their own aggregation when dissolved. The same is true with regard to solutions of liquids. The simplest of these is the solution of phenol and aniline in water. The stability of the compound formed by phenol with aniline shows that both have no affinity to water. Further, M. Alexeyeff discusses the applicability of his theory to bodies which easily pass from one state to another, and the relations of water to colloids. The solutions of liquids in liquids being, on his hypothesis, quite like emulsions. He is engaged now in experiments intended to show that the common emulsions have the properties of solutions.

M. FLAVITSKY proposes, in the *Journal of the Russian Chemical Society*, the following interesting theory of chemical affinity. According to this theory, the atoms of each simple chemical body, when its molecule is dissociated, move in circles parallel to one another, and to a certain plane, the position of which is constant in space. Each chemical element has its own plane of motion, and the circles described by the atoms of different elements cross one another under different angles. Besides, the atoms of opposite elements (such as metals and haloids) move in opposite directions. The chemical relations between different elements would thus depend upon the masses of the atoms, their velocities, their positions on their orbits, the direction of the motion, and the angles between the orbits; while the chemical combinations would be nothing more than the mutual destruction (or rather equilibration) of the velocities of the atoms of the respective chemical elements which enter into a combination. This supposition would explain all the variety of chemical relations even without a great difference in the masses of the atoms and their velocities; a complete stop might be brought only when the orbits are parallel, or the orbits being inclined with regard to one another—when a certain number of velocities acting under different angles make together the necessary resultant. This mutual action of the atoms on one another could be imagined—the author says—at a distance, by means of the ethereal medium which would be thus the medium of transformation of the physical energy into the chemical one.

TECHNICAL EDUCATION[1]

General Objects

THE object of the Central Institution is to give to London a College for the higher technical education, in which advanced instruction shall be provided in those kinds of knowledge which bear upon the different branches of industry, whether manufactures or arts.

Just as the Royal School of Mines gives a technical training to mining engineers, so the Central Institution is intended to afford practical scientific and artistic instruction which shall qualify persons to become—

1. Technical teachers.

2. Mechanical, civil, and electrical engineers, architects, builders, and decorative artists.

3. Principals, superintendents, and managers of chemical and other manufacturing works.

The main purpose of the instruction to be given in this Institution will be to point out the application of different branches of science to various manufacturing industries; and in this respect the teaching will differ from that given in the Universities and in other institutions in which science is taught rather for its own sake than with the view to its industrial application. In order that this instruction may be efficiently carried out, the Institution, in addition to the lecture theatres and class rooms, will be fitted with laboratories, drawing offices, and workshops; and opportunities will be afforded for the prosecution of original research, with the object of the more thorough training of the students, and for the elucidation of the theory of industrial processes.

Students

It is probable that the students seeking admission into the Central Institution will belong to one or other of the following classes:—

1. Persons who are training to become technical teachers.

These will be students entering the College by means of exhibitions under category 2 (*b*); or students selected at the May examinations in technology who pass with special distinction in the Honours Grade; or teachers of the Institute, registered under the scheme of technological examinations, who, during certain months of the year, when they are disengaged, will receive gratuitous instruction, and will have the opportunity of using the laboratories, collections of machinery, instruments, and apparatus with which the College will be provided.

2. Persons not under sixteen years of age who, having passed a matriculation or entrance examination, are prepared to take a complete course of instruction with a view to some professional or industrial occupation. These students will probably belong to two classes—

(*a*) Persons who pay full fees, and will receive in this Institution an education similar, in many respects, to that which they may acquire in one of the technical high schools of the Continent.

(*b*) Persons who are received into the Institution from the Finsbury Technical College, or other similar colleges in the provinces, by means of exhibitions, which will cover the whole or part of their educational and other expenses.

It is probable that many of the persons in sub class (*b*) will be select pupils from the public elementary and national schools, who, having received a preliminary science training, and distinguished themselves at the Finsbury Technical College or elsewhere, will proceed to the Central Institution in the hope of qualifying themselves for some of the higher posts in engineering or manufacturing industry.

3. Persons who, having been already engaged in industrial pursuits, desire to attend special courses, with the view of acquainting themselves more fully with the scientific principles underlying their work.

