendiency of blending into one Estimate the charges hitherto stated separately to Parliament, under the heads of 'Geological Survey and Museums of Practical Geology, London and Dublin,' and 'Practical Art Department, including Schools of Design.' Request Sir E. Tennent to inform the Lords of the Committee that their Lordships concur generally in the plans proposed in his letter. . . . My Lords concur in the remarks of the Lords of Privy Council for Trade, as to the best mode in which the efforts of Government can be directed, with a view to the encouragement of Local Institutions for Practical Science ; they agree that that object will be best attained by the creation in the Metropolis of a school of the highest class, capable of affording the best instruction and the most perfect training, which can alone be hoped for from an institution which has the command of the most eminent and distinguished talent ; the advantages of which will be experienced by minor institutions throughout the kingdom, not only as furnishing a central source of information, but as a means of furnishing competent and well-qualified teachers for Local Institutions, and of completing the education of pupils who desire higher accomplishments than can reasonably be expected from minor schools.

"Request Sir E. Tennent to inform my Lords of the Committee that they entirely concur in the proposed arrangement, which will unite in one department, under the Board of Trade, with the Departments of Practical Art and Science, the kindred and analogous institutions of the Government School of Mines and Science, the Museum of Practical Geology, the Geological Survey, the Museum of Irish Industry, and the Royal Dublin Society, all of which are in part supported by Parliamentary Grants ; and my Lords have given directions that the Estimates for all these institutions shall be brought together under the general head of 'Board of Trade Department of Science and Art.' From this arrangement, by which the whole of these institutions will be brought under one common superintendence, and by which the advantages of each may be in some degree made to contribute to the success of the whole, my Lords anticipate much public benefit." †

Thus in March 1853 the Geological Survey, the Museum, and the School of Mines, were united under the "Science and Art Department"

* Appendix A, *First Report of the Department of Science and Art*, pp. 1-8 : 1854.
† Treasury Minute 6652, Appendix A, *First Report of the Department of Science and Art :* 1854, pp. 9, 10.

of the Board of Trade. The School, which had been established by Sir Henry De la Beche for a specific and important branch of scientific education, became the "*Metropolitan School of Science applied to Mining and the Arts*," which was to form a sort of nucleus round which it was intended that a great central establishment should grow, where every department of science should be taught that might be required for thorough practical training in the industrial arts.

Shortly after this, "a Treasury Commission was appointed to inquire into the working of the School, and to report upon the best means of improving its organisation and extending its usefulness." The Survey staff gave evidence before the Commissioners, and "pointed out what they considered the injustice done to men of science in the treatment they received from the Government, as well as the need of clear and definite arrangements for the proper conduct of the School." * The Report of the Commission did not give satisfaction, and was not acted upon. The uncertainty and want of precision continued throughout the session, as, in fact, it had done from the commencement of the School. There had been a slight increase in the number of pupils, fifteen attending as matriculated, forty-nine as occasional students; but this was not, on the whole, satisfactory.

Two new appointments had occurred during this session. A professorship of Applied Mechanics having been provided for by the Parliamentary votes, Professor Willis was appointed to fill it; while Robert Hunt, who had previously lectured on "Mechanical Science with its Applications to Mining," continued to teach Physical Science. Dr. Lyon Playfair, upon his appointment as Secretary to the new Department of Science and Art, had resigned the professorship of Chemistry, and the post was offered to Professor Hofmann, of the College of Chemistry in Oxford Street. His acceptance led to one of the most important events in the History of the School—namely, the affiliation of the Royal College of Chemistry. In 1852 the Treasury had sanctioned the lease of premises in Marylebone Street at a rent of £150 a year for temporary chemical and metallurgical laboratories, on account of the lack of accommodation in Jermyn Street. Upon Hofmann's appointment, the Council of the College of Chemistry offered to place their premises and appliances at the disposal of the School, if the Board of Trade would take an assignment of the lease at a rent of £130 a year. As the lease of the house in Marylebone Street was expiring in 1854, this suggestion was most suitable and opportune. The Lords of the Committee of Privy Council for Trade recommended the proposal,

* *Life of Edward Forbes*, p. 517: Wilson and Geikie.

which was at once sanctioned by the Treasury ; and the Royal College of Chemistry, in which there were at that time from forty to fifty students, became the chemical department of the Jermyn Street School in July 1853.*

Under its new title of "*Metropolitan School of Science applied to Mining and the Arts*," the School opened for its third session on October 1st, 1853. Edward Forbes delivered the introductory lecture on "The Educational Uses of Museums," having particular reference to the leading and characteristic features of the Jermyn Street Institution, considered as an educational museum. He alluded to the School as the only organised instructional institution arising out of a Museum, and being maintained in strict connection and relation with its origin.

Referring to the changes of the past session, he said :—

"This year our resources, though still too limited, have been considerably extended, and an important and indispensable want supplied through the institution of a lectureship on Applied Mechanics. It is with feelings of exultation that I venture to allude to the manner in which this new post has been filled. The accession to our corps of so eminent a philosopher as Professor Willis is an honour deeply appreciated by all of us. In him we feel that we have acquired a new source of strength, whose value cannot be too highly reckoned. We feel, too, that in the world of science, and in the world of mechanical industry, the approbation of this appointment is universal.

"In the presence of Dr. Hofmann, who, though appointed to the lectureship on Chemistry, and charge of the Laboratory since the conclusion of last session, has sat with us and served amongst us for some time, I will not—I need not—enter on any eulogium of his distinguished merits. To have secured the services of one of the most eminent of European chemists, for the post until lately so ably filled by Dr. Lyon Playfair, is as great a satisfaction to ourselves as it will be a guarantee of good work to the public. His predecessor has left us for a post of heavy responsibility and inestimable importance,—one on the conduct of which the success of Government institutions for scientific education will in a great measure depend. He has left us with our warmest wishes for his success, and our firmest confidence in his ability, energy, earnestness, and truthfulness. But though no longer holding a professional post here, we retain the benefit of his advice and counsel, since he still remains connected with our Institution, and sits with us as a member of our Educational Committee." †

Alluding to the students of the past two years he continued :—

". . . Since their studies are now completed, I may speak of the men in the language, not of compliment, for of that there is no necessity, but of unmixed praise. I can say this, not only for myself, but for all my colleagues ; and we have the delightful satisfaction of anticipating a distinguished scientific and practical career for those who were lately our pupils, and whom now we number among esteemed friends. Their services are sure to be appreciated and anxiously sought for ; and already we have had the pleasure of congratulating some of them on the obtainment of highly valuable and honourable posts, for which they had become qualified within these walls."

* A full official account of the circumstances which led to the transference of the lease of the College of Chemistry to the Government, with the consequent events, is to be found in the *First Report of the Department of Science and Art*, Appendix L, p. 411.

† See note, p. xvi.

Of the apathy of the public in general, which had proved so detrimental to the School, he added:—

"It was supposed that opportunities for scientific instruction such as are here afforded would have been appreciated by intelligent persons among the middle and higher ranks having time at command. With the exception of a chosen few, the anticipation has proved fallacious. Possibly the occult science of table-turning, which in these days seems to occupy the place filled by astrology in days of yore, has too seriously occupied their thoughts to permit of chemical, physical, geological, or biological studies. In London there are several institutions of high character that offer, at reasonable cost, scientific instruction to the so-called 'educated' classes; yet if the numbers of all, young and old, who avail themselves of the chances that are placed within their reach were to be summed up, scanty indeed would the proportion appear who appreciate as compared with the vast majority who neglect the opportunity. Need we wonder, then, at the success of popular follies and absurdities among persons to whom, if we applied the epithet 'unenlightened,' we should give mortal offence? There is, indeed, no stronger argument in favour of the State taking the initiative in scientific instruction of the kind given here, than the fact that the classes of the people who cannot afford to pay high fees, or come to learn during the hours of the day, are anxious and thankful for it; whilst those who ought to support deserving institutions of private foundation have yet to be imbued with a taste for natural knowledge before they will do that which should be at once a duty and a pleasure."*

The prospectus for this third session shows that the School was now divided (theoretically) into four distinct sections:—(*a*) a General Division, for those who desired a general knowledge of Applied Science; (*b*) a Mining and Metallurgical Division, for students who intended to pursue Mining or Metallurgy; (*c*) a Technical Division, for those who proposed to engage in the arts or manufactures depending either chiefly on chemical or chiefly on mechanical principles; and (*d*) a Working Men's Division, for the instruction of working men by evening lectures. It is interesting to note how closely this arrangement, made within two years of the foundation of the School, resembles that which exists at South Kensington at the present time.

During this session it became necessary to look out for some place in which to accommodate the metallurgical laboratory, the lease of the Marylebone Street house having almost expired. The house next to the Museum had become vacant, and it appeared to afford the requisite space by the removal of certain portions of the back premises. The sanction of the Treasury having been obtained, the Board of Works took the new premises, and there the metallurgical laboratory was installed.

1854 Early in 1854 Edward Forbes was elected to the Chair of Natural History in the University of Edinburgh; and Huxley, upon De la Beche's offer, accepted the post of Lecturer on Natural History. In the same year Robert Hunt, in order to give more time to the Mining Record Office, resigned his Lectureship on Physical Science, and

* *Introductory Lecture on the Educational Uses of Museums*, by Edward Forbes, F.R.S. (Longman, Brown, Green & Longmans: 1854).

Professor George Gabriel Stokes was appointed in his stead. At this time there were various Exhibitions attached to the School. H.R.H. the Prince of Wales, as Duke of Cornwall, granted two Exhibitions of £30 each, which were awarded to *matriculated* students—that is to say, to students who entered for the full course at the School. The Educational Council of the School granted two Exhibitions, and the Department of Science and Art also provided certain provincial Exhibitions. During this session there were eighteen matriculated students at the School.

In the following year (1855) the founder of the whole Jermyn Street establishment—Sir Henry De la Beche—died. He had continued to act as Director, and to visit the Museum in that capacity up to the date of his death. He appeared for the last time on Wednesday, April 11th, and passed away on the morning of Friday the 13th. The choice of his successor was a matter of extreme difficulty to the authorities, more especially to those who interested themselves in the development of the comprehensive scheme of the general science school. 1855

Their views are well expressed in a memorandum by H.R.H. Prince Albert, from which the following extracts are taken :—

"Buckingham Palace : *May 2nd*, 1855.

"It is important that the opportunity afforded by the appointment of a new Director of the Museum of Practical Geology should not be lost for furthering the General Scheme for bringing science and art to bear on the productive industry of the country, as recommended by the Commissioners for the Exhibition of 1851, in connection with the appropriation of their surplus, and as approved of by the Government.

"According to this scheme, Museums of Science and Art were to be formed on the ground purchased by the Commissioners at Kensington, the main utility of which should not consist in their being a mere collection of curious or interesting objects, but as serving for the purposes of National Education in illustrating courses of instructive lectures. . . .

"With respect to Science, a 'Department of Practical Science,' has also been formed, under the Board of Trade ; and the institution on which an educational organisation would be most easily grafted was that of the Geological Survey and the Museum of Practical Geology, an establishment created solely by the untiring energy of the late Sir H. de la Beche, who raised it, under the Board of Woods and Forests, almost as it were under disguised colours, at a time when little interest was felt generally in the subject, this being at the time the only recognition in this country of the claims of science to be directly fostered by the Government. This institution is now transferred directly to the Board of Trade ; a School of Mines has been formed as a branch of it, under Professor Smyth,* and the Royal College of Chemistry embodied with it under Professor Hofmann. As it often happens that a person who, through great difficulties and by his own exertions, has succeeded in realising one idea, does not readily merge this in a larger one, so Sir Henry de la Beche cannot be said to have extended the usefulness of his department, but has rather counteracted the plans of the Commissioners by confining his attention to simple Geology.†

* Mr. Warington Smyth was Professor of Mineralogy and Mining, and not Director of the Mining School.

† Sir Archibald Geikie, from whose *Memoir of Sir Roderick I. Murchison*, vol. ii., p. 184, this memorandum is taken, adds the remark :—

"... His Royal Highness appears to have been misinformed as to the real breadth of

"It becomes of the utmost importance that whoever is appointed now should be made thoroughly aware of the views of the Government, and accept the office with a clear understanding that he will be called upon to work them out. He should further consider himself, not in the light of a simple geologist, but as at the head of a Government educational establishment for the diffusion of science generally as applied to productive industry. Besides the collection in Jermyn Street, which has already outgrown its means of accommodation, there are ready to go to the Commissioner's grounds at Kensington a collection of animal and vegetable produce, now temporarily deposited in Kensington Palace, and formed by the Commissioners themselves; and also a most important collection of mechanical models for the illustration of the history of inventions forming, by Professor Woodcroft, under the authority of the Patent Commissioners, and temporarily stored away in the buildings belonging to the Master of the Rolls."

The man eventually selected as successor to Sir Henry De la Beche was Sir Roderick Murchison, who having been already twice elected President of the Geological Society, and combining with scientific prestige a high social position and considerable knowledge of affairs, was considered the most suitable man of the time to fill such a responsible and difficult position.

He himself writes to his friend Professor Phillips on April 18th, 1855 :—

"When poor De la Beche was gone, very old and valued geological friends (not of the Survey) urged me to look to the place as the man who, by his labours in British fields, and his application of his knowledge to maps, sections, and books, was most entitled to the post, and who, from successful management of Societies, could best succeed in it. But I peremptorily declined, not only this appeal, but also a gentle allusion of the President of the Board of Trade, when he sounded me *in limine*. At that time my great fear was that Geology would be submerged in other affairs if a good hammer man was not at the head of the whole. . . .

"Who, then, was to be (Geology and Palæontology apart) the *régisseur*? A split was to be deprecated—two kings would never answer, and confusion would arise. Yesterday sundry professors, the four or five who are the oldest and most influential, met together in Jermyn Street and unanimously opined that I was the only man who could keep the whole thing together and make it work well. This opinion they conveyed to the authorities, through Playfair, and the appeal being made to me in so very flattering a way, I could not resist, particularly as I saw that I should, by accepting, prevent discord. Whether the Government will offer it to me is another question.

"Notwithstanding your *mot* on the triple directorate, I view it simply as the School of British Geology and Mines. The affiliated sciences are all subordinate to that fundamental point.

the deceased Director-General's views. . . . So far from confining his attention to simple Geology, he had conceived a great plan for establishing in this country a School of Mines at least as fully equipped as any on the Continent. The wide scope of this plan may be gathered from the mere list of eminent men in various branches of science whom he gathered round him. It is probably true that he offered or gave no help to the scheme for establishing a general school of Applied Science under the Marlborough House officials. He knew that the school he had himself founded supplied a real want in England, and that it could be successfully carried on. He did not know that the time had yet come for the establishment of a great general school, and though twenty years have passed away since his death, the scheme for the equipment of one great Government School of Science in London has only partially been carried out. . . So far from being really obstructive, he was in advance of his time. To have planned and successfully founded the great Jermyn Street School of Mines was of itself work enough for one man; yet it is only one of the many claims which De le Beche has on the grateful recollection of all lovers of science in this country."

"If they name me, and should my health continue as good as now, you know me well enough to be certain that I will do some good at all events, though perhaps I have offered to undertake what I had better have left alone, as far as my happiness is oncerned." *

The Professors and the Educational Council of the School agreed as to the selection of Murchison as Director-General. Mr. Cardwell (President of the Board of Trade) also approved of the appointment; and Murchison entered upon his new duties on May 5th, 1855.

Soon after this, the inconvenience attending the continual passing to and from the chemical laboratory in Oxford Street and the lecture theatre in Jermyn Street became so noticeable that Murchison and Hofmann pointed out to Lord Stanley of Alderley, who had succeeded Mr. Cardwell as President of the Board of Trade, that the vacant space which existed behind the College of Chemistry might be utilised, as originally intended, for the purpose of a theatre. The matter was submitted to the Lords of the Treasury, and upon their approval the theatre was built to accommodate about two hundred and fifty persons.

In the following year (1856) a further change took place with regard to the government of the School. The Education Department of the Privy Council was constituted by an Order in Council of February 25th, 1856, to include the Educational Establishment of the Privy Council Office and the Science and Art Department of the Board of Trade. The new department was placed under the Lord President of the Council, assisted by a member of the Privy Council, who is called the Vice-President of the Committee of Council on Education, and who acts under the direction of the Lord-President, and for him in his absence.† 1856

This change did not meet with Murchison's approval. He saw, or thought he saw, the advent of a time when the scientific character of the Institution under his charge would be dealt with by men who had no knowledge of, or sympathy with, science, and whose control would fetter the natural and free development alike of the Survey and the School. In his anxiety for the interests of the establishment, he drew up a lengthy document in the form of a letter to Lord Stanley, dated January 25th, 1856, in which, after recalling the history of the School and showing that the Institution was founded with a view to bringing science and art to bear upon the productive industry of the country, more particularly with a view to the develop-

* Geikie's *Memoir of Sir Roderick I. Murchison*, vol. ii., p. 187.

† 1896. No further change has been made since 1856 in respect to the controlling authorities. At present His Grace the Duke of Devonshire is Lord President of the Council, and the Right Hon. Sir J. E. Gorst is Vice-President of the Committee of Council on Education.

ment of its mineral wealth, he went on to show what, in the opinion of himself and his colleagues, would be the result of rendering the establishment subservient to the general education of the country. He expresses this opinion in the following paragraphs towards the close of his letters :—

"Liberal as the minister may be under whose control the general education of the nation may be placed, there is little doubt that in this country the greater number of its instructors will be drawn from among such of the graduates of the ancient universities, as, both by their training and position must be, to a great extent, disqualified from assigning their due importance to the practical branches of science. Such persons may be eminent in scholarship and abstract science, and yet ignorant of the fact that the continued prosperity of their country absolutely depends upon the diffusion of scientific knowledge among its masses. They may, with the most sincere and earnest intention, not only fail to advance, but even exercise a retarding influence on such diffusion, and may object to a course of study which, as now pursued, is irrespective of religious teaching. Experience has shown in how sickly a manner practical science is allowed to raise its head under the direction of those persons whose pursuits are alien to it, whilst in every land where it has had due support the greatest benefits have resulted.

"Placed as the Geological Survey and its affiliated branches now are, in subordination to the Board of Trade, they are continually aiding in the development of an amount of mineral wealth far exceeding that of any other country, and in this wholesome and important action the movements of our body are not only unfettered, but are likely to receive all that encouragement which seems alone to be wanted to enable this establishment to be eminently useful in instructing that class of persons who will materially augment the productive industry and trade of Great Britain."

This letter was treated as a private communication, and was not answered until May 10th, when Dr. Lyon Playfair, as Secretary of the Science and Art Department, replied to it by a letter from which the following is taken :—

"I am directed by the Lords of the Committee of Privy Council for Trade to acknowledge the receipt of your letter of January 25th. That letter, until it was moved for in the House of Commons, had been treated as a private communication addressed to the President of the Board for his information, and had been transmitted by his Lordship to the Lord President of the Council previously to the transfer of the Department of Science and Art to the Education Department. . . . Without entering upon any objections which you have urged to the transfer in question, I am instructed to inform you that the Department of Science and Art will be placed under the management of the Lord President of the Council on the same footing as it has hitherto been under the President of the Board of Trade."

A copy of this correspondence was called for by a resolution of the House of Commons.* Murchison's letter was, he himself said, lost in one or other of the departments, so that when it was required to be printed, a copy of it had to be obtained from the letter-book of the Survey Office. One result of the change, which had already taken place on February 25th, was that, whereas the Director-General of

* Copy of correspondence between the Director-General of the Geological Survey and the President of the Board of Trade, etc., 248. Ordered, by the House of Commons, to be printed, June 2nd, 1856.

the Geological Survey and Director of the School of Mines had hitherto reported direct to a Minister of State, he now had to conduct his communications through Mr. Henry Cole. The administration of the School remained the same, and Murchison's fear of the subordination of practical science teaching to the general education of the country was not realised.

In 1857 the headquarters of the Science and Art Department were removed from Marlborough House, where they had been since 1853, to South Kensington; and the Department has always remained a distinct branch of the General Education Department, whose headquarters are at Whitehall.

On the establishment of the Science and Art Department in 1853, Dr. Lyon (now Lord) Playfair and Mr. (afterwards Sir) Henry Cole had been appointed Joint Secretaries, Dr. Lyon Playfair also discharging the functions of "Inspector of Local Schools." In 1854 Mr. Cole had been appointed "Inspector-General of Schools and Museums" (with the exception of the Jermyn Street establishment), while Dr. Lyon Playfair became sole Secretary. In the year 1856, upon the constitution of the Education Department, Playfair became "Inspector-General of Government Museums and Schools of Science," while Mr. Henry Cole was appointed "Secretary and General Manager," his title being subsequently changed to "Secretary of the Department of Science and Art, and Director of the South Kensington Museum." Playfair resigned his appointment in 1858, and the office of "Inspector-General for Science" fell into abeyance for a time. Captain (now General Sir) John F. D. Donnelly was appointed "Inspector for Science" in December 1859, his title being changed in 1866 to that of "Official Inspector for Science," and in 1874 to that of "Director for Science." On the retirement of Sir Henry Cole in May 1873, the Department was re-organised; the then Assistant Secretary and Accounting Officer (MacLeod of MacLeod) was made an Assistant Secretary of the Education Department, and Principal Officer at South Kensington; while the Secretary of the Education Department (Sir F. Sandford) was made Secretary, and was given executive control of the Department of Science and Art. On Mr. MacLeod's retirement in December 1881, Colonel Donnelly (the Director of the Science division) was appointed an Assistant Secretary of the Education Department and Chief Executive Officer at South Kensington; and in 1884, upon Sir F. Sandford's retirement, he was made Secretary, Permanent Head, and Accounting Officer of the Department, while he retained the office of "Director for Science" until 1893, when Captain Abney was promoted to hold that

post. These are the chief official changes which have taken place in the Department since its constitution.

The scope of the teaching at Jermyn Street, throughout Murchison's rule, again became contracted. Indeed, there never had been any material alteration, the departmental schemes having in reality very little practical effect, and the School continued—what it had always been called—a School of Mines.

1857 In 1857 the name was again changed, and the former title of "*Government School of Mines and of Science applied to the Arts*" was revived. This was thought expedient, partly to avoid the appearance of having drifted away from the original object of the School, and partly to remove any grounds of jealousy on the part of other scientific bodies.* The change was formally sanctioned in 1859 by the late Lord Salisbury, then Lord President of the Council. Murchison, in making his application, stated :—

> "At the same time I particularly wish it to be understood that under this name I comprehend an institution with as wide a scope as any of the foreign establishments of a similar class—in fact, a college in which not merely mining in the narrowest sense of the word is taught, but all those branches of science which have a direct bearing upon the development of the mineral and agricultural resources of the country."†

Two years later the evening lectures, which had been first initiated for the general public by Professors Hofmann and Huxley in 1854, were resumed, at the suggestion of the professors. A nominal fee of five shillings was charged for the course to the public, and half-a-crown to schoolmasters and pupil-teachers. Hofmann lectured on Chemistry, Tyndall on Electricity and Magnetism, Huxley on Physiology, and Warington Smyth on Geology. These lectures, as well as those still given to working men, were attended with great success.

1861 In 1861, the number of entries for the full course having fallen very low—in fact, only six having entered for matriculation in the session 1860-61, while large numbers had entered for the special courses,—it was determined by the Council of Professors to change the name "matriculated student" to "associated student," and to grant a certificate to men who passed the examinations at the end of the full course of study, with the title of "Associate of the Government School of Mines." The result of the change was beneficial, and the number of entries for the full course in the following year was increased.

1862 In 1862 the whole Jermyn Street Establishment was reported upon to

* Huxley in evidence before Select Committee of House of Commons, 1858. Answer 7972.
† *History and General Summary of Regulations of the Department of Science and Art*, 1896 Edition, p. xxxi.

the Lords of the Committee of Privy Council upon Education by a special sub-committee, consisting of Lord Granville, Mr. Lowe and Sir C. Trevelyan.

Referring to the School of Mines, the Report says:—

"The School of Mines is at present the only large and comprehensive institution of the kind in this country, although attempts have been made to establish somewhat similar institutions in various seats of mining industry.

"This school was commenced in 1851, and was intended by its originator, Sir H. De la Beche, to afford practical scientific instruction applicable to mining operations, such instruction being illustrated by the Geological Survey and its collections.

"Courses of instruction have been laid down as shown in a printed prospectus, which is published. Examinations have been established and exhibitions founded.

"At the time of the commencement of this inquiry, those students who entered for *all* the courses of the lectures were termed '*matriculated*,' and made one payment of £30 or two annual payments of £20, whilst those attending some courses only were termed '*occasional*.' The 'matriculated' students were those who avowedly devoted themselves to the especial object of the Mining School. Some 'occasional' students, though not attending the whole matriculated course of instruction, may be reckoned as having had mining instruction in view.

"The annual average of 'matriculated' students during nine years has been only twelve, that of 'occasional' fifty-four. The number of 'matriculated' students must therefore not be viewed as the only test of the school. If they were, its maintenance by public funds could hardly be justified. A large proportion of both classes of the students have found employment in the Government Home and Colonial Surveys, and in various chemical, metallurgical, mining, and other works in the British dominions.

"It has been recommended that the distinctions between 'matriculated' and 'occasional' students should be abolished, and that all the examinations, prizes, and exhibitions of the School should be thrown open to all its students.

"The professors agree that, in view of the practical necessities of the existing class of mining students, the instruction at present embraces too wide a range of study in certain directions, and might with advantage be more closely confined to those sciences which directly bear upon mining. But they also observe that the instruction begins at an elementary point, because the students do not come sufficiently prepared, and that certain essential branches of a mining education are not represented in the school. Some of the professors therefore suggest that it would be desirable to add mining, surveying, and the construction of mining and metallurgical machines, to the courses of instruction, and to exclude some subjects at present taught from the mining curriculum.

"The principles which we consider should be adopted in the re-organisation of the School are as follows:—

"The aim to be kept always in view should be to make the School as directly useful as possible to the great mining interest—to teach the greatest numbers; and, with the view of rendering the School as self-supporting as possible, the professors should derive the principal part of their incomes from fees. From time to time a revision of the Government subsidies and a re-apportionment of the fees among the professors should be made, always having due regard to the interests of the existing professors.

"All suggested changes in the management should be submitted for the approval of the Lord President.

"The instruction should have especial reference to mining, and should be of a technical character such as is not obtainable elsewhere, embracing those branches only of general science which are applicable to mining, and touching on Chemistry, General Mechanics, Physics, and Natural History, only as far as is required for mining purposes. Though it may not be possible at once to cease giving instruction of an elementary character, this should be considered an arrangement of a temporary nature, to be modified annually as the standard can be raised.

"For the present, general instruction in Mechanics, Physics, and Natural History

may be given (by lectures) in the evening classes. In order to mark emphatically the primary work of the School, all instruction *special* to mining should be given in the daytime.

"*Admission of Students.*—If the matriculation fee be abolished, perhaps the separate fees for each subject might be slightly increased. A limited number of persons possessing elementary knowledge in certain sciences bearing on mining (say for the present, one for every £20 paid by the State to the professor), should be admitted without payment of the *fees*. A test of the possession of the requisite knowledge by candidates seeking for free admission might be afforded by the prizes and certificates given in the local examinations of the Science and Art Department, King's College, University College, and other public schools, and the Society of Arts. When such applications exceeded the number of free studentships, then preference should be given by a special competition. Other persons might be admitted without examination, by payment of fees as at present.

"As a commencement, eight exhibitions of the value of £50 a year each should be established, to be given, after a competition open to the whole country to qualified students, and to be held for three years.

"The present exhibitions are, H.R.H. the Duke of Cornwall's two exhibitions of £30 each, which are held for two years; and the Government exhibitions, two of £15 each and one of £25, held for one year. They should hereafter be called 'scholarships,' and be increased in number. They should be given by competition to students who have attended at least one year, so that they may be held with the exhibitions already spoken of.

"It is to be hoped that the leading mining proprietors, and others interested in the subject, will establish endowments in connection with this scheme.

"*Examinations.*—All the students should be examined once in the year as a condition of their continuing to belong to the School, and prizes and certificates of competency in the various subjects should be given. No special fee should be charged for this examination.

"It has been suggested that the name should be changed to the Royal School of Mines, and we think this desirable.

"The measures recommended above would bring the School into direct relations with, and would stimulate in various ways, the scientific instruction carried on in all parts of the country.

"We now turn to *General Scientific Instruction* as distinguished from the special object of the proposed School of Mines. It may be considered under two heads: 1st, the preliminary elementary instruction (in those sciences which bear on mining) which is rendered necessary by the students not being sufficiently prepared on entering; 2nd, General instruction in science such as is afforded in the evening lectures to working men and evening lectures to teachers.

"To the first head the remarks in the last paragraph apply—viz., that this elementary instruction must be considered an arrangement of a temporary nature, to cease as soon as the standard of attainment on entrance can be raised sufficiently high, and that it should, with the exception of Chemistry, be given, as far as possible, in the evening.

"With respect to the second head, this general instruction should be regarded as incidental, and due to the fact that the Mining School exists. If there were no Mining School, it is doubtful if general instruction in science should be undertaken by the Government. The science examinations of the Committee of Council already prove that the public, with a slight stimulus, will provide it for themselves. Nor is it justifiable that the State should be at the cost of providing scientific lectures to the working men only in a particular district of the Metropolis, whilst a similar advantage is not afforded to other places. But as a staff of professors has been formed for other purposes, there can be no objection to their giving these lectures, which are popular, which cost the State nothing, and may be viewed, not as an official duty, but an act of goodwill on the part of the professors. When the Mining School becomes much larger, it may be a question if these lectures ought not to be given up." *

* Appendix V., *Tenth Report of the Department of Science and Art*, p 189: 1863.

The committee also inquired into the advisability of granting a mining degree. The opinion of the staff of professors had been taken on this subject. It is embodied in the following letter * :—

"28, JERMYN STREET, S.W.
"12 *July*, 1861.

"SIR,—In reference to the conversation you held yesterday with the Council of Professors in this establishment, I have first to report, for the information of the Lords of the Committee of Privy Council on Education, that my colleagues and self are of opinion that the degree which has been suggested for acquirements in the sciences relating to mining might with very great advantage be granted by the University of London.

"As to the branches of science in which the examinations of the University should take place, with a view to the granting of such mining degree, we think that the subjects for final examination which should be required of candidates are the following :— Mineralogy, Mining, Mining Mechanics, Mining Surveying, Mechanical Drawing, Practical Geology, with Palæontology and Metallurgy.

"It is obvious, however, that no candidate could be in a condition to pass such *final* examination unless he possessed a competent knowledge of Mathematics, Physics, Chemistry, and Natural History.

"I remain, Sir,
"Your obedient Servant,
"*Henry Cole, Esq., C.B.* RODERICK I. MURCHISON."

The Committee thus referred to the matter in their Report :—

"*Degrees. etc.* It has been suggested that a further encouragement to the acquirement of Mining Science might be given by Diplomas conferring some title.

"It is probable that 'besides the School of Mines' of Cornwall, Glasgow, Bristol, and Wigan, already existing, Mining Schools will be gradually established in other parts of the kingdom, and that mining science will also be acquired by other means. It is highly desirable to give the whole a culminating point.

"But it is obvious that an universal diploma could not be granted by any one school in London, however eminent. Any diploma must be granted by an independent and impartial agency.

"The University of London seemed to fulfil all the necessary conditions, having already by charter the requisite powers. But it has been found that no arrangements can be made with the University of London, as classical knowledge is considered indispensable in the matriculation examination.

"We do not consider it expedient at present to recommend that a new body should be incorporated by charter for the special purpose of conferring degrees in mining science.

"Under these circumstances we are of opinion that a general Examining Board should be established, to grant certificates of competency and of merit of three grades, in mining science.

"The examiners should be appointed annually by the Committee of Council on Education.

"It would be of great advantage if the possession of the proposed certificates was made a condition to the appointment of a mining or colliery inspector and other Government appointments." †

One effect of this Report was that the name of the School was changed for a third time. It now became the "*Royal School of Mines*," and as such it has been known ever since. The title of "Associate of the Royal School of Mines" was made retrospective, and given to all those who had received diplomas since the foundation of the School.

* Appendix V., *Tenth Report of the Department of Science and Art*, p. 194 : 1863.
† *Ibid.*, p. 193.

The course was also extended to three years, having previously been only two, which was undoubtedly too short, considering the small general scientific knowledge with which the majority of students entered the School. Beyond these changes practically nothing was done to carry out the recommendations contained in the Report. It was found inadvisable, and indeed impossible, to reduce the teaching in the general sciences to the mere extent of their bearing upon Mining and Metallurgy. Many men entered every year for special subjects, such as Chemistry and Geology, while others, attracted by the eminence of the teaching staff, wished to study some branch of pure science for its own sake, without any desire to gain the Associateship. In fact, such was the apathy of those engaged in the English mining and metallurgical industries, that the standard of the School could never have been retained at its high level by the fees of students entering for those branches of study alone.

1863 In 1863 Hofmann, having been asked by the Prussian Government to organise a chemical institution on a great scale at Bonn, received three years' leave of absence from London. Dr. Edward Frankland was elected to take his place in the meantime, and upon Hofmann's final resignation, he was, two years later, officially appointed to the professorship. The accommodation at Oxford Street had already been found insufficient. The laboratory only held about fifty students, including those in the research laboratory, and from the time Frankland took charge, he constantly drew attention in his Reports to the urgent necessity of larger premises.

In 1857 the Science and Art Department had been transferred from Marlborough House to South Kensington. There a site of eighty-eight acres had been bought by Her Majesty's Commissioners of the 1851 Exhibition, with part of their surplus funds, according to the proposition of their President, the Prince Consort. Parliament had aided the purchase, by the vote of a loan of some £181,000, and in 1858 the commissioners had repaid £121,000, and given up to the Government, for the use of the Science and Art Department, about twelve acres of the south-eastern portion of the estate, valued at £60,000. Upon this land certain iron buildings and sheds had been erected, and in these and a few of the ancient houses upon the property, the Museum of Education, the Patent Museum, the National Art Training School, and the Offices of the Department, were installed. The Museum was opened by the Queen, accompanied by the Prince Consort, on June 22nd, 1857; and since that date about

£403,000 have been spent upon buildings on this site. The original design is, however, still very far from complete, and the appalling ugliness of the unfinished Museum, only hidden during the summer months by the foliage of a few trees, continues to be an eyesore hardly congruous with the cultivation of Art.

In 1864 a school for the study of the science of ship-building and naval engineering was established in one of the many dilapidated sheds by the Lords of the Committee of Council on Education, at the request of the Lords Commissioners of the Admiralty. The old sheds being unsuitable, and running great risk from fire, it was resolved in 1865 to build permanent premises for the School.*

Provision was made in the upper part of this building for laboratories of considerable size; Professor Hofmann was consulted concerning the plans, and Dr. Frankland was also asked to look over them; but it does not appear that these laboratories were actually intended to supersede those of the College of Chemistry, nor indeed it is clear for what definite purpose they were erected. The idea of establishing a general school of science at South Kensington had, however, at this time begun to take root, and it was probably felt that the laboratories would be required when that school was established. The building was started in 1867, but was carried on in such a dilatory manner that it was not completed until three or four years later.

In 1867 Captain Donnelly, "Official Inspector for Science" to the Science and Art Department," drew up, in accordance with the instructions of the Lords of the Committee of Council on Education, a memorandum of suggestions for enlarging the system of state aid to scientific instruction. In this memorandum, dated November 12th, he pointed out that, owing to the decision of the 1862 Committee that the instruction in the Royal School of Mines should embrace only those branches of general science applicable to Mining and Metallurgy, the School was prevented from filling the position of an advanced school of general science. He showed that a large portion of the scientific instruction given there was of necessity general, and would consequently form a course applicable to any industry. He considered that it was most advisable to found a college of general science upon the plan of the Irish College of Science, to meet the requirements of general scientific training, and that the Royal School of Mines ought to be enlarged to meet this want. He added: "It is

1867

* The School of Naval Architecture was transferred to the Royal Naval College, Greenwich, by an order in Council dated January 16th, 1873, thus giving up the whole building to the needs of the Science School.

greatly to be regretted that the admirable courses of lectures of the professors of the Royal School of Mines are attended by so few students. Though the separate courses are in some cases fairly attended, there are only some five or six students entered, besides the Royal Exhibitioners, for the full course of the School—that is, for the Associateship.... Even the separate courses are not taken that advantage of which one would suppose." *

Mr. Henry Cole, in a memorandum of "Notes on Public Education," prepared at the desire of the Vice-President of the Committee of Council on Education, dated November 28th of the same year (1867), wrote that he concurred generally with Captain Donnelly's paper. Amongst other remarks he suggested that four establishments should be formed in the nature of Training Colleges for teaching practical science, and that the School of Navigation and Science, which was then building at South Kensington, should be enlarged to form one of these.†

The Science and Art Department, during the winter of 1867-68, had this question of the formation of a Central College constantly before them, and after giving the matter careful consideration, a draft minute was prepared, embodying the views of the heads of the Department, including Lord Robert Montagu and the Duke of Marlborough. This draft minute dealt largely with the formation of a Central Science University. It was not, however, passed, partly because it was considered a very bad year for commencing a system of increased expenditure, but chiefly owing to the fact that the whole subject was shortly to be taken into consideration by a Select Committee of the House of Commons.‡

Upon the motion of Mr. (now the Right Hon. Sir Bernhard) Samuelson, it was ordered on March 24th, 1868, that a Select Committee of the House of Commons should be appointed "to inquire into the provisions for giving instruction in theoretical and applied science to the industrial classes."

"One inquiry of the Committee," said Mr. Samuelson in his motion, "would be, whether the School of Mines could not be made the foundation of a great school of general technical instruction." § The Committee, consisting of eighteen members and presided over by Mr. Samuelson himself, was nominated on March 27th.

* Appendix XI., *Report and Evidence, Select Committee of the House of Commons on Scientific Instruction :* 1868.

† Appendix XII., part ii., *Report and Evidence, Select Committee of the House of Commons on Scientific Instruction :* 1868.

‡ *Ibid.*, evidence of the Right Hon. Lord Robert Montagu, Answer 7920 *seq.*

§ *Hansard*, vol. cxci., p. 161.

A mass of evidence was taken by the Committee upon general scientific instruction, much of which turned upon what was then the chief Government technical school—the Royal School of Mines. It was pointed out that the expense of the School to the nation did not appear to be justified, judging by the small numbers annually trained there. Up to this date there had been eleven hundred and thirteen occasional students, and two hundred and thirty-three associated students, in the School, during the sixteen years of its existence, or an average of only fifteen associated students in each year. That these numbers could, however, be taken neither as a real test of efficiency, nor to indicate failure, was carefully pointed out by Professor Huxley in his evidence. He said :—

"I must take leave to deny that the School of Mines has been a failure. It is very true that the number of students who have been turned out of that School is comparatively small, especially if it is looked at as a mere matter of arithmetic in relation to expenditure ; but those persons who have taken the Associateship of the School of Mines are instructed men ; most of them have filled and are filling important positions, and act as centres for the diffusion of science throughout this country and the Colonies ; and, more than that, they have been of great value as leading people everywhere, though slowly, to admit the importance of professional training. So that, although we may not have turned out more than a few Associates every year, the School of Mines is not a failure ; on the contrary, I think that, even if it had done nothing more than show the value of scientific training, the School has been a considerable success." *

He went on to show that the small numbers of students was due rather to the ignorance and apathy of the manufacturing classes, in their want of appreciation of scientific training, than to any serious deficiency in the School. The memorandums of Captain Donnelly and Mr. Henry Cole were handed in to the Committee, and also a further memorandum by Mr. Cole "on combining the Royal School of Mines, the Royal College of Chemistry, and the Royal School of Naval Architecture into a Metropolitan College of Science" ; † his scheme being practically that contained in the minute of the Board prepared in the previous spring.

The Committee seriously considered the various plans proposed by the Department for the establishment of the Central College at South Kensington, but would not recommend its adoption until it had been further considered by competent persons.‡ In the conclusion of their final Report they added :—

"That a more intimate connection between the various Government institutions for scientific instruction in London would increase the efficiency of each of those institutions, and that the constitution and management of those institutions and their future relations to each other requires further investigation." §

* *Report and Evidence, Select Committee of the House of Commons on Scientific Instruction.* Answer 7958.
† *Ibid.*, Captain Donnelly. Answer 7860.
‡ *Ibid.*, Draft Report, p. xxii., § 40 (15). § *Ibid.*, Report, p. ix., § 15.

In the December of this year (1868) there was a change of Government, and the Liberals came into office. The question of the Science Schools was not, however, allowed to drop. It was brought before the public again in the debates on Supply in the House of Commons during the summer
1869 of 1869. Before the debate, Mr. Samuelson rose to make some observations, drawing the attention of the Government to the whole question of Schools of Science. He enlarged upon the importance and use to the country of the School of Mines, and alluded to its crowded state—"Dr. Percy's laboratory being in the backyard of a tailor's shop, and Professor Huxley's anatomical preparations having to be made in a dark closet about eight feet square." He referred to the Treasury minute of December 5th, 1865, which partly referred to the building of the new school at South Kensington, and he recommended that the whole of the Government Science Schools, including the Royal School of Mines and Royal College of Chemistry, should be concentrated at South Kensington.*

The Right Hon. W. E. Forster, replying to Mr. Samuelson, and to questions raised in the debate in committee, stated that the Government was desirous of organising the new School of Science as quickly as possible, as they had the whole system of education under consideration at the time.†

1870 In May of the next year (1870) a Royal Commission was appointed "to make inquiry with regard to Scientific Instruction and the Advancement of Science." This Commission, consisting of Lord Lansdowne, Sir John Lubbock, Sir James P. Kay-Shuttleworth, Mr. Samuelson, Dr. Sharpey, and Professors Huxley, Stokes, and Smith, was presided over by the Duke of Devonshire. Their first Report was made on March 9th, 1871, after having given special consideration with regard to the Royal School of Mines, the Geological Survey of Great Britain and Ireland, the Mining Record Office, the Museum of Practical Geology, and the Royal College of Chemistry. In this Report they stated that there was no necessary connection between the direction of the Survey and the government of the Royal School of Mines; that the "School of Mines and College of Chemistry" was deficient as a school of pure and applied science, in consequence of the absence of a Chair of Mathematics, the want of physical and biological laboratories, and the insufficient accommodation in the chemical laboratory; and that the premises at Jermyn Street were insufficient for the purposes of the Survey, Museum, and Mining Record Office. They therefore recommended, as a remedy, the removal of the School from Jermyn Street

* *Hansard*, vol. cxcviii., p. 162.

† *Ibid.*, vol. cxcviii., p. 218.

to the buildings at South Kensington, then nearly completed, where it should be consolidated with the College of Chemistry, be provided with laboratories for practical instruction in Physics and Biology, and have added to it a Chair of Mathematics. They also recommended that the proposed science school should be governed by a Council of the professors, one of that body acting as Dean. Further they suggested that the School would be available for the instruction of science teachers.*

Upon the issue of this Report, three of the Professors of the Royal School of Mines—Smyth, Ramsay, and Percy, together with Hunt, then Keeper of the Mining Records—drew up a memorial dated April 22nd, 1871, which they sent to Sir Roderick Murchison, with their opinions on the recommendations of the Commissioners. Their chief objections to these, were (1), that the School of Mines, being a school of science strictly applied to Mining and the Arts, it was a mistake to merge it in a general elementary science school; (2), that the School of Mines, to be efficient, ought to be retained in close association with the accumulations of geological maps, mining plans, mining models, etc., belonging to the Museum; and (3) that the School of Mines might easily be rendered efficient by slight alterations and additions, at a small cost to the Government. Murchison forwarded this memorial to the Science and Art Department, with a statement that he entirely endorsed the opinions which it expressed. The Department sent it on to the Commissioners, who appointed three of their number, Mr. Samuelson, Dr. Sharpey, and Professor Smith, to consider the objections. This sub-committee replied categorically to the memorial, pointing out that a comparatively small number of students had availed themselves of the full mining and metallurgical course, and that this was probably due to the incompleteness of the general scientific training, and the absence of any mathematical teaching.† They allowed the objection to the removal of the School from the collections of the Museum, but added that sufficient collections for teaching purposes might easily be provided for the School, upon a smaller scale, which would be perfectly adequate.‡

The arguments of the memorialists were not altogether satisfactorily met by this reply, and Dr. Percy, in a letter to the *Times* of August 24th, 1871, urged those points which had been neglected by the sub-committee.§

In the following year the Royal Commissioners issued a supple-

* *First Report of the Royal Commission on Scientific Instruction*, 1872, vol. i., pp. ix.-x.

† The sub-committee appear not to have realised that there were annually from eighty to a hundred occasional students at the School, many of whom came there for the specific work connected with Mining and Metallurgy.

‡ Copies of correspondence presented to both Houses by command: C. 422.

§ Percy's views on the matter are also clearly expressed in an Appendix to his work on *Silver and Gold*, being a letter reprinted from the *Mining Journal*, January 3rd, 1880.

mentary Report, in which they sketched out a proposed organisation of the new science school, and suggested how that school might be accommodated at South Kensington. They proposed that the Council of the Professors of the School of Mines should consider the re-arrangement of the courses, and report to the Committee of Council on Education, having due regard to the maintenance of the character of the School for Special Scientific Instruction as well as the extension of the Practical Instruction to Science Teachers.

On October 22nd, 1871, Sir Roderick Murchison died, and from this time the School of Mines ceased to be immediately connected with the Geological Survey. Professor Ramsay was appointed Director-General of the Survey, but the office of Director of the School of Mines was not filled. The School continued to be governed by the Council of the Professors, Mr. Warington Smyth acting as Chairman.

The recommendations of the Royal Commission, for some reason, were not acted upon, and nothing was done, either to increase the accommodation at Jermyn Street, or to move the School to South Kensington.

1872 At last, in July 1872, the Council of Professors forwarded through their Chairman the following resolution, in which they were unanimously agreed:—

"The Council of the Royal School of Mines regret that, notwithstanding their repeated representations, sufficient accommodation has not been afforded for efficiently conducting the classes in the building in Jermyn Street, where large collections essential to a School of Mines already exist. But as there appears to be no prospect of obtaining the necessary extension of premises, the Council are of opinion that it would be advisable to transfer the instruction in Physics, Chemistry, and Natural History to the buildings in South Kensington, where it is understood that adequate accommodation may be obtained."

The removal of the School of Naval Architecture and Marine Engineering * to Greenwich enabled this request to be granted, and the instruction in Chemistry, Physics, Applied Mechanics, and Biology, was transferred to South Kensington in the following session. The house in Oxford Street was given up to the Office of Works after its twenty-seven years' occupation by the College of Chemistry, while the additional space created at Jermyn Street was utilised for the purposes of the Survey and Museum. The instruction in Physics and Biology, hitherto consisting only of lectures, was supplemented by laboratory practice; while drawing-, model-, and class-rooms were provided for the course of Mechanics. The result of the change was remarkable, so far as the chemical course was concerned: double the number of students at once entering for the new session.

* See pp. xxx.-xxxi.

In 1877 the Council made further representations as to the lack of room and appliances for the efficient teaching of Geology in the Jermyn Street building. Professor Huxley volunteered to give up certain of his rooms at South Kensington, and the removal of the instruction in Geology was accordingly sanctioned. Professor Judd, who had succeeded Ramsay in the Chair of Geology in 1876, came to South Kensington. The teaching geological collection, which was quite distinct from the Museum collection, was also transferred, and at the same time room was provided for microscopic and practical laboratory work, which had been impossible at Jermyn Street. 1877

In 1874 the metallurgical laboratory had been enlarged, very much after the plan suggested by Dr. Percy himself. It was ventilated and made capable of accommodating twenty-five instead of twelve students. In 1879, however, the lease upon which the premises were held was about to expire, and it was found that it would be only possible to extend it till 1884. Considering the fact that the accommodation was not good, and that the basement of the South Kensington building could be readily utilised for the purpose at a small cost, and would hold as many students as the laboratory at Jermyn Street, with far greater convenience, it was felt desirable to remove the whole metallurgical department. 1879

Professor Percy was strongly adverse to any change, and he proposed various alternatives; even offering to build a laboratory on the site of the existing one, at his own cost. His suggestions, however, had they been followed, would only have put off the inevitable removal for a short time; the authorities being determined, sooner or later, to concentrate the school at South Kensington. The sanction of the Treasury was obtained to the necessary expenditure, and the transfer was effected in 1880. Percy resigned the Lecturership in Metallurgy,* and Mr. W. Chandler Roberts (now Professor Roberts-Austen) was appointed to the post, while at the same time Mr. Richard Smith, who had previously acted as Dr. Percy's assistant, was given the official title of "Instructor in Assaying."

Throughout the last ten years the School of Mines had been passing through a period of considerable uncertainty and unrest. From the time that the Select Committee of the House of Commons had considered "Scientific Instruction," no one knew what might come to pass with any new year. A notice had been placed in the prospectus to the effect that all arrangements might be liable at any time to alteration,

* *Vide* his letter to the *Mining Journal*, January 3rd, 1880.

and that no right of compensation would be given by such changes. In 1874 the following notice had been inserted in the prospectus, printed in large type on yellow paper:—

"*Laboratories.*—It is to be clearly understood that the laboratory accommodation is limited, that the Department in no way undertakes at present to increase it, and that students joining the School do so at their own risk, and subject to the proviso that regulations may from time to time be made, or changed, with regard to the amount of the laboratory accommodation at the disposal of the students of the Royal School of Mines."

This notice being thus prominently brought forward, it is not surprising that men were discouraged from entering upon a three-years' course at the School. It is even to be wondered at, that, considering the adverse circumstances and the disjointed character of the School, as many as a hundred and forty-four Associateships in Geology, Metallurgy, or Mining, had been granted as the results of the work from 1870 to 1880, or an average of fourteen a year.* This disquietude with respect to the future of the School of Mines lasted until the year 1880. The Science and Art Department had not forgotten their project for a Central Science School and Training College for Teachers. The transfer of the instruction in certain branches of science from Jermyn Street favoured their scheme, and in 1880 they proposed to Her Majesty's Treasury that a Departmental Committee of Inquiry should be appointed to consider the Science School at South Kensington. The Lords Commissioners of the Treasury replied that there was not sufficient reason for such a Committee, but suggested that a complete scheme should be prepared by the permanent Officers of the Department, which should be submitted to the Treasury, with explanations, for approval.

Acting on this suggestion, the Lords of the Committee of Council on Education† caused a memorandum to be prepared by Colonel Donnelly. This memorandum recapitulated the history of the establishments at Jermyn Street and South Kensington, and elaborated a scheme for the re-organisation of the School upon the lines laid down in the Report of the Duke of Devonshire's Commission of 1870-71. The proposals were summarised in the fifty-second section of the memorandum as follows:—

"(*a*) To remove the instruction in Mineralogy, and the library, except such books of reference as are required by the Survey, as soon as possible, to South Kensington.

"(*b*) To enable the Professor of Mining and Mineralogy to give practical instruction in these subjects, the former in Jermyn Street and the latter at South Kensington.

"(*c*) To complete the staff, and especially provide for instruction in Mathematics at South Kensington.

* In 1896 twenty-one Associateships were granted in these three subjects.

† Lord Spencer was at this time Lord President of the Council, and took great interest in promoting the new scheme.

"(*d*) To re-organise the administration of the School.

"(*e*) Lastly, to change the name, or rather to call the school at South Kensington a College of Science, and to preserve the title School of Mines, for the special third year course in Jermyn Street."

In Appendix B to this memorandum, Colonel Donnelly added :—

"In this scheme the School of Mines is strengthened as a special school, so as to give a more practical and complete course. And those branches of instruction, which are the basis of a general scientific training, are developed and supplemented so as to carry out the original intention of a general Training School, or College of Science, to which is added another special course—Agriculture. While the whole School is treated essentially as a training school for teachers and Government servants, it is proposed not to confine it to such, but, as far as there may be accommodation, to admit private students, paying fees,—these fees being fixed, as at present, sufficiently high to prevent the School unduly competing with other more or less private institutions."

The memorandum also contained much that had reference to financial matters connected with the re-organisation.

Copies of Colonel Donnelly's memorandum and appendices were sent to all the Professors of the Royal School of Mines, with a request from the Lords of the Committee of Council on Education that they should furnish an expression of their views on the matter.

A few of their remarks will indicate the general opinion on the question at the time.

PROFESSOR HUXLEY :—

"In regard to the proposed new organisation of the School, I may observe that it is in accordance with the spirit of the recommendations of the Royal Commission, of which I was a member, and that I consider the proposals to be just and expedient. It may not be out of place to add that I can speak with complete impartiality on the subject, as my pecuniary interests will not be favourably affected if they are adopted. . . . The establishment of such a school is one of the most important and beneficial steps that could be taken in the present state of national education."

PROFESSOR GUTHRIE :—

"The proposed re-organisation is so very much in accord with the suggestions which I have ventured from time to time to submit to my Lords, that I may at once say that the scheme, in its general outline, and especially as my own faculty is concerned, meets with my very hearty welcome."

PROFESSOR JUDD :—

"The draft scheme seems to me to be well adapted to secure the main objects, which those who are responsible for the instruction given in these institutions have at heart. These objects are as follows :—Firstly, the development of the practical character of the instruction, by the extension of the system of laboratory work ; secondly, the arrangement of such a curriculum of study as will ensure to every student a thorough groundwork of knowledge in all subjects taught in the School, while it permits him, during the latter portion of his course, to concentrate his attention upon one particular branch of science, so as to attain proficiency therein."

DR. FRANKLAND :—

"I am of opinion that, as a whole, such a re-organisation is very desirable and calculated to increase the usefulness of these institutions for training and instruction

in experimental science. . . . The removal of the instruction in Mineralogy would contribute greatly to the convenience of students, many of whom have expressed to me their desire to undergo a second year's training in the laboratories at South Kensington, if they were not prevented from doing so by their attendance in the mineralogical lectures in Jermyn Street; these lectures being given in the second year of the course. . . . Such comments as disagree with the documents submitted to me do not, to any important extent, touch either the accuracy of the statements in the memorandum, or the general excellence of the proposals for the re-organisation of the School."

PROFESSOR W. CHANDLER ROBERTS (ROBERTS-AUSTEN):—

"I believe that the scheme, while providing for a comprehensive system of science teaching, will at the same time be advantageous to students who are preparing for a career in connection with the great mineral industries; and I am convinced that it would be difficult to over-rate the value of the proposed teaching in Mathematics, Mine-surveying, and Practical Mineralogy. . . . The teaching of Metallurgy in the proposed College of Science at South Kensington will, I am satisfied, prove of great value to the country, as it will be possible, by training science teachers, to provide for the scientific instruction of blast-furnace managers and foremen in metallurgical works."

PROFESSOR GOODEVE:—

"In my judgment, the advantages to be anticipated, both to students of the School of Mines and to science teachers, from a complete and extended course of mechanical study, would be considerable."

PROFESSOR WARINGTON W. SMYTH alluded to the purposes for which the School was instituted, and quoted the words of H.R.H. the late Prince Consort on opening the Museum in May 1851, that the Institution was "intended to direct the researches of science, and to apply their results to the development of the immense mineral riches granted by the bounty of Providence to our Isles and their numerous colonial dependencies." * He added:—

"The name 'School of Mines' was intended to show the bearing of the subjects to be illustrated on a certain profession, without which reference it might have appeared that the courses of instruction would be indefinite. . . . On breaking away to the wider aims advocated in the memorandum, a total alteration, both as to time and cost, will necessarily have to be further carried out; and the question of competing institutions for general science will need serious attention."

Colonel Donnelly's memorandum and appendices, together with the estimate of the proposed School and the letters of the professors, were forwarded to the Treasury by the Lords of the Committee of Council on Education. In an explanatory letter they remarked that they had carefully examined the whole question and were of the opinion that it would be eventually found advisable to move the entire establishment, then in Jermyn Street, to South Kensington; and that all such steps should be taken as would tend to bring back the School to its object,

* *Times*, May 13th, 1851; and see p xi.

as defined in 1853, making it a Metropolitan School and College of Science, not specially devoted to Mining, but to all science applicable to industry, and with a special organisation as a training college for teachers. They also proposed to complete the Staff and to re-organise the School according to Colonel Donnelly's scheme, except that Mr. Warington Smyth would give up the professorship of Mineralogy, the instruction in that subject being made a branch of the Geological School, a lecturer being added for this purpose; while an addition of Botany, Agriculture, Physiography, and Mathematics, should be made to the curriculum. This letter was sent to Lord Frederick Cavendish, the Secretary to the Treasury, on March 19th, 1881, by Mr. A. J. Mundella, Vice-President of the Committee of Council on Education.

Lord Frederick Cavendish replied for the Lords of the Treasury on June 22nd, 1881, that after careful and repeated consideration of the very serious questions raised—

"My Lords do not think it material to determine whether at this time the School of Mines and its kindred institutions in Jermyn Street, or the various lectures and laboratories which have been established at South Kensington, more accurately represent the supposed ideas of the Government in 1853. . . .

"My Lords think the important point of departure to take for present purposes is the fact that a school and appliances specially adapted to mining industry exist at this moment in Jermyn Street, in more or less close connection with other schools and appliances at South Kensington, which have for their special object the formation of a training school for teachers and other students selected from the science schools of the country, with admission also for other fee-paying students, so far as there is room for them. . . .

"Reverting now to the general proposal before my Lords, they offer no objection to the establishment at South Kensington of a normal school of science, of which the principal object is to train teachers of science classes, and of which, so far as is consistent with this primary object, other students may take advantage.

"They are not, however, prepared, on the information before them, to concur in the merging of a strictly technical and professional school of mining knowledge in any more general scientific institution. They attach great weight to the opinions on this subject of an authority like Mr. Warington Smyth, confirming the opinion of Sir Henry de la Beche and Sir Roderick Murchison. The papers before my Lords leave no reasonable doubt upon their minds that, whether or not the term 'School of Mines' expresses all that was intended when the attention of the Government was first directed to the promotion of instruction in science, still that the development of the mineral riches of this country and of its colonies and dependencies was the foremost object to which the Government intended, by its measures in 1851-53, to direct the researches of science and to apply their results.

"The proposed school at South Kensington is educational in its character, but the Geological Survey evidently invites the connection with it of a special school for mining, an industry on which, in an especial degree, the power and prosperity of this country rests. Possibly some of the classes at South Kensington may usefully serve as an introduction to the School of Mines, but my Lords look upon this school as deserving of an independent consideration which shall preserve its direct technical character. Preceding Governments appear to have recognised this particular industry as one which, more than most others, called for scientific knowledge on the part of those engaged in it, was of an importance which justified public assistance to promote t, and, in connection with the Geological Survey, was peculiarly easy to assist.

"Subject to these remarks, of which the sum is, that the school at South Kensington is to be, in its character, a normal school, and that the technical character of the School of Mines is to be preserved ; and on the understanding that neither now, nor within near prospect, the Committee of Council on Education foresees serious increase of expense : my Lords offer no objection to the proposals before them, respecting the details of which they do not profess to do more than accept the conclusion of the Committee. . . ."

Certain correspondence followed with respect to financial questions ; and the Lords of the Committee of Council on Education, having stated that they were quite prepared to accept the limitations and suggestions of the Lords of the Treasury, the scheme was finally sanctioned in time for the opening of the re-organised school in October 1881, under the title of "*Normal School of Science and Royal School of Mines.*" *

The School continued to be governed, as before, by the Council of Professors, and Professor Huxley was appointed Dean and Chairman of the Council.† Lecturers on Mathematics, Botany, and Agriculture, were added to the Staff, and provision made for the appointment of an increased number of demonstrators and laboratory-assistants. Mr. Norman Lockyer was also appointed Lecturer on Astronomical Physics, a short course on that subject being made part of the general curriculum. The Mineralogical course was transferred from Jermyn Street, and made a sub-division of the Geological School under Mr. Frank Rutley. These were the only changes that affected the School of Mines, the mining lectures being still delivered by Mr. Warington Smyth at Jermyn Street.

On Saturday, June 24th, 1882, at the close of the first session of the Normal School of Science, there was a public distribution of prizes. Professor Huxley made the chief speech, in which he gave a brief account of the foundation of the School, and alluded in the following references to the then recent changes: —

"I had the honour to be appointed one of the professors of the School of Mines in the year 1854. I have now, therefore, completed twenty-eight years' connection with it. . . . Let me say, in respect of such change of policy as has taken place, I am just as much responsible as anybody else, so that you must not think that I have the smallest intention of saying a word which could militate against the estimation which the School

* The whole correspondence, memoranda, appendices, etc., were printed in 1882 and presented to both Houses by command. C. 3085.
The name "Normal School of Science" had been suggested by Professor Huxley, who hoped that the School would take a place in this country similar to that which the famous *École Normale* of Paris takes in France. The name was approved of by the Lords of the Treasury as preferable to that of "College of Science," which had also been proposed.
† Upon Professor Huxley's death in 1895, Professor Judd was appointed Dean, by the Lords of the Committee of Council on Education.

of Mines, I am happy to say, always has held, and which I profoundly trust it always will hold, if I point out to you that there were, from the very beginning, certain extremely grave defects in its constitution. I cannot say that they arose from the fault of anybody concerned, but from the fact that the necessities of scientific training were understood a quarter of a century ago in a totally different way to that in which they are now understood. The only provision which was made for that practical instruction, which is the heart and soul of all efficient scientific education, in the original School of Mines, consisted in the laboratories for Chemistry and for Metallurgy. For no other branch of science was there any efficient practical teaching provided, and even the accommodation for Chemistry and Metallurgy was so imperfect that, within a very few years after the foundation of the School, laboratories for these purposes had to be sought elsewhere. For eighteen years I did my duty as well as I could towards that Institution, lecturing about natural history, and, I am sorry to say, all the time with the more or less definite consciousness that I was an involuntary impostor, and that it was not possible for me to teach in any genuine fashion, because I had no room in which practical instruction could be given. I do not know whether my colleagues would be inclined to make the same confession, but the same want must have been felt in the teaching of Physics, and in the other kinds of instruction given at the School. Moreover, we had no mathematical instruction, and, in spite of our repeated representations, it was not provided.

"Now that state of things obtained up to the year 1872. By that time some of us had got extremely tired of it—and I was one of those who were so tired; my chemical colleague was another; my colleague the professor of Physics was a third: and we got up a sort of little pronunciamento to say that we really could not go on teaching in that way any longer; that at South Kensington there was a large building which was standing perfectly empty, and might we be allowed to do our business in a more efficient way, by being transferred to this empty building? With the assent and consent of our colleagues, and with the sanction of the Department of Science and Art, the desired transference took place, and the result of that was, that all the professors who were moved were able at once to institute a more or less adequate system of practical instruction, and to make the teaching in the School, in their own departments, something like what it ought to be. Subsequently the professors of Geology and Metallurgy and Applied Mechanics were similarly moved, until now only the professor of Mining remains at Jermyn Street, simply because he has there the admirable collection of models which are so important for his work.

"That is the history, as far as it can be told, in a few words. . . . The only change that has taken place in consequence of the new organisation in that Institution (the Royal School of Mines) is that it has been made more efficient. Mathematical instruction has been added; practical teaching has been supplied in all branches of science which the Associates of the Royal School of Mines are required to study; and I cannot doubt, seeing the respect which has for many years been paid to the title of Associate of the Royal School of Mines, that that respect will simply grow and increase with the knowledge of the public, that the only alteration which has taken place here of late years is to make the title represent a very much larger value than hitherto it has been possible it should represent." *

In the introductory lecture to his first course of mining (delivered in 1851) Mr. Smyth observed that the art of surveying was "too important and extensive to be included in the course of mining," and expressed the hope that it "would ultimately form the subject of a separate course" (*Records of the School of Mines*, 1852, vol. i., p. 121). When, by the removal of the greater part of the work of the School from Jermyn Street to South Kensington in 1881, it became

* *Nature*, June 28th, 1882.

possible to make provision for adequate development of the various branches of study, the wish thus expressed thirty years earlier was carried into effect. The subject of mine-surveying was assigned to an assistant, under the superintendence of the Professor of Mining; and in 1882, Mr. Bennett H. Brough was appointed to the post. The class thus established gradually increased in numbers, and its usefulness has been made apparent by the fact that, in several cases, old Associates have returned to the School for the purpose of taking advantage of a kind of instruction, the absence of which, in their time, had placed them at a disadvantage.

In 1890, some dissatisfaction having been shown on the part of the students to the name "Normal School of Science," various alternative titles were proposed, and finally, on October 25th of that year, Royal Consent was obtained to that of "Royal College of Science." The title of the degree was altered to "Associate of the Royal College of Science," and was made to apply to all those degrees granted since the year 1880. The standing of the Royal School of Mines has been unaltered by the change. The Technical and the Purely Scientific portions of the Institution continue in union as before. The title of "Associate of the Royal School of Mines" is still given to those who pass out in the technical division of Mining and Metallurgy; while that of "Associate of the Royal College of Science" is given to those who pass out in the non-technical divisions.

In 1890, upon the death of Professor Warington Smyth, and the appointment of Dr. Le Neve Foster to the Chair of Mining, the connection between the School of Mines and the Jermyn Street Museum was finally severed; the mining models were removed; and the lectures have since been delivered in the Metallurgical Lecture Theatre at South Kensington, thus saving students the long distance between the two places, with the consequent loss of time.

Reviewing the various changes that have affected the School of Mines since its foundation in 1851, one is constrained to allow that at the present time the course of instruction is throughout far more satisfactory than it has been or could have been at any former period. South Kensington, owing to the growth of London towards the west, and the facilities given by the underground railway, has become—what it was not in early days—a convenient centre for students; while the proximity of the Natural History Museum and the Science Museum are a manifest advantage to the School. The two years' course of general

scientific training at the College of Science, in Chemistry, Physics, Geology, Mechanics, and Mathematics, is as thorough as it could possibly be in the time ; and the courses of Geology, Metallurgy, and Mining,—the subjects which were made a speciality in the Royal School of Mines,—have been rendered infinitely more efficient than was possible with the limited accommodation in the Museum of Practical Geology. The teaching collections bearing upon these subjects are excellent. The Geological Department possesses a good museum of typical palæontological, and lithological specimens, and examples of the instruments and appliances used for geological survey-work and research. The Metallurgical Department has a practical technical laboratory in addition to the assaying laboratory, where the use and manipulation of various forms of furnaces, crushing mills, chlorinators, and the like, may be practically studied. There is also a complete plant for the treatment of gold quartz, including a three-stamp battery, a Frue-vanner, and an amalgamating pan and settler, with which students can become practically acquainted. The Mining course, since its transfer to South Kensington, has been considerably extended : practical underground work has been made an essential part of the course, every student being recommended to spend at least six months in a mine before attending the mining lectures, additional marks being given in the Associate examination for his notes and sketches made during such time. Every mining student is also bound to obtain the certificate of the St. John Ambulance Association to be qualified to give first aid in the case of accidents.

The Royal College of Science and Royal School of Mines is again overcrowded. There are already twice as many applications for admittance as there are vacancies. Mining and Elementary Physics have been driven from the main building into temporary sheds on the other side of the main road, while Geology has only been able to find, at a distance of over half a mile from headquarters, suitable rooms, for which a considerable rent has to be paid. Every year it is becoming more urgent that the authorities should bestir themselves to provide a new building suitable to the requirements of the national College of Science, and the chief School of Mines in this country. One of the chief reasons urged for the removal of the School from Jermyn Street was the want of accommodation ; but never has that want been more severely felt than at the present time.

The " 1851 Exhibition Commissioners " have done their part, offering the site opposite to the Imperial Institute, valued at £100,000, for the

new Science Museum and School, if the Government will provide the building fund.

The Register of past students and Associates, incomplete though it is, forms a record of the good work done by the School in the past, and may be taken as evidence to show that money spent by the State in providing increased accommodation will not be wasted in training men for Government and Colonial service, and in the general advancement of Scientific and Technical Instruction throughout the country.

THE ROYAL COLLEGE OF CHEMISTRY.

ABOUT the year 1842 certain prominent Englishmen realised the 1842
importance of establishing in this country a national institution where Chemistry might be studied systematically and experimentally, having laboratories attached, where tuition in chemical analysis might be obtained by students of moderate means.

A few well-known English chemists had, indeed, opened their laboratories to students—notably the celebrated Thomas Graham, who received pupils first in Glasgow and later in London. Such tuition was of necessity, however, limited in character as well as expensive, and those who were anxious to further advance their chemical knowledge, and had sufficient means to go abroad, used to study in Liebig's laboratory at Geissen, or in that of Wöhler at Göttingen.

Owing mainly to the representations and energy of Dr. John Gardner, who was zealously assisted in his early endeavours by his friend Mr. J. Lloyd Bullock, the eyes of the public were gradually opened to see the benefits which would be derived from a practical school of Chemistry established in London upon the model of that at Geissen. It was proposed to call the new Institution the "Davy College of Practical Chemistry," as a memorial to the great English chemist. A provisional committee was formed, consisting of the Earl of Essex, Sir H. Elphinstone, Sir Henry De la Beche, Thomas Wyse, Roderick I. Murchison, John Davy, J. Lloyd Bullock, and Professors Brande, Daubeny, and Gregory, with Dr. John Gardner as Secretary. A prospectus was issued, calling the attention of the public to the importance of the proposal, and asking for its subscriptions. "The *Davy* College of Practical Chemistry," says this prospectus, "will be mainly devoted to *Pure Science;* at the same time, to meet the exigencies of this country, and to adopt the latest improvements in the continental schools, an appendage will be provided, devoted to the Economic Arts, where inquiries relating to Pharmacy, Agriculture, and other Arts, may be pursued."

By the year 1843 the sympathies of a number of prominent men had 1843

been enlisted, and promises of substantial support obtained. In the autumn of that year Messrs. Gardner and Bullock induced the then professor of Chemistry at the Royal Institution, Mr. W. T. Brande—one of the provisional committee—to bring their prospectus, together with a carefully prepared scheme for establishing the scientific section of a British school of practical chemistry within the walls of the Royal Institution, before its Managers. It was not proposed to make the school a part of the Institution in government and funds, but merely to ask for a place under its roof, that, by such protection, it might appear that the Institution approved of its object. It was suggested that the existing laboratory in Albemarle Street, with the room and cellars beyond it, were adequate to provide a practical laboratory for the scientific school, while another laboratory was to be established, apart from the scientific school, in a house in George Street, Hanover Square, for the pursuit of studies in the most important applications of Chemistry, and for research.

The Managers of the Royal Institution referred the scheme to Professors Brande and Faraday in November 1843, who reported favourably on the objects of the proposed school at the meeting of the managers on December 4th. Messrs. Gardner and Bullock attended to give explanations, and the matter was referred back again to the Professors. They presented their further report on December 19th, in which, after discussion of the scheme, they stated that accommodation might be given to the proposed school by the transfer of Professor Brande's School of Chemistry (which consisted of lectures for medical students and others), together with certain other changes; "though no doubt," they added, "with the loss of many conveniences to the Institution and its Professors." The result of their consideration was strong approval of the end proposed, and a desire that the scheme might be carried out, if practicable. This report was carefully considered by the Managers; and in the meantime the Professors made a further examination of the Institution buildings, finally coming to the conclusion that the space would be too limited for the increasing stock of books, apparatus, and collections. Upon this, the Managers requested their Secretary to intimate to the promoters of the new school, their regret at being unable to accede to the request, owing to the space at their disposal being too limited.

The promoters of the British School of Practical Chemistry did not lose heart after this failure in their negotiations with the Royal Institution. They continued to add important names to their list of

supporters, and to increase their provisional Council by the addition of several noblemen and influential gentlemen, until it numbered over forty-five. This enlarged Council held its first meeting on January 14th, 1845, with the Marquis of Downshire in the chair. 1845
It then directed its labours to giving publicity to the design, by the distribution of copies of the proposal to peers, members of Parliament, and members of the scientific and learned societies; by issuing further pamphlets, pointing out the necessity and uses of the new school to agriculturists and farmers, to chemists and druggists, to manufacturers, artists, and artizans; and by circulating papers "On the Claims of Chemistry on the Benevolent" and "On the Bearing of Chemistry upon Metallurgy and Mining." These publications were largely responded to, more especially by those interested in Agriculture, who no doubt saw, from the clever prospectus "To Agriculturists," a panacea for the prevailing agricultural depression.

At last, on July 29th, 1845, at a public meeting held at the temporary offices of the provisional council in St. Martin's Place, Trafalgar Square, a definite form was given to the proposed College of Chemistry, and a Council was elected, of which His Royal Highness Prince Albert graciously consented to be named President. The first object of the executive council was the appointment of a professor. The post was successively offered to Dr. Fresenius, Professor of Chemistry at the Agricultural School of Wiesbaden, and to Dr. Will, Assistant-Professor at the University of Geissen, who both declined it. Dr. Hofmann was at this time as "Privat Docent" at Bonn, lecturing on Agricultural Chemistry and following up his research work in his private laboratory. He had already acquired considerable reputation throughout Europe, as a scientific chemist, and, by the advice of Sir James Clark, the Council offered him the appointment. Hofmann himself, in his "Page of Scientific History," * relates how, by the gracious intervention of the Prince Consort, he was appointed *Extraordinary* Professor of Chemistry at Bonn by the Prussian Government, and given an immediate leave of absence for two years, which enabled him to accept the offer and to come to England without fears for the future.

In October 1845, temporary laboratories having been fitted up in George Street, Hanover Square, the College of Chemistry was opened to students, and laboratory practice begun. Within a week of the opening, twenty-six pupils were enrolled, amongst whom were Warren de la Rue, F. A. Abel, E. C. Nicholson, Henry How, Thomas Rowney,

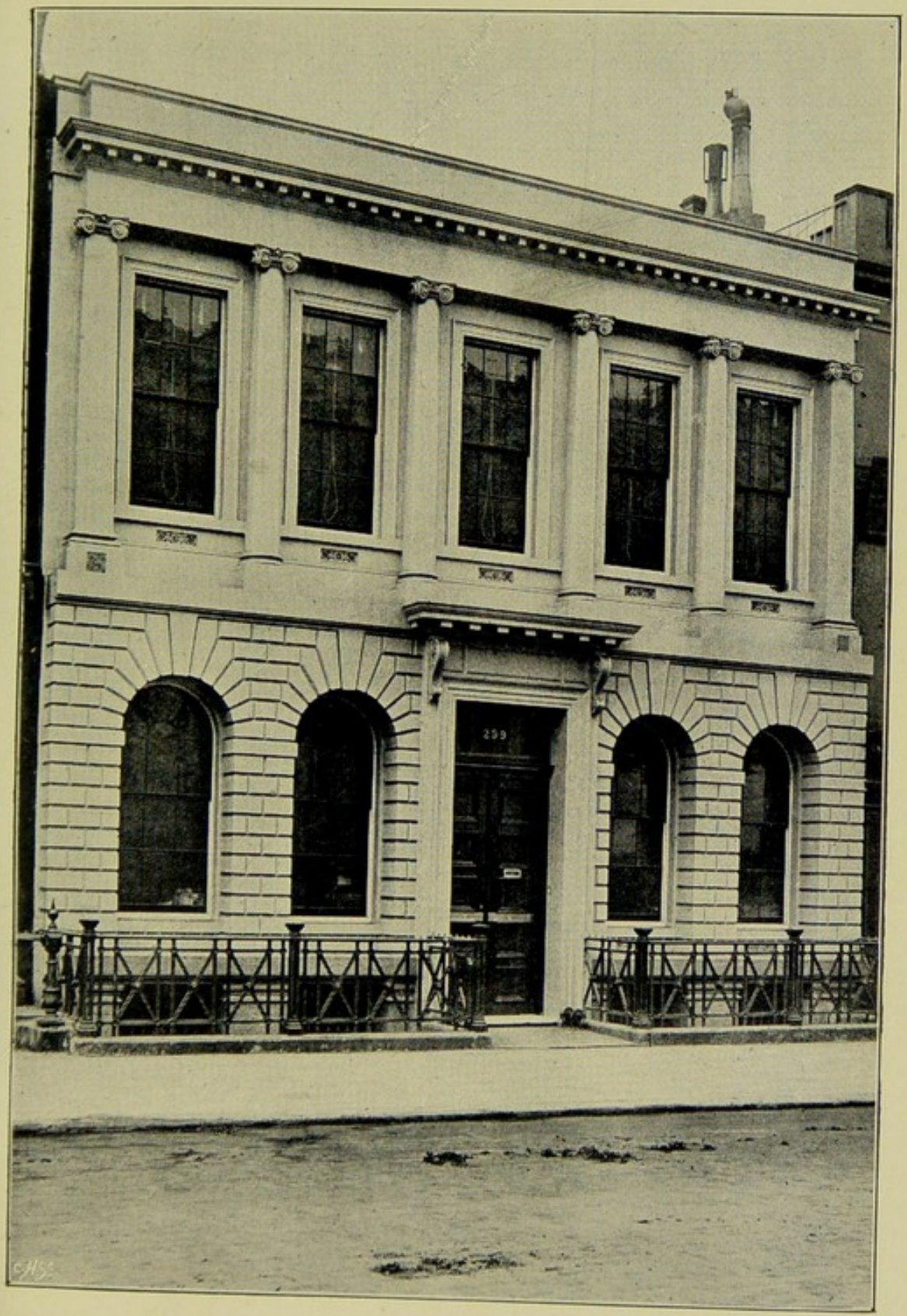
* "A Page of Scientific History" (*Quart. Journ. Science*, April 1891).

C. L. Bloxam, and Robert Galloway,—all distinguished in their subsequent careers. On December 9th, 1845, Her Majesty the Queen was graciously pleased to signify her consent that the new College should be called the "Royal College of Chemistry."

The premises in George Street were little adapted for the purposes of the School; and the laboratories having been fitted up in a temporary and very economical manner, the Council lost no time in seeking better accommodation. They succeeded in securing the premises No. 16 Hanover Square, with a large piece of ground at the rear, and a frontage on Oxford Street. An agreement for a lease for a term of sixty years, at a ground-rent of £380, was drawn up between Mr. Malcolm, the owner of the property, and the Council. Plans were prepared by the Architect, Mr. Lockyer, under Hofmann's guidance, with valuable aid from Warren de la Rue. The first stone of the building was laid by the Prince Consort on June 16th, 1846, in the presence of the Council and members of the College, and a large assemblage of noblemen and gentlemen. The Earl of Clarendon made an eloquent speech, contrasting the rapid progress of Chemistry in Continental schools with its slow development in this country. The Bishop of Oxford also spoke, and H.R.H. Prince Albert expressed his cordial concurrence in the design of the College.

So rapidly was the work of the new building carried on, that the laboratories were fitted up during the summer vacation, and the work of the third session* of the College actually began in the new premises in October of the same year. Eleven students had entered the College in the second session, beginning March 1846, making thirty-seven pupils in all; and the temporary laboratories in George Street had been inconveniently crowded. Among the new students were Charles Mansfield, Frederick Field, George Merck, Henry M. Noad, and Bransby B. Cooper, eminent men who have all long since passed away. The new establishment in Oxford Street accommodated about forty students, besides those engaged in the small private laboratory, which had been arranged for the professor; and in the third session there were altogether forty-six men working in the College. Hofmann soon obtained complete sway over his pupils by his indomitable perseverance and infectious enthusiasm. "He possessed," says Sir Frederick Abel, "a genial and charming manner, a high flow of spirits, and originality in conversation and correspondence, which secured to him devoted friends, not merely among colleagues and pupils, but in whichever intercourse was opened up to him. Just as his earnestness of

* There were two sessions in each year.



ROYAL COLLEGE OF CHEMISTRY.

purpose and enthusiasm kindled corresponding qualities in a large proportion of his pupils, so also his sanguine temperament and airy treatment of difficulties maintained, among many of the early friends and important patrons of the struggling Institution, a steadfastness of purpose which otherwise would doubtless have speedily waned." During the years that followed the move to Oxford Street, an immense quantity of diligent research was undertaken under Hofmann's guidance. Two volumes, published respectively in 1849 and 1853, entitled *Reports of the Royal College of Chemistry, and Researches Conducted in the Laboratories*, were issued to members. These afford ample illustration of the extent and importance of the work done in the College.

At the general meeting of 1848, Professor Hofmann, in his report to the Council, says :—

"The number of students have fluctuated after the first year between forty and fifty, and during the present session fifty-two have entered. Amongst these are men of all ages, of all ranks, and of a variety of professions. Almost all classes of society have been represented in the laboratory—gentlemen following Chemistry as a profession, or as an object of scientific taste, chemists and druggists, medical students, and medical men actually engaged in practice, officers in the army, clergymen, agriculturists, manufacturers in almost all branches of the chemical arts, copper-smelters, dyers, painters, varnish-makers, soap-boilers, brewers, and sugar-makers, have been working side by side. Nor have the higher classes of society been wanting; and it was interesting to observe working at the same table the peer and the medical student—the member of Parliament and the druggist's apprentice. For not without a feeling of pride may I here affirm that during the whole time that I have had to superintend the practical studies of the laboratory the attention of the students has been so entirely engrossed with the studies before them as altogether to preclude the possibility of any deviation from perfect propriety of conduct."

In spite, however, of the satisfactory educational state of the new Institution, financial difficulties began very early to surround the management.

The building and the laboratories were rendered absolutely complete by May 1847, at a cost of about £5000; but a liability was thus incurred to the extent of £2500, which hung very heavily upon the Institution. In spite of all endeavours to obtain subscriptions, the debt was only reduced to about £2112, when at this stage twenty-three members of the Council most generously contributed sums of £50 each. Subscriptions, however, had fallen off considerably, partly owing to the scarcity of money due to the political agitations of 1845 and 1846, and partly owing to the disappointment of some of the contributors, who desired some more substantial return for their money in the form of lectures, *soirées*, analyses, and the like,—these, not receiving such return, withdrew their support.

The fees of the students, although they had steadily increased since the foundation of the College, could not meet the expenses, and in 1848 it was resolved to restrict operations entirely to the laboratories and to the extension of the School, giving up the idea of personal privileges to members, in the form of analyses, but continuing the investigation of matters of public or national importance.

"Some of us know that the ability of the promoters to perform their part of the arrangement fell very far short of their anticipations, the very existence of the College being in fact in danger; and that Dr. Hofmann voluntarily gave up in succession—first a portion of his salary, then his share of the students' fees, and lastly his house; yet during this trying period he never in the slightest degree relaxed his efforts to establish the reputation of the College. He not only gave up the money which was his due, but, out of his extreme devotion to the educational objects of the College, abandoned for some years what to a German *savant* is of still greater importance, his original scientific investigations."—WARREN DE LA RUE, FAREWELL BANQUET TO DR. HOFMANN, *April 28th*, 1864.

The house in Hanover Square given up by the Professor was leased to Mr. Arnold Rogers for the remainder of the term at £250 a year, thus greatly relieving the College as to rates and taxes, and reducing the rent upon the establishment in Oxford Street to £130 a year. Sufficient ground was retained behind the laboratories for the erection of a theatre, as originally designed, the foundations of which had been laid when the house in Oxford Street was built. Lectures up to this time had been delivered in the basement of the Oxford Street building, but a new theatre was much needed, as the existing accommodation was deficient, while the room was badly lighted and inefficiently ventilated.

