

ice, except along the west shore of Wijde bay, where is a relatively fertile area. The middle of the island, west of the main watershed, is a region of boggy valleys, fertile slopes, and mountain ridges, or the remains of a high plateau. The nature and interest of this country can be shown by a few specimen areas. The east shore of Wijde bay is formed by a long and very uniform slope, about 1000 feet high. The ice-sheet almost reaches the edge of this slope, except at a few places where the plateau has been broken down into valleys, whereby tongues of ice reach or approach the sea. That is an example of a plateau protected from denudation by ice. Along the north-east side of the Sasselndal there is a similar plateau, from which, however, the ice-sheet has been withdrawn in recent times. Denudation has begun, and the plateau is being cut down by narrow and precipitous cañons, from which it derives the name Colorado Berg. These cañons are not being gradually lowered, but they are gradually creeping back. However short, all are practically of the same depth. It is at their heads that they are formed. Each is eating its way back with considerable rapidity, and the whole is the first stage of the formation of a mountain group.

From the whole area west of the Sasselndal, between it and Advent bay, bounded on the north by Ice fjord, and on the south by Advent dale, the ice that once covered it appears to have been gradually withdrawn, beginning from the west. As one goes westward one comes to mountains in a more advanced stage of manufacture. The hills that look down upon the Sasselndal are the bluff-fronted remains of a plateau, only a little more cut down than the Colorado Berg. Except in two cases, the valleys that penetrate them from the Sasselndal are short. Further west come rounded hills, such as Mount Lusitania. Beyond De Geer valley are maturer peaks, with clearly defined arêtes and faces such as are familiar in ordinary mountain regions.

Where mountains are most developed valleys are oldest. Advent dale may be taken as type of these. As the ice retreated eastwards, Advent dale widened and crept back, receiving the drainage of a constantly developing valley-system, whose eastern watershed ran close behind the Sasselndal bluffs. Later on the Sasselndal tributaries became more active, and ate their way back, stealing one after another of the headwaters of Advent dale. The Esker valley is a good instance of this. It was formerly drained to Advent dale; now it drains in the opposite direction. Brent pass divides the drainages, but will not long continue so to do, for already a small stream, descending almost on to the pass, is in process of being stolen by the Esker. It now divides its waters upon its fan when in flood, one stream going to Advent dale, the other to the Esker. Fulnar valley, which formerly drained into Agardhs bay, has been similarly invaded by the Sasselndal, and many more instances might be quoted.

The great interest, therefore, of this peculiar island of temperate climate in the midst of Arctic ice-sheets, lies in the fact that there is one of the very best examples in the world of the processes of mountain and valley manufacture. This fact altered the plan of the expedition, and showed that it was a far more important matter to make a fairly detailed examination of one portion (in itself, however, not inconsiderable) of Spitzbergen, than to scamper hurriedly across two or three separate belts. Sir Martin Conway and his companions crossed from sea to sea along three different lines; but, instead of being as far as possible from one another, these lines were so arranged that each should display the flank of the next. The crossings were from Advent bay to Van Mijen bay, from Van Mijen bay to Sassen bay, and from Sassen bay to Agardhs bay and back, finally returning along the shore of Sassen bay to Hyperite Hat, and completing the work by expeditions into the heart of the important mountain region which has been already referred to.

Sir Martin Conway proceeded to describe the incidents of the various journeys across the island, the journey being made both wearisome and dangerous by the constant rain, the boggy floors of the valley and the still more treacherous slopes of rotten snow. Thawing was going on very rapidly, and the rivers were so numerous, that fifty-two, which required to be forded, were counted in a single mile near the head of Advent dale. Some gleams of sunshine allowed of comprehensive views being obtained over the maze of valleys and broken plateau. The party carried on much of their work separately, thus being able not only to survey a large part of the island for the first time, but also to devote special attention to the geology and the conditions of the numerous large glaciers and innumerable moraines which were encountered.

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UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—Mr. W. N. Shaw, F.R.S., has been appointed a member of the General Board of Studies. Mr. Middleton-Wake, the Sandar's Reader in Bibliography, will this term give a course of four lectures on the invention of printing, with special reference to book-illustration. Mr. C. H. Robinson, who has been elected University Lecturer in the Hausa language, will give an inaugural lecture on the Hausa people on February 2. Mr. E. J. Stone, F.R.S., and Prof. J. J. Thomson, F.R.S., have been nominated as examiners for the Adams prize to be awarded in 1899. Dr. Somerville is this term lecturing on agriculture and forestry at the University Chemical Laboratory. He announces also a special lecture on the "finger and toe" disease of turnips on February 6.

A SPECIAL educational supplement is published with the *Academy* of January 23. In it will be found some suggestive notes on the use of illustrations and models in teaching, and records of scholastic events in the principal public schools during the third term of 1896.