Conditions of Entrance

The matriculation or entrance examination for students intending to take the ordinary science curriculum, with the view of subsequently obtaining a diploma, will include mathematics, pure and applied; chemistry; physics; drawing, and modern languages. Whilst considerable freedom will be allowed to students entering the College as regards the courses of instruction which they desire to follow, a definite scheme of instruction will be drawn up for each of the different branches of industry, and students intending to spend two or three years in the College and to devote their whole day to study will be recommended to follow the scheme laid down. The fee for the courses to be pursued by a matriculated student will be about 30*l*. per annum, and a fee of about 20*l*. per annum will be charged to students wishing to take special courses and to occupy themselves for the greater part of the day with laboratory practice and research work. With the view of encouraging research work, the Institution will be provided with separate laboratories in which the students will have the opportunity of working without distraction or disturbance. The permission to use these laboratories will be reserved for the advanced students who have previously passed through the ordinary courses of the College, and for non-matriculated students under very special circumstances.

Subjects of Instruction

As the object of this Institution is to train technical teachers, proprietors and managers of chemical manufactories and of other industrial works, as well as mechanical, civil and electrical engineers, architects, builders, and persons engaged in art industries, the Institution will comprise five chief divisions, viz.:—(1) Chemical Technology; (2) Engineering, mechanical, civil, and electrical; (3) General Manufactures; (4) Architecture and Building Construction; (5) Applied Art; and the subjects of instruction may accordingly be grouped under the general headings of Chemistry, Engineering, Mechanics and Mathematics, Physics, Manufacturing Technology and Art. Inasmuch as the Royal School of Mines is already established as a training school for mining engineers, no provision will be made for the instruction of students in this branch of industry; and consequently the sciences of geology, mineralogy, and metallurgy will not necessarily be included in the subjects of instruction at the Central Institution.

Professorial Staff

Chemistry.—The main object of the instruction in this department will be to afford to students facilities for acquiring a knowledge of the highest branches of Chemistry, and of its application to such industries as alkali manufacture, the manufacture of artificial colouring matters, brewing, soap boiling, the manufacture of oils and varnishes, dyeing, &c. To provide the requisite instruction in this department, it will be necessary to

[1] The scheme for the organisation of the Central Institution of the City and Guilds of London Institute, recommended to the Council for adoption at a meeting of the Executive Committee held January 21, 1884, is now being circulated. We regard the matter as so important, and the scheme so perfect in its way, that we give it in full.

have one chief professor, who shall devote the whole of his time to the work of the Institution, and who will be expected to direct and superintend the students in his department and to train them in the methods of original research. In addition to this appointment, it will be advisable to have two assistant professors, who shall respectively take charge of the research and of the technical departments. A separate laboratory will be placed under the direction of each professor; and the arrangements of the building, which provide three large laboratories, besides several smaller rooms which may be used as such, render possible this division of the work. Besides these professors, demonstrators, laboratory and lecture assistants and attendants will be required to complete the staff in this department.

Engineering.—The instruction to be given in this subject will have for its object the practical scientific training of persons who intend to enter any branch of the engineering profession. The instruction will be adapted to those who have already spent some time in the office of a civil engineer or in engineering works, as well as to those who desire to obtain in the College a sound theoretical knowledge of the principles of science applicable to their future career, and an insight into the practice and manipulative work in which they will be subsequently engaged. The professor appointed to take charge of this department will be expected to devote the whole of his time to the work of the College, and to lecture on such subjects as the strength of constructive materials; the construction of docks, roads, bridges, and roofs; machine designing; hydraulic and other machinery; steam-engines, gas-engines, &c. He will also be required to give instruction in levelling and surveying, to superintend the laboratory practice of the students in the testing and engine rooms, and to direct their work in the machine shops and drawing offices. He will need the assistance of a teacher of machine drawing, and of a workshop instructor, besides one or two laboratory demonstrators, and the necessary attendants to look after the engines and machines. Later on, an additional professor will be required to take charge of some of the work of this department.

Mechanics and Mathematics.—Immediately connected with the teaching of engineering and physics is the instruction required by the students of a technical college in mechanics and mathematics. There is little doubt that the student's progress in the several branches of engineering depends very much upon his possessing such a knowledge of pure and applied mathematics as enables him to use it as an instrument of his ordinary work, and for this purpose it is necessary that his knowledge should be in advance of such applications of it as he may at any time be required to make. The professor appointed to this post will be expected to give practical instruction in the application of mathematics and mechanics to the solution of engineering and physical problems. He will be required to devote the whole of his time to the work of the College, and to give courses of instruction, illustrated by laboratory practice, on the principles of dynamics and of mechanicism, on graphical statics, on descriptive geometry, and on some of the higher parts of pure and applied mathematics. He will need the services of two demonstrators to assist in the mechanical laboratory and in the drawing office.