The debt having been cleared off, the Council proceeded to raise a building fund for the new theatre, wisely determining to have sufficient money in hand before beginning the building, rather than to incur another debt. To this fund Michael Faraday was the first contributor. Objections to the plans of the proposed building were, however, raised by an adjoining owner, on account of obstruction to his light, and at that time the scheme had to be abandoned.

Until the year 1850 the number of students continued to average about fifty, and the fees were almost sufficient to cover the expenses of carrying on the College. Dr. Hofmann exercised the strictest economy in his management, and upon the resignation of the Secretary he undertook the duties of that post, with the entailed correspondence, in addition to those of professor.

In the following sessions of 1850-51 and 1851-52 the number of students fell to an average of thirty-five. This was due, in the opinion of some,

to the opening of the Great Exhibition, and the consequent attraction of public attention from the College; while according to others it was due to the establishment of rival schools. The "School of Mines and of Science applied to the Arts" was founded at the Museum of Practical Geology in Jermyn Street in the autumn of 1851, with a chemical laboratory under Dr. Lyon Playfair; and in 1853 the Science and Art Department was constituted under the Board of Trade, with a view to fostering the acquisition of scientific knowledge. The Council of the College came to the conclusion "that, rather than leave the Institution in its isolated state, they would but consult the enlightened views of the members, if they were to bring the College into connection with the more extended scheme contemplated by the Government, and thus not only render the College more useful, but perpetuate its influence in the diffusion of that noble science, whose study it has so greatly promoted." * While an application of the Council to the Board of Trade on this subject was under discussion, a proposal was made by Sir Henry De la Beche—the Director of the Jermyn Street School (now called the Metropolitan School of Science applied to Mining and the Arts)—to Professor Hofmann that he should accept the Lectureship of Chemistry in that Institution, vacated by Dr. Lyon Playfair upon his appointment as Secretary to the newly created Science and Art Department.

Dr. Hofmann was advised by the Council of the College "to accept a position so favourable to himself, and one in which his zeal and ability might be made more available for the advancement and diffusion of the Science which their Society had been destined to promote."

Lord Ashburton, on behalf of the College of Chemistry, wrote to Mr. Cardwell, President of the Board of Trade, pointing out the inadequacy of the accommodation in the laboratory of the Metropolitan School of Science in Marylebone Street, and stating that his Council would recommend the subscribers to the College to place their laboratories, together with furnaces and fixtures, in the hands of the Government, subject to certain conditions named in the letter. On July 7th, 1853, Dr. Lyon Playfair, as Secretary to the Science and Art Department, wrote :—

"*To the* RIGHT HONOURABLE LORD ASHBURTON.

"DEPARTMENT OF SCIENCE AND ART, MARLBOROUGH HOUSE,

"*July 7th*, 1853.

"MY LORD,—I am desired by the Lords of the Committee of Privy Council of Trade to reply to your Lordship's letter of May 9th, in which your Lordship offers, on the part of the Council of the Royal College of Chemistry, to recommend to its subscribers to present to the Government the lease of the premises and all the fittings and appliances, valued at £3000. The conditions attached to this proposed transfer my Lords

* Report of the Council, July 26th, 1853.

understand to be (1) that the Government should take an assignment of the lease of the College buildings, and pay the rental of the premises—viz., £130 per annum; (2) That the Government pay a sum of £350 to the Council of the College in the name of expenses which cannot be met in the usual way by the subscription of members, in the event of the offer made by the Council being accepted by Government, and ratified by the members of the College; (3) That this sum of £350 should be considered as a loan, and be repaid out of any sums which may hereafter accrue from the possible sale of the lease, fixtures, and apparatus of the College, it being understood that any further sum of money arising from such sale should be devoted, as the Government may deem fit, to the promotion of Practical Chemistry. My Lords have submitted these conditions to the Lords Commissioners of Her Majesty's Treasury, as being highly liberal on the part of the Royal College of Chemistry, and very advantageous to the public; and the sanction of the Treasury has been obtained for the acceptance of the offer of the Council on the above terms. I have the honour to be your Lordship's obedient servant,

"LYON PLAYFAIR,
"*Secretary.*"

At a general meeting of the College of Chemistry, on Tuesday July 26th, 1853, this correspondence was read, and the proposal of amalgamating the College with the Metropolitan School of Science, and of assigning the lease, furniture, and fixtures of the College to the Government, was sanctioned and adopted. A committee was appointed to carry the transfer into effect, and to wind up the affairs of the College. This last meeting concluded with unanimous resolutions of thanks to His Royal Highness, Prince Consort, President of the College, for his generous and liberal support of its funds and for his exertions at all times in its favour; and of thanks to Lord Ashburton Richard Blakemore, Dr. Hofmann, and last, but not least, to Sir James Clark for his long-continued and generous services.

In October 1853 the new session opened with the College of Chemistry as a department of the Metropolitan School of Science, and it remained the chemical department of that School when its name was changed to the Royal School of Mines.

In 1863 Dr. Hofmann was persuaded by the Prussian Government to return to his own country, in order to organise a chemical institution on a great scale in the University of Bonn; and in the following year, being elected Professor of Chemistry in the University of Berlin, he returned to England to take a final farewell. On April 28th a banquet was given in his honour by a number of those who had worked under him at the Royal College of Chemistry; Mr. Warren de la Rue took the chair, and the Comte de Paris was amongst those of his pupils who were present.

Hofmann had been granted three years' leave of absence in which to organise the schools in Germany, and during his absence Dr. Edward Frankland occupied his place. Upon Hofmann's final resignation in

1865, Frankland was officially appointed the Professor of Chemistry at the Royal School of Mines, and head of the Royal College of Chemistry. The Institution continued to bear its distinctive name until its transfer to the South Kensington Laboratories in 1872. It also granted separate diplomas of the Royal College of Chemistry to occasional students in Chemistry, thus maintaining a certain apparent independence, which was rather misleading. In 1880 it became the Chemical Department of the newly organised "Normal School of Science" (now the Royal College of Science) in which students of the Royal School of Mines receive their chemical training.

Notes taken from "Hofmann and Modern Chemistry" (*Quart. Journ. Science*, vol. iii., January 1866); "A Page of Scientific History: Reminiscences of the Early Days of the Royal College of Chemistry," by A. W. Hofmann, Ph.D., LL.D., F.R.S. (*Quart. Journ. Science*, April 1871); "Hofmann Memorial Lectures," by Lord Playfair and Sir Frederick Abel (*Journ. Chem. Soc.*, June 1896); *Select Committee of House of Commons on Scientific Instruction, Minutes of Evidence*, 1868; *Royal Commission on Scientific Instruction*, vol. i., *Minutes of Evidence, etc.*, 1872; *First Annual Report of the Science and Art Department*, 1854, Appendix L (h).; etc. etc.

By the courtesy of Mr. C. E. Groves, F.R.S., the illustration of the Royal College of Chemistry in Oxford Street has been reproduced from the *Journal of the Chemical Society* for June, 1896.

SCIENCE TEACHERS.

IT was the intention of the Government, as early as the year 1853, to create a central school where science teachers might be trained at the cost of the State. The minute, upon which the Science and Art Department of the Board of Trade was constituted, stated that the Lords of the Treasury agreed that the Metropolitan School of Science proposed to be established at Jermyn Street "would be a means of furnishing competent and well-qualified teachers for Local Institutions." *

A few teachers were, from time to time, sent, both to the College of Chemistry in Oxford Street and to the Government School of Mines. At that time, however, there were comparatively few science schools in this country, and in consequence science teaching had not become a definite profession. As late as the year 1860 there were only nine science schools, with an aggregate of five hundred students, throughout the United Kingdom. In 1859 the Science and Art Department first established a system of aid to science instruction, in the form of grants to teachers. At the same time they instituted examinations, upon the results of which they made certain payments. The stimulus thus afforded was so effectual that within ten years there were thirty-four thousand, and within twenty years fifty-seven thousand science students in the kingdom.† The demand for qualified teachers grew in proportion to this extraordinary increase. The Royal Exhibitions given to the School of Mines in 1862, and the Local Exhibitions created in 1867, led many who wished to take up science-teaching to come to Jermyn Street to study.

In 1868 the Department began to grant allowances to a limited number of teachers, to enable them to visit London for a few weeks in the summer, in order to benefit by the science museums, and the lectures

* Appendix A, *First Report of the Department of Science and Art:* 1854.

† At the end of 1895 there were one hundred and sixty-seven thousand science students in the British Isles.

that were arranged to be delivered at some of the London institutions. In the following year short courses of science lectures were given, by Professors Huxley and Guthrie and by Dr. Michael Foster, for the purpose of instructing teachers in the art of imparting scientific knowledge. In July 1869 a hundred and twenty teachers were brought up to London, and each worked for a week in the laboratory of the College of Chemistry, where they were instructed in chemical manipulation, and in the best methods of teaching Chemistry. The time had to be short, owing to the limited space in the College laboratory, which only held forty men at a time.

The Royal Commission of 1870-71 * advised increased practical instruction in elementary science to teachers, and recommended that the "Royal School of Mines and Royal College of Chemistry" should be made available for the instruction of science teachers, having due regard to the maintenance of its character as a school for special scientific instruction. It was largely with a view to the accession of students that might be expected from this source that they recommended the removal of the School to South Kensington.

After the transfer of the courses of Chemistry, Physics, and Biology to South Kensington, provision was made for a few teachers and promising students who *undertook* to become teachers, to come up to London for more thorough training. They received their travelling expenses, and an allowance of twenty-five shillings a week whilst thus engaged.

In 1881, upon the re-organisation of the School and the establishment of the Normal School, or Royal College of Science, the system of training teachers formed the most important part of the scheme. In fact, it was with a view to this branch of instruction that the Normal School was founded, fee-paying students being only admitted as there might be accommodation for them. †

The scheme was approved by the Treasury, subject to the condition that the Mining and Metallurgical School should be allowed to retain its direct technical character, and that its students should receive their general scientific training in the Normal School.

There are at present about fifty teachers-in-training, besides exhibitioners, who are admitted free to the sessional courses and laboratories of the Royal College of Science, and maintained in London at the expense of the State.

* Duke of Devonshire's Commission on Scientific Instruction.
† *Calendar, History, etc. of the Department of Science and Art*, p. xxxvi.

Every year, after the regular course is over, about two hundred and fifty teachers are brought up to London from all parts of the country for three weeks in July to attend short courses of instruction in different branches of science, and to work in the laboratories of the Royal College of Science.

THE ANNUAL DINNER.

In connection with the Schools, an annual dinner, numerously attended by past and present students, has been held without interruption since the year 1873. The records of the earlier dinners are unfortunately somewhat incomplete; indeed, of the first, second, and fifth, only the slightest traces remain. More or less complete accounts of all the others are to be found in the two dinner-books,—now in the possession of the secretary,*—and in the periodical literature of the day; while in recent years, the *Mining Journal* has given verbatim reports of the proceedings.

The first dinner-book starts with the fourth dinner, which was held at the Pall Mall Restaurant in 1876. It was not, however, again used until the seventh dinner in 1879, though, from that date, its records are continuous. The present secretary has endeavoured to fill up the gaps of history with tickets, menus, newspaper cuttings, and other matters of interest.

The chief toast of the evening has always been that of the "Mining and Metallurgical Industries," which has given the Chair an opportunity of reviewing the progress of the past year. Other toasts are those of the "Professors" the "Old Students," and so forth.

The dinner is now held about the last week in January. At first it took place shortly before Christmas, except on two occasions, when it occurred in May, thus bringing two dinners together in the same year, with none in the intermediate years. As a rule the "Criterion" has been chosen for the meeting-place, but the "Holborn," the "Pall Mall," and the "Café Royal," have also, from time to time, been selected.

As a reunion of old students and a common meeting-place for the

* Mr. H. G. Graves, Assoc. R.S.M. has been elected permanent Honorary Secretary of the Dinner Committee.

present and past, this annual dinner has always been most successful, and it is to be hoped that the publication of the Register may cause it to be more numerously attended than ever.

A list of the names of those who have occupied the Chair, together with their respective years of office, is as follows :—

1. G. Seymour : 1873.
2. (?)
3. M. A. J. Campbell : 1875.
4. J. Taylor Smith : 1876.
5. (?)
6. F. Drew : 1878.
7. T. H. D. May : 1879.
8. T. W. Danby : 1880.
9. P. C. Gilchrist : 1881.
10. E. W. J. Ridsdale : 1882.
11. W. T. Blanford : 1883.
12. F. W. Harman : 1884.
13. G. J. Snelus : 1886.
14. G. Seymour : 1886.
15. E. Matthey : 1888.
16. A. E. Pinching : 1888.
17. C. Le Neve Foster : 1889.
18. F. W. Bayly : 1891.
19. H. Bauerman : 1892.
20. W. Gowland : 1893.
21. B. H. Brough : 1894.
22. W. H. Greenwood : 1895.
23. A. G. Charleton : 1896.

PAST PROFESSORS

OF THE

ROYAL SCHOOL OF MINES

AND

ROYAL COLLEGE OF SCIENCE.

Chemistry.

1851–53. The Right Hon. Baron Playfair of St. Andrews, P.C., G.C.B., LL.D., Ph.D., F.R.S.
1853–65. August Wilhelm von Hofmann, Ph.D., LL.D., F.R.S.
1865–85. Edward Frankland, M.D., D.C.L., LL.D., Ph.D., F.R.S.
1885–94. Thomas Edward Thorpe, Ph.D., D.Sc., LL.D., F.R.S.

Physics.

1853–54. Robert Hunt, F.R.S.
1854–60. Sir George Gabriel Stokes, Bart., D.C.L., LL.D.. D.Sc., F.R.S.
1860–68. John Tyndall, D.C.L., LL.D., F.R.S.
1868–86. Frederick Guthrie, Ph.D , F.R.S.

Mechanics and Mathematics.

1851–53. Robert Hunt, F.R.S. (Mechanical Science).
1853–69. The Rev. Robert Willis, M.A., F.R.S.
1869–94. Thomas Minchin Goodeve, M.A., Barrister-at-Law.

Geology.

1851–76. Sir Andrew C. Ramsay, LL.D., F.R.S.

Biology.

1851–54. Edward Forbes, F.R.S.
1854–95. The Right Hon. Thomas Henry Huxley, P.C., D.C.L., LL.D., F.R.S.

Metallurgy.

1851–71. John Percy, M.D., F.R.S.

Mining.

1851–91. Sir Warington W. Smyth, F.R.S.

PAST DIRECTORS OF THE ROYAL SCHOOL OF MINES.

1851–55. Sir Henry Thomas De la Beche, F.R.S.
1855–71. Sir Roderick I. Murchison, Bart., K.C.B., D.C.L., LL.D., F.R.S.

LATE DEAN OF THE ROYAL COLLEGE OF SCIENCE AND ROYAL SCHOOL OF MINES.

1881–95. The Right Hon. Thomas Henry Huxley, P.C., D.C.L., LL.D., F.R.S.

PRESENT STAFF

AT

SOUTH KENSINGTON.

ROYAL COLLEGE OF SCIENCE.

Mechanics and Mathematics.

Professor.—J. Perry,* M.E., D.Sc., F.R.S.
Assistant Professor.—A. R. Willis, M.A., D.Sc., Assoc. R.S.M.
Instructors.—P. T. Wrigley, M. A.; J. Harrison, M. Inst. M. E., Assoc. M.Inst.C.E.
Demonstrator.—J. E. Livsey, M.Inst.M.E.
Assistant.—G. A. Baxandall.

Physics.

Professor.—A. W. Rücker,* M.A., D.Sc., F.R.S.
Assistant Professor.—C. V. Boys, F.R.S., Assoc. R.S.M.
Demonstrator.—W. Watson, B.Sc., Assoc. R.C.S.
Assistants.—W. Williams, B.Sc.; R. W. Forsyth, Assoc. R.C.S.
Occasional Lecturer.—Capt. W. de W. Abney, C.B., D.C.L., F.R.S. (late R.E.).

Astronomical Physics.

Professor.—J. Norman Lockyer,* C.B., F.R.S.
Demonstrator.—A. Fowler, Assoc. R.C.S., F.R.A.S.

Chemistry.

Professor.—W. A. Tilden,* D.Sc., F.R.S.
Assistant Professor.—W. P. Wynne, D.Sc., F.R.S., Assoc. R.C.S.
Demonstrators.—H. Chapman Jones; J. W. Rodger, Assoc. R.C.S.
Assistants.—G. S. Newth; A. Eiloart, Ph.D., B.Sc.; M. O. Forster, Ph.D.

* Members of the Council.

Biology.

Professor of Zoology.—G. B. Howes, F.L.S., F.Z.S.*
Professor of Botany.—J. B. Farmer,* M.A., F.L.S.
Demonstrators.—M. F. Woodward, Assoc. R.C.S.; L. A. Boodle, Assoc. R.C.S.

Geology.

Professor.—J. W. Judd,*† C.B., LL.D., F.R.S.
Lecturer on Mineralogy.—F. Rutley, F.G.S.
Demonstrators.—W. F. Hume, D.Sc., Assoc. R.S.M.; C. G. Cullis.

Agriculture.

Professor.—J. Wrightson,* F.C.S.

ROYAL SCHOOL OF MINES.

Metallurgy.

Professor.—W. Chandler Roberts-Austen,* C.B., F.R.S., Assoc. R.S.M.
Instructor in Assaying.—H. C. Jenkins, Assoc. R.S.M., Assoc. M.Inst.C.E.
Assistants.—E. A. Smith, Assoc. R.S.M.; A. Stansfield, Assoc. R.S.M.

Mining.

Professor.—C. Le Neve Foster,* D.Sc., B.A., F.R.S., Assoc. R.S.M.
Instructor in Mine Surveying.—L. H. Cooke, Assoc. R.S.M.

REGISTRAR.
Francis Fladgate.*

CLERK AND LIBRARIAN.
A. E. Cooper.

* Members of the Council. † Dean of Council.

BIOGRAPHICAL NOTICES

OF

PAST AND PRESENT PROFESSORS.

SIR HENRY THOMAS DE LA BECHE, F.R.S.

HENRY THOMAS DE LA BECHE, the founder of the Royal School of Mines, was the last male representative of a family of Norman barons who came to England with the Conqueror. His father was Thomas De la Beche, of Clarendon, Jamaica. He was born in 1796, near London, and the family shortly afterwards moved to Ottery St. Mary, in Devonshire, where he was educated. Afterwards they moved to Charmouth, and later to Lyme Regis, where, in collecting Liassic fossils, so plentiful in that district, he first showed his natural taste for the Science to which he afterwards devoted his life.

De la Beche entered the Military College at Great Marlow in 1810, with the intention of joining the Army. The general peace of 1815, however, cut short his military career, and, settling in Dorsetshire, he gave himself up to geological work. In 1817, at the age of twenty-one, he became a member of the London Geological Society, and two years later was elected a Fellow of the Royal Society. During the four or five succeeding years he travelled in France and Switzerland, gaining during that time a sound knowledge of Mineralogy and Petrography. Called to visit his father's estate in Jamaica, he did not lose the opportunity of making himself thoroughly acquainted with the geology of that Island, upon which he published several papers.

One of his earliest geological papers appeared in the *Edinburgh Philosophical Journal*, "On the Temperature and Depth of the Lake of Geneva." In 1819 he contributed his first paper—"On the Secondary Formations of the Southern Coast of England"—to the *Transactions of the Geological Society*. After his return from Jamaica he produced his *Manual of Geology* in 1831, and his *Researches in Theoretical Geology* in 1834. About this time a great Map of England, on the scale of one inch to a mile, was in process of construction by the Ordnance Survey Department of the Government,

HENRY T. DE LA BECHE.

De la Beche was struck with the idea of making this ordnance map the groundwork of a geological survey of each county. He began such a work at his own expense in the mining districts of Devon and Cornwall, and soon saw of how much practical value carefully prepared geological maps would be, in aiding the development of the mineral resources of the country, and how much more efficiently the work might be performed in connection with the General Trigonometrical Survey. He laid his views before the authorities, and in 1832 he was appointed "to affix geological colours to the Maps of Devonshire, and portions of Somerset, Dorset, and Cornwall." In 1835, the advice of Dr. Buckland and Professor Sedgwick having been taken, a sum of £300 a year was granted by the Treasury towards the expenses. Later, owing to De la Beche's representations to the Chancellor of the Exchequer, a house in Craig's Court, Charing Cross, was placed at his disposal by Lord Duncannon, for the accommodation of various collections of stones and minerals made during the Geological Survey. This building was known as the "Museum of Economic Geology," and it was placed under the control of the Office of Woods and Forests.

How the Geological Survey grew in importance, and, in 1845, was emancipated from the control of the Board of Ordnance, and placed under the direction of the Office of Woods and Forests; and how, the Museum in Craig's Court becoming filled to overflowing, De la Beche, by his marvellous energy and consummate skill in dealing with Ministers and Departments, obtained from the Government the site and building in Piccadilly, and there founded the "Government School of Mines, and of Science applied to the Arts";— is so well told by Sir Archibald Geikie, in his Memoirs of Murchison and Ramsay, that it is hardly necessary to repeat the story here.

The new museum was opened in 1851 by Prince Albert. Edward Forbes, Robert Hunt, Percy, Ramsay, Smyth, and Playfair —men whom De la Beche had gathered round him during the life of the Survey—formed the staff of Lecturers. It is to these distinguished men of Science that the lasting reputation of the School of Mines is chiefly due.

De la Beche did not live long after the completion of his great work. In 1853 he saw the Geological Survey, the Museum, the

Mining Record Office and the School—all of which he had created—taken over by the Department of Science and Art, newly formed under the Board of Trade. Towards the end of 1853 his health failed, and he began to suffer from the paralysis that terminated his life. He remained in control at Jermyn Street another year, and continued to visit the Museum almost to the day of his death, even though he could not leave the chair in which he was wheeled from his room. He appeared there for the last time on Wednesday, April 11th, 1855. It was his intention to return on the following Saturday, but becoming rapidly worse the next day, he died on the morning of Friday, April 13th.

De la Beche was President of the Geological Society in 1847, and received the Wollaston Medal in 1855. He was knighted in 1848, and was the recipient of many foreign orders. His published works on geological subjects are more than forty-three in number. Two of his most remarkable treatises were entitled respectively, *How to Observe Geology*, and *The Geological Observer*.

Sir Archibald Geikie—from whose works these notes are mainly taken—depicts his character in the following words: "To his scientific qualities were added those of the artist and the keen lover of nature, combined with a strength of frame which, in his prime, made him a bold swimmer and an active pedestrian. Over and above all shone his bright, cheery nature, his irrepressible enthusiasm, which not only supported his own untiring efforts, but, like a contagion, affected and stimulated all who were associated with him."

In memory of Sir Henry De la Beche, as founder of the School of Mines, a bronze medal has been established, which is awarded each year to the student in the School who does best in the course of Mining.

Notes from Sir A. Geikie's *Life of Sir Roderick I. Murchison* (John Murray, 1875); also his *Memoir of Sir A. C. Ramsay* (Macmillan and Co., 1895); Stephen and Lee's *Dictionary of National Biography*, vol. iv., notice by Professor W. Jerome Harrison; Waller's *Imperial Dictionary of International Biology*, notice by Edwin Lankester, M.D.; references in Sopwith's *History of the Museum of Economic Geology, etc.*; and *Quart. Journ. Geol. Soc.*, vols. xi. and xii.

The block from which the portrait is taken was lent by Messrs. Macmillan and Co., by the kind permission of Sir Archibald Geikie.

RODERICK IMPEY MURCHISON.

SIR RODERICK I. MURCHISON, Bart., K.C.B., D.C.L., LL.D., F.R.S.

RODERICK IMPEY MURCHISON, the son of the late Mr. Kenneth Murchison, of Tarradale, in Ross-shire, was born on February 19th, 1792, and received his early education at the grammar school attached to the cathedral at Durham. In 1805 he was removed to the Royal Military College at Great Marlow, and two years later obtained a commission in the Army, being gazetted Ensign in the 36th Foot. The following summer he joined his regiment, and served with the Army in Spain and Portugal, under Lord Wellington. He carried the colours of his regiment at the Battle of Vimiera, and afterwards accompanied the army in its advance to Madrid, and its junction with the Force under Sir John Moore ; while he also shared in the dangers and retreat at Corunna. At the siege of Cadiz, he served on the staff of his uncle, Sir Alexander Mackenzie, and afterwards went out to Sicily as his *aide-de-camp.* The Peace of 1814 placed him on half-pay ; and although he exchanged into a cavalry regiment, with the hope of seeng further active service, he was disappointed.

In the following year he married the daughter of General Hugonin, and early in 1816 started with his wife for a leisurely tour on the Continent, which lasted till the summer of 1818. On his return to England he settled for a time at Barnard Castle, where he devoted himself to field sports—chiefly fox-hunting. About five years later he became acquainted with Sir Humphry Davy, meeting him accidentally as a guest at the house of the late Mr. Morritt, of Rokeby. Through his influence, Murchison removed to London, with the intention of studying Science. In the autumn of 1824 he attended lectures at the Royal Institution, and also placed himself

under the private instruction of the late Mr. Richard Phillips, F.R.S In 1825 he was admitted a Fellow of the Geological Society, and the following year was elected a Fellow of the Royal Society. The science of Geology soon kindled his enthusiasm, and he devoted himself to field-work. His first paper, a "Geological Sketch of the North-west Extremity of Sussex, and the Adjoining Parts of Hampshire and Surrey," was read to the Geological Society about the end of the year 1826. This was followed up, with indefatigable industry, during the next forty-six years, by a succession of some hundred and twenty separate or joint papers and works on Geology.

From 1825 to 1830 Murchison made a series of tours in England, Scotland, and various parts of the Continent, including Auvergne, North Italy, and Rhenish Prussia; sometimes accompanied by Sir Charles Lyell, and sometimes by Professor Sedgwick. During the whole of this time he had in his mind a great investigation upon the order of succession of our older rocks. In 1831 he was elected President of the Geological Society, after five years' service as its Secretary. He then gave himself up more entirely to the systematic examination of the older sedimentary rocks underlying the mountain limestones—generally known at that time as "Transition Rocks," or "Grauwacke." In the summer of 1831 Sedgwick attacked the northern part of Wales from Anglesey: Murchison directed his labours to the Border counties of England and Wales. Working thus, from different directions, Murchison established the "Silurian System," and Sedgwick the "Cambrian System"; and although the two spent some days together in the summer of 1834, discussing their work, they eventually parted without discovering that the lower part of Murchison's system was identical with the upper part of that worked out, and called "Cambrian," by Sedgwick. This afterwards led to considerable controversy among English geologists. The summary of the results of Murchison's investigations appeared in a thick quarto volume, entitled *The Silurian System.* Almost concurrently with the establishment of the Silurian System, Murchison and Sedgwick, with the assistance of Lonsdale, confirmed the independence of the Devonian System from their observations both in England and on the Continent.

During 1839 and the following years Murchison carried on his investigations chiefly in Russia, where he was accompanied by De Verneuil and Count Keyserling. The result of his work appeared in 1845, when he published *The Geology of Russia and the Ural Mountains* in conjunction with his colleagues. It was during these tours that Murchison's observations of the similarity of the Geological formations of the Urals to those of Australia led him to prophesy a rich future to that continent from the presence of gold. In 1843 he was elected President of the Geographical Society, and in 1849 he received the Copley Medal of the Royal Society, in recognition of his having established the Silurian System in Geology.

In 1855, on the death of Sir Henry De la Beche, Murchison was appointed Director-General of the Geological Survey and of the whole establishment at Jermyn Street, including the Government School of Mines; and he continued to hold this office until his death on October 27th, 1871.

Murchison was twice President of the Geological Society—once in 1831-32, and again in 1842-43—and he was awarded its Wollaston Medal in 1864. He received many foreign honours, was knighted in 1846, created a K.C.B. in 1863, and had a Baronetcy conferred on him in 1866. He was a member of most of the Scientific Societies, and held honorary degrees of the Universities of Oxford, Cambridge, and Edinburgh. He was a Trustee of the British Museum, and an Associate of the French Institute. A full list of his numerous publications is given at the end of his Memoir by Sir Archibald Geikie.

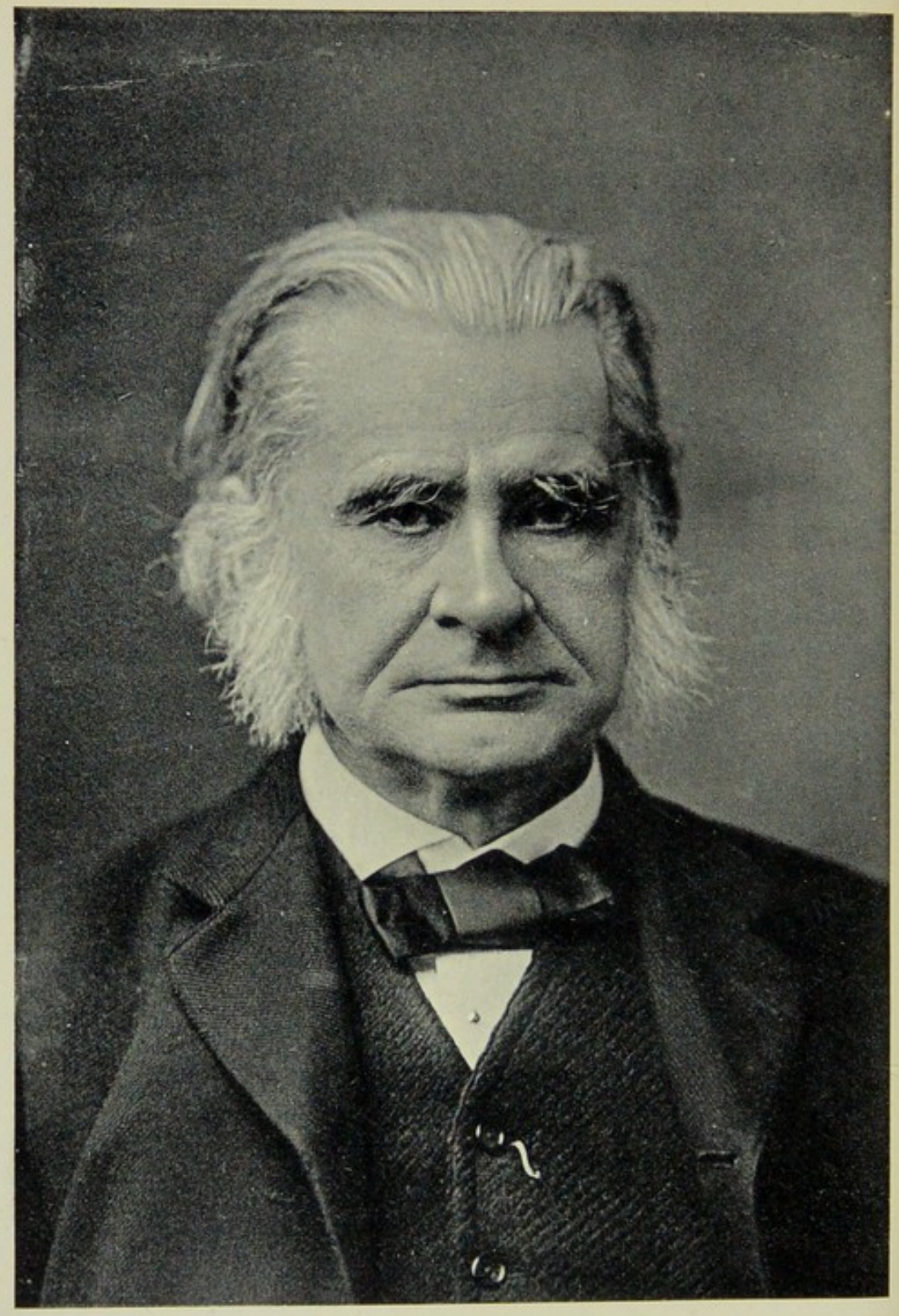
In person Murchison was tall, muscular, of a commanding presence and dignified manner. His social influence was considerable, and his means ample. Both were employed for the benefit of Science and its workers. One of his last acts was to contribute half the endowment to a chair of Geology at Edinburgh. He was a hospitable host; a firm and generous friend; a man of indomitable energy, and great power of work; blessed with an excellent constitution; very methodical and punctual in his habits.

By his will Sir Roderick Murchison bequeathed to the "Directors and Professors for the time being of the Royal School of Mines,"

the sum of £500, to be invested in the public funds of Great Britain; the income arising to be applied annually to purchase books for a prize to be styled the "Murchison Prize"; to be accompanied by a Bronze Medal, the dies of which he also bequeathed to the School. In his memory, busts have been placed in the Jermyn Street Museum, and in the meeting-room of the Geological Society.

Notes from *Lee's Dictionary of National Biography*, vol. xxxix., notice by the Rev. Professor Bonney, F.R.S.; *Life of Sir Roderick I. Murchison*, by Sir A. Geikie, LL.D., F.R.S. (John Murray, 1875). Also *Quart. Journ. Geol. Soc.*, Pres. Addr., February 1872, obituary notice by Joseph Prestwich, F.R.S.; *Times*, obituary notice, October 23rd, 1871, leading article, October 24th, 1871; *Proc. Roy. Soc.*, vol. xx.

The portrait is taken from a block lent by Messrs Macmillan and Co., by he kind permission of Sir Archibald Geikie.



THOMAS HENRY HUXLEY.

Photograph by W. & D. Downey, London.

THE RIGHT HON. THOMAS HENRY HUXLEY, P.C., D.C.L., LL.D., F.R.S.

Thomas Henry Huxley was born at Ealing on May 4th, 1825. Although sent to school at his native place, his educational progress was largely due to his own efforts. He taught himself the German language, and received preliminary instruction in medicine from his brother-in-law, who was a doctor. Huxley's own desire was to be a Mechanical Engineer or an Artist, but fate intervened, and in 1842 he entered the Medical School attached to Charing Cross Hospital. Mr. Wharton Jones was at that time Lecturer on Physiology at this School, and his teaching had considerable influence on Huxley. It was through Wharton Jones' advice that Huxley published his first scientific paper in the *Medical Times and Gazette*. In 1845 he passed the first M.B. examination at the University of London, taking honours in Physiology and Anatomy. After devoting himself for a short time to the practice of his profession, Huxley, in 1846, joined the Medical Service of the Royal Navy, at the suggestion of a fellow-student—now Sir Joseph Fayrer. He was duly appointed Assistant Surgeon to H.M.S. *Victory*, for duty at Haslar Hospital. Here he had for his official chief the distinguished naturalist Sir John Richardson, who had accompanied Franklin in his early Arctic expeditions. Owing to his influence, Huxley, after serving seven months at Haslar, was given the post of Assistant Surgeon on H.M.S. *Rattlesnake*. The *Rattlesnake*, under the command of Captain Owen Stanley, had been commissioned to survey the eastern and northern coasts of Australia, and the coasts of New Guinea. The ship sailed from England in the winter of 1846, and did not return until November 1850. This voyage was the beginning of Huxley's scientific career. He took ample advantage

of his opportunities to study the fauna of the seas which he traversed, and sent home a number of papers to the Linnean Society, which were not printed at the time. In 1849 he wrote an elaborate paper, which he forwarded to the Royal Society. This paper, on "The Anatomy and Affinities of the Medusæ," was presented to the Society by the then Bishop of Norwich (Edward Stanley, father of Captain Owen Stanley, R.N.). It was read on June 21st, 1849.

Huxley, on his return to England, was engaged in literary and scientific work of a somewhat arduous nature. He in vain endeavoured to obtain the publication by the Government of a part of the work done during his voyage. At that time he was unsuccessful; and in 1853, on being ordered by the Admiralty to join a ship, he resigned the Medical Service. Having already earned considerable reputation, Huxley had been elected a Fellow of the Royal Society before he reached England, and in 1852 he received the Royal Medal for his services to Science. In 1854, on the translation of Edward Forbes from the posts of Palæontologist to the Geological Survey and Lecturer on Natural History at the Royal School of Mines, to the Chair of Natural History at Edinburgh University, Huxley was offered the appointment by Sir Henry De la Beche. At first he refused the office, but finally accepted it provisionally, with the intention of resigning as soon as a physiological post should become vacant. This idea was, however, abandoned, and he eventually continued his connection with the School until his death.

In 1854 there was no laboratory attached to the Natural History department of the School. Lectures alone were given, and these were not always well attended. Huxley, like Forbes, realised the insufficiency of such teaching. In his evidence before the Royal Commission in 1870 he states "There is an entire want in the School of Mines, as it now exists, of any means of teaching several of the subjects practically. For example, I am set there to teach Natural History without a biological laboratory, and without the means of showing a single dissection."

In 1872 the Council of the Professors of the Royal School of Mines passed a unanimous resolution in favour of the transfer of

the instruction in Physics, Chemistry, and Natural History, to South Kensington. This resolution was acted upon, and from the date of removal, the instruction in Biology was supplemented by laboratory practice.

Upon the re-organisation of the School in October 1881, Huxley was appointed Dean of the Council, and continued to occupy the Chair of "Biology (Zoology and Botany)." Having resigned the latter post in 1885, he continued, at the request of the Lord President, to act as Dean and Honorary Professor of Biology.

Huxley was twice chosen Fullerian Professor of Physiology at the Royal Institution. He was also an examiner in Physiology and Comparative Anatomy to the University of London. From 1863 to 1869 he held the post of Hunterian Professor at the Royal College of Surgeons. He was President of the Geological and Ethnological Societies in 1869 and 1870. In 1872 he was elected Lord Rector of Aberdeen University for three years. He was elected Secretary of the Royal Society in 1873, and ten years later was called to the Presidency; he was awarded the Copley Medal in 1888, and the Darwin Medal in 1894. He was elected a Fellow of the Geological Society in 1856, was President in 1868-69, and received the Wollaston Medal in 1876.

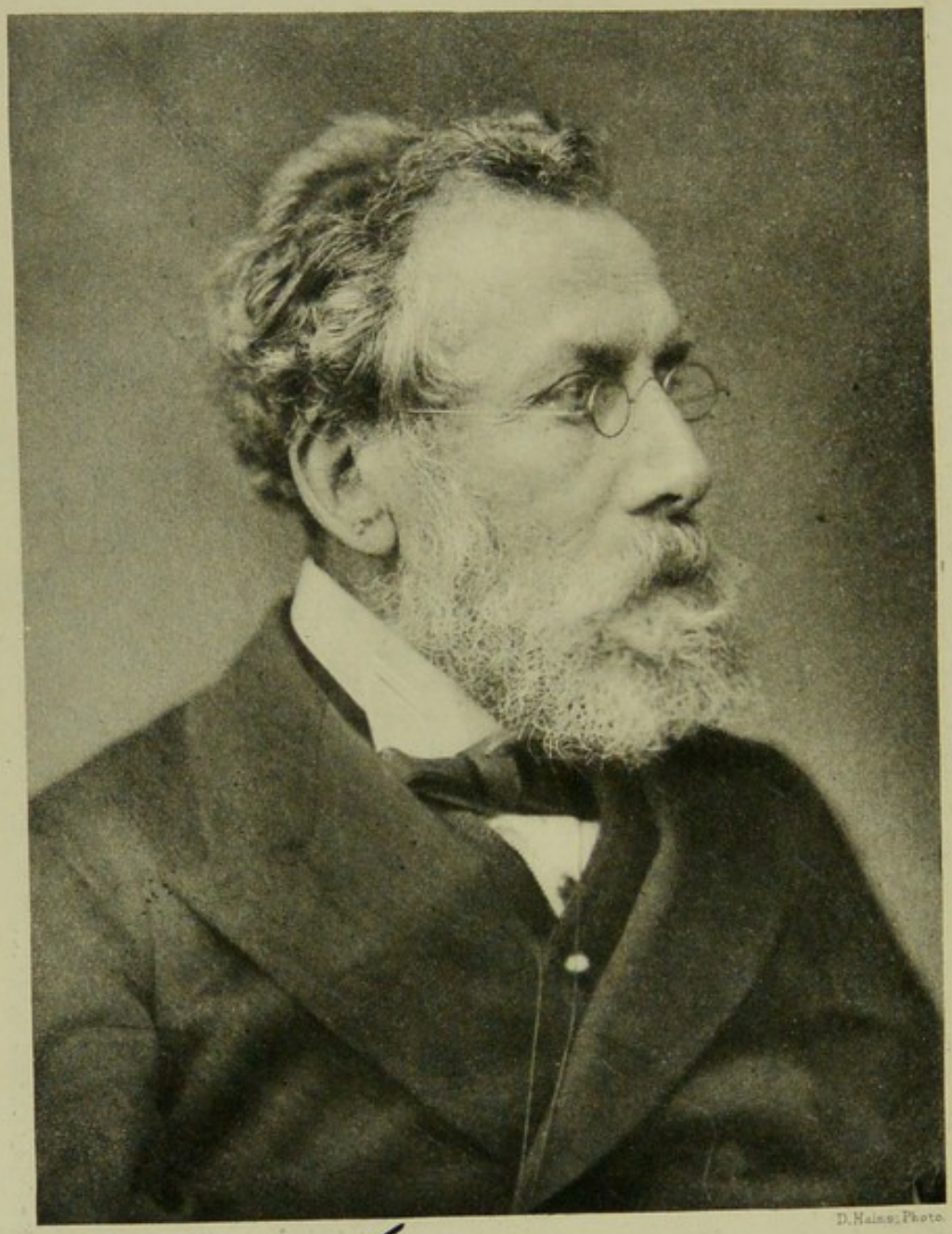
Huxley was the recipient of a number of honorary degrees, and was a member of most of the important English and foreign Academies and Societies. The King of Sweden made him a Knight of the Order of the North Star. From 1892 he was a member of Her Majesty's Privy Council. He died at Eastbourne on June 29th, 1895, from an illness following upon an attack of influenza.

This must remain but the briefest sketch of Huxley's life, and his connection with the School. Space is too limited to allow of our entering upon any lengthy consideration of his work and writings, or of the enormous influence which they have had, and must continue to have, upon the scientific and theological thought of our time. Much of Huxley's technical work was published through the Royal Society, the Geological Survey, the Geological and other Societies. These memoirs deal chiefly with the history and structure of animals of many types. Among his published works may be mentioned his *Oceanic Hydrozoa*, embodying the results of his voyage in the

Rattlesnake; *Lectures on Comparative Anatomy and Physiology*; *Lay Sermons, Addresses, and Reviews*, 1870;" and his text-books on the Anatomy (1) *Of the Vertebrata*, (2) *Of the Invertebrata*.

A sum of nearly three thousand pounds has been subscribed up to the present time towards a memorial to Professor Huxley. It has been decided to invest part of this sum to provide a medal which is to be awarded yearly at the Royal College of Science. A white marble statue of Huxley, upon which Mr. Onslow Ford, R.A., is now at work, is to be placed in the Entrance Hall of the British (Natural History) Museum, South Kensington. It is also intended, if a sufficient fund is collected, to bring out an edition of Professor Huxley's collected scientific memoirs.

Notes from *Nature*, obituary notice, July 4th, 1895; *Times*, obituary notice and leading article, July 1st, 1895; *Men and Women of Our Time*, 14th edition; *Royal College of Science Magazine*, November 1890, autobiography by Professor Huxley; *Royal College of Science Magazine*, October 1895, article by Professor Howes; *Proc. Geol. Soc.* May 1896, obituary notice by Henry Woodward, F.R.S.; etc.



D. Haines, Photo.

Walker & Boutall, Ph. Sc.

SIR ANDREW C. RAMSAY, LL.D., F.R.S.

ANDREW CROMBIE RAMSAY was born in Glasgow, on January 30th, 1814. From his father, a chemist of note in his day, he inherited a love of Science, but during his earlier years, being engaged in business, he was unable to devote himself entirely to its pursuit. At Glasgow he made the acquaintance of Professor Nichol, of the University, who directed his reading and encouraged him to persevere in the cultivation of Geology. Owing to delicacy of health, he had to leave Glasgow for a time, and so visited the Isle of Arran. Here, he not only recovered his strength, but laid the foundation of his fame as one of the ablest stratigraphical geologists of his day.

In the year 1840 the British Association held its meeting at Glasgow: Andrew Ramsay's map and model of Arran were exhibited to the members, and attracted special notice from the Geologists, particularly from Murchison. This proved to be the turning point of Ramsay's career. Murchison, at that time planning an expedition to America, was on the look-out for an active and clever assistant. He invited Ramsay to accompany him, who accordingly came to London about the middle of March 1841, where he was introduced to the leading geologists of the time, at the Geological Club, which then met at the "Crown and Anchor" by Temple Bar. Murchison, however, changed his plans, and instead of going to America, decided upon continuing his researches in Russia. Being unable to take Ramsay with him, he, with characteristic thoughtfulness, secured his *protegé* a place on the Geological Survey. Under De la Beche, Ramsay soon acquired the method of mapping and section-drawing which that incomparable field-geologist had introduced. In spite of his work, he now found time to publish

the little volume on Arran which embodied the results of his survey of that island.

Within four years after he had joined the Survey, Ramsay had given such signal proofs both of his ability as a surveyor and his general capacity for affairs, that, when in 1844 the Survey was remodelled and enlarged, he was chosen by De la Beche to be the first Local Director. So rapidly had Ramsay's reputation grown that not only did he receive this appointment to the second place on the staff of the Geological Survey, but in 1848 he was chosen Professor of Geology at University College, London, a post which he continued to hold, together with his Survey appointment, until 1851, when, on the institution of the Royal School of Mines, he became the Lecturer on Geology. His official position was now definitely settled. He remained Director in the Survey for the next twenty years, only relinquishing the appointment to accept the post of Director-General in succession to Murchison in 1871; while he retained his Lectureship till 1876. He retired from the Survey in 1881, and then received the honour of knighthood for his long and distinguished services. Shortly after this, his health gradually becoming impaired, he quitted London, and took up his abode at Beaumaris, where he spent the last eight years of his life. He died on December 9th, 1891, within a few weeks of his seventy-eighth year.

The greater part of Ramsay's work was published either in the *Memoirs of the Geological Survey*, the *Quarterly Journal of the Geological Society*, or the *Proceedings of the Royal Society*. A full list of his writings is published as an appendix to Sir A. Geikie's memoir of the author. Vast as the modern literature of Glacial Geology is, it can hardly be said to have begun to exist when Ramsay broke ground as an inquirer into the superficial drifts, scratched rocks, and perched boulders of North Wales. He visited Switzerland again and again, making himself thoroughly acquainted with the habits of glaciers. By publishing the results of his investigations he gave that impetus to the progress of this branch of Geology which was perhaps the most marked feature of the advance of British Geology during his life. Another department of inquiry which always had for Ramsay a peculiar

fascination was the history of the topographical features of a country. The still highly controversial subject of the origin of Glaciated Rock-basins was initiated by him, in his well-known paper "On the Glacial Origin of Certain Lakes," read to the Geological Society in the year 1862.

It was, however, as a teacher of Geology that Ramsay will be chiefly remembered. He had few equals in the power of luminous exposition and happy illustration. His range of experience in the field was so wide that there were few departments on which he did not speak from actual personal knowledge of the facts. The working men used to crowd round his table at the end of a lecture to ask questions, and one of them once said to him, "You are the best lecturer I ever heard in my life; and you always look so happy in it."

Ramsay was elected a Fellow of the Geological Society in 1844; a member of its Council in 1848; and President in 1862. He received its Wollaston Medal in 1871. The Royal Society enrolled him among its Fellows in 1849, and awarded him its Royal Medal in 1879. He was an honorary member of most of the Scientific Societies in this country, and of numerous foreign Academies. He was created a Knight of the order of SS. Maurice and Lazarus by the King of Italy, as a mark of appreciation of his services to Science.

Notes from Sir A. Geikie's notice in Pres. Addr. Geological Society May 1892 (*Quart. Journ. Geol. Soc.*, vol. xlviii., Part ii.). Also *Memoir of Sir A. C. Ramsay*, by Sir A. Geikie, LL.D., F.R.S. (Macmillan and Co., 1895) which contains full list of publications; *Proc. Roy. Soc.*, vol. li., obituary notice.

The plate from which the portrait is taken was lent by Messrs. Macmillan and Co., by kind permisson of Sir Archibald Geikie.

EDWARD FORBES, F.R.S.

EDWARD FORBES was born at Douglas, in the Isle of Man, on February 12th, 1815, and was educated at a day-school in his native place. Very early in life he displayed marked tastes for Natural History, Literature, and Drawing. When at school he was described as tall and thin, with limbs loosely hung, and wearing his hair very long. His school-books were covered with caricatures and grotesque figures, and his parents were so much impressed by his artistic talent that, at the age of sixteen, they sent him to London to study Art. This was a compromise, as his mother wished him to be a Clergyman, his father desired him to be a Doctor, and he himself wanted to be a Naturalist. Being, however, refused entrance to the Royal Academy School, he went to Edinburgh, to enter the University as a Medical Student. His love for Natural History, which subject he studied on every possible occasion, especially during his holidays, gave him a bias against Medicine. In 1836, circumstances leaving him free to act for himself, he resigned Medical study. During the vacation of 1832 he investigated the Natural History of the Isle of Man. In 1833 he went to Norway with his friend Campbell (afterwards Principal of Aberdeen University); and in 1835 he visited France, Switzerland, and Germany. During the winter of 1836–37 he studied at the Jardin des Plantes, attending the lectures of De Blainville and Geoffroy Saint-Hilaire. He then returned to Edinburgh, and continued to work there, at Natural History. In the summer of 1838, after a tour through Austria, during which he collected about three thousand plant specimens, Forbes attended the British Association meeting at Newcastle, and read a paper "On the Distribution of Pulmoniferous Mollusca in Europe." The winter of 1838–39 found him delivering a course of

EDWARD FORBES.

lectures before the Edinburgh Philosophical Association on "The Natural History of the Animals in the British Seas."

Forbes continued to lecture and carry on research work until 1841, when he was appointed Naturalist on H.M.S. *Beacon*, engaged upon surveying work in the Levant, under Captain Graves. The account of this expedition forms delightful reading in Wilson and Geikie's *Life of Edward Forbes*. Not only did he make large collections and valuable scientific observations, but, during an extended journey in Lycia, he explored ancient cities that had been lost for centuries, and discovered the ruins of Termessus.

In 1842, when about to compare the fauna of the Red Sea with that of the Mediterranean, he was stricken with fever, the effects of which impaired his constitution for life. On his recovery in October of this year, he reluctantly returned to England, on his friends' representations that he should do so, in order to secure the Chair of Botany at King's College, for which they were canvassing on his behalf. On his arrival he found himself already appointed to the post. The income arising from the Professorship was, however, less than £100 a year, so he applied for the curatorship of the Geological Society, and was duly elected. In 1844, at Ramsay's suggestion, he was appointed to the office of Palæontologist to the Geological Survey. His work was not only to discriminate, name, describe, and arrange the fossils collected by the Survey, but to visit the districts where the surveyors were at work, and examine the rocks with the fossils in them.

About this time Forbes became a Fellow of the Geological Society, and in 1845 he was elected a Fellow of the Royal Society. He also founded the society of Metropolitan Red Lions, convivial club on the lines of the original Club of Red Lions, which he had founded during the meeting of the British Association of 1839.

During the winter of 1849–50 Forbes was busy with the arrangement of the new Geological Museum, just erected in Jermyn Street. When the School of Mines was instituted in 1851, he was appointed Lecturer on Natural History as applied to Geology and the Arts. In 1853 Forbes was elected President of the Geological Society, an office never before held by so young a man. In 1854, backed by an overwhelming influence, Forbes was elected to the Professorship

of Natural History at Edinburgh. Having thus obtained the often-expressed object of his ambition, he opened a class for the Short Summer Session, but had scarcely resumed his duties for the winter when he was carried away, after an illness of ten days, in his thirty-ninth year. He died on November 18th, 1854.

His published works consist chiefly of scattered memoirs, and are about eighty-nine in number. His largest books are the *Natural History of British Mollusca* and *Travels in Lycia*.

"The name of Edward Forbes," says Bettany, "will go down to posterity inseparably linked with the history of Palæontology, as one of the greatest naturalists that ever strove to bring his knowledge to elucidate the physical and organic changes in the past history of the earth. . . . In bearing down all jealousy and envy among his fellow-naturalists, and enlisting their active co-operation in the common cause, he stood forth conspicuous among the scientific men of his time. . . . It was not his mental powers, nor his vast knowledge of those branches of science which he made his special study that gained him the love and respect of all men, but a simple, kindly heart that knew no selfishness, and embraced in its wide and generous sympathy all that was honourable and good."

The trustees of the Edward Forbes Memorial Fund presented a Bronze Medal and Prize of Books, to be awarded at the Royal School of Mines to the student who did best in Natural History and Palæontology: the Medal and Books are now awarded on similar lines to the student who excels in Biology at the Royal College of Science, South Kensington. His bust has been placed in the Museum of Practical Geology, and in the Edinburgh Museum.

Notes from Stephen's *Dictionary of National Biography*, vol. xix., notice by G. T. Bettany. Also Wilson and Geikie's *Memoir of Edward Forbes* (Macmillan and Co., 1861); Literary Papers of the late Professor E. Forbes, from the *Literary Gazette*, with biographical notice (Lovell Reeves, Covent Garden, 1855); *Literary Gazette*, November 25th, 1854; *Monthly Journal of Medicine*, January 1855, notice by J. Hughes Bennett; *Witness*, January 1855, notice by Hugh Miller; *Scotsman*, November 22nd, 1854; *Brit. Quart. Journ.*, 1861, vol. xxxiv.

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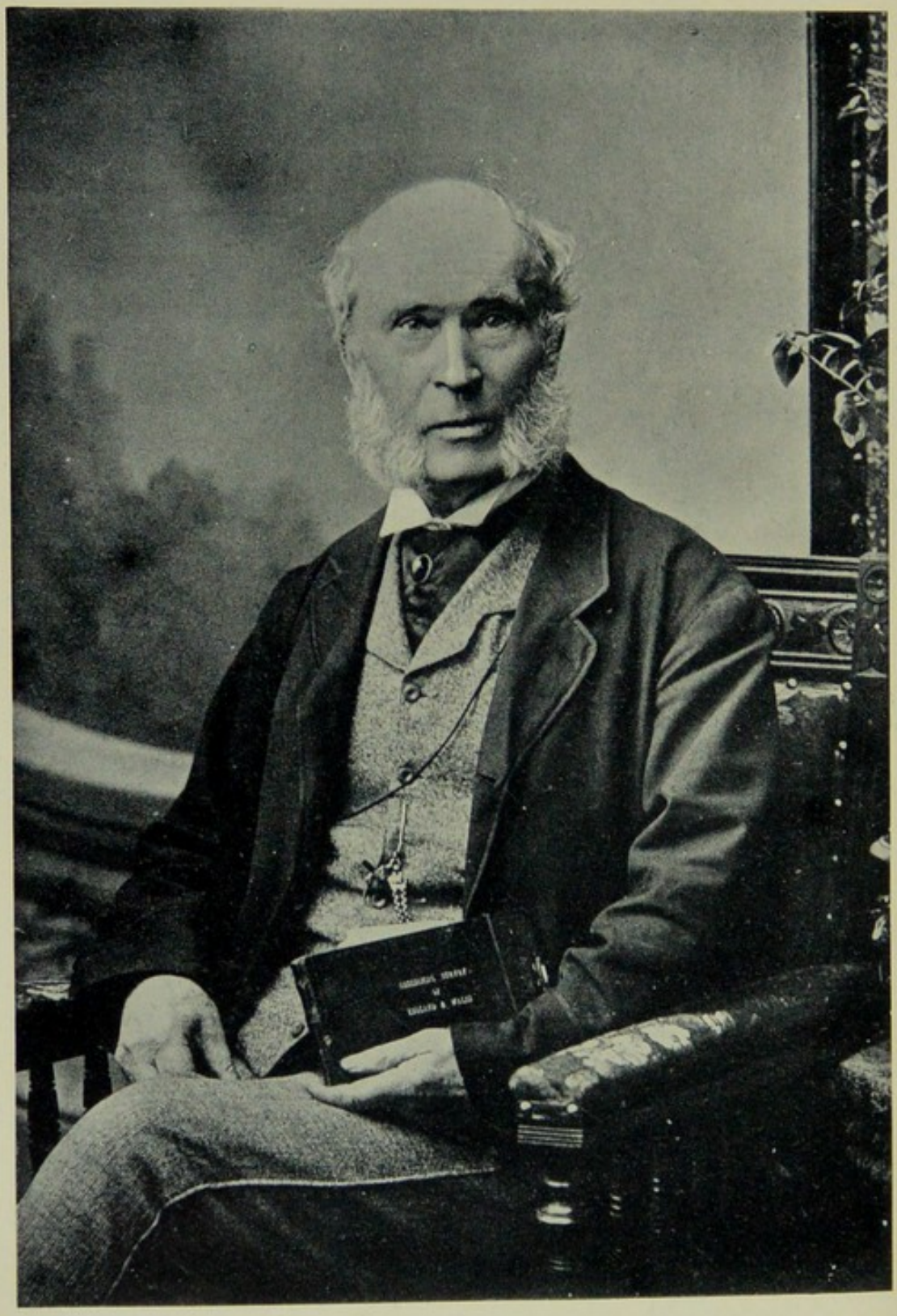


WARINGTON W. SMYTH.

SIR WARINGTON W. SMYTH, F.R.S.

WARINGTON W. SMYTH was born in 1817, at Naples, where his maternal grandfather was British consul. His father, Admiral Smyth, spent many years in the Admiralty Survey of the Mediterranean. The son was sent home to be educated in this country, and was placed at Westminster and Bedford Schools, subsequently entering Trinity College, Cambridge. Endowed with a constitution of rare vigour, and a passion for exercise, he threw himself with ardour into the sports of the University, forming one of the winning University crew in 1839. Leaving Cambridge with a travelling bachelorship, he spent more than four years in journeying over a large part of Europe, extending his rambles into Asia Minor, the borders of Kurdistan, Syria, and Egypt. Having already begun to look with interest on minerals and rocks, he made it one of his main objects, in this prolonged tour, to visit mines, and to see for himself how the various ores occur in nature. This prolonged absence not only gave him a wide experience of practical mining, but afforded him opportunities of cultivating that familiarity with foreign habits and foreign languages for which he was remarkable. Returning to this country in 1844 he was appointed Mining-Geologist on the staff of the Geological Survey. When, a few years later, in 1851, the School of Mines was organised, he was appointed Lecturer on Mining and Mineralogy, and he continued to give his mining lectures until his death. His wide knowledge of all that related to the extraction of minerals led to his being called upon to undertake many additional duties. He was appointed Chief Mineral Inspector to the Duchy of Cornwall, and besides acting as adviser to the Crown in all mining questions, he was often requested to give his services on Committees and Commissions. In 1879 he was appointed Chairman of the

Royal Commission which was formed to inquire into the subject of accidents in mines, and he had the main share in drawing up the voluminous report of the seven years of inquiry spent in this laborious and important investigation. It was more especially in recognition of this service that he received the honour of knighthood on the occasion of the Queen's Jubilee in 1887.

Early in life he wrote an account of his wanderings in the East, which appeared in 1854 under the title of *A Year with the Turks.* A few memoirs by him, chiefly on mineral veins and mining localities, found a place in the *Memoirs of the Geological Survey* and the *Transactions of the Geological Society of Cornwall.* He wrote occasional articles, such as that on Mining in Ure's *Dictionary*, likewise a small but standard treatise on Coal and Coal-mining, of which seven editions have appeared. For more than twenty years he served on the Council of the Geological Society, filling successively the office of Secretary, Vice-President, and President, and for the last seventeen years sitting at the Council table as Foreign Secretary. He was a Fellow of the Royal Society, a Fellow of the Royal Geographical Society, and President of the Royal Geological Society of Cornwall. A year before his death he was presented with the freedom of Penzance. Up to within the last year or two of his life he showed but little sign of advancing age. On June 19th, 1891, he attended the *conversazione* of the Royal Society. Next morning, sitting in his library with his students' examination papers before him, he quietly passed away, dying, as he had lived,—in harness.

Abridged from *Journ. Geol. Soc.* 1891. Pres. Addr.

LORD PLAYFAIR.

THE RIGHT HON. BARON PLAYFAIR OF ST. ANDREWS, P.C., G.C.B., LL.D., Ph.D., F.R.S.

LYON PLAYFAIR, son of Mr. George Playfair, Chief Inspector-General of Hospitals of Bengal, was born at Meerut, in India, in 1818. He was educated at St. Andrews, and at an early age developed a strong taste for Chemistry. He studied that science at the Andersonian University of Glasgow, under Professor Thomas Graham, from 1834 to 1837, and then went to Giessen to continue Organic Chemistry under Liebig.

On his return to Scotland, he undertook the management of Messrs. Thompson's large calico print works at Clitheroe, but in 1843 was appointed Professor of Chemistry at the Royal Institution. This post he held for one year only, for the then Prime Minister, Sir Robert Peel, offered him the office of Chemist to the Museum of Economic Geology, having its headquarters at that time in Craig's Court. Here Lyon Playfair remained until 1851, and took an active part in the organisation of the Great Exhibition of that year. On the transfer of the Museum to Jermyn Street, and the foundation of the "Government School of Mines, and of Science applied to the Arts," he was appointed Lecturer on "Chemistry applied to the Arts and Agriculture." On the establishment of the Science and Art Department of H.M. Board of Trade in 1853, Professor Playfair resigned the Chair of Chemistry at the School of Mines to become joint Secretary with Mr. Henry Cole of the new department. In 1856, upon the constitution of the Education Department of the Committee of Council on Education, he was appointed Inspector-General of Government Museums and Schools of Science. In 1858 Dr. Lyon Playfair severed his connection with the Department, upon his appointment to the Chair of Chemistry in the University of Edinburgh.

In 1868 he was elected as Member of Parliament for the Universities of Edinburgh and St. Andrews, which seat he retained for seventeen years. He held office as Postmaster General in 1873-74, and was appointed Chairman of Ways and Means, and Deputy Speaker of the House of Commons after the general election of 1880. In 1883 he was created K.C.B. and subsequently (in 1894) G.C.B.; 1885 saw him returned for the South Division of Leeds; and in Mr. Gladstone's Government of 1886 he was appointed Vice-President of the Council. After the dissolution he was again returned for South Leeds, a constituency which he continued to represent until his elevation to the Peerage, as Lord Playfair, of St. Andrews in 1892. He is a Lord-in-waiting, and a Privy Councillor to the Queen, and also to the Prince of Wales in the Duchy of Cornwall. Lord Playfair has acted either as Chairman, or as a member, of many Royal Commissions. He is a member of several of the learned Societies, a Commander of the Legion of Honour, and a Knight of numerous foreign orders.

Amongst other works, Lord Playfair has edited Baron Liebig's *Chemistry in its Application to Agriculture and Physiology*. He is also the author of many scientific memoirs, and has published numerous papers on such subjects as Free Trade, Labour and Wages, Currency, and general questions of Political Economy.

Lord Playfair has devoted much attention to the promotion of Technical Education for the people, and has published many addresses and reviews for the object of its advancement. The improvement of the public health in our large towns and industrial centres has also been one of his main objects in life.

Abridged from *Men and Women of Our Time*, 14th edition, by permission of the publishers, Messrs. Routledge and Sons.

JOHN PERCY.

From a Drawing by J. GILBERT, 1859.

JOHN PERCY, M.D., F.R.S.

Dr. John Percy, whose death occurred on June 20th, 1889, was born at Nottingham on April 23rd, 1817. In 1838 he graduated as Doctor of Medicine at the University of Edinburgh, and subsequently established himself in practice in Birmingham, where he conducted some important medical researches. Living in a metallurgical centre, he was led to take an interest in the principles of Metallurgy, and when the Royal School of Mines was founded in 1851, he was selected as the Lecturer on Metallurgy. This post he held until 1879, when, owing to want of space at the Jermyn Street Museum, the metallurgical laboratories were transferred to South Kensington. These changes not meeting with his approval, for the reasons given in his letter to the *Times* of August 24th, 1871, and, as set out in an article given as an Appendix to his work on the Metallurgy of Silver and Gold, he resigned the appointment that he had so ably held for twenty-eight years. No man in this or perhaps in any other country rendered more conspicuous service to Metallurgy than Dr. Percy did. The great work of his life was the preparation of an exhaustive treatise on this subject, the first volume of which appeared in 1861. He found Metallurgy practised as an empirical art, and by his teaching and researches he secured for it a scientific basis. He collected metallurgical knowledge from every source, and systematised and condensed that knowledge into a form convenient for reference. The work was never finished. Four volumes were published, in which the subjects of fuel, copper, zinc, iron, lead, and silver, were dealt with. The work has been translated by competent authorities into French and German, and remains the standard book of reference both here and on the

Continent. To his scientific attainments Dr. Percy added singular literary skill. He spared no pains and neglected no details. As a teacher he was very popular with his pupils. His lectures at the Royal School of Mines were enlivened by brilliant flashes of wit and scathing cynicism. All the leading metallurgists of the day studied under him, and the principal discoveries and improvements in Metallurgy made during the last thirty years have been, directly or indirectly, the outcome of his teaching.

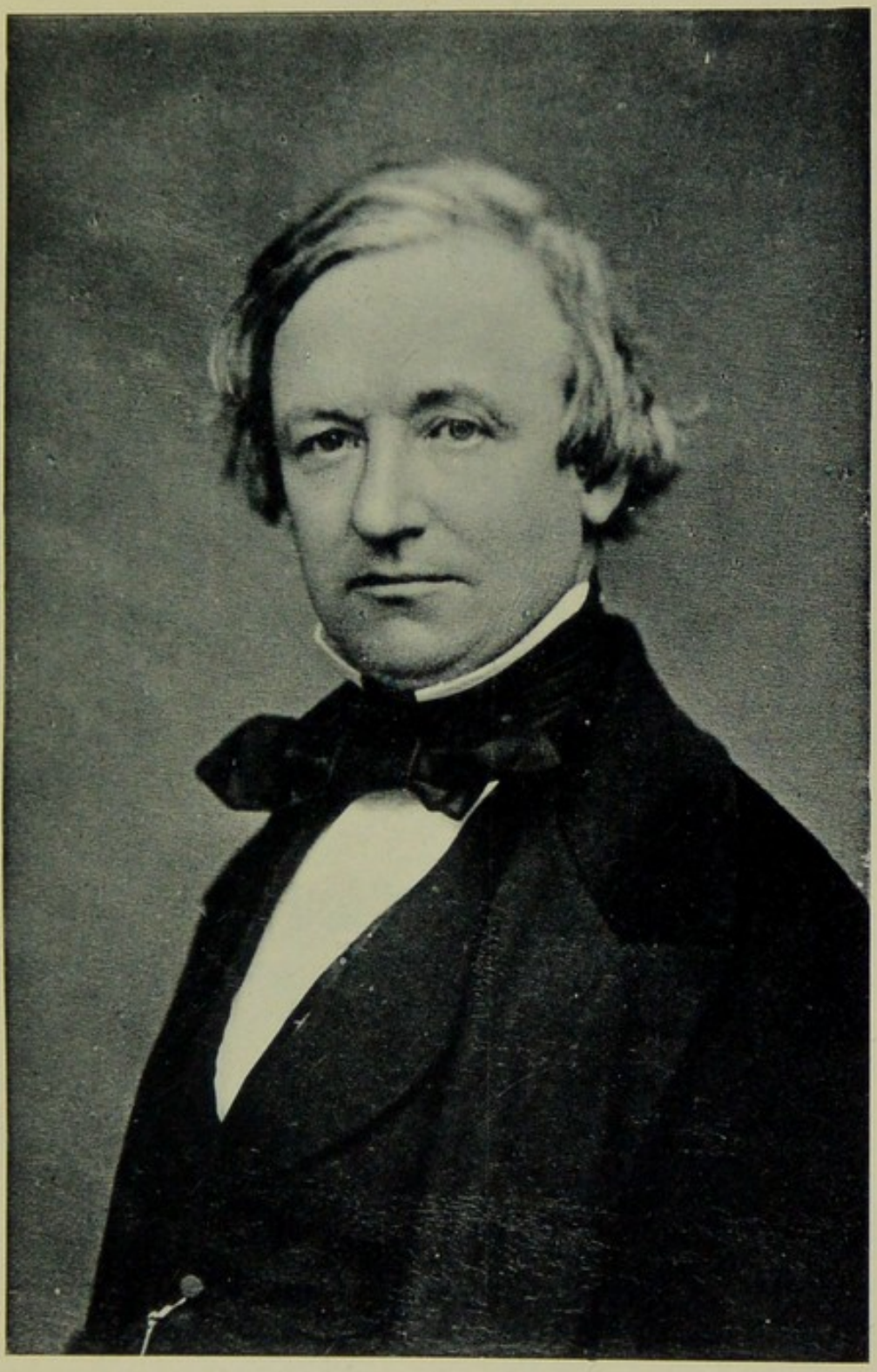
Thus, by pointing out in his lectures the necessity for dephosphorisation in the Bessemer converter, he induced his pupils, Messrs. Thomas, Gilchrist, Snelus, and Riley, to institute the researches that led to the introduction of the Basic Process. Again, in a paper written in 1848, he suggested the extraction of silver from argentiferous ores by its conversion into chloride, and subsequent solution in sodium hyposulphite. This paper ultimately fell into the hands of von Patera, and resulted, in 1858, in the introduction of the process now bearing his name. Dr. Percy's scientific achievements were fully recognised both in England and on the Continent. He was elected a Fellow of the Royal Society in 1847, and a Fellow of the Geological Society in 1851, of whose council he was a member from 1853 to 1856. He was also an honorary member of the Institution of Civil Engineers and of the Iron and Steel Institute. In 1877, he was awarded the Bessemer Medal by the last-named body, and in 1885 he was elected their President. The Society of Arts awarded him the Albert Medal for the year 1889, and the freedom of the Turners' Company was conferred on him. In appearance Percy was very tall and spare, and had strongly marked features. Shy in his early years, he became fond of society later, and received many friends at his home, first at Craven Hill, and afterwards at Gloucester Crescent, Bayswater. He frequented the Athenæum and Garrick Clubs, and was of a genial, though at times brusque, temper. He took an interest in social and political questions, on which he wrote many trenchant letters to the *Times*, under the signature "Y". He was a great collector of treasures of Art and Science, and his house in Bayswater was a perfect museum. A fair artist himself, he made a valuable collection of water-colour drawings and engravings, which were

dispersed at his death. The most important of his collections, consisting of an unrivalled series of metallurgical products, has been acquired for the collections of the Royal School of Mines at South Kensington.

Obituary notices will be found in *Proc. Geol. Soc.* 1890, p. 45, Pres. Addr. and Lee's *Dictionary of National Biography*, vol. xliv., notice by P. J. Hartog. Other notices to be found in *Men of Our Time*, 11th edition; *Athenæum* 1889, i. 795; *Temple Bar*, lxxxix. 354, "A Many-Sided Man," by Mrs. Andrew Crosse; *Journ. Iron and Steel Inst.* 1889, i. 210; *Proc. Roy. Soc.* 1890.

ROBERT HUNT, F.R.S.

ROBERT HUNT was born at Plymouth Dock (now Devonport) on September 6th, 1807. He was the posthumous son of a naval officer who had perished with H.M.S. *Mocheron* in the Grecian Archipelago. Hunt attended schools at Plymouth and Penzance, and was then placed with a surgeon practising at Paddington. He here acquired some knowledge of Practical Chemistry, a little Latin, and studied Anatomy; and for nine years he remained in London in connection with Medicine. Inheriting a small property on the Fowey, in Cornwall, he settled in that county for a time, and in the year 1829 established a Mechanics' Institute in Penzance, where he had set up as Chemist and Druggist. Thence he again moved to London and found employment with a firm of chemical manufacturers. On the discovery of Photography he began a series of careful experiments, the results of which he published in the *Philosophical Transactions*. In 1840, being appointed Secretary of the Royal Cornwall Polytechnic Society, he went to live at Falmouth, where he devoted himself to scientific research. He published his *Popular Treatise of the Art of Photography* in 1841, which passed through six editions, and he wrote the article "Photography," for the *Encyclopædia Metroplitana*, which was afterwards (1851) published separately. At this time Hunt also distinguished himself by experimenting on electrical phenomena in mineral veins, and by some papers on the application of the steam engine in pumping mines. Sir Henry De la Beche, who about this time was working in the West of England on the Geological Survey, made Hunt's acquaintance, recognised his merits, and in 1845 recommended him as successor to Mr. T. B. Jordan in the Government appointment of "Keeper of the Mining Records," an office which he discharged for thirty-seven



ROBERT HUNT.

by Maull & Fox, London.

years. In 1851, upon the foundation of the Government School of Mines, Hunt was appointed Lecturer on "Mechanical Science, with its Applications to Mining." In 1853, Professor Willis being appointed Lecturer on Mechanics, Hunt continued for a short time as Lecturer on "Experimental Physics." This post he resigned in 1854, in order to give more time to the Mining Record Office.

Robert Hunt drew up the "Synopsis" and the *Handbook* for the Scientific work of the 1851 Exhibition, and he was also engaged in much of the preparatory work for the 1862 Exhibition. He was elected a Fellow of the Royal Society in 1854. In 1859 Hunt called a meeting to consider how best technical instruction might be given to those engaged in mining in Cornwall. At this meeting the "Miners' Association of Cornwall and Devon" was instituted. In this same year he was made President of the Royal Cornwall Polytechnic Society. In 1866 he was appointed a member of the Commission to inquire into the amount of coal remaining in the British Isles.

Hunt edited three editions (1860, 1867, 1875) of Ure's *Dictionary of Arts, Manufacturers, and Light.* Amongst his other works may be mentioned *Researches on Light*, 1844; *Elementary Physics*, 1851; and *British Mining*, his last work, published in 1884, and containing a mass of valuable information. He was also author of a popular guide to the Museum of Practical Geology. He died at Chelsea, on October 17th, 1887. A "Robert Hunt Memorial Museum" has since been established to his memory at Redruth, in Cornwall.

Notes from Lee's *Dictionary of National Biography*, vol xxviii. notice by R. E. Anderson. Also *Athenæum*, October 22nd, 1887; *Times*, October 20th, 1887; *Western Morning News*, March 27th, 1889; *Biography*, August 1881; Boase and Courtney's *Bibl. Cornub.*

THE REV. ROBERT WILLIS, M.A., F.R.S.

ROBERT WILLIS was born in London in 1800. He completed his education at Caius College, Cambridge, where he took his degree, and became a Fellow of his college in 1826. In 1828-29 he read before the Cambridge Philosophical Society some remarkable papers on Acoustics, and on the Mechanism of the Larynx. He invented the "Lyophone"; the "Odontograph" for regulating the construction of toothed wheels; and several other mechanical instruments. In 1830 he was elected a Fellow of the Royal Society. He was also one of the original members of the British Association. In 1832 he set out on a tour of architectural study through France, Germany, and Italy, and the results of his observations appeared in his "Remarks on the Architecture of the Middle Ages, 1835." In 1837 he was appointed Jacksonian Professor of Natural and Experimental Philosophy, in the University of Cambridge. "As a lecturer," says the *Saturday Review* (March 13th, 1875) "he was simply perfect. The power, the clearness, the vividness, with which he brought forth every point, left absolutely nothing to be wished for." He united profound theoretical knowledge with extensive and minute technical and historical knowledge. In addition to his official lectures, he delivered scientific addresses before the Royal Institution, the Cambridge Philosophical Society, the Royal Institute of British Architects, and at the meetings of the Archæological Institute.

In 1853, shortly after the establishment of the School of Mines, Professor Willis was appointed Lecturer on Applied Mechanics, which post he retained for fifteen years. The great subject, however, to which Professor Willis applied himself was the study of "Architectural History." His reputation is unique as Architectural Historian of many of the great churches of England. Amongst his published

ROBERT WILLIS.

y Maull & Polybank, London.

works are: *The Principles of Mechanism*, 1841; *The Architectural History of Canterbury Cathedral*, 1845; *Architectural Nomenclature*, 1866; and many other books on architectural subjects. He died at Cambridge, February 28th, 1875, in his seventy-fifth year.

The portrait is from a photograph of Professor Willis, taken about the time that he lectured at the School of Mines.

SIR GEORGE GABRIEL STOKES, BART., D.C.L., LL.D., D.Sc., F.R.S.

GEORGE GABRIEL STOKES was born in 1819, at Skreen, co. Sligo, in Ireland. He was educated at a Dublin school, at the Bristol College, and at Pembroke College, Cambridge, where he took his B.A. degree in 1841, as Senior Wrangler, and was elected to a Fellowship. In 1849 he was appointed to the Lucasian Professorship of Mathematics at the University of Cambridge. In 1852 he was elected a Fellow of the Royal Society; in the same year he was awarded the Rumford Medal in recognition of his services to the cause of Science, by his discovery of the change in the refrangibility of light; and in 1854 he was chosen one of its secretaries.

In this same year he was appointed Lecturer on Physics at the school attached to the Museum of Practical Geology in Jermyn Street, then known as the "Metropolitan School of Science, applied to Mining and the Arts." He occupied this post till the year 1860, when he retired. Professor Stokes was President of the British Association when it met at Exeter in the year 1869. In 1885, on Professor Huxley's retirement, he was elected President of the Royal Society. He retired in 1890, when he was succeeded by Sir William Thomson (now Lord Kelvin). In 1893 he received the Copley Medal of the Royal Society. On the death of Mr. Beresford-Hope in 1887, Professor Stokes was returned as one of the Members of Parliament for the University of Cambridge, and as such he sat in the House until the year 1892. In 1889 he was created a Baronet of the United Kingdom.

Sir George Gabriel Stokes has contributed largely to the *Transactions* of several Learned Societies. In 1887 he published a book *On Light*, being three courses of Burnett lectures, which he delivered at Aberdeen in 1883-4-5; and in 1891 and 1893 he

GEORGE GABRIEL STOKES.

published two courses of lectures on "Natural Theology" which he had delivered in Edinburgh as Gifford Lecturer. He has also at times contributed articles on religious topics to current literature.

He is an Honorary Fellow, or Corresponding Member, of several foreign academies, and has received the Prussian order Pour le Mérite. He has received the honorary degree of D.C.L. from the University of Oxford, and LL.D. from the University of Edinburgh, Dublin, and Aberdeen, as well as the honorary degrees of LL.D. and D.Sc. from his own University. He is also a Member of the Asiatic Society of Bengal, and an Honorary Member of the Institution of Civil Engineers.

The portrait is from a photograph by G. C. Wallich, Esq., M.D., published in *Eminent Men of the Day*, and is reproduced by permission of the publishers Messrs. Gurney and Jackson (late Van Voorst).

AUGUST WILHELM VON HOFMANN, Ph.D., LL.D., F.R.S.

AUGUST WILHELM HOFMANN, the son of John Phillipp Hofmann, a German architect of repute, was born at Giessen, April 8th, 1818. After his preliminary education he entered the famous University of his birth-place, in order to study Law. About this time the construction of Liebig's new laboratory was committed to the elder Hofmann. Friendly relations arose between the architect and Professor Liebig, which led to the younger Hofmann's giving up the legal profession in order to devote himself to the study of Science and Mathematics. He eventually entered Liebig's laboratory to study Practical Chemistry.

In 1842 Baron Liebig made a tour through this country, visiting the houses of many of our noblemen, and lecturing on Chemistry in our chief towns. For a time, Chemistry—a science little considered in this country up to this period—became amazingly popular. Laboratories were opened all over the country to receive pupils who wished to study the subject practically. In 1845 the Royal College of Chemistry was founded as a national institution, under Royal patronage, where lectures should be delivered to the public, laboratory training granted to students at low fees, and analyses conducted for the benefit of subscribers. Hofmann, then "Privat Docent" at Bonn, upon Liebig's recommendation was asked to become the Professor of Chemistry to the College. He hesitated at first, but being, through the influence of the late Prince Consort, appointed Extraordinary Professor of Chemistry at Bonn with an immediate grant of two years' leave of absence, he was able to come to England, with the assurance that, should the new institution prove a failure, he might return to take up his work in Germany without loss.

AUGUST WILHELM HOFMANN.

Taull & Polybank, London.

On arriving in London, Hofmann exerted himself to make the College a success. During the first year he superintended the erection of the new building in Oxford Street, and the fitting up of the laboratories. Then, with indefatigable energy, he began to direct the educational department of the College, and to initiate important researches and investigations. The two volumes issued in 1849 and 1853, entitled *Reports of the Royal College of Chemistry* and *Researches Conducted in the Laboratories*, show how successful were his endeavours in these directions.

Through all the adverse influences of its eight years' independent existence, with public interest diminishing and subscriptions falling off year by year, Hofmann did everything in his power for the College. He resigned his house in Hanover Square, previously held with the College, in order that it might be underlet. He voluntarily surrendered a considerable portion of his salary, and his share of the students' fees; while he took upon himself the arduous duties of Secretary, in addition to his professional duties. At the same time he maintained the strictest economy in the management of the whole Institution.

About the year 1852 it became evident to the Council of the College that the Institution could not be kept in existence without State assistance. Dr. Lyon (now Lord) Playfair resigning the Chair of Chemistry at the Government School of Mines, in 1853, Hofmann was asked to succeed him. The Council of the College of Chemistry then offered their building in Oxford Street, valued at £3000, to the Government, who, realising the inadequate accommodation for laboratory practice, already existing in connection with the School of Mines, accepted the proposal. Hofmann, therefore, as Professor of Chemistry to the School of Mines, continued to conduct the work in Oxford Street, much upon its old lines.

In 1851 Hofmann was elected a Fellow of the Royal Society, and in 1854 was awarded its Royal Medal. The following year he was appointed Warden of the Royal Mint. In 1863 he left England to return to Bonn, and in the next year, resigning the Chair of Chemistry at the School of Mines, he was called to Berlin, where he spent the remainder of his life as Professor of Chemistry in the

University. He continued, after leaving England, to communicate many of the results of his research work to the Royal Society, and in 1875 received the Copley Medal. He had been elected a Foreign Member of the Chemical Society in 1845, and he became an ordinary member in 1849. He acted as Foreign Secretary of the Royal Society from 1847 until elected President in 1861. He delivered the "Faraday" Lecture in 1875, taking as his subject Liebig's work.

