

Shales, apparently passing upward into the Middle Devonian Slates by the irregular intercalation of grits with slates.

During the progress of the field-work in South Devonshire a large series of specimens, sent up by Mr. Ussher, has been sliced and subjected to microscopic investigation by the petrographer to the Survey, Mr. J. J. H. Teall, F.R.S., who reports that the detailed examination of the rocks from the metamorphic area of South Devon has brought to light the fact that the previously published descriptions of the green varieties of rock were very imperfect. The specimens which have been least altered by surface-agencies consist essentially of hornblende, albite and epidote. In altered specimens hornblende is more or less replaced by chlorite; and when this is the case calcite is usually present. The hornblende is either uralitic or actinolitic in character, never compact. The felspar is water-clear, and usually without any trace of cleavage or twinning. It has been definitely determined to be albite in one case, and from its uniform character in all the slides examined there can be no doubt that this is the dominant if not the only species present. The association of albite with hornblende, epidote, chlorite and calcite has been described by Lossen in his various papers relating to the modification of the diabases associated with Devonian rocks in the Hartz. Quartz, which had previously been supposed to form an important constituent of these rocks, appears to be comparatively scarce.

Petrographical Department.—The important assistance of the petrographical department has again during the past year been largely extended to the field officers, and has greatly aided their work. Mr. Teall, besides the microscopic and chemical work carried on by him in this office, and the determinations and reports made by him for the guidance of the officers in the field, has during the past year undertaken some field-work himself. As he is specially charged with the investigation of the petrography of the Lewisian gneiss—the most ancient rock in the British Isles—it was considered desirable that he should make himself practically familiar with the minutest details of the complex structure of this venerable formation, and for that end should himself map a portion of its area on the six-inch scale. The Island of Rona, lying between Skye and Ross-shire, was selected for him, and he spent nearly two months in mapping it.

With regard to the ordinary work of the department in the office and to the more important scientific results obtained by Mr. Teall during the last few years, he has at my request drawn up a memorandum, from which the following passages are taken:—The principal work of the petrographical department during the year has been the examination and description of specimens sent up by the officers in the field. Of these 492 have been prepared for microscopic examination and have been described in detail. The total number of Scottish rocks from which sections have been cut is now more than 5000. The system of cataloguing has been improved during the year. Each field officer now numbers his specimens consecutively. These specimens are entered in a book under the name of the officer who sends them up, and a record is kept of the destination of each. Those specimens of which sections are prepared are numbered consecutively in the order in which they are cut, and are entered in books kept for the purpose. When they have been described and named they are again entered in two distinct catalogues, one of which is arranged according to the sheets of the one-inch map, and the other according to petrographical types. It will thus be seen that every sliced specimen is entered four times, and that every specimen sent up for examination, whether sliced or not, can at once be found.

On the general question of metamorphism much important detail has been accumulated. The fact that the central and southern Highlands of Scotland are largely composed of highly crystalline rocks of sedimentary origin has long been known. Petrographical work has tended to render the correctness of this view more and more certain. Thus fine-grained quartzo-felspathic rocks, which show no decided indications of elastic origin, have been found to be traversed by narrow dark bands in which minute crystals of zircon, rutile, and ilmenite abound. Similar bands occur in loose sandy deposits of much later geological age, so that the doubtful rock may be recognised as really a sandstone consolidated by the secondary enlargement of the quartz, and possibly also of the felspar grains. The detailed microscopic work of the department has also thrown much light on the nature of the processes by which the present mineralogical and structural characters of the Highland rocks have been produced.

(To be continued.)

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UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

THE results of an inquiry into the position taken by Universities in different parts of the world as regards the admission of women, are given in the *Revue Scientifique*. It appears that the French Faculties opened their doors to women for the first time in 1863. None of the German Universities yet admit women either to lectures or examinations. There will be a difficulty, however, in resisting for long the force of opinion in favour of the admission of women to courses of study, and especially to medical classes. A petition for the removal of the present restrictions was presented to the Reichstag not long ago, containing more than 50,000 signatures of women. In Austria-Hungary and Spain the laws are against the access of women to higher education. Women possess a special school of medicine in Russia, in spite of their exclusion from the Universities. In Belgium, women are admitted to the courses in all the Faculties, and are eligible for all diplomas. They may also follow the medical profession, or become dispensing chemists. Holland has a large number of women students in its Universities, but Switzerland heads the list in this respect. During the summer semester of 1892, no less than 541 women students were studying in Swiss Universities. In Italy women are admitted to all the Faculties, and are at liberty to exercise all professions except the legal. Among the professors in Bologna University, a lady occupies the chair of histology in the Faculty of Medicine. The Universities of Jasi and Bucharest, in Roumania, are open to women, as are also those of Denmark, Sweden, Norway, and Iceland. Higher education is available for women in most parts of the United States. The result of this is that America has about 3500 women following various branches of the medical profession, 70 have been appointed physicians in hospitals, and nearly 100 are professors in schools of medicine.