Physics.—In view of the present and future applications of electricity to engineering problems, considerable importance attaches to the character of the instruction to be given under this heading. The teaching of practical physics has only recently been introduced into schools of applied science, and the number of students receiving laboratory instruction in this subject in our own colleges, and in foreign polytechnic schools, is still very limited. The large number of students in attendance at the courses of electricity in the Finsbury Technical College shows that there is already a strong demand for instruction in the practical applications of this important branch of physical science. In order to supply the requisite teaching staff in this subject, it will be necessary, in the first instance, to appoint a professor, who shall devote the whole of his time to the work of the College, and who shall be responsible for the work of his department. This appointment will be supplemented by that of an additional professor, whose duties will depend very much upon the particular branch of physics to which the chief professor may devote his attention. Whilst it is highly desirable that every facility should be afforded in the Central Institution to students desiring to become electrical engineers, of receiving practical instruction in the theory and application of electricity to such technical subjects as telegraphy, electric lighting and the transmission of power, for experiments in which subjects special laboratories will be set apart, it will be the duty of the chief professor or of the additional professor to give courses of lectures on heat, light, and sound; to superintend and encourage laboratory practice in these branches of physics; and to take up from time to time the consideration of other technical subjects, such as the principles of thermo-dynamics in their application to the theory and working of steam-engines, gas-engines, ventilation, &c. To complete the teaching staff of this department, the professors will require the assistance of one or more demonstrators, according to the number of students in attendance at their laboratories.

Technology.—Under this heading is included instruction in the processes and practical details of various manufactures, some of which will be treated of by the professors of the several departments already referred to, whilst others will need the assistance of specialists who will be engaged to give lectures on these subjects. The gentlemen appointed to give these lectures will be either the Institute's examiners in technology, or other persons equally well acquainted with the technical details of particular manufacturing processes. They will be appointed from time to time as required, and will not necessarily form part of the permanent staff of the College.

The lectures will probably be of two kinds, according as they are delivered during the session or during the long vacation. The one course will form part of the curriculum of the ordinary students of the College, whilst the other course will be especially arranged for the instruction of teachers of the Institute, registered under the scheme of Technological Examinations. The lectures given during the session will be attended by the matriculated students towards the close of their regular course of study, those delivered during the recess by teachers of technical classes in London and the provinces, who will be invited to hear them without payment of fee. Arrangements will also be made by which other persons seeking information on technical matters may be admitted to these lectures.

The lectures will embrace several of the subjects included in the programme of Technological Examinations, such as Alkali Manufacture, Spirit Distilling, Glass Manufacture, Pottery and Porcelain, Printing, Weaving, the Manufacture of Cotton, Wool, Linen, &c., and will treat of the technical details involved in these and other industrial processes. For the illustration of the lectures, specimens of materials in various stages of manufacture, models and diagrams of machinery, will be required; and these should be found ready for use in the Museum of Technology, a room for which has been provided in the Institution. Facilities will be afforded to the lecturers and students for carrying on experimental work in explanation of the lectures; and considering the varied character of the work which may have to be performed in connection with this department, for which it is impossible to make provision at the outset, it is very important that here and there rooms should be left available to be fitted with such arrangements and apparatus as experience may show to be desirable. These lectures will form a special and characteristic feature of the instruction to be given in the Central Institution.

Architecture and Building Construction.—To give completeness to the instruction which this Institution should afford, a department of Architecture and of Building Construction should be added to those already enumerated. The establishment of a special school for Architects and Builders would not involve any great addition to the professorial staff which it is suggested should be provided for the other departments of the College. But as the funds at the disposal of the Institute are not sufficient to enable the Council to give effect at starting to a complete scheme of higher technical instruction adapted to all the different industries of the country, it would seem advisable at first to restrict within certain limits the work to be carried on in the Institution, and to defer for some little time the organisation of this special school.

Applied Art.—Under this heading instruction might be given in decorative art, and in several special branches of applied art, particularly in those in which artistic effects are produced by a combination of art with processes involving applications of science, such as Chromo-lithography, Enamelling, Photo-engraving on Metals, Photo-lithography and Photography. Lectures might be delivered on these subjects, and on the scientific principles connected with them; and the processes themselves might be practically illustrated under the direction of experienced teachers in the workshops of the building. Lessons might also be given in designing for, and in the execution of, glass painting, mosaic work, wood and ivory inlaying, the

inlaying of metals into various substances, wood-engraving and wood-carving.