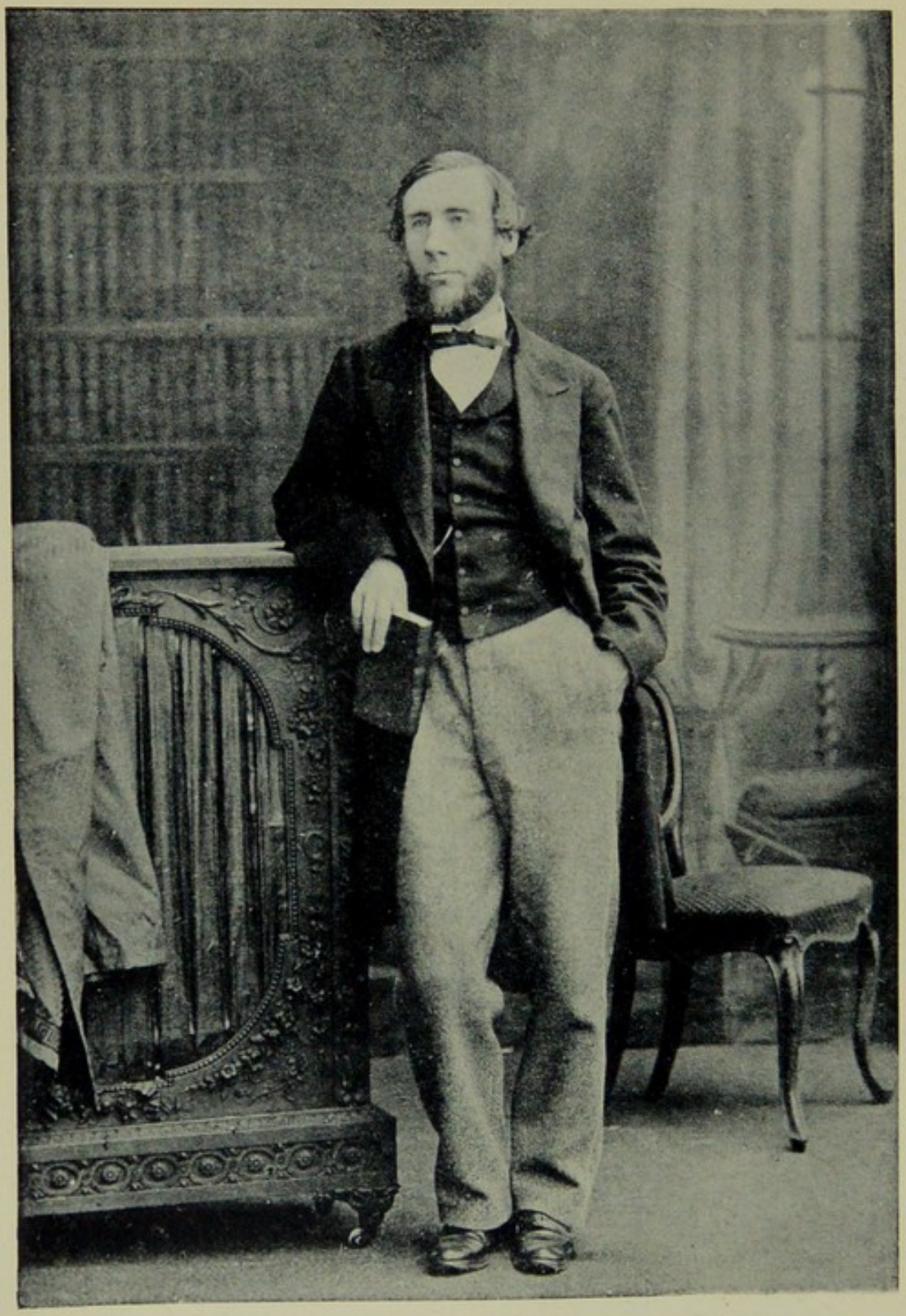
Hofmann died on May 5th, 1892, in his seventy-fifth year. His funeral, which took place at Berlin, was attended with great ceremony, the Minister of Education, and numerous officials of his Department, all the members of the Berlin Academy, and almost all the professors and students of the University, accompanying the procession.

An account of Hofmann's scientific work, and of its great influence upon English Chemistry and English Commerce; of the early history of the College of Chemistry, and of the researches which led to the foundation of the great Coal-tar Colour Industry by his pupils;—is given in the "Hofmann Memorial Lectures" delivered by Lord Playfair, Sir F. A. Abel, Dr. Perkin, and Dr. Henry E. Armstrong, before the Chemical Society in 1893, and published in the June number of its *Journal*, 1896.

The German Chemical Society, since Hofmann's death, has determined to found an Institute, for Chemical and General Scientific Research, to his memory.

Notes from the "Hofmann Memorial Lectures" (*Journ. Chem. Soc.*, June 1896); *Nature*, May, 1892, obituary notice; "Hofmann and Modern Chemistry" (*Quart. Journ. Science*, vol. iii., January 1866); "A Page of Scientific History" by A. W. Hofmann (*Quart. Journ. Science*, April 1871).

The portrait is from a photograph taken about the time that Dr. Hofmann was Lecturer on Chemistry at the Royal School of Mines.



JOHN TYNDALL.

Photograph by Ernest Edwards, London.

JOHN TYNDALL, D.C.L., LL.D., F.R.S.

JOHN TYNDALL was born at Leighlin Bridge, in County Carlow, Ireland, on the August 21st, 1820. Here he spent his early years, and received instruction in the school of one John Conwill. On leaving school at the age of nineteen he obtained an appointment as Assistant in the division of the Ordnance Survey at Carlow, under Colonel Owen Wynne. Two years later he came to England, and received employment in levelling, surveying and drawing, under a Manchester firm of railway engineers, during the first press of railway construction.

In the year 1847, making the acquaintance of the late George Edmondson, Tyndall was persuaded by him to become a teacher of Mathematics and Surveying in the Greenwood College, where, at that time, Dr. Frankland was Chemist. Towards the end of 1848 he accompanied Frankland to Marburg, where he studied Chemistry under Bunsen, and also attended the classes in Mathematics and Physics. In 1850 he graduated in the Philosophical Faculty, taking as his subjects Mathematics, Chemistry, and Physics. It was about this time that Tyndall met with Professor Knoblauch, to whom he owed the initiation of the love for physical research to which he subsequently devoted himself. It was in 1850 that Tyndall, in conjunction with Knoblauch, published the results of their experiments on *The Deportment of Crystallised Bodies between the Poles of a Magnet.* During the following thirty-three years he published some hundred and thirty-five papers, mostly on subjects connected with physical research. From Marburg he went to Berlin, where he continued his investigations in the laboratory of Magnus, remaining there one year. He then returned to England to await the advent of some suitable appointment.

On February 11th, 1853, he delivered, on the invitation of Dr. Bence Jones, at the Royal Institution, his first public lecture on "The Influence of Material Aggregation upon the Manifestation of Force." The phenomenal success of this lecture, which took the audience by storm, established Tyndall's reputation as an expositor of Experimental Science, and in the following July he was unanimously elected, on Faraday's proposal, Professor of Natural Philosophy in the Royal Institution. Here in the Physical Laboratory the greater part of Tyndall's research work was performed. From 1860 to 1868 he also held the post of Lecturer on Physics at the Royal School of Mines, but at that time there was not sufficient accommodation at Jermyn Street for a laboratory, either for himself or his students. In 1887, owing to continued ill-health, Tyndall was obliged to resign the professorship of Natural Philosophy at the Royal Institution, much to the regret of the managers. He continued, however, to act as Honorary Professor, and, as such, delivered a course of lectures each year.

Professor Tyndall held the post of Examiner in the Royal Military Colleges, and in the University of London. In 1866 he succeeded Faraday as Scientific Adviser to the Trinity House, and held that office for seventeen years. In 1872 he went on a lecturing tour to the United States. So popular were his lectures, and so successful were the results, that he realised a sum of between £6000 and £7000, the whole of which he generously devoted to the encouragement of scientific training in the United States.

Dr. Tyndall was elected a Fellow of the Royal Society in 1852. He received its Royal Medal in 1853, and its Rumford Medal in 1864. He held the degrees of D.C.L. (Oxford), and LL.D. (Cambridge, Dublin, and Edinburgh). He was honorary member of a large number of scientific societies and academies.

During the latter years of his life Tyndall suffered considerably from ill-health. He died on December 4th, 1893, in his seventy-fourth year, from an overdose of chloral, accidentally administered.

Professor Tyndall's fame among contemporaries was due mainly to the fact that he was a masterly expositor of the results of Science, an unrivalled experimentalist, and an unsurpassed controversialist. His researches embraced a wide circle of subjects in

the domain of Physics—in Light, Sound, Magnetism, Electricity, and, above all, in Heat. Among his chief works are *The Glaciers of the Alps*; *Heat Considered as a Mode of Motion*; a volume on Sound, and one on Light; two volumes of collected Memoirs; *Fragments of Science: a Series of Detached Essays:* and *Addresses and Reviews*, fifth edition, 1876.; etc.

Professor Tyndall presented to the College of Science the sum of £100, the interest of which is given in the form of a Prize of Books, for proficiency in Physics.

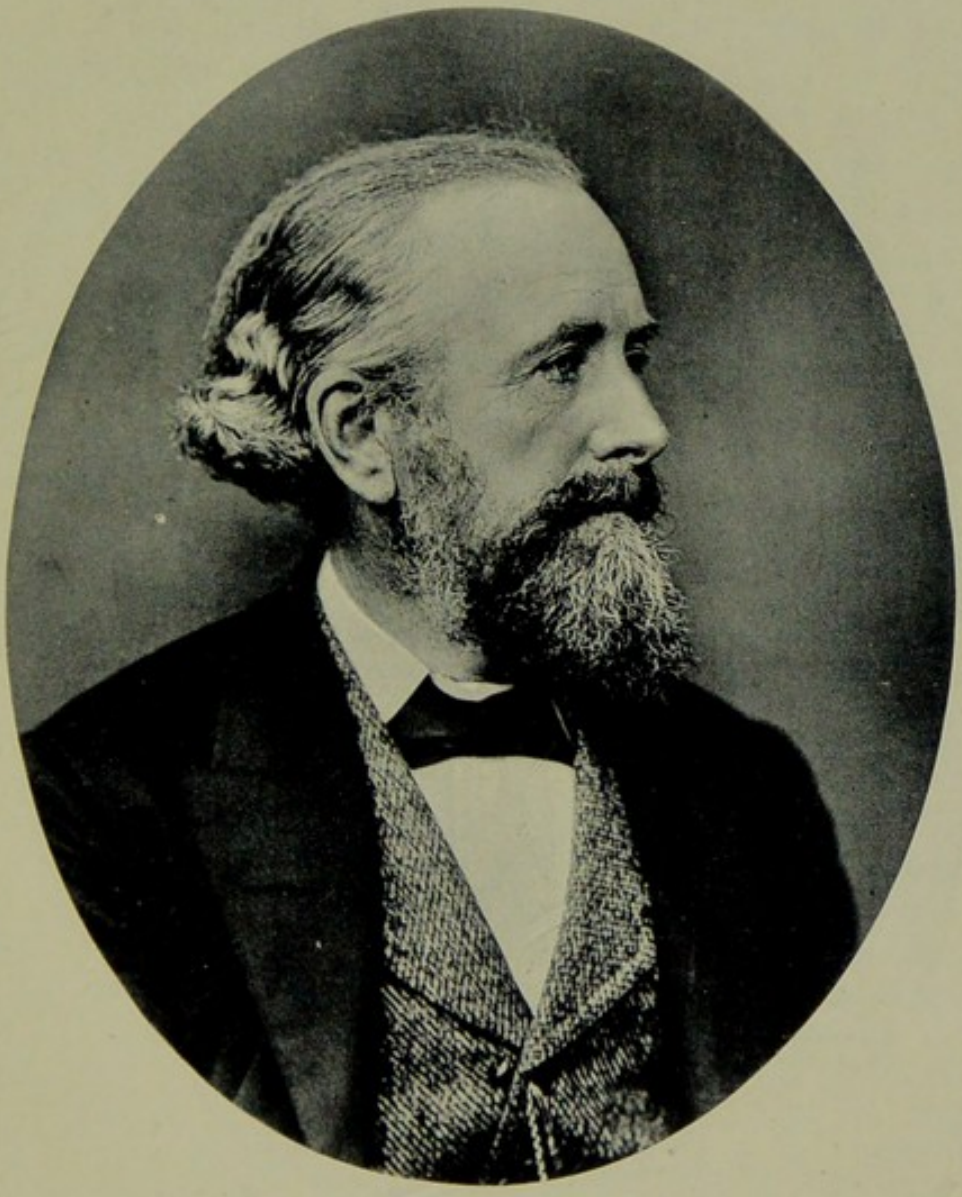
Notes from *Proc. Roy. Soc.*, obituary notice by Dr. Edward Frankland, F.R.S.; *Times*, December 5th, 1893, obituary notice and leading article; *Nature*, August 20th, 1874, notice by H. Helmholtz, and December 7th, 1893, obituary notice; *Fortnightly Review*, February 1894, article by Mr. Herbert Spencer; *Men and Women of our Time*, 13th edition; *Quart. Journ. Geol. Soc.*, May 1894, obituary notice in Pres. Addr. by W. H. Hudleston, F.R.S.

The portrait is from a photograph taken about the time that Professor Tyndall was Lecturer on Physics at The Royal School of Mines.

EDWARD FRANKLAND, M.D., D.C.L., LL.D., Ph.D., F.R.S., J.P.

EDWARD FRANKLAND was born in 1825, and educated at the Grammar School, Lancaster, the Museum of Practical Geology, London, and the Universities of Marburg and Giessen. He was appointed Lecturer on Chemistry at the College of Civil Engineers, Putney, in 1849, and Professor of Chemistry in Owens College, Manchester, in 1851 ; in St. Bartholemew's Hospital in 1857 : and in the Royal Institution of Great Britain in 1863. In 1865, upon the retirement of Professor Hofmann, he was appointed to the Chair of Chemistry in the Royal College of Chemistry, Oxford Street, then affiliated to the Royal School of Mines.

From the time that Frankland took charge of the laboratories he had constantly represented that great additional space was required for the numbers who came there for instruction. In time his representations were submitted to the Lords of the Privy Council on Education, and they directed the construction of the Chemical Laboratories at South Kensington. Four years after, the Chemical Department of the Royal School of Mines was moved to South Kensington, and the result was so beneficial that the entry of students was almost at once doubled. In 1881 various changes were made, and the name of the allied Institutions was changed to that of "The Normal School of Science and Royal School of Mines." Professor Frankland retained the Chair of Chemistry until the year 1885, when he retired. He was elected a Fellow of the Royal Society in 1853, a Corresponding Member of the French Academy of Sciences in 1866, a Foreign Member of the Royal Academy of Sciences in Bavaria in 1869, and subsequently of the Academies of Sciences of Berlin, St. Petersburg, Upsala, America, and Bohemia. He was elected President of the Chemical Society in 1871, and first President of the Institute of Chemistry in 1877.



EDWARD FRANKLAND.

Dr. Frankland is the author of *Researches on the Isolation of the Radicals of Organic Compounds, and other Researches in Organic Chemistry*, for which he received, in 1857, a gold medal from the Royal Society; also of many other papers and memoirs on scientific subjects published in the *Transactions* of the Learned Societies. Amongst other of his works may be mentioned *Researches in Pure, Applied and Physical Chemistry*, which embodies a considerable part of his various investigations. He is joint author, with Professor Norman Lockyer, of *Researches connected with the Atmosphere of the Sun*. Dr. Frankland has always been considered one of the first authorities on hygiene, more particularly on the question of water supply and its purity. He was nominated one of Her Majesty's Commissioners for inquiring into the pollution of rivers in 1868. For a period of over thirty years he has made monthly analyses of the water supplied to London by the various water companies, and has reported thereon to the Registrar General and the Local Government Board. A result of this supervision of the water companies has materially improved the purity of the water supply. In 1887 he reported to the International Congress of Hygiene at Vienna on the present state in England of the purification of sewage, with special reference to the prevention of river pollution. In 1889 Dr. Frankland was appointed a Justice of the Peace for the Counties of London and Surrey. In 1894 he received the Copley Medal—the highest honour the Royal Society has to bestow. In 1895 he was elected one of the eight Foreign Associates of the French Academy of Sciences, and was appointed Foreign Secretary of the Royal Society.

FREDERICK GUTHRIE, Ph.D., F.R.S.

FREDERICK GUTHRIE, though a Scotchman by descent, was born at Notting Hill, London, in 1833. After private tuition from the chemist, Henry Watts, F.R.S., in his twelfth year, he was sent to University College School, from whence he proceeded to the University College. Here he studied Chemistry under Professors Graham and Williamson, and Mathematics under De Morgan, and graduated in Arts at the age of nineteen. Early in 1854 he went to Germany, where he received further chemical training in the University of Heidelberg under Bunsen; and at Marburg under Kolbe; taking at the latter place his degree of Ph.D. During this time he contributed a number of papers on Organic Chemistry to Liebig's *Annalen*, the *Journal of the London Chemical Society*, and to the *Proceedings of the Royal Society of Edinburgh*. On his return to England in 1855 he took his B.A. degree at London, and the following year was appointed Demonstrator in Chemistry under Dr. Frankland at Owens College, Manchester. Later, in 1859, he held the same post under Dr. Lyon Playfair at Edinburgh. In 1861 he accepted the offer of an appointment to the Professorship of Physics in the Royal College, Mauritius. Whilst there, he continued his scientific investigations, and contributed a paper on "A Speculation touching the Nature of Solar Ether" to the *Philosophical Magazine*; also two papers to the Royal Society—one on "Drops" in 1864; the other on "Bubbles" in 1865. In 1868 he succeeded Dr. Tyndall as Lecturer on Physics at the Royal School of Mines at Jermyn Street; and he occupied the chair of Physics from the time of the transfer of that department of the School to South Kensington, until his death. In recognition of Dr. Guthrie's important work in scientific research, he was elected

FREDERICK GUTHRIE.

raph by J. White, Littlehampton.

a Fellow of the Royal Society of Edinburgh in 1859, and a Fellow of the Royal Society of London in 1871. He was the founder of the Physical Society of London in 1873. Its meetings were held in his rooms at South Kensington. It was not, however, until 1884 that he consented to become its President.

Professor Guthrie was an authority upon "Science Teaching," and he delivered three Cantor Lectures on that subject before the Society of Arts in 1886. His own teaching was always essentially experimental and practical. He was a good French and German scholar, and had high literary ability. His chief scientific books were *Elements of Heat, and Non-Metallic Chemistry*, 1868; *Magnetism and Electricity*, 1873; *Introduction to Physics*; and *The First Book of Knowledge*. He also wrote some forty papers on Chemistry and Physics. He died on October 21st, 1886.

Notes from Stephen and Lee's *Dictionary of National Biography*, vol. xxiii., notice by W. Jerome Harrison; *Proc. Physiolog. Soc.* 1887," vol. viii. p. 9–13, notice by Professor Carey Foster; *Nature*, November 4th, 1886, pp. 8–10.

THOMAS MINCHIN GOODEVE., M.A., Barrister-at-law.

THOMAS MINCHIN GOODEVE took his degree of Master of Arts at St. John's College, Cambridge, in 1846. In 1843 he had been Ninth Wrangler, under the disadvantage of being present during only four out of the six days of the Senate House Examination.

He was appointed Lecturer on Applied Mechanics in the Royal School of Mines in 1869 ; and subsequently, upon the re-organisation of the School, he was appointed Professor of Mechanics and Mathematics at the Royal College of Science, which post he occupied until his resignation in 1894. He held for several years the Professorship of Natural Philosophy and of Manufacturing Art at King's College, London ; and later the Professorship of Applied Mechanics and Physics at the Royal Military Academy, Woolwich.

Mr. Goodeve was called to the Bar on January 27th, 1862, and has had a considerable practice, chiefly connected with Patent Cases. He is the author of a number of well-known text-books, including *The Elements of Mechanism*, *A Text-Book on the Steam Engine*, *The Principles of Mechanics*, *The Gas Engine*, and *An Abstract of Reported Cases relating to Letters Patent for Inventions*.

THOMAS MINCHIN GOODEVE.

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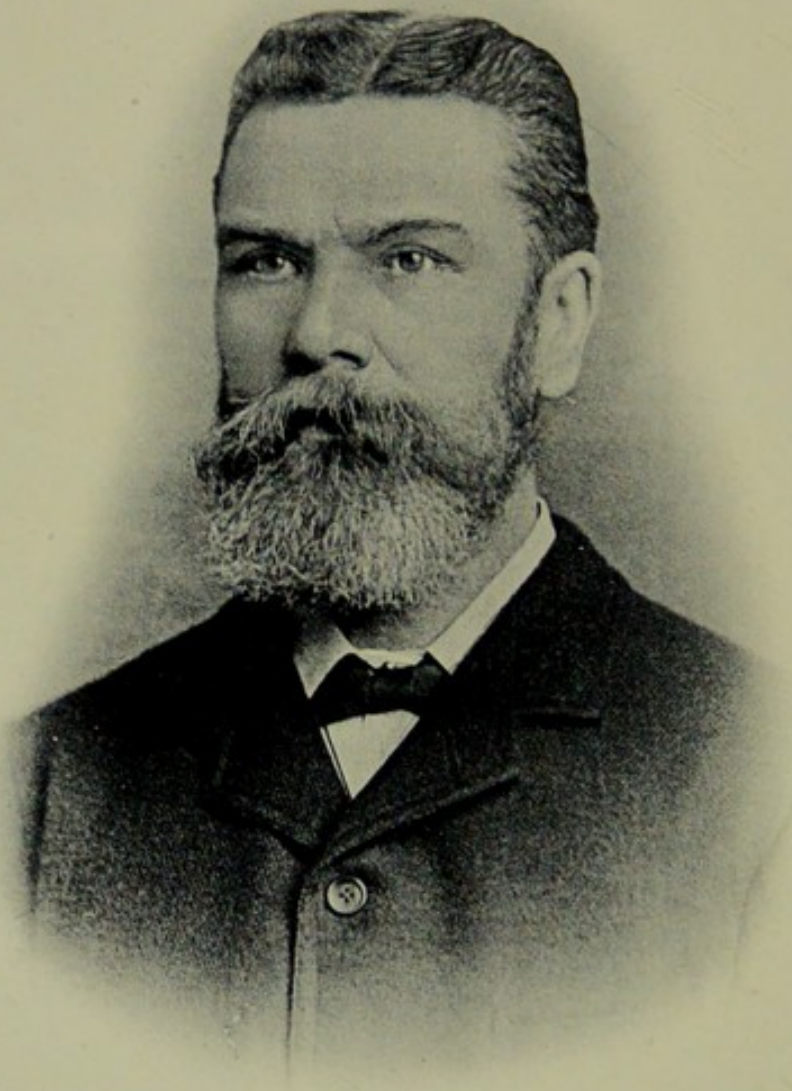


JOHN W. JUDD.

Photograph by MAYALL & CO., LONDON.

PROFESSOR JOHN W. JUDD, C.B., L.L.D., F.R.S., F.G.S.

JOHN W. JUDD was born at Portsmouth, February 18th, 1840. He was educated in London, and was for some years engaged in teaching, first in London, and afterwards in Lincolnshire. His taste for scientific work, more particularly for Geology, induced him in 1863 to enter the Royal School of Mines in Jermyn Street, where he attended the lectures during nearly a year and a half. In 1864 he was appointed Analytical Chemist to one of the great iron-and-steel works at Sheffield. It was here that a railway accident disabled him for a time, and seriously interrupted his work. When sufficiently recovered, Mr. Judd devoted himself to geological investigation on his own account, and began a survey of the county of Lincolnshire, some of the results of which were published in a series of memoirs on the Neocomian strata. In 1867 he was invited to become a Member of the Staff of the Geological Survey of England and Wales, under Murchison. For four years he was engaged in mapping Rutland and the adjoining counties, and in working out the relations between the Jurassic rocks of the Midland district, and those of the Northern and Southern areas in England. The results of these labours are recorded in his book on the Geology of Rutland. In 1871 Mr. Judd was induced by his friend, the late Matthew Arnold, to act with him for a time as School Inspector. After a year of this work, however, he returned to his geological pursuits, and undertook privately the special investigation of the Secondary Strata of the Scottish Highlands. Not only was he able to show what are the true relations of the great series of Triassic and Jurassic rocks in that area, but he also discovered and studied very interesting deposits of Carboniferous and Cretaceous age, the existence of which, in that district, had been previously overlooked. These studies led

him to investigate the relics of the great Tertiary volcanoes of the Western Isles of Scotland; and during several years he was engaged in travelling in various volcanic regions, and in visiting the chief Universities and Mining Schools of the Continent. In 1876 he was appointed to the Chair of Geology at the Royal School of Mines, Jermyn Street, as successor to the late Sir Andrew Ramsay. In 1877 Professor Judd was elected a Fellow of the Royal Society. From 1877 to 1885 he was Secretary to the Geological Society, and during the years 1886 and 1887 held the office of President of that Society. In 1885 he presided over the Geological section of the British Association at Aberdeen. In 1891 the Geological Society awarded him the Wollaston Medal, in recognition of his great services to Geological Science.

In 1895 Professor Judd was appointed Dean of the Royal College of Science, as successor to the Right Hon. T. H. Huxley, and in the same year was created Civil Companion of the Most Hon. Order of the Bath. Professor Judd is the author of *The Geology of Rutland*, *Volcanoes; what they Are, and what they Teach*; and of the Geological portion of the Monograph on the Eruption of Krakatoa, issued by the Royal Society. He is the editor of the English edition of Behrens' *Microchemical Analysis*, and of the *Student's Lyell*, and has written many memoirs for the *Proceedings* and *Transactions of the Royal Society*, the *Quarterly Journal of the Geological Society*, the *Mineralogical Magazine*, *Geological Magazine*, and other serials.

W. CHANDLER ROBERTS-AUSTEN.

tograph by W. & D. Downey, London.

PROFESSOR W. C. ROBERTS-AUSTEN, C.B., F.R.S. A.R.S.M.

W. CHANDLER ROBERTS-AUSTEN, who is entrusted with the duties of the ancient office of the "Queen's Assay Master," is the son of George and Maria Louisa Roberts. His father's ancestry were Welsh, and his mother belonged to the old Kentish family of Chandler, which intermarried with the Hulses and Austens, and included among their more distinguished members the learned scholar, Isaac Casaubon, Canon of Canterbury. In 1885, at the request of his uncle, the late Major Austen, J.P., of Haffenden and Camborne, in Kent, Mr. Roberts obtained Royal licence to take the name of Austen. Mr. Roberts-Austen entered the Royal School of Mines in 1861, with a view to becoming a Mining Engineer; he completed his course in 1863, and on obtaining the Associateship his services were at once secured by the late Professor Graham, then Master of the Mint. With him he conducted a remarkable series of researches, and on Professor Graham's death in 1869, he succeeded him in the appointment of "Assayer to the Mint," and in 1882 he was entrusted with all the duties of the "Queen's Assay Master." In 1880, on the retirement of the late Dr. Percy, F.R.S., at the request of the then Lord President of the Council, Mr. Roberts-Austen was appointed to the Chair of Metallurgy at the Royal School of Mines. His Royal Highness the Prince of Wales appointed him a Member of the Executive Council of the Inventions Exhibition, 1885, and he served on the British Executive Council of the 1889 Paris Exhibition, and on that of the Chicago Exposition in 1893. He was chosen Vice-President of the International Mining and Metallurgical Congress in Paris, and received from the President of the French Republic the Cross of Knight of the Legion of Honour. He was created a Civil Companion of the Most Honour-

able Order of the Bath in 1890. Professor Roberts-Austen was elected a Fellow of the Royal Society in 1875. He is the author of an *Introduction to the Study of Metallurgy*, and of many papers, which have been published in the *Philosophical Transactions of the Royal Society*, and elsewhere. He delivered the Bakerian Lecture in the present year (1896). He was the first secretary, one of the founders, and Vice-President, of the Physical Society, and is a Vice-President of the Chemical Society, a Vice-President of the Society of Arts, and a Member of the Council of the Iron and Steel Institute.

Abridged from *Men and Women of Our Time*, 14th edition.

J. NORMAN LOCKYER.

Photograph by ELLIOTT & FRY, LONDON.

PROFESSOR J. NORMAN LOCKYER, C.B., F.R.S.

JOSEPH NORMAN LOCKYER was born at Rugby on May 17th, 1836. He was educated in various private schools in England and on the Continent, where he attended the scientific lectures at the Sorbonne in Paris.

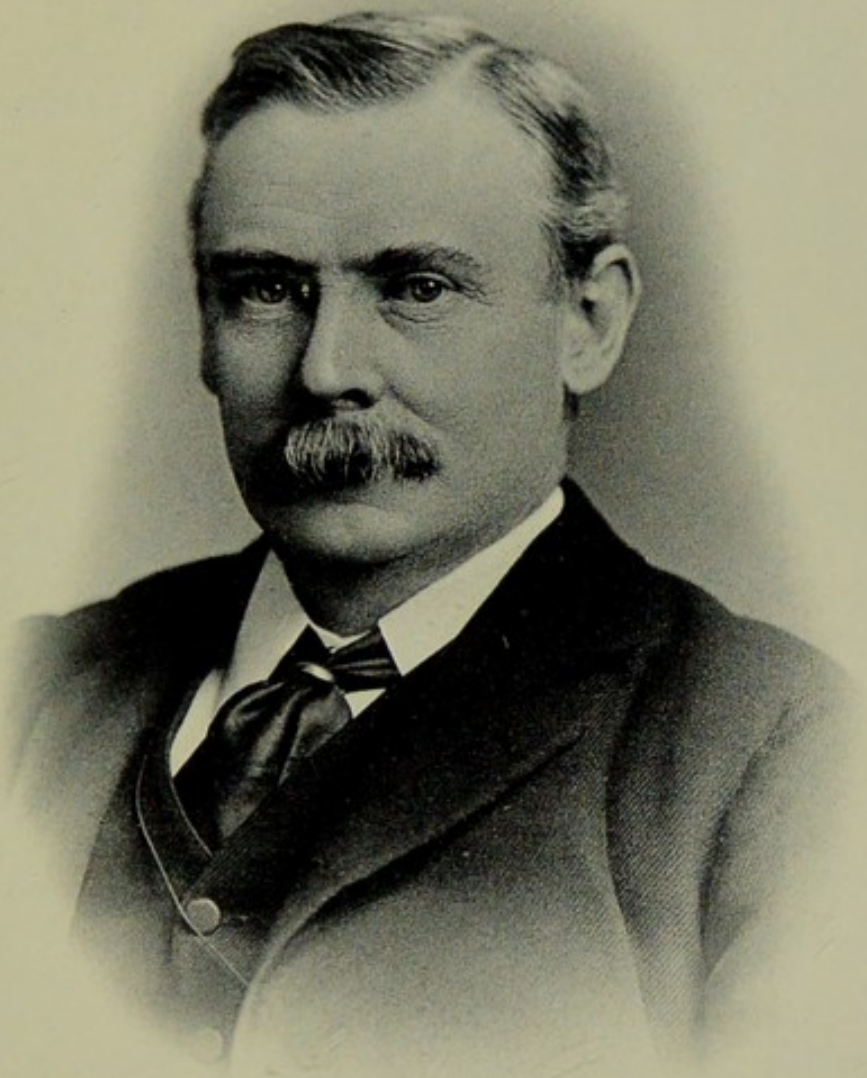
He was appointed to the War Office, 1857, and from Lord de Grey received the appointment of Editor of Army Regulations in 1865. In 1870 he was appointed Secretary of the Royal Commission on "Scientific Instruction and the Advancement of Science," presided over by the late Duke of Devonshire, and in 1875 he was transferred by the then Prime Minister, Mr. Disraeli, to the Science and Art Department. Mr. Lockyer was appointed a Member of the Solar Physics Committee on its establishment in 1878, and Professor of Astronomical Physics at the Royal College of Science upon its re-organisation in 1881. He was elected a Fellow of the Royal Society in 1869, on account of his work in connection with Solar and Physical discoveries, and since that time he has communicated many memoirs dealing with astronomical subjects. He is a Bakerian Lecturer and Rumford Medallist of the Society. He was Chief of the English Government Eclipse Expeditions to Sicily in 1870, to India in 1871, to Egypt in 1882, and to the West Indies in 1886. He also observed the total eclipse of the sun in the United States in 1878. Professor Lockyer has been elected a member of numerous foreign Academies. He has published a number of well-known text-books on Astronomy, and is perhaps best known as the author of *The Meteoritic Hypothesis*, published in 1890, and *The Dawn of Astronomy* in 1894. Many of his works have been translated into German, and some of them into Russian, Greek, and Chinese. He is also editor of *Nature*.

Professor Norman Lockyer is a Knight of the Brazilian Order of the Rose, and he was created a C.B. in 1894 for his public service in the cause of Science.

T. E. THORPE, Ph.D., D.Sc., LL.D., F.R.S.

THOMAS EDWARD THORPE was born at Harpurhey, near Manchester, December, 8th, 1845. He received his early education at private schools, and at Owens College, Manchester, and subsequently studied at the Universities of Heidelberg and Bonn. In 1869 he was appointed Demonstrator of Chemistry at Owens College. In 1870 he became Professor of Chemistry in Anderson's College, Glasgow, and in 1874 Professor of Chemistry in the Yorkshire College, Leeds. In 1885, upon the retirement of Doctor Edward Frankland, he was appointed to the Chair of Chemistry at the Royal College of Science, which post he occupied until March 1894, when he was given the appointment of Director of the Chemical work, connected with the Inland Revenue and Customs Department, the Local Government Board, and the Board of Agriculture, when the administration of these laboratories was, for the first time, placed under one head.

Professor Thorpe is a Fellow, Vice-President, and Royal Medallist of the Royal Society, and also one of its Bakerian Lecturers. He is a Vice-President and Treasurer of the Chemical Society of London, and was the first Longstaff Medallist; a Member and Vice-President of the Council of the Society of Chemical Industry, of which he was President in 1894–5; an Honorary Member of the Literary and Philosophical Societies of Manchester, Glasgow, and Leeds, and of the Pharmaceutical Society of Great Britain; a Fellow of the Berlin Chemical Society, and of the Physical Society of London. He is a Doctor of Philosophy of Heidelberg University, an Honorary Doctor of Science of Trinity College, Dublin, and an Honorary Doctor of Laws of the University of Glasgow. He is a Fellow of the University of London, and was formerly one of its Examiners, as



THOMAS E. THORPE.

LIOTT & FRY, LONDON.

well as Examiner to the Victoria University, and to the Science and Art Department, South Kensington.

Professor Thorpe is the author of upwards of a hundred memoirs on Chemistry and Physical Chemistry published in the *Philosophical Transactions*, *The Proceedings of the Royal Society*, *The Journal of the Chemical Society*, and the British Association Reports. He is the editor of *Coal; its History and Uses*, and of a *Dictionary of Applied Chemistry*. He is the author of *Essays in Historical Chemistry*, of a *Life of Sir Humphry Davy*, in the Century Science Series, *Inorganic Chemistry*, two vols., *A Manual of Quantitative Analysis*, and several other well-known text-books; and he has written various articles in Watts' "*Dictionary of Chemistry*" (Morley and Muir).

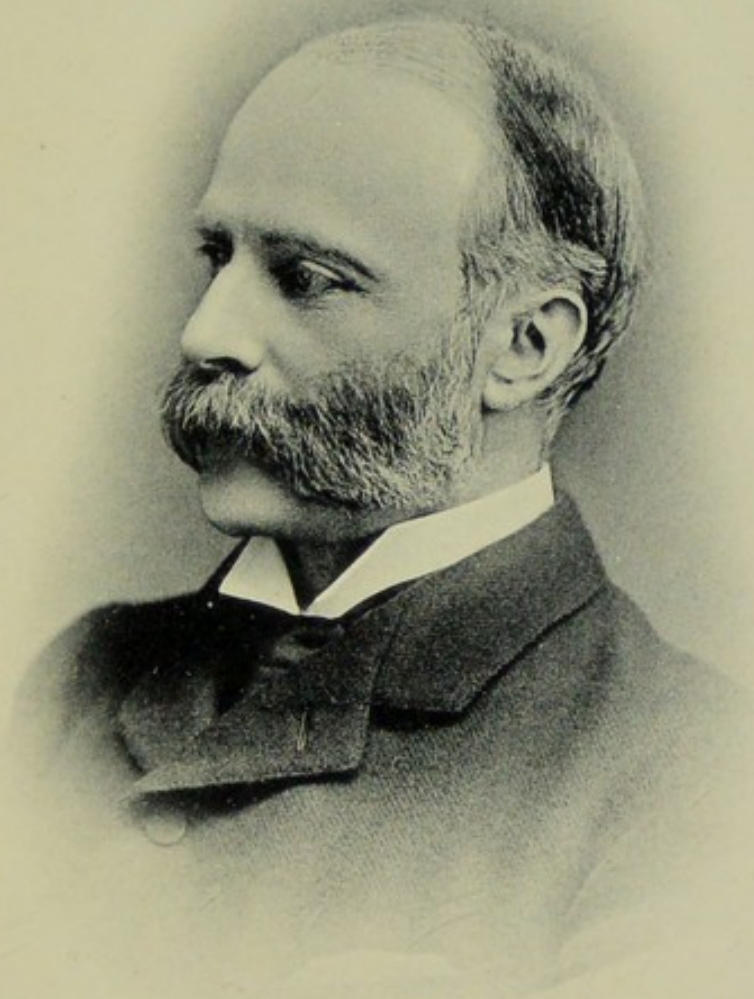
Professor Thorpe was a Member of the Solar Eclipse Expeditions of 1870 to Sicily; 1878 to Central America; 1886 to the West Indies; and 1893, when he had charge of the party sent to Fundium on the Salûm river in Senegal. Professor Thorpe, in conjunction with Professor Rücker, carried out the Magnetic Survey of the United Kingdom. During his connection with the Royal College of Science, more than eighty papers were contributed to various scientific journals, which represent, to some extent, the work done in the laboratories under his direction.

PROFESSOR ARTHUR WILLIAM RÜCKER, M.A. (Oxon.), F.R.S., M.I.E.E.

ARTHUR WILLIAM RÜCKER, eldest son of the late D. H. Rücker, Esq., of Errington, Clapham Park, was born in 1848, and educated at Clapham Grammar School. In 1867 he obtained an open mathematical scholarship at Brasenose College, Oxford, where he distinguished himself both in Mathematics and Physics, and afterwards became Fellow and Lecturer of his College, and Demonstrator in the Clarendon Laboratory of the University. He was appointed Professor of Mathematics and Physics in the Yorkshire College, Leeds, in 1874, the year of its foundation. Professor Rücker, being a politician as well as a scientific man, contested the Northern Division of Leeds in the general election of 1885; and in 1886 he appeared as Liberal Unionist Candidate for the Pudsey Division of the West Riding.

In that year he was appointed to the Chair of Physics in the Royal College of Science, in succession to the late Dr. Guthrie. He was elected a Fellow of the Royal Society in 1884, and was awarded a Royal Medal of that Society in 1891. He has served as Treasurer and President of the Physical Society of London, and is the Treasurer of the British Association. He is a Fellow of the University of London, an Honorary Fellow of Brasenose College, Oxford, and an Honorary D.Sc. of the Victoria University.

Professor Rücker is the author or joint author of numerous scientific papers. In the *Transactions of the Royal Society* during 1881, 1883, 1886, and 1893 he published, in conjunction with Professor Reinold, F.R.S., a series of memoirs on the properties of liquid films. Together with Professor Thorpe, F.R.S., he undertook, and has successfully carried out, the magnetic survey of the United



ARTHUR W. RÜCKER.

by A. J. Melhuish, London.

Kingdom. An account of this survey formed the subject of the Bakerian Lecture delivered before the Royal Society in 1889, and since that date the total number of stations at which the magnetic elements have been determined has been increased to eight hundred and sixty-seven, and a further discussion of the work has appeared as a separate volume of the *Philosophical Transactions*. Professor Rücker has also written on the Dynamo; on Combination Tones; on the Magnetic Properties of Rocks; and on various other physical subjects.

The portrait is reproduced by the kind permission of Dr. Gale, F.G.S., F.C.S., Chairman of Melhuish and Gale, 58, Pall Mall, London, S.W.

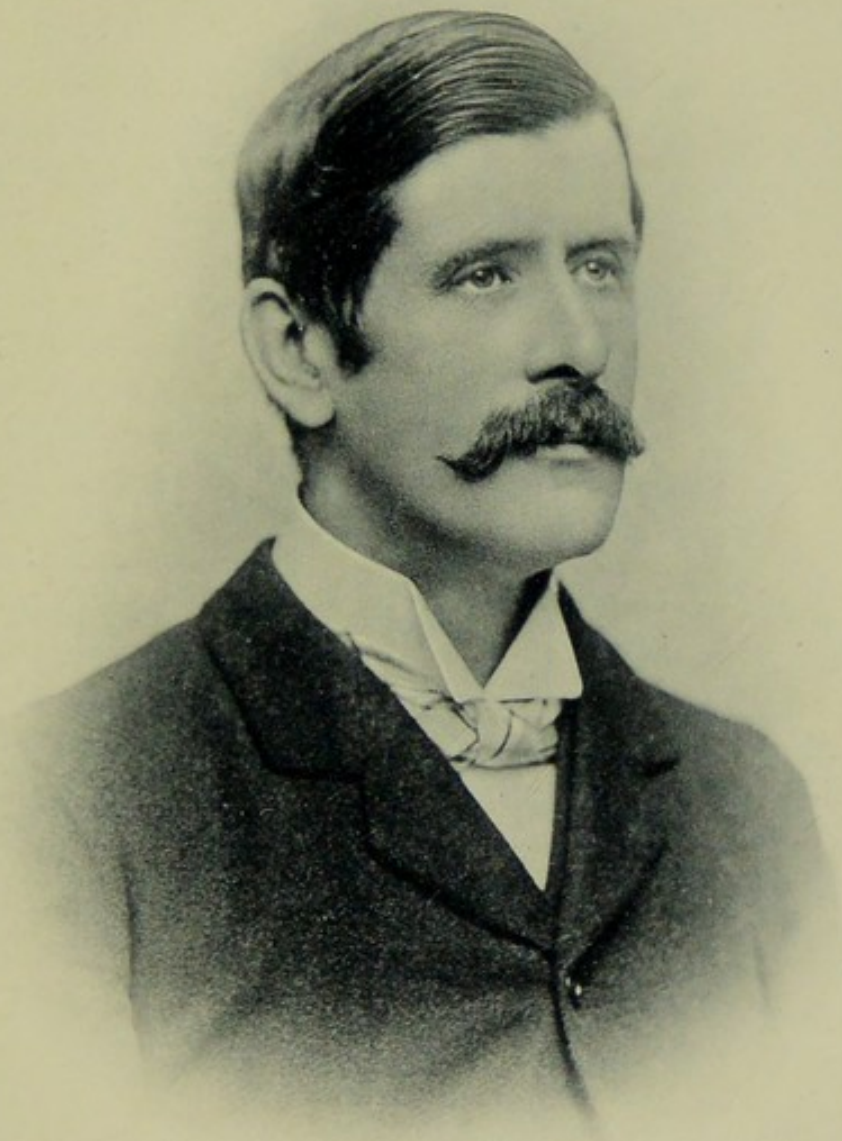
PROFESSOR CLEMENT LE NEVE FOSTER. B.A., D.Sc. (Lond.), F.R.S., F.G.S., A.R.S.M.

Clement Le Neve Foster was born in 1841 at Camberwell, in Surrey. He is the second son of the late Mr. Peter Le Neve Foster, who for many years was Secretary of the Society of Arts.

Le Neve Foster received his preliminary education in France, where in 1857 he took his degree of Bachelor of Science. This same year he entered the Royal School of Mines in Jermyn Street, and in 1859 he obtained his associateship, with first-class certificates in the subjects of Mining, Metallurgy, and Geology, having in his first year taken the Duke of Cornwall's Scholarship, and being awarded in his final year the Edward Forbes Medal and Prize of Books for the first place in Biology.

On leaving the Royal School of Mines, Le Neve Foster studied for a year at the Mining College of Freiberg, in Saxony, and visited mines in various parts of Germany and Hungary. In 1860 he received from Sir Roderick Murchison an appointment upon the Geological Survey, and for five years he was engaged in mapping the geology of parts of Kent, Sussex, and Yorkshire. In 1865 he resigned his appointment upon the Survey to become Lecturer to the Miners' Association of Cornwall and Devon. Early in 1868 he joined an exploring expedition, sent by the Viceroy of Egypt to examine the mineral resources of the Peninsula of Sinai, and upon his return to England in the summer he at once set out to Venezuela, to report upon the Caratal Gold-field. In 1869 he was appointed Engineer to the Pestarena Gold Mining Company, and for three years he was resident at the gold-mines in the Val Anzasca, North Italy.

In 1873 Dr. Le Neve Foster was appointed Inspector of Mines



CLEMENT LE NEVE FOSTER.

Manders, Llandudno, *August*, 1896.

in Cornwall and Devon, and in 1880, upon the retirement of Mr. Fanning Evans, he was translated at his own request to the Inspectorship of the North Wales District, which post he still occupies.

In 1890 Dr. Le Neve Foster was appointed to the Chair of Mining at the Royal College of Science, with which Institution the Royal School of Mines had been incorporated in the previous year. He delivered his inaugural lecture in the Chemical Theatre on January 19th, 1891. Since this time Professor Le Neve Foster has done much for the improvement of the course of Mining, and he has encouraged to a very large extent the practical mining work during the vacations, which has since become almost an essential feature of the course.

Professor Le Neve Foster is a Doctor of Science of the University of London and a Fellow of the Geological Society. In 1893 he was elected a Fellow of the Royal Society. After the Paris Exhibition of 1889 he was created a Knight of the Legion of Honour.

In 1876, together with his former colleague Mr. W. Galloway, he translated into English the treatise on Mining written by Professor Callon, of the Paris "École des Mines." This translation for many years formed the standard work on Mining in the English language. In June 1894 he published his *Text-book of Ore and Stone Mining*, designed mainly for the use of students.

Dr. Le Neve Foster has been a Member of various Departmental Committees upon Mineral Statistics, Open Quarries, and the Merionethshire Slate Mines, and his "First Annual General Report upon the Mineral Industry of the United Kingdom" appeared last year. It embodies the results of a considerable amount of labour upon his part in investigating the Mining Industries of the United Kingdom and comparing them with those of other countries.

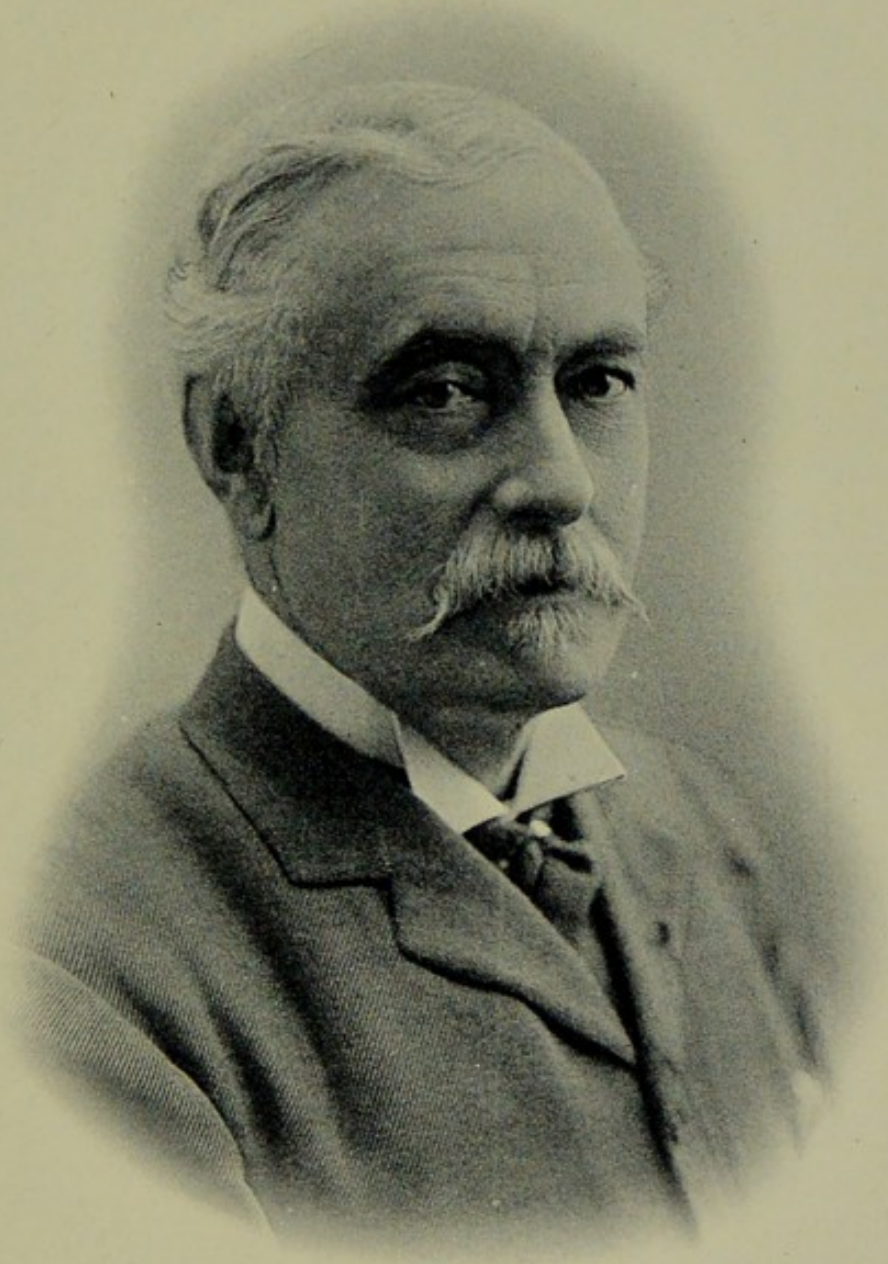
PROFESSOR W. A. TILDEN, D.Sc., F.R.S.

WILLIAM AUGUSTUS TILDEN was born in London, on August 15th, 1842. At the age of seven he was sent to the Kidderminster Grammar School, and subsequently to a succession of schools, including the Bedford Modern School. At an early age he was sent to a business house in London to be made into a pharmaceutical chemist. This, however, was not what the boy himself had in his mind when he chose Chemistry as a profession, and having permission to attend the lectures on Physics, Chemistry, and Botany, at the Pharmaceutical Society's School in Bloomsbury Square, he began his education on his own lines.

In 1860 he attended for the first time Hofmann's lectures at the Royal College of Chemistry, and from that famous teacher derived inspiration which subsequently helped him forward.

About this time he won the first Bell Scholarship awarded by the Pharmaceutical Society, and after attending courses of lectures on Physics, by Tyndall, and on Geology, by Ramsay, at the School of Mines, he entered in 1862 the research laboratory of the late Dr. Stenhouse, in the capacity of junior assistant. A year later he was appointed Demonstrator of Chemistry in the laboratory of the Pharmaceutical Society, where he remained for seven years, and in the course of that time took the degree of B.Sc. of the University of London, at which he was placed first in the Honours list. The D.Sc. was reached in 1871. In 1872 he was appointed Senior Science Master at Clifton, and there remained till 1880, when he was appointed the first Professor of Chemistry at Mason College.

Dr. Tilden was elected a Fellow of the Royal Society in 1880. In 1892 he received the Honorary Degree of Doctor of Science from the University of Dublin on the occasion of the celebration of



WILLIAM AUGUSTUS TILDEN.

by Harold Baker, Birmingham.

its 300th anniversary. He has served three years as President of the Institute of Chemistry of Great Britain and Ireland ; he is also a Vice-President of the Chemical Society of London, and has been a Member of Council of the Royal Society. In 1893 he was elected an Honorary Member of the Pharmaceutical Society of Great Britain, Corresponding Member of the College of Pharmacy of Philadelphia, and Honorary Member of the Society of Public Analysts. He is also an Honorary Member of the Bristol Society of Naturalists and of the Birmingham Philosophical Society. During his residence in Birmingham, he held office as President of the Birmingham Teachers' Association (1884), and of the Philosophical Society (1886) Vice-President of the British Association (1886), and President of the Chemical Section of the British Association at its Meeting in Bath (1888). Dr. Tilden was for three years Chairman of the Academic Board in the early days of the Mason College. He is the author of some fifty papers in the *Journal of the Chemical Society*, the *Philosophical Transactions of the Royal Society*, the *Berichte* of the German Chemical Society, and other Journals. He has also published several text-books.

In 1894 he was appointed by the Lord President of the Council, upon the advice of the Council of the Royal College of Science, to the Chair of Chemistry in that College, in succession to Dr. T. E. Thorpe, who had resigned the professorship upon his appointment as Chief Chemist to the Government.

PROFESSOR G. B. HOWES, F.L.S., F.Z.S.

GEORGE BOND HOWES was born in London in 1853, and was educated at a private school. His connection with the School of Mines began in 1875, when he was appointed Assistant in the Biological Laboratory. In 1880 he succeeded Mr. T. J. Parker as Demonstrator in Biology, and five years later he was promoted to the Assistant-Professorship in Zoology, vacating the Lecturership in Zoology and Comparative Anatomy at the St. George's Hospital Medical School, which for two previous years he had held.

Upon the death of Professor Huxley in 1895, the Chair of Zoology was instituted at the Royal College of Science, and Mr. Howes was elected to fill it.

He is President of the Malacological Society of London, Zoological Secretary of the Linnean Society, a Member of the Council of the Zoological Society, and Treasurer of the Anatomical Society of Great Britain and Ireland, of which he was an original member.

Professor Howes is the author of numerous papers, dealing chiefly with Vertebrate Morphology, and of an *Atlas of Elementary Biology*, based upon the work he originally performed in the service of the Science and Art Department. With Dr. D. H. Scott, he is joint author of the revised and expanded edition of Huxley and Martin's *Elementary Biology*, and in conjunction with Mr. H. M. Bemard he has produced an Annotated Translation of Wiedersheim's *Structure of Man; an Index to His Past History*. Professor Howes is also a member of the editorial staff of *Science Progress*.

G. B. HOWES.

ograph by W. & D. Downey, London.

JOHN BRETLAND FARMER.

Photograph by GILLMAN & CO., OXFORD.

PROFESSOR J. B. FARMER, M.A.

JOHN BRETLAND FARMER was born in 1865, and at an early age he developed a strong taste for Natural History. In 1883 he was elected to an open Demyship in Natural Science at Magdalen College, Oxford. His first intention was to study Medicine, and for this purpose he entered his name as a medical student. He, however, soon abandoned Medicine for Natural Science, and his tastes were fostered by the influence of Professor Isaac Bayley Balfour, who about this time was appointed to the Chair of Botany at Oxford.

In 1887 Mr. Farmer graduated with First-Class Honours in Natural Science, and afterwards became Demonstrator in Botany at Oxford. Upon the retirement of Professor Balfour, and for a year previous to the appointment of Dr. Vines to the Professorship, Mr. Farmer conducted the whole botanical work at the University. In 1889 he obtained an open Fellowship at Magdalen College, and in 1890 left England to study the flora of India and Ceylon. Upon the retirement of Dr. Scott in 1892, Mr. Farmer was appointed Assistant-Professor of Botany at the Royal College of Science, and on the institution of the Chair of Botany in 1895, he was appointed to fill it.

Professor Farmer is the author of a number of papers in the *Annals of Botany* and in the *Proceedings of the Royal Society*. He is also the editor of *Science Progress*.

PROFESSOR JOHN PERRY, F.R.S.

JOHN PERRY was born in 1850 at Garvagh, Ulster, and was educated at the Model School, Science and Art Classes, and at the Queen's College, Belfast. He was apprenticed at the Lagan Foundry, Belfast, and took a Whitworth Scholarship in 1870. He was Science Master at Clifton College from 1870 to 1874; Thomson Scholar and Assistant to Lord Kelvin from 1874 to 1875; and in 1875 he was appointed Professor in the Imperial College of Engineering, Yedo, Japan. Since his return to England in 1879, he has practised as a Mechanical and Electrical Engineer. In 1881 he was appointed Professor of Mechanical Engineering and Applied Mathematics in the City and Guilds of London Technical College at Finsbury.

Professor Perry is the author of an *Elementary Treatise on Steam* (Macmillan and Co., 1874); *Practical Mechanics* (Cassell 1883); *Spinning Tops* (the British Association Operative Lecture of 1890). He is also either joint author with Lord Kelvin or Professor Ayrton, or author of numerous scientific papers published in the Royal and Physical Societies' *Proceedings* and elsewhere. He has occasionally, for many years, been a Member of Council of the Institution of Electrical Engineers. He is M.E. (Master of Engineering) and D.Sc. of the Royal University of Ireland. He was elected a Fellow of the Royal Society in 1885, and he is Vice-President of the Physical Society of London. He states that his Laboratory Methods of Teaching, developed during the last twenty-six years, and now adopted at many teaching institutions, were based on those introduced by Sir Robert Ball at the Royal College of Science in Dublin. He has decided views as to the necessity for a more practical training of operatives and engineers, especially as to their training in Mechanics and Mathematics.

Professor Perry was appointed to the Chair of Mechanics and Mathematics at the Royal College of Science in 1896.

JOHN PERRY.

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REGISTER

OF THE

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OF

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AND

THE ROYAL COLLEGE OF SCIENCE.

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REGISTER.

* Signifies "Deceased."

A

ABBOTT, A. K., MAJOR. **1889-90.** *Student in Geology.*

Secretary of Public School of Science, Technical School, Cheltenham.

SCHOOL OF SCIENCE, FREE LIBRARY BUILDINGS, CLARENCE STREET, CHELTENHAM.

ABEL, SIR FREDERICK AUGUSTUS, BART. **1846.** *Student, Royal College of Chemistry.*

K.C.B.; F.R.S.; Hon. D.C.L. (Oxford); D.Sc. (Camb.); Vice-Pres. Soc. Arts; Vice-Pres. C.S; Hon. Mem. Inst. C.E.; Hon. Mem. Inst. Mech. Eng.; F. Germ. Chem. Soc..

Born 1827. Studied Chemistry under Professor Hofmann, 1846. Assistant at the Royal College of Chemistry, 1847-51. 1854, Chemical Referee to the Government. 1855, Chemist to the War Department. 1867, Appointed Member of the Ordnance Committee. 1883, Member of the Royal Commission on Accidents in Mines. Organising Secretary and Director of the Imperial Institute. President of the Government Committee on Explosives.

Sir Frederick Abel was created C.B. in 1877; K.C.B. in 1893; Baronet in 1894. He was President of the British Association at Leeds in 1890. He has been President of the Chemical Society, the Iron and Steel Institute, the Institute of Chemistry, and of the Society of Chemical Industry; also Chairman of the Society of Arts. He is a Fellow of the Royal Society, and has been Bakerian Lecturer, Rede Lecturer, Recipient of the Royal Medal, the Telford Medal, and the Albert Medal. He is author of *The Modern History of Gunpowder; Gun Cotton; Explosive Agents*, and other works connected with Explosives and Chemistry.

2, WHITEHALL COURT, LONDON, S.W.; ATHENÆUM CLUB; *and* IMPERIAL INSTITUTE, LONDON, S.W.

***ABEL,** JOHN SANGSTER. **1849.** *Student, Royal College of Chemistry.*

Born September 11th, 1832. Educated in Germany, and at the Royal College of Chemistry 1851-53, Assistant in the College. 1853, Appointed Chemist to the Mexican and South American Co., and went to Chili. Later appointed Head Manager to the Smelting Establishment of Messrs. Urmeueta and Co., Tongoy, near Coquimbo. Died in 1871.

ABNEY, WILLIAM DE WIVELESLIE, CAPT. R.E.

C.B.; D.C.L. (Durham); F.R.S.; formerly Pres. R.A.S. and Phys. Soc. of London.

Born at Derby 1843, and educated at Rossall, and the Royal Military Academy, Woolwich. Appointed Lieutenant in the Royal Engineers in 1861, and Captain in 1873. Formerly Instructor in Chemistry to the Royal Engineers, Chatham. Now Director for Science, in the Science and Art Department, and occasional Lecturer on Physics at the Royal College of Science. One of the scientific observers of the transit of Venus in 1874. Member of the Committee on Solar Physics. Author of *Instruction in Photography; Emulsion Photography; Colour Vision; Thebes and its Five Greater Temples*, etc., and numerous papers in the *Philosophical Transactions* and *Proc. Roy. Soc.* on Photography, Spectrum Analysis, etc. Elected F.R.S. 1876, and awarded a Rumford Medal in 1883 for his researches in Physical Science.

WILLESLIE HOUSE, WETHERBY PLACE, LONDON, S.W.; *and* ATHENÆUM CLUB, LONDON, S.W. *Permanent Address:* MEASHAM HALL, DERBYSHIRE.

ACKERMANN, ARTHUR. **1850.** *Student, Royal College of Chemistry.*

Colour Manufacturer.

ACKROYD, FRANK. **1889-92 and 1894-95.** *Mining and Geology.* **Assoc. R.S.M., Assoc. R.C.S.**

1895, Appointed Junior Assistant Keeper, South Kensington Museum.

WESTFIELD HOUSE, ECCLESHILL, BRADFORD.

ACWORTH, MARION W. (*née* STEVENSON). **1890-93.** *Physics.* **Assoc. R.C.S.**

34, CHICHELE ROAD, CRICKLEWOOD, LONDON, N.W.

ADAMS, ROBERT. **1889-92.** *Agriculture.* **Assoc. R.C.S.**

1892, Appointed Assistant Examiner of Patents in H.M. Patent Office, Chancery Lane.

48, WARHAM ROAD, HARRINGAY PARK, LONDON, N. *Permanent Address :* H.M. PATENT OFFICE, SOUTHAMPTON BUILDINGS, CHANCERY LANE, LONDON, W.C.

ADAMSON, ARTHUR. **1886-90.** *Physics and Mechanics.* **Assoc. R.C.S.**

1890, Assistant Demonstrator in the Physical Laboratory, Royal College of Science, London. 1892, Assistant Master of Physics and Mathematics at Chester Science and Art Technical School. 1894, Assistant Master of Physics and Mathematics at the Central Board School, Manchester.

5, OXFORD STREET, OLD TRAFFORD, MANCHESTER.

ADIE, RICHARD HALIBURTON. **1882-83.** *Student in Chemistry.*

M.A. (Camb.); B.Sc. (Lond.); F.C.S.

1883, Hodgkinson Prize for Chemistry, R.C.S. 1886-90, Assistant Demonstrator in the Cavendish Physical and Physiological Laboratories, Cambridge. 1890, Demonstrator in Chemistry at Caius College, Cambridge. 1895, Lecturer on Chemistry at St. John's College, and Lecturer to the Cambridge and Counties' Agricultural Education Board.

8, RICHMOND ROAD, CAMBRIDGE.

AJURIA, CARLOS DE. **1891-94.** *Mining.* **Assoc. R.S.M.**

1895, Appointed Mining Engineer to the Sabero Mines, Provincia de Leon, Spain.

FABRICA DE HIERROS, ALAVA, ARAYA, SPAIN.

ALCOCK, A. **1869.** *Student in Chemistry.*

Civil Engineer.

ALGER, HAROLD. **1890.** *Student in Chemistry.*

1895, Director in the firm of "Burnard and Alger, Ltd.," Chemical Works, Plymouth.

c/o MESSRS. BURNARD AND ALGER, LTD., CHEMICAL WORKS, PLYMOUTH.

ALISON, Robert E. **1869.** *Student in Chemistry.*

F.I.C.

Formerly Assistant Chemist in the Laboratory at the Woolwich Arsenal. Also Assistant Chemist to Messrs. Brooke, Simpson and Spiller, and to Messrs. J. C. and J. Field. In practice as Analytical and Consulting Chemist.

32, Brooke Street, Holborn, London, E.C.

***ALLAN**, William. **1891-92.** *Student in Chemistry, Physics, etc.*

Tyndall Prize, 1891.

Educated at Allan Glen's School, Glasgow, where he was later Laboratory Assistant. Died October 14th, 1892, while still at the Royal College of Science.

ALLEN, Arthur Ormiston. **1893-96.** *Physics.* **Assoc. R.C.S.**

B.Sc. (Lond.).

2, Ravenswood Road, Walthamstow, Essex.

ALLEN, Frederick John. **1891-94.** *Chemistry.* **Assoc. R.C.S.**

F.C.S.

1894, Analytical Chemist to Messrs. F. Allen and Sons.

c/o Messrs. F. Allen and Sons, Phœnix Chemical Works, Poplar, London, E.

ALLEN. J. **1859.** *Student in Chemistry.*

Aniline Colour Manufacturer.

ALLEN, James. **1885-86.** *Student in Mining and Metallurgy.*

1885, Bessemer Medal; 1886, Murchison Medal.

Clyde Street, Dunedin, New Zealand.

ALLEN, J. J. **1870.** *Student in Chemistry.*

In the Indian Telegraph Department, Director-General's Office.

ALLINGHAM, Sidney. **1884-88.** *Metallurgy and Mining.* **Assoc. R.S.M.**

After occupying various mining appointments in Singapore and Siam, appointed in 1894 the Head Engineer of the Mining department of the Acme and Immisch Electrical Works, Ltd.

11, Park Village West, Regent's Park, London, N.W.

ALVAREZ, D. **1892.** *Student in Mining.*

Mining Engineer in United States of Columbia.

ANDERSON, HERBERT. **1884-88.** *Chemistry and Physics.* **Assoc. R.C.S.**

F.C.S.

1892-93, Head-master Torquay Science Schools. 1889-93, Science master at the Newton Abbot Science and Art Schools, and at the Paignton Science and Art Schools, South Devon. 1893, Appointed Science master at the County School, Wellington, Somerset.

COUNTY SCHOOL, WELLINGTON, SOMERSET. *Permanent Address:* 28, GREAT CHEETHAM STREET WEST, BROUGHTON, MANCHESTER.

ANDRES, ANGELO. **1876-77.** *Student in Biology (Research).*

Ph.D. (Leipzig).

At South Kensington investigated Anatomy of Dog-fishes and Sea-anemones, and published paper on the genus "Pameria." For some years Assistant on the Zoological Station at Naples, where he worked exhaustively at the Sea-anemones, and published in the *Fauna and Flora of the Gulf of Naples* the first part of a revisionary monograph upon the group. In 1884 appointed Professor of Zoology and Comparative Anatomy in the Museo Civico, Milan.

MUSEO CIVICO, MILAN, ITALY.

***ANSELL**, GEORGE F. **1851.** *Student, Royal College of Chemistry.*

Sometime Lecture-Assistant at the Royal College of Chemistry. Subsequently Assistant to Professor Graham at the Royal Mint. Inventor of the Coal Miners' Safety Indicator.

ARCHER, RALPH MELVILLE. **1891-94.** *Physics.* **Assoc. R.C.S.**

1894, Appointed Assistant Demonstrator in Physics at the Royal College of Science.

9, STRATFORD GROVE, PUTNEY, LONDON, S.W.; *and* ROYAL COLLEGE OF SCIENCE, LONDON, S.W.

ARMSTRONG, FREDERICK W. **1893.** *Mining and Metallurgy.* **Assoc. R.S.M.**

1895, Science Master at Mottram Grammar School, Cheshire. Lecturer on Engineering Science under Manchester School Board.

2, BINDLOSS AVENUE, ECCLES, MANCHESTER.

ARMSTRONG, Henry Edward. **1866**. *Student in Chemistry, etc.*

Ph.D (Leipzig); LL.D. (St. Andr.); F.R.S.; Hon. Mem. Pharm. Soc. Lond.; F.C.S. (Past Pres. and Mem. of Council).

Professor of Chemistry at the City and Guilds of London Institute's Central Technical College, South Kensington. Formerly Professor of Chemistry at the London Institution.

55, Granville Park, Lewisham, London, S.E.

ASANO, Nagayuki. **1884-88**. *Geology*. **Assoc. R.C.S.**

F.G.S.

Master of Ceremonies to His Imperial Majesty the Emperor of Japan.

c/o Marquis Asano, 3, Yayoi chó, Hongo, Tokio, Japan.

ASHER-ARON, Samuel Bernard. **1886-89**. *Metallurgy*. **Assoc. R.S.M.**

F.C.S.

1890-93, Assistant to B. Kitto, Esq., Assayer and Analyst. 1894, Went to South Africa as Chemist to the Ferreira Gold Mining Co. 1895, Mining Editor, *Financial Record*.

P.O. Box 1990, Johannesburg, S.A.R. *Permanent Address:* 21, Long Street, Lower Broughton, Manchester.

ASHLEY, The Rev. John Marks. **1848**. *Student, Royal College of Chemistry*.

LL.B. (Camb.).

Attended Chemical Lectures at the Royal College of Surgeons 1849, and at the Society of Apothecaries 1848. 1848-55, Lecturer on Chemistry at the "Hunterian" School of Medicine. Ordained in 1857; took priest's orders 1858. Author of *The Relations of Science*, and a number of works on theological subjects.

Fewston, Otley, Yorkshire.

ASHMORE, G. Percy. **1892**. *Student in Mining*.

Manager to the Caylloma Silver Mining Co., Peru.

c/o C. Wagner, Esq., Caylloma Silver Mining Co., Ltd., Peru.

ASHWIN, Guy Hamilton. *Student*.

Mem. of Fed. Inst. Min. Eng; Mem. Colliery Managers' Assoc.

1887, Appointed Manager of the Bedworth Coal and Iron Co., near Nuneaton.

The Gables, Exhall, Bedworth, near Nuneaton, Warwickshire.

ATKINS, HENRY C. **1886-89.** *Metallurgy.* **Assoc. R.S.M.**

1889, Assistant to the Solar Physics Commission. 1889-90, Science Teacher at the People's Palace Schools. 1890, Electrician to Messrs. Fowler, Lancaster, and Co., Birmingham. 1892, Appointed Lecturer on Electrical Engineering at the Birmingham Municipal Technical Schools.

39, SUSSEX ROAD, SOUTHPORT, LANCASHIRE.

ATKINSON, ROBERT WILLIAM. **1870.** *Student.*

ATKINSON, WILLIAM. **1881-84.** *Student in Geology.*

Assistant in Geology at the Royal College of Science, 1884-85.

ATTENBOROUGH, LEONARD GEORGE. **1891-95.** *Chemistry and Metallurgy.* **Assoc. R.C.S., Assoc. R.S.M.**

TOWER HOUSE, STRAWBERRY HILL, TWICKENHAM.

AUDLEY, JAMES, A. **1881-84.** *Biology and Geology.* **Assoc. R.C.S.**

B.Sc. (Lond.); F.I.C.; F.C.S.

1887, Head-master of The Municipal Science and Technical School, Hanley, Staffordshire.

97, LICHFIELD STREET, HANLEY, STAFFORDSHIRE.

AUSTEN, 1855-57. *Student in Chemistry.*

Sometime Manager to Price's Candle Company.

B

BAKER, — . **1854-55.** *Student in Mining.*

Sometime on Mineral Surveys in North America.

BAKER, CHARLES KERSLAKE. **1878-81.** *Metallurgy.* **Assoc. R.S.M.** F.I.C.

1882, Demonstrator in Chemistry at the University College, Nottingham. 1883, In practice as Consulting and Analytical Chemist and Assayer in Sheffield. Gas Examiner for the Corporation of Sheffield.

16, CHANGE ALLEY, SHEFFIELD.

BAKER, F. J. **1893-96.** *Agriculture.* **Assoc. R.C.S.**

Fellow of the Royal Horticultural Society. Lecturer at the Horticultural College, Swanley; and at the Technical School, Gravesend.

COBHAM PARK, GRAVESEND.

***BAKER**, H. W. **1863-64.** *Student in Mining.*

***BAKER**, WILLIAM. **1852-54.** *Metallurgy and Geology.* **Assoc. R.S.M.** F.C.S. Mem. Iron and Steel Inst.

Born 1830. Educated at City of London School. 1855, appointed Analytical Chemist and Manager to Messrs. Barker & Co.'s Lead Works, Sheffield. Afterwards in practice as Analytical Chemist; Borough Analyst to Barnsley and Rotherham; and Lecturer on Texicology at the Sheffield School of Medicine. Chief scientific work in connection with lead. Died from the effects of an accident, June 6th, 1878. (See Memoir in *Journ. Iron and Steel Inst.*, 1878, p. 293).

BALL, EDWIN, J. **1881-83.** *Student in Mining and Metallurgy.* Ph.D.

1883-90, Assistant in Metallurgy, and 1890-93 Instructor in Assaying at the Royal School of Mines. 1894, Appointed Inspector of Science Schools under Science and Art Department, for the district of Cornwall, Devon, Dorset, and Somerset.

INSPECTOR'S OFFICE, SCIENCE AND ART DEPARTMENT, SOUTH KENSINGTON, LONDON, S.W.

BALL, JOHN. **1891-94.** *Mining.* **Assoc. R.S.M.**

De la Beche Medal 1894; Senior Whitworth Scholar 1894.

1895, Freiberg Mining Academy. 1896, University of Zurich.

18, REDSHAW STREET, DERBY.

BALLARD, E. G. **1868-71.** *Metallurgy.* **Assoc. R.S.M.**

F.I.C.; Mem. Soc. Chem. Ind.

1873, Chemist to the Germania Smelting and Refining Works, Utah, U.S.A. 1874, Chemist to, and subsequently manager of, the Chicago Silver Mining and Smelting Co., Ltd., Utah, U.S.A. 1880, Manager of the Par Smelting Works, Par, Cornwall. 1882, Inspector under the Alkali, etc., Works Regulation Act for West Lancashire, Cheshire, North Wales, and Ireland.

TRENYTHON, NEWTON LANE, HOOLE, CHESTER; *and* c/o LOCAL GOVERNMENT BOARD, WHITEHALL, LONDON, S.W.

BALY, GEORGE. **1849.** *Student, Royal College of Chemistry.*

Manufacturing Chemist.

BAMBER, HENRY KELWAY. **1855.** *Student in Chemistry.*

F.I.C., Mem. Iron and Steel Inst.

Analytical Chemist.

5, WESTMINSTER CHAMBERS, VICTORIA STREET, LONDON, S.W.

BANKART, HOWARD. **1846.** *Student, Royal College of Chemistry.*

Metallurgist and Mining Engineer.

BANON, HENRY C. **1878-81.** *Metallurgy.* **Assoc. R.S.M.**

Mem. Am. Inst. Min. Eng.

1890-92, Manager of the Gold Bank Mining Co., Gilpin Creek, Colorado, 1892-95, Manager of the Ida May Gold Mining Co., Cripple Creek. Colorado, U.S.A. 1895, Manager of the East Nigel Gold Mining Co., Nigel, S.A.R.

NIGEL, TRANSVAAL, S.A.R.

BANTOCK, J. W. **1871.** *Student in Chemistry.*

Sometime Chemist to Messrs. Whites' Gunpowder Works.

BARBOUR, HUGH. **1884-87.** *Metallurgy.* **Assoc. R.S.M.**

WORKINGTON, CUMBERLAND.

BARCLAY, —. **1871.** *Student in Chemistry.*

Manure Manufacturer.

BARKER, MATTHEW WILSON. **1885.** *Student in Mining.*

Mem. Fed. Inst. Min. Eng.; Mem. Inst. Mech. Eng.; Cert. Mine Manager 1887.

Sometime Chief Surveyor, De Beers Consol. Mines, Ltd., Kimberley., Manager to Messrs. Howard, Farrar, & Co., Engineers, Johannesburg, S.A.R. 1895, Consulting Engineer to the East Rand Prop. Mines, Ltd., the New Kleinfontein Gold Mining Co., Ltd.; Chimes West, Ltd.; Kleinfontein Central Gold Mining Co., Ltd.; and the Benoni Gold Mine, Ltd.

P.O. Box 1463, JOHANNESBURG, S.A.R.

***BARLOW**, THE REV. JOHN. **1852.** *Student, Royal College of Chemistry.*

F.R.S.

Formerly Secretary Royal Institution.

BARNETT, FRANCIS THOMAS. **1878-82.** *Metallurgy.* **Assoc. R.S.M.**

F.I.C.; Mem. Iron and Steel Inst.

1884, Chemist and Steel-works Manager, Messrs. Hattons, Sons, and Co., Birmingham. 1894, Representative for F. Siemens, Esq., in the Midlands, North of England, and Scotland; also for the "Sewage and Effluent Water Filtration" Co. 1896, Appointed Chemist and Assayer to the Belingwe Consolidated Gold Mines, Ltd., Buluwayo, South Africa.

BELINGWE CONSOLIDATED MINES, NEAR BULUWAYO, BRIT. S. AFRICA; *Permanent Address:* c/o MESSRS. BARNETT AND AUSTEN, SOLICITORS, 48, WATLING STREET, LONDON, E.C.

BARNETT, ROBERT E. **1890-93.** *Chemistry.* **Assoc. R.C.S.**

B.Sc. (Lond.) 1895; Frank Hatton Prize, R.C.S., 1893.

Late Senior Science Master, Royal Grammar School, Sheffield. 1895, Appointed Senior Science Master at King Edward's School, Chelmsford, Author of Paper "On the Viscosity of Water," etc., in *Proc. Roy. Soc.*, June 1894; "Note on the Formation of Platinum Pyrophosphate," in *Trans. Chem. Soc.*, June 1895.

GRAMMAR SCHOOL, CHELMSFORD, ESSEX. *Permanent Address:* 4, QUEEN'S GARDENS, SURREY.

BARNES, JAMES S. BENJAMIN. **1848-49.** *Student, Royal College of Chemistry.*

Pharmaceutical Chemist. Formerly Member of Council and Examiner to the Pharmaceutical Society of Great Britain. Author of several Papers published in the *Pharmaceutical Journal.*

1, TREVOR TERRACE, KENSINGTON ROAD, LONDON, S.W.

BARNES, Robert D. **1845.** *Student, Royal College of Chemistry.*
M.D. (Lond.); F.R.C.P.; F.R.C.S.

***BARRATT. 1860.** *Student in Mining.*
Formerly at the Hodbarrow Iron Mines. Died before 1870.

BARRON, Thomas. **1887-93.** *Biology and Geology.* **Assoc. R.C.S.**
Honours in Geology, Royal College of Science, 1895; Demonstrator in Geology, Royal College of Science 1893. 1896, Appointed to the Geological Survey of Egypt.
Permanent Address: Belmont, Kelso, N.B.

BARROW, H. G. James. *Student in Metallurgy.*
Mem. S. Wales Inst. Eng.
Colliery Manager and Agent to Garth and Maesteg Merthyr Collieries.
Fairfield House, Maesteg, Glamorganshire.

BARRY, J. H. **1869-74, 1875-76.** *Mining.* **Assoc. R.S.M.**

BARTON, Robert. *Student in Chemistry and Metallurgy.*
F.C.S.
1869-87, Assayer, 1887-95, Superintendent of Bullion Office, and in 1895 appointed Deputy Master, of the Melbourne branch of the Royal Mint.
Royal Mint, Melbourne, Victoria.

BAUERMAN, Hilary. **1851-53.** *Mining, Metallurgy, and Geology.* **Assoc. R.S.M.**
F.G.S.; Mem. of Council; Assoc. M.Inst.C.E.
1853-55, Studied at the Freiberg Mining Academy. 1855-58, Assistant Geologist to the Geological Survey of Great Britain. 1858-63, Geologist to the North American Boundary Commission. 1864, Engaged in Surveys and Explorations in Sweden and Lapland. 1865, In Michigan; 1866, Labrador. 1867-69, Arabia, Red Sea, and Gulf of Aden. 1870, Savoy. 1871, Missouri. 1872-73, Bengal, Borar and Kumaon. 1874, Northern Peru. 1876, Murcia and Granada. 1878, Asia Minor. 1881, North and South Carolina, Colorado, and Sonora State. 1883, Brazil (Matto Grosso). 1884, Arizona. 1886, Brazil (Sta. Calarina). 1888, Cyprus. 1888, S.E. Portugal. 1883, Lecturer on Metallurgy at Firth College, Sheffield. 1874-79, Joint Examiner in Mining and Mineralogy for the Science and Art Department. 1880-95, Examiner in Mining Science and Art Department. 1878, International Juror, Paris. 1889, Inventions Exhibition. 1884, Antwerp. 1893, Chicago. Professor of Metallurgy, Royal Artillery College, Woolwich, S.E. Author of *Descriptive Mineralogy; Systematic Mineralogy; The Metallurgy of Iron*, etc., etc.
14, Cavendish Road, Balham, London, S.W.

BAXANDALL, DAVID. **1891-94.** *Mechanics.* **Assoc. R.C.S.**

16, MALSIS ROAD, KEIGHLEY, YORKSHIRE.

BAXANDALL, FRANK E. **1884-87.** *Mechanics.* **Assoc. R.C.S.**

1895, Research Work, Astronomical Physics, Royal College of Science.

16, MALSIS ROAD, KEIGHLEY, YORKSHIRE.

BAXANDALL, G. A.

Assistant Demonstrator Mechanics and Mathematics Royal College of Science 1896.

ROYAL COLLEGE OF SCIENCE, LONDON, S.W.

BAXTER, CECIL ALWYNE SELPRAM. **1892-95.** *Mechanics.* **Assoc. R.C.S.**

6, WHITES VIEW, MANNINGHAM, BRADFORD.

BAYLY, FRANCIS WILLIAM. **1866-70.** *Metallurgy.* **Assoc. R.S.M.** F.C.S.

1871, Appointed Assayer at the Royal Mint.

8, ROYAL MINT, LONDON, E.

BEADNELL, H. J. L. **1893-95.** *Student in Geology;* **1896,** *in Mining.*

1896, Appointed to the Geological Survey of Egypt.

***BEALE,** E. S. **1886.** *Student in Mining.*

BEALEY, ADAM. **1850.** *Student, Royal College of Chemistry.*

M.D. (Camb.); F.R.C.P.

BEARD, J. **1880-81.** *Student in Biology.*

Ph.D. (Freiburg); D.Sc. (Vict.); Berkeley Fellow, Owens College, Manchester.

Sometime at the Naples Zoological Station, and for some years at Würzburg and Freiburg. 1889, Appointed Scientific Assistant to the Scottish Fishing Board, and stationed at Dunbar. 1890, Appointed University Assistant in Zoology in the University of Edinburgh. Now holds office as Lecturer on Comparative Embryology, and on Vertebrate Zoology at Edinburgh. Author of numerous papers on Animal Morphology.

93, COMELY BANK AVENUE, EDINBURGH. *Permanent Address:* UNIVERSITY OF EDINBURGH.

BEAUFORT, WILLIAM M. **1855.** *Student in Chemistry.*

Indian Civil Service. Retired 1871.

* **BECHER,** HARRY M. **1873-75.** *Mining and Metallurgy.* **Assoc. R.S.M.**

F.R.G.S.; A.M.Inst.C.E.; Mem. Inst. Min. and Met; Mem. Am. Inst. Min. Eng.

Born at Simla 1855. Educated in England and at Dresden. 1871, Entered Freiberg Mining Academy. 1873-75, At the Royal School of Mines. 1875, Went out to the Malay Peninsula for the Borneo Co. 1882, Reporting upon properties in China, Japan, and Siberia. 1883-85, Reporting upon mines on the Pacific Coast. 1883, Reported upon the mineral resources of Korea. 1885-87, Reporting upon mines in China and established the first Chinese gold mine and quartz-mill in Shan-tung. 1887, Reported upon gold mines in North-East Siam. 1888, Engaged at the Pahang Gold Mines and established office and assay laboratories at Singapore. 1890, Entered into partnership with Mr. Henry Louis, A.R.S.M. He was drowned in the river Tahan, by a sudden flood, whilst exploring the Gunong Tahan, Malay Peninsula, under the auspices of the Royal Geographical Society, on September 16th, 1893. Mr. Becher contributed various papers to the *Quarterly Journal of the Geological Society*, including a note on "The Cupriferous Shale of Hon-peh, China," and a paper on "The Gold-quartz Deposits of Pahang."