THE annual general meeting of the Association of Technical Institutions was held in the Clothworkers' Hall, London, on Friday, January 22, when the Right Hon. A. J. Mundella, M.P. (the retiring President), presided over a large attendance of members. Mr. Henry Hobhouse, M.P., was elected President for the year 1897, and delivered his inaugural address. It was resolved to request the Council to take into consideration and to report to the next general meeting as to the best means of promoting full recognition of the attainments of technological students, and also as to the best method of securing a closer co-operation with the Examination Board of the City and Guilds of London Institute; in considering this important matter the Council is to have power to co-opt such persons as it may deem desirable. The Council for the year was elected as follows:—President: Mr. Henry Hobhouse, M.P. Vice-Presidents: The Right Hon. A. J. Mundella, M.P., Mr. W. Mather. Treasurer: Councillor R. F. Martineau. Hon. Secretary: Prof. J. Wertheimer.

A NOTEWORTHY event in the annals of technical education in the United States will be the forthcoming celebration of the twenty-fifth anniversary of the Stevens Institute of Technology, on February 18 and 19. From the *Journal* of the Franklin Institute we learn that the institute was founded by the late Edwin A. Stevens, of Hoboken, N.J., and in 1870 the erection of a building was commenced. Dr. Henry Morton, at that time secretary of the Franklin Institute, was tendered the presidency of the institute, and gathered a faculty of eight members about him. To this number others have, from time to time, been added as the work of the institute increased, until at the present time the faculty includes twenty-two professors and instructors. The total number of student graduates is 675, and the number in attendance during recent years has been about 260 each year. The Stevens Institute has always taken high rank among the institutions devoted to technical education in the United States, and its twenty-five years of successful effort is amply exemplified in the work accomplished by its graduates in all departments of mechanical and electrical engineering.

FROM the Berlin correspondent of the *Lancet* we understand that there is some uneasiness in German University circles. In Germany a university student has to pay a fee each half-year for every lecture he attends, and this money becomes the property of the individual teacher. In addition to the students' fees, the professors receive a fixed salary from the Treasury; but the great majority of associate professors and *privat-docents* do not get any remuneration from the Government. In order to redress this inequality, the Government proposes to introduce a Bill providing that lecture fees exceeding 4000 marks (200*l.*) in Berlin University and 2000 marks (100*l.*) in the provincial universities shall be divided between the lecturer and the Treasury. The fund thus obtained will be used to increase the remuneration of the teaching staff of the university. The announcement of this contemplated innovation has caused a sensation among the members of the universities. They point out that the new measures will induce the members to raise the fees, and that the expense of university education will thereby be increased. The Bill would also restrict the liberty and freedom of action

at present possessed by the universities, and place them in a position of dependence on the Government. Although it is intended that the new regulations shall only come into operation gradually as new appointments are made, and shall not be applicable to the professors who already occupy chairs, the effect has been to cause so much uneasiness in university circles that the Government may possibly abandon the proposal.

THE annual general meeting of the Association of Technical Institutions was held on Friday last. Mr. Hobhouse, M.P., in the course of his presidential address remarked that he hoped the rising generation of agriculturists, as of other classes, would listen to the wise advice given them by such men as the Duke of Devonshire, Lord Rosebery, and Sir Henry Roscoe, and would avail themselves of every opportunity to acquire skill and apply knowledge in adapting their industry to the altered conditions of the times. As to how far this kind of instruction was to be carried, he urged that they should extend and advance their instruction as far as ever their funds would permit. It was somewhat extraordinary to see the same men who were willing to pour money out like water on new ironclads and regiments for meeting the remote contingency of an invasion by foreign troops grudge a few thousands a year for checking, and, if possible, defeating, the immediate and actual invasion of our country by foreign products and foreign workmen. As to the conditions under which technical instruction should be given, he pleaded that specialised training should not begin too early in life, but should as far as possible be based on a solid foundation of literary and general culture; and they should bear in mind the importance of a well-balanced and truly educational curriculum. They would, further, all agree that in a properly-managed institute there should be no cramming for examinations; that neither children nor adult pupils should be treated as grant-earning machines; and that they ought to aim at securing that continuous "low-pressure" system of work that was induced by enlightened and helpful inspection rather than an intermittent "high-pressure" system resulting from mechanically-conducted paper examinations.

THE Technical Education Committee of the Derbyshire County Council have already provided definite systems of applied technical instruction for agriculture and mining—the two great industries of the county, but they have found a difficulty in doing anything for the smaller and more scattered industries. For these it is often not possible to do more than provide general secondary education and instruction in scientific principles. From a report just issued by the Committee, it appears that in the north-west of the county there is, in a comparatively small area, a large development of the calico-printing industry, involving a capital expenditure of over half-a-million, and giving employment to 2000 hands. Recent inquiry has shown a definite want of technical instruction in this industry. At a meeting of manufacturers, attended by Mr. Percy Hawkrige, the Organising Secretary, it was shown that they obtain their colours from Germany, and that their composition is not known in this country by the people engaged in their use. They are bought and used in accordance with instructions supplied by the German colourist. Most of these colours are, however, definite chemical compounds derived from coal-tar. They are understood thoroughly by English chemists, and there is no valid reason why they should not be produced in this country, in association with the industries employing them. Indeed, the Committee reports that, even with the ordinary chemical appliances in use at New Mills, valuable results have been achieved. As a result of the meeting referred to, it has been resolved to ask the Derbyshire County Council to construct a laboratory to be specially devoted to this work. The scheme commends itself to the Committee on account of its decidedly practical nature, and also on account of the unique development of the calico-printing industry in the neighbourhood of New Mills.