THE Council of the Association of Technical Institutions have sent a letter to Mr. Gladstone with reference to the Royal Commission on Secondary Education, the appointment of which was recently announced. The signatories point out that, as the education given in the institutions represented by them is a necessary and important part of the general secondary education of the country, it is of great importance that the Royal Commission should be fully informed as to the nature of the work that is being done, as to the best means of improving and extending this work, and so enabling the institutions most efficiently to take their share in the work of national education. They therefore urge that the Royal Commission should be expressly empowered to deal with technical education, and in order that it might be able to do so effectually, that there should be among the Royal Commissioners an adequate number of gentlemen of experience as administrators and teachers of technical institutions.

THE Italian Government has decided to suppress six small universities—those of Messina, Catania, Modena, Parma, Sassari, and Siena—the academic population of which is from 100 to 400.

SCIENTIFIC SERIALS.

Bulletin of the New York Mathematical Society, vol. iii. No. 5.—Prof. Klein's recent visit to Chicago was taken advantage of by American mathematicians. One of the most interesting results was the publication of twelve lectures on mathematics, with the title of "The Evanston Colloquium." An abstract of the contents of this work, by H. S. White, occupies pp. 119-122 of the present number. L. E. Dickson contributes a note on the number of inscribable regular polygons (pp. 123-125). E. M. Blake (pp. 125-127) writes upon the "Bibliography of Mathematical Dissertations." His remarks are based upon two recently issued works, viz. "Catalogues des Thèses de Sciences soutenues en France de 1810 à 1890 inclusivement, par A. Marie (1892)," and "Verzeichnis der Seit 1850 an den Deutschen Universitäten erschienenen Doctor-Dissertationen und Habilitationsschriften aus der reinen und Angewandten Mathematik" (München, 1892). The Paris dissertations are 701 in number, and the departments furnish 172 more. The German work gives references to 939 dissertations. Both books supply a want which has long been felt, for most of these dissertations appear unannounced at irregular intervals, and are with difficulty

run to earth. The remaining article is on the teaching of mathematics in the secondary schools (pp. 127-130), and consists of an extract from the report rendered to the National Educational Society, December 1893, by the Committee on Secondary School Studies.

Meteorologische Zeitschrift, February.—The results of the Swedish International Polar Expedition at Cape Thorsden, Spitzbergen, 1882-83, by Dr. J. Hann. The meteorological results, which have only recently been published, show that the winter temperature is relatively very mild compared with that observed at all the other Polar stations north of 70° N. latitude. In the year commencing September 1882, and ending August 1883, Cape Thorsden, latitude 78° 28', had the smallest extreme cold, with the exception of Jan Mayen, latitude 71°, while the summer was very cool. The lowest mean monthly temperature was -1° 3' in December, and the absolute minimum -31° 9' in January; the highest mean monthly temperature was 40° 3', and the absolute maximum 56° 5', both in August. The yearly rainfall (including snow), was 74 inches; no real hail fell during the year. The daily range of the barometer shows a double period, as in lower latitudes, but the maxima and minima occur at different hours; the day maximum occurs about 1h. p.m., and the minimum about 6h. a.m., and there is a second maximum from 10h. p.m. to midnight, and a second minimum about 6h. p.m. In summer the amplitudes are much smaller than in winter; the day maximum then occurs from about noon to 1h. p.m., and the afternoon minimum about 6h. p.m. The prevalent wind directions are east and west; in summer the south-west wind is most frequent, and in winter north-west and east. The daily range of wind velocity is very marked in summer, the maximum occurring about 1h. p.m., and the minimum about 1h. a.m.; while the reverse obtains in winter, but with less regularity.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, March 1.—“Terrestrial Refraction in the Western Himalayan Mountains.” By General J. T. Walker, C.B., F.R.S.

In the operations of the great Trigonometrical Survey of India it is customary to determine the coefficient of refraction by reciprocal vertical observations between contiguous stations on the sides of all the principal triangles, and also as many as possible of the secondary triangles.