BECKWITH, JOHN M. **1885-88.** *Mining.* **Assoc. R.S.M.**

1889-90, Assistant Manager to the Ravenswood Silver Mining Co., Ltd., Queensland, Australia. 1891, Appointed Engineer and Assistant Manager to the Silver King Mining Co., Calico, California.

c/o SILVER KING MINING CO., CALICO, CALIFORNIA; *and* 9, HIGHFIELD SOUTH, ROCK FERRY, CHESHIRE.

BECKWITH, LEONARD H. **1888-91.** *Mining.* **Assoc. R.S.M.**

1893, Appointed Assayer to the Silver King Mining Co., Calico, California.

c/o SILVER KING MINING CO., CALICO, CALIFORNIA; *and* 9, HIGHFIELD SOUTH, ROCK FERRY, CHESHIRE.

BEDDARD, FRANK EVERS. **1877-78.** *Student in Biology.*

M.A. (Oxford); F.R.S.; F.Z.S.; F.R.S.E.

Educated at Harrow and New College, Oxford. Sometime Demonstrator under the late Professor Rolleston, and afterwards Assistant Editor of the *Challenger* Reports. He was appointed Prosector of the Zoological Society of London in 1884, and Lecturer on Comparative Anatomy at Guy's Hospital in 1886. He is also Examiner in the Honours School of

Morphology at Oxford. Author of *Report on Isopods collected during the Voyage of H.M.S. Challenger; Animal Coloration;* and numerous contributions to the publications of the Royal Zoological Society, etc.

c/o Zoological Society, Regent's Park, London, N.; *and* United University Club, Suffolk Street, Pall Mall, London, S.W.

BEDFORD, Thomas Taylor. **1890-93.** *Mining.* **Assoc. R.S.M.**

1893-94, Assistant Inspector and Prospector to the Government, Perâk, Straits Settlements. 1895, Teaching Scholar in Mining at Royal School of Mines.

24, Ethelburga Street, Battersea, London, S.W. *Permanent Address:* 42, Silver Street, Manningland, Bradford.

BEDFORD, T. T. **1895.** *Student in Mining.*

c/o C. F. Broadhead, Esq., North Featherstone, near Pontefract.

BELCHER, Frank. **1884-87.** *Chemistry.* **Assoc. R.C.S.**

BELL, A. H. **1890.** *Student in Mining.*

[See Addendum at end of letter B.]

BELL, A. M. **1855-56.** *Student in Mining.*

***BELL**, Henry Stowe. **1870-73.** *Metallurgy.* **Assoc. R.S.M.**

Mem. Iron and Steel Inst.

Sometime in the British Consular Service, Greece. Died March 15th, 1894.

BELL, J. Carter. **1861-65.** *Mining.* **Assoc. R.S.M.**

F.I.C.; F.C.S.; Mem. Soc. Pub. Analysts.

1876, County Analyst for Cheshire and Boroughs of Salford, Birkenhead, Glossop, Stalybridge, and Congleton. 1887, Chemist to The Palatine Insurance Co., Ltd. 1894, Chemist to the Silk Association of Great Britain and Ireland. Chemist to the United Fire Offices Committee.

The Cliff, Higher Broughton, Manchester.

***BELL**, James Wilson. **1870.** *Student in Chemistry.*

F.C.S.

Educated at City of London School, and Royal School of Mines (Chemistry, Oxford Street). Remained for a time as Assistant to Dr. E. Frankland. Appointed Assistant in the Laboratory of the Royal Commission on the Pollution of Rivers. Some years engaged in the Laboratory of Messrs. Gillman and Spencer, Consulting Brewers. Died September 1879, aged twenty-seven.

BELL, WILLIAM GOMM. **1866-69.** *Metallurgy.* **Assoc. R.S.M.**
Sometime Analytical Chemist, and Manager of Chemical Works.

BELLO, CÆSAR. **1884-87.** *Mining.* **Assoc. R.S.M.**

BENAVIDES, J. R. **1890.** *Student in Mining.*
127, CALLE DE LA COCA, LIMA, PERU.

BENN, —. **1865.** *Student in Mining.*

BENNETT, ALFRED W. **1847.** *Student Royal College of Chemistry.*
M.A.; B.Sc.; F.L.S.
Botanist. On the staff of *Nature.*
6, PARK VILLAGE EAST, LONDON, N.W.

BENSON, R. SEYMOUR. **1887-80.** **Assoc. R.S.M.**
Mem. Iron and Steel Inst.
Managing Director to Messrs. Ashmore, Benson, Pease, and Co., Ltd., Stockton-on-Tees.
PARKFIELD WORKS, STOCKTON-ON-TEES.

BENSUSAN, ARTHUR J. **1889-93.** *Metallurgy and Mining.* **Assoc. R.S.M.**
F.C.S.
Consulting Metallurgist and Mining Engineer, Sydney.
THE LABORATORY, 12, O'CONNELL STREET, SYDNEY, NEW SOUTH WALES.

BENSUSAN, E. V. **1889.** *Student in Mining.*
Mem. Am. Inst. M.E.
Formerly Manager of Silver Refinery, Sunny Corner Silver Mine, N.S. Wales. Late General-Manager Cullen Bullen Colliery, New South Wales. Owner and Manager of Butler's and Dutchman's Tin Mines, New England, New South Wales. Member of the firm of E. and A. Bensusan, Mining Engineers, Metallurgists, etc.
12, O'CONNELL STREET, SYDNEY, NEW SOUTH WALES. *Permanent Address:* P.O. BOX 411, SYDNEY, NEW SOUTH WALES.

BENTON, WILLIAM ELIJAH. **1876-79.** *Mining.* **Assoc. R.S.M.**
Mem. Iron and Steel Inst.; F.G.S.
1893, Engineer to the Midland Coal, Coke and Iron Co., Apedale, Staffordshire.
APEDALE HALL, NEWCASTLE-UNDER-LYNE, STAFFORDSHIRE.

BERINGER, JOHN J. **1877-80.** *Metallurgy.* **Assoc. R.S.M.**

F.C.S.; F.I.C.; Mem. Min. Soc.; Mem. Soc. Pub. Anal.; Mem. Soc. Chem. Ind.

Sometime Public Analyst to the County of Cornwall, and to the Boroughs of Penzance, Falmouth, Penryn, Bodmin, and Launceston. Also Assistant to Professor Huntingdon, King's College, London. Lecturer to the Mining Association and Institute of Cornwall. Principal of the Camborne School of Mines. Joint author of *A Text Book of Assaying* (C. Griffin and Co., London).

THE LABORATORY, MINING SCHOOL, CAMBORNE; *and* BASSET ROAD CAMBORNE, CORNWALL.

BERKELEY, RT. HON. LORD. **1889-90.** *Student in Geology.*

BOAR'S HILL, NEAR OXFORD.

***BERRELL,** CHARLES. **1864.** *Student in Chemistry, etc.*

Physician. Died previous to 1871.

BICKERTON, A. W. **1867-70.** *Metallurgy.* **Assoc. R.S.M.**

Professor of Metallurgy, Canterbury College, New Zealand. Formerly Teacher of Chemistry at the Hartley Institute, Southampton.

CANTERBURY COLLEGE, CHRIST CHURCH, NEW ZEALAND.

BIGGS, GEORGE HERBERT. **1892-96.** *Metallurgy and Mining.* **Assoc. R.S.M.**

WESTBURY LODGE, BRENTWOOD, ESSEX.

BIRD, DAVID BRUCE. **1877-80.** *Metallurgy.* **Assoc. R.S.M.**

BIRD, ROBERT MACDONALD. **1887-91.** *Student in Mining and Metallurgy.*

c/o MESSRS. GIBBS, BRIGHT AND CO., MELBOURNE, AUSTRALIA. *Permanent Address:* 26, HARRINGTON GARDENS, SOUTH KENSINGTON, LONDON, S.W.

***BIRKENHEAD.** *Student in Chemistry, Metallurgy, and Mining.*

B.Sc. (Lond.).

Teacher at Wigan. Died previous to 1870.

* **BISHOPP,** FRED C. **1859-62.** *Mining, Geology, etc.* **Assoc. R.S.M.**

Duke of Cornwall's Scholarship 1860; Royal Scholarship 1860; Edward Forbes Medal 1862.

Formerly on the Staff of the Geological Survey of England and Wales.

BISSET, Joseph. **1889-92.** *Agriculture.* **Assoc. R.C.S.**

Fellow of the Highland and Agricultural Society of Scotland; Life Member (by examination) of the Royal Agricultural Society of England.

1893, Agricultural Lecturer, Peterborough. 1894, Agricultural College, Aspatria. 1895, Lecturer on Agriculture to the Ayrshire County Council.

34, Union Buildings, Ayr. *Permanent Address:* Findhorn, Forres, N.B.

BLACK, Claude. **1887.** *Student in Mining.*

c/o Messrs. Isaac Brandon Bros., Panama, Republic of Columbia.

BLACK, Henry A. **1866.** *Student.*

Duke of Cornwall's Scholarship 1866; Royal Scholarship 1866; took a Scholarship at Oxford.

BLACKMORE, William. **1885-88.** *Metallurgy.* **Assoc. R.S.M.**

1888, Appointed Chemist and Assayer to the Sheffield Smelting Co., Ltd., Sheffield.

Marlborough Villa, Mill Houses, Sheffield.

BLAKE, G. S. **1893-96.** *Metallurgy.* **Assoc. R.S.M.**

* **BLANFORD**, Henry F. **1851-53.** *Mining, Geology, etc.* **Assoc. R.S.M.**

F.R.S.; F.G.S.; Mem. As. Soc. Bengal (Pres. 1884-85); F.R.M.S.; Hon. Mem. K.K. Met. Soc. Wien; Met. Soc. Hamburg; Met. Soc. Mauritius; Corr. Mem. K.K. Geol. Reichsanstalt, Wien.

Born 1834. Educated at Brighton and Brussels. After studying at the Old School of Design, Somerset House, he joined the Royal School of Mines in 1851, and took, in 1852, the first Duke of Cornwall's Scholarship. In 1853, he spent a year at the Freiberg Mining Academy, and in 1854 translated v. Kobell's work on the Blowpipe. In 1855 he was appointed to the staff of the Geological Survey of India, and went to Calcutta in 1855. His first work was to report upon the Talchir coal-fields in Orissa. Till 1857 he had charge of the Survey Office in Calcutta. He was then sent to Madras at the head of a Survey party, and was engaged for four years in examining the Cretaceous beds near Trichinopoly and Pondicherry. In 1862 he published an account of the Nautilidæ and Belemnitidæ in the "Palæontologica Indica." He was appointed Professor at the Presidency College, Calcutta, in 1864; and from 1864 to 1874 he was on the staff of the Bengal Education Department. In 1864 Mr. Blanford became one of the Hon. Secretaries of the Asiatic Society of Bengal; he was also member of the Government Meteorological Committee, and from 1867-74 he was Meteorological Reporter to the Government of Bengal. In 1874 he was appointed head of a new Meteorological Department for the whole of

India. This office he held until his retirement from Indian service in 1888. Mr. H. F. Blanford was the author of a number of reports and works on Meteorology; he contributed several papers to the *Memoirs of the Geological Survey of India*, the *Journal of the Asiatic Society of Bengal*, the *Quarterly Journal of the Geological Society*, etc.; and wrote two treatises on the Geography of India. He died on January 23rd, 1893.

BLANFORD, WILLIAM THOMAS. **1852-54.** *Mining, Geology, etc.* **Assoc. R.S.M.**

LL.D.; Fellow of the Calcutta University; F.R.S. (Vice-Pres. 1892-93); F.G.S. (Pres. 1888-90); F.Z.S. (Vice-Pres. 1893-96); F.R.G.S. (Vice-Pres. 1893-96); Mem. Soc. Géol. de France; Hon. Mem. As. Soc. Bengal (Pres. 1878-79); M.B.O.U.; Kt. Ord. St. Maur. et St. Lazar, Italy; Wollaston Medal, London Geol. Soc. (1883); Duke of Cornwall's Scholarship, R.S.M. (1853).

1855, Appointed to the Geological Survey of India. 1867-68, Geologist, Abyssinian Expedition (war medal). 1871-72, Geologist, Persian Boundary Commission. 1882, Retired from Indian Service. Author of Memoirs on the Geology of Orissa, Raniganji Coal Field, Cutch, Sind, Tapti and Lower Nerbudda Valleys, Nagpur, Sind, and Punjab Frontier, etc., in *Memoirs of the Geological Survey of India*; of *Observations on the Geology and Zoology of Abyssinia* (1870); *Eastern Persia*, vol. ii., Zoology and Geology (1876); and of many papers in the *Journal of the Asiatic Society of Bengal*; *Records of the Geological Survey of India*; *Quart. Journ. Geol. Soc.*; *The Fauna of British India*, etc. Joint author, with Mr. H. B. Medlicott, of *A Manual of the Geology of India* (1879). Editor of the *Fauna of British India*, and author of *Mammalia* and one volume of *Birds*.

72, BEDFORD GARDENS, LONDON, W.; ATHENÆUM CLUB, LONDON, S.W.; *and* ARTS CLUB, LONDON, W.

***BLOXAM**, CHARLES LOUDON. **1845.** *Student, Royal College of Chemistry.*

F.C.S., etc.

Born 1831. King's College, 1842-45. 1849, Appointed Assistant under Professor Hofmann. 1850, Started in Practice as Analyst and Teacher at Duke Street, Grosvenor Square. 1854, Appointed Demonstrator of Chemistry at King's College. 1856, Appointed Professor of Practical Chemistry, and in 1870 Professor of Theoretical Chemistry at King's College. Lecturer on Chemistry at the Royal Military Academy, Woolwich, 1864, until his death. Author of text-books on *Chemistry, Inorganic and Organic*, 1st edition 1855, 6th edition 1887: and of various papers in the *Journ. Chem. Soc.*, and *Chemical News*. Died November 28th, 1887, in his fifty-seventh year.

BLYTH, H. G. **1877-81.** **Assoc. R.S.M.**

***BOARD**, GREGORY. **1870-72.** *Student in Mining, etc.*

F.C.S.; Mem. Inst. Min. Eng. (Australia); F.R.S. (S. Australia).

Born 1846. After leaving the Royal School of Mines, appointed Attendant at British Museum under Professor Maskelyne. 1872-75, Engaged in Coal Mining in Illinois, U.S.A. 1875, To Colorado; appointed Professor in the School of Mines; held appointments on staff of several mines; and afterwards entered a smelting business at Denver. 1887, Appointed Manager of the Australian Smelting and Refining Works at Dry Creek. Consulting Manager for the Commodore-Vanderbilt Gold and Silver Mining Co.; and Consulting Metallurgist for the British Broken Hill Proprietary Co. 1890, To Port Pirie as Superintendent of the Refinery, and Manager of the British Broken Hill Co.'s Smelting Works. Died April 29th, 1894, at Port Pirie.

BOCQUET, REGINALD. **1888-92.** *Student in Mining.*

1892, Assistant Manager at the Pestarena United Gold Mining Co.'s mine in North Italy.

PESTARENA, VALL'ANZASCA, PROV. DI NOVARA, ND. ITALY. *Permanent Address:* c/o J. HARRISON, ESQ., LLANWYE, HAMPTON PARK, HEREFORD.

BODEY, RALPH T. **1882.** *Student.*

M.A. (Oxford); Millard Scholar Trinity College, Oxford 1882.

LIVERPOOL COLLEGE, UPPER SCHOOL, LODGE LANE, LIVERPOOL.

BOLT, F. J. *Student.*

Assistant Assayer to E. Riley, Esq.

14a, FINSBURY SQUARE, LONDON, E.C.

***BOLTON**, HENRY T. **1888-91.** *Metallurgy.* **Assoc. R.S.M.**

Died 1891.

BOLTON, HERBERT. **1886-89.** *Student in Chemistry, Biology, Geology, etc.*

F.R.S. (Edin.).

Assistant Keeper, Manchester Museum, Owens College. Extension Lecturer of the Victoria University. Author of numerous papers bearing on Geology, in the *Trans. Manch. Geol. Soc.*, the *Brit. Assoc. Reports*, the *Geological Magazine*, and elsewhere.

94, DICKENSON ROAD, RUSHOLME, MANCHESTER. *Permanent Address:* MANCHESTER MUSEUM, OWENS COLLEGE.

BOODLE, LEONARD A. **1884-86.** *Biology.* **Assoc. R.C.S.**

Demonstrator in Botany, Royal College of Science.

41, BARROWGATE ROAD, CHISWICK, LONDON, W.; *and* ROYAL COLLEGE OF SCIENCE, LONDON, S.W.

BOOT, LEWIS. **1845.** *Student, Royal College of Chemistry.*

Pharmaceutical Chemist.

BORLAND, HUGH A. MILLAR. **1892-95.** *Chemistry.* **Assoc. R.C.S.**

Demonstrator in Chemistry at Clifton College, Bristol.

CLIFTON COLLEGE, BRISTOL. *Permanent Address:* 2, GOLFHILL TERRACE, DENNISTOUN, GLASGOW, N.B.

BOSE, P. NATH. **1878-79.** *Student in Geology, etc.*

F.G.S.

Deputy Superintendent on the Indian Geological Survey.

GEOLOGICAL SURVEY OFFICE, CALCUTTA.

BOSWORTH-SMITH, PERCY. **1881-84.** *Metallurgy.* **Assoc. R.S.M.**

Bessemer Medal 1884; F.G.S.; Mem. Inst. Min. and Met.; Mem. Am. Inst. Min. Eng.

1886-89, Mineralogist to the Madras Presidency. Superintendent of the Sonapet Gold Mining Co., Chotah, Nagpore, India. 1895, Manager for the Mysore West, and Mysore Wynaad Gold Mining Cos. Author of *The Kolar Gold Field and its Southern Extension* (Govt. Press, Madras, 1889).

TANK BLOCK GOLD MINE, OORGAUM, MYSORE PROVINCE, MADRAS; *and* CHARNWOOD, LONSDALE ROAD, BARNES, SURREY.

***BÖTTINGER,** D. H. **1851.** *Student, Royal College of Chemistry.*

Late Manager in Allsopp's Brewery. Died in Germany.

BOUCHER, ARTHUR S. **1875-78.** *Mining and Metallurgy.* **Assoc. R.S.M.**

M.Inst.C.E.; M. Inst. Am. Eng.; Mem. S. African Assoc. Eng. and Arch.; Mem. Fed. Inst. Min. and Mech. Eng.; Mem. Sch. of Mines Assoc. S. Africa.

Late Superintending Engineer to the Consolidated Gold Fields of South Africa, Ltd. Now Consulting and Superintending Engineer to the United Australian Exploration, Ltd.

POST OFFICE, SYDNEY, NEW SOUTH WALES. *Permanent Address:* KEMPSEY HOUSE, WORCESTERSHIRE, ENGLAND.

BOULTON, William. **1886-89.** *Geology.* **Assoc. R.C.S.**

Lecturer on Geology and Physiography in the Mason College, Birmingham.

Mason College, Birmingham.

BOURKE, Henry W. McW. **1890-93.** *Metallurgy, Mining, and Geology.* **Assoc. R.S.M.**

BOURNE, Alfred Gibbs. **1878-79.** *Student in Biology.*

D.Sc. (London); F.R.S.; F. Univ. Coll. London.

Professor of Biology in the Presidency College, Madras. Many years engaged in teaching, and researches upon Comparative Anatomy and Embryology, especially of Invertebrata. Author of several Memoirs in the *Quart. Journ. Micros. Soc.*, the *Proc. Roy. Soc.*, etc. Authority on the Anatomy of the Hirudinea, and on the Indian Earthworms.

Presidency College, Madras.

BOWER, William R. **1884-87.** *Chemistry.* **Assoc. R.C.S.**

Mem. Phys. Soc. (Lond.)

1887-88, Assistant Demonstrator in Physics, R.C.S. 1889-93, Demonstrator and Assistant Lecturer in Physics, University College, Aberystwith. 1893, Lecturer in Mathematics, Physics, and Electrical Technology, Municipal School of Science, and Technical School, Brighton. 1896, Appointed Lecturer on Physical Science at the Technical College, Huddersfield.

The Technical College, Huddersfield.

BOWRY, J. J. **1869.** *Student in Mining.*

Sometime Chemist to Government, Jamaica.

BOYCOTT, Thomas. **1851.** *Student, Royal College of Chemistry.*

Physician. Late Indian Service.

BOYS, Charles Vernon. **1873-76.** *Mining and Metallurgy.* **Assoc. R.S.M.**

F.R.S.; Officier de l'instruction Publique, France; Mem. Council Brit. Assoc; Mem. Council Physical Society (Lond.).

Sometime Private Assistant to the late Dr. Percy, and afterwards to the late Dr. Guthrie. In 1881 appointed Demonstrator, and in 1889 Assistant Professor of Physics at the Royal College of Science. Author of numerous papers, bearing mainly upon Mechanical or Geometrical Questions connected with Physics, or with minute and exact measurements, for the most part published by the Royal and Physical Societies. Elected a Fellow of the Royal Society in 1888. Served on Juries at the Inventions Exhibition in London, and at the last Paris Exhibition, when he was made "Officier de l'Instruction Publique."

Royal College of Science, London, S.W.

BRADLEY, F. A. **1893-96.** *Chemistry.* **Assoc. R.C.S.**

***BRAZIER**, JAMES SMITH. **1847.** *Student, Royal College of Chemistry.*
F.C.S., etc.

Born 1825. Educated King William's College, Isle of Man. 1847, To the Royal College of Chemistry, and later appointed Assistant under Professor Hofmann. Leaving London, went as Assistant to Professor T. Andrews of Queen's College, Belfast. Thence to Aberdeen as Assistant to Dr. Thomas Clark and Dr. Andrew Fyfe. 1861, After the union of the Colleges, was elected to occupy the Chair of Chemistry. Afterwards Secretary of the Medical Faculty, and eventually Dean. Died January 14th, 1889, aged sixty-four.

BREBNER, G. **1887-92.** *Student in Biology and Geology.*
Forbes Medal, 1889; Marshall Scholarship, 1891.

1892-93, Algological Research, Millport Biological Station, Firth of Clyde. 1893-95, Research and Illustration Work, Jodrell Laboratory, Royal Gardens, Kew. 1895-96, Algological Research, Plymouth Biological Station. Joint author with Dr. Scott (late Professor of Botany, Royal College of Science) of several contributions to the *Annals of Botany.* Author of several illustrated papers bearing on Botanical Research in the *Journ. Linn. Soc.*, the *Annals of Botany*, and elsewhere.

THE LABORATORY, CITADEL HILL, PLYMOUTH. *Permanent Address:* 11, CARDEN PLACE, ABERDEEN.

BRELICH, HENRY. **1888-91.** *Mining.* **Assoc. R.S.M.**

1892, Assistant Manager to Ripanji Quicksilver and Silver Mines, Ripanji, Servia. 1894, Manager to the Vizianagram Manganese Mining Co., Madras Presidency. 1896, Appointed Assistant Manager to the Malacate Mining and Smelting Co., Ltd., Estado de Mexico, Mexico.

SULTEPEC, ESTADO DE MEXICO, MEXICO, VIA NEW YORK; *and* c/o A. JACKSON, ESQ., 292, HIGH HOLBORN, LONDON, W.C. *Permanent Address:* FIUME, HUNGARY.

BRISCOE, ALBERT E. **1886-89.** *Physics.* **Assoc. R.C.S.**
Honours in Physics, R.C.S. 1889; B.Sc. (Lond.).

1890, Assistant Demonstrator in Physics, R.C.S. 1889, London Matriculation Honours. 1890, On the Royal Society Magnetic Survey. 1891, Demonstrator in Physics, University College, Nottingham. 1891, First in First-Class Honours in Physics, London Institute. 1892, First in First-Class Honours in Physics, London B.Sc. 1895, Appointed Head of Physical and Electrical Department, Battersea Polytechnic.

BATTERSEA POLYTECHNIC, LONDON, S.W.

BROOK-FOX, F. G. **1895-96.** *Student in Geology and Biology.*

Assoc. M. Inst. C.E.

Executive Engineer, P.W.D. India.

BROOKS, FREDERICK ST. VINCENT. **1888-91.** *Mining.* **Assoc. R.S.M.**

1893, South Africa.

***BROOKS**, JAMES F. **1884-86.** *Mining.* **Assoc. R.S.M.**

Sometime Assistant to Messrs. Smith and De Crano. Manager of Potosi Gold Mine. Subsequently in the Transvaal and Mexico. Died in 1894.

BROOME, GORDON. **1866-69.** *Mining.* **Assoc. R.S.M.**

De la Beche Medal 1869.

Sometime Lecturer at Helmoth College, Canada. Later Professor of Mineralogy at Toronto. Wrote on Canadian Phosphates.

BROUGH, BENNETT H. **1878-81.** *Metallurgy.* **Assoc. R.S.M.**

F.G.S.; F.I.C. (Mem. of Council); F.C.S. (Mem. of Council); Mem. Fed. Inst. Min. Eng.

Educated at the City of London School, and at the Royal Prussian Mining Academy, Clausthal. 1882, Assistant to Sir Warington Smyth, Royal School of Mines. 1882-95, Abstractor to the *Journ. Chem. Soc.* 1883-93, Co-Editor of the *Journ. Iron and Steel Inst.* 1885, Juror, Inventions Exhibition, London. 1886-93, Instructor in Mine-Surveying, Royal School of Mines. 1889, On Committee of British Section, Paris Exhibition. 1892-96, Assistant Examiner in Mining to the Science and Art Department. 1893, Appointed Secretary of the Iron and Steel Institute. 1895, Member of Research Committee of the Imperial Institute. Author of papers on "The Mineral Resources of Hungary" (*Journ. Society of Arts*, 1885); on "Exploring for Iron Ore" (*Journ. Iron and Steel Inst.*, 1887); on "Tacheometry" (*Min. Proc. Inst. C.E.*, 1888); on "Outbursts of Gas in Metalliferous Mines" (*Trans. N. Engl. Inst. M.E.*, 1889); on "Mine-Surveying" (*Cantor Lectures, Society of Arts*, 1892); on "The Mineral Resources of South Africa" (*Journ. Society of Arts*, 1893); on "The Use of Cement in Shaft-Sinking" (*Journ. Fed. Inst. M.E.*, 1893); also of articles on "Fuel," in *Thorpe's Dictionary of Applied Chemistry*, 1891, and on "Mining," in *Chambers' Encyclopædia*, 1891; and of *Treatise on Mine-Surveying.* London (first edition, 1888; fifth edition, 1896).

IRON AND STEEL INSTITUTE, 28, VICTORIA STREET, LONDON, S.W.
Permanent Address: 31, ST. LEONARD'S TERRACE, CHELSEA, LONDON, S.W.

BROWN, ADRIAN J. **1867-69.** *Student in Chemistry, Physics, Mining, etc.*

F.I.C.; F.C.S.

1870, Assistant Chemist to Dr. Russell, F.R.S., St. Mary's and St. Bartholomew's Hospitals. 1873, Analytical and Consulting Chemist to Thomas Salt and Co., Ltd., Burton-on-Trent. Author of various papers on Bacteriology, Fermentation, etc., in the *Journ. Chem. Soc.*

c/o MESSRS. SALT AND CO., BURTON; *and* 6, ALEXANDRA ROAD, BURTON-ON-TRENT.

BROWN, CHARLES BARRINGTON. **1860-62.** *Geology.* **Assoc. R.S.M.** F.G.S.

1864-73, On the Geological Survey of the West Indies and British Guiana. 1873-75, Exploration of the Amazon and its tributaries. 1881-82, On Gold Placers in Surinam. 1887, 1889, and 1891, On Gold Placers and Reefs in British Guiana. 1887-88, Examined Burmah Ruby Mines for the Secretary of State for India. 1889-90 Reported on Gem and Plumbago Mines in Ceylon and in 1894 on Diamond Mines in New South Wales. Now in practice as Consulting Engineer in London. Author of *Canoe and Camp Life in British Guiana; Reports on the Geology of Jamaica, British Guiana*, etc.; of various papers in the Quarterly Journals of the Geological and Royal Geographical Societies; and "The Rubies of Burma and Associated Minerals" (*Phil. Trans. Royal. Soc.*, Vol. clxxxvii., 1896).

41, ST. QUINTIN AVENUE, NORTH KENSINGTON, LONDON; *and* 20, FINSBURY CIRCUS, LONDON, E.C.

BROWN, DAVID E. **1865-66.** *Student.*

Had for some years the management of Maldon Island, in the Pacific, where mining for Guano was carried on. 1882, In the Surinam Gold Fields. Since 1883 in the Department of Mines, Melbourne, Victoria.

. DEPARTMENT OF MINES, MELBOURNE, VICTORIA, AUSTRALIA.

***BROWN**, EDWIN ORMOND. **1849.** *Student, Royal College of Chemistry.*

F.C.S.

Born 1828 at Devonport. On leaving the Royal College of Chemistry became Lecture Assistant to Dr. Stenhouse at St. Bartholomew's Hospital, and subsequently Assistant to Professor Way. 1856, Appointed Assistant Chemist to the War Department. 1863-68, Conducted Experiments on the Manufacture of Gun Cotton, at Waltham Abbey, under Sir Fred. A. Abel, for the Department. Employed in similar investigations until his death, which occurred December 5th, 1885.

BROWN, F. D. **1871-72.** *Student in Chemistry, Geology, and Mineralogy.*

M. A. (Oxford); B. Sc. (Lond.)

Professor of Chemistry in the University College, Auckland. Author of several papers on Physical Chemistry.

University College, Auckland, New Zealand.

BROWN, Gerald Noel. **1890-94.** *Chemistry, Metallurgy.* **Assoc. R.C.S.**

8, The Esplanade, Plymouth.

BROWN, Henry Yorke Lyell. **1862-64.** *Student in Geology.*

F.G.S.

Sometime on the Geological Survey of Victoria, Australia. 1875-76, On the Geological Survey of Canada. After taking charge of the Costerfield Gold Mines in Victoria, and being employed in Western Australia for a time, he was appointed in 1878 to the post of Government Geologist, South Australia.

Adelaide, South Australia.

BROWN, Horace T. **1865-67.** *Student in Chemistry, etc.*

F.R.S.; F.G.S.; F.C.S. (Longstaff Medal 1894).

Formerly Managing Director to Messrs. Workington and Co., Burton. Author of various papers on Fermentation, etc.

52, Nevern Square, Kensington, London, S.W.

***BROWN**, James Thomas. **1860.** *Student in Chemistry.*

F.C.S.

Educated Stepney Grammar School and City of London School. On leaving the Chemical Laboratory of the Royal School of Mines, became Assistant to Dr. W. H. Perkin in the Research Laboratory at Greenford Green. Later entered into partnership to manufacture Coal-tar Colours. Author of several treatises, and of contributions to the *Journ. Chem. Soc.* Died January 8th, 1894, aged forty-nine.

BROWNE, Leonard. **1865-69.** *Metallurgy.* **Assoc. R.S.M.**

Science Teacher in 1871, and sometime Chemist to Iron Works, Nottingham.

BROWNING, John. **1848.** *Student, Royal College of Chemistry.*

Manufacturer of Physical Apparatus.

BRUCE, JAMES. **1891-94.** *Chemistry.* **Assoc. R.C.S.**

B. Sc. (Lond.); F.C.S.

1894-5, Research Chemical Laboratory, Royal College of Science. Joint author, with Dr. Wynne, of abstract in *Proc. Chem. Soc.* 1895, entitled "The Disulphuric Acids of Toluene and of Ortho- and Para-chlorotoluene."

10, SELWOOD TERRACE, FULHAM ROAD, LONDON, S.W. *Permanent Address:* ESKDALE, HAWKHEAD ROAD, GLASGOW.

BRYANT, CECIL MOXON. **1892-95.** *Mining.* **Assoc. R.S.M.**

65, GROSVENOR STREET, LONDON, W.

BUCHAN, W. **1893-96.** *Physics.* **Assoc. R.C.S.**

H.M. Inspector of Factories.

15, SALOP STREET, LIVERPOOL. *Permanent Address:* 542, CATHCART ROAD, GLASGOW.

BUCHANAN, WILLIAM. **1886-89.** *Mechanics.* **Assoc. R.C.S.**

B. Sc. (Glasgow).

1889, Senior Whitworth Scholar. Two years "Kelvin" experimental Scholarship, Glasgow University. 1892, Electrical Engineer to the London Electric Supply Corporation, Deptford. 1892-93, Engineer to the Fowler Waring Cables Co., Woolwich. 1894, Engineer to the Electric Construction Co., Wolverhampton.

11, WATERLOO ROAD NORTH, WOLVERHAMPTON. *Permanent Address:* COAL WYND, BANNOCKBURN, STIRLINGSHIRE, N.B.

BUCKTON, GEORGE BOWDLER. **1848.** *Student, Royal College of Chemistry.*

F.R.S.; F.C.S.; F.L.S.; Corr. Acad. Nat. Sc. Phil.

Amateur Chemist and Biologist. Author of many contributions to the *Phil. Trans. Roy. Soc., Journ. Chem. Soc., Trans. Linn. Soc., Trans. Ent. Soc., Ent. Month. Mag. Indian Notes*, Government Museum, Calcutta. Published *Monograph Brit. Aphides*, 4 vols, 1875-82; *Monograph Brit. Cicadæ* (Macmillan, 1890). *Nat. Hist. of Eristalis tenax* (Macmillan, 1895).

WEYCOMBE, HASLEMERE, SURREY.

BUDDEN, EDWARD RUSSELL. *Student*, **1875-76** *Chemistry;* **1883-85** *Biology.*

F.I.C.; F.C.S.; F.R.M.S.; Mem. Soc. Pub. Analysts; Mem. Soc. Chem. Ind.

Consulting Chemist to the National Association of Mineral Water Manufacturers.

11, FURNIVAL STREET, HOLBORN, LONDON, E.C.

BUDGETT, HENRY B. **1884-88.** *Mining.* **Assoc. R.S.M.**

1888-92, Apprenticed to Mr. Emerson Bainbridge, M.Inst.C.E., Nunnery Collieries, Sheffield. 1892-93, Lecturer on Mining to the Monmouthshire County Council. In practice as Consulting Mining Engineer (Colliery).

26, GREAT ST. HELENS, LONDON, E.C. *Permanent Address:* BECKENHAM, KENT.

***BUIK**, PETER S. **1885.** *Student in Chemistry.*

1885, Hodgkinson Prize for Chemistry. 1886-87, Assistant Demonstrator in Chemistry, Royal College of Science. Died August 1888.

BULLEN, MARK WHITTINGHAM. **1856.** *Student in Mining.*

Consulting Mining and Quarry Engineer. Formerly Consulting Engineer to the Teesdale Ironstone Co., the Southern States Iron and Coal Co., the Middlesbro' Salt Co., etc.

38, MOUNT PARK CRESCENT, EALING, LONDON, W.

BULLPETT, GEORGE. **1846.** *Student, Royal College of Chemistry.*

Amateur Chemist.

BURBIDGE, WILLIAM G. **1886-89.** *Physics.* **Assoc. R.C.S.**

1890-91, Teaching Physics at the Royal College of Scienee.

24, BELSIZE PARK GARDENS, LONDON, N.W.

BURBIDGE-HAMBLY, CHARLES HAMBLY, **1851-53.** *Certificated Student of the Royal School of Mines.*

F.G.S.; F.C.S.

1853-5, In Dr. Percy's Laboratory. Seventeen years Managing Director to the Mountsorrel Granite Co., Leicestershire.

HOLMESIDE, HAZELWOOD, DERBY.

BURGE, PERCY F. **1886-89.** *Chemistry.* **Assoc. R.C.S.**

Draughtsman to the Temperley Transporter Co.

c/o THE TEMPERLEY TRANSPORTER CO., 72, BISHOPSGATE STREET WITHIN, LONDON, E.C. *Permanent Address:* 167, GOLDHAWK ROAD, SHEPHERD'S BUSH, LONDON, W.

***BURGES**, J. Y. W. **1892.** *Student in Mining.*

Formerly Assistant Engineer to the Village Main Reef Gold Mining Co. Afterwards Assistant Engineer to the Simmer and Jack Gold Mining Co. South Africa. Died 1895.

BURGESS, W. T. **1882.** *Student in Chemistry.*

Tyndall Prize 1882; F.I.C.; F.C.S.; Mem. Soc. Chem. Ind.

1882-95, Chief Assistant in the Laboratory of Dr. Edward Frankland, F.R.S.

Beech Road, Reigate Hill, Surrey.

BURKE, John. **1870.** *Student in Chemistry, etc.*

Indian Telegraph Service. Superintendent, 1st Grade, Rajputana.

BURLS, Herbert Thomas. **1874-78.** *Student in Geology, etc.*

F.G.S.

Formerly at Kimberley. Now in the Transvaal.

P.O. Box 57, Klerksdorp, S.A.R.

BURNARD, Charles F. **1850.** *Student, Royal College of Chemistry.*

Manure Manufacturer, Plymouth.

BURNE, R. A. **1889-91.** *Student in Biology.*

B.A. (Oxford).

During latter part of his term employed to make some special dissections for teaching collection, Royal College of Science. 1891, Appointed Assistant in the Museum of the College of Surgeons. Author of several papers on Anatomy.

College of Surgeons, Lincoln's Inn Fields, London, W.C.

BURTON, William. **1885-87.** *Student in Chemistry, etc.*

F.C.S.; Mem. Manchester Literary and Philosophical Soc.

1887-92, Chemist to Josiah Wedgewood and Sons. 1892, Appointed Manager to Pilkington's Tile and Pottery Co., Ltd. Author of "Pottery and Porcelain," in *Thorpe's Dictionary of Applied Chemistry*, and "The Palette of the Potter," in *Journ. Society of Arts*, February 1896.

Clifton Junction, near Manchester.

BUSBRIDGE, H. **1888-91.** *Mechanics.* **Assoc. R.C.S.**

Mem. San. Inst.

1884, Lecturer at Westbourne Park Institute, Bayswater. 1893, Lecturer under Middlesex County Council at Tottenham. 1894, Principal Lecturer on Building Construction, at the Goldsmiths' Institute, New Cross, S.E. 1895, First place in the R. Inst. Brit. Arch. Intermediate.

96, Herbert Road, Plumstead, London, S.E.

BUSCH, Gustave E. **1888-91.** *Metallurgy and Mining.* **Assoc. R.S.M.**

Mem. School of Mines Assoc. of South Africa.

1893, On the Consulting Staff of the South African Trust and Finance Co. 1894, Surveyor and Assayer to the Salisbury Gold Mine Co. 1895, Mine Manager, Manicaland.

P.O. Box 1017, Johannesburg, S.A.R.

BUTCHER, Herbert Thomas. **1892-95.** *Mining.* **Assoc. R.S.M.**

c/o S. Butcher and Sons, Durban, Natal.

BUTEFISCH, Theodor A. **1887-90.** *Mining.* **Assoc. R.S.M.**

c/o C. Wilberth, Esq., Pirie Street, Adelaide, South Australia.

BUTLER, Arthur G. **1888-91.** *Biology.* **Assoc. R.C.S.**

Edward Forbes Medal 1891.

153, Cemetery Road, Sheffield.

BUTLER, Charles P. **1890-93.** *Physics.* **Assoc. R.C.S.**

1893-96, Research Astronomy, R.C.S. (London); Teaching Scholar in Astronomical Physics, R.C.S.

Royal College of Science, London, S.W.; *Permanent Address:* 153, Cemetery Road, Sheffield.

BUTLER, Francis H. **1866-69.** *Geology.* **Assoc. R.S.M.**

M.A.; L.S.A. (Lond.); Mem. Min. Soc.

1874, 1st Class in Hon. Sch. Nat. Sc., Oxford; Science Lecturer at Reading. 1877, Student at St. Mary's Hospital. Mineralogist, etc. Author of "History of Chemistry," and other articles in 9th edition of *Encyclopædia Britannica*, and of contributions on "Schorlaceous Rocks," "Francolite," and "Crystallized Dufrenite," to *Mineralog. Mag.*, vii., 65, 79, 164.

158, Brompton Road, London, S.W.

BUTTERFIELD, John Cope. **1871-73.** *Student in Chemistry.*

F.I.C.; F.C.S.; Mem. Inst. Min. Met.

1873-91, Chemist and Scientific Expert for the late Sir G. Elliot, Bart. Chemist to the Miner's Safety Explosive Co. Ltd. Now in private practice as consulting Chemist, etc.

The Laboratory, 13, Victoria Street, London, S.W.; *and* 79 Endlesham Road, Balham, London, S.W.

BUTTERS, J. B. **1893-96.** *Chemistry.* **Assoc. R.C.S.**

***BUTTON**, CHARLES. **1845.** *Student, Royal College of Chemistry.*
Manufacturing Chemist.

BYRAMJEE, RUSTOMJEE. **1870.** *Student in Chemistry.*
M.D.; Surgeon-Major.
Bombay Medical Service; retired 1875.
31, CAMPDEN HOUSE ROAD, LONDON, W. *Permanent Address:* c/o MESSRS. GRINDLAY AND CO., 55, PARLIAMENT STREET, LONDON, S.W.

BYRDE, FREDERICK T. **1890-93.** *Mining.* **Assoc. R.S.M.**
Mem. Inst. Min. and Met.
1893-94, Assayer to Mashonaland Trust and Exploration Co., Ltd. 1894-96, Mining Engineer to the Mazoc Development Co. (late Mazoc Syndicate, of Glasgow). 1896, Appointed Assistant Mining Engineer to Messrs. R. Williams and Co. (representing Zambesia Exploring Co., United Rhodesia Gold Fields, Buluwayo Syndicate, Clark's Consolidated, etc.).
c/o MESSRS. R. WILLIAMS AND CO., P.O. BOX 92, SALISBURY, MASHONALAND. *Permanent Address:* KEYNSHAM, SOMERSET.

ADDENDUM.

BELL, A. H. **1890.** *Student in Mining.*
Mem. Inst. Min. and Met.
Formerly Engineer (Pioneer Works) to Cane Springs Mine, Ibapah, Utah, U.S.A, (two years). Subsequently Engineering Manager to the Cefu Coch Gold Mine, Dolgelly, N. Wales. Now Manager to the "Woodbyrne Ayrshire Development Syndicate Ltd.," Salisbury, Mashonaland, Brit. S. Africa.
P.O. SALISBURY, MASHONALAND, BRIT. S. AFRICA.
Permanent Address: NORMANBY HOUSE, SOUTH PARK, LINCOLN.

C

CABENA, R. H. **1893-96.** *Mechanics.* **Assoc. R.C.S.**

CALDER, WILLIAM A. S. **1889-91.** *Student in Chemistry and Physics.*

F.C.S.

1891, In the laboratory of R. H. Harland, Esq., F.C.S., Analytical and Consulting Chemist, Lombard Street. 1892, Appointed Chemist at Messrs. F. C. Hills and Co.'s Chemical Works, Deptford, London, S.E.

CAWDOR, GROVE PARK, CAMBERWELL, LONDON.

CALVERT, S. A. **1887, 1893-96.** *Biology.* **Assoc. R.C.S.**

Edward Forbes Medal, 1887.

CAMPBELL, ALBERT JOHNSTONE. **1873-76.** *Mining.* **Assoc. R.S.M.**

Assoc.M.Inst.C.E.; Mem. Am. Soc. of Eng.; Mem. Inst. Min. and Met.

Born 1854. Educated at Rugby and the Royal School of Mines. 1879, Appointed Director of the Trojes Silver Mining and Smelting Co., Angangueo, Michoacan, Mexico. 1882, Member of the firm of Read and Campbell, Broad Street Avenue, London, E.C. Resident partner in Mexico, when the firm carried out the celebrated Tequixquiac Tunnel, part of the drainage works of the Valley of Mexico; and constructed the Mexican Southern Railway, the Mexican City Waterworks, a portion of the Interoceanic Railway, and other public works.

17, CLEVELAND GARDENS, LONDON, W. *Permanent Address:* c/o MESSRS. READ AND CAMPBELL, BROAD STREET AVENUE, LONDON, E.C.

CAMPBELL, P. **1885.** *Student in Mining.*

CARD, GEORGE W. **1884-87.** *Metallurgy and Geology.* **Assoc. R.S.M. & R.C.S.**

F.G.S.

Curator and Mineralogist, Geological Survey of New South Wales. Author of paper "On Flexibility of Rocks" (*Geol. Mag.* 1892), and of various contributions to the *Records of the Geological Survey of New South Wales.*

DEPARTMENT OF MINES, SYDNEY, NEW SOUTH WALES.

CAREY, FREDERICK C. **1885-88.** *Chemistry.* **Assoc. R.C.S.**

1893-95, Assistant Science Demonstrator to the Liverpool School Board. 1895, Appointed Science Master in Pembroke Dock Intermediate School.

3, UPPER GWYTHER STREET, PEMBROKE DOCK, SOUTH WALES. *Permanent Address:* STRUAN VILLAS, PORTLAND ROAD, KILMARNOCK.

CARR, PERCY E. O. **1882-85.** *Metallurgy.* **Assoc. R.S.M.**

CARRODUS, FRED. **1883-84, 1885-87.** *Chemistry.* **Assoc. R.C.S.**

1888-90, Assistant Demonstrator in Physics, Royal College of Science, London. 1890-94, Assistant Lecturer and Demonstrator in Physics at the Yorkshire College, Leeds, and Extension Lecturer in Photography. 1894-96, Science Master, King's College School, Strand, London, W.C.

34, SHEEN PARK, RICHMOND, SURREY.

* **CARTMELL**, ROWLANDSON. **1847.** *Student Royal College of Chemistry.*

F.C.S.

Sometime Chemist to Messrs. Salt and Co., Burton-on-Trent, and Assistant to Sir Benjamin Brodie, F.R.S., with whom he published researches on "Graphitic Acid."

CARTWRIGHT, HUBERT. **1891-94.** *Metallurgy.* **Assoc. R.S.M.**

41, BAKER STREET, NOTTINGHAM.

CATHERALL, EZRA. **1891-94.** *Chemistry.* **Assoc. R.C.S.**

1894, Appointed Sub-Inspector of Science Schools, Science and Art Department.

7, PORTMAN TERRACE, TAUNTON.

CATTERMOLE, ARTHUR E. **1884-87.** *Metallurgy.* **Assoc. R.S.M.**

1887-91, Manager for the Balkis Gold Mining Co., Eerstelling, Transvaal. 1891-95, Manager of gold mines in Canada and South America. 1895, Appointed Manager of the "Hetty" and "Rothery Block" Gold Mines, Krugersdorp, Transvaal.

P.O. BOX 187, KRUGERSDORP, TRANSVAAL, S.A.R. *Permanent Address:* OBSERVATORY COTTAGE, UPPER HELLESDEN, NORWICH.

* **CAVENDISH**, HARRY. **1888-91.** *Mining.* **Assoc. R.S.M.**

Educated at Manchester, and in 1888 obtained a National Scholarship at the Royal School of Mines. 1891, Appointed Science Demonstrator at Westminster School. 1892, Appointed Principal of the School of Mines and Agriculture at Penzance, which post he occupied until his death on July 28th, 1894.

CAWLEY, JOHN. **1875-78.** *Mining and Metallurgy.* **Assoc. R.S.M.**

Mem. Soc. Chem. Ind.

Analytical Chemist.

278, PASSAIC STREET, NEWARK, N.J., U.S.A.

CEPERO, FRANCIS L. **1879-82.** *Mining.* **Assoc. R.S.M.**

1882-85, Mining Engineer of the Freiberg Mining Academy. Sometime Engineer at the Mines of the "Compañia Esploradora de Zalamea de la Serena," Badajoz, Spain. Now Engineer and Director of the "Compañia Jerezana de Electricidad" (Electric Light Company of Jerez de la Frontera, Spain).

CORREDERA 52, JEREZ DE LA FRONTERA, SPAIN.

CHALMERS, JOHN A. **1885-88.** *Mining.* **Assoc. R.S.M.**

A.M. Inst. Min. and Met.; Mem. Fed. Inst. Min. Eng.; Silver Medallist, Mine-surveying, City and Guild Institute 1888.

1893, Engineer to the South African Trust and Finance Company, South Africa. Subsequently Mining Engineer to Messrs. Campbell and Evans, of Johannesburg, and Assistant to John Hays Hammond, Esq., Johannesburg. 1895, Appointed Engineer to the Consolidated Gold Fields of South Africa, Ltd.

P.O. BOX 357, JOHANNESBURG, S.A.R.

CHAMBERS, THEODORE G. **1888-91.** *Mining.* **Assoc. R.S.M.**

F.G.S.; Fellow of the Surveyor's Institution (Penfold Gold Medal, 1895).

1891-92, Assistant Engineer, under P. W. Stuart-Menteath, Esq., Assoc. R.S.M., at Las Minas de Ollin, Navarra, Spain. 1893, Entered practice as Surveyor and Architect, London.

4, BLOOMSBURY PLACE, LONDON, W.C.

CHANCE, J. FREDERICK. **1879-81.** *Student in Chemistry, etc.*

M.A.

51, PRINCE'S GATE, LONDON, S.W.

CHANEY, HARRY J. **1880-84.** *Metallurgy.* **Assoc. R.S.M.**

F.I.C.; F.C.S.

Sometime Chemist under Messrs. Newton, Chambers and Co., Sheffield. Subsequently Assayer to the North Mexican Silver Mining Co., Ltd.; Assayer and Chemist to the Cusihuiachic Silver and Lead Mining Co., Ltd., Boston; and Surveyor to the Mexican Government. 1889-93, In charge of Reduction Works of the Mysore Gold Mining Co., and Assayer to the South-East Mysore Gold Mines, the Mysore Reef Gold Mine, and the Nine Reefs Gold Mines. At present in practice as Consulting Engineer.

29, CHALCOT CRESCENT, REGENT'S PARK, LONDON, N.W.

***CHAPMAN**, Ernest Theophron. **1863.** *Student, Royal College of Chemistry.*

Born 1846. Studied at Heidelberg and Marburg Universities. 1869, Appointed Manager of a chemical factory in the Hartz Mountains. Contributed numerous researches to Chemical and Royal Societies. Killed by an explosion while preparing methylic nitrate, June 25th, 1872.

CHAPMAN-JONES, H. **1874-76.** *Student at Royal College of Chemistry and Royal School of Mines.*

F.I.C.; F.C.S. (London and Berlin); F.R.P.S., etc.

Appointed Senior Demonstrator in Chemistry, Royal College of Science in 1889. Author of *The Science and Practice of Photography* (Iliffe and Son), *Practical Organic Chemistry*, etc.; and of numerous Memoirs in the *Journ. Chem. Soc.*, *Journ. Roy. Photo. Soc.*, *Journ. Soc. Chem. Ind.*, etc. Joint author of Valentin's *Course of Qualitative Analysis*. Hon. Sec. Photographic Society.

Royal College of Science, London, S.W.

CHARLETON, Arthur George. **1876-79.** *Mining.* **Assoc. R.S.M.**

Mem. Inst. Min. and Met. (Mem. of Council 1896); Mem. N. of Eng. Inst. Min. and Mech. Eng; Mem. Am. Inst. M. E.

1879-80, Studied at the Freiberg Mining Academy, and inspected a large number of German mines and dressing works. 1881, Assistant Superintendent of the Canada Consolidated Gold Mine, Ontario, and in 1882 of the Goodwin Consolidated and Morning Star Gold and Silver Mines, Nevada; and Draughtsman with Messrs. Beckett and McDowell, Makers of Mining Machinery, New York. 1883, Inspected the Indian Consolidated and Indian Gold Mines in the Wynaad. 1884-89, General Manager to the Disraeli Gold Mine Co., Rishton, and New Queen Gold Mine Co., Charters Towers, Queensland. 1890, Reporting on Antimony Mines in Bohemia for Messrs. R. S. and Wm. Frecheville. 1891-93, Reporting on mining concessions in France, and designing dressing plant for treatment of silver-lead, and zinc ores for the New Pierrefitte Co., Hautes Pyrenees. In 1894 Mr. Charleton opened business in London as a Consulting Engineer, and in 1895 entered into partnership with F. W. Grey, Esq., Assoc. R.S.M. (Charleton and Co.), Consulting Engineers to the Exploring and Gold Mining Association, Ltd.; The North Boulder Gold Mining Co.; Hannan's and Worseman, Ltd., Dundas, West Australia; and other mining undertakings in Africa, Australia, and South America. Author of various works and papers on Mining, Ore-Dressing, etc. Silver medal of Society of Arts for a paper on "Nickel, its History, Distribution, and Metallurgical Treatment."

Dashwood House, 9, New Broad Street, London, E.C.

CHARLTON, WILLIAM. **1870-72.** *Mining and Metallurgy.* **Assoc. R.S.M.**

De la Beche Medal 1872; Mem. Iron and Steel Inst.

1880, Appointed Mining Engineer to Sir B. Samuelson and Co., Ltd., Middlesbrough.

GUISBOROUGH, YORKSHIRE.

CHATER, LIONEL G. **1887-88.** *Student in Chemistry.*

41, PORCHESTER SQUARE, HYDE PARK, LONDON, W. *Permanent Address:* 68, CANNON STREET, LONDON, E.C.

CHILD, GILBERT WALTER. **1858-61.** *Mining, etc.* **Assoc. R.S.M.**

Late Chemist to Dowlais Iron Works.

HOLYWELL LODGE, OXFORD.

***CHILD**, H. **1856.** *Student in Mining.*

Sometime on the Geological Survey of India.

CHILDS, WILLIAM. **1849.** *Student, Royal College of Chemistry.*

Pharmaceutical Chemist.

***CHISOLM**, WILLIAM. **1845.** *Student, Royal College of Chemistry.*

Manufacturing Chemist.

CHRISTIE, ARTHUR. **1846.** *Student, Royal College of Chemistry.*

Brewer.

CHURCH, ARTHUR HERBERT. **1851.** *Student, Royal College of Chemistry.*

M.A. (Oxford); F.R.S.; F.I.C.; F.C.S.; F.S.A.

Professor of Chemistry in the Royal Academy of Arts. Lecturer on Organic Chemistry, Royal Indian Engineering College, Cooper's Hill. Hon. Professor in the Royal Agricultural College, Cirencester.

SHELSLEY, KEW GARDENS, SURREY.

CLARK, ERNEST V. **1887-91.** *Metallurgy.* **Assoc. R.S.M.** *Chemistry.* **Assoc. R.C.S.**

F.C.S.

1892, Appointed Instructor in Assaying, Royal College of Science, Dublin.

ROYAL COLLEGE OF SCIENCE, DUBLIN. *Permanent Address:* 34, ST. AUBYN'S, HOVE, SUSSEX.

CLARK, HERBERT A. **1890-93.** *Mechanics.* **Assoc. R.C.S.**

Whitworth Scholarship 1893; Assoc. Inst. Elect. Eng.

1894, Appointed to the Electrical Staff of L. N. W. R. Co., Locomotive Works, Crewe. 1895, Appointed to Engineering Staff of the S.W.L. Polytechnic, Manresa Road, Chelsea.

32, FULHAM PARK GARDENS, FULHAM, LONDON, S.W. *Permanent Address:* 120, RUSKIN ROAD, CREWE.

CLARK, JAMES, **1884-86.** *Biology.* **Assoc. R.C.S.**

JOHNSHAVEN, MONTROSE, N.B.

CLARK, J. **1893-96.** *Agriculture.* **Assoc. R.C.S.**

CLARKE, C. STANLEY. **1889-92.** *Student in Metallurgy, etc.*

4, THE RESIDENCES, SOUTH KENSINGTON MUSEUM, LONDON, S.W.

CLARKSON, THOMAS. **1885-88.** *Metallurgy.* **Assoc. R.S.M.**

Senior Whitworth Scholarship 1885; A.M.Inst.C.E.; Mem. Inst. Mech. Eng.

1889, Lecturer on Metallurgy at King's College, London. 1891, Consulting Engineer to the Clarkson Stanfield Concentrator Co., Ltd. Consulting Engineer on Mining Machinery, Ore-Dressing, etc. Author of papers on "The Sampling of Iron Ores" (*Journ. Iron and Steel Inst.*); "Sampling of Ores and Tailings" (*Inst. of Min. and Met.*), etc.

GROVE VILLA, CARSHALTON GROVE, SUTTON, SURREY.

CLAUDET, ARTHUR C. **1874-78.** *Metallurgy.* **Assoc. R.S.M.**

F.I.C.; Mem. Am. Inst. M. E.; M. Inst. Min. and Met. (Mem. of Council).

Assayer to the Bank of England. Author of a paper on "Mining and Milling at the Mesquital del Oro Mine, Zacatecas, Mexico."

ASSAY OFFICES, 6 and 7, COLEMAN STREET, LONDON, E.C.

CLAY, RANDOLPH. **1874-78.** *Metallurgy.* **Assoc. R.S.M.**

522, WALNUT STREET, PHILADELPHIA, U.S.A. *Permanent Address:* c/o MESSRS. BROWN, SHIPLEY AND CO., FOUNDER'S COURT, LOTHBURY, LONDON, E.C.

CLEMENTS, HENRY HAMILTON. **1893-96.** *Physics.* **Assoc. R.C.S.**

B.A. (R.W.I.).

1896, Appointed Junior Master in the Nautical College, Colquilt Street, Liverpool.

88, EMPRESS ROAD, KENSINGTON, LIVERPOOL. *Permanent Address:* ANAHILT, HILLSBOROUGH, CO. DOWN, IRELAND.

CLEMES, J. **1870.** *Student in Metallurgy, Chemistry, etc.*

Sometime Manager to Silver Mining Co., Sierra Nevada.

CLIFFORD, EDWARD HERBERT. **1892-95.** *Metallurgy and Mining.* **Assoc. R.S.M.**

24, GLADSTONE ROAD, LONDON.

CLOUD, THOMAS CHARLES. **1865-68.** *Metallurgy.* **Assoc. R.S.M.**

F.I.C.; F.C.S.

Manager of the Wallaroo Smelting Works, South Australia.

WALLAROO SMELTING WORKS, WALLAROO, SOUTH AUSTRALIA.

CLOWES, FRANK. **1865.** *Student in Chemistry.*

D.Sc. (Lond.); F.I.C. (Mem. Council); F.C.S.; Mem. Soc. Chem. Ind. (Mem. Council); Mem. Fed. Inst. Min. Eng.

Professor of Chemistry, University College, Nottingham. Author of several text-books on Chemical Analysis, and of papers published in the *Transactions* of various societies.

99, WATERLOO CRESCENT, NOTTINGHAM.

COGILL, FRANK. **1890-93.** *Mining.* **Assoc. R.S.M.**

1894, Engineer to the Village Main Reef Gold Mining Co., Ltd., Transvaal.

JOHANNESBURG, S.A.R.

COKER, ERNEST G. **1887-90.** *Mechanics.* **Assoc. R.C.S.**

B.A. (Camb.); B.Sc. (Edin.); Mem. Soc. Chem. Ind.; Whitworth Scholarship 1890.

1890-92, Draughtsman to the L. N. W. R. Co's. Wolverton Works. 1892, Appointed Assistant Examiner at H. M. Patent Office, Chancery Lane. Joint author of *Experiments on the Torsional Strength of Solid and Hollow Shafts.*

H. M. PATENT OFFICE, SOUTHAMPTON BUILDINGS, CHANCERY LANE, LONDON, W.C. *Permanent Address:* 38, WINDSOR STREET, WOLVERTON, BUCKINGHAMSHIRE.

COLE, GRENVILLE A. J. **1876.** *Student in Geology and Mineralogy.*

F.G.S. (awarded Balance of Murchison Fund, 1881.)

1878-90, Demonstrator of Geology, Royal College of Science, London. 1887-90, Lecturer on Geology, Bedford College, London. 1890, Appointed Professor of Geology at the Royal College of Science, Dublin. Author of *Aids in Practical Geology*, and *Open-air Studies* (Griffin and Co.); also *The Gypsy Road* (Macmillan and Co.).

3, UXBRIDGE TERRACE, DUBLIN.

COLLINS, Henry F. **1880-83.** *Mining and Metallurgy.* **Assoc. R.S.M.**

Murchison Medal 1882; Bessemer Medal 1883; Assoc. M.Inst.C.E.; Mem. Inst. Min. and Met.; Mem. Min. Soc.; Mem. Am. Inst. M.E.

1883-88, Engineer to the Rio Tinto Co., Huelva, Spain. 1888-92, Manager of the Torreon Silver and Copper Mining Co., Mexico. 1892-93. Chief Engineer and Mine Superintendent, Guadalcazar Quicksilver Mining Co., St. Luis Potosi, Mexico. 1895-6, General Manager of the Hawkins Hill Gold Mines, New South Wales. Specialist in Economical Treatment of Ores, Metallurgy of Copper and Silver Ores, and the Construction and Working of Furnaces, etc.

c/o Messrs. J. H. Collins and Sons, Mining Engineers, etc., 14, Broad Street Avenue, London, E.C.

CONDY, Henry. **1847.** *Student, Royal College of Chemistry.*

Chemical Manufacturer.

COOKE, Arthur M. M. **1883-87.** *Mining and Metallurgy.* **Assoc. R.S.M.**

Battery Manager to the Buffelsdoorn Gold Mining Co., Klerksdorp, Johannesburg.

c/o Buffelsdoorn Gold Mining Co., Ltd., Johannesburg, S.A.R.

COOKE, Lewis H. **1889-92.** *Mining and Metallurgy.* **Assoc. R.S.M.**

De la Beche Medal 1892; F.G.S.

1891, Assistant in Astronomical Physics, Royal College of Science, London. 1891-93, Assistant Demonstrator in Mining, Royal School of Mines. 1893-96, Lecturer in Mining to the Glasgow and West of Scotland Technical College. 1896, Appointed Instructor in Mine-Surveying at the Royal School of Mines.

Royal College of Science, London, S.W.

COOMBER, T. **1854.** *Student in Chemistry.*

F.I.C.; F.C.S.

For many years Head-master of the Merchant Venturers' Technical School, Bristol.

52, Clarendon Road, Redland Green, Bristol.

COOPER, B. **1846.** *Student, Royal College of Chemistry.*

Sometime Manager of Silk Dye Works.

***COOPER**, BRAMSBY B. **1846.** *Student, Royal College of Chemistry.*

F.R.S.

COPELAND, ARTHUR. **1874-77.** *Metallurgy.* **Assoc. R.S.M.**

CORBIN, P. F. *Student in Biology, etc.*

1893, Engaged in research work for the Lancashire Sea Fisheries Commission, Liverpool. 1895, Went to America.

COTTON, HENRY S. **1877-80.** *Metallurgy.* **Assoc. R.S.M.**

COULTAS, PHILIP C. **1885-88.** *Physics.* **Assoc. R.C.S.**

1888-90, Teaching Scholar in Physics, Royal College of Science. 1890-91, Demonstrator and Assistant Lecturer in Physics, Public Science Schools, Cheltenham, Gloucestershire. 1891, Appointed Lecturer in Physics at the Birmingham Municipal Technical College.

MUNICIPAL TECHNICAL COLLEGE, BIRMINGHAM.

COWELL, ERNEST. **1888-92.** *Mining.* **Assoc. R.S.M.**

CLOISTER RAMP, GIBRALTAR.

***COWPER**, RICHARD. **1871-74.** *Mining and Metallurgy.* **Assoc. R.S.M.**

Born December 3rd, 1855. 1868-71, King's College School. 1875-78, Chemist to the Tredegar Iron Works. 1879-84, Demonstrator under Dr. H. Debus, F.R.S., Professor of Chemistry, Royal Naval College, Greenwich. 1884, Superintendent of the Education Section of the Health Exhibition. Editor of the *Proceedings of the International Conference on Education.* 1885, Appointed Chief Clerk to the Central Institution of the City and Guilds of London. Author of papers read before the Chemical Society. Died May 9th, 1886, aged thirty.

COX, SAMUEL HERBERT. **1872-74.** *Mining.* **Assoc. R.S.M.**

F.G.S.; F.C.S.; Mem. Soc. of Eng. (Pres. and Mem. of Council); Mem. Inst. Min. and Met. (Mem. of Council); Mem. Fed. Inst. Min. Eng.

1874, Assistant Geologist and Inspector of Mines, New Zealand. 1884, Instructor in Geology, Mineralogy, and Mining, Technical College, Sydney, New South Wales. 1891, Member of the firm of Messrs. Bainbridge, Seymour and Co.

13, ST. HELEN'S PLACE, LONDON, E.C.

CRABTREE, HENRY. **1890-93.** *Agriculture.* **Assoc. R.C.S.**

CRABTREE, JOHN D. **1888-91.** *Metallurgy.* **Assoc. R.S.M.**

1893-94, Demonstrator in Mechanics, Royal College of Science, London.

GAMERSAL, LEEDS.

CRESSWELL, CHARLES GERARD. **1873-75.** *Student in Chemistry.*

F.I.C.; F.C.S.

1883, Appointed Secretary of the Society of Chemical Industry.

ERMYNGARTH, ASHTEAD, SURREY.

CRESWELL, FREDERICK H. P. **1885-88.** *Mining.* **Assoc. R.S.M.**

F.G.S.; Mem. Inst. Min. and Met.; Assoc. M. Inst. C.E.

1888-90, Assayer to the Yuruaru Co., Venezuela. 1891-93, General Manager, Asia Minor Mining Co. 1894, Manager Durban Roodepoort Deep, Witwatersrand.

RAND CLUB, JOHANNESBURG, S.A.R. *Permanent Address:* GIBRALTAR-SPAIN.

CRICK, GEORGE C. **1875-80.** *Geology.* **Assoc. R.S.M.**

F.G.S.

1886, Assistant in the Geological Department of the Natural History Museum, South Kensington. Author of papers on "Fossil Cephalopoda."

BRITISH MUSEUM (NATURAL HISTORY), CROMWELL ROAD, LONDON, S.W.

CRIPER, WILLIAM R. **1874-78.** *Metallurgy.* **Assoc. R.S.M.**

F.I.C.; F.C.S.; Mem. Soc. Chem. Ind.; Mem. of the Asiatic Soc. Bengal.

Managing Partner in Messrs. D. Waldie and Co.'s Chemical Works, Calcutta.

c/o MESSRS. D. WALDIE AND CO., KONNAGAR, CALCUTTA.

CROCKER, WALTER S. **1889-92.** *Chemistry.* **Assoc. R.C.S.**

1892-94, Lecturer in the Hartley Institution, Southampton. 1895, Assistant Science Lecturer in the Currie Schools, Folkestone. 1895, Appointed Science Master at Northcroft, Combe Down, Bath.

PARK HOUSE, COMBE DOWN, BATH. *Permanent Address:* 12, ORCHARD PLACE, SOUTHAMPTON.

CROOKES, HENRY. **1879-81.** *Metallurgy.* **Assoc. R.S.M.**

Mem. Inst. Elect. Eng.

Held appointments as Manager of Incandescent Department of the Geilcher Co.; Battery Manager, Moss Rose Gold Mine; Battery Manager of Orkney Gold Mine; Assayer to the Morgan Gold Mine; Manager of the Waterhouse Co.; Engineer to the Tyddyngwladys Silver Mine. At present in practice as Consulting Chemist, Assayer, and Analyst.

166, BLOMFIELD TERRACE, HARROW ROAD, LONDON, W. *Permanent Address:* 7, KENSINGTON PARK GARDENS, LONDON, W.

CROOKES, WILLIAM. **1848-50.** *Student, Royal College of Chemistry.*

F.R.S. (Mem. of Council); F.C.S. (Vice-Pres. and Past Pres.); Mem. Inst. Elect. Eng. (Vice-Pres. and Past Pres.).

Ashburton Scholarship, R.C.C. Junior, and later Senior Assistant to Professor Hofmann. 1854, Appointed to superintend Meteorological Department of Radcliffe Observatory, Oxford. 1855, Appointed Professor of Chemistry at the Training College, Chester. 1859, Founded *Chemical News.* 1863, Elected F.R.S. 1864, Became Editor of *Quarterly Journal of Science.* Royal Medal 1875 and Davy Medal 1888. Delivered Bakerian Lecture 1878 and 1879. Research work connected with Chemistry and Physics. Discovered Thallium in 1861, and the Sodium Amalgamation Process for separating Gold and Silver from their Ores. Invented the Radiometer and Ortheoscope. Since 1883 almost exclusively engaged on Researches connected with the Rare Earths. Author of numerous papers in the *Transactions* of the Learned Societies; also of *Select Methods in Chemical Analysis; Handbook of Dyeing and Calico-Printing,* and other works.

7, KENSINGTON PARK GARDENS, LONDON, W.; *and* ATHENÆUM CLUB, LONDON, S.W.

CROSS, CHARLIE RICHMOND. **1891-94.** *Zoology.* **Assoc. R.C.S.**

1895, Entered the Leeds Medical School.

121, WHETLEY HILL, BRADFORD, YORKSHIRE.

CROSS, WILLIAM. **1877-80.** *Metallurgy.* **Assoc. R.S.M.**

CROWTHER, J. **1893-96.** *Metallurgy.* **Assoc. R.S.M.**

Bessemer Medal and Prize, R.S.M., 1896.

29, WYKE LANE, BAILIFFE BRIDGE, NEAR BRIGHOUSE, YORKSHIRE.

CRUM, JAMES R. **1887-91.** *Mining and Metallurgy.* **Assoc. R.S.M.**

Formerly in practice as Mining and Metallurgical Engineer, Workington, Cumberland. 1892, Appointed Manager of the Diamantina and Vesubio Gold Mines, Neiva, Republic of Columbia.

c/o J. CRUM, ESQ., HIGHFIELD, EBBW VALE, MONMOUTH.

CULLEN, HAROLD RIGBY. **1891-94.** *Mechanics and Physics.* **Assoc. R.C.S.**

Prize for Mechanics 1894. Whitworth Exhibitioner.

17, SHREWSBURY STREET, OLD TRAFFORD, MANCHESTER.

CULLIS, C. GILBERT. **1891.** *Student in Geology.*

Murchison Medal 1891.

Demonstrator in Geology at the Royal College of Science.

ROYAL COLLEGE OF SCIENCE, LONDON, S.W.

CURRIE, WILLIAM M. **1890-93.** *Mining.* **Assoc. R.S.M.**

BOLEHALL MANOR HOUSE, TAMWORTH.

CURTIS, ALFRED HARPER. *Student in Mining, etc.*

B.A. (Lond.); F.G.S.; Assoc. M.Inst.C.E.; Mem. Inst. Min. and Met.; Mem. Soc. of Arts.

1887-88, Engineer to the Komati Gold Mines, South Africa. Has examined Mines, and done other professional work in the United States, Central America, India, Algeria, Borneo, etc. Since 1890 has been on the London staff of Messrs. Bewick, Moreing and Co., Consulting Mining Engineers. At present examining mining properties for them in New Zealand. Author of a paper on "Gold Quartz Reduction Machinery," for which he was awarded a Telford Premium by the Council of the Institution of Civil Engineers in 1892.

13, SOUTH HILL PARK GARDENS, HAMPSTEAD, LONDON, N.W

D

DAGGER, John H. **1879-82.** *Student in Chemistry, Metallurgy, etc.*

F.I.C.

1884-89, Chemist, Assayer, and Works Manager at the Phœnix Smelting Works, Neath, Glamorganshire. 1889-91, Metallurgist and Consulting Chemist to the Cowles Aluminium Syndicate. 1892, In practice as Consulting Chemist, Metallurgist and Assayer; Lecturer in Physics at the Liverpool School of Science. Author of various Notes and Papers on the Metallurgy of Aluminium.

Victoria Villa, 5, Lorne Street, Fairfield, Liverpool. *Permanent Address:* The Laboratory, 171, The Albany North, Liverpool.

DALRYMPLE, Grant S. **1848.** *Student, Royal College of Chemistry.*

Engineer.

DANBY, T. W. **1857-60.** *Geology.* **Assoc. R.S.M.**

M.A.; F.G.S.; Edward Forbes Medal 1860; De la Beche Medal 1860.

1858-59, Duke of Cornwall's Scholarship. 1867, Fellow of Downing College, Cambridge. 1867, Lecturer in Natural Science, Trinity College, Cambridge. Examiner for Natural Science Tripos, Cambridge, 1870 and 1888. 1893, Appointed one of H.M. Chief Inspectors of Schools.

c/o Education Department, Whitehall, London, S.W.; *and* Seaford, Sussex.

DANIEL, Henry. **1870.** *Student in Chemistry.*

Brewer to Messrs. Salt and Co., Burton-on-Trent.

The Firs, Ashby Road, Winshill, Burton-on-Trent.

DARLINGTON, —. **1854-55.** *Student in Mining.*

Formerly at Zinc Smelting Works, Ruabon.

DARLINGTON, JAMES. **1874-75.** *Student in Mining.*

Mem. Fed. Inst. Min. Eng.; J.P.

Formerly apprenticed to Alfred Hewlett, Esq., the Wigan Coal and Iron Co., Ltd., Wigan. Now Director of the Black Park Colliery Co., Ltd., Ruabon, North Wales; and Justice of the Peace for the County of Denbigh.

BLACK PARK, RUABON.

DAVID, T. EDGEWORTH. **1878-79.** *Student in Geology.*

B.A.; F.G.S.

Sometime on the Geological Survey of New South Wales. Appointed Professor of Geology and Physical Geography in the University of Sydney.

SYDNEY UNIVERSITY, NEW SOUTH WALES.

DAVIDGE, H. T. **1893-96.** *Mechanics and Physics.* **Assoc. R.C.S.**

DAVIDSON, WALTER B. MURDOCH. **1876-79.** *Metallurgy.* **Assoc. R.S.M.**

F.G.S.; Mem. Am. Inst. M.E.

Sometime Student at Freiberg Mining Academy. Has been engaged in working phosphates in America.

119, INVERNESS TERRACE, HYDE PARK, LONDON, W.

DAVIES, ARTHUR MORLEY. **1884-90.** *Biology.* **Assoc. R.C.S.**

Geology 1891; Edward Forbes Medal 1888; B.Sc. (Lond.) 1891.

1891-94, Demonstrator in Geology, Royal College of Science, London. 1894, Appointed Tutor in Biology and Geology, University Correspondence College.

3, GONDAR MANSIONS, MILL LANE, WEST HAMPSTEAD, LONDON, N.W.

DAVIES, STEPHEN WILLIAM. **1870-73.** *Metallurgy.* **Assoc. R.S.M.**

Murchison Medal 1872.

DAVISON, ROBERT A. P. **1875-78.** *Metallurgy.* **Assoc. R.S.M.**

1878-89, Assistant Analyst and Sampler to E. Riley, Esq. 1889-95, Demonstrator in Metallurgy, King's College, London, W.C.

7, MINDEN ROAD, ANERLEY, LONDON, S.E.

DAW, FREDERIC WELDON. **1889-92.** *Chemistry.* **Assoc. R.C.S.**

F.C.S.

Chief Chemist to the Ebbw Vale Steel, Iron and Coal Co., Ltd.

EUREKA PLACE, EBBW VALE, MONMOUTHSHIRE.

DAWSON, George Mercer. **1869-72.** *Mining.* **Assoc. R.S.M.**

C.M.G.; LL.D.; F.R.S.; F.G.S. (Bigsby Medallist); Murchison and Edward Forbes Medals 1872.

1873-74, Geologist and Naturalist to H. M. North American Boundary Commission. Since 1875 has been connected with the Geological Survey of Canada, of which he was appointed Director in January 1895. In 1891-92 he was one of H.M. Behring Sea Commissioners. Author of many papers and Memoirs on the Geology of Canada, British Columbia, and Vancouver, including several valuable Reports, bearing on the mines and mineral wealth of British Columbia, and the coal and lignites of the North-West Territory, mostly published in the *Annual Reports of the Geological Survey of Canada.* Created a Companion of the Order of St. Michael and St. George in 1892. President of the Royal Society of Canada.

Geological Survey of Canada, Ottawa.

DAWSON, Thomas Launcelot. **1892-95.** *Mining.* **Assoc. R.S.M.**

Assistant Mining Engineer, Darien Gold Mining Co., Ltd.

c/o Mr. L. Gaibrois, Agent for the Darien Gold Mining Co., Ltd., Panama, Republic of Colombia, South America. *Permanent Address:* 78, Norwood Road, Herne Hill, London, S.E.

DAY, Albert W. **1879-82.** *Mining.* **Assoc. R.S.M.**

DAY, William. **1890-93.** *Metallurgy.* **Assoc. R.S.M.**

1893-94, Demonstrator in the Metallurgical Laboratory, Royal College of Science. 1894, Appointed Assayer in the Broken Hill Assay Office, Mark Lane.

596, Ledsham Street, Wolverton; *and* Broken Hill Assay Office, Mark Lane, London, E.C.

DEERING, W. H. **1864.** *Student in Chemistry.*

Analytical Chemist.

Chemical Department, Royal Arsenal, Woolwich, London, S.E.; *and* Endsleigh, Glenluce Road, Westcombe Park, London, S.E.

DE FERRARI, Paulo. **1874-76.** *Mining.* **Assoc. R.S.M.**

DE GONCER, José. **1873-76.** *Mining and Metallurgy.* **Assoc. R.S.M.**

***DE LA RUE,** WARREN. **1845.** *Student, Royal College of Chemistry.*

F.R.S.; F.R.A.S. (Pres. 1864-66); F.C.S. (Pres. 1867-69; 1879-80).

Son of Thomas de la Rue, the founder of the Firm of Thomas de la Rue and Co. Born 1815; educated at College of St. Barbe, Paris. While at R.C.C. completed investigation of colouring matter of cochineal; published results in *Journ. Chem. Soc.* 1845. Turned his attention not only to Chemistry, but also to Physics, Mechanics, Photography, and Astronomy. One of earliest adapters of Photography to Astronomical work. Designed the "Photoheliograph." Was with the "Himalaya" Eclipse Expedition to Spain 1860. Took an active part in preparation for the photographic observations of the Transit of Venus 1874. Some years Pres. of London Institution, and Sec. from 1878-82. One of the original members of the Chemical Society. Scientific work embodied in *Transactions* of the Learned Societies. Died April 19th, 1889.

DEL MAR, ALGERNON P. **1888-91.** *Mining.* **Assoc. R.S.M.**

1891-92, Reporting on Mines in the United States, Ohio, Nashville, Tennessee. 1892, Assistant Manager of the Gold Prince Mining Co. 1893, Assistant Manager of the Grass Valley Mines. 1895, Appointed Manager to the Lomatic Exploration Co., South Africa.

BARBERTON, S.A.R. *Permanent Address:* c/o MESSRS. W. DEL MAR & CO., 61, OLD BROAD STREET, LONDON, E.C.

DE MULLER, WALTER JOSEPH EDWARD. *Student.*

B.A.; F.G.S.; F.R.G.S.; Mem. Inst. Min. and Met.

1881-84, Mining and Metallurgical Engineer for the Borneo Co., Ltd., Sarawak, Straits Settlements. 1885-87, Manager of the Piranga Gold Dredging Association, Ltd., Brazil. 1891-95, Director-General of the Royal Department of Mines and Geology of Siam. Has reported on Gold, Silver, Coal, Abestos, and other Mines in Austria, the United States, Canada, Nicaragua, Brazil, Uruguay, the Argentine Republic, Australia, Siam, and the Malay Peninsula, for the London Mercantile Association, Ltd., the Austin Friar's Agency Association, and various other London Companies; also for the Siamese Government.

7, UPPER PORCHESTER STREET, HYDE PARK, LONDON, W. *Permanent Address:* c/o MESSRS. H. S. KING AND CO., 45, PALL MALL, LONDON, S.W.

DENNING, TOM HOPEWELL. **1884, etc.** *Student.*

1884, Royal Exhibitioner, Royal College of Science. 1886, Appointed Assistant Examiner in H. M. Patent Office.

40, MARMORA ROAD, HONOR OAK, LONDON, S.E.; *and* H. M. PATENT OFFICE, SOUTHAMPTON BUILDINGS, CHANCERY LANE, LONDON, W.C.

DENT, WILLIAM YERBURY. **1848.** *Student, Royal College of Chemistry.*

Sometime Assistant Chemist to the War Department, and formerly of Dowlais Iron Works.

5, CAITHNESS ROAD, BROOK GREEN, LONDON, W.

DE RANCE, CHARLES EUGENE. *Student.*

F.G.S.; A.M.Inst.C.E.; F.R.G.S. F.R. Met. Soc.; Hon. Mem. Manchester Geological Soc.; Hon. Mem. Yorkshire Pol. and Geol. Soc.

1866, On the staff of the late R. W. Mylne, Esq., C.E., F.R.S., Hydraulic Engineer to H. M. War Office. 1867, Appointed to the Geological Survey of England and Wales. Secretary to the Committees of the British Association on "Underground Water" 1874-95, and "Coast Erosion" 1881-95.

55, STOKE ROAD, STOKE-UPON-TRENT. *Permanent Address:* 28, JERMYN STREET, LONDON, S.W.

DICKENS, LIEUT-GEN. CRAVEN HILDESLEY. **1863.** *Student in Chemistry.*

C.S.I.; R.A.

Late Royal Artillery, Bengal. Retired 1878.

15, FERNSHAW ROAD, WEST BROMPTON, LONDON, S.W.

DICKINSON, ARTHUR. **1889-93.** *Mining and Metallurgy.* **Assoc. R.S.M.**

Mem. Inst. Min. and Met.; Mem. Fed. Inst. Min. Eng.

1893-94, Assistant-Manager of the Callington Mines, South Devon. 1894, Prospecting and developing properties on behalf of the Tasmanian Mining Corporation, Throgmorton Avenue, London, E.C.

POST OFFICE, MATHINNA, TASMANIA. *Permanent Address:* WARHAM ROAD, CROYDON.

DIETZSCH, FERDINAND. **1885-88.** *Mining.* **Assoc. R.S.M.**

1888, Under-Manager, and 1889, Manager to the "Cochrane Gold Syndicate, Ltd.," Nova Scotia. 1889-92, Engineer to the "Gaseitsive Concession Syndicate, Ltd.," Bechuanaland Protectorate, S. Africa. 1893-95, Under-Manager, and in 1895 appointed Manager, to the Chiapas Mining Co., Ltd., Santa Fé Mine, Mexico.

MINA SANTA FÉ, TEAPA DE TABASCO, MEXICO.

DILLON, EDWARD. **1868-72.** *Mining and Metallurgy.* **Assoc. R.S.M.**

M.A. (Lond.).

1871-73, Assistant Assayer, Royal Mint, London. 1873-78, Chief Assayer to the Imperial Japanese Mint, Osaka.

c/o F. DILLON, ESQ., 13, UPPER PHILIMORE GARDENS, LONDON, W.

DIVERS, EDWARD. **1852.** *Student, Royal College of Chemistry.*

M.D.; F.R.S.

Professor of Chemistry, Imperial University, Japan. Formerly Lecturer on Forensic Medicine at the Middlesex Hospital. Author of numerous contributions to the *Journ. Chem. Soc.*

HONGO, TOKIO, JAPAN.

***DIVETT**, GEORGE ROSS. **1879-82.** *Mining and Geology.* **Assoc. R.S.M.**

Was formerly interested in the working of clays and lignite at Bovey Tracey, Devonshire.

DIXON, A. J. *Student, Royal School of Mines.*

TECHNICAL COLLEGE, HARRIS STREET, SYDNEY.