SCIENTIFIC SERIALS

American Journal of Mathematics, vol. xix. 1 (Baltimore, January, 1897).—Theorie der periodischen cubischen Transformationen im Raum R_3 , by S. Kantor, contains a full account (in 59 pages) of the theory on the lines of the same author's Theorie der endlichen Gruppen von eindeutigen Transformationen in der Ebene (1895).—Mr. Basset, in theories of

the action of magnetism on light, discusses the theories of Maxwell, Fitzgerald, and Larmor. His object is twofold. First, he subjects Mr. Larmor's theory to a searching examination, and maintains that instead of being an improvement on its predecessors, it is open to a variety of additional objections and defects. In the next place, by means of a modification of the fundamental hypothesis, he proposes to show that the theory of Rowland and himself may be placed on a perfectly satisfactory basis, and that the difficulty with regard to the discontinuity of the tangential component of the electro-motive force at an interface may be removed.—In the article on the roots of Bessel- and P-functions, Mr. Van Vleck confines his attention to those functions which are symmetrical in their properties with respect to the real axis of the complex variable. The first part of his work aims at proving that between two successive positive or negative roots of $J_n=0$ there lies one, and only one root of $J_{n+1}=0$. He gives an extract from Gray and Mathews' treatise on Bessel Functions, but in so quoting he spells each author's name incorrectly. He proves, in the second part of his article, a similar theorem for contiguous Riemann P-functions.—Herr Kantor contributes a short note, Ueber Collineations gruppen an Kummer'schen Flächen.—Two more notelets are: note on linear differential equations with constant coefficients, by F. Franklin; and on certain partial differential equations connected with the theory of surfaces, by T. Craig, the editor.—An excellent portrait of Prof. L. Fuchs faces the title-page.

American Journal of Science, January.—The worship of meteorites, by H. A. Newton. (This lecture, delivered by the late Prof. Newton in 1889, has not hitherto been published. We hope to be able to refer to it fully in a later number.)—The spectra of argon, by J. Trowbridge and T. W. Richards. The two characteristic spectra of argon were studied by means of a high-tension accumulator of 5000 cells, which gives a more uniform discharge than either the induction coil or the influence machine. A tube 15 cm. long was filled with the gas. The red glow of argon was readily obtained with a voltage of about 2000. At higher pressures a higher voltage is required; but when the discharge has once set in, it may be continued with lower voltages. The introduction of a capacity in the circuit made no difference as long as the condenser was quiet; but as soon as the condenser began to emit its peculiar humming sound, the beautiful blue glow so characteristic of argon immediately appeared. Examined by a revolving mirror, this glow was seen to consist of intermittent discharges. The blue glow was changed to red by introducing a small coil of about 8 ohms resistance and a self-induction of 0.15 henry. The same conversion may be brought about by introducing a simple resistance or self-induction, or by increasing the pressure of the gas, and consequently its resistance. The blue glow may also be produced by sending an exceedingly strong current through the tube for very short intervals. In this case it is probably the capacity of the battery itself which produces the necessary oscillations. A tube containing argon at suitable pressure shows the blue colour at once on being brought near a Hertz oscillator giving 115 million oscillations per second. The tube may be used as a sensitive detector of electric waves, and the author proposes to give it the special name of talantoscope.—Some queries on rock differentiation, by G. F. Becker. The homogeneity of vast subterranean masses, called for by the hypothesis of differentiation, is unproved and improbable. The difference between well-defined rock types are more probably due to original and persistent heterogeneity in the composition of the globe. Hypogean fusion and eruption tend rather to mingling than to segregation, and transitional rocks may be accidental mixtures of the diverse primitive masses composing the earth's crust.—Igneous rocks from Smyrna and Pergamon, by H. S. Washington. Describes an augite-andesite rock from Mount Pagos, near Smyrna, and biotite-dacite from Pergamon.—Revision of the genera of the Ledidae and Nuculidae of the Atlantic coast of the United States, by A. E. Verrill and K. J. Bush. Describes five new genera, chiefly belonging to the family of Ledidae, from the U.S. Fish Commission dredgings. The paper is accompanied by twenty-two diagrams.—An experiment with gold, by M. Carey Lea. Of a 10 per cent. sodium hypophosphate solution, 15 cc. are placed in a beaker, and 1 cc. of a gold chloride solution containing 1 gr. of gold to 10 cc. of solution is added, and then one drop of H_2SO_4 . As soon as the solution begins to darken, 30 cc. of water are added. The solution then assumes a deep green colour, due to very