Instruction of this kind would be very serviceable in creating and developing art industries in this country, and it would be especially valuable in the training of teachers; and it is hoped that means will be found, at a very early date, for giving such instruction.

Modern Languages.—In view of the increasing importance to students of applied science of being able to read foreign scientific and trade journals so as to understand what is being done abroad in the particular branch of industry in which they are engaged, the students will have the opportunity in the Central Institution of pursuing their studies in the French and German languages. It is true that they might obtain these lessons elsewhere, but it is found, as a fact, that students very rightly object to the loss of time involved in going from place to place in pursuit of the instruction they require, and commonly neglect the lectures which they have not the opportunity of attending in the Institution in which they pass the greater part of their day. Moreover, students are attracted to a place of learning in which they can obtain all the instruction they need. For these reasons, it is thought desirable that teachers of French and German should, as soon as possible, be appointed. At the same time it is hoped that, as the teaching of modern languages becomes so far improved that students, seeking admission to the College, will be able to translate with ease passages from French and German into English, the necessity of supplementing the technical instruction, which the Institution is intended to afford, by providing for this branch of education will cease to exist.

Courses of Instruction

Systematic courses of instruction will be drawn up for matriculated students, which will be obligatory upon those who seek the Diploma of the Institute. These courses will cover a period of three years, and will be varied according to the branch of engineering or of manufacturing or art industry for which students are preparing. The details of these courses will be best settled in consultation with the several professors; but it is understood that, besides the general and special lectures and class work already referred to, the instruction will consist largely of laboratory practice in chemistry, mechanics, and physics; and that for students who may not previously have acquired any manipulative skill, the workshops of the Institution will be available; whilst machine drawing will form an important part of the ordinary curriculum. It is hoped, too, that the professors will have opportunities of conducting their students to some of the different factories and works in and near London.

Diplomas

It is desirable that the Institute should grant diplomas, in accordance with the power conferred upon the Council by the Articles of Association, Sec. 51. The diplomas should be o two kinds, the Associateship of the Institute, and the Fellowship of the Institute.

The Associateship should be awarded to students of the Central Institution, who shall have gone through the complete course of instruction as laid down for them, and have satisfactorily passed their several examinations. Of these examinations, the first would be the Matriculation or Entrance Examination, and candidates unable to pass it would be recommended to spend one year, at least, in some suitable College, in preparation for it. A subsequent examination would be held at the end of each year on the College work, and the final examination, at which external examiners would be selected to assist the Professors of the Institution, would be essentially practical in character. The diploma might be granted to students educated at any other College affiliated to, or associated with, the Institute, who should pass the Matriculation and other examinations.

The Fellowship would be conferred upon persons who, having obtained the Associateship, and spent at least five years in actual practice, should produce evidence of having done some original and valuable research work, or of having otherwise contributed to the advancement of the industry in which they are engaged.

Evening Instruction

Although, at the outset, the education of day students is all that can with advantage be attempted, it is desirable that, later on, the experiment shall be made of giving evening instruction in the Central Institution.

The instruction so given should consist of courses of lectures dealing with some of the applications of science or art to special branches of industry, and serving the double purpose of imparting information and of showing the importance of more systematic technical teaching. These lectures should be somewhat of the character of the Cantor lectures periodically delivered at the Society of Arts, and somewhat similar to the well-attended and varied courses held at the Conservatoire des Arts et Métiers at Paris. Whilst differing from class lessons, they would have a distinctly educational value; and, as distinguishing them from the Cantor lectures as well as from those given at the Paris Conservatoire, opportunities would be afforded to some of the students attending them of themselves doing laboratory work on one or more evenings of the week. It would be necessary that the evening instruction should be so arranged as not to interfere with the ordinary day courses.

Appointment of Chief Professors

Should the scheme now proposed for the organisation of the Central Institution be adopted, there are numerous details connected with it which will need to be carefully worked out. But before entering further into the consideration of these details, it is desirable that the chief professors should be appointed, not with the view of their entering immediately upon their duties, but in order that the Sub-Committee may confer with them as to the courses of instruction to be given, and as to the fittings of the several laboratories and class rooms, the preparation of which will occupy some considerable time.

It is recommended, therefore, that the Committee should at once appoint—

A Professor of Chemistry.
A Professor of Engineering.
A Professor of Mechanics and Mathematics.
A Professor of Physics.