DIXON, WILLIAM. **1890-94.** *Mining and Metallurgy.* **Assoc. R.S.M.**

HALKYN MINES, HOLYWELL, NORTH WALES.

DODD, N. **1893-96.** *Mining and Metallurgy.* **Assoc. R.S.M.**

DOLAN, A. A. **1886.** *Student in Mining.*

DOUGLAS, E. A. **1893-96.** *Mining.* **Assoc. R.S.M.**

DOWDEN, WALTER A. A. **1882-85.** *Metallurgy.* **Assoc. R.S.M.**

Prof. Assoc. Surveyor's Institution.

Sometime Assayer and General Manager to the Hardanger Mines in Norway and North Queensland. 1894, To West Australia.

P.O. PERTH, WEST AUSTRALIA. *Permanent Address:* 381, VAUXHALL BRIDGE ROAD, LONDON, S.W.

DOWLING, JOHN. **1890-93.** *Mechanics.* **Assoc. R.C.S.**

Sometime Engineering Teacher at the Nautical Academy, West Hartlepool; and Science Teacher at St. Andrew's Institute, Ludlow. 1894, Appointed Assistant Science Master at the Grammar School, Ashburton, South Devon.

2, BELVEDERE, BISHOP AUCKLAND, DURHAM; *and* THE GRAMMAR SCHOOL, ST. LAWRENCE LANE, ASHBURTON.

***DREW**, FREDERIC. **1853-55.** *Mining, etc.* **Assoc. R.S.M.**

F.G.S.

Born August 11th, 1836. 1853, Entered The Royal School of Mines. 1855, Obtained the Royal Scholarship, and Edward Forbes Medal and Prize of Books. 1855, Joined the Geological Survey, and did valuable work in the South-East of England. The general results of his survey of the Hastings Sands were published in the journal of the Geological Society of London in 1861. 1862, Retired from the Geological Survey to enter the service of the Maharajah of Kashmir. He was appointed Governor of Jummoo, and afterwards of Ladak. 1872, Returned to England, and was appointed one of the Science Masters at Eton College, which post he occupied until his death on October 28th, 1891.

DREW, WALTER NEWTON. **1888-92.** *Mining.* **Assoc. R.S.M.**

At the Collieries of Messrs. Newton, Chambers and Co., Ltd., Tankersley, near Barnsley, Yorkshire.

TANKERSLEY COTTAGE, WHARNCLIFFE SILKSTONE, NEAR BARNSLEY, YORKSHIRE.

DUERDEN, JAMES E. **1885-89.** *Biology, etc.* **Assoc. R.C.S.**

Sometime Demonstrator in Biology, R.C.S. Dublin, and Lecturer on Fisheries at the Fishery School, Dublin. 1895, Appointed Curator of the Museum of the Institute of Jamaica. Author of several papers on "British Marine Zoology"; also on "The Marine Zoology and Anthropology of Jamaica."

THE MUSEUM, KINGSTON, JAMAICA, WEST INDIES.

DUNKERLEY, GEORGE D. **1892-95.** *Chemistry.* **Assoc. R.C.S.**

Tyndall Prize, R.C.S., 1893.

CARMARTHEN COUNTY SCHOOL, PENCADER, SOUTH WALES. *Permanent Address:* 52, CORNBROOK STREET, OLD TRAFFORD, MANCHESTER.

DUNN, HENRY BARTRAM. **1858-61.** *Mining, etc.* **Assoc. R.S.M.**

DUNNAGE, Thomas A. **1858.** *Student in Chemistry.*

Formerly Proprietor of Lead Works near Sheffield.

***DUPPA**, Baldwin Francis. **1855.** *Student, Royal College of Chemistry.*

F.R.S.; J.P.

Born 1828. Educated at Hofwyl, near Berne, and at Cambridge University. After leaving the Royal College of Chemistry, worked for some time with Dr. W. H. Perkin. 1860-67, Associated in research work with Dr. Edward Frankland, first in the Laboratory at St. Bartholomew's Hospital, and afterwards at the Royal Institution. Died November 10th, 1873, in his forty-fifth year.

DUTTON, Frederick V. **1890-93.** *Agriculture.* **Assoc. R.C.S.**

1893, Assistant Lecturer, Agricultural College, Aspatria. 1893, Appointed Lecturer on Agricultural Chemistry at the University College, Bangor. Author of *Experiments with Manures in Rotation Cropping*, 1894-95; *Report on Field Experiments in North Wales for the Year* 1895, etc.

Menai Bridge, Anglesea.

DYKES, F. J. B. **1888-92.** *Student in Mining.*

1893, Appointed Inspector of Mines, Malay Peninsula.

Perâk, Straits Settlements. *Permanent Address:* 5, Sloane Gardens, London, S.W.

***DYMOND**, Arthur W. **1885-88.** *Mining.* **Assoc. R.S.M.**

1889-91, Assistant Manager of the Notre Dame des Victoire Gold Mine Co., Ltd., Klerksdorp, Transvaal. 1895, Mine Manager to the British Guiana Development Syndicate, Ltd., until his death.

E

EAGLES, J. **1893-96.** *Mechanics.* **Assoc. R.C.S.**

Science Teacher at the Bury Technical School.

58, Buckley Wells, Bury, Lancashire.

EASTICK, John Joseph. **1874-78.** *Metallurgy.* **Assoc. R.S.M.**

F.I.C.; F.C.S.; F.R.S. (Victoria).

1879, Lecturer on Chemistry, Whitgift College, Croydon. 1880-81, Head Chemist at Messrs. Hodges and Sons' Refinery, London. 1881-90, Head Chemist at Messrs. A. Lyle and Son's Refinery, London. 1890-95, General Manager of the Australian Sugar Refining Co., Ltd., Melbourne, Victoria. 1895, Appointed Manager at Messrs. R. Cran and Co.'s Millaquin Refinery, and also Yengarie Refinery, Queensland.

Millaquin Refinery, Bundaberg, Queensland.

EDSER, Edwin. **1890-92.** *Physics.* **Assoc. R.C.S.**

1893-95, Demonstrator in Physics at the Royal College of Science, London. 1895, Appointed Head of the Mathematical Section and Demonstrator in Physics at the South-West London Polytechnic, Chelsea, S.W. Joint author of various papers on subjects connected with Physics, including that "On the Objective Reality of Combination Zones" (with Professor A. W. Rücker, F.R.S., *Phil. Mag.*, May 1895), and "On the Velocity of Light in Rarified Gases through which an Electric Discharge is Passing" (with S. G. Starling, *Brit. Assoc. Report*, 1895).

74, Santos Road, Wandsworth, London, S.W. *Permanent Address:* South-West London Polytechnic, Chelsea, London, S.W.

EDWARDS, W. B. Dallas. **1886-90.** *Geology.* **Assoc. R.C.S.**

F.G.S.

1890-91, Assistant Master at Westminster School. 1891-94, Assistant Superintendent, Geological Survey of India. 1894, Appointed Inspector of Science Schools for the East Midland District, under the Science and Art Department.

7, Hamilton Drive, The Park, Nottingham. *Permanent Address:* East India United Service Club, 16, St. James's Square, London, S.W.

EILOART, A. *Assistant in Chemistry, Royal College of Science.*

Ph.D. (Leipzig); B.Sc. (Lond.).

Studied at King's College, London, and at Universities of Bonn and Leipzig. Formerly Instructor in Quantitative Analysis at Cornell University, U.S.A.; Director of Chemical Laboratory at Medical School of Post-Graduate Hospital of New York. Appointed to the Royal College of Science in 1895.

Royal College of Science, South Kensington, London, S.W.

ELIOT, Colonel. **1848.** *Student, Royal College of Chemistry.*

Indian Army. Retired 1892.

ELLIOTT, Stephen J. **1884.** *Student in Chemistry.*

Hodgkinson Prize 1884.

ELLIS, Arthur Devonshire. **1875-79.** *Mining.* **Assoc. R.S.M.**

De la Beche Medal 1879; Mem. Iron and Steel Inst.; Mem. Inst. Mech. Eng.

1891, Managing Director to Messrs. Thwaites Bros., Ltd., Vulcan Iron Works, Bradford.

Vulcan Iron Works, Bradford.

ELLIS, Thomas Flower. **1886-89.** *Mining.* **Assoc. R.S.M.** *Chemistry.* **Assoc. R.C.S.**

F.C.S.

1890, Private Assistant, St. Mary's Hospital. 1891-94, Analyst to Smelting Department of the Straits Settlements Trading Co., Singapore.

Widmore, Bromley, Kent.

ELLIS, W. A. **1875-78.** *Metallurgy.* **Assoc. R.S.M.**

***EPPS**, Richard. **1846.** *Student, Royal College of Chemistry.*

Surgeon.

EUSTICE, John. **1888-91.** *Metallurgy.* **Assoc. R.S.M.**

Whitworth Scholarship.

1891-92, Lecturer on Engineering to the Hampshire County Council. 1892, Appointed Lecturer on Engineering at the Hartley Institution, Southampton.

26, Wilton Avenue, Southampton. *Permanent Address:* 8, Sea-view Terrace, Camborne, Cornwall.

EVANS, — . **1857.** *Student in Mining.*

EVANS, JOHN WILLIAM. *Student in Geology and Assaying.*

D. Sc. (Lond.); LL.D. (Lond.); Barrister-at-law; F.G.S.

1889-91, Demonstrator in Geology at the Royal College of Science. 1891-92, Geologist to the Matto Grosso Gold and Exploration Concessions, Brazil. 1893-94, Geologist to the Junagadh State, Kathiawad, India. 1894, Appointed Senior Geologist, Analyst and Inspector of Mines in the Geological Department, Mysore Government.

c/o MYSORE GEOLOGICAL DEPARTMENT, BANGALORE, INDIA. *Permanent Address:* c/o THE GEOLOGICAL SOCIETY, LONDON, S.W.

EVERETT, SYDNEY A. **1886-89.** *Mining.* **Assoc. R.S.M.**

40, SOUTHVILLE, BRISTOL.

F

FARQUHARSON, Charles R. **1886-90.** *Mining.* **Assoc. R.S.M.**

Sometime Engineer and Mine-Manager to the Broken Hill Proprietary, and to the British Broken Hill Proprietary Mines, New South Wales. 1894, Appointed Mine-Manager at the Cue Victory Mine, West Australia.

Cue Victory Mine, Day Dawn, Murchison Gold Fields, West Australia. *Permanent Address:* 43, Cromwell Houses, South Kensington, London, S.W.

FEARNLEY, G. William. **1891-94.** *Mechanics.* **Assoc. R.C.S.**

Whitworth Exhibitioner.

1884, Apprenticed to Messrs. Ellison and Sons, Engineers, Manningham. Sometime with Messrs. D. Sowden and Sons, Machine Makers, Shipley. 1894, In charge of Electric Lighting Plant, with Messrs. D. and A. Wilson, Charlestown. 1895, Appointed Lecturer on Solid Geometry and Machine Construction at the Bedford Technical College.

5, Alva Terrace, Shipley, Yorkshire.

FEATHERSTONEHAUGH, — . **1852-53.** *Student in Mining.*

***FEDDEN**, Francis. **1857-59.** *Mining and Geology.* **Assoc. R.S.M.**

Sometime Assistant at the Museum of Practical Geology, Jermyn Street; and afterwards an Officer of the Geological Survey of India.

FEILDING, Rowland C. **1890-93.** *Mining.* **Assoc. R.S.M.**

1893-95, Pestarena Gold Mines, North Italy. 1895, In practice as Assayer in Buluwayo. 1896, Partner in White's Syndicate.

Buluwayo, British South Africa.

FELL, E. N. **1877-79.** *Mining.* **Assoc. R.S.M.**

Formerly Assistant Manager, St. John del Rey Gold Mining Co., Ltd., Brazil; and Manager of the Cuiaba Mine. 1895, Appointed Manager of Ironworks in Alabama.

Huntsville, Alabama, U.S.A. *Permanent Address:* c/o Arthur Fell, Esq., 46, Queen Victoria Street, London, E.C.

FERGUSON, George Ekem. **1890.** *Student in Mining.*

Gill Memorial Prize, Geographical Society, April 1894.

1881, Accompanied Sir S. Rowe to Prahsu during threatened Ashanti invasion. 1882, Queen's Advocate's Office. 1884, Governor's Office. 1886, With Mission to Akwamu and Croboe. 1887-90, Assistant Clerk, Board of Education. 1890, Transferred to Surveyors' Department; Conducted Political Expeditions to Kwahu and Atabubu. 1891, Expedition to Akim; the same year with Anglo-German Boundary Commission. 1892-94, Special Commissioner to the Hinterland. 1893, Acting Surveyor in charge of Public Works Department; appointed Surveyor to the Roads Department. Compiler of the Map of the Divisions in the Gold Coast Protectorate 1884.

c/o R. A. Ferguson, Esq., Harvest House, Anambu, Gold Coast, West Africa; *and* c/o H. M. Colonial Office, Downing Street, London, S.W.

FERGUSON, Reginald William S. **1892-95.** *Chemistry.* **Assoc. R.C.S.**

1895, Appointed Lecturer on Chemistry in the Leeds School of Science, and the Leeds Modern Schools.

8, Havelock Terrace, Paisley Road, Glasgow.

FERGUSON, William D. **1889-92.** *Mining.* **Assoc. R.S.M.**

1893-95, Manager to the United Mexican Mining Co. 1895, Exploring for the Ontario Exploration Co., Ltd., in Minnesota and Ontario; also Consulting Engineer to the Seine River Gold Mines, Ontario.

Duluth, Minnesota, U.S.A. *Permanent Address:* 7, Great Winchester Street, London, E.C.

FERGUSSON, Malcolm. **1891-94.** *Mining.* **Assoc. R.S.M.**

Sometime Sampler to the "Robinson" Gold Mine. 1895, Appointed Assistant to Samuel J. Truscott, Esq., Assoc. R.S.M., Manager for the Heidelberg District of the Consolidated Gold Fields, South Africa, Ltd., and the Sub-Nigel Gold Mining Co., Ltd.

Nigel, Heidelberg, S.A.R.. *Permanent Address:* P.O. Box 691, Johannesburg, S.A.R.

***FIELD**, Frederick. **1846-48.** *Student, Royal College of Chemistry.* F.R.S.

Born 1826. Educated at Denmark Hill Grammar School, and Mr. Long's School at Stockwell. 1843, At the Laboratory of the Polytechnic Institute. 1848, Appointed Chemist to a Copper Smelting Establishment at

Coquimbo, Chili. 1852, Appointed by his Company Manager of Smelting Works at Caldera, North of Coquimbo. 1853, Appointed Vice-Consul at Caldera in addition to professional duties. 1856, Appointed Chemist and Under-Manager to a Smelting Establishment at Guayacan. 1860, Returned to England, and was appointed Lecturer on Chemistry at St. Mary's Hospital, and in 1862 Professor of Chemistry at the London Institution. 1862-66, Chemist to the Aniline Colour Works of Messrs. Simpson Maule and Nicholson. 1866, Became a partner in the Firm of Messrs. J. C. and J. Field. Author of numerous papers on "Chemical Science." Died April 3rd, 1885, aged fifty-eight.

***FIELD**, JOHN. **1845.** *Student, Royal College of Chemistry.*

Member of the Firm of Messrs. J. C. and J. Field.

***FINCH**, FRED. G. **1861-64.** *Geology.* **Assoc. R.S.M.**

D.Sc. (Lond.); Duke of Cornwall's Scholarship 1862; Murchison Medal 1863.

Sometime at the Blanavon Iron Works. Died about 1869.

FINCH, HENEAGE WYNNE. **1892-95.** *Mining.* **Assoc. R.S.M.**

Assistant Engineer to the Langlaagte Royal Gold Mining Co.

c/o LANGLAAGTE ROYAL GOLD MINING CO., JOHANNESBURG, S.AR.

FISHER, EDWARD B. **1890-93.** *Metallurgy.* **Assoc. R.S.M.**

31, DONEGAL PLACE, BELFAST.

FISON, A. H. **1876-79.** *Metallurgy.* **Assoc. R.S.M.**

D.Sc. (Lond.); Mem. Phys. Soc.; F.R.A.S.

1887, Assistant Professor of Physics at the University College, London. 1890, Assistant Examiner in Experimental Philosophy to the University of London. 1895, Staff Lecturer in Physics to the Oxford University Extension Society.

27, DEAN ROAD, WILLESDEN GREEN, LONDON, N.W.

FITZ-BROWN, GEORGE. **1872-75.** *Mining and Metallurgy.* **Assoc. R.S.M.**

F.I.C ; F.C.S.

Manager of the Ditton Copper Works, Widnes.

DITTON COPPER WORKS, WIDNES.

FITZE, JOSEPH. **1889.** *Student in Chemistry.*

1, NEW CHINA BAZAAR STREET, CALCUTTA.

FLADGATE, Francis. *Registrar of the Royal College of Science, and Royal School of Mines.*

Born at Brompton, November 9th, 1843, and educated under the late Dr. John Wilson at St. Peter's College, Eaton Square. Entered the army in September 1862; served in the 34th, and subsequently in the 39th Regiment. Employed by H.M. Commissioners for the International Exhibitions of 1872-3-4, and in 1879 became Secretary to a Commission appointed by the Government of New South Wales to take part in carrying out the Sydney Exhibition. Appointed Registrar of the Royal College of Science on the decease of Major Macgregor in 1893.

Royal College of Science, London, S.W.

FLETCHER, J. J. **1877-78.** *Student in Biology.*

B.Sc. (Lond.).

Studied for a time under the late Professor F. M. Balfour at Cambridge. Appointed Master in Newington College, Stanmore. In 1886 appointed Secretary of the Linnean Society, New South Wales. Author of valuable papers on "Australian Earthworms," etc.

Newington College, Stanmore, New South Wales.

FOLKARD, Charles W. **1874-77.** *Mining and Metallurgy.* **Assoc. R.S.M.**

Editor of the *Royal School of Mines Magazine* 1878.

***FORBES,** J. *Student in Chemistry, etc.*

Died at St. Kitts, West Indies, February 11th, 1896.

FORD, Stanley H. **1888-91.** *Metallurgy.* **Assoc. R.S.M.**

Mem. Fed. Inst. Min. Eng.; Mem. N. of Eng. Inst. Min. and Mech. Eng.; Assoc. Mem. Inst. Min. and Met.; Mem. Chem. and Met. Soc. South Africa.

1892-93, Prospecting in Greater Namaqualand for the Orange River Estates Co., Ltd. 1895, Assayer and Chemist to the City and Suburban Gold Mining Co., Ltd., Johannesburg.

P.O. Box 2056, Johannesburg, S.A.R. *Permanent Address:* c/o F. G. Ford, Esq., 19, North Street, Stokes Croft, Bristol.

FORD, Stanley W. **1891-93.** *Student in Mining.*

F.G.S.

1890, Mining in South America. 1895, Gold prospecting in Matabeleland. 1896, Prospecting for Syndicate in Canada.

FORSTER, Martin Onslow. *Assistant in Chemistry at the Royal College of Science.*

Ph.D. (Würzburg) ; F.C.S.

Studied at City and Guilds of London Technical College, Finsbury. Formerly Private Assistant to Professor Tilden, F.R.S., at the Mason College, Birmingham. First Salters' Co.'s Research Fellow.

5, Thirlmere Road, Streatham, London, S.W. *Permanent Address :* East Grinstead, Sussex.

FORSYTH, Robert William. **1892-95.** *Physics.* **Assoc. R.C.S.**

Assistant in Physics at the Royal College of Science.

Royal College of Science, London, S.W. *Permanent Address :* 27 Oxford Terrace, Gateshead-on-Tyne.

FOSTER, Clement Le Neve. **1857-59.** *Mining, etc.* **Assoc. R.S.M.**

B. ès Sc. ; B.A. ; D.Sc. (Lond.) ; F.R.S. ; F.G.S. ; Hon. Mem. Fed. Inst. Min. Eng. ; Mem. Am Inst. M.E. ; Knight of the Legion of Honour ; Duke of Cornwall Scholarship 1857 ; Edward Forbes Medal 1859.

1860-65, On the Geological Survey of Great Britain and Ireland. 1865-68, Lecturer to the Miners' Association of Cornwall and Devonshire. 1868, Joined an exploring expedition to the Peninsula of Sinai. 1869, Reported on the Caratal Gold Field, Venezuela. 1869-72, Engineer to the Pestarena Gold Mining Co., North Italy. 1873, Appointed Inspector of Mines in Cornwall and Devon, and translated to the Inspectorship of North Wales in 1880. 1890, Succeeded the late Sir Warington W. Smyth in the Chair of Mining at the Royal School of Mines. In conjunction with Mr. Galloway, translated Callon's *Lectures on Mining* into English. Author of *Ore and Stone Mining* (London : Charles Griffin and Co.). (Further, *see* Professors.)

Royal College of Science, London, S.W. ; *and* Min-y-don, Llandudno, North Wales.

FOULDS, James. **1893-96.** *Geology.* **Assoc. R.C.S.**

Student Assistant in Geology 1894-96.

FOURNIER-D'ALBE, Edmund E. **1890-93.** *Physics.* **Assoc. R.C.S.**

B.Sc. (Lond.) ; Mem. Phys. Soc. London.

Demonstrator in Physics, Royal College of Science, Dublin. Author of "The Classification of Physical Experiments" (*Electrician*, March 1896), etc.

4, Old Court Terrace, Bray, Co. Wicklow, Ireland.

FOWLER, Alfred. **1882-85.** *Mechanics.* **Assoc. R.C.S.**

F.R.A.S.

1887, Demonstrator in Astronomy, Royal College of Science; Computer to the Solar Physics Committee. Author of *Popular Telescopic Astronomy.*

26, Octavia Street, Battersea, London, S.W.; *and* Royal College of Science, London, S.W.

FOWLER, — . **1855.** *Student in Mining.*

FOWLER, Percival. **1874-75.** *Student in Mining.*

M.Inst.C.E.; F.G.S.; Mem. Am. Inst. M.E.

Formerly Student at the Polytechnic, Aix-la-Chapelle and École des Mines, Paris. 1880-85, Manager and Resident Engineer for English Companies in Spain. 1896, Consulting Mining Engineer in Western Australia.

2, Queen's Square Place, Queen Anne's Mansions, Westminster, London, S.W.; *and* c/o Messrs. Read and Campbell, Broad Street Avenue, Blomfield Street, London, E.C.

FRAMES, G. C. **1873-75.** *Geology.* **Assoc. R.S.M.**

FRAMPTON, Napier Paul. **1891-94.** *Mining.* **Assoc. R.S.M.**

c/o W. Frampton, Esq., 73, Gower Street, Adelaide, South Australia.

FRANCHY, Andrés. **1884-87.** *Mining.* **Assoc. R.S.M.**

B.A. (Seville); F.G.S.

c/o Señor Don J. Manuel Montero, 137, Coca, Lima, Peru; *and* c/o Messrs. Kolp and Co., 5, Hall Street, Oxford Street, Manchester.

FRANCO, S. F. **1893-96.** *Mining.* **Assoc. R.S.M.**

FRANKLAND, Edward. **1845-47.** *Student in Chemistry.*

M.D.; D.C.L.; LL.D.; Ph.D.; F.R.S.; J.P.

1849, Appointed Lecturer on Chemistry at the College of Civil Engineers, Putney. 1851-57, Professor of Chemistry in Owens College, Manchester. 1857-63, Professor of Chemistry in St. Bartholomew's Hospital. 1863-65, Professor of Chemistry in the Royal Institution of Great Britain. In 1865, upon the retirement of Professor Hofmann, was appointed to the Chair of Chemistry at the Royal College of Chemistry, then attached to the Royal School of Mines, from which post he retired in 1885. (Further, *see* Professors.)

The Yews, Reigate Hill, Reigate, Surrey; *and* Athenæum Club.

FRANKLAND, PERCY FARADAY. **1875-78.** *Geology.* **Assoc. R.S.M.**

Ph.D. (Würzburg); B.Sc. (Lond.); F.R.S.; F.I.C.; F.C.S.; Mem. Berlin Chem. Soc.; Mem. Soc. Chem. Ind.; Edward Forbes Medal and Prize 1871, R.C.S.

Educated at University College School. 1878, Brackenbury Entrance Scholarship at St. Bartholomew's Hospital. 1880, Took the degree of Doctor of Philosophy at the University of Würzburg. 1881, Graduated as B.Sc. at the London University. 1880-89, Lecturer and Senior Demonstrator at the Royal College of Science, London. 1889-94, Professor of Chemistry in the University College, Dundee. 1894, Appointed to succeed Professor Tilden in the Chair of Chemistry at Mason College. Author of many important scientific papers, published in the *Philosophical Transactions*, the *Proceedings of the Royal Society*, the *Journal of the Chemical Society*, and elsewhere.

1, GREENFIELD CRESCENT, EDGBASTON. *Permanent Address:* MASON COLLEGE, BIRMINGHAM.

FRASER, THOMAS S. **1888-91.** *Metallurgy.* **Assoc. R.S.M.**

Prof. Assoc. Surveyor's Institution.

1896, Chief Assistant to Messrs. Thomas D. Smellie and Fraser, Surveyors and Valuers, Glasgow.

209, ST. VINCENT STREET, GLASGOW.

FRECHEVILLE, ROBERT J. **1866-69.** *Metallurgy.* **Assoc. R.S.M.**

F.G.S.; M.Inst.C.E.; Mem. Inst. Min. and Met.; Mem. Am. Inst. M.E.

Consulting Mining Engineer. Formerly H.M. Inspector of Mines in Cornwall and Devon.

4, DOWN TERRACE, RICHMOND; *and* 33, BROAD STREET AVENUE, LONDON, E.C.

FRECHEVILLE, WILLIAM. **1871-75.** *Mining, etc.* **Assoc. R.S.M.**

F.G.S.; Mem. Am. Inst. M.E.; Mem. Inst. Min. and Met. (Mem. of Council).

Consulting Mining Engineer. Engaged formerly in India, South Africa, United States of America, etc.

33, BROAD STREET AVENUE, LONDON, E.C.

FREEMAN, — . **1857-58.** *Student in Mining.*

FREEMAN, OLIVER. **1890-92** *Physics.* **Assoc. R.C.S.**

Whitworth Scholarship 1892; Assoc. Inst. Elect. Eng.

1892-93, Assistant Lecturer at the Battersea Polytechnic. 1895, Appointed Principal of the Municipal Technical Institute, Portsmouth.

HILSEA TERRACE, LONDON ROAD, NORTH END, PORTSMOUTH.

FREEMAN, WALTER. **1847.** *Student, Royal College of Chemistry.*

Formerly Lecturer at Brighton College.

FREEMAN, WILLIAM GEORGE. **1892-95.** *Botany.* **Assoc. R.C.S.**

Edward Forbes Medal, 1895.

79, COPLESTON ROAD, DENMARK PARK, LONDON, S.E.

FREMERSDORF, WILLIAM F. **1881-84.** *Metallurgy.* **Assoc. R.S.M.**

1885, Lecturer on Mechanics and Metallurgy, Washington College, Tacoma, U.S.A. 1890, Appointed Director of the Maryborough School of Mines, Borough and Shire Analyst.

SCHOOL OF MINES, MARYBOROUGH, VICTORIA, AUSTRALIA.

G

***GALLOWAY,** Robert. **1845.** *Student, Royal College of Chemistry.* F.C.S.

Born 1822 at Cartmel, Lancashire. On leaving school, became Assistant to Mr. Ross, a chemist of Lancaster. Then to London to study under Hofmann, after which he accepted the post of Teacher of Chemistry at Queenwood College, Hants. Later he became assistant to Dr. Lyon (now Lord) Playfair. Subsequently appointed Professor of Applied Chemistry at the Museum of Irish Industry at Dublin (afterwards the Royal College of Science for Ireland). Retired 1880, and died in London, January 15th, 1896, aged seventy-four. Author of numerous writings on Industrial Chemistry; also of a *Manual of Qualitative Analysis*, a *Treatise on Fuel*, *The Fundamental Principles of Chemistry*, etc.

GARCIA, A. **1887.** *Student in Mining.*

GARRISON, F. Lynwood. *Mining, etc.* **Assoc. R.S.M.**

Assoc. Mem. Am. Soc. Civil Eng.; Mem. Am. Inst. M.E.; Mem. Iron and Steel Inst.; Mem. Acad. of Nat. Sciences, Philadelphia.

1885-95, Consulting Mining Engineer, Philadelphia. 1893-96, Honorary Professor in Mining, Metallurgy, and Economic Geology, at the Franklin Institute of Pennsylvania. 1892-95, Treasurer of the Geographical Club of Philadelphia. Author of a number of papers on the Manufacture and Properties of Iron and Steel in the *Trans. Am. Inst. M.E.*, the *Journal of the Franklin Institute*, and elsewhere. Editor of second edition of *Kerl's Assayer's Manual.*

Radnor, Delaware Co., Pennsylvania, U.S.A.

GARZON, A. **1892.** *Student in Mining.*

United States of Columbia.

GEDDES, Patrick. **1875-77.** *Student in Biology, etc.*

F.R.S. (Edin.).

Went to Roscoff under Lacage-Duthiers, and afterwards to the Naples Zoological Station, carrying on investigations in Marine Zoology. Became

later an Assistant in the Botanical Department of the University of Edinburgh, and afterwards appointed Professor of Botany in University College, Dundee. He contributed several articles to the *Encyclopædia Britannica.* and is the author of several books, not wholly confined to scientific subjects. Has been for some years actively engaged upon a scheme for the restoration of Old Edinburgh. Author of *Every Man his own Art Critic.*

UNIVERSITY COLLEGE, DUNDEE.

GIBB, ALLAN. **1890-93.** *Metallurgy.* **Assoc. R.S.M.**

Bessemer Medal 1893; Honours, Metallurgy, 1894.

Chemist to Messrs. Bass and Co., Bristol. 1896, Appointed Lecturer in Chemistry and Metallurgy at the Intermediate Technical School, Swansea.

13, ZETLAND ROAD, BRISTOL. *Permanent Address:* THE COURT HALEWOOD, LIVERPOOL.

GIBB, THOMAS. **1862-63.** *Mining, etc.* **Assoc. R.S.M.**

Consulting Metallurgist to the Broughton Copper Co. Patentee of various metallurgical processes.

DITTON, NEAR WIDNES.

GIBBENS, GEORGE. **1882-84.** *Student.*

1884, Appointed Assistant Examiner in H. M. Patent Office.

ESCOTE, KEW GARDENS, SURREY.

GILBERT, JOHN W. **1886-89.** *Chemistry.* **Assoc. R.C.S.**

Assistant Science Master, Central Science School, Sheffield.

123, HADFIELD STREET, WALKLEY, SHEFFIELD; *and* CENTRAL SCHOOL, ORCHARD LANE, SHEFFIELD.

GILCHRIST, PERCY CARLYLE. **1868-71.** *Mining and Metallurgy.* **Assoc. R.S.M.**

F.R.S.; M.Inst.C.E.; Mem. Iron and Steel Inst. (Mem. Council); Mem. Inst. Mech. Eng.; Duke of Cornwall Scholarship 1869, and Murchison Medal 1870.

Born December 1851. Educated at Felsted Grammar School, Essex and the Royal School of Mines. He was joint author with his cousin, the late Sidney G. Thomas, of a paper read before the Iron and Steel Institute in May 1879, on "The Elimination of Phosphorus in the Bessemer Converter." From that time forward he has continued to devote his attention to the extension of the Basic or Thomas-Gilchrist process. The

result of this process has been remarkable. In 1879 the make of basic steel was only 1,200 tons, whilst in 1893 it amounted to 3,638,556 tons. Mr. Gilchrist has read the following papers before the Iron and Steel Institute: in 1881 on "Current Dephosphorising Practice"; in 1886 on "The Iron-making Resources of the Colonies"; and in 1887 on "The Utilisation of Basic Slag for Agricultural Purposes."

Frognal Bank, Finchley Road, London, N.W.

GILFILLAN, G. F. **1863.** *Student in Mining.*

Sometime with the Mineral Exploring Company, Cape of Good Hope.

GILMOUR, James A. **1884-87.** *Metallurgy.* **Assoc. R.S.M.**

General Manager of the Santa Francisca Gold Mines, and various other mines and ironworks in Central America.

c/o The Santa Francisca Gold Mining Co., Leon, Republica de Nicaragua, Central America. *Permanent Address:* Woodend, Hurlford, Ayrshire.

GODFREY, J. R. **1891.** *Student in Mining.*

Australia.

GOER, C. J. *Student, Royal College of Chemistry.*

Head Brewer to Messrs. Bass and Co., Burton-on-Trent.

Station Street, Burton-on-Trent.

GOODFELLOW, A. *Student in Agriculture.*

Stevens Scholar, Edinburgh University, 1893.

Todrig, Greenlaw, Berwickshire, N.B.

GOODWIN, Thomas S. *Student.*

F.C.S.

1889-90, Senior Assistant and Demonstrator in Chemistry at Anderson's College, Medical School, Glasgow. 1890-94, Senior Assistant to the Professor of Metallurgy, Technical College, Glasgow. 1894, Appointed Professor of Chemistry, Veterinary College, Glasgow.

Avenue Cottage, East, Tollcross, Glasgow. *Permanent Address:* Veterinary College, Buccleuch Street, Glasgow.

GOOGAN, Richard. **1862-64.** *Student in Geology.*

Murchison Medal 1864.

Sometime Chemist at Messrs. Hall's Powder Works, London.

* **GORDON**, DAVIS. **1863-64.** *Student in Mining.*

Formerly Agent for English Mining Company, Sardinia. Died previous to 1870.

GORDON, JOSEPH GORDON. **1869-71.** *Student in Chemistry.*

F.I.C.; F.C.S.; Mem. Iron and Steel Inst.

QUEEN ANNE'S MANSIONS, LONDON, S.W.

GOSSLETH, GEORGE. **1848.** *Student, Royal College of Chemistry.*

Chemical Manufacturer.

GOUGH, GEORGE H. **1888-93.** *Mining.* **Assoc. R.S.M.**

Sometime Surveyor to Messrs. Morgans Bros., Bristol. To India in 1895. 1896, Holding an appointment under the Giridih Colliery Co., India.

c/o GIRIDIH COLLIERY, GIRIDIH, BENGAL, INDIA. *Permanent Address:* SYDENHAM HOUSE, STOKE CROFT, BRISTOL.

* **GOULD**, CHARLES. **1854-56.** *Mining, Metallurgy, and Geology.* **Assoc. R.S.M.**

Duke of Cornwall's Scholarship 1854; Royal Scholarship 1856; Edward Forbes Medal 1856.

Was engaged on the Geological Survey of Tasmania. Died in Montevideo, South America, April 15th, 1895.

GOWLAND, WILLIAM. **1869-70.** *Mining and Metallurgy.* **Assoc. R.S.M.**

F.I.C.; F.C.S.; F.S.A.; Mem. Iron and Steel Inst.; Murchison Medal 1869; De la Beche Medal 1870.

1870-72, Chemist and Metallurgist to the Broughton Copper Co., Manchester. 1872-77, Chemist and Metallurgist to the Imperial Japanese Mint. 1878-88, Assayer and Foreign Head of the Imperial Mint, and sometime Metallurgical Adviser to the Imperial Arsenal, Japan. 1895, Appointed Examiner in Metallurgy to the Science and Art Department, and External Examiner in Metallurgy to the Royal School of Mines. Author of *Imperial Mint Technical Reports*, and various Metallurgical Papers read before the Chemical Society, the Society of Chemical Industry, and the Society of Arts.

13, RUSSELL ROAD, KENSINGTON, LONDON, W. *Permanent Address:* c/o THE CHARTERED BANK OF INDIA, AUSTRALIA, AND CHINA, HATTON COURT, THREADNEEDLE STREET, LONDON, E.C.

GRACE, GEORGE. **1885-88.** *Chemistry.* **Assoc. R.C.S.**

B.Sc. (Lond.).

Science Teacher at the Keighley Technical Institute.

SANDYWOOD, KEIGHLEY, YORKSHIRE.

GRACE, WILLIAM FRANK. **1883-84.** *Student in Chemistry and Metallurgy.*

Mem. Am. Inst. M.E.; Assoc. Inst. Min. and Met.; F.C.S.

1885-86, Chief Assistant Chemist, Rio Tinto Laboratory, London. 1886-89, Metallurgist to Las Trojes Mining Co., Mexico. 1889-90, Manager of Acton's Swaziland Concession, South Africa. 1890-93, Metallurgist to the Michoacan Mining and Railroad Co., Ltd., Mexico. 1895-96, Manager of the Mount Leyshon Mine, Charter's Towers, Queensland.

MOUNT LEYSHON, LTD., CHARTER'S TOWERS, QUEENSLAND, AUSTRALIA. *Permanent Address:* 54, YORK ROAD, HOVE, BRIGHTON.

GRANT, JOHN H. **1884-87.** *Mining.* **Assoc. R.S.M.**

1887, Head Assistant Chemist at the Laboratory of the Rio Tinto Company in London. Subsequently Chemist at the Rio Tinto Company's Works, Cwm Avon, South Wales.

RIO TINTO WORKS, CWM AVON, PORT TALBOT, SOUTH WALES; *and* 25, PENTYLA, ABERAVON, SOUTH WALES.

GRANT, WILLIAM LOUIS. **1877-80.** *Mining, etc.* **Assoc. R.S.M.**

GRAVES, HENRY G. **1881-85.** *Mining and Metallurgy.* **Assoc. R.S.M.**

Mem. Fed. Inst. Min. Eng.; De la Beche Medal 1885.

1885-86, Assayer in the London Office of the Rio Tinto Co. 1886, Appointed Assistant Examiner in H. M. Patent Office. 1892, Elected Permanent Secretary for the Old Students' Dinners. 1895, Appointed Assistant Examiner in Mining for the Science and Art Department.

5, ROBERT STREET, ADELPHI, LONDON, W.C. *Permanent Address:* H.M. PATENT OFFICE, SOUTHAMPTON BUILDINGS, LONDON, W.C.

GRAY, C. JOSEPH. **1891-94.** *Mining.* **Assoc. R.S.M.**

1895, Demonstrator in Mining, Royal College of Science, London. 1896, Appointed Deputy Commissioner of Mines, Nqutu District, and Government Assayer, Zululand.

NONDWENI, ZULULAND. *Permanent Address:* 36, BEAMSLEY ROAD, FRIZINGHALL, BRADFORD, YORKSHIRE.

GRAY, J. **1884.** *Student in Mining, etc.*

Science Teacher at the School of Science and Art, Corporation Buildings, Sauchiehall Street, Glasgow.

SCIENCE AND ART SCHOOL, SAUCHIEHALL STREET, GLASGOW, N.B.

GRAY, JOHN. **1875-78.** *Metallurgy.* **Assoc. R.S.M.**

B.Sc. (Lond.); Mem. of Lond. Phys. Soc.; Assoc. Inst. Elect. Eng.; Mem. Anthropological Inst.

1878, Assistant Examiner in H. M. Patent Office. Author of *Electrical Influence Machines*, 1890, and various papers published in the *Reports of the British Association*, 1892-94-95.

351, COLDHARBOUR LANE, BRIXTON, LONDON, S.W.; *and* H. M. PATENT OFFICE, 25, SOUTHAMPTON BUILDINGS, CHANCERY LANE, LONDON W.C.

GRAY, M. HAMILTON. **1873-76.** *Mining.* **Assoc. R.S.M.**

F.G.S.; F.R.G.S.; Mem. Inst. Min. and Met.

Engineer to the Silvertown Telegraph Works.

LESSNESS PARK, BELVEDERE, KENT.

GRAY, PHILIP L. **1885-88.** *Physics.* **Assoc. R.C.S.**

B.Sc. (Lond.).

1888-90, Private Assistant to Professor Rücker, F.R.S. 1890-93, Assisting Professors Rücker and Thorpe in a Magnetic Survey of the British Isles. 1893-94, Lecturer on Physics at the Mason College, Birmingham. 1894, Appointed Inspector under Science and Art Department. Joint author, with Mr. W. E. Wilson, of papers on "Experimental Investigations on the Effective Temperature of the Sun" (*Phil. Trans.*), and author of paper on "The Minimum Temperature of Visibility" (*Phil. Mag.*).

15, FRANCIS ROAD, EDGBASTON. *Permanent Address:* c/o The DEPARTMENT OF SCIENCE AND ART, SOUTH KENSINGTON, LONDON S.W.

GRAY, WILLIAM. *Student in Mining.*

Mining Engineer. Has been engaged in Australia, South Africa, Canada, and the United States.

THE GRESHAM CLUB, ST. SWITHIN'S LANE, LONDON, E.C.

GRAZZ, H. **1889.** *Student in Mining.*

GREAVES, Joseph. **1889-92.** *Mining.* **Assoc. R.S.M.**

1893, Appointed Surveyor and Valuer on the "General Valuation and Boundary Survey" of Ireland.

Clogher, Co. Tyrone. *Permanent Address:* 6, Ely Place, Dublin, Ireland.

GREEN, German. **1866-69.** *Metallurgy and Geology.* **Assoc. R.S.M.**

Mem. Soc. Chem. Ind.; Duke of Cornwall's Scholarship 1867.

Sometime Chemist in Copper Works at Newcastle.

Bergholt House, Park Road, Jarrow, Durham.

GREEN, John E. **1879-82.** *Metallurgy.* **Assoc. R.S.M.**

F.I.C.; F.C.S.

1881-87, Chemist to the Rio Tinto Company. 1887, Appointed Consulting Chemist and Manager of Soap and Candle Works at Durham and Islam, under the Co-operative Wholesale Society, Ltd.

Church Road, Urmston, near Manchester.

GREEN, John James. **1891-95.** *Chemistry.* **Assoc. R.C.S.**

B.Sc. (Victoria); Murchison Prize 1894.

1895, Appointed Science Master at Ashville College, Harrogate.

Ashville College, Harrogate, Yorkshire. *Permanent Address:* 14, Cleaver Street, Burnley, Lancashire.

GREEN, Leonard M. **1889-92.** *Metallurgy.* **Assoc. R.S.M.**

1892-94, Assayer to the Mawdach Copper Company, Dolgelly. 1894, Went to South Africa.

Johannesburg, S.A.R.

GREENE, John. **1877-80.** *Mining.* **Assoc. R.S.M.**

De la Beche Medal 1880.

GREENWELL, Leonard William. **1875-78.** *Metallurgy.* **Assoc. R.S.M.**

Carr Mount, Ruswarp, Whitby, Yorkshire.

GREENWOOD, S. Clough. **1891-94.** *Geology.* **Assoc. R.C.S.**

Brownroyd Fold, Wibsey, near Bradford.

GREENWOOD, W. H. **1869-71.** *Metallurgy.* **Assoc. R.S.M.**

F.C.S.; M.Inst.C.E.; Mem. Inst. Mech. Eng.; Mem. Iron and Steel Inst.; Mem. Fed. Inst. Min. Eng.

1871-75, Assistant Manager to Sir J. Whitworth and Co. 1875-82, Chief Engineer, Abouchoff Steel and Ordnance Works, St. Petersburg. 1882-85, Assistant General Manager to the Landore Siemens Steel Co., Ltd. 1885-89, Professor of Engineering and Metallurgy, Firth College, Sheffield. 1889, Appointed General Manager of the Birmingham Small Arms and Metal Co., Ltd. Author of *Manual of Metallurgy* (2 vols.); *Steel and Iron* (1 vol.); *Metallurgical Lecture Diagrams*, etc.; and of a paper "On Treatment of Steel by Hydraulic Pressure," read before the Institute of Civil Engineers, for which he was awarded the Watt Medal and Telford Premium.

Adderley Park Rolling Mills, Birmingham. *Permanent Address:* Hardwick House, Carpenter Road, Edgbaston, Birmingham.

GREEVES, Alfred. **1889-91.** *Chemistry.* **Assoc. R.C.S.**

1892-95, Assistant to Dr. Wynne, Royal College of Science. 1895, Appointed to charge of Chemical and Physical Departments of the Wandsworth Technical Institute. Joint author, with Dr. Wynne, of "The Preparation of the Six Dichlorotoluenes," in the *Journ. Chem. Soc.* 1895.

Wandsworth Technical Institute, London, S.W. *Permanent Address:* 25, Balmuir Gardens, Upper Richmond Road, Putney.

***GRETTON**, H. **1851.** *Student, Royal College of Chemistry.*

Late Partner in Messrs. Bass and Co.'s Brewery, Burton.

GRETTON, John. **1851.** *Student, Royal College of Chemistry.*

Partner in Messrs. Bass and Co.'s Brewery, Burton.

Sudbury Hill, Derbyshire; *and* 66, Ennismore Gardens, London, S.W.

GREY, F. W. **1876-79.** *Metallurgy.* **Assoc. R.S.M.**

Mem. Inst. Min. and Met.

1882-83, Assayer and Assistant to the Perseverance and South-East Wynaad Co., Wynaad. 1883-84, Assayer, etc., to the Devalah Moyar and Rhodes Reef, Wynaad. 1885-90, Assayer and Assistant Manager, and in 1890 appointed Superintendent to the Nundydroog Mine, Colar, India. 1894-95, Reporting in Western Australia. 1896, Reporting in the Mysore State, India.

Dashwood House, 9, New Broad Street, London, E.C. *Permanent Address:* The Homestead, Cranes Park Road, Surbiton.

GRIFFITH, N. ROBERT. **1863-66.** *Mining.* **Assoc. R.S.M.**

F.G.S.; Mem. Fed. Inst. Min. Eng.; Mem. N. of Eng. Inst. Min. and Mech. Eng.

1868-82, Manager of several large Colleries. Since 1882, in practice as Consulting Mining Engineer. Consulting Engineer to the Broughton and Plas Paves Coal Co., Ltd.; Mineral Agent for Lord Mostyn and other Lessors of Mineral Properties; one of the Examiners of Candidates for Certificates of Competency as Managers of Mines under the Coal Mines Regulation Acts. Engineer to Company formed in 1895 to work deep coal at Dover.

PLASNEWYD, RUABON, NORTH WALES. *Offices:* WESTMINSTER CHAMBERS, WREXHAM.

GRIFFITH, RICHARD. **1890-92.** *Student in Chemistry and Metallurgy.*

With Messrs. Daniel C. Griffith and Co., New Broad Street, London, E.C. Assayers to the Bank of England.

60, FITZJOHN'S AVENUE, HAMPSTEAD, LONDON, N.W.

GRIFFITHS, ALBERT. **1884-87.** *Mechanics.* **Assoc. R.C.S.**

M.Sc. (Victoria); Assoc. Owens College, Manchester; Assoc. Inst. Elect. Eng; Mem. Phys. Soc. London.

1887-90, Evening Teacher, Central Higher Grade Board School, Manchester. 1890, Evening Teacher at Manchester Technical School; 1891, Private Assistant to Dr. A. Schuster. 1893-95, Bishop Berkeley Fellow in Physics at Owens College; Demonstrator in Physics at Owens College.

137, LONDON ROAD, MANCHESTER.

GRIFFITHS, ANDRÉ P. **1884-87.** *Metallurgy.* **Assoc. R.S.M.**

Assoc. M.Inst.C.E.; Whitworth Scholarship; Mem. Am. Inst. M.E.

1887-89, Engineer in charge of construction for the International Sleeping Car Co., Ltd., in Russia. 1889-90, Manager of the Robert-Bessemer Steel Works, St. Chamond, France. 1890-91, Battery Manager and Assayer to the Goizeute Gold Mines, Lerma, Italy. 1891-92, General Manager, Goizeute Gold Mines. 1893-94, Assistant to S. H. Farrar, Esq., M.Inst.C.E., Johannesburg. 1894, Appointed Manager of the Quicksilver Mines, Ohaeawai, Bay of Islands, New Zealand.

P.O. BOX 336, AUCKLAND, NEW ZEALAND. *Permanent Address:* c/o JOHN GRIFFITHS, ESQ., DIEPPE, FRANCE.

GRIFFITHS, HARRY D. **1887-90.** *Mining.* **Assoc. R.S.M.**

Assoc.M.Inst.C.E.; Mem. Inst. Mech. E.; Mem. Inst. Min. and Met.; Whitworth Scholarship 1887.

1890-93, Engineer to the Kimberley Diamond Mining Co. 1893, Chief Engineer to the South African and International Exhibition. 1894-95, Chief Engineer to Howard Farrar and Co., Johannesburg, and Acting Consulting Engineer to the Simmer and Jack Geldenhuis Estate, and New Cornet Gold Mining Cos. Now Consulting Mining and Mechanical Engineer to the Durban Entreprise Gold Mining Co.; Rand Southern Gold Mining Co.; Grey's Upipacht Mining Co., Ltd.; Heidelberg Estates, etc., Exploration Co.; Heidelberg Proprietary Mining Co., Ltd., etc. Member of Patents Committee of Chamber of Mines. Mr. Griffiths instituted the School of Mines Association of South Africa in 1893, and was President from 1893 to 1895. He is the author of a paper on "Treatment of Pyritous Ores," in the *Trans. S. A. Assoc. Eng. and Arch.*, and of a paper on the "Rock Drill Tests at the Kimberley Exhibition," etc.

P.O. Box 2146, JOHANNESBURG, S.A.R.; *and* DIEPPE, FRANCE.

GRIFFITHS, J. ALFRED. **1865-68, 1872-73.** *Mining, etc.* **Assoc. R.S.M.**

B.Sc. (Victoria); Mem. Inst. Mech. Eng.; Assoc.M.Inst.C.E.; Whitworth Scholarship 1870.

1872, Engaged with L. N. W. Railway Co. under S. B. Worthington, Esq., M.Inst.C.E. 1874-75, Partner in Foundry, Toowoomba, Queensland. 1876, Entered Queensland Government Service—Railway Department. 1878, Engaged with West Australian Government for Railway Surveys. 1880, Assistant Lecturer in the Engineering Department, Owens College, Manchester. 1881, Engineer to the Waste Water Meter Co., Ltd., Liverpool. 1889-92, On the Normanton-Croydon Railway of North Queensland. 1894, On the Castle Hill Tramway (Parramatta) Survey. 1895, Engineer at the Penrith Electric Light Works, and later appointed to the Government Metallurgical Works, New South Wales. 1896, Inspector of Artesian Bores, Water Supply Department, Queensland. Author of several papers connected with Mechanical Science.

c/o WATER SUPPLY DEPARTMENT, BRISBANE, QUEENSLAND.

***GRIFFITHS**, LOUIS F. **1892.** *Student.*

Whitworth Exhibition, 1890.

Died April 1893.

GRIGOR, JAMES. **1890-93.** *Mechanics.* **Assoc. R.C.S.**

Sometime Science and Art Master, Leith High School; also at Blairgowrie, N.B., and at Forfar, N.B. 1893, Science and Art Master at

Morrison's Academy, Crieff, and appointed Science and Art Teacher at the Technical School, Crieff. 1895, Appointed Sub-Inspector under The Science and Art Department.

Moray Place, Elgin, N.B.

GRIME, Herbert. **1888-91.** *Chemistry.* **Assoc. R.C.S.**

Murchison Prize 1890; Frank Hatton Prize 1891.

1891-94, Demonstrator in Chemistry, Royal College of Science. 1894, Appointed Sub-Inspector, Science and Art Department, Manchester District.

11, Church Road, Chorlton-cum-Hardy, Manchester.

GRIMES, George Ernest. **1889-93.** *Mining and Metallurgy.* **Assoc. R.S.M. 1894.** *Geology.* **Assoc. R.C.S.**

1895, Appointed to the Geological Survey of India.

High Street, Redhill, Surrey; *and* Geological Survey Office, Calcutta.

***GROSSJEAN**, John Joseph B. Jeanneret. **1864.** *Student in Chemistry.*

F.I.C.; F.C.S.

Born 1843. Educated King's College School. 1862, Entered Lincoln College, Oxford, and in 1863 the Regent's Park Baptist College. 1864, Abandoned the idea of becoming a Minister and entered the Chemical Laboratory of the Royal School of Mines. 1867, Appointed Assistant to the Professor of Chemistry at the Royal Agricultural College, Cirencester. 1869, To Sicily to establish the Manufacture of Citrate of Calcium at Palermo. 1870, Appointed Assistant Chemist at Mr. Lawes' Tartaric and Citric Acid Factory at Millwall; Principal Chemist from 1873 until his death. 1872-76, Abstractor for *Journ. Chem. Soc.* Author of various papers on Chemical Science. Died June 11th, 1882.

GROSSMANN, Edward. **1890-93.** *Chemistry.* **Assoc. R.C.S.**

F.C.S.

1893-94, Assistant to Dr. Henry Wilson Hake, Westminster Hospital Medical School, Caxton Street, London, S.W.

12, Alfred Place West, London, S.W.

GROUSE, Robert. **1848.** *Student, Royal College of Chemistry.*

Surgeon.

GROVES, Charles Edward. *Student, Royal College of Chemistry.*

F.R.S.; F.I.C.; F.C.S.

Editor of the *Journ. Chem. Soc.*, and author of numerous Chemical Treatises.

352, Kennington Road, London, S.E.

GRUBB, Walter C. **1888-92.** *Mining.* **Assoc. R.S.M.**

1896, In Mashonaland.

GRUNDY, G. Graham S. **1876-80.** *Metallurgy.* **Assoc. R.S.M.**

Clarence Iron and Steel Works, Hunslet, Leeds.

GRUNDY, J. **1884.** *Student in Mining.*

Sometime H.M. Assistant-Inspector of Mines, Manchester. Now in India.

GUERARD, Arthur Rose. **1871-74.** *Mining and Metallurgy.* **Assoc. R.S.M.**

GUNN, Henry H. **1872-76.** *Mining, etc.* **Assoc. R.S.M.**

Mem. Am. Inst. M.E.; Cavaliere della Corona d'Italia.

1877-90, Inspecting and reporting on various mining properties in Europe and America. 1890-92, In association with the late H. M. Becher, Esq., Assoc. R.S.M., at Singapore, during which time engaged in Borneo, Siam, and The Malay Peninsula. 1893, Appointed Manager and Resident Engineer to the Delta Casa Granite Quarries of Italy, Ltd., Baveno, North Italy.

Baveno, Lago Maggiore, North Italy. *Permanent Address:* Marionville, Restalrig, near Edinburgh.

GUTHRIE, F. B. *Student in Chemistry.*

F.C.S.

Chemist to the Agricultural Department of the Government, New South Wales.

Sydney, New South Wales.

GWINNELL, Wintour Frederick. *Student.* **1876-77.**

B.Sc. (Lond.).

H

***HACKNEY**, WILLIAM. **1858-61.** *Mining, Metallurgy, and Geology.* **Assoc. R.S.M.**

Duke of Cornwall Scholarship 1859; De la Beche Medal 1861.

Sometime Assistant Engineer to the late C. Siemens, Esq., F.R.S.

HADLEY, HARRY E. **1885-88.** *Physics.* **Assoc. R.C.S.**

B.Sc. (Lond.); F.C.S.

1888-89, Assistant in the Physical Laboratory of the Royal College of Science. 1889-92, Demonstrator in Physics, Owens College, Manchester. 1892, Appointed Head Master at the Kidderminster School of Science.

SCHOOL OF SCIENCE, KIDDERMINSTER. *Permanent Address:* BEECHWOOD, BATTENHALL, WORCESTER.

HAGERTY, ELIZABETH G. **1889-92.** *Chemistry.* **Assoc. R.C.S.**

Mem. Berlin Chem. Soc.

1892-95, Science Mistress, Preston Higher Grade School. 1895, Appointed Head Mistress at the Cardiff Higher Grade and Organised Science School.

39, STACEY ROAD, CARDIFF.

HAINES, CLAUDE V. **1890-93.** *Mining.* **Assoc. R.S.M.**

1894-96, Assistant Engineer to the Magyar Gold Mining Company Transylvania, Hungary.

Permanent Address: HAREFIELD, CHEAM, SURREY.

***HALL**, THOMAS. **1845.** *Student, Royal College of Chemistry.*

B.A.; F.C.S.

Born 1818. Educated at University College, London. 1837, Appointed Assistant Classical and Mathematical Master at the City of London School. Studied Chemistry under Professor Hofmann, and also at Polytechnic Institution under Dr. Ryan. Instituted class for scientific instruction at City of London School, which, by its success, led to the inclusion of Science in the curriculum. Retired in 1868 through ill-health, and died July 10th, 1877.

HALSE, EDWARD. **1873-75, 1879.** *Metallurgy.* **Assoc. R.S.M.**

Mem. Inst. Min. Met.; Mem N. of Eng. Inst. Min. and Mech. Eng.; Mem. Fed. Inst. Min. Eng.

Sometime Manager of the Silencio Gold Mines, Ltd., Columbia, South America; also Manager to the Jaquah and Obosso Gold Mining Co., Ltd., Gold Coast, West Africa. Now in practice as Consulting Mining Engineer; head-quarters Coolgardie, Western Australia.

COOLGARDIE, WEST AUSTRALIA. *Permanent Address:* 15, CLARENDON ROAD, NOTTING HILL, LONDON.

HAMBLY, FRED. J. **1886-88.** *Student in Chemistry.*

F.I.C.; F.C.S.

1888-89, Teaching Scholar in Chemistry, Royal College of Science. 1889, Assistant Lecturer in Chemistry, University College, Dundee; and Lecturer in Chemistry at the Dundee Technical Institute; Joint author of various papers on chemical subjects with Professors T. E. Thorpe, F.R.S., Percy F. Frankland, F.R.S., and James Walker, D.Sc., Ph.D., in the *Journ. Chem. Soc.*, and elsewhere.

UNIVERSITY COLLEGE, DUNDEE.

HAMILTON-GORDON, ERNEST A. **1883-87.** *Mechanics.* **Assoc. R.C.S.**

HAMLEY, WILLIAM F. **1885-88.** *Mining.* **Assoc. R.S.M.**

Assayer to the Rio Tinto Co., Ltd., Huelva, Spain.

c/o RIO TINTO CO., LTD., HUELVA, SPAIN.

HANDS, RICHARD MEDWIN. **1847.** *Student, Royal College of Chemistry.*

Manufacturer of Aniline Colours, and Silk Dyer, of Coventry.

HARBORD, FREDERICK W. **1879-82.** *Metallurgy.* **Assoc. R.S.M.**

F.I.C.; Mem. Iron and Steel Inst.; Bessemer Medal, R.S.M., 1882.

Formerly Chemist to Staffordshire Steel and Ingot Iron Co. Subsequently Steel Works Manager to Messrs. Hatton, Sons and Co., Bilston. Now Analytical Chemist to Indian Government R.I.E. College, Cooper's Hill.

ROYAL INDIAN ENGINEERING COLLEGE, COOPER'S HILL, STAINES. *Permanent Address:* EGHAM, SURREY.

HARDIE, GAVIN. **1846.** *Student, Royal College of Chemistry.*

HARDY, FRANCIS J. **1885-88.** *Chemistry.* **Assoc. R.C.S.**

HARE, Gerald J. **1870.** *Student in Chemistry.*
Formerly in the Indian Telegraph Department.

HARMAN, Frederick Edwin. **1872-75.** *Student in Mining.*
M.R.A.C.; F.G.S.; F.C.S.; Mem. Inst. Min. and Met.

1875-80, Professor of Natural Science to the Government of Mysore. 1880-83, Manager of the Devala Central Gold Mining Co., Ltd.; Hon. Sec. Planting and Mining Association (Wynaad); Hon. Magistrate to the Government of Madras. 1886-88, Manager to the West Argentine Gold Mining Co. 1888-93, Reporting for various Companies in India, Spain, Portugal, the Argentine Republic, Cape Colony, Bechuanaland, and Mashonaland. Director of the Automatic Gold and Gem Separator Syndicate; the Ethel-Hope Gold Mines, Ltd.; Kuranui Caledonian Gold Mining Co., Ltd.; Lindsay's Gold Mines; Lindsay's Extended (East) Gold Mines, Ltd.; The Lone Ridge Gold Mines; Parral Consolidated Gold and Silver Mines, Ltd.; and Rhodesia Gold Reefs (Purdon's), Ltd.

c/o Messrs. Chapman and Co., 1, Henrietta Street, Cavendish Square, London, W. *Permanent Address:* 20, Warwick Gardens, Kensington, London, W.

HARRIS, Harry. **1890-93.** *Metallurgy.* **Assoc. R.S.M.**
F.C.S.

1894, Appointed Chemist and Assayer to the Puloh Brani Smelting Works of the Straits Trading Co., Singapore.

c/o The Straits Trading Co., Singapore. *Permanent Address:* c/o E. Harris, Esq., Claremont, Mundanea Road, Honor Oak, S.E.

HARRISON, Francis Chambers. **1892-95.** *Chemistry.* **Assoc. R.C.S.**

15, Broadway, Sheerness.

HARRISON, Fred J. **1887.** *Student.*

1896, Editor of the *International Photographic Annual* and of *Anthony's Photographic Bulletin*; also (1896) Manager of Messrs. E. and H. T. Anthony and Co.'s Publication Department.

c/o Messrs. E. and H. T. Anthony and Co., Broadway 591, New York. *Permanent Address:* 52, Claremont Road, Handsworth, Birmingham.

HARRISON, J. *Instructor in Mechanics and Mathematics at the Royal College of Science.*
M.Inst.M.E.; Assoc.Mem.Inst.C.E.

HARRISON, JAMES. **1888-91.** *Biology and Geology.* **Assoc. R.C.S.**

Assistant in the Geological Department of the Royal College of Science; Lecturer and Demonstrator in Biology at the People's Palace, and at the Battersea Polytechnic Institute.

14, CAVERSHAM STREET, CHELSEA, LONDON, S.W. *Permanent Address:* 43, HOOD STREET, NORTHAMPTON.

HARRISON, JOHN ANSTED. **1891-94.** *Chemistry.* **Assoc. R.C.S.**

1894-96, Science Master, Hinckley Grammar School.

52, CLAREMONT ROAD, HANDSWORTH, BIRMINGHAM.

HARRISON, WALTER E. **1889-92.** *Physics.* **Assoc. R.C.S.**

HARROLD, FRED WILLIAM. **1869-72.** *Metallurgy.* **Assoc. R.S.M.**

18, MADDOX STREET, LONDON, W.

HART, THOMAS G. **1880-83.** *Mining.* **Assoc. R.S.M.**

166, BLACKBURN ROAD, BOLTON.

HATHAWAY, HERBERT GEORGE. **1892-95.** *Chemistry.* **Assoc. R.C.S.**

94, CHESTERTON ROAD, NORTH KENSINGTON, LONDON, W.

***HATTON**, FRANK. **1875-78.** *Student in Chemistry, etc.*

Educated at the College of Marcq, Lille; King's College, London; and the Royal School of Mines. Conducted important research work in Dr. E. Frankland's Chemical Laboratory, South Kensington. 1881, Appointed Scientific Explorer to the British North Borneo Co.; continued to send home valuable reports until his death. Accidentally shot whilst elephant-hunting, March 26th, 1883.

HAWKER, E. W. **1890.** *Student in Mining.*

M.P. (Australia).

HAWKINS, ROBERT SPENCER. **1890-93.** *Mining.* **Assoc. R.S.M.**

Mem. Fed. Inst. Min. Eng.

1895, Appointed Acting Manager of The Lo Magunda Development Co., Ltd.

AYRSHIRE, LO MAGUNDA, SALISBURY, MASHONALAND, SOUTH AFRICA. *Permanent Address:* HILLCROFT, SANDERSTEAD, SURREY.

HEALEY, Elizabeth. **1881-86.** *Chemistry and Biology.* **Assoc. R.C.S.**

Science Teacher in Battersea Polytechnic. Published in 1893 *The Educational Systems of Sweden, Norway, and Denmark.*

15, Orlando Road, Clapham, London, S.W.

HEATH, — . **1859-61.** *Student in Mining.*

HEILPRIN, Angelo. **1874-77.** *Student in Biology, etc.*

Edward Forbes Medal 1877.

Professor of Invertebrate Palæontology at the Academy of Natural Sciences, Philadelphia. Author of *The Geographical and Geological Distribution of Animals* (The International Science Series); *Town Geology; the Lesson of the Philadelphia Rocks;* and other works on The Bermuda Islands, the West Coast of Florida, etc.

Academy of Natural Sciences, Philadelphia, U.S.A.

HELLON, Robert. **1873-75.** *Metallurgy.* **Assoc. R.S.M.**

Ph.D. (Heidelberg); F.I.C.; F.C.S.; F.C.S. (Berlin); Mem. Soc. Pub. Anal.; Mem. Soc. Chem. Ind.

1889, Public Analyst for the Counties of Cumberland and Westmoreland and for the Borough of Kendal. 1894, Appointed District Agricultural Analyst for Cumberland.

County Analyst's Laboratory, Whitehaven.

HEMBOROUGH, James. **1891-94.** *Chemistry.* **Assoc. R.C.S.**

1894-95, Assistant Demonstrator Merchant Venturer's College, Bristol. 1895, Appointed Science Teacher at Beverley Street Higher Grade School, Leeds School Board.

Permanent Address: 159, Hotwell Road, Bristol.

HERSCHEL, Alexander Stewart. **1865.** *Student in Chemistry.*

M.A.; Hon. D.C.L. (Durham); F.R.S.; F.R.A.S.

1868-71, Professor of Physics in the Andersonian Institution, Glasgow. 1871-86, Professor of Physics in the Durham College of Science, Newcastle-on-Tyne. Now Honorary Professor of Physics and Experimental Philosophy in the Durham College of Science, Newcastle-on-Tyne. Joint author of Committees' Reports to the British Association on "Luminous Meteors," 1861-81; and on "Thermal Conductivities of Certain Rocks," 1874-81. Author of various papers on Physics, Astronomy, and Meteorology, in the *Proceedings* and *Transactions* of the Scientific Societies.

Observatory House, Slough, Bucks.

HERVEY, E. W. **1876-79.** *Metallurgy.* **Assoc. R.S.M.**

HEWITT, JOHN THEODORE. **1884-87.** *Chemistry.* **Assoc. R.C.S.**

M.A. (Camb.); Ph.D. (Heidelberg); D. Sc. (Lond.); F.C.S.; F.C.S. (Berlin); Frank Hatton and Hodgkinson Prizes, R.C.S., 1887.

1891-94, Assistant Demonstrator at Cambridge University Chemical Laboratory. 1894, Appointed Professor of Chemistry at the People's Palace Technical Schools, Mile End, London, E.

11, VENNER ROAD, SYDENHAM, LONDON, S.E.

HEWITT, WILLIAM. **1873-76.** *Mining, etc.* **Assoc. R.S.M.**

B. Sc. (Lond.); Murchison Medal 1876; Edward Forbes Medal 1876.

1877-92, Science Demonstrator to the Liverpool School Board. 1892, Appointed Director of Technical Education to the Liverpool City Council. Author of *Class-Book of Elementary Mechanics; Elementary Science Lessons; Manual Training Exercises*, etc.

16, CLARENCE ROAD, BIRKENHEAD.

HEWSON, WALTER. **1892-95.** *Physics.* **Assoc. R.C.S.**

Engineer's Draughtsman with Messrs. Marshall, Sons and Co., Gainsborough, six years; and with Messrs. R. Hornsby and Sons, Grantham, three years. 1895-96, Assistant Demonstrator in Physics, Royal College of Science.

48, STOKENCHURCH STREET, FULHAM, LONDON, S.W. *Permanent Address:* 99, DENMAN STREET, NOTTINGHAM.

HEY, HAROLD E. **1885-88.** *Chemistry.* **Assoc. R.C.S.**

HEYWOOD, SHARP C. **1846.** *Student, Royal College of Chemistry.*

Varnish Manufacturer.

HICKINBOTHAM, R. C. **1893-96.** *Chemistry.* **Assoc. R.C.S.**

HIGGINS, CHARLES LONGUET. **1877-80.** *Metallurgy.* **Assoc. R.S.M.**

Mem. Soc. Chem. Ind.

1881, Manufacturing Chemist to the United Alkali Co., Ltd., Muspratt's Works, Widnes.

c/o UNITED ALKALI CO., LTD., MUSPRATT'S WORKS, WIDNES. *Permanent Address:* 79, BEDFORD STREET SOUTH, LIVERPOOL.

HIGHFIELD, Edmund G. **1886-89.** *Physics.* **Assoc. R.C.S.**
Mem. Phys. Soc. London.
1890, Appointed Science Master at the Victoria Science and Art School, Southport.
Victoria Science and Art School, Southport, Lancashire.

HILL, J. P. **1891-92.** *Student in Biology.*
1892, Appointed Demonstrator of Biology in Sydney University. Has published several important papers on the Indigenous Australian Animals.
Sydney University, New South Wales.

HILL, Julian. **1846.** *Student, Royal College of Chemistry.*
Engineer.

HILL, Malcolm. **1875-79.** *Metallurgy.* **Assoc. R.S.M.**

* **HILL**, Samuel Alexander. **1871-74.** *Mining, Metallurgy, and Geology.* **Assoc. R.S.M.**
Late Professor at Lahore College.

HILLS, Thomas H. **1891-92.** *Student in Chemistry.*
Manager and Chemist at Messrs. F. C. Hills and Co.'s Chemical Works, Deptford, London, S.E.
The Chemical Works, Deptford, London, S.E.

HINCHLEY, John William. **1893-96.** *Metallurgy.* **Assoc. R.S.M.**
F.C.S.; Whitworth Scholarship 1896; Whitworth Exhibition 1894.
Formerly two years and a half with Messrs. Ruston, Proctor and Co., Engineers, Lincoln; three years with Mr. G. W. Keep, Iron Works, Lincoln.
64, Park Walk, Chelsea, London, S.W. *Permanent Address:* Baggeholme Road, Lincoln.

HINTON, Henry Arthur. **1891-94.** *Metallurgy, Mining, and Geology.* **Assoc. R.S.M.**
1896, Assistant Demonstrator in Geology, Royal College of Science.
42, Brownswood Road, Green Lanes, London, N.

HIORNS, A. H. *Student in Metallurgy.*
1882-83, Director of the Metallurgical Department of the Municipal Technical School, Birmingham. Author of *Elementary Metallurgy, Principles of Metallurgy, Iron and Steel Manufacture, Metal Colouring and Bronzing*, and other Text-Books, published by Messrs. Macmillan and Co.
139, Church Hill Road, Handsworth, Birmingham. *Permanent Address:* Ivydene, Chester Road, Erdington, near Birmingham.

***HOBLER**, FRANK H. *Student in Chemistry.*

F.C.S.

Formerly Assistant Chemist, Woolwich Arsenal.

***HOBSON**, ARTHUR S. **1861-64.** *Student in Chemistry.*

Studied some years under Hofmann and Frankland. Also turned his attention to Physics, Meteorology, and Archæology. Fellow of several learned societies, and a regular attendant at the meetings of the British Association. Died October 24th, 1876, aged sixty-one.

HODGKINSON, W. R. EATON. **1873-75.** *Student in Chemistry and Geology.*

Ph.D. (Würzburg); F.R.S. (Edin.); Jodrell Scholar; F.I.C.; F.C.S.; F.G.S.; Mem. Soc. Chem. Ind.; Mem. Phys. Soc. (Lond.).

Sometime Senior Demonstrator and Lecturer in Chemistry in the Royal College of Science and Royal School of Mines. 1880-82, Examiner to the Institute of Chemistry. 1885, Appointed Professor of Chemistry and Physics in the Royal Military Academy and Artillery College, Woolwich. Edited and revised the 5th, 6th, 7th, and 8th editions of Valentin's *Course of Qualitative Analysis* (J. and A. Churchill). Translated *Strecker-Wislicenus' Organic Chemistry* (Kegan Paul and Co.). Author of small Note-Books on Analysis and Theoretical Chemistry, and of various papers on subjects connected with Chemistry.

8, PARK VILLAS, BLACKHEATH, LONDON, S.E. *Permanent Address:* ROYAL ARTILLERY COLLEGE, RED BARRACKS, WOOLWICH.

HODGSON, — . **1852-54.** *Student in Mining and Mineralogy.*

HOFFERT, H. H. **1876-81.** *Mining, etc.* **Assoc. R.S.M.**

D.Sc. (Lond.); Mem. Phys. Soc. (Lond.); De la Beche Medal 1881.

1894, Appointed Inspector of Science Schools under the Science and Art Department.

4, HAREWOOD GROVE, DARLINGTON; *and* c/o SCIENCE AND ART DEPARTMENT, SOUTH KENSINGTON, LONDON, S.W.

HOGAN, JAMES F. **1874-77.** *Metallurgy.* **Assoc. R.S.M.**

1896, Appointed District Inspector of National Schools, Ireland.

ENNIS, COUNTY CLARE, IRELAND.

HOLBECHE, HENRY. **1886-89.** *Physics.* **Assoc. R.C.S.**

B.Sc. (Lond.).

1891-92, Assistant Visiting Science Master, Nottingham School Board. 1892-96, Assistant Chemistry and Physics Master, Leeds School of Science, and Leeds Modern School. 1896, Appointed Science Master at Palmer's Endowed School, Grays, Essex.

PALMER'S ENDOWED SCHOOL, GRAYS, ESSEX. *Permanent Address:* STOTTESDEN, CLEOBURY MORTIMER, SHROPSHIRE.

HOLDEN, JOSHUA. **1887-90.** *Student.*

B.A. (Oxford).

MOOR EDGE, MANKINHOLES, TODMORDEN.

HOLGATE, THOMAS E. **1875-78.** *Mining and Metallurgy.* **Assoc. R.S.M.**

Mem. Iron and Steel Inst.; Mem. Soc. Chem. Ind.

1878-83, Chemist to the Darwen Iron Co., Ltd. 1883-87, Chemist and Under-Manager to the Darwen and Mostyn Iron Co., Ltd. 1887-96, Manager of the Darwen Works of the Darwen and Mostyn Iron Co., Ltd. Author of papers on "Composition of Ferro-Manganese," etc. (1888), and on "Manganese and Sulphur in Pig-Iron" (1892), read before the South Staffs. Institute of Iron and Steel Works Managers.

146, BLACKBURN ROAD, DARWEN.

HOLLAND, FRED H. **1886.** *Student in Geology.*

Bessemer Medal 1886.

1886-89, Assistant Chemist to the Dowlais Works, South Wales. 1889, Appointed Chemist and Assistant Blast-furnace Manager to the New Russia Co., Ltd., Hughesoffka, South Russia.

HUGHESOFFKA, GOVERNMENT OF EKATERINOSLAV, SOUTH RUSSIA.

HOLLAND, PHILIP. **1861-63.** *Student in Chemistry.*

F.I.C.; F.C.S.

1863-64, Honorary Assistant to Professor Hofmann; engaged in research work on Urea, Ethylamine, etc. Owing to an accident whilst preparing phosphorus trichloride, gave up work in 1864 and went to Natal. 1866, Entered Dr. Angus Smith's laboratory. Work on analyses of water, etc. 1872-82, Engaged in commercial analyses. 1880, Visited Davos Platz to make analyses of air. Sometime Public Analyst for Southport. Now in practice as Analytical Chemist in London. Author of papers in the *Chemical News* and elsewhere.

22, TAVITON STREET, GORDON SQUARE, LONDON, W.C.

HOLLAND, THOMAS H. **1885-88.** *Geology.* **Assoc. R.C.S.**

F.G.S.; Berkeley Fellow of Owens College, 1889; Murchison Medal, R.C.S., 1887.

1890-96, Curator of the Government Museum of Geology, Calcutta, and Deputy Superintendent of the Geological Survey of India. 1893, Appointed Professor of Geology and Mineralogy at the Presidency College, Calcutta. 1893-96, President of the Microscopical Society of Calcutta. Author of some twenty-two papers on Petrology and Physical Geology published in the *Min. Mag.*, *Quart. Journ. Geol. Soc.*, *Journ. Asiatic Soc. Bengal*; and *Records of the Geological Survey of India.*

GEOLOGICAL SURVEY OF INDIA, CALCUTTA.

HOLLOWAY, GEORGE THOMAS. **1881-84.** *Chemistry.* **Assoc. R.C.S.**

F.I.C.; F.C.S.; Mem. Soc. Pub. Anal.

1884-86, Assistant Demonstrator in Chemistry to the Royal College of Science. In practice as Consulting Chemist and Assayer.

57, CHANCERY LANE, LONDON, W.C.

HOLMES, GEORGE G. **1884-86.** *Mining.* **Assoc. R.S.M.**

HOLT, E. W. L. **1888-89.** *Student in Biology.*

On leaving South Kensington, studied at St. Andrew's, Maine Station, under Professor McIntosh; thence to Ireland, and worked under Professor A. C. Haddon and the Rev. W. S. Green, Inspectors of Irish Fisheries, accompanying them as Assistant Naturalist on a survey of the fishing grounds on the west coast of Ireland in 1891. The work done during this voyage has been embodied in a series of valuable official reports and scientific monographs. 1891, Appointed a Naturalist to the Marine Biological Association, stationed at Grimsby to investigate the North Sea Fishing Grounds. Subsequently resigned his connection with the Marine Biological Association, owing to ill-health.

***HOMERSHAM**, SAMUEL COLLETT. **1877-79.** *Student in Geology.*

A.M.Inst.C.E.; F.G.S.

Engineer to the Richmond Waterworks. Made important observations on Deep Boring in that town. Died 1892.

HOOD, JOHN JAMES. **1878-81.** *Metallurgy.* **Assoc. R.S.M.**

D.Sc. (Lond.); Bessemer Medal 1881.

Sometime Assistant to Professor Roberts-Austen, C.B., F.R.S. Now (1896) Assistant to Professor William Crookes, F.R.S.

1, FENCHURCH AVENUE, LONDON, E.C.

HOOKER, Brian H. H. **1878-81.** *Metallurgy.* **Assoc. R.S.M.**

1883-85, Manager of the Grube Elise, Alsace. 1885-86, Assayer to the Cunningar Gold Mining Co., New South Wales. 1886-89, Government Lecturer in Mineralogy, Queensland. 1889-92, Manager of the Queensland Minerals Exploration Co., Ltd. 1894, Manager of the Ivanhoe Mine, Hannan's, West Australia. 1896, Appointed Manager of the North White Feather Consolidated Gold Mines, Kanowna, West Australia.

Kanowna, West Australia. *Permanent Address:* c/o W. H. Hooker, Esq., India Store Depôt, Belvedere Road, Lambeth.

HOOKER, Samuel C. **1881-84.** *Student in Chemistry.*

Ph.D. (Munich); F.C.S.; F.C.S. (Berlin).

1883-85, Chemist to the Platinotype Co., London. 1885, Appointed Chief Chemist at the Franklin Sugar Refinery, Philadelphia.

The Franklin Sugar Refinery Co., 701, Front Street, Philadelphia, U.S.A.

HOPE, Edmund L. **1884-88.** *Mining.* **Assoc. R.S.M.**

De la Beche Medal 1888.

HOPKINS, Arthur W. **1880-83.** *Metallurgy.* **Assoc. R.S.M.**

13, Harrington Gardens, London, S.W.

HOPKINS, Herbert W. **1887-91.** *Metallurgy.* **Assoc. R.S.M.**

Assistant to Claude Vautin, Esq., 33, Wharf Road, London, N.; and Chemist to the Gold Ore Treatment Co. (Sulman's process).

60, Gracechurch Street, London, E.C.

***HORE**, — . (Capt. R. N.) **1848.** *Student, Royal College of Chemistry.*

Sometime Naval Attaché at Paris.

HOSKEN, H. **1882.** *Student in Mining.*

HOTSON, William Edward. **1886-90.** *Mining.* **Assoc. R.S.M.**

F. Lake Superior Min. Inst.

September to December 1890, Assistant Draughtsman to the Colorado Midland Railway Co. 1891, Draughtsman to C. E. Luckgraft, Esq., Engineer of Colorado Springs, Colorado. 1891-94, Chemist to the Florence Iron River Co., Florence, Wisconsin, U.S.A. 1894, Appointed Chemist to the Chapin Mining Co., Iron Mountain, Michigan.

Iron Mountain, Michigan, U.S.A.

***HOW**, HENRY. **1845.** *Student, Royal College of Chemistry.*

Formerly Professor of Chemistry in the Nova Scotia University.

HOWARD, A. **1893-96,** *Chemistry.* **Assoc. R.C.S.**

HOWARD, WILLIAM. **1873-76.** *Mining.* **Assoc. R.S.M.**

HOWE, BEN. **1888-91.** *Mining.* **Assoc. R.S.M.**

1892-93, Assistant Manager to P. W. Stuart-Menteath, Esq., Assoc. R.S.M., Las Minas de Ollin, Spain. 1893-94, Manager of Las Minas de Ollin. 1894, Went to Sarawak to prospect for the Borneo Mining Co.

c/o BORNEO MINING CO., LTD., SARAWAK, STRAITS SETTLEMENTS.

HOWELL, REGINALD. **1874-78.** *Metallurgy.* **Assoc. R.S.M.**

F.C.S.

Partner in the firm of Messrs. Stevenson and Howell, Manufacturing Chemists, London.

THE RED HOUSE, THAMES DITTON. *Permanent Address:* 95a, SOUTHWARK STREET, LONDON, S.E.

HUGHES, A. J. **1893-96.** *Metallurgy.* **Assoc. R.S.M.**

HUGHES, HERBERT W. **1881-84.** *Mining.* **Assoc. R.S.M.**

F.G.S.; A.M.Inst.C.E.; De la Beche Medal 1884.

Consulting Engineer to Messrs. Mobberly and Perry since 1884; to Messrs. Bowens, Ltd., Stourbridge, since 1885; and to Messrs. Doulton and Co., Rowley Regis, since 1887. Mining Engineer to Earl Dudley since 1889. Lecturer on Mining at the Mason Science College, Birmingham, since 1889. In 1895 appointed General Manager of Sandwell Park Colliery. 1888-90, President of the Society of Mining Students. Author of *A Text-Book of Coal Mining* (C. Griffin and Co.).

188, WOLVERHAMPTON STREET, DUDLEY, WORCESTERSHIRE.

HUGHES, THEODORE W. HUGHES. **1859-62.** *Geology and Metallurgy.* **Assoc. R.S.M.**

F.G.S.; Murchison Medal 1862.

Superintendent of the Geological Survey of India.

GEOLOGICAL SURVEY OFFICE, CALCUTTA.

HUGHES, THEOPHILUS VAUGHAN. **1880-83.** *Mining and Metallurgy.* **Assoc. R.S.M.**

F.I.C.; F.C.S.; Mem. Fed. Inst. Min. Eng.; Mem. Soc. Pub. Anal.

1883-84, On the staff of Messrs. Newton, Keates and Co., Copper Smelters and Manufacturers. 1884-88, On the staff of Messrs. Woodhouse

and Rawson, Electricians. 1890-93, Lecturer on Chemistry and Mining for the Flintshire and Staffordshire County Councils. 1888-95, In practice as General Technical and Metallurgical Chemist, and Electro-Metallurgist. 1896, In partnership with Alexander E. Tucker, F.I.C., at Birmingham.

35, Paradise Street, Birmingham.

HUME, William Fraser. **1884-89.** *Geology and Metallurgy.* **Assoc. R.C.S. and R.S.M.**

B.Sc. (Lond.) 1890; D.Sc. (Lond.) 1893; F.G.S. (Balance of Lyell Fund, 1896).