The values of the coefficient thus obtained for the operations in the Western Himalayas—between the meridians of 73° and 80° east of Greenwich—have been grouped together for comparison in successive ranges of 2000 feet of altitude between the elevations of 5000 and 21,000 feet above the sea-level. The operations happen naturally to have been divided into two sections; for the regions lying between the great snowy ranges on the southern face of the Himalayas and the plains of India were first completed, and some time subsequently the still higher regions to the north, extending up to the Karakoram and Kuenlun Ranges, which look down on the plains of Turkestan. The first portion appertains to what is called the N.W. Himalayan Series, the second to what is called the Kashmir Triangulation. Thus the values of the coefficients of refraction were obtained separately for each section, and the results show that at each range of altitude the coefficient of refraction was greater in the Southern than in the Northern Section; also that from the height of 13,000 feet upwards the coefficient decreased in magnitude, as it theoretically should do, in the Northern Triangulation, but, on the other hand, in the Southern it increased until it became twice as great as in the Northern. These differences of behaviour in the two regions are very curious and difficult to account for. They point to some difference in the atmospheric conditions to the north and south of the outer Himalayan Range, and this may possibly arise from the circumstance that the atmosphere to the south is more heavily laden with moisture than the atmosphere to the north; for the great southern range is the first to receive the clouds which come up from the Indian Ocean, and which are the chief source of Himalayan moisture; these clouds are mostly condensed into rain on the southern face of the range, and thus only a comparatively small portion of their contents is carried on beyond into the more northerly regions. Whatever the cause, the fact is very remarkable that the coefficient of

refraction has a minimum value at an altitude of 20,000 feet on the north side of the Himalayan Ranges, and a maximum value at the same altitude on the south side.

“On a Spherical Vortex.” By Dr. J. M. Hill, Professor of Mathematics at University College, London.

The nature of the irrotational motion of an infinite mass of frictionless fluid, in which a solid sphere is moving, is well known. The object of this investigation is to show that continuous motion throughout space is possible if the solid sphere be replaced by a spherical mass of rotationally moving fluid. This spherical mass is the spherical vortex of the investigation. Its centre moves with uniform velocity along a straight line, which may be called the axis of the vortex. The surfaces inside the vortex which contain the same particles of fluid throughout the motion are ring-shaped surfaces of revolution about the axis, but are not anchor-rings. The molecular rotation at any point of the vortex is proportional to the distance of the point from the axis. The cyclic constant of the spherical vortex is equal to five times the product of the radius of the sphere and the uniform velocity with which the vortex moves along its axis.

Dr. E. L. Mellus made a preliminary report of the results of experimental investigation of the central nervous system of the monkey (*Macacus sinicus*) at the pathological laboratory of University College. Small portions of the cortex cerebri were removed from the left hemisphere, amounting in each case to about 16 sq. mm. At the end of three weeks the animals were killed, and the resulting degeneration traced by Marchi's method. Two foci of representation were selected for excision: the focus for the movements of the hallux, and the focus for the movements of the thumb. In the former, degeneration had taken place extensively throughout the pyramid of the left side down to the decussation in the cervical region, where the degenerated fibres were seen to divide, the greater portion, about two-thirds, crossing over to the opposite (right) lateral column, the remainder passing through the grey matter to the lateral column of the left side. This degeneration was maintained throughout the entire cord to the lower lumbar region. In the case of the removal of the thumb centre similar degeneration was observed, though the number of degenerate fibres was less than in the former. At the decussation the tract also divided, though the proportion of fibres going to the left lateral tract was much less than in the case of the hallux, and there was no degeneration of the cord below the level of the second dorsal nerve.

Mathematical Society, March 8.—Mr. A. B. Kempe, F.R.S., President, in the chair.—The following papers were read:—Groups of points on curves, by Mr. F. S. Macaulay. In the earlier part of the paper a proof is given that any n^{th} through all the points of intersection of two given curves C_l, C_m of orders l and m is necessarily of the form

$$S_n \equiv C_l S_{n-l} + C_m S_{n-m} = 0$$

but the chief part of the paper is an investigation of the amount of independence of a group of points on a given curve which are residual to the partial intersection of the given curve by another curve of any order. The question may be expressed thus:—“If three curves C_l, C_m, C_n ($l > m > n$) have N points common (N being not less than $\frac{1}{2}l(l+3)$), what is the amount of independence of the remaining points common to C_l, C_n (and those common to C_m, C_l) for curves of any order passing through them, and what is the number of absolute relations that connect either of the above groups of points among themselves?” The method of investigation is geometrical, i.e. it does not depend on the solution of any equations or on the investigation of the properties of a curve from its equations.—On a simple contrivance for compounding elliptic motions, by Mr. G. H. Bryan. The author exhibited a number of “pendulum curves” drawn with a very simple arrangement based on the principle of a pendulum curve-tracer that he saw exhibited at the British Association meeting at Nottingham. The paper to be drawn on is placed on a heavily weighted board suspended from two points overhead by strings attached to its four corners in such a way that it can swing in any direction without twisting round. From the under-side of the board is suspended a weight, thus giving two periods of oscillation. The pen is attached to a triangular framework, hinged to fixed supports, and carefully counterpoised. The pen thus rests gently on the paper, which moves about underneath. The author uses a kind of “reservoir pen,”