These gentlemen having been elected, the appointment of the other professors, the demonstrators, and lecturers on technology may be deferred, it being understood that some of these additional posts must be filled before the opening of the first session. Meanwhile, however, the work of preparing the fittings and of arranging the courses can be advanced.

Management

The following Rules have been drawn up for the regulation of the educational and administrative work of the Central Institution:—

1. There shall be a Board of Studies, composed of the Professors of the Institution, for the consideration of all matters connected with the education of the students.

2. Any lecturer holding an annual appointment and giving a separate course of instruction may be appointed by Sub-Committee A as a member of the Board.

3. Subject to a general scheme of instruction to be laid down by the Institute, the Board shall arrange courses of instruction for students, and shall recommend to the Institute with respect to the appointment and removal of instructors, teachers, demonstrators, and attendants.

4. The Organising Director and Secretary of the Institute shall have a branch office in the Central Institution, and shall have a right to visit its classes, laboratories, and workshops, and to call for any information he may think necessary for the use of the Sub-Committee A. He shall also have a right to be present at any time he may think it desirable at the meetings of the Board, and to take part in the discussions, but without a vote.

5. All communications from the Board to the Institute shall be made in writing, and shall be addressed to the Organising Director and Secretary.

6. The Institute, at the outset, shall appoint, for the period of a year or longer, from among the professors, a Dean, who shall preside at the meetings of the Board, and who shall attend any meeting of Sub-Committee A at the request of the Sub-Committee or of the Board for consultation on any special business.

7. The minutes of the meetings of the Board shall be recorded, and shall be laid on the table at the meetings of Sub-Committee A.

8. The chief clerk of the Central Institution shall act as secretary to the Board, receiving in that capacity his instructions from the Dean, and shall take minutes of the proceedings.

9. The Dean shall consult with the Organising Director and Secretary, who shall confer with the Chairman of the Executive

Committee, or, in his absence, with one of the honorary secretaries, with respect to any *ad interim* arrangement that may have to be made requiring the subsequent sanction of Sub-Committee A.

10. All the administrative work of the Central Institution, general questions of discipline, and the superintendence of the library and museum, shall be in charge of the Organising Director and Secretary of the Institute, who shall act under instructions from Sub-Committee A.

GEOLOGICAL SURVEY OF THE UNITED KINGDOM [1]

THE completion of the one-inch Geological Survey Map of England and Wales affords a fitting opportunity for directing public attention to the history and progress of this great national undertaking.

As far back as the year 1832 that enthusiastic geologist, Henry T. De la Beche, began at his own expense to prepare geological maps of the mining districts of Cornwall and Devon. Being impressed with the great public utility of such maps in a country deriving so large a portion of its wealth from its mineral resources, he applied to the Government of the day for recognition and assistance. Eventually he and his two or three assistants were incorporated as a portion of the staff of the Ordnance Survey. From this modest beginning De la Beche's genius conceived the idea of founding a great central establishment in London, in which specimens of all the ores and other mineral products of the country should be selected and arranged for public inspection and reference, and where should also be preserved copies of the plans of mines and collieries, from which it would be possible to learn at any moment what areas had been exhausted and the condition of the abandoned underground workings. But besides the practical applications of science, he contemplated the foundation of a school in which all the sciences concerned in mining operations should be taught by the ablest professors in the country, and of a museum in which the rocks, minerals, and fossils of the British Islands should be thoroughly illustrated and made completely available to the public for instruction as well as for economic purposes. Being gifted with indomitable perseverance and no common measure of personal tact, he succeeded in impressing his views upon the Government. By degrees the Geological Survey was fully organised and equipped, and the Mining Record Office and the Royal School of Mines were established, De la Beche himself becoming the Director-General of the whole scheme. The accommodation afforded him at first in the buildings in Craig's Court soon proving inadequate, Parliamentary sanction was in the end obtained for the erection of the present establishment in Jermyn Street, which was opened in 1851, and which, as was then said by the late Sir Roderick I. Murchison, "stands forth, to the imperishable credit of its author, as the first palace ever raised from the ground in Britain which is entirely devoted to the advancement of science."