1890, Demonstrator in Geology at the Royal College of Science, London. Author of "The Cretaceous Rocks of South Russia," and "The Loess of South Russia" (*Geol. Mag.* 1892); "The Black Earth of South Russia" (1894); and other papers on geological subjects in *Science Progress*, *Natural Science*, etc.

27, Ella Road, Crouch Hill, London, N.

***HUMPIDGE**, Thomas Samuel. **1874-75.** *Student in Chemistry, etc.*

Ph.D. (Heidelberg); B.Sc. (Lond.); F.C.S.

Born 1853. Educated at Crypt Grammar School, and the Science and Art Schools, Gloucester. Entered R.S.M. 1874. Bronze Medal and Jodrell Scholarship 1875. 1876-78, Heidelberg. 1878, Appointed Science Master at Tellenberg Institute, Hofwyl, near Berne. 1879, Elected to the Chair of Natural Science, in the University College of Wales, Aberystwyth. Devoted the remainder of his life to the improvement of the Science Department of the College. Translated Kolbe's *Inorganic Chemistry*. Chiefly engaged in investigations of the rare earths. Died November 30th, 1887.

HUNT, Bernard. **1885-89.** *Mining.* **Assoc. R.S.M.**

A.M.Inst.C.E.; Assoc. Inst. Min. and Met.

1889-92, Assayer and Chemist to the Michoacan Railway and Mining Co., Ltd., Mexico. 1893-95, Assayer and Mining Engineer to the Mesquital del Oro Mining Co., Ltd., Mexico. 1896, Appointed Assistant Mining Engineer, Assayer, and Surveyor to the Caylloma Silver Mining Co., Ltd., Peru. (Present position, "Interim Manager.")

c/o Chas. Wagner, Esq., Caylloma, Arequipa, Peru. *Permanent Address:* The Elms, 36, Alleyn Park, West Dulwich, London, S.E.

***HUNT**, Robert. **1851-53.** *Mining, etc.* **Assoc. R.S.M.**

F.G.S.

Sometime at the Royal Mint, Sydney, New South Wales.

HUNTINGTON, Alfred K. **1874-77.** *Mining and Metallurgy.* **Assoc. R.S.M.**

F.I.C.; Mem. Iron and Steel Inst.; Mem. Inst. Min. and Met. (Past Pres.); Mem. Soc. Chem. Ind. (Vice-Pres.)

1879, Appointed Professor of Metallurgy in King's College, London, and formerly for ten years Lecturer on Metallurgy to the Medical School of the Dental Hospital of London. Rewrote *Metals* in Longmans' Science Series in 1882; New edition by Huntington and MacMillan (in press, 1896). Author of various papers in *Journals* and *Transactions* of the Societies.

Mervel Hill, Hambledon, Godalming, Surrey.

HUNTLY, George N. **1887-90.** *Chemistry* (*honours*). **Assoc. R.C.S.**

Frank Hatton Prize 1890.

1891, Gas Examiner to the London County Council; and Science Master Whitgift Grammar School, Croydon.

56, Sheen Road, Richmond, Surrey.

HURST, C. H. **1879-81.** *Student in Biology.*

Ph.D. (Leipzig).

1883, Appointed Demonstrator and Assistant Lecturer in Zoology at Owens College, Manchester. 1895, Appointed Demonstrator in Zoology at the Royal College of Science, Dublin. Author of various zoological papers, and joint author, with the late Professor A. M. Marshall, of an Elementary Laboratory Treatise on Zoology.

Royal College of Science, Dublin, Ireland.

HUTCHIN, Henry William. **1892-95.** *Chemistry.* **Assoc. R.C.S.**

174, Green Lanes, Small Heath, Birmingham.

HUXLEY, Henry. *Student in Biology.*

M.R.C.S.; A.R.C.P.

Formerly House Surgeon to St. Bartholomew's Hospital.

2, Queensberry Place, London, W.

HUXLEY, James Henry. **1869-72.** *Mining, etc.* **Assoc. R.S.M.**

F.I.C.

Head Analytical Chemist to Messrs. Vickers, Sons and Co., Ltd., River Don Works, Sheffield, since 1872.

15, Kenwood Park Road, Sheffield

I

I'ANSON, Frank C. **1875-82.** *Mining.* **Assoc. R.S.M.**

ILLINGWORTH, Benjamin. **1881-84.** *Physics.* **Assoc. R.C.S.**

INGALL, Elfric D. **1874-78.** *Metallurgy.* **Assoc. R.S.M.**

In charge of the Division of Mineral Statistics and Mines, Geological Survey Department, Ottawa, Canada. Author of *Report on Silver Mines of Lake Superior, Geological Survey of Canada Reports*, 1887; and papers on Laurentian Limestones, Argentiferous Galena Veins of British Columbia, etc.; and of the *Annual Reports of the Division of Mineral Statistics and Mines* since 1889.

Geological Survey Department, Ottawa, Ontario, Canada.

IVEY, J. H. **1893-96.** *Metallurgy.* **Assoc. R.S.M.**

Butte, Montana, U.S.A. *Permanent Address:* Stray Park House, Camborne, Cornwall.

J

JACKSON, EDGAR. **1871-73.** *Mining, etc.* **Assoc. R.S.M.**

F.I.C.; Duke of Cornwall Scholarship 1871; De la Beche Medal 1873.

Assayer and Consulting Chemist.

106, QUEEN VICTORIA STREET, LONDON.

JACKSON, SAMUEL. **1886-89.** *Chemistry.* **Assoc. R.C.S.**

F.G.S.; F.I.C.

Chemist and Dye-works Manager to Messrs. Binny and Co., Cotton Spinners, Madras.

c/o MESSRS. BINNY AND CO., MADRAS, INDIA.

JACKSON, WILLIE. **1891-94.** *Chemistry.* **Assoc. R.C.S.**

1894, Zurich Polytechnic. 1895, Appointed Science Master at the Victoria Institute, Tunstall, Staffordshire.

3, MADELEY STREET, TUNSTALL, STAFFS.

***JACOB**, ERNEST. **1875-78.** *Mining.* **Assoc. R.S.M.**

Sometime on the United States Survey.

JAQUET, JOHN B. **1887-90.** *Mining.* **Assoc. R.S.M.**

F.G.S.

Geological Surveyor, Geological Survey, Department of Mines, New South Wales. Author of Monograph *On the Geology of the Broken Hills Lode and Barrier Ranges Mineral District, New South Wales*, and of various reports in the Annual Reports, Department of Mines and Agriculture, New South Wales, 1891-96; also of papers in *Records of Geological Survey, New South Wales.*

GEOLOGICAL SURVEY DEPARTMENT OF MINES, SYDNEY, NEW SOUTH WALES.

JAMES, H. H. **1886.** *Student in Mining.*

JARRATT, WILLIAM S. **1887-90.** *Physics.* **Assoc. R.S.M.**

B.A. (Camb.).

1894, Assistant Examiner in H.M. Patent Office, Chancery Lane.

3, MIDDLE TEMPLE LANE, LONDON, W.C.

JEANS, HAROLD. **1889-92.** *Metallurgy.* **Assoc. R.S.M.**

Mem. Franklin Inst., Philadelphia; Bessemer Medal 1892.

1893-94, Machine-designer and Draughtsman with Messrs. William Sellers and Co., Philadelphia. 1894, Inspecting Engineer for the Pittsburgh Testing Laboratory, Ltd. (inspected bridges erected by the Peoria and Eastern Railroad Co., the Park Avenue Viaduct in New York City, and other structures). At present (1896) engaged on special work for the Pittsburgh Reduction Co.

325, WATER STREET, PITTSBURGH, U.S.A. *Permanent Address:* CEDAR HOUSE, NORTH SIDE, CLAPHAM COMMON, LONDON, S.W.

JEFFERSON, JOHN CLARK. **1870-73.** *Metallurgy.* **Assoc. R.S.M.**

JEFFERSON, JOSEPH. **1888-91.** *Metallurgy.* **Assoc. R.S.M.**

Mem. Council, Sheffield Soc. Eng. and Met.

Sometime Assistant to Professor Roberts-Austen, C.B. 1891, Appointed Senior Demonstrator in Metallurgy, and Lecturer in Geology, and on Fuel, at the Technical School, Sheffield.

SHEFFIELD TECHNICAL SCHOOL, SHEFFIELD, YORKSHIRE. *Permanent Address:* 59, GIRLINGTON ROAD, BRADFORD.

JENKINS, — . **1860.** *Student in Mining.*

F.G.S.

Formerly Secretary to the Royal Agricultural Society.

JENKINS, HENRY C. **1885-88.** *Metallurgy.* **Assoc. R.S.M.**

Assoc. M.Inst.C.E.; Whitworth Scholar 1885; Tyndall Prize 1886; Bessemer Medal 1888.

1891-94, Assistant to Professor Roberts-Austen, C.B. 1894, Appointed Instructor in Assaying at the Royal School of Mines. Author of note on "Electrolysis" (*Brit. Assoc. Report* 1891); "Calculation of Blast Furnace Charges" (*Proc. Iron and Steel Inst.* 1891); Cantor Lectures; on "Typewriters" (Society of Arts 1894).

5, DEERBROOK ROAD, HERNE HILL, LONDON, S.E.; *and* ROYAL COLLEGE OF SCIENCE, SOUTH KENSINGTON, LONDON, S.W.

JENNINGS, Alfred Vaughan. **1885.** *Student in Biology and Geology.*

F.G.S.; F.L.S.; Edward Forbes Medal 1885.

Sometime Assistant Demonstrator in Geology, R.C.S., and Lecturer on Biology at the Birkbeck Institute. Subsequently Curator of the Eton College Museum. 1896, Demonstrator in Geology and Biology at the Royal College of Science, Dublin.

18, Frognal, Hampstead, London N.; *and* Royal College of Science, Dublin, Ireland.

JERVIS, Il cav. William Paget. **1851-53.** *Student in Mining and Mineralogy.*

F.G.S.; Member (and one of the Founders) of the Italian Geological Society, Rome; Correspondent of the Imperial and Royal Geological Institute at Vienna.

Appointed Conservator of the Royal Italian Industrial Museum at Turin, in 1863. Author of a work on the Topographical Distribution of Mineral Species in Italy, entitled, *I Tesori sotteranei dell' Italia*, in four octavo volumes, illustrated, for which two silver medals have been awarded; also of numerous other publications in English, French, and Italian, both private and official.

Regio Museo Industriale Italiano, Turin, Italy.

***JESSEMAN**, Alexander. *Student in Chemistry, etc.*

Some years Schoolmaster under the London School Board. On leaving the Royal School of Mines was appointed Science Lecturer at Dulwich College. Died July 19th, 1882.

JOHNS, John Henry. **1880-81.** *Student in Mining and Metallurgy.*

Assoc. M.Inst.C.E.; Mem. Am. Inst. M.E.; Mem. Fed. Inst. M.E.; Mem. Soc. Eng. and Arch. S. Africa; Mem. Geol. Soc. S. Africa, etc.

1881-88, Superintendent of the Nine Reefs Gold Mining Co., Colar, India. Manager of the Ferreira Gold Mine since 1889. Consulting Engineer to the Worcester Exploration and Gold Mining Co. since 1890. February 1892 to December 1894, General Manager of the Wemmer Gold Mining Co.

c/o Ferreira Gold Mining Co., Ltd., P.O. Box 1021, Johannesburg, S.A.R. *Permanent Address:* Rand Club, Johannesburg, S.A.R.

JOHNSON, Robert R. **1888-92.** *Metallurgy.* **Assoc. R.S.M.**

Assoc. Inst. Min. and Met.

Formerly Under Manager to the Magyar Gold Mining Co., Tekero, Transylvania. 1896, Engineer at the Beresoff Gold Mines, Russia.

Beresovski Zavod, Ekaterinburg, Govvernement Perm, Russia. *Permanent Address:* 77, Queen's Crescent, Haverstock Hill, London, N.W.

***JOHNSON**, Matthew Warton. **1851-52.** *Student, Royal College of Chemistry.*

On leaving College of Chemistry became Lecture-Assistant to Dr. Stenhouse at St. Bartholomew's Hospital. Latterly applied himself to Technical Chemistry, particularly to the improvement of marking ink. Died October 12th, 1862, aged thirty-five.

JOHNSON, Thomas. *Student in Biology.*

D.Sc.; F.L.S.; M.R.I.A.

Professor of Botany at the Royal College of Science, Dublin, and Keeper of the Herbarium, Science and Art Museum, Dublin.

Inglewood, Silford Road, Sandymount, Dublin, Ireland. *Permanent Address:* Royal College of Science, Dublin, Ireland.

JONES, A. Coppen. **1885-86.** *Student in Biology.*

F.L.S.; Edward Forbes Medal 1886; R.C.S.

Author of papers entitled "Ueber einen neuen bei Tuberkulose, träufigen Fadenpilz"; and "Die Morphologie u. systematische Stellung d. Tuberkelpilzes" (*Centralblatt f. Bakt*, 1893 and 1895).

Institut für Klinische Analyse, Davos Platz, Switzerland.

JONES, E. J. **1876-80.** *Geology.* **Assoc. R.S.M.**

JONES, Edgar Strangways. **1891-95.** *Mining.* **Assoc. R.S.M.**

With the Sulphide Corporation (Ashcroft's Process), Ltd., New South Wales.

c/o The Sulphide Corporation, Ltd., Cockle Creek, near Newcastle, New South Wales. *Permanent Address:* The Oaks, Newport, Monmouthshire.

JONES, Henry E. **1887-90.** *Mining.* **Assoc. R.S.M.**

Assayer to the Village Main Reef Gold Mining Co., Johannesburg, S.A.R.

c/o Village Main Reef Gold Mining Co., Ltd., Johannesburg, S.A.R.

JONES, LIONEL M. **1888-91.** *Chemistry.* **Assoc. R.C.S.**

Murchison Prize 1890; R.C.S.

Science Master at St. Dunstan's College, Catford.

331, STANSTEAD ROAD, CATFORD, LONDON, S.E. *Permanent Address:* BEAUMONT HOUSE, LLANELLY, SOUTH WALES.

JONES, THOMAS. **1891-94.** *Agriculture.* **Assoc. R.C.S.**

Prize in Agriculture, R.C.S., 1893.

1894, Sub-inspector of Science Schools under Science and Art Department. Subsequently Head-master of the Penmorfu Board School. 1895, Appointed Science Master at the County Intermediate School, Towyn, North Wales.

FRONDEG, NANTERNIS, NEW QUAY, R.S.O., CARDIGANSHIRE.

JONES, T. MANN. **1865-70.** *Metallurgy.* **Assoc. R.S.M.**

F.G.S.

Formerly Professor of Chemical and Physical Science in the Oxford and Woolwich Common Military Colleges. Author of notes "On Mind and Habit in Animals," included in Appendix D to Mr. Herbert Spencer's *Justice*. Engaged in research upon the Mind in Animals.

NORTHAM, NORTH DEVON.

JORDAN-SMITH, BENJAMIN. **1891-94.** *Chemistry.* **Assoc. R.C.S.**

42, KING'S ROAD, READING.

***JOYNSON**, EDMUND. **1850.** *Student, Royal College of Chemistry.*

Late Member of the Firm of Joynson and Son, Paper Makers.

JUDD, JOHN W. **1863-64.** *Student in Geology.*

C.B.; LL.D.; F.R.S.; F.G.S.

1864, Appointed Analytical Chemist to Iron and Steel Works in Sheffield. 1867, Joined the Staff of the Geological Survey of England and Wales. 1876, Appointed to the Chair of Geology at the Royal School of Mines. 1877, Elected a Fellow of the Royal Society. 1885, Presided over Geological Section of British Association at Aberdeen. 1877-85, Secretary, and 1886-87, President, of the Geological Society. 1895, Appointed Dean of the Royal College of Science and Royal School of Mines. (Further, *see* PROFESSORS.)

16, CUMBERLAND ROAD, KEW; ROYAL COLLEGE OF SCIENCE, SOUTH KENSINGTON, LONDON, S.W.; *and* ATHENÆUM CLUB, LONDON, S.W.

K

KAMENSKY, GEORGE. **1879-83.** *Mining and Metallurgy.* **Assoc. R.S.M.**

Member Physico-Chemical Society of Russia. Holds appointment in the Imperial Russian Mint. Translator of Mendeleef's *Principles of Chemistry*, etc. Author of paper on Iron Works of South Russia (*Journ. Iron and Steel Inst.* 1895).

FORTRESS OF ST. PETER AND ST. PAUL, ST. PETERSBURG, RUSSIA.

KAY, WILLIAM HEPPENSTALL. **1892-95.** *Physics.* **Assoc. R.C.S.**

11, THORNHILL TERRACE, THORNBURY, BRADFORD, YORKSHIRE.

KAY-SHUTTLEWORTH, THE RIGHT HON. SIR UGHTRED JAMES, BART. **1860.** *Student in Chemistry and Mining.*

P.C.; M.P. (North-East Lancashire, Clitheroe Division).

Born 1844. Educated at Harrow and London University. J.P. (Lancashire); J.P. and D.L. (Westmoreland). Member London School Board 1880-82. February to April 1886, Under Secretary of State for India. April to July 1886, Chancellor of the Duchy of Lancaster. August 1892 to July 1895, Parliamentary Secretary to the Admiralty. P.C. 1886. M.P. (Hastings) 1869-80. Present seat since December 1885. Author of *The First Principles of Modern Chemistry.*

28, PRINCE'S GARDENS, SOUTH KENSINGTON, LONDON, S.W.; GAWTHORPE HALL, PADIHAM, LANCS.; REFORM AND ATHENÆUM CLUBS, LONDON, S.W.

KAYE, FREDERICK. **1889-92.** *Chemistry.* **Assoc. R.C.S.**

1892-93, Assistant Science and Art Master at the Technical Schools, Malmesbury, Wiltshire. 1893-94, Science Lecturer at the Technical School, Dewsbury, and Science Demonstrator to the Dewsbury School Board. 1894, Appointed Science Master in the Science Department of the Technical School, Stockport.

THE TECHNICAL SCHOOL, STOCKPORT.

***KAYESS**, James. **1848.** *Student, Royal College of Chemistry.*

Silk Dyer. Late Member of the Firm of Messrs. Baker, Tucker and Co., of London and Manchester.

KEEP, William. **1875-78.** *Mining, etc.* **Assoc. R.S.M.**

KEKEWICH, G. O. **1884.** *Student in Mining.*

Mining Engineer in Alsace, Ceylon, Queensland, etc.

c/o G. W. Kekewich, Esq., C.B., Education Department, Whitehall, London, S.W.

KELSALL, William. **1885-88.** *Mechanics.* **Assoc. R.C.S.**

Assistant, Engineer's Department, Great Northern Railway.

G.N.R. Engineer's Office, 16, Castle Gate, Nottingham. *Permanent Address:* Park View, Sydenham Place, Bradford.

KEMPER-VOSS, Ebden. **1889-92.** *Mining.* **Assoc. R.S.M.**

F.G.S.

1893, Manager of the Scientific Section of the South African Exhibition, Kimberley. 1893-96, Chief Surveyor to the City and Suburban Silver Mining Co., Johannesburg. 1896, Manager Klipfontein Gold Mining Co., Johannesburg.

c/o The City and Suburban Silver Mining Co., Johannesburg, S.A.R.

KENDALL, Percy Fry. **1880-82.** *Student in Geology.*

F.G.S.; Berkeley Fellow of Owens College.

1887, Assistant Lecturer on Geology at Owens College, Manchester. 1889, Lecturer on Natural Science, Stockport Technical School. 1891, Appointed Lecturer on Geology at the Yorkshire College, Leeds.

5, Woodland Terrace, Stainbeck Lane, Chapel Allerton, Leeds.

KENNEDY, Myles. **1854.** *Student in Mining.*

F.G.S.

Formerly Owner and Manager of Iron Mines, Ulverstone.

*** KENSINGTON**, Arthur. **1878-81.** *Metallurgy.* **Assoc. R.S.M.**

Died 1885.

KENT, W. Saville. *See* Saville-Kent, W.

KERR, E. **1890.** *Student in Mining.*

1892-93, Assayer to the Ferreira Gold Mining Co. 1893, Appointed Surveyor and Assayer to the Wolhuter Gold Mining Co., Johannesburg, S.A.R.

c/o Wolhuter Gold Mining Co., Johannesburg, S.A.R.

KINLOCH, Archibald David. **1890-94.** *Mining.* **Assoc. R.S.M.**

Formerly Engineer to the Village Main Reef Gold Mining Co., Ltd.; Assistant Engineer to the Simmer and Jack Gold Mining Co., Ltd. Now Sampler to the Unified Gold Mining Co., Transvaal.

P.O. Box 1006, Johannesburg, S.A.R. *Permanent Address:* Gourdie, Dunkeld, N.B.

KIRKPATRICK-PICARD, Hugh F. **1888-91.** *Metallurgy.* **Assoc. R.S.M.**

1892-93, Assistant to Claud Vautin, Esq. 1893-95, Chemist to the Newberry-Vautin Gold Extraction Co., Ltd. 1895, Appointed Electro-Metallurgist to the Electrolytic Separation Syndicate.

59, Abbey Road, St. John's Wood, London, N.W.

* **KIRMAN**, Walter. **1886-89.** *Chemistry.* **Assoc. R.C.S.**

Born 1871, and educated at Manchester. 1885, Took a National Scholarship and entered the Royal College of Science. 1888, Associateship in Chemistry (first place). 1889-92, Assistant in the North Chemical Laboratory at the Royal College of Science. 1893, Was appointed Analyst to a large Creamery in the neighbourhood of Limerick. Died November 2nd, 1894. Was joint author, with Dr. T. E. Thorpe, F.R.S., of a paper on "Thiosul-phuric acid" in the *Journ. Chem. Soc.*

KITCHENER, Arthur B. **1872-76.** *Mining.* **Assoc. R.S.M.** F.G.S.

1877-80, Manager of the Trojes Silver Mining Co., Mexico. 1894, Manager-Director of the Bonanza Gold Mining Co. Since 1894, sheep-farming in New Zealand.

Waihemo Grange, Dunback, Otago, New Zealand.

KITTO, Nono. **1888-91.** *Mining.* **Assoc. R.S.M.**

F.G.S.; Assoc. Inst. Min. and Met.

1891, Appointed Assistant Manager of the Alamillos Mines, Linares.

Alamillos Mines, Linares, Provincia de Jaen, Spain. *Permanent Address:* Foxedale, Isle of Man.

KNOWLTON, A. R. **1893-96.** *Biology.* **Assoc. R.C.S.**

L

*** LACE**, Frank D. **1889-92.** *Mining and Metallurgy.* **Assoc. R.S.M.**

1893, Assistant Manager to the Ferreira Gold Mining Co., Ltd., Johannesburg. 1895, Appointed Manager of the Modderfontein Gold Mining Co., Ltd.

LACEY, Henry B. **1891-95.** *Student in Biology, etc.*

Edward Forbes Medal 1893.

1890, Assistant Master, Wyggeston Schools, Leicester. 1895, Appointed Demonstrator in Biology, St. Mary's Hospital Medical School, London. 1896, Appointed Lecturer in Biology to the South-West London Polytechnic, Chelsea.

33, Paulton Square, Chelsea, London, S.W. *Permanent Address:* Central Avenue, Clarendon Park, Leicester.

LANCHESTER, F. W. **1888.** *Student in Mining.*

LANG, C. **1886-87.** *Student.*

1887, Assistant Manager at the Johnstone Foundry, Johnstone, N.B.

The Johnstone Foundry, Johnstone, N.B.

LANG, S. A. **1892.** *Student in Mining.*

LAW, Channell. **1870-73.** *Mining and Metallurgy.* **Assoc. R.S.M.**

F.C.S.; Mem. Phys. Soc. Lond.

Ilsham Dene, Torquay.

LAWN, James G. **1888-91. Assoc. R.S.M.**

Tyndall Prize 1889; Murchison Prize 1890; De la Beche Medal 1891.

Six years at mines before attending the Royal School of Mines. 1891-92, Surveyor and Engineer at the mines of the Barrow Steel Co. 1892-93, Lecturer on Mining to the Cumberland County Council. 1893, Instructor of Mine-Surveying at the Royal School of Mines. 1896, Appointed Professor of Mining at the South African School of Mines, Kimberley.

School of Mines, Kimberley, South Africa.

LAWS, B. C. **1893-96.** *Mechanics and Physics.* **Assoc. R.C.S.**

LAWSON, JAMES C. E. **1887-90.** *Mining.* **Assoc. R.S.M.**

1892-94, Chief Engineer, and in 1894 appointed Acting Manager, of the Caylloma Mines, Peru, South America. 1896, Appointed Mining Engineer to the Colenbrander Development Co., Matabeleland, South Africa.

c/o THE COLENBRANDER DEVELOPMENT CO., BULAWAYO, MATABELELAND, SOUTH AFRICA. *Permanent Address:* FINCHLEY LODGE, NORTH FINCHLEY, LONDON, N.W.

LAYZELL, JAMES. **1883-84.** *Student.*

Whitworth Scholarship 1883.

1884, Appointed Assistant Examiner in H. M. Patent Office.

H. M. PATENT OFFICE, 25, SOUTHAMPTON BUILDINGS, CHANCERY LANE, LONDON, W.C.

LEA, F. C. **1893-96.** *Mechanics and Physics.* **Assoc. R.C.S.**

LEADLEY, LEWIS HENRY. *Student in Chemistry, etc.*

B.A. (Lond.); B.Sc. (Lond.)

1892, Science and Mathematical Master, Congregational School, Caterham Valley, Surrey.

CONGREGATIONAL SCHOOL, CATERHAM VALLEY, SURREY. *Permanent Address:* 6, SWINDEN ROAD, DEWSBURY, YORKSHIRE.

LEBOUR, GEORGE A. **1864-67.** *Student in Geology, etc.*

M.A.; F.G.S.

1867-74, On the Geological Survey of England and Wales. 1879, Appointed Professor of Geology at the Durham College of Science, Newcastle-on-Tyne. Author of *Geological Map of Northumberland* (1877), and *Geology of Northumberland and Durham* (1889).

DURHAM COLLEGE OF SCIENCE, NEWCASTLE-ON-TYNE.

* **LEE**, GEORGE. **1882.** *Student in Mining.*

LEECH, — . **1855.** *Student in Mining.*

Sometime Teacher of Chemistry, Staffordshire.

LEECHMAN, JOHN. **1884-88.** *Mining.* **Assoc. R.S.M.**

LEFROY, George Anthony. **1889-90.** *Student in Geology, Metallurgy, etc.*

Chief Surveyor at Perâk.

Taiping, Perâk, Straits Settlements.

LEITCH, Angus. **1888-91.** *Mechanics.* **Assoc. R.C.S.**

1891-95, Demonstrator in Mechanics at the Royal College of Science.

3, John Street, Paisley, N.B.

LEMANN, Charles Henry. **1872-77.** *Metallurgy.* **Assoc. R.S.M.**

LEVICK, G. **1863.** *Student in Mining.*

LEVICK, Thomas. **1859-63.** *Mining.* **Assoc. R.S.M.**

Sometime practising as Metallurgist in Australia.

LEWIS, Henry L. **1885-88.** *Mining.* **Assoc. R.S.M.**

Pimmer House, Dinas, Rhondda, South Wales. *Permanent Address:* Cyn Glas, Bridgend, South Wales.

LEYSON, William. **1874-77.** *Metallurgy.* **Assoc. R.S.M.**

LEZARD, Herbert L. **1889-92.** *Mining.* **Assoc. R.S.M.**

Sometime Assayer to the Comet and Blue Sky Gold Mining Cos. 1896, Chief Surveyor, East Rand Proprietary Mines, Transvaal.

c/o Messrs. Lezard and Co., Johannesburg, S.A.R.

LICHTENBURG, Ernest. **1885-88.** *Mining.* **Assoc. R.S.M.**

Mem. South Wales Inst. Eng.

Colliery Manager to Messrs. Powell's Tillery Steam Coal Co., Ltd., Abertillery, South Wales.

Permanent Address: c/o Messrs. Wills and Co., Ltd., Grosvenor Buildings, Tithebarn Street, Liverpool.

LIEVING, E. **1875-77.** *Mining and Metallurgy.* **Assoc. R.S.M.**

***LINDON**, Edward Byron. **1877-80.** *Mining and Metallurgy.* **Assoc. R.S.M.**

F.G.S.

Born in Lancaster 1860. 1885, Went first to Victoria and thence to Queensland, where he was appointed Mineralogist to the Brisbane Museum. 1887, Entered practice as Mining Engineer in Brisbane. Author of certain papers on "Australian Minerals," published in *Proc. Roy. Soc. of Queensland.* Killed in July 1891, whilst descending a shaft in the Copeland District, New South Wales.

LISHMAN, Alfred B. **1888-91.** *Physics.* **Assoc. R.C.S.**

Science Teacher, Science School, Bradford.

129, Belvoir Terrace, Bradford.

LITTLE, John C. **1882-86.** *Mining and Metallurgy.* **Assoc. R.S.M.**

Bessemer Medal 1885; De la Beche Medal 1886.

1888-90, At the Mines of the Pestarena United Gold Mines Co., Ltd., Vall'Anzasca, North Italy. 1891-95, In the London Offices of Messrs. J. Taylor and Sons, Mining Engineers, etc.

c/o Messrs. J. Taylor and Sons, 6 and 7, Queen Street Place, London, E.C.

LITTLETON, J. **1882-83.** *Student.*

42, Harwood Road, Fulham, London, S.W.

LIVEING, Edward. **1873-77.** *Mining.* **Assoc. R.S.M.**

Mem. N. of Eng. Inst. Min. Eng.

Mining Engineer. In West Australia in 1896.

Permanent Address: 52, Queen Anne's Street, Cavendish Square, London, W.

LIVEING, George Downing. **1851.** *Student, Royal College of Chemistry.*

M.A.; D.Sc. (Dublin); F.R.S.

Professor of Chemistry, Fellow of St. John's College, Cambridge.

Newnham, Cambridge.

LIVERSIDGE, Archibald. **1867-70.** *Mining and Metallurgy.* **Assoc. R.S.M.**

M.A.; LL.D.; F.R.S.; F.G.S.; F.I.C.; F.C.S.; F.R.G.S.; Mem. Phys. Soc. (Lond.).

1866, Entered the Royal College of Chemistry and Royal School of Mines. Spent some time in Dr. Frankland's chemical research laboratory. 1870, Obtained an open Scholarship at Christ's College, Cambridge. For a time he was Demonstrator in Chemistry in the Cambridge University Laboratory. 1872, Appointed Professor of Chemistry and Mineralogy in the University of Sydney. 1878, Representative Commissioner for New South Wales, and Juror in Chemistry and Metallurgy at the Paris Exhibition. He has been a member of the Sydney University Senate since 1878, and Dean of the Faculty of Science since its foundation in 1883. He was member of the Board of Technical Education, and Hon. Sec. of the

Royal Society of New South Wales from 1874 to 1889, and President of the Royal Society New South Wales 1883-84 and 1889-90. He is the author of a well-known work on the Minerals of New South Wales, published in 1888, and of many scientific papers and reports on Chemistry, Mineralogy, and the kindred sciences. He originated the Australasian Association for the Advancement of Science, which held its first meeting in Sydney in 1888. He has been its Hon. Sec. since 1886, and is President elect for the next meeting.

THE UNIVERSITY, SYDNEY, AUSTRALIA.

LIVSEY, J. E. *Demonstrator in Mechanics and Mathematics, Royal College of Science.*

M.Inst. M.E.

LOMAS, JOSEPH. **1880-84.** *Biology, etc.* **Assoc. R.C.S.**

1884, Chief Science-Instructor to the Liverpool School Board. 1886, Special Lecturer in Geology, University College, Liverpool. 1893-95, Co-Editor of the *Glacialist's Magazine.* 1894, Vice-President of the Liverpool Geological Society. Author of papers "On Hollow Pyramidal Ice Crystals," Royal Soc., 1894; "On the Geology of the Faröe Islands"; "On Artificial Perlitic Structure"; "On Calcareous Spicules in Polyzoa"; and various papers on "Glacial Geology" in the *Proc. Liverpool Geol. Soc.*; also various reports and papers on "Polyzoa of Liverpool Bay" in *Proc. Lit. and Phil. Soc. Liverpool, Proc. Liverpool Biol. Soc.*, and elsewhere.

16, MELLOR ROAD, BIRKENHEAD. *Permanent Address:* SCIENCE LABORATORY, PLEASANT STREET BOARD SCHOOL, LIVERPOOL.

LONGBOTTOM, JOHN G. **1890-92.** *Mechanics.* **Assoc. R.C.S.**

Whitworth Scholarship 1893.

11, GRASSINGTON TERRACE, KEIGHLEY, YORKSHIRE.

LONG-INNES, CLIVE SELWYN. **1892-95.** *Mining.* **Assoc. R.S.M.**

Mining Engineer, Coolgardie, West Australia.

COOLGARDIE, WEST AUSTRALIA.

LONGMAID, JOHN. **1848.** *Student, Royal College of Chemistry.*

Manufacturing and Metallurgical Chemist.

LONGSHAW, WILLIAM. **1892-95.** *Chemistry.* **Assoc. R.C.S.**

Frank Hatton Prize 1895.

3, CHURCH ROAD, SEAFORTH, LANCASHIRE.

LOTT, FRANK E. **1872-76.** *Mining and Metallurgy.* **Assoc. R.S.M.**

F.I.C.; Mem. Soc. Chem. Ind.; Mem. Inst. of Brewing; President of the Burton-on-Trent Natural History and Archæological Society.

1875, Went to Siam with the Royal Society's Eclipse Expedition. 1877-84, Chemist and Brewer at Messrs. Thomas Robinson and Co.'s Brewery, Burton-on-Trent. Since 1884, in practice as Analytical Chemist and Consulting Brewer, Burton-on-Trent (Messrs. Matthews and Lott). Joint author of *The Microscope in the Brewery and Malthouse* (Bemrose and Sons, London; Appleton and Co., New York). Author of papers on Brewing subjects read before Institute of Brewing, London, Manchester, Leeds, and Birmingham. Editor of *R.S.M. Magazine* in 1877.

GLENTHORN, ALEXANDRA ROAD, BURTON-ON-TRENT. *Permanent Address:* THE LABORATORY, BRIDGE CHAMBERS, BURTON-ON-TRENT.

LOUIS, D. A. **1876-81.** *Student in Mining, etc.*

F.I.C.; F.C.S.; Mem. Soc. Chem. Ind.; Mem. Berlin Chem. Soc.; Mem. Fed. Inst. Min. Eng.; Mem. Am. Inst. M.E.; Mem. Min. Assoc. and Inst. Cornwall.

1880-82, At Dye Works, Silver Plating Works, and Lecturing. 1882-86, At Sir John Lawes' Agricultural Experimental Station, and Lecturing. 1886-89, Mining in Colorado, Montana, Italy, and elsewhere. 1890, Manager of Metallurgical Works. Since 1891 in practice as Consulting Mining Engineer and Metallurgist. Since 1893 Assistant Examiner in Mining to the Science and Art Department. Joint author of article "On Miners' Safety Lamps" in *Grove's and Thorp's Chemical Technology.* Author of numerous articles on Mining, Ore-Dressing, and Metallurgical Operations.

77, SHIRLAND GARDENS, LONDON, W.

LOUIS, HENRY. **1873-76.** *Mining and Metallurgy.* **Assoc. R.S.M.**

Hon. M.A. (Durham) 1896; F.I.C.; F.G.S.; Mem. Iron and Steel Inst.; Mem. Am. Inst. M.E.; Mem. N. of Eng. Inst. of Min. and Mech. Eng.; Fel. Min. Soc.

Assistant to the late Dr. J. Percy up to 1877. 1880-81, Lecturer on Metallurgy at the Dental Hospital of London. 1877-95, Assayer, Consulting Metallurgist and Mining Engineer, and Mines Manager. 1895, Appointed to the Chair of Mining at the Durham College of Science, Newcastle-on-Tyne. Author of *A Handbook of Gold Milling* (Macmillan and Co., 1894). Papers in *Trans. Nova Scotia Inst. Nat. Science; Trans. Iron and Steel Inst.; Trans. Amer. Inst. Min. Eng.; Trans. Roy. Geog. Soc.; Trans. Min. Soc.*; etc.

DURHAM COLLEGE OF SCIENCE, NEWCASTLE-ON-TYNE.

***LOWE**, Henry Thomas. **1848.** *Student, Royal College of Chemistry.*

Manufacturing Chemist, and formerly Works Manager to Messrs. Simpson, Maule and Nicholson.

LOWE, William Foulkes. **1871-75.** *Metallurgy.* **Assoc. R.S.M.**

F.I.C.

1877, Assayer to the Chester Goldsmiths' Company. Public Analyst to the City of Chester, 1878; to the County of Flint, 1879; Carnarvon, 1880; Anglesey and Denbigh, 1883. District Agricultural Analyst for the Counties of Anglesey and Denbigh, and the City of Chester, 1895. Author of papers, "Note on Modification of Körttstarfer and Reichert's Methods of Butter Analysis" and "Hall Marking and Assaying at the Chester Assay Office."

Assay Office, Chester. *Permanent Address:* 9, Hough Green, Chester.

LUCAS, J. H. **1876-79.** *Metallurgy.* **Assoc. R.S.M.**

Holding an appointment under the Langlaagte Royal Gold Mining Co.

c/o Langlaagte Royal Gold Mining Co., P.O. Box 2357, Johannesburg, S.A.R. *Permanent Address:* c/o J. E. Tucker, Esq, 35, Wellington Street, Gloucester.

LUCAS, Percy Walter. **1892-95.** *Mining.* **Assoc. R.S.M.**

Mering's Poort, Oudtshoorn, Cape Colony.

LUDLOW, Col. **1850.** *Student, Royal College of Chemistry.*

Indian Army; Civil employ, Hyderabad.

LUMBY, — . **1861-62.** *Student in Mining.*

LYELL, Sir Leonard, Bart. **1867-68, 1871-72.** *Student in Geology.*

M.P.; F.G.S.

Formerly Professor of Natural Science, South Wales.

Kinnordy, Kirriemuir, Forfarshire.

M

MACANDREW, HAROLD. **1884-88.** *Mining.* **Assoc. R.S.M.**

F.G.S.; M.Inst.C.E.; Mem. Am. Inst. Min. Eng.

1889-91, Assistant Assayer to the Gold and Copper Co., Adelaide, South Australia. 1891, Assistant Manager to the Australian Broken Hill Consolidated Mines, New South Wales. 1891-93, Surveyor to the Godkin Mine, Tasmania. 1893-94, Draughtsman to the Broken Hill Proprietary Co., New South Wales. 1894-95. Manager of the Wagra Gold Mine, Victoria. 1895, Went to Mashonaland.

P.O. Box 227, BULAWAYO, BRITISH SOUTH AFRICA. *Permanent Address:* c/o GENERAL MACANDREW, 59, HARCOURT TERRACE, LONDON, S.W.

MACCULLOCK, WILLIAM MANSELL. **1879-80.** *Student in Geology.*

M.D. (Edin.); M.B. and C.M. (King's Coll., London, Edinburgh and Vienna); F.G.S.; F.Z.S.; Assoc. King's Coll. London; Hon. Mem. King's Coll. Med. Soc.; Mem. Roy. Inst. Great Britain.

Late Assistant House-Surgeon at Salop Infirmary, and Assistant Demonstrator of Anatomy at King's College. Jurat, Royal Court of Guernsey.

THE TOUILLETS, GUERNSEY.

MACDONALD, DONALD J. **1890-93.** *Mining.* **Assoc. R.S.M.**

Mem. Inst. Min. and Met.

1895, Appointed Assistant Manager and Assayer to the Mount Charlotte Gold Mining Co. Hannan's, West Australia.

MOUNT CHARLOTTE GOLD MINING CO., HANNAN'S FIND, COOLGARDIE, WEST AUSTRALIA. *Permanent Address:* 31, PALLISER ROAD WEST KENSINGTON, LONDON, W.

MACDONALD, J. D. **1892.** *Student in Mining.*

Orange Planting in Florida.

MACDONALD, WILLIAM. **1885-89.** *Metallurgy and Chemistry* **Assoc. R.S.M.**

F.I.C.; F.C.S.

1889-93, Chemist in the Rio Tinto Co.'s Assay Office, London. 1893, Shanghai Polytechnic. 1895, In the Imperial Maritime Customs Service, Peking.

TUNG WEN KUAN (IMPERIAL COLLEGE), PEKING. *Permanent Address:* c/o DR. THOMAS MACDONALD, BEAULY, N.B.

MACDONALD, WILLIAM. **1893-96.** *Metallurgy.* **Assoc. R.S.M.**

243, ST. JAMES' ROAD, GLASGOW.

MACFARLANE, RIENZI WALTON. **1890-94.** *Mining.* **Assoc. R.S.M.**

2, LEXHAM GARDENS, KENSINGTON, LONDON, S.W.

***MACGREGOR**, CORTLANDT ALEXANDER MAJOR, R.E.

Late Registrar R.C.S. and R.S.M.

Born in 1841, and educated at Addiscombe College. In 1860, receiving a Commission in the Royal (Bombay) Engineers, went to India. Employed on the Topographical Survey, and in the Public Works Department. In 1878 retired from the Army, and become Deputy-Governor of Wakefield Gaol, and subsequently Governor of Hereford Gaol. In April 1883 appointed Registrar of the R.C.S. and R.S.M. Died on September 12th, 1893, after a long illness.

MACKENZIE, JOHN E. **1886-87.** *Student.*

Ph.D. (Strasburg); B.Sc. (Edin.); F.C.S. (Berlin).

1891-92, Lecturer at the Edinburgh Evening Schools. 1890-92, Demonstrator in Chemical Laboratory, Heriot-Watt College, Edinburgh. 1894, Appointed Assistant Professor of Chemistry in the Heriot-Watt College.

HERIOT-WATT COLLEGE, EDINBURGH. *Permanent Address:* 7, RAMSAY GARDEN, EDINBURGH.

MACKENZIE, KENNETH. **1890-93.** *Mining.* **Assoc. R.S.M.**

Formerly Assistant Inspector of Mines to the Government of Perâk, Straits Settlements.

BLAIR DRUMMOND, MOORLAND ROAD, DIDSBURY, MANCHESTER.

MACLEAN, H. G. **1889.** *Student in Mining.*

Sometime Assistant Mining Engineer, Rio Tinto.

McCARTHY, EDWARD T. **1874-77.** *Metallurgy.* **Assoc. R.S.M.**

Mem. Inst. Min. and Met.

SHERFIELD, TOWER ROAD WEST, ST. LEONARD'S-ON-SEA.

McCORMICK, SHEPHERD J. **1889-92.** *Metallurgy.* **Assoc. R.S.M.**

Assoc. Inst. Min. and Met.

1893-94, Assistant Mine Agent, Pestarena, North Italy. 1895, Appointed Assayer to the Ouro Preto Gold Mining Co., Brazil.

c/o OURO PRETO GOLD MINING CO., BRAZIL. *Permanent Address:* ST. MATTHEW'S VICARAGE, BRIGHTON.

McDONALD, JOHN. *Student.*

Australian Agent.

43, THREADNEEDLE STREET, LONDON, E.C.

McEWEN, ARTHUR LOIS. *Student in Mining, etc.*

Assoc. Am. Inst. M.E.

Formerly Manager to the Jarvis Silver Mining Co. 1895, Appointed Manager of a mine in Ontario.

PORT ARTHUR, ONTARIO, CANADA.

McEWEN, S. **1893-96.** *Metallurgy.* **Assoc. R.S.M.**

McLEOD, HERBERT. *Student in Chemistry.*

F.R.S.; F.I.C.; F.C.S.

1858, Junior Assistant in the Laboratory of the Royal College of Chemistry. 1860, Assistant Chemist to the Royal School of Mines. 1871, Appointed Professor of Chemistry in the Royal Indian Engineering College, Cooper's Hill.

THE COLLEGE, COOPER'S HILL, STAINES.

McMAHON, LIEUT.-GEN. C. A. **1879-80.** *Student in Geology.*

F.G.S. (Vice-Pres.).

Author of many papers on Indian and English Geology.

20, NEVERN SQUARE, SOUTH KENSINGTON, LONDON, S.W.

McMURTRY, GEORGE C. **1885-88.** *Metallurgy and Chemistry.* **Assoc. R.S.M.** *and* **R.C.S.**

1889-91, Instructor in Metallurgy and Assaying at the Adelaide School of Mines. 1891, Appointed Under Manager of the Wallaroo Smelting Works, South Australia.

WALLAROO SMELTING WORKS, WALLAROO, SOUTH AUSTRALIA.

McNEILL, BEDFORD. **1878-80.** *Metallurgy.* **Assoc. R.S.M.**

F.G.S.; F.I.C.; Mem. Iron and Steel Inst.; Mem. Inst. Min. and Met.

Author of *McNeill's Code.*

29, NORTH VILLAS, CAMDEN SQUARE, LONDON, N.W.; *and* 25a, OLD BROAD STREET, LONDON, E.C.

McNEILL, H. C. **1893-95.** *Mining.* **Assoc. R.S.M.**

29, NORTH VILLAS, CAMDEN SQUARE, LONDON, N.W.

McNEILL, WILLIAM. **1885-88.** *Metallurgy.* **Assoc. R.S.M.**

A.M.Inst.C.E.; Whitworth Scholarship.

29, NORTH VILLAS, CAMDEN SQUARE, LONDON, N.W.; *and* BROAD STREET, LONDON, E.C.

McWILLIAM, ANDREW. **1883-87.** *Metallurgy.* **Assoc. R.S.M.**

1887, Chief Demonstrator in Metallurgy, and Lecturer on Geology and Mineralogy at Sheffield Technical School. 1891, Chemist and Manager of the Steel Department, The Martino Steel Co., Birmingham. 1894, Appointed Lecturer on Metallurgy to the Staffordshire County Council.

SCIENCE SCHOOLS, WEDNESBURY, STAFFORDSHIRE.

***MAHMOUD**, EFFENDI. **1855-56.** *Student in Mining.*

Died at Constantinople.

MALCOLMSON, JAMES W. **1886-89.** *Mining.* **Assoc. R.S.M.**

Whitworth Scholarship 1886; A.M.Inst.C.E.; Mem. Am. Inst. M.E.

1889-92, Assistant Mining and Mechanical Engineer to the Michoacan Railway and Mining Co., Las Trojes, Mexico. 1892 to date, Mining Engineer and Ore-purchasing Agent to the Consolidated Kansas City Smelting and Refining Co. Author of paper on "Erection of Water-Jacketed Silver-Lead Smelters in Mexico," read before the Inst. C.E. 1892.

c/o KANSAS CITY SMELTING AND REFINING CO., APARTADO 94, PACHUCA, MEXICO.

MALLET, R. T. **1865.** *Student in Chemistry.*

M.Inst.C.E.

1855-62, On Engineering Staff of East Indian Railway. 1863, On Engineering Staff of Amsterdam Sea Canal. 1863-67, On Engineering Staff of Ottoman Railway, Smyrna. 1868-91, Civil Engineer, Indian Government Service. Since retired.

185, CROMWELL ROAD, LONDON, S.W.

MALONE, T. A. **1851.** *Student, Royal College of Chemistry.*

Late Lecturer on Chemistry at the London Institution. Acted as Assistant to H. Fox Talbot, F.R.S., when elaborating his early processes of photography.

MALTLAND, JOHN. **1845.** *Student, Royal College of Chemistry.*

Pharmaceutical Chemist.

MANNING, FR. A. **1847.** *Student, Royal College of Chemistry.*

F.I.C.; F.C.S.

Formerly in the Mint at Hong Kong (Superintendent of the Melting and Rolling Departments). Now in practice as Consulting Chemist and Analyst.

18, BILLITER STREET, LONDON, E.C.

***MANSFIELD**, CHARLES BLACHFORD. **1845.** *Student, Royal College of Chemistry.*

Born 1819. Educated at Winchester and Cambridge. On leaving the Royal College of Chemistry undertook the investigation of the constituent volatile oils of coal-tar, and discovered benzol in considerable quantity. Researches described in *Journ. Chem. Soc.* of that time. Received Telford premium from the Institute of Civil Engineers for his work. 1851, Delivered a course of lectures at the Royal Institution on "The Chemistry of the Metals." Died February 26th, 1855, from effects of an accident caused by the boiling over of the naphtha from a small still, while he was preparing specimens of coal-tar products for the French Exhibition.

MANOBH, N. **1888.** *Student in Mining.*

Native of Siam.

MARAIS, BELFIELD. **1892-95.** *Mining.* **Assoc. R.S.M.**

CAPE TOWN, SOUTH AFRICA.

MARRIOTT, HUGH F. **1886-91.** *Geology.* **Assoc. R.C.S.** *Mining.* **Assoc. R.S.M.**

1890-91, Assistant to P. W. Stuart-Menteath, Esq., Assoc. R.S.M. in the Pyrenees. 1892, Mining Engineer in the employ of Messrs. H. Eckstein and Co., Johannesburg.

JOHANNESBURG, S.A.R. *Permanent Address:* THE MANOR HOUSE, PERRY HILL, LONDON, S.E.

MARSH, WALTER. **1876-79.** *Metallurgy.* **Assoc. R.S.M.**

Mem. Am. Inst. M.E.

c/o CONSOLIDATED GOLD MINES WEST AUSTRALIA, LTD., COONGAN MINE, MARBLE BAR, WEST AUSTRALIA. *Permanent Address:* c/o MESSRS. GREY AND MARTEN, CITY LEAD WORKS, SOUTHWARK BRIDGE ROAD, LONDON, S.E.

MARSHALL, B. M. COLE. **1891-94.** *Chemistry.* **Assoc. R.C.S.**

Joint author, with Professor W. A. Tilden, F.R.S., of papers on Certain Organic Compounds in *Journ. Chem. Soc.*, 1895.

119, GROSVENOR ROAD, LONDON, S.W. *Permanent Address:* BARTHOMLEY, CREWE.

MARSHALL, FRANK HERBERT. **1872-75.** *Mining and Metallurgy.* **Assoc. R.S.M.**

Mem. Iron and Steel Inst.; Vice Pres. Cleveland Inst. Eng.; Mem. Inst., Mech. Eng.

1877-80, Analyst to Messrs. Cochrane and Co., Ltd., Ormesby Iron Works; appointed Secretary in 1880, and Manager in 1884, to the same firm.

ORMESBY IRON WORKS, MIDDLESBROUGH.

MARSHALL, GEOFFREY. **1887-90.** *Mining.* **Assoc. R.S.M.**

De la Beche Medal 1890.

Assayer to the United Langlaagte and Pearl Central Gold Mining Co., Johannesburg.

P.O. Box 1048, JOHANNESBURG, S.A.R. *Permanent Address:* BRACONDALE, NORWICH.

MARSHALL, JACOB. **1887-90.** *Student.*

279, CHARLES ROAD, SMALLHEATH, BIRMINGHAM.

MARSHALL-HALL, JOHN E. **1878-81.** *Mining.* **Assoc. R.S.M.**

Teacher of Chemistry, St. Paul's School, West Kensington.

ST. PAUL'S SCHOOL, WEST KENSINGTON, LONDON, S.W.; *and* 6, BREAKSPEARS ROAD, ST. JOHN'S, LONDON, S.E.

MARTINEAU, CARYL EDWARD. **1893-96.** *Mining.* **Assoc. R.S.M.**

1896, Appointed Assistant Agent to the Pestarena United Gold Mining Co., North Italy.

PESTARENA, VALL'ANZASCA, PROVINCIA DI NOVARA, NORTH ITALY. *Permanent Address:* 11, VICARAGE GATE, KENSINGTON, LONDON, S.W.

MARTYN, H. C. **1893-96.** *Physics.* **Assoc. R.C.S.**

MARTYN, T. GRAHAM. **1890-93.** *Metallurgy.* **Assoc. R.S.M.**

Mem. Soc. Chem. Ind.; Mem. Min. Assoc. and Inst., Cornwall.

Instructor in Metallurgy and Ore-Dressing in the offices of Messrs. Henderson and Son, Civil and Mining Engineers, 30 and 31, Lemon Street, Truro. Author of a paper entitled *Upward Current Separators*, Min. Assoc. and Inst., Cornwall, 1895.

4, THE AVENUE, TRURO, CORNWALL.

MASON, F. H. **1889-91.** *Student in Chemistry, etc.*

F.C.S.; Mem. N. of Eng. Inst. Min. and Mech. Eng.; Mem. Am. Inst. M.E.; Mem. of Council of Canadian Fed. Inst. Min. Eng. (Nova Scotia Branch).

1891-93, Chemist and Assayer to the Newberry-Vautin Gold Extraction Co., Ltd. Since 1893 in practice as Consulting Metallurgist, Analytical Chemist, and Assayer, Halifax, Nova Scotia. Associate Editor of the *Canadian Mining Review* since 1895. Author of papers: "Gold Mining in Nova Scotia" (Fed. Inst. Min. Eng.); "The Newberry-Vautin Chlorination Process"; "Notes on the Behaviour of Gold Solvents," etc.

QUEEN BUILDING, HALIFAX, NOVA SCOTIA.

***MASON**, J. WOOD. **1877-78.** *Student in Biology.*

Late Professor of Comparative Anatomy in the Medical College of Bengal, and Superintendent in Indian Museum, Calcutta. A recognised authority on the Morphology of the Insecta and Crustacea. Towards the close of his life engaged in working out, with Dr. Alcock, who succeeded him, the Zoological Results of the "Investigation" expedition for the exploration of Indian Seas. Died on his way home in enfeebled health, May 1893.

MASTERS, E. **1893-96.** *Chemistry.* **Assoc. R.C.S.**

MASTERS, MILLER. **1850.** *Student, Royal College of Chemistry.*

Late Assistant to Messrs. Lawes and Gilbert.

MATHER, THOMAS. **1880-82.** *Student in Chemistry, Mechanics, etc.*

Whitworth Scholarship 1878; Mem. Phys. Soc. (Lond.); Assoc. Inst. Elect. Eng.; Ashbury Engineering Scholar, Owens College, 1880.

1882-85, Assistant in the Electrical Department of the Finsbury Technical College, London. 1885, Appointed Assistant to the Physical Department of the City and Guilds Central Technical College. Author of papers read before the Physical Society, the Institution of Electrical Engineers, and at the meetings of the British Association, 1895.

1, SOLENT CRESCENT, WEST HAMPSTEAD, LONDON, N.W.

MATHESON, RODERICK MCK. **1878-81.** *Metallurgy.* **Assoc. R.S.M.**

MATTHEY, EDWARD. **1855-57.** *Metallurgy.* **Assoc. R.S.M.**

F.C.S.; F.S.A.

Director in the firm of Johnson, Matthey and Co., Assayers to the Bank of England. Colonel in the London Rifle Brigade.

78, HATTON GARDEN, LONDON, E.C.

***MATTHIESSEN**, AUGUSTUS. **1857.** *Student in Chemistry.*

Ph.D.; F.R.S.

Studied Chemistry at Giessen, Heidelberg, and the College of Chemistry. 1863-69, Lecturer on Chemistry at St. Mary's Hospital Medical School. Afterwards Lecturer on Chemistry at St. Bartholomew's Hospital. One of the Examiners of Chemistry for the University of London. Published several papers relating to Chemical Science. Received the Royal Medal of the Royal Society 1869. Died October 6th, 1870.

***MAULE**, GEORGE. **1848.** *Student, Royal College of Chemistry.*

Late partner in the firm of Messrs. Simpson, Maule, and Nicholson.

MAURICE, —. **1865-66.** *Student in Mining.*

***MAURY**, MATTHEW F. **1866-69.** *Mining, etc.* **Assoc. R.S.M.**

Mem. Am. Inst. Min. Eng.

Mining Engineer in Virginia. Died in 1886.

MAVOR, PERCY W. **1873-75.** *Student in Mining, etc.*

Engineer to the Linares Mines, Spain, since 1879.

LINARES, PROVINCIA DE JAEN, SPAIN.

MAXWELL, D. L. **1892.** *Student in Mining.*

MAXWELL, P. **1895.** *Student in Mining.*

WEST HILL, GUILFORD, SURREY.

MAY, THE REV. T. H. D. **1875-78.** *Mining and Metallurgy.* **Assoc. R.S.M.**

M.A. (Oxford).

Clerk in Holy Orders.

MAYBURY, Augustus Constable. **1862-65.** *Geology.* **Assoc. R.S.M.**

Edward Forbes Medal, R.S.M., 1865; M.D., F.R.C.S. (Eng.) 1868; L.S.A. (St. Thos.) 1866; D.Sc. (Lond., Hon. in Org. Chem., Geol., and Palæontol.) 1873; D.P.H. (Dublin) 1891; F.G.S.; Mem. Roy. Agric. Soc.; Mem. Brit. Med. Assoc.

Educated at the City of London School (taking thence the St. Thomas' Medical Scholarship in 1861). Served as Clinical Clerk to Dr. Bristowe, F.R.S., and as Dresser to Sir John Simon, F.R.S. Student at St. Thomas' Hospital, Westminster Hospital, University College (Gower Street), Queen's College (Belfast), Royal College of Chemistry, and Royal School of Mines. Lecturer on Agriculture and Chemistry under Kent County Council; Assistant Examiner in Physiography to the Science and Art Department; Hon. Examiner in Chemistry, Physics, and Physiography to the City of London College; Lecturer Matriculation Classes, St. Thomas' Hospital. Formerly Lecturer on Chemistry and Geology, City of London College; on Chemistry at Charterhouse Science School; on Chemistry, Physics, and Physiology at the Polytechnic; on Physiology and Hygiene at the People's Palace, Mile End. Formerly Resident Medical Officer and Secretary to Chelsea, Brompton, and Belgrave Dispensary, and Surgeon to the Farringdon Dispensary and to the Royal Military Asylum, Chelsea. Late Registrar, London Fever Hospital, Islington. Author of *The Student's Chemistry* (Bailliere), *Animal Physiology*, the *Commentary on the British Pharmacopœia*, and *Commentary on the Public Health Act* (*London*), 1891. Translator and Annotator of some thirty books of Ovid, Virgil, Horace, Cicero, Sallust, Livy, and Homer. Contributor to various medical papers.

19, Bloomsbury Square, London, W.C.; *and* Cedar Lodge, Frimley, Surrey.

MAYER, H. J. E. **1847.** *Student, Royal College of Chemistry.*

Inspector-General of Hospitals under late Madras Presidency. Retired 1868.

***MEDLOCK**, Henry. **1846.** *Student, Royal College of Chemistry.*

D.Sc.

After leaving Royal College of Chemistry became Private Assistant to Dr. Hofmann; then appointed Chemist and Laboratory Manager of the General Apothecaries Company in Berners Street. Subsequently became Chemist to Messrs. Ind, Coope, and Co., Brewers, of Romford and Burton-on-Trent. The treatment of aniline with arsenic acid, first suggested by Dr. Medlock, has constituted the process by which the greater proportion of magenta has been produced in this country and abroad. Many of his inventions were equally successful. Died February 22nd, 1875.

***MEESON**, N. A. **1845.** *Student, Royal College of Chemistry.*

M.D.

Formerly Lecturer on Chemistry at a provincial institution.

MELDRUM, ANDREW NORMAN. **1893-96.** *Chemistry.* **Assoc. R.C.S.**

92, BONNYMUIR PLACE, ABERDEEN, N.B.

MELLAND, GODFREY. **1891-93.** *Metallurgy and Mining.* **Assoc. R.S.M.**

B.Sc. (Victoria); F.I.C.; F.C.S.

1893-94, Demonstrator in Metallurgy, Owens College, Manchester. 1894-95, Lecturer in Chemistry at the Horticultural College, Swanley, Kent. 1895, Appointed Demonstrator in Chemical Laboratory, and Lecturer on Metallurgy and Applied Chemistry at the University College, Nottingham.

UNIVERSITY COLLEGE, NOTTINGHAM.

MELTON, GEORGE R. **1890-93.** *Physics.* **Assoc. R.C.S.**

1893-95, Demonstrator in Physics at the Royal School of Mines. 1895, Appointed Assistant in Physics Department, Technical College, Bradford.

ADWALTON, NEAR BRADFORD, YORKSHIRE.

MENTEATH, P. W. STUART-. *See* STUART-MENTEATH, P. W.

MERCK, GEORGE. **1846.** *Student, Royal College of Chemistry.*

Came over from Germany to study Chemistry under Hofmann. Returned to start a manufactory of Alkaloids at Darmstadt.

MERCK, WILLIAM. **1855.** *Student in Chemistry.*

Brother to George Merck. Alkaloid Manufacturer, Darmstadt.

MEREDITH, ALBAN. **1859.** *Student in Mining.*

Formerly Manager of Iron Works, Askam, and Steel Works, Sheffield.

MERRETT, WILLIAM HENRY. **1891-94.** *Metallurgy.* **Assoc. R.S.M.**

F.C.S.

1894-95, Demonstrator of Metallurgy at the Royal College of Science, London. 1895, Assistant in the Research Laboratory of the Royal Mint.

BRASS AND IRON WORKS, SHORT STREET, LAMBETH, LONDON, S.E.

MERRICKS, Frank. **1894-96.** *Mining.* **Assoc. R.S.M.**

F.G.S.; Mem. Am. Inst. M.E.; Mem. Inst. Min. and Met.

1887-89, Assistant to P. W. Stuart-Menteath, Esq., A.R.S.M. in the Pyrenees. 1889-92, In Spain. Now partner in the firm of Edward Riley and Co., Mining and Metallurgical Engineers.

c/o Messrs. E. Riley and Co., 2, City Road, London, E.C.

MERRITT, W. Hamilton. **1874-77.** *Mining.* **Assoc. R.S.M.**

F.G.S.; Mem. Iron and Steel Inst.; Mem. Am. Inst. M.E.; Vice-Pres. Ontario Min. Inst.

Formerly General Manager to the Grand River Gypsum Co., Ltd. One of the Royal Commissioners on Mineral Resources of Ontario. Engineer-in-charge to the Strathyre Mining Co. Vice-President and General Manager of the Canadian Anthracite, and Bituminous Coal Mining Co., Ltd. Now Lecturer on Mining at the School of Mines, Kingston, Ontario.

The School of Mines, Kingston, Ontario.

METCALFE, R. M. **1893-96.** *Mechanics.* **Assoc. R.C.S.**

***MILLER**, Hugh. **1869-72.** *Geology.* **Assoc. R.S.M.**

F.G.S.; F.R.S. (Edin.).

Late Officer of the Geological Survey of Scotland. Author of "The Geology of Otterburn and Elsdon," in the *Memoirs of the Geological Survey* 1887; and of *Landscape Geology: a Plea for the Study of Geology by Artists*, 1891. Born July 15th, 1850; died at Edinburgh, January 8th, 1896.

MILLS, Frederick G. **1875-79.** *Mining and Metallurgy.* **Assoc. R.S.M.**

Murchison Medal 1877; De la Beche Medal 1878.

Engaged in Mining in South America.

86, Dresden Road, Hornsey Rise.

MILLS, John. *Student in Chemistry, etc.*

Sometime Editor of *Science and Art* and *The Technical World.*

85, Montholme Road, Wandsworth Common, London, S.W.

MILNE, Henry Barnes. **1891-94.** *Zoology and Botany.* **Assoc. R.C.S.**

MINCHIN, JOHN B. **1889-90.** *Student in Mining, etc.*

A.M. Inst. C.E.

Mining Engineer, etc., Oruro, Bolivia.

MINTON, S. **1852-53.** *Student in Mining and Mineralogy.*

F.G.S.

Formerly Lessee and Worker of Collieries in South Staffordshire.

MIRZA, MEDHJ KHAN. **1876-79.** *Mining and Metallurgy.* **Assoc. R.S.M.**

Mem. Royal Agric. Soc. (England).

Served in the Revenue Survey, and afterwards as District Collector (Revenue) for several years. Acted six months in the capacity of Director-General of Mines in H.H. the Nizam's Dominions; and was, lastly, Census Commissioner to the Nizam's Government. Author of a *Chemistry Primer*, published 1883; *Physical Geography;* and three vols. *Census Reports* (English and Hindu).

SAIFOBAD, HYDERABAD, DECCAN, INDIA.

***MITCHELL**, JOHN. **1847.** *Student, Royal College of Chemistry.*

Author of *Metallurgy*, and other works.

MOLTENI, RICCARDO. **1863-65.** *Geology.* **Assoc. R.S.M.**

De la Beche Medal 1865.

MONTE CATINI MINES, TUSCANY.

MONDY, EDMUND FELIX. **1869-72.** *Metallurgy.* **Assoc. R.S.M.**

Senior Royal Exhibition R.S.M. 1869; Senior Whitworth Scholarship 1871; F.C.S.

1873, Professor of Drawing, and Lecturer on Metallurgy at the Imperial College of Engineering, Tokio, Japan. 1880, Appointed to the Bengal Educational Service; Professor of Science, Government Engineering College, Seebore, Calcutta. 1887, Appointed Professor of Physics at the Dacca College, Dacca, Bengal, India.

DACCA COLLEGE, BENGAL. *Permanent Address:* BENGAL EDUCATIONAL SERVICE, CALCUTTA, BENGAL.

***MONTEIRO**, JOACHIM JOHN. **1854-56.** *Metallurgy.* **Assoc. R.S.M.**

Sometime Manager of Mines in West Africa. Author of *Angola and the River Congo* (1875). Died at Lourenço Marques, Delagoa Bay, on January 6th, 1878.

MONTGOMERY, A. B. **1886.** *Student in Mining.*

MOORE, JOHN E. S. **1888-91.** *Biology and Zoology.* **Assoc. R.C.S.**

1895, Investigating the Fresh Water Fauna of Lake Tanganyka on behalf of the Royal Society. Author of papers "On the Structural Changes in the Reproduction Cells during the Spermatogenesis of Clasmobranchs," etc.

c/o T. McMASTER, ESQ., BRITISH VICE-CONSUL, BALANTYRE, BRITISH CENTRAL AFRICA. *Permanent Address:* 4, BATH ROAD, BEDFORD PARK, CHISWICK.

MOORE, W. H. **1860-61.** *Student in Mining.*

Sometime engaged at Staffordshire Firebrick Works.

MORALES, M. N. **1887.** *Student in Mining.*

1887, Appointed to the Coipa Gold and Silver Mine, Copiapa, Chili.

COPIAPA, CHILI.

MORE, ANDREW. **1892-95.** *Chemistry.* **Assoc. R.C.S.**

5, BARONY STREET, GLASGOW.

MORELAND, JOHN. **1855-57.** *Metallurgy and Geology.* **Assoc. R.S.M.**

Duke of Cornwall's Scholarship 1855; Royal Scholarship 1857; Edward Forbes Medal 1857.

MORGAN, CONWY LLOYD. **1871-74.** *Mining and Metallurgy.* **Assoc. R.S.M.**

F.G.S.; Corr. Mem. Acad. Science, Philadelphia; Corr. Mem. New York Acad. Sciences; Duke of Cornwall's Scholarship 1872-73; Murchison Medal 1873; De la Beche Medal 1874.

1878, Lecturer in Science, Diocesan College, Rondeborch, South Africa. 1884, Appointed Professor of Geology and Zoology in the University College, Bristol, and Lecturer in Biology in the Bristol Medical School. 1887, Principal of University College, Bristol. Author of *Animal Biology* (1886); "The Pebidian Volcanic Series of St. David's" in the *Quart. Journ. Geol. Soc.*, vol. xlvi. (1890); *Animal Life and Intelligence* (1890); *An Introduction to Comparative Psychology* (1895); etc.

16, CANYNGE ROAD, CLIFTON, BRISTOL.

MORGAN, Gilbert Thomas. **1893-96.** *Chemistry.* **Assoc. R.C.S.**

Frank Hatton Prize, R.C.S., 1896.

1886-89, Technical College, Finsbury. 1889-94, Research and Works Chemist with Messrs. Read, Holliday and Son, Ltd., Huddersfield.

35*a*, Russell Road, Kensington, London, W. *Permanent Address:* Essendon, Hatfield, Herts.

***MORGAN**, Joseph Bickerton. **1890-93.** *Student in Geology.*

F.G.S.; Murchison Medal 1893.

Born in 1859. Chiefly interested in Geology; paid especial attention to the Geology of Wales, particularly to the rocks of the Upper Ordorvician, and Silurian formation of Powysland and the Welsh Border. By the advice of Professor Lapworth he began to map these strata, and succeeded in defining the lower limits of the Silurian with considerable exactitude. 1890, Entered the Royal School of Mines. 1893, Obtained the Murchison Medal and gift of books for Geology. Died March 8th, 1894, in his thirty-fifth year.

MORGAN, — . **1854.** *Student in Mining.*

Engaged in Colliery Work, South Wales.

***MORLEY**, Robert Reginald Ingham. **1849-53.** *Student, Royal College of Chemistry.*

Born 1826. Sometime Private Assistant to Professor Hofmann. Communicated two papers to the Chemical Society. Died January 11th, 1860.

MORRIS, Daniel. **1874-76.** *Student.*

C.M.G.; M.A.; D.Sc. (Dublin); F.L.S.; F.R.H.S.

Late Senior Moderator and First Gold Medallist, Trinity College, Dublin. 1877-79, Assistant at the Botanical Gardens, Ceylon. 1879, Investigating the causes of the Coffee-Leaf Disease, Ceylon. 1879-82, Director of the Public Gardens, Jamaica. 1882, Reported on the cultivation of Cacao in Trinidad and Grenada; also on the economic resources of British Honduras; and in 1883 on the economic resources of St. Helena. 1886, Appointed Assistant Director of the Royal Gardens, Kew. 1890-91, Employed by Secretary of State for the Colonies on Special Mission to West Indies. 1895, Reported on the Resources of the Bahama Islands. Author of works on Pure and Applied Botany, especially relating to Tropical Plants.

14, Cumberland Road, Kew, Surrey. *Permanent Address:* Royal Gardens, Kew, Surrey

MORRIS, JAMES. **1892-95.** *Mining.* **Assoc. R.S.M.**

MORRISON, C. R. **1893-96.** *Mining and Metallurgy.* **Assoc. R.S.M.**

***MORRISON**, W. H. **1892.** *Student in Mining.*
Died in South Africa, 1893.

MOTT, BASIL. **1876-80.** *Mining.* **Assoc. R.S.M.**
M.Inst.C.E.; Murchison Medal 1879.
195, CLAPHAM ROAD, LONDON, S.W.

MOULDEN, JOHN COLLETT. **1892-95.** *Metallurgy.* **Assoc. R.S.M.**
Bessemer Medal 1895; F.G.S.
Consulting Mining and Metallurgical Engineer, Kalgoorlie, West Australia. Author of "Some Contributions to South Australian Petrography" (*Trans. Roy. Soc. South Australia*).
SEMAPHORE CHAMBERS, KALGOORLIE, WEST AUSTRALIA. *Permanent Address:* c/o B. A. MOULDEN, ESQ., ADELAIDE, SOUTH AUSTRALIA.

MOUSLEY, FRANK. **1884-87.** *Metallurgy.* **Assoc. R.S.M.**
F.I.C.
1881-84, Assistant Chemist to Messrs. Chance Bros., Birmingham. 1888-90, Assistant Assayer to the Victorian Mint. 1890-92, Metallurgist and Assayer to the Broken Hill Proprietary Block 10 Co., New South Wales. 1892, Chief Chemist to the Broken Hill Proprietary's Refinery, Port Pirie, South Australia. 1894, Reappointed Assistant Assayer at the Victorian Mint.
ROYAL MINT, MELBOURNE, VICTORIA.

MOVATT, —. **1864-65.** *Student in Mining.*

MUIR, W. **1893-96.** *Mining.* **Assoc. R.S.M.**

MUNNIK, JOHN H. **1890-93.** *Mining.* **Assoc. R.S.M.**
Mine Inspector Zoutpansberg, South Africa.
c/o J. MUNNIK, ESQ., LANDROST, PIETERSBURG, ZOUTPANSBERG, S.A.R.

N

***NESBITT**, John. **1845.** *Student, Royal College of Chemistry.*

F.C.S.

Late Director of the Agricultural College, Kensington, where he was for many years Agricultural Chemist and Analyst.

NEWLANDS, John A. R. *Student, Royal College of Chemistry.*

F.C.S.

Davy Medallist of the Royal Society.

The Laboratory, 27, Mincing Lane, London, E.C.

NEWMAN, F. H. **1893-96.** *Chemistry.* **Assoc. R.C.S.**

NEWSOME, Tom. **1887-90.** *Chemistry.* **Assoc. R.C.S.**

Formerly Assistant to B. Kitto, Esq., Analyst and Assayer, 31, St. Swithin's Lane, London. Now Teacher of Applied Mechanics, Mathematics, etc., at the Technical College, Bradford; Teacher of Theoretical and Practical Chemistry at the Technical School, Cleckheaton; and Teacher of Applied Mechanics at the Keighley Technical School.

Technical College, Bradford, Yorkshire. *Permanent Address:* 30, Burnett Avenue, Manchester Road, Bradford.

NEWTH, G. S. **1869-71.** *Student, Royal College of Chemistry.*

1871-73, Demonstrator in Royal College of Chemistry (Royal School of Mines). Appointed Lecture Demonstrator (succeeding Professor Pedler) in 1873. Author of *Chemical Lecture Experiments* (1892); *Inorganic Chemistry* (1894); *Elementary Practical Chemistry* (1896).

Royal College of Science, South Kensington. *Permanent Address:* Lyndhurst House, Wallington, Surrey.

NEWTON, WILLIAM. **1879-83.** *Student in Chemistry.*

Ph.D.; F.I.C.; F.C.S.; Mem. Soc. Pub. Anal.

Analytical and Consulting Chemist. Author of *Specific and Latent Heats in Relation to the Combining Heats of Elements* (Diploma Thesis and Brit. Assoc. 1889); *The Origin of Nitrate in Chili;* and of various papers on Agricultural Chemistry, and on the Chemistry of Paper-making.

OFICINA LAGUNAS, IQUIQUE, CHILE. *Permanent Address:* 39, MINCING LANE, LONDON, E.C.

NICHOLLS, ARTHUR. **1891-95.** *Chemistry.* **Assoc. R.C.S.**

WOLVERLY HOUSE, WARDLE ROAD, SALE, MANCHESTER.

NICHOLLS, H. ERNEST. **1890-94.** *Mining and Metallurgy.* **Assoc. R.S.M.**

Assayer and Surveyor to the Mesquital del Oro Gold Mining Co., Ltd.

GUADALAJARA, MEXICO. *Permanent Address:* MOOR VIEW, TAVISTOCK, SOUTH DEVON.

NICHOLS, HORACE G. **1886-89.** *Metallurgy.* **Assoc. R.S.M.**

BROOMSGROVE, BRENTWOOD, ESSEX.

NICHOLSON, —. **1860.** *Student in Mining.*

Formerly Colliery Viewer, Collieries near Newcastle.

***NICHOLSON**, EDWARD CHAMBERS. **1845.** *Student, Royal College of Chemistry.*

F.I.C.; F.C.S.

Born at Lincoln 1827. Spent some time in the laboratory of Mr. Lloyd Bullock, in Conduit Street, London. Entered the Royal College of Chemistry as one of the first pupils; promoted to Assistantship, and remained there until 1850. Then accepted an engagement with Messrs. Fothergill and Co. to investigate the Chemistry of Iron-making. 1853, Joined Messrs. Simpson and Maule, of Kennington Road, and helped to start the Factory at Locksfields, Walworth. His chief technical work lay in reference to Aniline and the Coal-tar Colours, into the manufacture of which he introduced great improvements. Died October 23rd, 1890, in his sixty-fourth year.

NITCH, HERBERT G. **1890-93.** *Mining.* **Assoc. R.S.M.**

1894-96, With the Ferreira Gold Mining Co. 1896, Appointed Surveyor to the New Reitfontein Estate Gold Mine, Ltd., Johannesburg.

c/o NEW REITFONTEIN ESTATE GOLD MINE, LTD., P.O. Box 590, JOHANNESBURG, S.A.R. *Permanent Address:* c/o STANDARD BANK, JOHANNESBURG, S.A.R.

NIXON, William Frederick. **1892-95.** *Mechanics.* **Assoc. R.C.S.**

Assistant in Mechanics, Battersea Polytechnic, London, S.W.

Battersea Polytechnic, London, S.W. *Permanent Address:* 15, Victoria Street, Loughborough, Leicestershire.

***NOAD**, Henry Minchin. **1845-48.** *Student, Royal College of Chemistry.*

Ph.D. (Giessen); F.R.S.

Born 1815. Educated at Frome Grammar School. Lectured on Science at Bristol and Bath when nineteen. 1845, Entered the Royal College of Chemistry. 1848, Appointed to the Chair of Chemistry in the Medical School of St. George's Hospital, which he occupied until his death. Well known as an author and investigator. Contributed the article on "Iron" in Hunt's *Ure's Dictionary*. Consulting Chemist to the Ebbw Vale Iron Co., the Cwm Celyn and Blaina, and other Iron Works in South Wales. Examiner of Malt Liquors to the India Office; and Examiner in Chemistry and Physics at the Royal Military Academy, Woolwich. Died 1877.

NORTH, Barker. **1885-88.** *Chemistry.* **Assoc. R.C.S.**

***NORTH**, Richard. *Student.*

Assoc. Inst. Elect. Eng.

1886, Appointed Assistant Examiner at H. M. Patent Office, Chancery Lane. Died May 24th, 1895.

***NORTHCOTE**, Augustus Beauchamp. **1851.** *Student, Royal College of Chemistry.*

M.A. (Oxford).

Born 1831. Entered the Royal College of Chemistry 1851; became one of Professor Hofmann's Assistants. 1855, Appointed Senior Assistant. 1858, Appointed Demonstrator of Chemistry to Professor Brodie. 1859, Lecturer on Natural Science at Exeter College, Oxford. 1864, Radcliffe Travelling Fellowship. Published several papers in the *Journ. Chem. Soc.*, and joint-author of a *Manual of Quantitative Chemical Analysis*. Died December 28th, 1869.

NUÑEZ, E. **1886.** *Student in Mining.*

O

ODLING, WILLIAM. **1848**. *Student, Royal College of Chemistry.*

M.B.; F.R.S.; F.I.C. (Past Pres.); F.C.S. (Vice-Pres.); Hon. Math. Phys. Doct. (Lugd. Bat.).

Waynflete Professor of Chemistry in the University of Oxford.

15, NORHAM GARDENS, OXFORD.

O'DONOGHUE, — . **1856**. *Student in Mining.*

OGLE, EDWARD A. **1895**. *Student in Mining.*

Went to New Zealand in 1895.

Permanent Address: 30, CAVENDISH SQUARE, LONDON, W.

OLDHAM, RICHARD D. **1875-79**. *Geology*. **Assoc. R.S.M.**

F.G.S.

Acting Director of the Geological Survey of India.

GEOLOGICAL SURVEY OFFICE, CALCUTTA. *Permanent Address:* c/o MESSRS. H. S. KINGS AND CO., 65, CORNHILL, LONDON, E.C.

ORDONNEZ, — . **1856**. *Student in Mining.*

Sometime Manager of Mines in New Granada.

OSBORNE, H. F. **1879-80**. *Student in Biology.*

D.Sc. (Princeton, New Jersey).

On leaving South Kensington studied at Cambridge, and at some of the Continental Universities. On returning to America was appointed Professor of Zoology in Princeton College, New Jersey, U.S.A. In 1892 appointed Da Costa Professor of Zoology in Columbia College, New York, and Curator of Mammalian Palæontology in American Museum of Natural History. Has produced a most important series of monographs on the Fossil Mammalia of the United States of America, and other biological papers.

COLUMBIA COLLEGE, NEW YORK, U.S.A.

O'SULLIVAN, CORNELIUS. **1865.** *Student in Geology.*

F.R.S.; F.C.S.; F.I.C.

Sometime Assistant to Professor Hofmann at the Royal College of Chemistry, Oxford Street; and at the Berlin University. 1867, Appointed Brewer and Chemist to Messrs. Bass and Co., Burton-on-Trent.

c/o MESSRS. BASS AND CO., THE BREWERY, BURTON-ON-TRENT; *and* 148, HIGH STREET, BURTON-ON-TRENT.

OWEN, EDWARD. **1850.** *Student, Royal College of Chemistry.*

Chemical Manufacturer.

P

PADLEY, Charles S. **1875-78.** *Mining and Metallurgy.* **Assoc. R.S.M.**

PAGE, F. J. Montague. **1866-69.** *Mining and Metallurgy.* **Assoc. R.S.M.**

B.Sc. (Lond.); F.I.C.; F.C.S.; Mem. Phys. Soc. of London; Mem. Physiological Soc.

1869-70, Assistant Gas Examiner to the Corporation of the City of London. 1870-73, Private Assistant to Dr. Thudichum. 1873-82, Chemical Assistant to Professor J. S. Burdon Sanderson, M.D., F.R.S. 1883, Appointed Lecturer on Practical Chemistry and Physics at the London Hospital. 1893, Examiner in Chemistry to the Society of Apothecaries, London.

London Hospital, Turner Street, London, E.; *and* 54, Sutherland Street, London, S.W.

PAGET, Fr. **1850.** *Student, Royal College of Chemistry.*

PALMER, Henry George. **1891-94.** *Mining.* **Assoc. R.S.M.**

Sullington Rectory, Pulborough, Sussex.

PARK, Francis W. **1890-93.** *Mining and Metallurgy.* **Assoc. R.S.M.**

Assoc. Inst. Min. and Met.

1895, Appointed Surveyor to the Jigerfontein Gold Mining Co. 1896, Surveyor to the Randfontein Ect. and Gold Mining Co.

P.O. Box 1030, Johannesburg, S.A.R. *Permanent Address:* 157, Haverstock Hill, London, N.W.

PARKER, G. B. **1890-93.** *Mining.* **Assoc. R.S.M.**

1895, Appointed Manager of Cyanide Works, Durban Roodepoort Gold Mining Co., Kimberley.

Kimberley, Cape Colony, South Africa.

PARKER, G. C. **1889.** *Student in Mining.*

PARKER, LLEWELLYN. **1889-92.** *Mining and Metallurgy.* **Assoc. R.S.M.**

Assoc. Inst. Min. and Met.

1893, Appointed Assistant Mining Engineer to the Rio Tinto Mining Co., Huelva, Spain.

LAS MINAS DE RIO TINTO, HUELVA, SPAIN. *Permanent Address:* DENHOLME, NEAR BRADFORD, YORKSHIRE.

PARKER, T. JEFFERY. **1868-71.** *Geology.* **Assoc. R.S.M.**

D.Sc. (Lond.); F.R.S.; A.L.S.; F.R.M.S.; Mem. Imp. Soc. Nat. (Moscow).

1872-80, Demonstrator in Biology at the Royal College of Science. 1879-80, Lecturer in Biology at Bedford College, London. Appointed Professor of Biology at the University of Otago, Dunedin, New Zealand, in 1880. Introduced important new method of preserving the skeletons of cartilaginous fish for museum purposes. Author of over thirty-three Papers on Biological Subjects in the *Proceedings* and *Transactions* of various Societies.

OTAGO UNIVERSITY MUSEUM, DUNEDIN, NEW ZEALAND.

PARKER, W. N. **1878-79.** *Student in Biology.*

Ph.D.

Sometime Assistant in the Biological Department of the Royal College of Science. Now Professor of Biology in the University of Wales (University College, Cardiff). Author of various papers in the *Phil. Trans.* and *Proc. Roy. Soc.*, the *Trans. Zool. Soc.*, the *Trans. Roy. Irish Acad.*, etc. Translator of Wiedersheim's *Comparative Anatomy of Vertebrates*, and of Weismann's *Germ-Plasm.*

UNIVERSITY COLLEGE, CARDIFF, SOUTH WALES.

PARKIN, JOHN. **1848.** *Student, Royal College of Chemistry.*

Physician.

PARKINSON, FRANK B. **1882-85.** *Metallurgy.* **Assoc. R.S.M**

Mem. Royal Asiatic Soc.

1886-89, Manager of the Ferriere Copper Mines, North Italy. 1889-94, Engineer to the Chinese Government.

Permanent Address: PRESTBURY ROAD, CHELTENHAM.

PARKINSON, JAMES. **1863-65.** *Student in Chemistry, Mining, Metallurgy, etc.*

F.G.S.; F.C.S.

Consulting Metallurgical, Technical, and Analytical Chemist: practising in Adelaide. Several years reporting upon Mines in United States of America, Canada, etc.; now reporting upon properties in Australia: Author of papers read before the Geological Society, London, and papers published in the *Journ. Chem. Soc.* (London), etc.

QUEEN'S CHAMBERS, PIRIE STREET, ADELAIDE, SOUTH AUSTRALIA.

PARKINSON, THOMAS F. **1887-90.** *Mechanics.* **Assoc. R.C.S.**

Whitworth Exhibition 1888.

1893-95, Assistant Keeper of Museums. 1895, Appointed Keeper of the Bethnal Green Museum.

BETHNAL GREEN MUSEUM, LONDON, E. *Permanent Address:* WOOLFIELD HOUSE, BURY, LANCASHIRE.

PARRISH, SAMUEL. **1887-90.** *Chemistry.* **Assoc. R.C.S.**

1892-93, Science Master in Central Schools, Manchester. 1893, Appointed Head of Chemistry Department in the Central Higher Grade School, Leeds.

1, HIGHFIELD TERRACE, KINGSTON ROAD, LEEDS.

PARRY, LAURENCE. **1890-93.** *Metallurgy.* **Assoc. R.S.M.**

1893-94, Assistant to J. J. Beringer, Esq., Assoc. R.S.M. at the Camborne Mining School, Cornwall. 1896, Assayer to Messrs. C. Pass and Son, Ltd., Bedminster Smelting Works, Bristol.

40, CAMDEN ROAD, SOUTHVILLE, BRISTOL. *Permanent Address:* BOLDROYD, FARTOWN, HUDDERSFIELD.

PAVY, FREDERICK WILLIAM. **1849.** *Student, Royal College of Chemistry.*

LL.D. (Glasgow); M.D. (Lond.); F.R.C.P.; F.R.S.

Consulting Physician (and formerly Lecturer on Principles and Practice of Medicine, on Physiology, and on Comparative Anatomy and Zoology) at Guy's Hospital. Author of numerous papers and works on Medical Subjects.

35, GROSVENOR STREET, LONDON, W.

PAWLE, REGINALD. **1887-91.** *Mining.* **Assoc. R.S.M.**

1891-93, Assistant to M. Francis, Esq., at the Halkyn, Rhosumur, and Llanarmon Mines, Flintshire. 1893, Appointed Superintendent of the Borneo Co.'s Quicksilver Mine and Smelting Works, Tegora, Upper Sarawak, Borneo.

c/o THE BORNEO CO., LTD., KUCHING, SARAWAK. *Permanent Address:* NORTHCOTE, REIGATE, SURREY, ENGLAND.

PAYNE, ALBERT E. **1890-93.** *Mining.* **Assoc. R.S.M.**

1893, Exploring Zemindary of H. H. Rajah of Bobbili, K.C.I.E., Vizaj District, Madras Presidency. 1894, Surveyor to H. H. Maharajah Vizianagram at the Manganese Mines, Kodur, Vizaj. 1895, Appointed Assistant Mining Engineer at the Nicol Gold Mines, Western Australia.

P.O. ROEBURNE, WESTERN AUSTRALIA. *Permanent Address:* BRUNSWICK HOUSE, KEW, SURREY.

PEACH, BENJAMIN NEEVE. **1859-61.** *Geology.* **Assoc. R.S.M.**

F.R.S. (Lond.); F.R.S. (Edin.); F.G.S.; Mem. Phys. Soc. of London; F. Bot. Soc. (Edin.).

District Surveyor and acting Palæontologist to the Geological Survey of Scotland.

THE GEOLOGICAL SURVEY OFFICE, SHERIFF COURT BUILDINGS, EDINBURGH; *and* 86, FINDHORN PLACE, EDINBURGH.

PEAKE, WALTER C. **1890-93.** *Metallurgy and Mining.* **Assoc. R.S.M.**

1893-94, Travelling in the United States of America and Australia. 1896, To South Africa.

P.O. Box 1915, JOHANNESBURG, S.A.R. *Permanent Address:* OAKFIELD, ST. NICHOLAS' ROAD, UPPER TOOTING, LONDON, S.W.

PEARCE, HAROLD VYVYAN. *Student.*

1712, SHERMAN AVENUE, DENVER, COLORADO, U.S.A.

PEARCE, J. S. *Student.*

Mem. Soc. Chem. Ind.

CHEMICAL WORKS, BOW COMMON, LONDON, E.

PEARCE, RICHARD. **1859-60.** *Student.*

Ph.D. (Col. Coll. New York); F.G.S.; Mem. Chem. Soc. (New York); Mem. Am. Inst. Min. Eng. (Pres. 1889); Mem. Min. Soc. (Lond.).

1860, Instructor in Chemistry and Mineralogy to the Miners' Association of Cornwall and Devon. 1865, Manager of the Morfa Silver Works,

Swansea, South Wales. 1873, Appointed Manager of the Boston and Colorado Smelting Co., Denver, Colorada, U.S.A. Author of sundry scientific papers published in the *Transactions of the Royal Institution of Cornwall*, the *American Institute of Mining Engineers*, the *Colorado Scientific Society*, etc.

1712, Sherman Avenue, Denver, Colorado, U.S.A.

PEARCE, William. **1871-74.** *Student.*

F.C.S.; Mem. Soc. Chem. Ind.

J.P. County of London; London County Councillor for Limehouse.

The Chemical Works, Bow Common, London, E.

PEARSON, A. N. **1877.** *Student.*

Chemist to the Agricultural Department, Melbourne, Victoria.

Melbourne, Victoria, Australia.

PEDLER, Alexander. **1870.** *Student in Chemistry.*

F.R.S.; F.C.S.; F.I.C.; Fellow of the University of Calcutta.

1871-73, Demonstrator of Chemistry at the Royal School of Mines (Royal College of Chemistry). 1873, Appointed Professor of Chemistry at the Presidency College of Calcutta. 1887, Meteorological Reporter to the Government of Bengal, and Curator of the Bengal Government Museum, Calcutta. 1896, Appointed Principal of the Presidency College, and Registrar of the Calcutta University. Author of papers published in the *Proc. Roy. Soc.*, *Journ. Chem. Soc.*, and the *Journ. Asiat. Soc., Bengal.*

Presidency College, Calcutta, India.

PEGLER, Oliver. **1869-72.** *Mining and Metallurgy.* **Assoc. R.S.M.**

c/o The African City Properties Co., Ltd., Johannesburg, S.A.R.

PENN, Francis Richard. **1893-96.** *Chemistry.* **Assoc. R.C.S.**

Teaching Scholar in Chemistry at the Royal College of Science.

Permanent Address: 7, Lawrence Street, Northampton.

PEREZ, Victor E. **1883-86.** *Metallurgy.* **Assoc. R.S.M.**

B.Sc. (Seville); F.C.S.

1886, Appointed Assistant Mining Engineer to the Rio Tinto Co., Huelva, Spain. 1892, Appointed Director of the Taoro Co., Puerto Oratava, Teneriffe.

La Dehesa, Puerto Oratava, Teneriffe.

PERKIN, William Henry. **1855.** *Student in Chemistry.*

Vice-Pres. C.S.; LL.D. (St. And.); Ph.D.; F.R.S.

Discoverer and Manufacturer of the first Aniline Colour. Recipient of the Davy and Royal Medals of the Royal Society.

The Chestnuts, Sudbury, Harrow.

PERKIN, A. G. **1877.** *Student in Chemistry.*

F.C.S.

8, Montpelier Terrace, Hyde Park, Leeds.

PERKIN, William Henry, Jun. **1877.** *Student in Chemistry.*

F.R.S.; F.C.S.

Fairview, Wilbraham Road, Fallowfield, Manchester.

***PERRINS**, Frederick Dysons. **1846.** *Student, Royal College of Chemistry.*

Pharmaceutical Chemist.

PERRY, George H. **1889-92.** *Chemistry.* **Assoc. R.C.S.**

B.Sc. (Lond.); F.I.C.

1893, Appointed Assistant Chemist to H. M. War Department at the Woolwich Arsenal.

37, Hanover Road, Plumstead, London, S.E. *Permanent Address:* Chemical Department, Royal Arsenal, Woolwich, London, S.E.

PERRY, Percy J. **1889-92.** *Metallurgy.* **Assoc. R.S.M.**

Assistant to W. E. Whitehouse, Esq., Bullion Merchant, Refiner, etc., Birmingham.

18, Speedwell Road, Edgbaston.

PETLEY, William. **1884-86.** *Metallurgy.* **Assoc. R.S.M.**

Since 1886 with Messrs. Bailey, Pegg and Co., Engineers and Iron-founders, of 81, Bankside, Southwark, at their London and Brierly Hill Works. 1891, Became a Partner in the above firm, and in 1895 Acting Manager of the Brierly Hill Works, Staffordshire.

Brierly Foundry, Brierly Hill, Staffordshire; *and* Pedmore Lodge, Stourbridge, Worcestershire.

PETO, S. ARTHUR. **1875.** *Student.*

Chairman of the Morgan Crucible Co., Ltd. Director of the Denaby and Cadeby Main Collieries, Ltd., of the South Yorkshire Junction Railway.

REDHEATH, RICKMANSWORTH; *Permanent Address:* c/o MORGAN CRUCIBLE CO., BATTERSEA.

PETTER, GUY BAZELEY. **1891-94.** *Mechanics.* **Assoc. R.C.S.**

15, HIGH STREET, YEOVIL, SOMERSET.

PHILIP, ARNOLD. **1879-82.** *Metallurgy.* **Assoc. R.S.M.**

B.Sc. (London); F.I.C.; F.C.S.; Mem. Iron and Steel Inst.; Mem. Soc. Chem. Ind.

Sometime Analytical and Consulting Chemist to the Engineering Department of the India Office and the Indian Store Department. Subsequently Professor of Electrical Engineering and Applied Physics at the Heriot Watt College, Edinburgh. 1895, Appointed Professor of Physics at the Merchant Venturers' Technical College, Bristol.

MERCHANT VENTURERS' TECHNICAL COLLEGE, BRISTOL; *and* 43, ONSLOW ROAD, RICHMOND, SURREY.

PHILLIPS, ARTHUR GAVED. **1870-73.** *Mining and Metallurgy.* **Assoc. R.S.M.**

F.I.C.; F.C.S.; A.M.Inst.C.E.

Barrister-at-law.

1, GARDEN COURT, TEMPLE; *and* 18, FOPSTONE ROAD, LONDON, S.W.

PICKLES, JOHN W. **1889-92.** *Physics.* **Assoc. R.C.S.**

B.Sc. (Lond.).

Formerly Demonstrator and Assistant Lecturer in Physics at Owens College, Manchester. 1896, Student of Trinity College, Cambridge.

TRINITY COLLEGE, CAMBRIDGE. *Permanent Address:* 55, ASHGROVE, BRADFORD, YORKSHIRE.

PILL, ROBERT. **1890-91.** *Mining.* **Assoc. R.S.M.**

B.Sc. (Victoria).

Mining Engineer to the Collieries of La Compania de Arauco, Ltd., Coronel, Chile.

c/o LA COMPANIA DE ARAUCO, LTD., CORONEL, CHILE, SOUTH AMERICA. *Permanent Address* DROSKIN, PERRANPORTH, R.S.O., CORNWALL.

PINCHIN, E. ALFRED. *Student.*

Assistant Gas Examiner to the London County Council; also Assistant to Dr. Teed, F.C.S., Analytical Chemist.

c/o F. L. TEED, ESQ., D.Sc., 15, VICTORIA STREET, WESTMINSTER, LONDON, S.W.

***PINCHING**, ARCHIBALD E. **1869-75.** *Mining.* **Assoc. R.S.M.**

Born at Gravesend 1853. Educated at Charterhouse and Cheltenham. 1869, Entered the Royal School of Mines. 1871, Went to the Royal Mining Academy at Freiberg, after which he returned to London and took his Associateship in Mining in 1875. In this year he was articled to Mr. John Marley at Darlington. 1877, Took charge of the Cobalt Mines of the South African Republic Mining Co. in the Transvaal, but in consequence of the Zulu and Sekekimi wars had to return to England in 1879. In 1880 he was appointed to succeed Mr. C. J. Harvey in the management of the Indian Glenrock and South Indian Gold Mining properties in the Wynaad, Madras. 1884-85, Went to South America to report on the West Argentine Gold Co.'s mining properties. 1885, Entered into partnership with Mr. J. Marley and his eldest son as Consulting Engineers. In 1886 he was appointed H. M. Inspector of Mines for the Cornwall District. Died December 3rd, 1892.

PITTMAN, EDWARD FISHER. **1873-76.** *Mining and Metallurgy.* **Assoc. R.S.M.**

1877-78, Mining Surveyor, New South Wales. 1878-81, Geological Surveyor in the Department of Mines, New South Wales. 1881-82, Registrar and Lecturer in Geology at the School of Mines, Bendigo, Victoria. 1882-83, Geological Surveyor in the Department of Mines, New South Wales. 1883-91, Chief Mining Surveyor, Department of Mines, New South Wales. 1891, Appointed Government Geologist, New South Wales, and Lecturer on Mining at the Sydney University.

DEPARTMENT OF MINES, SYDNEY, NEW SOUTH WALES.

PLATNAUER, H. MAURICE. **1877-80.** *Geology.* **Assoc. R.S.M.**

B.Sc.; F.G.S.; Murchison Medal 1880; Edward Forbes Medal 1880.

1880-84, Assistant in the Mineralogical Department of the British Museum. 1884, Appointed Keeper of the Museum of the Yorkshire Philosophical Society.

LOW ROYD, ST. OLAVE'S ROAD, YORK. *Permanent Address:* THE MUSEUM, YORK.

PLATT, W. N. **1893-96.** *Chemistry and Agriculture.* **Assoc. R.C.S.**

PLEWMAN, GILBERT G. **1890-93.** *Mining.* **Assoc. R.S.M.**

POOLE, F. Cecil. **1887-90.** *Metallurgy.* **Assoc. R.S.M.**

1891-95, Assistant Manager to the Asia Minor Mining Co., Asia Minor. 1895, Appointed Manager to the Kanye Exploration Co., Bechuanaland, South Africa. 1896, Assistant Manager, Consolidated Gold Fields, Heidelberg, South African Republic.

Permanent Address: Tudor House, Woodville Road, Hadley, New Barnet.

POOLE, H. S. **1864-67.** *Geology.* **Assoc. R.S.M.**

M.A.; F.G.S.; Mem. Am. Inst. Min. Eng.; Mem. Canadian Soc. Civil Eng.; Past Pres. Min. Soc. Nova Scotia.

1867-70, Manager to the Caledonian Coal Co. of Cape Breton. 1871-72, On the Japanese Commission, Washington. 1872, Manager to the Silver Mining Co., Bingham, Utali. 1872-78. Government Inspector of Mines in Nova Scotia. 1878-95, Managing Agent of the Acadia Coal Co.

Stellarton, Nova Scotia.

POORE, P. **1893-96.** *Mining.* **Assoc. R.S.M.**

c/o South African Republic National Bank, Johannesburg, S.A.R.
Permanent Address: Old Lodge, Salisbury.

PORTER, James. *Student.*

B. Eng. (R.V.I.); Mem. of Geologist's Association.

1891, Crawford Observer in Queen's College, Cork. 1895, In practice as Analytical Chemist.

Moanarone, Bandon, Co. Cork.

POTTER, Frederick A. **1862-65.** *Metallurgy and Mining.* **Assoc. R.S.M.**

POWELL, A. **1893-96.** *Chemistry.* **Assoc. R.C.S.**

POWELL, Charles H. **1879-82.** *Metallurgy.* **Assoc. R.S.M.**

De la Beche Medal 1882.

1882-84, Assistant Master at the Merchant Venturer's School, Bristol. 1884, Appointed Assistant Examiner at H. M. Patent Office, Chancery Lane. 1892, Appointed Lecturer on Metallurgy at the South-West Polytechnic, Manresa Road, Chelsea.

Ryland House, Peckham Rye, London, S.E.

POWELL, JOHN H. **1884-85.** *Chemistry.* **Assoc. R.C.S.**
F.G.S.; Mem. Inst Min. and Met.; Tyndall Prize 1886.
GEORGETOWN, BRITISH GUIANA.

POWER, FRANCIS REGINALD. **1880-83.** *Mining and Metallurgy.* **Assoc. R.S.M.**
F.C.S.
In 1884 appointed Assistant Assayer to the Royal Mint, Melbourne; Appointed Second Assayer there in 1887, and First Assayer in 1894.
THE ROYAL MINT, MELBOURNE.

POWER, HUGH ALEXANDER. **1891-94.** *Mining.* **Assoc. R.S.M.**
Assayer to the Consolidated Gold Fields of South Africa, Ltd., Barberton Branch.
c/o CONSOLIDATED GOLD FIELDS OF SOUTH AFRICA, LTD., BARBERTON, SOUTH AFRICA. *Permanent Address:* 37a, GREAT CUMBERLAND PLACE, HYDE PARK, LONDON, W.

POYSER, — . **1851.** *Student, Royal College of Chemistry.*
Sometime Managing Partner, Allsopp's Brewery.

PRADO, MAX. **1884-88.** *Mining.* **Assoc. R.S.M.**
F.G.S.
135, CALLE GENERAL DE LA FUENTE, LIMA, PERU.

PRESCOTT, HARRY RICHMOND. **1892-95.** *Metallurgy.* **Assoc. R.S.M.**
1896, Appointed Assistant Lecturer at the West Bromwich Municipal Science School.
MUNICIPAL SCIENCE SCHOOL, WEST BROMWICH, STAFFORDSHIRE. *Permanent Address:* 9, ABINGDON STREET, MANNINGHAM, BRADFORD, YORKSHIRE.

PRESSLAND, EDWARD B. **1873-76.** *Mining and Metallurgy.* **Assoc. R.S.M.**

PRETTY, WILLIAM H. **1890-93.** *Mechanics and Physics.* **Assoc. R.C.S.**
Whitworth Scholarship 1891.
Demonstrator in Engineering at Messrs. W. H. Allen and Son and Co.'s, Mechanical and Electrical Engineers, Bedford.
17, WESTERN STREET, BEDFORD.

PRICE, ARTHUR FARADAY. *Student.*

F.C.S ; Mem. Soc. Chem. Ind.

Member of the firm of Thomas Price and Son, Assayers, Analytical Chemists, etc., of San Francisco, California.

524, SACRAMENTO STREET, SAN FRANCISCO, CALIFORNIA, U.S.A.

PRICE, SAMUEL WARREN. **1890-93.** *Mining and Metallurgy.* **Assoc. R.S.M.**

De la Beche Medal 1893 ; F.G.S. ; Mem. N. of Eng. Inst. Min. and Mech. Eng.

1894-95, Demonstrator in Mine-Surveying at the Royal School of Mines. 1896, Lecturer on Mine-Surveying in the University College of South Wales and Monmouth ; also in private survey practice.

25, LOCHABER STREET, CARDIFF. *Permanent Address :* c/o THE REV. JOHN PRICE, BARRY, NEAR CARDIFF.

PRICE, THOMAS. *Student in Chemistry.*

M.D. ; Mem. of Technical Soc. ; Mem. Academy of Sciences ; Mem. Microscopical Soc. of San Francisco.

1857-59, Instructor of Chemistry, Normal College, Swansea. 1859-62, Chemist and Assayer to Messrs. Townshend, Wood, and Co., and to Messrs. Richardson and Co., Swansea. Now Senior Partner in the firm of Thomas Price and Son. Assayers, Analytical Chemists, and Mining Engineers, of San Francisco, California.

524, SACRAMENTO STREET, SAN FRANCISCO, CALIFORNIA, U.S.A.

PRIESTLEY, CHARLES W. **1889-92.** *Chemistry.* **Assoc. R.C.S.**

PRINGLE, ROBERT WILLIAM. **1892-95.** *Mining.* **Assoc. R.S.M.**

In South Africa.

Permanent Address : 18, RUTLAND STREET, EDINBURGH.

PULLEN, WILLIAM W. F. **1887-90.** *Student.*

Whitworth Scholarships 1887 ; A.M. Inst. C.E. ; M.I. Mech. E. ; Prize Mechanics, R.C.S. 1890.

1883-87, Apprenticed at the Taff Vale Railway Locomotive Works. 1890, Appointed Demonstrator and Assistant Lecturer in Engineering at the University College of South Wales and Monmouthshire, Cardiff. 1895, Elected Professor of Engineering at the South-West London Polytechnic. Author of paper on "Water Softening and Filtering for Locomotive Purposes," contributed to the Institution of Civil Engineers,

and which received a "Miller" Prize in 1889; also of *Injectors and Ejectors*, and *The Application of Graphic Methods to Structural Design* (Technical Publishing Company, Manchester).

South-West London Polytechnic, Manresa Road, Chelsea, London, S.W.; *and* Fairley Villa, Oxford Road, Putney, London, S.W.

PUNNETT, 1860. *Student in Mining.*

Formerly Agent to Messrs. Williams and Co., Copper Smelters.

PURDIE, Thomas. **1872-75.** *Metallurgy.* **Assoc. R.S.M.**

Ph.D. (Würzburg); B.Sc. (Lond.); F.R.S.; F.C.S.; F.I.C.

1875-81, Demonstrator in the Chemical Laboratory, Royal College of Science, under Professor Frankland. 1881-84, Science Master at the High School, Newcastle, Staffs. 1884, Appointed Professor of Chemistry at St. Andrews University. Author of numerous memoirs connected with Chemistry in the *Trans. Chem. Soc.*

United College of St. Salvator and St. Leonard, St. Andrews University, N.B.

Q

QUIBELL, O. **1882-83.** *Student in Chemistry.*

F.C.S.

MAGNUS LODGE, NEWARK-ON-TRENT, NOTTS.

QUINN, GERALD G. **1889-93.** *Chemistry.* **Assoc. R.C.S.**

F.C.S.

1893-94, Science Teacher to Manchester School Board. 1894, Appointed Head Science Master at Hanley, Staffordshire.

16, ALBERT STREET, NEWCASTLE, STAFFS. *Permanent Address:* 24, LIVINGSTONE STREET, CHORLTON-ON-MEDLOCK, MANCHESTER.

R

RANDS, WILLIAM H. **1875-78.** *Mining and Metallurgy.* **Assoc. R.S.M.**

F.G.S.; F. Geological Soc. Australasia; F.R.S. (Queensland); Mem. Australian Soc. for the Advancement of Science.

1880-83, Assistant Secretary to the "Accidents in Mines" Commission, London. 1883, Appointed Assistant to the Geological Survey of Queensland.

THE GEOLOGICAL SURVEY OFFICE, GEORGE STREET, BRISBANE, QUEENSLAND.

RATHBONE, EDGAR. *Student in Mining.*

M.Inst.C.E.; M.I.Mech.E; Mem. Am. Inst. M.E.

Inspector of Mines for the South African Republic, Witwatersrand District. Consulting Engineer to Messrs Bewick, Moreing and Alford. Mining Reporter to the *Mining Journal.*

P.O. Box 2098, JOHANNESBURG, S.A.R.

REEKS, TRENHAM HOWARD. **1877-80. Assoc. R.S.M.**

F.I.C.

1881-85, Assistant to E. Jackson, Esq., Assoc. R.S.M. 1885, Appointed Assistant to Dr. Augustus Voelcker and Sons, Agricultural Chemists.

39, TIERNEY ROAD, STREATHAM HILL, LONDON, S.W.

REES, ERNEST W. **1888-91.** *Mechanics.* **Assoc. R.C.S.**

RENWICK, HENRY J. GREEN. **1866-70.** *Mining.* **Assoc. R.S.M.**

REYNOLDS, EDGAR J. R. **1885-89.** *Chemistry.* **Assoc. R.C.S.**

B.Sc. (Lond.).

1890-95, Head-master of the Penwerris Grammar School, Falmouth. 1893, Appointed Science Teacher under the Technical Education Committee, Falmouth. Author of "The Composition of Prussian Blue and Turnbull's Blue" (*Journ. Chem. Soc.* 1887), "The Action of Bromide on Potassium Ferricyanide" (*Journ. Chem. Soc.* 1888).

4, HARRIET PLACE, FALMOUTH, CORNWALL.

***REYNOLDS**, John William. **1846.** *Student, Royal College of Chemistry.*

Major-General.

Born 1820. Educated at Eton, whence he joined the 11th Hussars at Meerut, Bengal. About 1846, being on half-pay, he entered the Royal College of Chemistry and soon became a skilful experimenter. The result of his researches were published in the *Journ. Chem. Soc.* Received a Staff appointment at the Horse Guards. Thence he went to Jamaica. Attained the rank of Major-General. Died at Coblentz, July 28th, 1874.

RICHARDS, E. **1866-67.** *Student in Mining.*

RICHARDS, Edward. **1864-67.** *Metallurgy.* **Assoc. R.S.M.**

Duke of Cornwall's Scholarship 1865; Murchison Medal 1866.

Analytical Chemist.

Leeds Steel Works, Leeds.

RICHARDS, John J. **1884-87.** *Metallurgy.* **Assoc. R.S.M.**

Bessemer Medal 1887.

RICHARDS, T. H. **1884.** *Student in Mining.*

RICHARDSON, Robert. **1846.** *Student, Royal College of Chemistry.*

Manufacturing Chemist.

RICHARDSON, Samuel S. **1890-93.** *Physics.* **Assoc. R.C.S.**

1893, Appointed Assistant Master at the Lynn Technical School.

11, High Street, King's Lynn. *Permanent Address:* Washington House, Arnold, Notts.

RICHARDSON, William H. **1891-92.** *Mining.* **Assoc. R.S.M.**

Former Student of the École Centrale, Paris.

RICHMOND, Henry. **1850.** *Student, Royal College of Chemistry.*

Formerly Commissioner of the Province of Taranaki, New Zealand.

RICKARD, Forbes. **1884-86.** *Metallurgy.* **Assoc. R.S.M.**

F.G.S.; Mem. Am. Inst. M.E.

Formerly Assistant Manager, New California Mining Co., Ltd.; also Manager of the Seven Stars Mining Co. Now in practice as Ore Broker, Consulting Chemist, and Assayer, Central City, Colorado.

Central City, Colorado, U.S.A. *Permanent Address:* c/o Messrs. Rickard Bros., 35, Queen Victoria Street, London, E.C.

RICKARD, JAMES A. **1887-90.** *Mining.* **Assoc. R.S.M.**

1890-91, Assistant Manager of the Mine de Roure. 1891, Appointed Manager of the Pontgibaud Silver Lead Smelting Works.

PONTGIBAUD, PÛY-de-DÔME, FRANCE. *Permanent Address:* c/o MESSRS. RICKARD BROS., 35, QUEEN VICTORIA STREET, LONDON, E.C.

RICKARD, T. ARTHUR. **1882-85.** *Metallurgy.* **Assoc. R.S.M.**

F.G.S.; Mem. Am. Inst. M.E. (Mem. Council): Vice-Pres. Colorado Scientific Society.

1885-87, Assistant Manager California Gold Mining Co., Ltd., Colorado. 1887-89, Manager of the Union Gold Co., Ltd., California. 1889-91, Consulting Engineer, Melbourne, Australia. 1891-92, Manager French Mines, Ltd., France. 1892-94, Consulting Engineer, Denver, Colorado. 1894-95, General Manager to the Enterprise Mining Co. and the Yankee Girl Mines, Colorado. 1895, Consulting Engineer, Denver, Colorado; Appointed State Geologist of Colorado.

608, MCPHEE BUILDING, DENVER, COLORADO.

RIDDING, HOWARD C. **1886-89.** *Metallurgy.* **Assoc. R.S.M.**

Assoc. Inst. Chem.

Science Teacher to the Municipal Science and Technical School, Hanley.

28, ALBION STREET, HANLEY. *Permanent Address:* MILTON VILLA, ALGERNON ROAD, BIRMINGHAM.

RIDEAL, SAMUEL. *Student in Chemistry.*

D.Sc. (Lond.); F.I.C.; F.C.S.; Mem. Soc. Pub. Anal.; Mem. Sanitary Inst.; Mem. Iron and Steel Inst.; Fellow of University College, London.

1884, Assistant Lecturer at University College, London. 1889, Lecturer on Chemistry at St. George's Hospital, London. 1893, Public Analyst for the Lewisham District, and Consulting Chemist to various local authorities. Examiner in Chemistry at the Royal College of Physicians, London. Author of *Practical Organic Chemistry* (Lewis and Co.); *Disinfection and Disinfectants* (Griffin and Co.); and of several papers in the *Journ. Chem. Soc.*, *Journ. Soc. Chem. Industry*, etc.

28, VICTORIA STREET, WESTMINSTER, LONDON, S.W. *Permanent Address:* BOWLHEAD, THURSLEY, GODALMING.

RIDEWOOD, WALTER G. **1883-87.** *Biology and Geology.* **Assoc. R.C.S.**

B.Sc. (Lond.); F.L.S.; F.Z.S.; F.G.S.

1888, Assistant to Sir William Flower, K.C.B., F.R.S., at the Natural History Museum, Kensington. 1889-92, Teacher of Biology at the

Birkbeck Institute. 1892, Lecturer on Biology at St. Mary's Hospital Medical School, Paddington. Author of papers "On the Hyoid Arch of Ceratodus" (*Proc Zoo. Soc.* 1894); "On the Spiracle and Associated Structures in Elasmobranch Fishes" (*Anatomischer Anzeiger* 1895); and numerous other papers on biological subjects.

80, Oakley Street, Chelsea, London, S.W.

RIDGES, Thomas J. C. **1890-93.** *Zoology.* **Assoc. R.C.S.**

RIDSDALE, Edward Aurelian. **1880-83.** *Mining and Metallurgy.* **Assoc. R.S.M.**

F.G.S.

1888, Member of the London Stock Exchange; elected to Committee 1896. Author of *Notes on Inorganic Evolution*, and *Cosmic Evolution.*

37, Hyde Park Gate, London, S.W. *Permanent Address:* Rottingdean, Sussex.

RIDSDALE, Edward Lucas Jenks. **1854.** *Student.*

F.G.S.; F.Z.S.

Late Queen's Assay Master H.M. Mint. Retired 1882.

37, Hyde Park Gate, London, S.W.; *and* Rottingdean, Sussex.

RILEY, Edward. **1850-53.** *Student.*

F.I.C.; F.C.S.; Mem. Inst. Min. and Met. (Mem. of Council); Mem. Iron and Steel Inst.

1853-58, Chemist to the Dowlais Iron Works, and Consulting Chemist to various other Works. Since 1858 in practice as Metallurgical and Consulting Chemist, and Assayer.

2, City Road, Finsbury Square, London, E.C.

RILEY, Henry C. **1887-90.** *Mining.* **Assoc. R.S.M.**

1892-93, Engineer to the South African Trust and Finance Co. 1893, Appointed Surveyor to the Heriot Gold Mining Co., and the Jumpers Gold Mining Co., Johannesburg. 1895, Appointed Assayer to the United Langlaagte Gold Mining Co., Johannesburg.

c/o The United Langlaagte Gold Mining Co., Ltd., Johannesburg, S.A.R.

RIVINGTON, Walter R. G. **1889-93.** *Mining and Metallurgy.* **Assoc. R.S.M.**

c/o The Exploration Co., Ltd., 30, St. Swithin's Lane, London, E.C. *Permanent Address:* Coniston, Epping.

ROBERTS, MALCOLM. **1887-90.** *Mining.* **Assoc. R.S.M.**

1891-92, Assistant Engineer and Draughtsman to the London County Council. 1892, Appointed Mining Engineer to the Compania Guadalupe de Bolivia, and Sub-Administrador of Mines.

CIA GUADALUPE, TATASI, BOLIVIA, viâ BUENOS AYRES. *Permanent Address :* 33, ABINGDON STREET, BRADFORD, YORKSHIRE.

ROBERTS, RICHARD. **1889-92.** *Mining.* **Assoc. R.S.M.**

ROBERTS-AUSTEN, W. CHANDLER. **1861-65.** *Metallurgy.* **Assoc. R.S.M.**

C.B.; F.R.S.; F.C.S. (Vice-Pres.); Mem. Iron and Steel Inst. (Mem. Council); Chev. Lég. Hon. France; Mem. Chem. Soc. Berlin.

1865-69, Assistant to the late Professor Graham, Master of the Mint. With him engaged in research work. In 1869 appointed Assayer to the Mint, and in 1882 "Queen's Assay Master." 1880, Succeeded the late Dr. Percy, F.R.S. in the chair of Metallurgy at the Royal School of Mines. 1885, Member of the Executive Council of the Inventions Exhibition. 1889, Member of the British Executive Council of the Paris Exhibition. Author of numerous papers relating to scientific subjects. (Further, *see* PROFESSORS.)

ROYAL MINT, TOWER HILL, LONDON, E.; CHILWORTH, GUILDFORD; *and* ATHENÆUM AND ARTS CLUBS.

ROBINSON, CHARLES HAROLD. **1891-94.** *Chemistry.* **Assoc. R.C.S.**

Formerly Science Teacher at the Carmarthen County School.

19, CARRINGTON STREET, NOTTINGHAM.

ROBINSON, — . **1864-66.** *Student in Mining.*

ROBINSON, R. BIRD. **1868.** *Student in Mining.*

Sometime engaged at Hæmatite Works, Cumberland.

ROBSON, WILLIAM G. **1887-90.** *Physics.* **Assoc. R.C.S.**

1890-91, Assistant in Physics Department of the Royal College of Science, London. 1892, Appointed Professor of Physics at St. Andrews University, N.B.

RODGER, JAMES W. **1884-88.** *Chemistry.* **Assoc. R.C.S.**

Murchison Prize 1886; Tyndall Prize 1887; Frank Hatton Prize 1888; Departmental Prize (Practical Chemistry) 1888.

1888-89, Assistant in Physiology at the Royal College of Science. 1889-94, Assistant in Chemical Research Laboratory at the Royal College of Science. 1894, Demonstrator in Chemistry at the Royal College of Science.

ROYAL COLLEGE OF SCIENCE, LONDON, S.W.

ROGER, W. H. **1886-87.** *Student in Mining.*

ROGERS, GEORGE J. **1887-90.** *Chemistry.* **Assoc. R.C.S.**

F.I.C.

Since 1891 Chemist to the Wallaroo and Moonta Mining and Smelting Company.

Permanent Address: WALLAROO SMELTING WORKS, WALLAROO, SOUTH AUSTRALIA.

ROGERS, J. R. **1846.** *Student, Royal College of Chemistry.*

Pharmaceutical Chemist.

ROGERS, WILLIAM A. C. **1888-91.** *Chemistry.* **Assoc. R.C.S.**

1893, Appointed Engineer to the Fowler-Waring Cable Company, Ltd., North Woolwich.

15, RECTORY PLACE, WOOLWICH. *Permanent Address:* 1, HAVELOCK TERRACE, SOUTHAMPTON.

ROLL, J. C. **1845.** *Student, Royal College of Chemistry.*

Pharmaceutical Chemist.

ROPER, R. **1853-54.** *Student in Mining.*

ROSE, THOMAS K. **1883-86.** *Metallurgy and Chemistry.* **Assoc. R.S.M.**

D.Sc. (Lond.).

1888-90, Chemist to the Colorado Gold and Silver Extraction Company. 1890, Appointed Assistant Assayer to the Royal Mint. Author of *The Metallurgy of Gold*, etc.

9, ROYAL MINT, LONDON, E.

***ROWAN**, R. **1882.** *Student in Mining.*

ROWDEN, WILLIAM C. **1883-86.** *Metallurgy.* **Assoc. R.S.M.**

F.I.C.; Mem. Iron and Steel Inst.

Head Metallurgical Chemist to Messrs. Armstrong, Mitchell, and Co., Ltd., Newcastle-on-Tyne.

66, WARRINGTON ROAD, NEWCASTLE-ON-TYNE. *Permanent Address:* ELSWICK STEEL WORKS, NEWCASTLE-ON-TYNE.

ROWDEN, W. T. **1863-66.** *Mining and Metallurgy.* **Assoc. R.S.M.**

B.Sc. (Lond.); Duke of Cornwall's Scholarship, R.S.M., 1864; Murchison Prize 1865; De la Beche Medal 1866.

1867, Conducted Laboratory for Experiments in "Heating and Lighting" at the Paris Exhibition for British Commissioners. 1867-68, Natural Science Master at Clifton College. 1868-70, Organising Master for Technical Education in Northumberland and Durham, under the auspices of the Coal Trade Association. 1870-76, Science Master of the Elswick Institute, Newcastle-on-Tyne. 1876, Appointed Professor of Applied Mechanics at the Andersonian University, Glasgow, now known as the Glasgow and West of Scotland Technical College.

Lenzie, near Glasgow.

***ROWNEY**, Thomas H. **1845.** *Student, Royal College of Chemistry.*

Ph.D.; F.C.S.

Assistant at the Royal College of Chemistry for some years. He left to become Professor of Chemistry at Queen's College, Galway, where he remained until his death.

RUDD, William Henry. **1892-95.** *Metallurgy.* **Assoc. R.S.M.**

1896, Appointed Assayer to the Regina Gold Mining Co., Ltd., Lake of the Woods, Manitoba.

c/o Regina Gold Mining Co., Ltd., Lake of the Woods, Manitoba.

RUDLER, Frederick William. **1861.** *Student in Geology, etc.*

F.G.S.

1861, Appointed Assistant in the Museum of Practical Geology in Jermyn Street. 1870, Assistant Secretary of the Ethnological Society, and sometime editor of the *Quarterly Journal*, and also of that of the Anthropological Institute. 1876-79, Lecturer on Natural Science in the University College of Wales. In 1879, Appointed Curator of the Museum of Practical Geology, and Registrar of the Royal School of Mines: the latter post he resigned in 1880. In 1887 and 1888 he was President of the Geologist's Association. In conjunction with the late Mr. Robert Hunt he edited the seventh edition of Ure's *Dictionary of Arts*. Has contributed numerous articles to the *Encyclopædia Britannica*, to Longman's *Dictionary of Chemistry*, and to various scientific journals.

28, Jermyn Street, London, S.W.

RUTLEY, FRANK. **1862-64.** *Student.*

F.G.S.; Mem. Soc. of Arts; Mem. Min. Soc.; Mem. Soc. Française de Min. 1867-82, Assistant Geologist to the Geological Survey of England and Wales. 1882, Appointed Lecturer on Mineralogy at the Royal School of Science, London. Author of *Mineralogy; The Study of Rocks; Rock-forming Minerals; Granites and Greenstones;* and numerous papers in the *Geological Survey Memoirs, Proc. Roy. Soc., Quart. Journ. Geol. Soc., Quart. Journ. Mineralog. Soc.*, and elsewhere, chiefly dealing with Petrology and Mineralogy.

93, EDITH ROAD, WEST KENSINGTON, LONDON, S.W.

RUTTER, ALFRED. **1890-93.** *Chemistry.* **Assoc R.C.S.**

1894-95, Science Teacher at the Working Men's College, Melbourne. 1895, Science Director at the School of Mines, Sale, Victoria. 1896, Experimental Chemist and Assayer to the Broken Hill Proprietary Co., Broken Hill, New South Wales.

c/o BROKEN HILL PROPRIETARY CO., BROKEN HILL, NEW SOUTH WALES.

RYCE, GEORGE. **1892-96.** *Chemistry and Agriculture.* **Assoc. R.C.S.**

B.A. (Roy. Univ. Ireland); Assoc. Civ. and Mech. Eng., Queen's College, Cork; Diploma in Agriculture and Agricultural Chemistry, R.C.S. London, 1896.

"1851, Royal Commissioners" Scholar in Chemistry 1892.

AGRICULTURAL COLLEGE, WEST LAVINGTON, DEVIZES. *Permanent Address:* RATHMORE PLACE, CORK, IRELAND.

S

SACHE, H. *Student in Mining.*

At the Langlaagte United Mines.

c/o Langlaagte United Gold Mining Co., Johannesburg, S.A.R.

SAFFORD, George Herbert. **1890.** *Student.*

Business Manager of the *Mining Journal.*

"Mining Journal" Office, 18, Finch Lane, London, E.C.; *and* 34, Cedars Road, Clapham Common, London, S.W.

SAISE, Walter. **1871-74.** *Mining, etc.* **Assoc. R.S.M.**

D.Sc. (Lond.); M.Inst.C.E.; F.G.S.; Mem. Fed. Inst. Min. Eng.; Mem. N. of Eng. Inst. Min. and Mech. Eng.

1878-82, Assistant Manager to the East Indian Railway Collieries; appointed Manager in 1882. Consulting Mining Engineer and Geologist. Author of papers on the "Bristol Coalfield" (*Trans. N. E. Inst. Min. and Mech. Eng.*), and on various Indian Coalfields, published by the E.I.R. Co., or in *The Records of the Geological Survey of India.* Also joint author of *The Igneous Rocks of the Giridih Coalfield.*

Giridih, East Indian Railway, Bengal, India.

SALAMON, A. Gordon. **1877-79.** *Metallurgy.* **Assoc. R.S.M.**

F.I.C. (Mem. of Council, 1895); F.C.S.; Mem. Soc. Pub. Anal. (Vice-Pres. 1896).

Consulting and Analytical Chemist. Author of various papers; amongst others, "Influence of Phosphates on Fermenting Worts" (*Journ. Soc. Chem. Ind.*, 1885); "Purification of Water" (*Journ. Soc. Chem. Ind.*, 1886); "Purity of Beer," read before the Society of Arts, 1886 (silver medal); Cantor Lectures on "Fermentation" (Society of Arts, 1887); Friday evening discourse, Royal Institution, 1888—subject, "Yeast."

The Laboratory, Fenchurch Avenue, London, E.C. *Permanent Address:* 27, Holland Park, London, W.

SALTER, Charles. **1863-65.** *Student in Chemistry.*

Mem. Soc. Chem. Ind.

Abstractor for the Fed. Inst. Min. Eng.; the *Journal of Chemical Industry*; and *The Analyst.*

33, Park Hall Road, East Finchley, London, N.

SALTMARSH, JOHN G. **1888-91.** *Chemistry.* **Assoc. R.C.S.**

F.I.C.

1892-95, Head Chemist at Davis's Chlorine Processes Co., Ltd., Northwich. 1895, Appointed Sub-Inspector of Science Schools under Science and Art Department.

WEST MOUNT, UPTON, MACCLESFIELD.

SANFORD, P. GERALD. **1879-83** *and* **1888.** *Student in Chemistry and Metallurgy.*

F.I.C.; F.C.S.; Mem. Soc. Pub. Anal.; Mem. Soc. Chem. Ind.

1884-86, Assistant to the late Dr. C. Meymott Tidy, at the London Hospital. 1886-87, Assistant to Professor Pickering, F.R.S., at Bedford College. 1888-90, At the Metallurgical Laboratory in the Royal School of Mines, and in Assay Office, Royal Mint. 1890-91, Chemist to the New Explosive Co., Ltd. 1891-94, Chemist to the National Explosive Co., Ltd. Since 1894 in practice as Analytical and Consulting Chemist and Assayer; Consulting Chemist to the Cotton Powder Co., Ltd.; Consulting Metallurgist to, and Director of, The Fauvel Gold Recovery Co., Ltd. Author of *The Nitro-Explosives* (Crosby, Lockwood and Son), and of various papers on Explosives in the *Journal Am. Chem. Soc.*, the *Chemical News*, etc.

68, RIGGENDALE ROAD, STREATHAM, LONDON, S.W. *Laboratory:* 20, CULLUM STREET, FENCHURCH STREET, LONDON, E.C.

SANSOM, C. J. **1893-96.** *Physics.* **Assoc. R.C.S.**

SAUNDERS, WILLIAM. **1892-95.** *Chemistry.* **Assoc. R.C.S.**

B.A. (Lond.); B.Sc. (Lond.).

3, GLADSTONE TERRACE, BRIGHTON.

SAVILLE-KENT, W. **1879-80.** *Student in Biology.*

F.L.S.; F.Z.S.; Past. Pres. Roy. Soc. (Queeensland).

Formerly Assistant to the Natural History Department of the British Museum. Lately Inspector and Commissioner of Fisheries to the Governments of Tasmania, Queensland, and Western Australia. Author of various Zoological Works, including *A Manual of the Infusoria*, vols. i.—iii.; *The Great Barrier Reef of Australia; The Naturalist in Australia;* etc.

THE ROWANS, WALLINGTON, SURREY. *Permanent Address:* ROYAL SOCIETIES' CLUB, 63, ST. JAMES STREET, LONDON, S.W.

SAWYER, Arthur Robert. **1875-78.** *Geology and Mining.* **Assoc. R.S.M.**

F.G.S.; Mem. N. of Eng. Inst. Min. and Mech. Eng.; Mem. Fed. Inst. Min. Eng.; Vice-Pres. Geol. Soc. S. Africa.

1879-89, H. M. Inspector of Mines under the Coal and Metalliferous Mines Regulation Acts. 1889, Went to South Africa; Consulting Mining Engineer to several South African Companies. On the late Government Mining Commission for the Revision of Mining Regulations in the Transvaal. Author of *Accidents in Mines; Guide to the Murchison Range; Goldfields of Mashonaland*; and of papers, "Mining at Kimberley 1889," "Coal Mining in South Africa in 1889," "Temperature in Mines," etc., read before the North Staffordshire Institution of Engineers (published by John Heywood, Manchester).

P.O. Box 2233, Johannesburg, S.A.R. *Offices:* Zirman Building, Harrison Street, Johannesburg. *Permanent Address:* 40, Brompton Square, London, S.W.

SCANLAN, Morris. **1846.** *Student, Royal College of Chemistry.*

Manufacturing Chemist.

SCHOFIELD, J. **1893-96.** *Physics.* **Assoc. R.C.S.**

SCHOFIELD, James A. **1886-89.** *Metallurgy.* **Assoc. R.S.M.**

F.C.S.

Demonstrator in Chemistry and Assaying at the Sydney University, New South Wales.

The University, Sydney, New South Wales.

SCHRÖDER, George H. **1880-83.** *Metallurgy and Mining.* **Assoc. R.S.M.**

Sometime Science Master at Brighton College. Now Chemist in the Laboratory of the Rio Tinto Mines at Huelva, Spain; appointed Chief of the Cementation Process in 1895.

Naya, Las Minas de Rio Tinto, Huelva, Spain.

SCHWARZ, Ernest H. L. **1890-93.** *Geology.* **Assoc. R.C.S.**

Honours in Palæontology, R.C.S., 1894.

1894-96, Demonstrator in Geology at the Royal School of Science. Editor of the *Scientific African*, Cape Town. Appointed Assistant Geologist to the Geological Survey of Cape Colony, March 1896. Author of papers in the *Geological Magazine*, *The Annals and Magazine of Natural Science*, and elsewhere.

South African Museum, Cape Town, South Africa. *Permanent Address:* 80, Philbeach Gardens, London, S.W.

SCOTT, CHARLES C. **1888-91.** *Mining.* **Assoc. R.S.M.**

1891, Appointed Inspector of Mines for the State of Perâk, Malay Peninsula.

IPOH, PERÂK, STRAITS SETTLEMENTS. *Permanent Address:* 9, THE CRESCENT, NORWICH.

SCOTT, HENRY GEORGE. **1893-96.** *Mining.* **Assoc. R.S.M.**

OXTED, SURREY.

SCOTT, RALPH GEORGE. **1877-80.** *Mining and Metallurgy.* **Assoc. R.S.M.**

Mem. Iron and Steel Inst.; Mem. Inst. Min. and Met.; Fel. Imp. Inst.

1882, Appointed Manager of the Steel Department, Monkbridge Iron and Steel Co., Ltd., Leeds.

TARN VILLAS, ILKLEY, YORKSHIRE. *Permanent Address:* MONKBRIDGE IRON WORKS, LEEDS.

SCOTT, W. B. **1878-79.** *Student in Biology.*

D.Sc. (Princeton, New Jersey); Ph.D. (Heidelberg).

Studied at Cambridge under the late F. M. Balfour, and at Heidelberg under Gegenbaur, and elsewhere on the Continent. Appointed Professor of Geology in Princeton College, U.S.A. Author of numerous important monographs on Mammalian Palæontology. Founder of the modern system of dental cusp terminology.

PRINCETON COLLEGE, NEW JERSEY, U.S.A.

***SCUDAMORE**, WILLIAM. **1885-89.** *Agriculture.* **Assoc. R.C.S.**

B.A. (Camb.); Int. B.Sc. (Lond.).

1889-92, Held Clothworker's Scholarship, Cambridge. 1892, Appointed Science Lecturer in Dr. Sachs' Schools, 116, West 59th Street, New York. Died January 31st, 1896.

SENIER, HAROLD. *Student, Royal College of Chemistry.*

F.I.C.; F.C.S.

BRAYBROOKE LODGE, HARROW-ON-THE-HILL.

SEVERN, WALTER DALRYMPLE. **1884-87.** *Chemistry.* **Assoc. R.C.S.**

In practice as Bacteriologist.

9, EARL'S COURT SQUARE, LONDON, S.W.

SEWARD, G. E. **1859.** *Student in Chemistry.*

M.D.; Surgeon-Major.

Indian Civil Service. Retired 1884.

3d, The Mansions, Earl's Court Road, London, S.W.

SEYMOUR, George. **1872-75.** *Mining.* **Assoc. R.S.M.**

A.M.Inst.C.E.; Mem. Inst. Min. and Met. (Past Pres.); Murchison Medal 1875.

Consulting Mining Engineer. Member of the firm of Bainbridge, Seymour, and Co.

13, St. Helen's Place, London, E.C.

SHACKLETON, William. **1888-91.** *Physics.* **Assoc. R.C.S.**

F.R.A.S.

1892, Computer to Solar Physics Committee in Astronomical Laboratory, at the Royal College of Science, London.

32, Octavia Street, Battersea, London, S.W. *Permanent Address:* 7, Enfield Street, Keighley, Yorkshire.

***SHANNON**, Arthur. **1878-81.** *Metallurgy.* **Assoc. R.S.M.**

Sometime Engineer to the Borneo Co., Ltd., Kuching, Sarawak.

SHAROTT, T. C. **1893-96.** *Chemistry.* **Assoc. R.C.S.**

SHARWOOD, William J. **1884-87.** *Mining.* **Assoc. R.S.M.**

Fell. Am. Chem. Soc.; De la Beche Medal 1887.

1888-90, Assayer to the Black Oak, Kelvin Mine, Tuolumne Co., California. 1890-92, Assayer to the Golden Gate Sulphuret Mining Co. 1892, Appointed Instructor in Chemistry at the University of California.

Soulsbyville, Tuolumne Co. California.

SHAW, G. *Student.*

Sub-Inspector of Science Schools under Science and Art Department.

5, Parkvedras Terrace, Truro; *and* c/o Science and Art Department, South Kensington, London, S.W.

SHAWCROFT, J. S. **1882.** *Student in Mining.*

Sometime Colliery Manager, Alfreton. Now in Chili.

SHEPHERD, JOHN W. **1890-93.** *Chemistry.* **Assoc. R.C.S.**

1893-95, Science Teacher, Thurso. 1895, Appointed Science Teacher under the Liverpool School Board.

263, SMITHDOWN ROAD, LIVERPOOL. *Permanent Address:* 479, ST. VINCENT STREET, GLASGOW.

***SHEPHERD**, R. BRIGHAM. **1846.** *Student, Royal College of Chemistry.*

Late Chemist to Cobalt Works.

SHERIFF, —. **1855.** *Student in Mining.*

Inventor of Improvements in Coal-cutting Machines.

SHORE, T. W. **1878-79.** *Student in Biology.*

M.D. (Lond.).

Warden of St. Bartholomew's Hospital, in the Medical School of which he is Lecturer on Biology. Has published several papers on the Comparative Anatomy of the Vertebrata.

ST. BARTHOLOMEW'S HOSPITAL, WEST SMITHFIELD, LONDON, E.C.

SIDEBOTHAM, CHARLES H. **1891-94.** *Metallurgy.* **Assoc. R.S.M.**

Bessemer Medal and Prize 1894.

Science Lecturer, School of Science and Art, Deansgate, Manchester.

HEATON MOOR HOUSE, HEATON MOOR, STOCKPORT.

SILLEM, WILLIAM. **1885.** *Student in Mining.*

Assoc. M.Inst.C.E.

Engineer at Cockerill's Works, Seraing; then Humbolt's Works at Kalk; now Electrical Engineer.

194, CROMWELL ROAD, LONDON.

SIMMONS, ARTHUR T. **1884-87.** *Physics.* **Assoc. R.C.S.**

B.Sc. (Lond.).

1888-90, Lecturer in Physics, Chemistry, etc., at the Science and Art Institute, Southport. 1891, Appointed Science Master at Tettenhall College, and Tutor in Geology for the University Correspondence College. 1893, Appointed Second Master of Tettenhall College. Author of *Physiography for Beginners* (Macmillan and Co.), and of various geological papers.

TETTENHALL COLLEGE, WOLVERHAMPTON. *Permanent Address:* c/o W. SIMMONS, ESQ., 10, BRIDGE STREET, SOUTHAMPTON.

***SIMPSON**, GEORGE. **1845.** *Student, Royal College of Chemistry.*

F.C.S.

Manufacturer of Coal-tar Colours. Member of the firm of Messrs. Simpson, Maule, and Nicholson.

***SIMPSON**, MATTHEW HENRY. **1880.** *Student in Metallurgy.*

Assoc.M.Inst.C.E.; Mem. Iron and Steel Inst.

1879, Managing partner, Phœnix Foundry, Lancaster. Subsequently engaged in gold mining. Died in British Guiana on February 29th, 1892.

SIMPSON, WILLIAM EVAN. **1892-95.** *Metallurgy.* **Assoc. R.S.M.**

c/o THE CASSEL GOLD EXTRACTING CO., LTD., 108a, HOPE STREET, GLASGOW. *Permanent Address:* "ROSELANDS," HIGH ROAD, LEYTONSTONE.

SIORDET, HERBERT L. **1884-86.** *Mechanics.* **Assoc. R.C.S.**

1886-89, In the Locomotive Works of Messrs. Krauss and Co., Munich. 1889, At the "Ealing Works," Sheffield. In September 1890 went out to Hayti, West Indies, and started Engineering Business. 1896, Received appointment at Humboldt's Mining Machinery Works, Kalk-near-Cologne.

MASCHINENBAN-ANSTALT HUMBOLDT, KALK-NEAR-COLOGNE, GERMANY. *Permanent Address:* c/o MESSRS. WATSON, ESAM AND BARBER, SOLICITORS, BANK STREET, SHEFFIELD.

SKELTON, JOHN R. **1878-80.** *Student in Chemistry.* **1881-82.** *Metallurgy.*

F.C.S.; F.I.C.; Mem. Soc. Chem. Ind.

1880-81, Chemist to the Stowmarket Explosives Co., Ltd. 1882-83, Senior Demonstrator in the Chemical Laboratory, London Hospital, E. 1883, Appointed Chemical Adviser to the Norwich Silk Crape Co., Ltd.

"THE HOMESTEAD," THORPE, ST. ANDREW, NORFOLK. *Permanent Address:* c/o THE NORWICH CRAPE CO., LTD., ST. AUGUSTIN'S, NORWICH.

SLADE, J. **1870-75.** *Student.*

F.G.S.

1865-85, Teacher of Geology, Mineralogy, Biology, and Botany at the Working Men's College, Birkbeck Institute, and at the City of London College. Author of various papers read before the Geologists' Association, etc.

CHAPEL ROAD, BEXLEY HEATH, KENT.

SMEETH, WILLIAM F. **1889-91.** *Geology and Metallurgy.* **Assoc. R.S.M.**

B.A. (Dublin).

Demonstrator in Geology at the Sydney University.

SYDNEY UNIVERSITY, SYDNEY, NEW SOUTH WALES.

SMITH, —. **1849.** *Student, Royal College of Chemistry.*

Formerly Professor of Chemistry at Sydney University, New South Wales.

***SMITH**, C. J. **1887-92.** *Mining.* **Assoc. R.S.M.**

Sometime Assistant Manager, Magyar Gold Mine, Hungary. Went to Matabeleland in 1895.

SMITH, ERNEST ALFRED. **1885-91.** *Metallurgy.* **Assoc. R.S.M.**

F.C.S. ; Mem. Soc. Chem. Ind.

1889-90, Chief Assistant to B. Kitto, Esq., Analyst and Assayer, London. 1890, Lecturer on Metallurgy, and Instructor in Assaying at the Royal College of Science, Dublin. In 1890 appointed Demonstrator of Assaying at the Royal College of Science, London.

17, OVAL ROAD, GLOUCESTER GATE, REGENT'S PARK, LONDON, N.W.

SMITH, ERNEST HEBER. **1884-87.** *Chemistry.* **Assoc. R.C.S.**

1888-89, Assistant Master at the Technical Schools, People's Palace, London, E. 1888-91, Evening Lecturer to the Great Eastern Railway Mechanics' Institute at Stratford. 1891-94, Head Science Master at the Technical Schools, Chester, and Organising Secretary to the Chester City Council. 1894, Appointed Lecturer under the Cambridge Town and County Councils.

17, CARLYLE ROAD, CAMBRIDGE; *and* ST. PETER'S COLLEGE, CAMBRIDGE.

SMITH, FRED. **1882-84.** *Student in Mining.*

Late Manager of the Cyanide Works, Buffelsdoorn Gold Mining Co. 1895, Chemist and Assayer to the Jubilee Gold Mining Co.

P.O. BOX 1324, JOHANNESBURG, S.A.R.

SMITH, FREDERICK H. **1887-90.** *Geology.* **Assoc. R.C.S.**

Deputy-Superintendent on the Geological Survey of India, Baluchistan.

GEOLOGICAL SURVEY OFFICE, CALCUTTA.

SMITH, F. P. **1876-81.** *Metallurgy.* **Assoc. R.S.M.**

SMITH, GEORGE. **1871-73.** *Geology.* **Assoc. R.S.M.**

B.Sc. (Lond.); Whitworth Scholarship 1871; Edward Forbes Medal 1873.

1878, Lecturer on Science at St. Gregory's College, Downside, Bath. 1881, Appointed Lecturer on Chemistry at Rutherford College, Newcastle-on-Tyne.

RUTHERFORD COLLEGE, NEWCASTLE-ON-TYNE. *Permanent Address:* THE RECTORY, SHERIFF MOUNT, GATESHEAD.

SMITH, JAMES HENRY. **1891-94.** *Mechanics.* **Assoc. R.C.S.**

Whitworth Scholarship 1894.

161, TIPPING STREET, ARDWICK, MANCHESTER.

SMITH, JOHN NIDD. **1848.** *Student, Royal College of Chemistry.*

Marine Engineer for Messrs. John Penn and Co., Greenwich.

***SMITH**, MILES H. **1864.** *Student in Chemistry.*

F.C.S.

Formerly Chemist to Messrs. Hopkin and Williams.

***SMITH**, RICHARD. *Instructor in Assaying, Royal School of Mines.*

Born in 1830, in London. One of those who took part in the formation of the Royal School of Mines in 1851. He began his career as Assayer and Metallurgist at the Museum of Economic Geology in Craig's Court, in 1845, under Mr. Richard Phillips, F.R.S. On the institution of the School of Mines Mr. Smith was appointed Assistant to Dr. Percy, and Instructor in Assaying in the Metallurgical Laboratory. He retired early in 1891, and died on August 6th of the same year.

SMITH, SAMUEL W. J. **1887-90.** *Physics.* **Assoc. R.C.S.**

B.A. (Camb.).

Scholar and Coutts-Trotter Student of Trinity College, Cambridge.

TRINITY COLLEGE, CAMBRIDGE. *Permanent Address:* 16, OTTERBURN TERRACE, JESMOND, NEWCASTLE-ON-TYNE.

SNELUS, GEORGE JAMES. **1864-67.** *Mining and Metallurgy.* **Assoc. R.S.M.**

F.R.S.; F.C.S.; Mem. Inst. Mech. Eng.; Mem. Iron and Steel Inst. (Vice-Pres.); De la Beche Medal, R.S.M. 1867.

Born in 1837. Educated at St John's College, Battersea, and at Owens College, Manchester, from whence he obtained a Scholarship to the Royal School of Mines. 1866-71, Chief Chemist to the Dowlais Works. 1871,

Was recommended by the late William Menelaus as Scientific Adviser to the Iron and Steel Institute's Commission sent out to the United States to investigate and report on the Danks Rotatory Puddling Process. This investigation, coupled with his experience at the Dowlais Works, led Mr. Snelus to his great discovery of the elimination of phosphorus from iron in the Bessemer Converter lined with basic material. For his discovery he was awarded the Bessemer Gold Medal by the Iron and Steel Institute in 1883. Is a member of the Iron and Steel Institute, and has been a member of its Council since 1881 ; now Vice-President. Author of numerous contributions to the *Journ. Iron and Steel Inst.*

Ennerdale Hall, Frizington, Cumberland; *and* 28, Victoria Street, London, S.W.

SNELUS, George J. **1888-91.** *Mining and Metallurgy.* **Assoc. R.S.M.**

Metallurgical Chemist (Consulting and Analytical).

Ennerdale Hall, Frizington, Cumberland; *and* 28, Victoria Street, London, S.W.

SNELUS, John Ernest. **1891-94.** *Mining.* **Assoc. R.S.M.**

Abertillery Road, Blaina, Monmouthshire.

SOLLAS, W. Johnson. **1867-70.** *Geology.* **Assoc. R.S.M.**

D.Sc. (Camb.); LL.D. (Dublin); F.R.S.; F.R.S. (Edin.); F.G.S.

Formerly Professor of Geology at the University College, Bristol. Subsequently appointed to the Chair of Geology and Mineralogy in the University of Dublin, and Petrographer to the Geological Survey of Ireland. 1896, On a Scientific Expedition in the South Pacific.

Lisnabin, Dartry Park Road, Rathgar, Dublin.

SOWERBUTTS, Henry. **1885-88.** *Chemistry.* **Assoc. R.C.S.**

1888, Appointed Science Master to the Central School Board, Manchester.

33, Marshall Place, Cheetham, Manchester.

SOWTER, Robert. **1893-96.** *Physics.* **Assoc. R.C.S.**

1896, Junior Demonstrator in Physical Laboratory at the Royal College of Science.

Royal College of Science, London. S.W. *Permanent Address:* Huntock House, Brighouse, Yorkshire.

SPEAK, SAVANNAH J. **1886-89.** *Metallurgy.* **Assoc. R.S.M.**

Assoc. Inst. Min. and Met.; Mem. Council Chem. and Met. Soc. of South Africa.

1890-91, Assayer and Assistant Engineer to the South African Finance and Prospecting Syndicate. 1892-95, Lecturer on Metallurgy, and Demonstrator of Chemistry and Assaying at Sydney University, New South Wales. 1891, Mining Engineer to the Damaraland Exploration Syndicate. 1895, Chief Chemist and Cyanide Manager to the Deep-level Cos. of the Rand Mines, Ltd., Johannesburg. 1895, Erecting Cyanide Works for two hundred stamps for the Geldenhuis Deep Gold Mining Co., Ltd. 1896, Manager of Cyanide Works for the Geldenhuis Deep Gold Mining Co., Ltd.

GELDENHUIS DEEP GOLD MINING CO., LTD., PER PRIVATE BAG, JOHANNESBURG, S.A.R. *Permanent Address:* RAND MINES, LTD., P.O. BOX 771, JOHANNESBURG, S.A.R.

SPENCER, BERNARD ERIC. **1891-94.** *Physics.* **Assoc. R.C.S.**

Tyndall Prize 1892.

With Messrs. S. Pearson and Son, Contractors, Port Talbot Docks, South Wales.

ROSE MANOR, ABERAVON, SOUTH WALES. *Permanent Address:* 38, ASHGROVE, BRADFORD.

SPENCER, JOHN. **1884-86.** *Mechanics.* **Assoc. R.C.S.**

***SPENCER**, JOHN ALBERT. **1845.** *Student, Royal College of Chemistry.*

F.C.S.

Manufacturer of Photographic Materials and Joint Inventor of the Carbon Printing Process. Formerly partner in the firm of Spencer, Sawyer and Bird, now known as "The Autotype Company."

SPILLER, JOHN. **1848-50.** *Student, Royal College of Chemistry.*

F.I.C.; F.C.S.; Vice-Pres. Soc. Chem. Ind.; Vice-Pres. Roy. Phot. Soc. (President 1875).

1850-53, Assistant at Royal College of Chemistry, 1853-56, Assistant in Metallurgical Laboratory at the Royal School of Mines. 1856-73, Examiner in Chemistry at the City of London School. 1856-68, Assistant Chemist to the War Department, and 1864-68 Lecturer on Metallurgy at the Royal School of Gunnery, Shoeburyness. 1868-88, Consulting Chemist, Atlas Dye Works. Member of Essex County Technical Committee, and Hon. Inspector of Science Classes. Member of General Committee of the British

Association. Author of several papers in the *Proc. Roy. Soc., Journ. Chem. Soc., Journ. Roy. Phot. Soc., Reports of Brit. Assoc.*, and *Geol. Magazine*. Joint author of "The Iron Ores of Great Britain," published in *Memoirs of the Geological Survey*.

2, St. Mary's Road, Canonbury, London, N.; *and* Cleveland Villa, Southwold.

SPILLER, William. **1851-52.** *Student, Royal College of Chemistry.*

F.I.C.; F.C.S.

After leaving the College entered the service of Messrs. Simpson, Maule and Nicholson, Locksfields, Walworth; and, later, assisted in the manufacture of Aniline and Coal Tar Colours at their Hackney Wick factory. In 1868 became a partner in the newly constituted firm of Messrs. Brooke, Simpson and Spiller, who took over the aforesaid factory, and subsequently incorporated with it the Greenford Works of Messrs. Perkin and Sons, for the manufacture of Alizarine. Introduced several improvements in the processes of making Coal Tar Colours, one of which—"Spiller Purple"—became identified with his name.

66, Fitzjohn's Avenue, Hampstead, London, N.W.

SPOONER, Archibald St. G. **1883-86.** *Metallurgy.* **Assoc. R.S.M.**

1887, Assayer and Sub-Manager at Mount Leyshon Mines, Queensland. 1892, Factory Overseer in Sugar Works, St. Kitts, and Demerara. 1894, Factory Overseer in Antigua. 1894, Appointed Factory Manager to the Leeward Islands Produce Co., Ltd. 1895, Attorney Leeward Islands Produce Co., Ltd.

Belvidere Estate, Antigua, British West Indies. *Permanent Address:* 26, Brook Green, London, W.

SQUIRE, W. S. **1851.** *Student, Royal College of Chemistry.*

Ph.D.; F.C.S.; Mem. Iron and Steel Inst.

Manufacturing Chemist.

STANFIELD, Richard. **1886-89.** *Metallurgy.* **Assoc. R.S.M.**

Whitworth Scholarship 1884; F.R.S. (Edin.); A.M. Inst. C.E.; Bessemer Medal 1889; F. Royal Scot. Soc. of Arts.

1889, Appointed Professor of Engineering and Applied Mechanics at the Heriot Watt College, Edinburgh.

Heriot Watt College, Edinburgh.

STANILAND, MEABURN. **1879-82.** *Metallurgy and Mining.* **Assoc. R.S.M.**

Murchison Medal 1881 ; F.G.S.

1883, Appointed to the Geological Survey of England and Wales. Retired. Author of "Analysis with Notes of Neocomian Rocks," published in J. Jukes-Browne's *Memoir on the Geology of East Lincolnshire.*

LANGTON OLD HALL, SPILSBY, LINCOLNSHIRE; *and* REFORM CLUB, PALL MALL, LONDON, W.

STANSFIELD, ALFRED. **1888-91.** *Metallurgy* (*Honours*). **Assoc. R.S.M.**

B.Sc. (Lond.).

1894, Appointed Assistant to Professor Roberts-Austen, C.B., F.R.S., at the Royal Mint, and Lecture Assistant in Metallurgy at the Royal School of Mines.

ROYAL MINT, LONDON, E. *Permanent Address:* BROOK'S LANE, WHALLEY, NEAR BLACKBURN.

STANSFIELD, HERBERT. **1889-93.** *Physics.* **Assoc. R.C.S.**

First Place, First Class Honours, in Experimental Physics at the Inter. B.Sc., London 1894; Neil Arnott Exhibition and Medal.

1894, Appointed Lecturer in Physics at the People's Palace Science Schools.

ALDERSYDE, HAINAULT ROAD, LEYTONSTONE, LONDON, E. *Permanent Address:* BROOK'S LANE, WHALLEY, NEAR BLACKBURN.

STANTON, HENRY L. **1887-90.** *Mining.* **Assoc. R.S.M.**

Surveyor to the New Kleinfontein Co., Ltd., South Africa.

NEW KLEINFONTEIN CO., LTD., BENONI, *viâ* BOXBURG, TRANSVAAL, SOUTH AFRICA. *Permanent Address:* 46, COTHAM VALE, CLIFTON, BRISTOL.

STANTON, J. **1882.** *Student in Mining.*

STARLING, SYDNEY G. **1891-93.** *Physics.* **Assoc. R.C.S.**

Murchison Medal and Prize 1892.

1893-95, Assistant Demonstrator in Physics at the Royal College of Science. 1895, Appointed Assistant in Mathematics and Physics at the Battersea Polytechnic Institute.

7, CROMARTIE ROAD, HORNSEY RISE, LONDON, N.

STATTER, H. B. **1876-79.** *Mining.* **Assoc. R.S.M.**

STENHOUSE, Ernest. **1892-95.** *Zoology.* **Assoc. R.C.S.**

8, West Street, Rochdale.

STEPHENS, —. **1857.** *Student in Mining.*

STEPHENSON, Erskine H. B. **1880-84.** *Metallurgy.* **Assoc. R.S.M.**

STEPHENSON, George. **1887-89.** *Student.*

Science Master at the Warehousemen and Clerks' Schools, Cheadle Hulme, Stockport.

Acomb, near York.

STEPHENSON, Herbert F. **1886-89.** *Chemistry.* **Assoc. R.C.S.**

F.C.S.

1889, Appointed Assistant to Charles E. Groves, Esq., F.R.S.

352, Kennington Road, London, S.E.

STEVENSON, Marion W. [*See* Acworth, M. W.]

STEWART, —. **1849.** *Student, Royal College of Chemistry.*

M.D.

Late Physician at Middlesex Hospital.

STREATFEILD, Hugh S. **1886-90.** *Mining and Geology.* **Assoc. R.S.M.**

Mem. Fed. Inst. Min. Eng.

Resident Director of the Ryhope Colliery, near Sunderland.

Ryhope Hall, Ryhope, Sunderland.

STRICKLAND, H. **1876-79.** *Mining.* **Assoc. R.S.M.**

Grand Junction, Colorado.

STROMEYER, Louis. **1887-90.** *Mining.* **Assoc. R.S.M.**

Assistant Superintendent, Kempin Rote Gold Mining Co., Ltd., Hassan District, India.

Kempin Rote, Hassan District, Mysore Province, India. *Permanent Address :* Strawberry Hill, Middlesex.

ST. STEPHENS, RAYNARDE HÉLÉ. **1884-86.** *Metallurgy.* **Assoc. R.S.M.**

Formerly Manager to the Kolar Gold Mines, Mysore, India. Subsequently Mechanical Engineer to the United Mexican Mines, Guanajito, Mexico. Now Manager to the Kabyn Gold Syndicate, Siam.

Permanent Address : 25, FORDWYCK ROAD, LONDON, N.W.

STUART, J. W. R. **1887.** *Student in Mining.*

Mine Surveyor in West Australia.

FARQUAHAR ROAD, NORWOOD.

STUART-MENTEATH, PATRICK WILLIAM. **1864-65** *and* **1878-80.** *Mining and Metallurgy.* **Assoc. R.S.M.**

Mem. French Geol. Soc.

Certificated pupil of the Clausthal Practical Mining School. Formerly in the Royal Navy, and sometime Journalist and War-Correspondent. Sometime Chief Assistant to the Technical Manager at the Rio Tinto Mines. Many years Manager of the Mines of Ainhoa, Changoa, Ollin, Arrieta, Arive, etc., in the Pyrenees. Author of many papers and maps relating to the Geology of the Pyrenees, published in French and Spanish.

MAISON AITA-BEITA, ST. JEAN DE LUZ, FRANCE.

***STUBBS**, —. **1857-58.** *Student in Mining.*

STUDLEY, SAMUEL H. **1887-90.** *Metallurgy.* **Assoc. R.S.M.**

Assistant Waterworks Engineer to the Sheffield Corporation.

22, HAVLEOCK SQUARE, BROOMHALL, SHEFFIELD. *Permanent Address :* WATER WORKS OFFICE, SHEFFIELD.

STURGE, GEORGE. **1845.** *Student, Royal College of Chemistry.*

Merchant.

STYLES, R. CURLING. **1890-93.** *Metallurgy.* **Assoc. R.S.M.**

F.C.S.

1893-96, Assistant to Professor Roberts-Austen, C.B., F.R.S. At present Chemist to Messrs. J. B. White and Brothers, Cement Manufacturers, Swanscombe, Kent.

KNOCKHALL, GREENHITHE, KENT.

SUTTON, ALFRED. **1881-84.** *Metallurgy.* **Assoc. R.S.M.**

Whitworth Scholarship 1881.

1884, Appointed Assistant Examiner in H. M. Patent Office.

H. M. PATENT OFFICE, SOUTHAMPTON BUILDINGS, LONDON, W.C.

SWAIN, —. **1845.** *Student, Royal College of Chemistry.*

Physician. Formerly in practice in London.

SWANN, F. *Student.*

B.A.; B.Sc. (Lond.).

1888-93, Science Master at Newcastle Grammar School. 1893, Appointed Head-Master of the Ilkley Grammar School, Yorkshire.

THE GRAMMAR SCHOOL, ILKLEY, YORKSHIRE.

SWINBURNE, UMFREVILLE P. **1888-91.** *Student in Mining.*

F.G.S.; Mem. Inst. Min. and Met.

1892-95, Managing various Gold Mines in Mashonaland. 1895, Went to West Australia.

Permanent Address: CAPHEATON, NEWCASTLE-ON-TYNE, NORTHUMBERLAND.

SWORDS, WILLIAM FRANCIS. **1892-95.** *Chemistry.* **Assoc. R.C.S.**

EAST ROAD, WOOLSTONE, SOUTHAMPTON.

SYED, ALI BILGRAMI. **1876-78.** *Geology.* **Assoc. R.S.M.**

B.A.; LL.B.; F.G.S.; F.R.A.S. (London and Bombay); Mem. Inst. Mech. Eng.; Mem. Asiatic Soc., Bengal.

Formerly Director-General of Mines to H.H. The Nizam's Government. Subsequently appointed Secretary of Public Works Department of Railways and Mines. Now member of the Legislative Council, and Official Director of H.H. The Nizam's Guaranteed State Railway, and of the Hyderabad (Deccan) Co., Ltd.

MINISTRY OF PUBLIC WORKS, HYDERABAD, DECCAN, INDIA.

T

TALBOT, F. R. SAMUEL. **1891-94.** *Physics.* **Assoc. R.C.S.**

B.Sc. (Lond.).

Formerly Science Master at Tiverton Technical School, Devonshire.

Permanent Address : 42, NORFOLK ROAD, ESSEX ROAD, LONDON, N.

TANNER, H. W. LLOYD. **1867-68.** *Geology.* **Assoc. R.S.M.**

M.A. (Oxford); F.R.A.S.; Mem. Lond. Math. Soc. (Past Mem. of Council).

1873-75, Assistant Master, Sherborne School. 1875-79, Professor of Mathematics in the Royal Agricultural College, Cirencester. 1879-83, Assistant Master, Bristol Grammar School. 1883, Professor of Mathematics in the University College, Cardiff. Has contributed several papers to *Proc. Lond. Mathematical Society*, the *Messenger of Mathematics*, the *Quart. Journ. Mathematics*, etc.

27, CWRT-Y-FIL ROAD, PENARTH, GLAMORGAN. *Permanent Address :* UNIVERSITY COLLEGE, CARDIFF.

TARVER, PERCY. **1891-94.** *Chemistry.* **Assoc. R.C.S.**

Analyst to Messrs. Stanger and Blount, Broadway, Westminster, London, S.W.

19, SANDWELL PARK, WEST END LANE, HAMPSTEAD, LONDON, N.W.

TATE, RALPH. **1870.** *Student in Geology.*

F.G.S.; F.L.S.

Balance of "Murchison Geological Fund" (Geol. Soc. 1874). Sometime Curator of Geological Society's Museum. Professor of Natural Science, University of Adelaide, South Australia.

THE UNIVERSITY, ADELAIDE, SOUTH AUSTRALIA.

TATE, WILLIAM. **1886-89.** *Chemistry* (*honours*). **Assoc. R.C.S.**

Murchison Prize 1888; F.C.S.

Formerly Assistant in Chemistry at the Royal College of Science. 1896, To India.

TAYLOR, ALBERT. **1883-89.** *Chemistry and Metallurgy.* **Assoc. R.C.S. Assoc. R.S.M.**

F.R.A.S.

1889, Superintended the Solar Eclipse Expedition to Santa Paula de Loanda. 1893, In charge of the Total Solar Eclipse Expedition to Paracuru, Brazil. 1895, Appointed Sub-Inspector under the Science and Art Department.

28, RUSKIN ROAD, TOTTENHAM, LONDON.

TAYLOR, H. CUMBERLAND. **1863-66,** *and* **1868-69.** *Metallurgy and Mining.* **Assoc. R.S.M.**

M.D.

Physician. In practice in Jersey.

46, DAVID PLACE, ST. HELIER, JERSEY.

TAYLOR, HERBERT JOHN. *Student in Chemistry and Physics.*

F.C.S.

1891-94, Assistant Science Master to the Manchester School Board. 1894, Appointed Science Master to the Dewsbury and District Technical School.

9, PORTLAND VILLAS, BATH STREET, DEWSBURY.

TAYLOR, H. Y. **1845.** *Student, Royal College of Chemistry.*

Pharmaceutical Chemist.

TAYLOR, JAMES. **1871-74, 1878-80.** *Metallurgy.* **Assoc. R.S.M.**

Whitworth Scholarship 1870; B.Sc. (Vic.); F.C.S.; Mem. Iron and Steel Inst.; Mem. Soc. Chem. Ind.; Fellow Royal Soc. New South Wales.

1874-78, Demonstrator in Metallurgy at Owens College, Manchester. 1878-79, Consulting Chemist to the Nitrate and Railway Co., Antofagasta, Chili. 1880-84, Metallurgist to Messrs. Holloway Bros., London and Majdanpek, Servia. 1884-92, Chief Chemist to Messrs. T. Firth and Sons, Sheffield. 1893, Appointed Superintendent of Metallurgical Works to the New South Wales Government. Translated J. Landauer's *Blowpipe Analysis.*

GOVERNMENT METALLURGICAL WORKS, CLYDE, NEW SOUTH WALES.
Permanent Address: BLAEN CRAI, DUNDAS, NEW SOUTH WALES.

TAYLOR, William Arthur. **1893-96.** *Mechanics.* **Assoc. R.C.S.**

Whitworth Scholarship 1896.

15, Havelock Street, Crewe, Cheshire.

***TAWNEY**, Edward Bernard. **1860-63.** *Mining and Geology.* **Assoc. R.S.M.**

F.G.S.

For some time Curator of the Bristol Museum, and afterwards Assistant to the Woodwardian Professor of Geology at Cambridge. Died at Mentone December 30th, 1882, aged forty-two.

TERRERO, Manuel M. **1874-78.** *Geology.* **Assoc. R.S.M.**

Murchison Medal 1878.

1883-84, Assistant in the Biological Laboratory, Royal College of Science.

50, Belsize Park Gardens, London, N.W.

TERRY, —. **1869.** *Student in Mining.*

Sometime Mine Agent at Dudley.

***TESCHEMACHER**, Edward Frederick. **1859.** *Student in Chemistry.*

F.C.S.; F.G.S.; F.R.G.S.

Born 1843. Grandson of the late Richard Phillips, F.R.S., the Curator of the Museum of Economic Geology, Craig's Court. Began his chemical studies in 1859, continuing them under Professor Williamson at the University College. Subsequently entered his father's laboratory, and eventually entered into partnership with Mr. J. Denham Smith, his father's successor. His published papers deal chiefly with Chemical Analysis. Died September 13th, 1877.

THACKERAY, J. R. **1895.** *Student in Mining.*

43, Richmond Terrace, Darwen, Lancashire.

THOMAE, William F. A. **1885-88.** *Mining.* **Assoc. R.S.M.**

Assoc. Inst. Min. and Met.; Mem. Am. Inst. M.E.

1888-91, Assayer and Mining Engineer to Messrs. Becher, Louis, and Co., Singapore. 1892-95, Assayer and Consulting Mining Engineer to the Hamburg Metal Co., Zeehan, Tasmania. 1896, Appointed Mining Engineer to the Kuluk Mining Syndicate, Smyrna. Author of "The Zeehan and Dundas Silver Field, Tasmania" (Inst. Min. and Met.).

c/o Kuluk Mining Syndicate, Smyrna. *Permanent Address:* 3, Jessel Mansions, Queen's Club Gardens, West Kensington.

THOMAS, JOHN, **1892-95.** *Chemistry.* **Assoc. R.C.S.**

THOMPSON, CHARLES G. **1885-88.** *Mining.* **Assoc. R.S.M.**

THOMPSON, COURTENAY W. **1884-86.** *Mining.* **Assoc. R.S.M.**

Late Manager in the Transvaal to the Graskop, the Jubilee, the Main Reef, the Johannesburg Pioneer, the Langlaagte Royal, the Buffelsdoorn Gold Mining Cos., etc. Also late Manager of the New Morgan Gold Mine, North Wales, under the British Gold Fields, Ltd. 1896, Appointed to take charge of the properties of the Anglo-Netherland Exploration of West Australia.

c/o ANGLO-NETHERLAND EXPLORATION CO., LTD., PERTH, WEST AUSTRALIA; *and* 3, PRINCE'S STREET, LONDON, E.C. *Permanent Address:* 30, COLLEGE ROAD, BROMLEY, KENT.