In the meantime, while its offshoots were showing such vigorous growth, the original and parent Geological Survey was extending its operations over the country. The objects for which it was created were twofold. In the first place it was meant to advance geological science by the production of an accurate and detailed geological map of the United Kingdom, with the necessary sections and descriptive memoirs, and by the collection of a full series of specimens to illustrate the mineralogy, petrography, and palæontology of the various geological formations. In the second place it was designed to be "a work of great practical utility bearing on agriculture, mining, road-making, the formation of canals and railroads, and other branches of national industry." This original conception of the object of the Survey has been steadily kept in view. From the districts first surveyed in Devon and Cornwall the mapping was pushed forward into the south-west of England, and then into South Wales. In 1845, the importance of the work having now been fully realised by the Government, some changes were made in the organisation. In particular, the charge of the whole scheme was transferred from the Board of Ordnance to the Office of Woods and Works. A branch of the Survey was likewise equipped for the investigation of the geology of Ireland, where some progress had already been made by Capt. Portlock, R.E. Nine years later—viz. in 1854—the operations of the Survey were extended to Scotland, and the whole establishment was finally placed under the Science and Art Department, which had now been created. The basis of the Geological Survey map is the one-inch map of the Ordnance Survey. In Ireland and Scotland, where Ordnance county maps on the scale of six inches to a mile have long been in existence, the geologists of the Survey made use of this larger scale for their field work, which was subsequently reduced and published on the one-inch scale. In England corresponding six-inch Ordnance maps having meanwhile appeared, the Geological Survey of the northern counties was carried on upon them. The surveys of the northern coalfields and other mineral tracts have been engraved and published on this larger scale. These maps embody a mass of accurate information regarding the structure and resources of our mineral districts, and have been much appreciated by those who are practically interested in the development of this branch of the national industry.

The Ordnance Map of England and Wales is divided into 258 squares, known as sheets or quarter-sheets. These can now be procured as sheets of the Geological Survey, except those last completed, which are now in preparation. As the whole ground has been surveyed, the remaining maps may be expected to appear with no great delay. To make the maps fully available for the information of the public, sections and memoirs are issued. The sections are of two kinds. One of these, called Horizontal Sections, of which 130 have been published, are drawn on a true scale of six inches to a mile, the profile of the ground being accurately shown by levelling, with the geological structure underneath. Many of these sections are accompanied by explanatory pamphlets. For various economic purposes, such as railway-cutting, tunnelling, water-supply, mining, road-making, building, and so on, these Horizontal Sections are of the utmost value. The second kind, called Vertical Sections, are drawn on the scale of forty feet to an inch, in explanation of the detailed structure of our coalfields. One of the most valuable parts of the work of the Survey is embodied in its "Memoirs." At first these were issued in goodly octavo volumes, either embracing a number of disconnected essays, some of which, like Edward Forbes's famous paper on the history of the British flora, have become classics in geological literature, or devoted entirely to the description of a particular area, such as John Phillips's well-known treatise on the Malvern Hills. After 1855, when, on the death of Sir Henry De la Beche, Sir R. I. Murchison became Director-General, this form of memoir was postponed in favour of shorter explanatory pamphlets with which each sheet or quarter-sheet was to be accompanied. These were designed to supplement the map and sections, and to make their information at once intelligible to the public by giving detailed information regarding the natural sections, characteristic fossils, economic minerals, &c., in each district. It was fully determined, however, that, as the Survey advanced, ample monographs should be prepared for each geological formation or important district. Among the other publications of the Survey are the "Decades" and "Monographs" of organic remains, of which seventeen have been issued; the "Mineral Statistics" of the Mining Record Office, which have appeared as an annual volume for the last thirty years; and various catalogues and other works, which swell up the total separate printed publications of the Survey of the United Kingdom to upwards of 270. It ought to be stated here that, first under De la Beche, and subsequently under Murchison, the work of the Survey depended largely for its efficiency and breadth of view on the Local Director, Prof. (now Sir A. C.) Ramsay, who on Murchison's death was appointed Director-General in 1872, and continued in that post until his retirement from the service at the end of 1881. He was then succeeded by Prof. Geikie, who had for more than fourteen years held the office of Director of the Survey in Scotland, and who since his appointment has pushed on the completion of the one-inch map of England and Wales, which is now announced by him as accomplished. The completion of the map of what is termed the "Solid Geology" of England and Wales—that is, the rocks underlying the superficial deposits—terminates indeed an important part of the work of the Survey.

But much remains to be accomplished. The one-inch map of Ireland will be completed in a few years; but that of Scotland, not having been begun till much later, and having always had a much smaller staff, will require longer time. From the last published report of the present Director-General we learn that such of the staff as are qualified for the difficult mountainous area of Scotland will be transferred to that region as soon as

[1] From the *Times*.