THOMPSON, EDWARD C. **1889-93.** *Chemistry.* **Assoc. R.C.S.**

B.Sc. (Lond.) 1894 (1st class, Hon. Chem.); F.C.S.

Analyst to Messrs. Hills' Chemical Works, Deptford, London, S.E.

48, KESTREL AVENUE, HERNE HILL, LONDON.

THOMPSON, FRANK E. **1889-92.** *Chemistry.* **Assoc. R.C.S.**

F.C.S.

Science Master at the Technical School, Smallheath, Birmingham, and Teacher of Chemistry at the Dudley Institute, and at the Waverley Road Technical School, Birmingham.

97, MURDOCK ROAD, HANDSWORTH, BIRMINGHAM.

THOMPSON, GEORGE R. **1889-91.** *Mining.* **Assoc. R.S.M.**

B.Sc. (Lond.).

Lecturer on Mining to the Cumberland County Council. Formerly Lecturer on Science at various Schools in Cumberland.

153, HUNSTER ROAD, LEEDS.

THOMPSON, H. E. **1870.** *Student in Chemistry.*

Indian Telegraph Department, Assistant Superintendent.

THOMPSON, JAMES. **1891-94.** *Metallurgy.* **Assoc. R.S.M.**

Formerly Assayer in the Broken Hill Assay Office, Mark Lane, London, E.C.

HEPWORTH BUILDINGS, NEWGATE STREET, BARNARD CASTLE, DURHAM.

***THOMS**, WILLIAM. **1846.** *Student, Royal College of Chemistry.*

Manufacturing Chemist.

***THOMSON**, Alexander Morrison. **1860.** *Student in Geology, Chemistry, etc.*

B.A.; D.Sc. (Lond.); F.C.S.

Born 1841. Educated at Aberdeen. 1859, To King's College. Subsequently appointed Reader in, and in 1870 Professor of, Mineralogy and Geology at Sydney University, New South Wales. Author of Memoirs *On the Wellington Caves*, *On the Abercrombie River*, and *On the Diamond Fields of Mudgee*, etc. Died November 16th, 1871, aged thirty.

THORBURN, Frederick Harrison. **1891-94.** *Metallurgy.* **Assoc. R.S.M.**

Romanby, Northallerton, Yorkshire.

THORNTON, H. **1882.** *Student in Mining.*

Assistant to Sir George Elliott.

***THORNTON**, Richard. **1855-57.** *Mining and Metallurgy.* **Assoc. R.S.M.**

Appointed by Murchison to accompany Livingstone to Africa in 1858 as Mineralogist. Died in Africa, while serving under Baron von der Decken.

THORP, William. **1864-67.** *Student in Chemistry.*

B.Sc. (Lond.); F.I.C. (Past Mem. of Council); F.C.S. (Past Mem. of Council); Mem. of Council of Soc. Chem. Ind., and Past Chairman of London section; Mem. Phys. Soc.

1867-77, Principal Assistant Royal Commission on Pollution of Rivers. 1872-95, Assist. General Manager Lewis Berger and Sons, Ltd., Colour Makers, Homerton, Sheffield.

24, Crouch Hall Road, Crouch End, London, N.

TIGERSTEDT, Axel Fredrik. *Student.*

M.A.; M.P.; F. Econ. Soc., Geol. Soc., Chem. Soc., and Geog. Soc. of Helsingfors, Finland; F. Geol. Soc. Stockholm.

1883-87, Superintendent of the Gold Washings of Lapland. 1885-89, Manager of the Steel Works and Iron Foundries at Wärtsila. 1887, State Geologist in Finland. Appointed Official Mining Engineer and Metallurgist at the "Industristyrelsen," in Finland. 1888, Lecturer on Metallurgy and Mining in the Polytechnic Institute in Helsingfors, and since 1894 Director of the "Dalsbruk Iron and Steel Works." Author of *A Popular Geology*, and of papers on Archæan Rock Formations in Finland, etc. Since 1895 he has been one of the Editors of the weekly paper, *Teknikern*.

Ö. Brunsparken, 11, Helsingfors, Finland. *Permanent Address:* Industristyrelsen, Helsingfors, Finland.

TILDEN, W. A. **1860-62.** *Student in Chemistry, Physics, and Geology.*

D.Sc. (Lond.); F.R.S. (Past Mem. of Council); F.I.C. (Past Pres.); F.C.S. (Vice-Pres.); etc.

1862-63, In the Research Laboratory of the late Dr. Stenhouse. 1863-70, Demonstrator of Chemistry in the Laboratory of the Pharmaceutical Society. 1872-80, Senior Science Master at Clifton College. 1880-92, Professor of Chemistry at Mason College, Birmingham. Appointed in 1894 to the Chair of Chemistry at the Royal College of Science. He is author of *Introduction to the Study of Chemical Philosophy*, and other text-books; also of many papers published in the *Transactions* of various societies. (Further, *see* PROFESSORS.)

ROYAL COLLEGE OF SCIENCE, SOUTH KENSINGTON, LONDON, S.W.

TINDALL, JOHN EDWARD. **1890-92.** *Student in Physics, Geology, and Mechanics.*

B.Sc. (Lond.), 2nd Class, Hon. in Physics.

1892-96, Science Demonstrator to the Liverpool School Board. 1896, Appointed Lecturer in Physics Department, Leeds Modern School (Science).

LEEDS MODERN SCHOOL, HILLSIDE, TADCASTER.

TINDALL, WILLIAM F. P. **1888-91.** *Metallurgy.* **Assoc. R.S.M.**

Mem. Am. Inst.M.E.

1892-93, Assayer to the Black Hills Milling and Smelting Co., Rapid City, U.S.A. 1893-96, Instructor in Assaying at the State School of Mines, Rapid City, Dakota, U.S.A. 1896, Chemist to the Metallic Extraction Co., Colorado.

c/o THE METALLIC EXTRACTION CO., CYANIDE, COLORADO, U.S.A. *Permanent Address:* HILLSIDE VILLA, REDHILL, SURREY.

TOMLINSON, JOHN HENRY. **1882.** *Student.*

Whitworth Scholarship 1882.

1884, Appointed Assistant Examiner in H. M. Patent Office, Chancery Lane.

8, FURNIVAL'S INN. *Permanent Address:* H. M. PATENT OFFICE, SOUTHAMPTON BUILDINGS, LONDON, W.C.

TOOKEY, CHARLES. **1851.** *Student, Royal College of Chemistry.*

F.I.C.; F.C.S.

1852, Assistant Royal College of Chemistry. 1854-55, Assistant to Dr. Stenhouse, St. Bartholomew's Hospital. 1856-65, Assistant to Dr. Percy at

the Royal School of Mines. 1865-68, Assayer in H.M. Mint, Hong Kong. 1870-74, Assayer, Chemist, Superintendent of Refinery, and Temporary Director, Japanese Imperial Mint, Osaka. 1874-78, Chemist on Admiralty Boiler Committee. Author of paper "On the Separation of Tin, Lead, and Antimony with Small Quantities of Copper" (1862); and "On the Manipulation of Assays of Gold and Silver Bullion" (*Journ. Chem. Soc.*, 1870).

Portland Hotel, Great Portland Street, London, W.

***TOPLEY**, William. **1858-61.** *Student in Geology, Chemistry. etc.*

F.R.S.; Assoc. Inst. Civ. Eng.; F.G.S.

Born 1841. Educated at the Royal School of Mines, Jermyn Street 1858-61. 1862, Appointed Assistant Geologist to the Geological Survey. He prepared the descriptive memoir of the Survey of the Wealden area, which was published in 1875. In 1869 he was appointed Geologist to the Survey, and until 1880 was engaged in field work in Northumberland and Durham. In 1880 he was called to superintend the publication of Maps and Memoirs at the Geological Survey Office in Jermyn Street, and in 1893, on the retirement of Mr. Edward Best, he was appointed to the entire charge of this office. For some years he took a leading part in the publication of the *Geological Record*, undertaking the post of Editor in 1887. For many years he was on the Council of the London Geological Society, and also President and Vice-President of the Geologists' Association. He was the author of over eighty published memoirs and papers, and of more than twenty sheets of geological maps. He wrote a Report on the Geological Distribution of Gold and Silver; investigated the Occurrence of Phosphates, and wrote several papers on the subject of "Coal in Kent." From 1875 he was Examiner in Geology to the Durham University, and at the Newcastle College of Science. He also succeeded Mr. Bristow as Examiner in Geology to the Science and Art Department. He died at Croydon in September 1894.

TOWNSEND, Harry P. **1890-93.** *Mining.* **Assoc. R.S.M.**

B.A. (Cape of Good Hope).

1894-95, Assayer to the Wemmer's Pan Cyanide Works. 1895-96, Surveyor to the Porges Randfontein Gold Mining Co., Ltd. 1896, Appointed Surveyor and Assayer to the Molyneux Mines Consolidated, Ltd.

c/o Molyneux Mines Consolidated, Ltd., Heidelberg, S.A.R. *Permanent Address:* P.O. Box 74, Port Elizabeth, Cape Colony.

TREDCROFT, H. E. **1872-76, 1879-80.** *Mining.* **Assoc. R.S.M.**

TREVOR, TUDOR G. **1882-86.** *Metallurgy.* **Assoc. R.S.M.**

F.G.S.

1886-87, Assayer to the Rio Tinto Co., Spain. 1887-92, Various appointments in South Africa.

TOKA, I'SHENNI'S POORT, SMITSDORP, S.A.R. *Permanent Address:* c/o H. ANDERSON, ESQ., NEWCASTLE, NATAL.

TRUSCOTT, SAMUEL J. **1886-89.** *Mining.* **Assoc. R.S.M.**

F.G.S.; Murchison Prize 1888; De la Beche Medal 1889.

Formerly Assayer and Surveyor to the Main Reef Gold Mining Co., Johannesburg; Assistant Manager to the Lisbon-Berlyn Gold Mining Co., Lydenburg. Subsequently Assayer to the Penjin Gold Mining Co., Malay Peninsula, and Assistant Mining Engineer to Messrs. Becher, Louis, and Co., Singapore. 1895-96, Sampler to the Geldenhuis Estate Gold Mining Co., Johannesburg. 1896, Engineer in the employ of the Consolidated Gold Fields, South Africa, Co., Ltd.

c/o THE CONSOLIDATED GOLD FIELDS, SOUTH AFRICA, P.O. Box 67, JOHANNESBURG, S.A.R.

TUBBS, WILLIAM EDWARD. **1892-96.** *Mechanics.* **Assoc. R.C.S.**

NORTH-EASTERN COUNTY SCHOOL, BARNARD CASTLE, DURHAM. *Permanent Address:* 7, MARKET SQUARE, WOLVERTON, BUCKS.

TURNER, BASIL WILLIAM. **1892-95.** *Metallurgy.* **Assoc. R.S.M.**

Mining, 1896.

TURNER, THOMAS. **1878-83.** *Metallurgy.* **Assoc. R.S.M.**

F.I.C.; F.C.S.; Mem. Iron and Steel Inst.; De la Beche Medal 1883.

1893-94, Lecturer on Metallurgy, and Senior Demonstrator in Chemistry at the Mason College, Birmingham. 1894, Appointed Director of Technical Instruction to the Staffs County Council. *Author of* "The Metallurgy of Iron and Steel."

RAVENHURST, ROWLEY PARK, STAFFORD.

TURNER, WILLIAM JAMES. **1892-95.** *Metallurgy.* **Assoc. R.S.M.**

1896, Appointed Manager of the Brookman Boulder Mine, Western Australia.

BROOKMAN BOULDER MINE, KALGOORLIE, WEST AUSTRALIA.

TUTTON, ALFRED E. **1884-86.** *Chemistry.* **Assoc. R.C.S.**

F.C.S.; Murchison Medal 1885; Tyndall Prize 1885; Frank Hatton Prize 1886.

1887-95, Demonstrator in Chemistry and Lecturer on Chemical Analysis at the Royal College of Science. 1895, Appointed Inspector of Science Schools in the Oxford District, under the Science and Art Department.

17, BARDWELL ROAD, OXFORD; *and* c/o SCIENCE AND ART DEPARTMENT, SOUTH KENSINGTON, LONDON, S.W.

TWEEN, AMBROSE. **1854-56.** *Student.*

For some years Curator of the Calcutta Museum; Member of the Indian Geological Survey from 1858 to 1876, when he retired.

6, APSLEY TERRACE, ILFRACOMBE.

TWITE, —. **1860.** *Student in Mining.*

Late Government Mining Agent in Paraguay.

TYLDEN-WRIGHT, CHARLES. **1854.** *Student in Mining.*

M.Inst.C.E.; F.G.S.; J.P. (Notts., Worc., and Staffs.).

1858-84, Managing Director Shireoaks Collieries. 1884-90, Chief Agent to the Guardians of the Earl of Dudley. Now Chairman of the Shireoaks Co.; Director of the Monckton Main and J. and G. Wells' Collieries, and the Sheffield and South Yorkshire Navigation Co.: Viewer to the Duke of St. Albans; Mr. Webb, of Newstead Abbey; and the Duchy of Lancaster, in the West Riding. Author of paper on "Shireoaks Colliery" in *Journ. Geol Soc.*, and "The Channel Tunnel" in *Proc. N. of Eng. Inst. Eng.*

WORKSOP, NOTTINGHAMSHIRE.

TYRER, THOMAS. *Student, Royal College of Chemistry.*

F.I.C.; F.C.S.; Past-Pres. Soc. Chem. Ind.

Sometime partner in May and Baker's, of Battersea; now partner in T. Tyrer and Co., Stirling Chemical Works, Stratford.

3, NORWICH ROAD, FOREST GATE, LONDON, E.

V

***VALENTIN,** WILLIAM GEORGE. **1855.** *Student in Chemistry.*

F.C.S.

Born at Nevenberg in the Black Forest, May 16th, 1829. To England in 1855, and entered the Chemical Department of the Royal School of Mines. Subsequently Senior Assistant to Dr. Hofmann and Dr. Frankland. Chemical Adviser to Trinity House, and Gas Examiner to the Great Western Railway Co. Wrote several text-books of considerable merit. Member of Council of the Chemical Society. Died May 1st, 1879.

VARTY, THOMAS N. **1889-92.** *Mining.* **Assoc. R.S.M.**

1893, Appointed Mining Engineer to the Deccan Co., Ltd., Lingsugur, Hyderabad.

c/o THE DECCAN CO., LTD., WUNDALLI, LINGSUGUR, HYDERABAD. *Permanent Address :* STAG STONES, PENRITH, CUMBERLAND.

VERNEY, HARRY. **1891-94.** *Mechanics.* **Assoc. R.C.S.**

Whitworth Scholarship 1894.

Engaged for some years in engineering works at Bristol. Sometime Assistant Engineer at the Works of Messrs. G. Kynoch and Co., Birmingham. 1895, Appointed one of H. M. Inspectors of Factories.

OAK COTTAGE, BURNLEY ROAD, ACCRINGTON, LANCASHIRE. *Permanent Address :* HOME OFFICE, LONDON, S.W.

VINCENT, JOSEPH HERBERT. **1891-95.** *Physics.* **Assoc. R.C.S.**

BRIARFIELD, WEST BROMWICH.

VOELCKER, EDWARD WILLIAM. **1874-77.** *Mining and Metallurgy.* **Assoc. R.S.M.**

F.I.C.; F.C.S.; Mem. Soc. Pub. Anal.; De la Beche Medal 1877.

1894, Appointed Public Analyst for the Counties of Hereford and Northampton.

22, TUDOR STREET, NEW BRIDGE STREET, LONDON, E.C.

VREDENBURG, Ernest W. **1887-90.** *Mining and Geology.* **Assoc. R.S.M.**

1891, Le Creusot Steel Works. 1895, Appointed to the Geological Survey of India.

Geological Survey Office, Calcutta.

W

WADHAM, WILLIAM. **1851.** *Student, Royal College of Chemistry.*
M.D.; F.R.C.P.

WADSWORTH, GEORGE H. **1886-89.** *Chemistry.* **Assoc. R.C.S.**
LUME LANE, BRADFORD, YORKSHIRE.

WALKER, GEORGE WALKER. **1892-94.** *Physics.* **Assoc. R.C.S.**
11c, NEW COURT, TRINITY COLLEGE, CAMBRIDGE. *Permanent Address:* 99, IRVINE PLACE, ABERDEEN, N.B.

WALL, GEORGE PARKES. **1853-55.** *Mining, Metallurgy, and Geology.* **Assoc. R.S.M.**
After leaving the School of Mines, studied at Freiberg, Liége, and Paris. 1856, Appointed Government Geologist for the West Indian Colonies, and served on the Surveys of Trinidad and Jamaica; explored St. Vincent and part of Venezuela. 1864, Left the West Indian Survey, and, in spite of the appointments of Geologist for Cashmere and for Queensland having been subsequently offered him, has retired from active geological service since that date.
3, VICTORIA ROAD, BROOMHALL PARK, SHEFFIELD. *Permanent Address:* "MAGNETO WORKS," SHEFFIELD.

WALLS, ISAAC T. **1882-85.** *Chemistry.* **Assoc. R.C.S.**
Tyndall Prize 1884.
1885, Appointed Assistant Examiner in H. M. Patent Office.
H. M. PATENT OFFICE, 25, SOUTHAMPTON BUILDINGS, LONDON, W.C.

WALTON, JOSEPH P. **1879-82.** *Metallurgy.* **Assoc. R.S.M.**
Mem. Iron and Steel Inst.
1882-86, Metallurgist at the Wishaw Iron and Steel Works for the Glasgow Iron and Steel Co., Ltd., and Manager from 1886-92. 1894-96,

Chemist and Metallurgist to the Frodingham Iron and Steel Co. 1896, Appointed Chemist and Metallurgist to the Consett Iron Co., Ltd.

c/o The Consett Iron Co., Ltd., Blackhill, co. Durham; *and* St. Cuthbert's Terrace, Benfieldside, co. Durham.

WAN, Ping Yan. **1889-93.** *Metallurgy and Mining.* **Assoc. R.S.M.**

Mining Engineer at the Tong Shan Colliery, under the Chinese Engineering and Mining Company.

c/o Chinese Engineering and Mining Co., Tong Shan Colliery, Tientsin, North China.

WARD, H. Marshall. **1873-74.** *Student in Biology.*

M.A.; [D.Sc. (Camb.); F.R.S.; Late Fellow of Christ's College, Cambridge.

1880-82, Investigating and Reporting upon the Causes of the Coffee Leaf Disease in Ceylon for the Secretary of State for the Colonies. 1882, Made a Berkeley Fellow of Owens College. 1883, Appointed Assistant Lecturer in the Victoria University (Owens College). 1885-95, Professor of Botany at the Royal Indian Engineering College, Cooper's Hill (Forestry Branch). 1895, Appointed Professor of Botany at Cambridge University. Member of Council of the British Association. Examiner in Botany in the Universities of London and Edinburgh. Governor of the South-Eastern Agricultural College at Wye, in Kent. Author of numerous scientific memoirs published in the *Phil. Trans.* or *Proc. Roy. Soc.*, the *Journ. Linn. Soc.*, *Annals of Botany*, *Quart. Journ. Micros. Soc.*, *Nature*, and elsewhere. Elected F.R.S. 1888, and awarded the Royal Medal 1893.

University Botanical Laboratory, Cambridge.

* **WARD**, J. Clifton. **1861-64.** *Geology.* **Assoc. R.S.M.**

Edward Forbes Medal and Prize 1864.

1861, Entered the Royal School of Mines in Jermyn Street. He was appointed to the Geological Survey in 1865, and was sent to Yorkshire, where he worked upon the Millstone Grit and the Lower Coal Measures. In 1869 he was transferred to Keswick. The results of his work appear in his Geological Survey Memoir on *The Geology of the Northern Part of the English Lake District*, published in 1876, accompanied by numerous maps and sections. He was the originator and main support of the Cumberland Association for the Advancement of Literature and Science. In 1871 he made preparations for taking Holy Orders, and in December of that year was licensed to the curacy of St. John's, Keswick. In 1880 he was appointed Vicar of Rydal. He died in 1881, after a brief illness.

WARD, William F. **1872-76.** *Metallurgy.* **Assoc. R.S.M.**

WARE, Morton. **1888-91.** *Chemistry.* **Assoc. R.C.S.**

B.Sc. (Lond.), Hons. Geol. & Chem.

1892-94, Science Teacher at Tiverton Technical Science and Art School, Devonshire. 1895-96, Science Master at Brighton Grammar School. 1896, Appointed First Assistant Master at Newtown County Intermediate School, North Wales.

Victoria House, Newtown, Montgomeryshire. *Permanent Address:* 13, Glynrhondda Street, Cardiff.

WATERMEYER, Gottfried Andreas. **1893-96.** *Mining.* **Assoc. R.S.M.**

B.A. (Cape of Good Hope) 1892.

Qualified to practise as a Land Surveyor in the Cape Colony 1893.

63, Redcliffe Road, London, S.W. *Permanent Address:* 58, Kloof Street, Cape Town, South Africa.

WATKINS, A. Octavius. **1886-89.** *Mining.* **Assoc. R.S.M.**

F.G.S.

Sometime Instructor in Geology, Mineralogy, and Mathematics at the School of Mines, Zeehan, Tasmania; Assayer to Grubb's Silver Mining Co., Zeehan; Assayer to Experimental Works for Hannay's Cyanide Gold Extraction Process, Austral Otis Co.'s Works, Melbourne, Victoria; Manager Dunallan No. 1, Dunallan North, and Golden Dyke Gold Mines, Coolgardie. Now (1896) in practice as Mining Engineer, Metallurgist, etc., Coolgardie, West Australia. Compiler of Map of the Coolgardie Gold Fields, West Australia, published by Messrs. Bacon and Co.

The Assay Office, Bayley Street, Coolgardie, West Australia. *Permanent Address:* c/o Geological Society, London.

WATSON, David. **1864-67.** *Metallurgy and Geology.* **Assoc. R.S.M.**

Edward Forbes Medal 1867; D.Sc. (Lond.).

Sometime Teacher of Chemistry at Chester College.

WATSON, John. **1892-95.** *Chemistry.* **Assoc. R.C.S.**

Hillside Cottage, Hawick, N.B.

WATSON, Walter Henry. **1891-94.** *Chemistry.* **Assoc. R.C.S.**

6, Back Burley Street, Park Lane, Leeds.

WATSON, WILLIAM. **1887-90.** *Physics (honours).* **Assoc. R.C.S.**

B.Sc. (Lond.); Murchison Prize 1889; Tyndall Prize 1888; Prize in Astronomical Physics 1888.

1890-94, Assistant Demonstrator in Physics at the Royal College of Science. 1891, On the Royal Society's Magnetic Survey. 1894, Appointed Senior Demonstrator in Physics, at the Royal College of Science.

7, UPPER CHEYNE ROW, CHELSEA, LONDON, S.W.; *and* ROYAL COLLEGE OF SCIENCE, SOUTH KENSINGTON, LONDON, S.W.

WATSON, WILLIAM S. **1884-86.** *Mechanics.* **Assoc. R.C.S.**

WATT, A. G. **1895-96.** *Student in Geology and Mining.*

M.A.; B.Sc.; F.G.S.

SYDNEY UNIVERSITY.

WAUGH, PERCIVAL B. **1890-93.** *Mining.* **Assoc. R.S.M.**

1893-95, Assistant Mining Engineer at Las Minas de Rio Tinto, Huelva, Spain. 1895, Appointed Manager of the Magyar Gold Mines, Zalatna, Hungary. 1896, Prospecting for Syndicate in Canada.

RAT PORTAGE, LAKE OF THE WOODS, ONTARIO. *Permanent Address:* c/o MESSRS. BAINBRIDGE, SEYMOUR AND CO., 13, ST. HELEN'S PLACE, LONDON, E.C.

WEAVER, NATHANIEL G. **1850.** *Student, Royal College of Chemistry.*

Manufacturing Chemist.

WEBBER, RONALD W. *Student in Zoology.*

1892, Appointed Officer in the Commercial Intelligence Department of the Imperial Institute.

33, OXFORD GARDENS, NORTH KENSINGTON, LONDON, W.

WEBB, H. H. *Student.*

Formerly Assayer to the Selby Smelting and Lead Co., Porta Costa. 1895, Went to Mashonaland.

WELDON, HORACE. **1887-90.** *Student in Mining.*

F.G.S.

Employed on the Ferriera, Wolhuter, and Village Main Reef Gold Mining Cos. Also on the Staff of the Buffelsdoorn Gold Mining Co. In 1895 appointed Manager of the Main Reef Gold Mining Co.

c/o MAIN REEF GOLD MINING CO., MARAISBURG, S.A.R. *Permanent Address:* P.O. BOX 1990, JOHANNESBURG, S.A.R.

WELLS, G. JAMES. *Student.*

Draughtsman to Messrs. Welton and Co., Thames Ditton.

15, BROOK GREEN, HAMMERSMITH, LONDON, W.

WELLS, H. G. **1884-87.** *Student.*

B.Sc. (Lond.); L.C.P.; F.C.P.

1889-90, Science Master at Henley House School, Kilburn. 1890-94, Biological Tutor to University Correspondence Classes. Engaged in Occasional Journalism, and taught Science Classes at St. Peter's, Staines. 1894, On the Staff of the *Pall Mall Gazette.* Reviewer and Contributor to the *Saturday Review, Nature, The Natural Observer, Educational Times,* and the *Journal of Education.* Author of *The Time Machine; The Wonderful Visit; The Wheels of Chance,* etc.; also a frequent contributor to the *New Review, Idler, To-Day,* etc. First Editor of *Students' Magazine* after change to South Kensington.

"LYNTON," MAYBURY ROAD, WOKING.

WELLS, S. RUSSELL. **1887-89.** *Student in Chemistry, etc.*

M.D.; B.Sc. (Lond.); M.R.C.P.; M.R.C.S.; F.C.S.

Medical Registrar, St. George's Hospital. Late Assistant Curator, House Physician, House Surgeon, etc., St. George's Hospital. Pollock Prizeman, and William Brown £100 Exhibitioner. Author of several works on medical subjects.

E, BLANDFORD MANSION, EAST STREET, PORTMAN SQUARE, LONDON, W. *Permanent Address:* ST. GEORGE'S HOSPITAL, HYDE PARK CORNER, LONDON, S.W.

WEST, GEORGE STEPHEN. **1891-95.** *Zoology.* **Assoc. R.C.S.**

Edward Forbes Medal and Prize 1894.

Scholar of St. John's College, Cambridge. Author of a number of papers on biological subjects in the *Journ. Linn. Soc.*, the *Proc. Zool. Soc.*, the *Journ. Roy. Micr. Soc.*, and elsewhere; many written conjointly with William West, Esq., F.L.S., Assoc. R.C.S.

C, NEW COURT, ST. JOHN'S COLLEGE, CAMBRIDGE. *Permanent Address:* 13, WOODVILLE TERRACE, HORTON LANE, BRADFORD.

WEST, HOWARD. **1889-92.** *Mining.* **Assoc. R.S.M.**

Conducting Assay Office, New Denver, British Columbia.

NEW DENVER, BRITISH COLUMBIA. *Permanent Address:* 55, LIVERPOOL ROAD, ISLINGTON, LONDON, N.

WEST, WILLIAM. **1889-92.** *Biology and Botany.* **Assoc. R.C.S.**

F.L.S.; Edward Forbes Medal and Prize 1892.

Scholar of St. John's College, Cambridge; Wright's Prize 1893; First Class, Natural Science Tripos, Part I., 1894. Author of several papers on biological subjects.

D, NEW COURT, ST. JOHN'S COLLEGE, CAMBRIDGE. *Permanent Address:* 13, WOODVILLE TERRACE, HORTON LANE, BRADFORD.

WESTERN, FRANK. **1889-92.** *Metallurgy.* **Assoc. R.S.M.**

WESTMORELAND, JAMES WILLIAM. **1870-73.** *Metallurgy.* **Assoc. R.S.M.**

F.I.C.; Mem. Soc. Pub. Anal.

Analytical and Metallurgical Chemist.

14a, FINSBURY SQUARE; *and* 2, CITY ROAD, LONDON, E.C. *Permanent Address:* 9, NURSERY MOUNT, HAMLET CARR, LEEDS.

WESTON, WILLIAM. **1855-58.** *Metallurgy and Geology.* **Assoc. R.S.M.**

F.I.C.; Duke of Cornwall's Scholarship 1857; De la Beche Medal 1858.

Admiralty Chemist.

CHEMICAL LABORATORY, H.M. DOCKYARD, PORTSMOUTH.

WETHERELL, ERNEST WILLIAM. **1890-94.** *Geology.* **Assoc. R.C.S.**

Science Master, Wood Green School, Middlesex.

WOOD GREEN SCIENCE SCHOOL, MIDDLESEX. *Permanent Address:* 13, STRATFORD PLACE, LONDON, W.

WHALLEY, SYDNEY. **1889-92.** *Chemistry.* **Assoc. R.C.S.**

32, BONNY STREET, BLACKPOOL, LANCASHIRE.

WHALLEY, W. **1893-96.** *Physics.* **Assoc. R.C.S.**

WHITAKER, JAMES. **1885-88.** *Mechanics.* **Assoc. R.C.S.**

A.M. Inst. C.E.

Author of paper on "Silo Granaries," read before the Students Inst. C.E. 1892.

18, ACOMB STREET, GREENHEYS, MANCHESTER.

WHITE, JOHN H. **1879-82.** *Metallurgy.* **Assoc. R.S.M.**

Mem. Iron and Steel Inst.

1882-84, Analyst to the Blaina Furnaces Co., Ltd., Blaina, Monmouthshire. 1884, Analyst and Siemens' Furnace Manager to the New British Iron Co., Ltd., Corngreaves, Birmingham. 1894, Appointed Analyst to Messrs. C. Cammell and Co., Ltd., Derwent Works, Workington, Cumberland.

DERWENT WORKS, WORKINGTON, CUMBERLAND.

WHITE, JOSEPH FLETCHER. **1869-70.** *Student in Geology.*

F.G.S.; Mem. N. of Eng. Inst. Min. Eng.

ST. JOHN'S SQUARE, WAKEFIELD.

WHITE, WILLIAM HERBERT.

Tyndall Prize 1895.

WHITELEY, A. W. B. **1889.** *Student in Mining.*

Mine Manager, Michigan, United States of America.

WIGGIN, HENRY A. *Student.*

J.P. and D.L. for the County of Staffs.; High Sheriff 1896; Mem. Iron and Steel Inst.

Director in the firms of Messrs. Henry Wiggin and Co., Ltd., Birmingham; the Birmingham Small Arms and Metal Co., Ltd.; and Messrs. D. F. Tayler and Co., Ltd. Author of paper on "Nickel Steel" (*Trans. Iron and Steel Inst.* 1895).

52, GEORGE STREET, BIRMINGHAM. *Permanent Address:* HARBORNE PARK, NEAR BIRMINGHAM; *and* REFORM CLUB.

***WILCOCK**, EDGAR. *Student in Chemistry, etc.*

Educated at City of London School and South Kensington. Research work at the Royal College of Science in conjunction with Dr. F. R. Japp, F.R.S. Appointed Senior Assistant to Dr. C. M. Tidy. Died 1883.

WILKIN, —. **1855.** *Student in Mining.*

***WILKINSON**, CLEMENT. **1859-62.** *Mining, Metallurgy, and Geology.* **Assoc. R.S.M.**

Died on Geological Survey of India.

WILKINSON, DAVID. **1886-90.** *Physics and Metallurgy.* **Assoc. R.S.M.**

Bessemer Medal 1890.

Formerly Demonstrator in Metallurgy, Dunedin, New Zealand.

SCHOOL OF MINES, DUNEDIN, NEW ZEALAND. *Permanent Address:* 15, ST. PAUL'S SQUARE, PRESTON, LANCASHIRE.

WILKINSON, HENRY. **1890-93.** *Agriculture.* **Assoc. R.C.S.**

1893-94, Science Master, Clay Cross Science School, Derbyshire. 1894, Appointed Sub-Inspector of Science Schools under the Science and Art Department.

STANLEY TERRACE, SEMILONG, NORTHAMPTON.

WILKINSON, JOHN F. **1878-81.** *Metallurgy.* **Assoc. R.S.M.**

B.A. (Lond.).

1886, Appointed Head Master at Bacup Higher Grade School.

BACUP, NEAR MANCHESTER.

WILKINSON, THOMAS. **1869.** *Student in Mining.*

Sometime Agent at Silverdale Collieries, Staffs.

WILLIAMS, CH. **1869.** *Student in Mining.*

***WILLIAMS**, JOHN. *Student, Royal College of Chemistry.*

F.C.S.

Formerly member of the firm of Hopkin and Williams; President of the Pharmaceutical Society, and for many years its Treasurer.

WILLIAMS, W. *Assistant in Physics.* **R.C.S.**

B.Sc.

WILLIS, AMBROSE R. **1872-75.** *Mining, Metallurgy, and Geology.* **Assoc. R.S.M.**

D.Sc.; M.A.; Duke of Cornwall's Scholarship 1873; Edward Forbes Medal 1874; Murchison Medal 1874.

1875, Appointed Demonstrator in Mechanics at the Royal School of Mines; 1881, Instructor in Mathematics at the Royal College of Science; and 1884, Assistant Professor of Mathematics and Mechanics at the Royal College of Science.

ROYAL COLLEGE OF SCIENCE, SOUTH KENSINGTON, LONDON, S.W.

***WILLIS**, ARTHUR. *Student in Chemistry and Metallurgy.*

F.C.S.

Son of Professor Willis, of Cambridge. Appointed Chemist in the Sample Steel Works, Birmingham, under Dr. C. W. Siemens. 1869, Appointed Chemist to the Landore-Siemens Steel Co. Contributed paper "On the Chemistry of Steel Making" to Iron and Steel Institute. Died April 1881.

WILLMOTT, SAM ACKROYD. *Student.*

1886, Appointed Assistant Examiner in H. M. Patent Office.

3, MEXFIELD ROAD, PUTNEY; *and* H. M. PATENT OFFICE, SOUTHAMPTON BUILDINGS, LONDON, W.C.

WILSON, A. GRANT. **1884-86.** *Mining.* **Assoc. R.S.M.**

Formerly Assistant Manager, Trabboch Colliery, Ayrshire; Surveyor to Ponells Tillery Steam Coal Collieries, Monmouthshire. 1895, Under-Manager Hill's Plymouth Collieries, Glamorganshire.

PLYMOUTH HOUSE, NEAR MERTHYR TYDFIL, GLAMORGANSHIRE.

WILSON, P. O. **1885.** *Student in Mining.*

7, BIRCHINGTON ROAD, LONDON, N.W.

WILSON, R. ALEXANDER. **1891-94.** *Mining.* **Assoc. R.S.M.**

c/o G. STOWE, ESQ., P.O. BOX 2409, JOHANNESBURG, S.A.R. *Permanent Address:* RYDAL MOUNT, 21, COTHAM ROAD, BRISTOL.

WILSON, —. **1858.** *Student in Mining.*

***WITT**, HENRY MATTHEW. **1851.** *Student, Royal College of Chemistry.*

Afterwards Lecture-Assistant at the College. Joint author, with Dr. Hofmann, of *Investigations on London Sewage.*

WOAKES, ERNEST. **1882-85.** *Mining.* **Assoc. R.S.M.**

Mem. Am. Inst. Min. Eng.; Mem. Inst. Min. and Met.

1886-91, Assistant Engineer to the Tolima Silver Mines, South America 1891, Appointed Manager of the Darien Gold Mines, Panama.

DARIEN GOLD MINES, PANAMA, REPUBLIC OF COLUMBIA, SOUTH AMERICA. *Permanent Address:* 78, HARLEY STREET, LONDON, W.

WOLFENDEN, JOHN H. **1889-92.** *Chemistry.* **Assoc. R.C.S.**

B.Sc. (Lond.); F.C.S.

1892, Assistant Science Master at the Technical School, Shipley, Yorkshire. 1893, Appointed Science Teacher to the Manchester Central Board School.

226, ASHTON ROAD WEST, FAILSWORTH, MANCHESTER.

WOLFF, ADOLPH, **1889.** *Student in Mining.*

***WOLLASTON**, ROBERT. **1849.** *Student, Royal College of Chemistry.*

WOO, Y. T. **1888.** *Student in Mining.*

Native of China.

WOOD, ALEXANDER. **1889-91.** *Student.*

1894-95, Assistant in the Cyanide Works of the Durban Roodepoort Gold Mining Co., Ltd., and the Champ d'or Gold Mining Co., Ltd. 1895, Appointed Assayer to the New Crœsus Gold Mines, Johannesburg.

c/o NEW CRŒSUS GOLD MINING CO., LTD., JOHANNESBURG, S.A.R. *Permanent Address:* 327, SEVEN SISTERS ROAD, FINSBURY PARK, LONDON, N.

***WOOD**, CHARLES S. **1857-59.** *Mining and Geology.* **Assoc. R.S.M.**

Sometime Teacher at Bristol. Died in New Zealand previous to 1870.

WOOD, JOHN E. **1886-89.** *Mining.* **Assoc. R.S.M.**

F.G.S.; Assoc. Mem. Inst. Min. Met.

1889-91, Manager of the Bristol Sublimed Lead Co., Ltd. 1891-92, Assistant to M. Francis, Esq.; Engineer to the Halkyn and other Flintshire Mines. 1892, Appointed Mining Engineer and Metallurgist to the Borneo Co., Ltd., Sarawak. 1896, Superintendent of Gold Cyanide Works, Bau, Sarawak.

c/o BORNEO CO., LTD., KUCHING, SARAWAK, BORNEO. *Permanent Address:* THE BORNEO CO., LTD., 28, FENCHURCH STREET, LONDON, E.C.

WOOD, SIDNEY. **1887-91.** *Chemistry and Physics.* **Assoc. R.C.S.**

Assistant Keeper of Museums.

5, WOODVIEW, BRADFORD, YORKSHIRE.

WOODALL, HERBERT J. **1889-92.** *Physics.* **Assoc. R.C.S.**
Contributor to the *Educational Times.*
33, MARKET PLACE, STOCKPORT.

WOODHOUSE. CLAUDE H. C. **1887-90.** *Biology and Botany.* **Assoc. R.C.S.**

WOODWARD, HARRY PAGE. **1886-87.** *Student in Geology.*
Assistant on Geological Survey of South Australia; afterwards Government Geologist, West Australia; lately retired, and in practice as Consulting Geologist and Mining Engineer.
PERTH, WEST AUSTRALIA.

WOODWARD, MARTIN F. **1882-85.** *Biology.* **Assoc. R.C.S.**
Murchison Medal 1884.
Demonstrator in Zoology at the Royal College of Science.
129, BEAUFORT STREET, CHELSEA.

WRATTEN, FREDERICK PERCY. **1892-95.** *Chemistry.* **Assoc. R.C.S.**
HELLINGLEY, DINGWALL, CROYDON.

***WRAY**, R. **1882-84.** *Student in Biology.*
1884, Appointed Assistant to Director of Natural History Museum, where he started work upon the Index collection, N.H.M. The cases illustrating Dentition of Mammals, Anatomy of Amphioxus, Pterylography of Birds, remain as a testimony to his skill and ability. In connection with the latter, he published in the *Proc. Zoo. Soc.* 1887 a paper entitled "On Some Points in the Morphology of the Wings of Birds." He died in 1889.

WRIGLEY, P. T. *Instructor in Mechanics and Mathematics.* **Assoc. R.S.C.**
M.A. (Camb.).
Born at Huddersfield 1855. Educated at Clapham Grammar School. Second Exhibition at London University Matriculation, and the first B.A. Passed into the Royal Engineering College, Cooper's Hill, taking first place. In April 1876 obtained an Open Minor Scholarship at St. John's College, Cambridge. Foundation Scholarship 1878. Thirty-third Wrangler in Mathematical Tripos, January 1880, and Second-class Honours Natural Science Tripos December 1880. Appointed Instructor in Mathematics in Royal College of Science in 1881. Since 1887 Joint Examiner in Mathematics for Science and Art Department.
ROYAL COLLEGE OF SCIENCE, LONDON, S.W.

WYATT, GEORGE H. **1882-85.** *Physics.* **Assoc. R.C.S.**

B.Sc. (Lond.); Mem. Phys. Soc. of London.

Science Master at Emanuel School, Wandsworth Common.

EMANUEL SCHOOL, WANDSWORTH COMMON. *Permanent Address:* 8, VICTORIA ROAD, COTHAM, BRISTOL.

WYATT, THOMAS M. **1886-90.** *Chemistry.* **Assoc. R.C.S.**

F.I.C.; F.C.S.

1890, Appointed Assistant Chemist to the Chemical Department of the Royal Arsenal.

CHEMICAL DEPARTMENT, ROYAL ARSENAL, WOOLWICH.

WYMAN, — . **1860.** *Student in Mining.*

Mining in South America.

WYNNE, R. **1860.** *Student in Mining.*

Formerly Colliery Viewer, North Staffordshire.

WYNNE, W. PALMER. **1881-84.** *Chemistry.* **Assoc. R.C.S.**

D.Sc. (Lond.); F.R.S.; F.I.C.; F.C.S; Murchison Medal 1883; Tyndall Prize 1883; Hodgkinson Prize 1884.

1884, First place in Honours Chemistry at the London B Sc. Examinations. 1885, Lecturer on Chemistry at Rutherford College, Newcastle-on-Tyne. 1886, Private Assistant to Professor H. E. Armstrong, F.R.S., at the Central Technical College, South Kensington. 1887-88, Lecture Demonstrator, and 1888-90, Lecturer on Chemistry, at the Central Technical College. 1890, Succeeded Professor F. R. Japp, F.R.S., as Assistant-Professor of Chemistry at the Royal College of Science.

ROYAL COLLEGE OF SCIENCE, LONDON, S.W.

Y

YATES, John. **1888-91.** *Mining.* **Assoc. R.S.M.**
F.G.S.
Formerly Assistant Manager Bengal Gold Mines. Now in the employ of the McArthur Forrest Co., South African Republic.
c/o McArthur Forrest Co., Johannesburg, S.A.R.

YOUNG, Benjamin. **1888-91.** *Metallurgy.* **Assoc. R.S.M.**

YOUNG, James. **1885-88.** *Chemistry.* **Assoc. R.C.S.**
F.C.S.
Instructor in Chemistry at the Royal Military Academy, Woolwich.
4, Plumstead Common Road, Woolwich.

YOUNG, J. W. **1884-86.** *Student.*
1887, Appointed Analyst to the Great Northern Railway Co. at Doncaster.

***YOUNG**, Lamont H. G. **1872-75.** *Mining.* **Assoc. R.S.M.**

YOUNG, William Dawson. **1891-94.** *Mechanics.* **Assoc. R.C.S.**
Whitworth Exhibition 1894.
Westfield, near Bathgate, Linlithgow.

LIST OF MATRICULATED STUDENTS AND ASSOCIATES OF THE ROYAL SCHOOL OF MINES AND ROYAL COLLEGE OF SCIENCE DURING EACH SESSION SINCE 1851.

ROYAL SCHOOL OF MINES.

1853.

Hilary Bauerman	*Mining, Metallurgy and Geology.*
Henry F. Blanford	*Mining, Metallurgy and Geology.*
Robert Hunt	*Mining, Metallurgy and Geology.*

1854.

William Baker	*Metallurgy and Geology.*
William T. Blanford	*Mining, Metallurgy and Geology.*

1855.

Frederic Drew	*Mining, Metallurgy and Geology.*
George P. Wall	*Mining, Metallurgy and Geology.*

1856.

Charles Gould	*Mining, Metallurgy and Geology.*
Joachim J. Monteiro	*Metallurgy.*

1857.

John Moreland	*Metallurgy and Geology.*
Richard Thornton	*Mining and Metallurgy.*
Edward Matthey	*Metallurgy.*

1858.

William Weston	*Metallurgy and Geology.*

1859.

Francis Fedden	*Mining and Geology.*
Clement Le Neve Foster	*Mining, Metallurgy and Geology.*
Charles S. Wood	*Mining and Geology.*

1860.

Thomas William Danby	*Geology.*

1861.

Walter Child	*Mining, Metallurgy and Geology.*
Henry Bartram Dunn	*Mining and Geology.*
William Hackney	*Mining, Metallurgy and Geology.*
Benjamin Peach	*Geology.*

1862.

Frederick C. Bishopp	*Mining, Metallurgy and Geology.*
Theodore Hughes	*Metallurgy and Geology.*
Clement Wilkinson	*Mining, Metallurgy and Geology.*

1863.

Thomas Gibb	*Mining and Metallurgy.*
Thomas Levick	*Mining.*
Edward B. Tawney	*Mining and Geology.*

1864.

Charles Barrington Brown	*Geology.*
Frederick G. Finch	*Geology.*
J. Clifton Ward	*Geology.*

1865.

Joseph Carter Bell	*Metallurgy.*
Augustus C. Maybury	*Geology.*
Riccardo Molteni	*Geology.*
Frederick A. Potter	*Metallurgy.*
William Chandler Roberts (Roberts-Austen)	*Metallurgy.*

1866.

N. R. Griffith	*Mining.*
W. T. Rowden	*Mining and Metallurgy.*

1867.

Henry S. Poole	*Geology.*
Edward Richards	*Metallurgy.*
George James Snelus	*Mining and Metallurgy.*
David Watson	*Metallurgy and Geology.*

1868.

Thomas Charles Cloud	*Metallurgy.*
H. W. Lloyd Tanner	*Geology.*

1869.

William Gomm Bell	*Metallurgy.*
Gordon Broome	*Mining and Metallurgy.*
Leonard Browne	*Metallurgy.*
Francis H. Butler	*Geology.*
Robert J. Frecheville	*Metallurgy.*
German Green	*Metallurgy and Geology.*
Matthew F. Maury	*Mining and Metallurgy.*
F. J. Montague Page	*Mining and Metallurgy.*
H. Cumberland Taylor	*Metallurgy.*

1870.

Francis William Bayly	*Metallurgy.*
A. W. Bickerton	*Metallurgy.*
William Gowland	*Mining and Metallurgy.*
Thomas Jones	*Metallurgy.*
Archibald Liversidge	*Mining and Metallurgy.*
Henry J. Green Renwick	*Mining.*
W. Johnson Sollas	*Geology.*

1871.

E. G. Ballard	*Metallurgy.*
Percy Carlyle Gilchrist	*Mining and Metallurgy.*
W. H. Greenwood	*Metallurgy.*
T. Jeffery Parker	*Geology.*

1872.

William Charlton	*Mining and Metallurgy.*
George Mercer Dawson	*Mining and Geology.*
Edward Dillon	*Mining and Metallurgy.*
Frederick William Harrold	*Metallurgy.*
James Henry Huxley	*Metallurgy.*
Hugh Miller	*Geology.*
Edmund Felix Mondy	*Metallurgy.*
Oliver Pegler	*Mining and Metallurgy.*

1873.

Henry Stowe Bell	*Metallurgy.*
Stephen William Davies	*Metallurgy.*
J. Alfred Griffiths	*Mining and Metallurgy.*
Edgar Jackson	*Mining and Metallurgy.*
John Clark Jefferson	*Metallurgy.*
Channell Law	*Mining and Metallurgy.*
Arthur Gaved Phillips	*Mining and Metallurgy.*
George Smith	*Geology.*
James William Westmoreland	*Metallurgy.*

1874.

Richard Cowper	*Mining and Metallurgy.*
Samuel Herbert Cox	*Mining.*
Arthur Rose Guerard	*Mining and Metallurgy.*
Samuel Alexander Hill	*Mining, Metallurgy and Geology.*
Conwy Lloyd Morgan	*Mining and Metallurgy.*
Walter Pearce	*Metallurgy.*
Walter Saise	*Mining, Metallurgy and Geology.*

1875.

Harry M. Becher	*Mining and Metallurgy.*
George Fitz-Brown	*Metallurgy.*
G. C. Frames	*Geology.*
William Frecheville	*Mining, Metallurgy and Geology.*
Robert Hellon	*Metallurgy.*
William Foulkes Lowe	*Metallurgy.*
Frank Herbert Marshall	*Mining and Metallurgy.*
Archibald E. Pinching	*Mining.*
Thomas Purdie	*Metallurgy.*
George Seymour	*Mining.*
Ambrose R. Willis	*Mining, Metallurgy and Geology.*
Lamont H. G. Young	*Mining.*

1876.

J. H. Barry	*Mining.*
Charles Vernon Boys	*Mining and Metallurgy.*
A. J. Campbell	*Mining.*
Paulo De Ferrari	*Mining.*
José De Goncer	*Mining and Metallurgy.*
M. H. Gray	*Mining.*
Henry H. Gunn	*Mining.*
W. Hewitt	*Mining, Metallurgy, and Geology.*
William Howard	*Mining.*
Arthur B. Kitchener	*Mining.*
Frank E. Lott	*Mining and Metallurgy.*

1876 (*continued*).

Henry Louis	*Mining and Metallurgy.*
Edward F. Pittman	*Mining and Metallurgy.*
Edward B. Pressland	*Mining and Metallurgy.*
William F. Ward	*Metallurgy.*

1877.

Arthur Copeland	*Metallurgy.*
Charles W. Folkard	*Mining and Metallurgy.*
James F. Hogan	*Metallurgy.*
Alfred Kirby Huntingdon	*Mining and Metallurgy.*
Charles Henry Lemann	*Metallurgy.*
William Leyson	*Metallurgy.*
Edward Liveing	*Mining.*
Edward T. McCarthy	*Metallurgy.*
William Hamilton Merritt	*Mining.*
Edward William Voelcker	*Mining and Metallurgy.*

1878.

Arthur S. Boucher	*Mining and Metallurgy.*
John Cawley	*Mining and Metallurgy.*
Randolph Clay	*Metallurgy.*
Arthur C. Claudet	*Metallurgy.*
William R. Criper	*Metallurgy.*
Robert A. P. Davison	*Metallurgy.*
John Joseph Eastick	*Metallurgy.*
W. A. Ellis	*Metallurgy.*
Percy Faraday Frankland	*Geology.*
John Gray	*Metallurgy.*
Leonard W. Greenwell	*Metallurgy.*
Thomas Edward Holgate	*Mining and Metallurgy.*
Reginald Howell	*Metallurgy.*
Elfric D. Ingall	*Metallurgy.*
Ernest Jacob	*Mining.*
William Keep	*Mining and Metallurgy.*
T. H. D. May	*Mining and Metallurgy.*
Frederick G. Mills	*Mining and Metallurgy.*
Charles S. Padley	*Mining and Metallurgy.*
William H. Rands	*Mining and Metallurgy.*
Arthur Robert Sawyer	*Geology and Mining.*
Ali-Syed	*Geology.*
Manuel M. Terrero	*Geology.*

1879.

William Elijah Benton	*Mining.*
A. G. Charleton	*Mining.*
W. B. M. Davidson	*Metallurgy.*
Arthur Devonshire Ellis	*Mining.*
E. N. Fell	*Mining.*
A. H. Fison	*Metallurgy.*

1879 (*continued*).

F. W. Grey	*Metallurgy.*
Edward Halse	*Metallurgy.*
E. W. Hervey	*Metallurgy.*
Malcolm Hill	*Metallurgy.*
J. H. Lucas	*Metallurgy.*
Walter Marsh	*Metallurgy.*
Mehdj Khan Mirza	*Mining and Metallurgy.*
Richard D. Oldham	*Geology.*
Alfred Gordon Salamon	*Metallurgy.*
H. B. Statter	*Mining.*
H. Strickland	*Mining.*

1880.

Robert Seymour Benson	*Metallurgy.*
John J. Beringer	*Metallurgy.*
David Bruce Bird	*Metallurgy.*
Henry S. Cotton	*Metallurgy.*
George C. Crick	*Geology.*
William Cross	*Metallurgy.*
William Louis Grant	*Metallurgy.*
John Greene	*Mining.*
Graham S. Grundy	*Mining and Metallurgy.*
Charles L. Higgins	*Metallurgy.*
E. J. Jones	*Geology.*
Edward Byrom Lindon	*Mining and Metallurgy.*
Bedford McNeill	*Metallurgy.*
B. Mott	*Mining.*
Henry M. Platnauer	*Geology.*
Trenham Howard Reeks	*Metallurgy.*
Ralph George Scott	*Mining and Metallurgy.*
P. W. Stuart-Menteath	*Mining and Metallurgy.*
James Taylor	*Metallurgy.*
H. E. Tredcroft	*Mining.*

1881.

Charles K. Baker	*Metallurgy.*
Henry C. Banon	*Metallurgy.*
H. G. Blyth	*Metallurgy.*
Bennett H. Brough	*Metallurgy.*
Henry Crookes	*Metallurgy.*
H. H. Hoffert	*Mining, Metallurgy, and Geology.*
John James Hood	*Metallurgy.*
Brian H. H. Hooker	*Metallurgy.*
Arthur Kensington	*Metallurgy.*
J. E. Marshall-Hall	*Mining.*
Roderick McK. C. Matheson.	*Metallurgy.*
Arthur Shannon	*Metallurgy.*
F. P. Smith	*Metallurgy.*
John F. Wilkinson	*Metallurgy.*

ROYAL COLLEGE OF SCIENCE.						ROYAL SCHOOL OF MINES.	
Mechanics.	*Physics.*	*Chemistry.*	*Biology.*	*Geology.*	*Agriculture.*	*Metallurgy.*	*Mining.*
1882.							
				*G. R. Divett.**		F. T. Barnett. J. E. Green. F. W. Harbord. A. Philip. C. H. Powell. J. P. Walton. J. H. White. *M. Staniland.*	F. L. Cepero. A. W. Day. G. R. Divett. F. C. I'Anson. M. Staniland.
1883.							
						A. W. Hopkins. T. Turner. *H. F. Collins.* *T. V. Hughes.* *G. Kamensky.* *F. R. Power.* *E. A. Ridsdale.* *G. H. Schroder.*	H. F. Collins. T. G. Hart. T. V. Hughes. G. Kamensky. F. R. Power. E. A. Ridsdale. G. H. Schroder.

* Names in italics are those of students who have taken a double associateship. They will also be found in ordinary type under some other subject. The name is placed as a rule under the year in which the student left the school.

ROYAL COLLEGE OF SCIENCE.						ROYAL SCHOOL OF MINES.	
Mechanics.	*Physics.*	*Chemistry.*	*Biology.*	*Geology.*	*Agriculture.*	*Metallurgy.*	*Mining.*
1884.							
	B. Illingworth. *A. Howard.*	G. T. Holloway. W. P. Wynne.	*J. A. Audley.* *J. Lomas.*	J. A. Audley. J. Lomas.		P. Bosworth-Smith. H. J. Chaney. W. F. Fremersdorf. A. Howard. E.H.B. Stephenson. A. Sutton.	H. W. Hughes.
1885.							
A. Fowler.	G. H. Wyatt.	I. T. Walls.	M.F.Woodward.			P. E. O. Carr. W.A.A.Dowden. F. B. Parkinson. T. A. Rickard. *H. G. Graves.*	H. G. Graves. E. Woakes.
1886.							
H. L. Siordet. J. Spencer. W. S. Watson.		E. Healey. A. E. Tutton.	L. A. Boodle. J. Clark. *E. Healey.*			V. E. Perez. W. Petley. F. Rickard. W. C. Rowden. T. K. Rose. A.St.G.Spooner. R. de H. St. Stephens. T. G. Trevor. *J. C. Little.*	J. F. Brooks. G. G. Holmes. J. C. Little. F. Merricks. C. W. Thompson. A. G. Wilson.

1887.

F. E. Baxandall. A. Griffiths. E. A. Hamilton-Gordon.	A. T. Simmons.	F. Belcher. W. R. Bower. F. Carrodus. J. T. Hewitt. J. H. Powell. W. D. Severn. E. H. Smith.	*W. G. Ridewood.*	W. G. Ridewood. *G. W. Card.*		H. Barbour. G. W. Card. A. E. Cattermole. J. A. Gilmour. A. P. Griffiths. A. McWilliam. F. Mousley. J. J. Richards. *A. M. M. Cooke.*	C. Bello. A. M. M. Cooke. A. Franchy. J. H. Grant. W. J. Sharwood.

1888.

W. Kelsall. J. Whitaker.	P. C. Coultas. P. L. Gray. H. E. Hadley. *H. Anderson.*	H. Anderson. F. C. Carey. G. Grace. F. J. Hardy. H. E. Hey. B. North. J. W. Rodger. H. Sowerbutts. J. Young. *G. C. McMurtry.*		N. Asano. T. H. Holland.		H. C. Atkins. W. Blackmore. T. Clarkson. H. C. Jenkins. G. C. McMurtry. W. McNeill. *S. Allingham.*	S. Allingham. J. M. Beckwith. H. B. Budgett. J. A. Chalmers. F. H. P. Cresswell. F. Dietzsch. A. W. Dymond. W. F. Hamley. E. L. Hope. J. Leechman. H. L. Lewis. E. Lichtenburg. H. Macandrew. M. Prado. W. F. Thomae. C. G. Thompson.

ROYAL COLLEGE OF SCIENCE.						ROYAL SCHOOL OF MINES.	
Mechanics.	*Physics.*	*Chemistry.*	*Biology.*	*Geology.*	*Agriculture.*	*Metallurgy.*	*Mining.*
1889.							
W. Buchanan.	A. E. Briscoe. W. G. Burbidge. E. G. Highfield. H. Holbeche.	P. F. Burge. J. W. Gilbert. S. Jackson. W. Kirman. E. J. R. Reynolds. H. F. Stephenson. W. Tate. G. H. Wadsworth. *W. Macdonald.* *A. Taylor.*	J. E. Duerden.	W. Boulton. *W. F. Hume.*	W. Scudamore.	S. B. Asher-Aron. W. F. Hume. W. Macdonald. H. G. Nichols. H. C. Ridding. J. A. Schofield. S. J. Speak. R. Stanfield. A. Taylor.	S. E. Everett. B. Hunt. J. W. Malcolmson. S. J. Truscott. A. O. Watkins. J. E. Wood.
1890.							
E. G. Coker. T. F. Parkinson. *A. Adamson.*	A. Adamson. W. S. Jarratt. W. G. Robson. S. W. J. Smith. W. Watson. *D. Wilkinson.*	G. N. Huntly. T. Newsome. S. Parrish. G. J. Rogers. T. M. Wyatt.	C H. C. Woodhouse.	W. B. D. Edwards. F. H. Smith. *H. S. Streatfeild.*		F. C. Poole. S. H. Studley. D. Wilkinson.	T. A. Butefisch. C. R. Farquarson. H. D. Griffiths. W. E. Hotson. J. B. Jaquet. H. E. Jones. J. C. E. Lawson. G. Marshall. J. A. Rickard. H. C. Riley. M. Roberts. H. Stanton. H. S. Streatfeild. L. Stromeyer.

1891.

H. Busbridge. A. Leitch. E. W. Rees.	A. B. Lishman. W. Shackleton. S. Wood.	A. Greeves. H. Grime. L. M. Jones. W. A. C. Rogers. J. G. Saltmarsh. M. Ware. *S. Wood.* *E. V. Clark.*	A. G. Butler. J. E. S. Moore. *A. M. Davies.*	A. M. Davies. *W. F. Smeeth.* *H. F. Marriott.*		H. T. Bolton. E. V. Clark. J. D. Crabtree. J. Eustice. S. H. Ford. T. S. Fraser. H. W. Hopkins. J. Jefferson. H. F. Kirkpatrick-Picard. W. F. Smeeth. E. A. Smith. W. F. P. Tindall. B. Young. *G. E. Busch.* *J. R. Crum.* *G. J. Snelus.*	L. H. Beckwith. H. Brelick. F. St. V. Brooks. G. E. Busch. H. Cavendish. T. G. Chambers. J. R. Crum. A. P. Del Mar. G. H. Gough. B. Howe. N. Kitto. J. G. Lawn. H. F. Marriott. R. Pawle. R. Pill. C. C. Scott. G. J. Snelus. G. R. Thompson. J. Yates.

1892.

J.G.Longbottom.	E. Edser. O. Freeman. W. E. Harrison. J. W. Pickles. H. J. Woodall.	W. S. Crocker. F. W. Daw. E. G. Hagerty. F. Kaye. G. H. Perry. C. W. Priestley. E. C. Thompson. F. E. Thompson. S. Whalley. J. H. Wolfenden. *T. F. Ellis.*	W. West.		R. Adams. J. Bisset.	L. M. Green. H. Jeans. R. R. Johnson. J. McCormick Shepherd. P. J. Perry. F. Western. *L. H. Cooke.* *F. D. Lace.* *L. Parker.*	L. H. Cooke. E. Cowell. A. Dickinson. W. N. Drew. T. F. Ellis. W. D. Ferguson. J. Greaves. W. C. Grubb. E. Kemper-Voss. F. D. Lace. H. Lezard. L. Parker. W. H. Richardson. R. Roberts. C. J. Smith. T. N. Varty. H. West.

ROYAL COLLEGE OF SCIENCE.					ROYAL SCHOOL OF MINES.		
Mechanics.	*Physics.*	*Chemistry.*	*Biology.*	*Geology.*	*Agriculture*	*Metallurgy.*	*Mining.*
1893.							
H. A. Clark. J. Dowling. J. Grigor.	C. P. Butler. E. E. Fournier d'Albe. G. R. Melton. S. S. Richardson. H Stansfield. S. G. Starling. M. W. Stevenson.	R. E. Barnett. J. Bruce. E. Grossmann. G. G. Quinn. A. Rutter. J. W. Shepherd.	T. J. C. Ridges.		H. Crabtree. F. V. Dutton. H. Wilkinson.	W. Day. E. B. Fisher. A. Gibb. H. Harris. T. G. Martyn. L. Parry. W. C. Peake. A. Stansfield. R. C. Styles. *F. W. Armstrong.* *A. J. Bensusan.* *K. Mackenzie.* *G. Melland.* *F. W. Park.* *A. E. Payne.* *S. W. Price.* *W. R. G. Rivington.* *P. Y. Wan.* *P. B. Waugh.*	F. W. Armstrong. T. T. Bedford. A. J. Bensusan. F. T. Byrde. F. Cogill. W. M. Currie. R. C. Feilding. R. S. Hawkins. D. J. Macdonald. K. Mackenzie. G. Melland. J. H. Munnik. H. G. Nitch. F. W. Park. A. E. Payne. G. G. Plewman. S. W. Price. W. R. G. Rivington. H. P. Townsend. P. Y. Wan. P. B. Waugh.
1894.							
D. Baxandall. G. W. Fearnley. G. B. Petter. W. H. Pretty. J. H. Smith. H. Verney. W. D. Young.	R. M. Archer. B. E. Spencer. F. R. S. Talbot. G. W. Walker. *W. H. Pretty.*	F. J. Allen. E. Catherall. J. A. Harrison. J. Hembrough. W. Jackson. B. Jordan-Smith. B. M. C. Marshall. C. H. Robinson. P. Tarver. W. H. Watson.	C. R. Cross. H. B. Milne. G. S. West.	S. C. Greenwood. E. H. L. Schwarz. E. W. Wetherell. *G. E. Grimes.*	T. Jones.	H. Cartwright. W. H. Merrett. C. H Sidebotham. J. Thompson. F. H. Thorburn. *W. Dixon.* *G. E. Grimes.* *H. E. Nicholls.*	C. de Ajuria. J. Ball. W. Dixon. M. Fergusson. N. P. Frampton. C. J. Gray. G. E. Grimes. A. D. Kinloch. R. W. Macfarlane. H. E. Nicholls. H. G. Palmer. H. A. Power. J. E. Snelus. R. A. Wilson.

1895.

C. A. S. Baxter. H. R. Cullen. W. F. Nixon. W. E. Tubbs.	R. W. Forsyth. W. Hewson. W. H. Kay. J. H Vincent. *H. R. Cullen.*	H. A.M. Borland. G. D. Dunkerley. R. W. Ferguson. J. J. Green. F. C. Harrison. H. G. Hathaway. H. W. Hutchin. W. Longshaw. A. More. A. Nicholls. G. Ryce. W. Saunders. W. F. Swords. J. Thomas. J. Watson. F. P. Wratten. *L. G. Attenborough.* *G. N. Brown.*	W. G. Freeman. E. Stenhouse. *T. Barron.* *J. Harrison.*	T. Barron. J. Harrison. *F. Ackroyd.* *H. W. L. McW. Bourke.* *E. W. Vredenburg.*		L. G. Attenborough. G. H. Biggs. G. N. Brown. E. H. Clifford. H. R. Prescott. W. H. Rudd. W. E. Simpson. B. W. Turner. *H. W. L. McW. Bourke.* *H. A. Hinton.* *H. C. McNeill.* *J. C. Moulden.* *W. J. Turner.*	F. Ackroyd. H. W. L. McW. Bourke. C. M. Bryant. H. T. Butcher. T. L. Dawson. H. W. Finch. H. A. Hinton. E. S. Jones. C. S. Long-Innes. P. W. Lucas. H. C. McNeill. B. Marais. J. Morris. J. C. Moulden. R. W. Pringle. W. J. Turner. E. W. Vredenburg.

1896.

W. Buchan. J. Eagles. W. A. Taylor. R. H. Cabena. R. M. Metcalfe. *H. T. Davidge.* *F. C. Lea.* *B. C. Laws.*	A. O. Allen. H. T. Davidge. F. C. Lea. J. Schofield. R. Sowter. H. H. Clements. B. C. Laws. H. G. Martyn. C. I. Sansom. W. Whalley.	J. B. Butters. A. Howard. A. N. Meldrum. G. T. Morgan. F. R. Penn. W. A. Bradley. H. C. Hickinbotham. E. Masters. F. H. Newman. W. N. Platt. A. Powell. T. C. Sharrott.	S. A. Calvert. A. R. Knowlton.	J. Foulds. *H. A. Hinton.*	F. J. Baker.] J. Clark. *W. N. Platt.* *G. Ryce.*	J. Crowther. J. W. Hinchley. J. H. Ivey. S. McEwen. G. S. Blake. A. J. Hughes. W. Macdonald. *H. Dodd.* *C. R. Morrison.*	H. Dodd. E. A. Douglas. S. F. Franco. C. E. Martineau. C. R. Morrison. W. Muir. P. Poore. H. G. Scott. G. A. Watermeyer. *E. H. Clifford.* *G. H. Biggs.* *B. W. Turner.*

LIST OF THE AWARDS OF SCHOLARSHIPS, MEDALS, AND PRIZES SINCE THE FOUNDATION OF THE SCHOOL.

THE DUKE OF CORNWALL'S SCHOLARSHIP.

His Royal Highness Prince Albert, acting for His Royal Highness the Prince of Wales, as Duke of Cornwall, presented to the School of Mines two Scholarships of the annual value of £30, tenable for two years. This Scholarship was not granted after the year 1875.

1852. Henry Francis Blanford.
Robert Hunt (one year).
1853. William Thomas Blanford.
1854. Frederic Drew.
1855. Charles Gould.
1856. John Moreland.
1857. William Weston.
1858. Clement Le Neve Foster.
1859. Thomas William Danby.
1860. William Hackney.
1861. Frederick Charles Bishopp.
1862. Edward B. Tawney.
1863. Frederick G. Finch.
1864. Riccardo Molteni.
1865. William Thomas Rowden.
1866. Edward Richards.
1867. Henry A. Black.
1868. German Green.
1869. William J. Sollas.
1870. Percy Carlyle Gilchrist.
1871. George M. Dawson.
1872. Edgar Jackson.
1873. Conway Lloyd Morgan.
1874. Ambrose R. Willis.
1875. Henry Louis.

ROYAL SCHOLARSHIPS.

Four Scholarships of £15 each are now given to the students who have gained the greatest aggregate of marks in the Examinations of the first year; and two Scholarships of £25 to those students who have gained the greatest aggregate of marks in the examinations of the first two years.

1855. Ambrose Tween.
Frederic Drew.
George P. Wall.
1856. Edward Matthey.
Mark Bullen.
1856. Charles Gould.
Ambrose Tween.
1857. Richard Thornton.
John Morland.
1858. Thomas William Danby.

ROYAL SCHOLARSHIPS—(*continued*).

1858. Charles S. Wood.
William Weston.
1859. William Hackney.
Walter Child.
1860. Frederick C. Bishopp.
Clement Wilkinson.
Walter Child.
1861. Edward B. Tawney.
Clement Wilkinson.
1863. Thomas Gibb.
Cornelius O'Sullivan.
1864. W. T. Rowden.
Charles Berrell.
Cornelius O'Sullivan.
1865. George J. Snelus.
W. Thorp.
1866. Edward Collens.
Henry A. Black.
George Snelus.
1867. F. J. M. Page.
German Green
E. Collens.
1868. A. W. Bickerton.
William J. Sollas.
Gordon Broome.
1869. J. J. Bowry.
William Gowland.
1870. W. H. Greenwood.
F. C. Milford.
Robert W. Atkinson,
1871. W. Charlton.
Channell Law.
W. H. Greenwood.
1872. S. A. Hill.
James Taylor.
Channell Law.
1873. W. Carter.
A. G. Meeze.
S. A. Hill.
1874. Henry Louis.
E. F. Pittman.
W. F. Lowe.
1875. A. N. Pearson.
L. J. Whalley.
W. Hewitt.
1876. T. E. Holgate.
F. G. Mills.
A. N. Pearson.
1877. R. W. Lancaster.
1877. W. Marsh.
F. G. Mills.
1878. R. G. Scott.
W. Cross.
R. W. Lancaster.
1879. J. J. Hood.
J. F. Wilkinson.
R. G. Scott.
1880. J. E. Green.
C. H. Powell.
J. J. Hood.
1881. H. F. Collins.
R. T. Bodey.
J. P. Walton.
1882. A. Sutton.
H. W. Hughes.
T. Mather.
H. G. Graves.
H. F. Collins.
R. T. Bodey.
1883. I. T. Walls.
G. Gibbens.
J. H. Tomlinson.
A. Fowler.
A. Sutton.
H. G. Graves.
1884. A. G. Hadcock.
F. Carrodus.
W. C. Rowden.
T. Rose.
G. Gibbens.
I. T. Walls.
1885. J. W. Rodger.
A. McWilliam.
T. H. Denning.
J. Richards.
A. E. Tutton.
T. Rose.
1886. W. Blackmore.
J. Young.
C. Lang.
H. E. Hadley.
A. McWilliam.
J. Richards.
1887. S. B. Asher-Aron.
W. Tate.
J. A. Schofield.
S. J. Speak.
W. Blackmore.

ROYAL SCHOLARSHIPS—(*continued*).

1887. H. Sowerbutts.
1888. S. H. Studley.
S. Wood.
W. S. Jarratt.
G. N. Huntly.
S. J. Speak.
W. Tate.
1889. L. M. Jones.
J. Jefferson.
J. G. Lawn.
H. Grime.
S. H. Studley.
W. S. Jarratt.
1890. J. W. Pickles.
H. J. Woodall.
W. E. Harrison.
C. L. E. Heath.
L. M. Jones.
H. Grime.
1891. W. Allan.
T. T. Bedford.
E. Edser.
H. A. Clark.
J. W. Pickles.
1891. S. Whalley.
1892. B. E. Spencer.
G. S. West.
C. J. Gray.
1892. H. Verney.
G. R. Melton.
L. Parry.
1893. R. W. Forsyth.
G. W. Walker.
J. Thomas.
H. R. Prescott.
B. E. Spencer.
G. S. West.
1894. R. Sowter.
A. O. Allen.
H. T. Davidge,
J. B. Chambers.
R. W. Forsyth.
W. Longshaw.
1895. E. Smith.
G. M. Russell.
F. Fisher.
N. Barton.
R. Sowter.
J. Crowther.
1896. J. W. Barker.
C. E. Goodyear.
E. R. Verity.
E. T. Harrison.
W. H. White.
E. Smith.

THE HODGKINSON PRIZE.

This prize was not awarded after the year 1886.

1882. C. A. White.
1883. First prize, Samuel C. Hooker.
Second prize, Richard H. Adie.
1884. First prize, George T. Holloway.
Second prize, Stephen J. Elliott and William P. Wynne.
1885. First prize, Arthur W. Bishop.
Second prize. Peter S. Buik.
1886. First prize, Thomas H. Greenall.
Second prize, Alfred E. Tutton.
1887. First prize, John T. Hewitt.
Second prize, William E. Hotson.

THE FRANK HATTON PRIZE.

In memory of the late Frank Hatton, this prize is awarded to the student who does best in Chemistry.

1886. Alfred E. Tutton.
1887. John T. Hewitt.
1888. James W. Rodger.
1889. James Kelly.
1890. George N. Huntly.
1891. Herbert Grime.
1891. Lionel M. Jones.
1892. George H. Perry.
1893. Robert E. Barnett.
1894. John Thomas.
1895. William Longshaw.
1896. Gilbert Thomas Morgan.

THE EDWARD FORBES MEDAL AND PRIZE OF BOOKS.

Presented by the Trustees of the Edward Forbes Memorial Fund to the student who does best in Biology.

1855. Frederic Drew.
1856. Charles Gould.
*1857. John Moreland.
1859. Clement le Neve Foster.
1860. Thomas William Danby.
1861. Walter Child.
1862. Frederick C. Bishopp.
1863. Edward B. Tawney.
1864. J. Clifton Ward.
1865. A. C. Maybury.
1867. David Watson.
1871. T. Jeffery Parker.
1872. G. M. Dawson.
1873. George Smith.
1874. Ambrose R. Willis.
1876. W. Hewitt.
1877. Angelo Heilprin.
1878. Percy F. Frankland.
1880. H. M. Platnauer.
1882. Charles J. Gahan.
1883. Richard S. Wray.
1884. Thomas Johnson.
1885. Alfred V. Jennings.
1886. Arthur C. Jones.
1887. Agnes Calvert.
1888. Arthur M. Davies.
1889. George Brebner.
1890. Claude H. C. Woodhouse.
1891. Arthur G. Butler.
† 1892. William West.
John H. Vanstone.
1893. Henry B. Lacey.
1894. George S. West.
1895. William G. Freeman.
1896. Ernest Charles Horrell.

THE DE LA BECHE MEDAL.

Established in memory of the founder of the Royal School of Mines—Sir Henry De la Beche—and awarded to the student who does best in Mining.

1857. Richard Thornton.
1858. William Weston.
1859. Charles S. Wood.
1860. Thomas W. Danby.
1861. William Hackney.
1862. Clement Wilkinson.
1863. Edward B. Tawney.
1864. F. Gordon Davis.
1865. Riccardo Molteni.
1866. W. T. Rowden.
1867. George Snelus.
1869. Gordon Broome.
1870. William Gowland.
1871. Frank Taylor.
1872. W. Charlton.
1873. Edgar Jackson.
1874. C. Lloyd Morgan.
1875. George Fitz-Brown.
1876. Henry Louis.
1877. E. W. Voelcker.
1878. F. G. Mills.
1879. A. D. Ellis.
1880. John Greene.
1881. H. H. Hoffert.
1882. C. H. Powell.
1883. Thomas Turner.
1884. Herbert W. Hughes.
1885. Henry G. Graves.
1886. J. C. Little.
1887. William J. Sharwood.
1888. Edmund L. Hope.
1889. Samuel J. Truscott.
1890. Geoffrey Marshall.
1891. James G. Lawn.
1892. Lewis H. Cooke.
1893. Samuel W. Price.
1894. John Ball.
1895. Robert W. Pringle.

* When a year is omitted it may be taken that no award was then made.
† In this year two Medals were awarded, and the Prize was divided.

THE MURCHISON MEDAL AND PRIZE OF BOOKS.

Sir Roderick Impey Murchison bequeathed the sum of £500 to the Directors and Professors, for the time being, of the Royal School of Mines, the interest arising from which was to be applied annually to purchase books for a prize to be called the "Murchison Prize"; to be accompanied with a bronze medal, the dies of which he also bequeathed to the School. The award is made to the student who does best in Geology.

1862. Theodore Hughes.
1863. Frederick G. Finch.
1864. Richard Googan.
1865. W. T. Rowden.
1866. Edward Richards.
1867. Edward Collens.
1868. F. J. M. Page.
1869. William Gowland.
1870. Percy Carlyle Gilchrist.
1871. George M. Dawson.
1872. Stephen W. Davies.
1873. C. Lloyd Morgan.
1874. Ambrose R. Willis.
1875. George Seymour.
1876. W. Hewitt.
1877. Frederick G. Mills.
1878. Manuel M. Terrero.
Syed Ali (*extra medal*).
1879. B. Mott.
1880. H. M. Platnauer.
1881. M. Staniland, junior.
1882. H. F. Collins.
1883. William P. Wynne.
1884. Martin F. Woodward.
1885. Alfred E. Tutton.
1886. Medal, James Allen.
Prize of books, James W. Rodger.
1887. Thomas H. Holland.
1888. Books, William Tate and Samuel J. Truscott (*medal not awarded*).
1889. Medal, John W. Evans.
Books, William Watson.
1890. Books, Herbert Grime and James G. Lawn (*medal not awarded*).
1891. Charles G. Cullis.
1892. Sydney G. Starling.
1893. Joseph B. Morgan.
1894. Books, John J. Green and Francis C. Harrison (*medal not awarded*).
1895. John Caspell.
1896. Ernest Edward L. Dixon.

THE BESSEMER MEDAL AND PRIZE OF BOOKS.

A bronze medal and a prize of books to the value of £5, given by Sir Henry Bessemer, are awarded each year to the student who does best in Metallurgy.

1881. J. J. Hood.
1882. F. W. Harbord.
1883. Henry F. Collins.
1884. Percy Bosworth Smith.
Prize of books, William F. Grace.
1885. John C. Little.]
James Allen.
1886. Frederick H. Holland.
1887. John J. Richards.
1888. Henry C. Jenkins.
1889. Richard Stanfield.
1890. David Wilkinson.
1891. Joseph Jefferson.
1892. Harold Jeans.
1893. Allan Gibb.
1894. Charles H. Sidebotham.
1895. John Collett Moulden.
1896. Joe Crowther.

THE TYNDALL PRIZE.

The late Professor Tyndall having bequeathed a sum of £100 to the School, the interest is annually expended in the purchase of a prize of books, which is awarded to the student who does best in Elementary Physics.

1882. W. T. Burgess.
1883. William P. Wynne.
1884. Isaac T. Walls.
1885. Alfred E. Tutton.
1886. John H. Powell.
Henry C. Jenkins.
1887. James W. Rodger.
1888. William Watson.
1889. James G. Lawn.
1890. George H. Perry.
1891. William Allan.
1892. Bernard Eric Spencer.
1893. George D. Dunkerley.
1894. Robert Sowter.
1895. William Herbert White.
1896. Ernest Thomas Harrison.

PRIZES OF BOOKS EACH OF THE VALUE OF THREE POUNDS, GIVEN BY THE DEPARTMENT OF SCIENCE AND ART IN THE FOLLOWING SUBJECTS:—

Mechanics.

1888. James Whitaker.
1889. William Buchanan.
1890. William W. F. Pullen.
1891. Charles H. Kilby.
1892. John G. Longbottom.
1893. William H. Pretty.
1894. Harold R. Cullen.
1895. Cecil A. S. Baxter.
Frederick C. Lea.
1896. Frank Fisher.

Astronomical Physics.

1888. William S. Jarratt.
William Watson.
1889. John B. Coppock.
1890. Lewis H. Cooke.
1891. Charles P. Butler.
Herbert A. Clark.
Laurence Parry.
Samuel S. Richardson.
1892. James Bruce.
1893. William E. Tubbs.
Willie Whalley.
1894. Francis Richard Penn.,
Robert Sowter.
1895. Ernest E. L. Dixon.
William H. White.
1896. William Allan Picknett.

Practical Chemistry.

1888. James W. Rodger.
James Young.
1889. James Kelly.
1890. George N. Huntly.
1891. William A. C. Rogers.
1892. George H. Perry.
1893. Robert E. Barnett.
Gerald G. Quinn.
1894. Bouchier M. C. Marshall.
1895. Henry W. Hutchin.
1896. Gilbert Thomas Morgan.

PRIZES OF BOOKS—(*continued*).

Mining.

1888. John M. Beckwith.
1889. Samuel J. Truscott.
1890. Geoffrey Marshall.
1891. James G. Lawn.
1892. Lewis H. Cooke.
1893. Samuel W. Price.
1894. John Ball.
1895. Robert W. Pringle.
1896. Osmer Bernard Ward.

Principles of Agriculture and Agricultural Chemistry.

1889. William Scudamore.
1890. Robert Adams.
1891. Henry Wilkinson.
1892. Thomas Jones.
1893. Robert S. Seton.
1894. William Wilson.
1895. William Williams.

THE WARINGTON SMYTH MEDAL AND PRIZE.

A silver-gilt medal, and the balance of the proceeds of a fund established in memory of the late Sir Warington W. Smyth, are given to the student who takes first place in the "Honours" examination in Mining.

The medal and prize have not yet been awarded.

THE HUXLEY LABORATORY FOR BIOLOGICAL RESEARCH.

The research laboratory, founded to commemorate the long connection of Professor Huxley with the Royal School of Mines and the Royal College of Science, is supplied with a valuable library given by him to the Institution, and is capable of accommodating two students. The occupants of this laboratory are required to undertake some branch of original research in Biology (Zoology, Botany, or Palæontology), under the superintendence of the professors and assistant professors in the Biological and Geological Divisions.

THE MARSHALL SCHOLARSHIP.

This Scholarship was founded by Miss Sarah Marshall, in honour of her father, the late Mr. Mathew Marshall, of the Bank of England, and is awarded annually to a student engaged in biological research in the Huxley Laboratory. The funds for this scholarship are supplied from the interest of £1000 left by Miss Marshall for its endowment.

ROYAL EXHIBITIONS, NATIONAL SCHOLARSHIPS, AND FREE STUDENTSHIPS.

These Exhibitions, Scholarships and Free Studentships are awarded by the Department of Science and Art to successful competitors in their annual May examinations.

The ROYAL EXHIBITIONS are of the value of £50 a year, with free admission to the lectures and laboratories of the Royal College of Science, during the three years' course for the Associateship. There are twelve such exhibitions, four of which are awarded each year. They are open to all British subjects.

The NATIONAL SCHOLARSHIPS, sixty-six in number, twenty-two being open each year, are reserved for students of the industrial classes, as defined by the Department. They are tenable either at the Royal College of Science in London, or at the Royal College of Science in Dublin, at the option of the successful candidates. They are of the value of thirty shillings a week throughout three sessions of about nine months each, with free admittance to the lectures and laboratories during this time.

The FREE STUDENTSHIPS, eighteen in number, of which six are awarded each year, are open to all British subjects. They entitle the holder to free education at the Royal College of Science during three years, with the use of the laboratories.

TEACHERS-IN-TRAINING AND LOCAL EXHIBITIONERS.

About fifty Teachers, and students of science intending to become Teachers, are educated at the expense of the State, at the Royal College of Science. They attend special courses, and are maintained by the Department of Science and Art during their residence in London for this purpose.

Free instruction is also given to certain Local Exhibitioners, who are maintained partly by the State and partly by the locality from which they are sent.

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