scientific instrument makers. A catalogue just received from Messrs. W. and J. George, Ltd., the successors to the late firm of Becker and Co., contains illustrations and prices of apparatus described in the volumes on practical physics by Schuster and Lee, Stewart and Gee, Watson, and Glazebrook. Similar catalogues have lately been published by Messrs. Griffin and Sons and Messrs. Philip Harris and Co. It is satisfactory to know that scientific instrument makers are beginning to understand the necessity of producing simple apparatus at a low price, now that students of physical science are expected to gain their knowledge by individual experience, even in the most elementary stages of the subject. What some of them have yet to learn, however, is that the apparatus is not intended as toys, but as a means of obtaining quantitative results; and unless this end is attainable, the instruments are of little value.

THE annual report for 1896-97 of the Director of the Field Columbian Museum, Chicago, is of interest to curators of museums, and records much progress. It is profusely illustrated by photographs of the rooms, and case-objects. In the division of economic botany, what is called a monographic installation of material exemplifying the North American forest trees is being pursued. The elements of the series comprise a branch, flowers, and fruit from the same tree, a photograph of the tree in summer, and in winter, a seven-foot length of trunk, and transverse section, a two-foot map, coloured to show the distribution of the species, and ornamental cabinet specimens. In the department of zoology the cases have been painted black inside. The report on the expedition and field work is of unusual interest. An account is given of the party which entered Somaliland under Mr. Elliot. He regards the collections made as very valuable, and probably the most important, especially as regards quadrupeds, ever brought out of any country by an expedition. Casts of heads and parts of bodies showing the muscles of the large animals were made, which will prove of the utmost service during mounting. Besides these, over 300 photographic negatives are in hand illustrating the scenery, the people, and also the animals, both living and dead. The last-named will be used in conjunction with the casts. It may be noted that the museum mostly does its own printing.

THE additions to the Zoological Society's Gardens during the past week include two Prairie Marmots (*Cynomys ludovicianus*) from North America, presented by Mr. J. Maurice Glyn; a Spotted Ichneumon (*Herpestes auropunctatus*) from Nepal, presented by the Rev. Sidney Vatcher; a Great Eagle Owl (*Bubo maximus*), European, presented by Captain Betram Goff; two Indian Chevrotaints (*Tragulus meminna*, ♂ ♂) from India, a Mantell's Apteryx (*Apteryx mantelli*), an Owen's Apteryx (*Apteryx oweni*) from New Zealand, two Cardinal Grosbeaks (*Cardinalis virginianus*) from North America, eight Undulated Grass Parrakeets (*Melopsittacus undulatus*) from Australia, a Brown Gannet (*Sula leucogastra*) from South America, a Black Lark (*Melanocorypha yeltoniensis*, ♂) from Siberia, four Chinese Quails (*Coturnix chinensis*) from China, a Black Woodpecker (*Picus martius*), a Solitary Thrush (*Monticola cyanus*), European, purchased; a Leopard (*Felis pardus*), born in the Gardens.

OUR ASTRONOMICAL COLUMN.

CONSTANT OF ABERRATION.—Prof. C. L. Doolittle, from observations made at the Flower Observatory of the University of Pennsylvania, contributes a paper on this subject to the *Astr. Jour.* 428. He states "that in view of the present interest in the values of the astronomical constants, the investigation is published earlier than was intended. The result is preliminary in the sense that it is derived from a limited amount of material, which will ultimately be combined with other data."

Küstner's method was employed, and he obtains a result of 20″·572 ± 0″·009, which is even larger than his recent deduction of 20″·55 from his South Bethlehem observation.

Since the adoption, then, of 20″·47 at the Paris Conference, the four most recent deductions all give higher values, viz. 20″·55 (Doolittle), 20″·533 (Fergola), 20″·57 (Finlay), and 20·572 (Doolittle).

WINNECKE'S COMET (*a* 1898).—This comet will make its perihelion passage in a few days—March 20. In *Astr. Nach.*, No. 3480, Dr. Hillebrand publishes a continuation of the ephemeris, which shows that the comet is on the borders of Aquarius and Capricornus, having passed between α and β Capricorni some few days ago. It is moving slowly in an easterly direction, but is badly placed for observation; so that it is unlikely to be seen again in ordinary telescopes until its next return in 1904.

NEW VARIABLE STARS.—We learn from the *Astronomical Journal*, No. 428, that the variability of the star S.D.M. −20°·2007, announced by Mr. Perry in No. 398 of that *Journal*, has been confirmed by Mr. Parkhurst, and in consequence the definite notation 2689 Z Puppis has been assigned to it.

The star in Gemini, announced as variable by Mr. Anderson in *Astr. Nach.* 3463, has also been confirmed by Mr. Parkhurst, and accordingly it has been called 2404 X Geminorum.

ASTRONOMICAL SERIALS.—The *Berliner Astronomisches Jahrbuch* for 1900 has recently been issued, under the editorship, as before, of Prof. Bauschinger, Director of the Rechen-Institut at Berlin. It contains particulars of the solar eclipse which will occur on May 28 of that year, and will be visible as total in the States of Georgia and South Carolina. Leaving North America the shadow band crosses the Atlantic, and strikes Europe on the coast of Portugal near Oporto, passing over Spain and Algeria.

The *Jahrbuch* contains the elements of all the small planets up to No. 425, which was discovered December 28, 1896, by M. Charlois; also opposition elements of a selected number.

The data and arrangement are the same generally as in previous years, but some important changes are contemplated in the planetary table for future years.

In the *Bulletin de la Société Astronomique* for this month there are several reproductions of the partial eclipse of the moon which took place on January 7. The photographs illustrating the various phases were taken by MM. Quénisset and Touchet; one at maximum is from a negative taken by M. Rudaux.

In the same *Journal* there is a summary of Prof. Schiaparelli's fifth "Memoir on Mars," containing his observations made during the opposition in 1886. The author has not given a general chart of the planet for this year, but his observations of 1886 happily complete our aerographical knowledge, by a rigorous examination of the north-polar region. A fine chart illustrating this region accompanies the paper, together with various aspects of the planet on different dates.

Five instantaneous photographs of Jupiter are also reproduced from photographs taken by Prof. Barnard at the Lick Observatory with the 36-inch telescope.

THE SPITSBERGEN GLACIERS.

ON Monday last Sir W. Martin Conway delivered a lecture before the Royal Geographical Society, in which he described the principal results of his second expedition to Spitsbergen, undertaken in conjunction with Mr. E. J. Garwood, in July and August 1897. It will be remembered that in the previous summer Sir Martin Conway, with several companions, for the first time explored, with any thoroughness, certain parts of the interior of the main island of Spitsbergen, throwing much new light on the physical features of the island and their mode of origin. In that year the principal attention was directed to the country south of Ice Fiord, between it and Bell Sound, the result being to show that this region was by no means the ice-clad country it had previously been considered. The principal object of last year's expedition was to examine a new section of the interior, north of Ice Fiord, which was still believed by some to be covered with an ice-sheet similar to that found in Greenland. Two districts in particular were chosen as the field of operations, the one (named by the lecturer Garwood Land) occupying the area between the extremities of Wijde Bay and Ice Fiord in the west and the sea in the east; the other lying west of the line joining the heads

© 1898 Nature Publishing Group

of Wijde Bay and Ice Fiord. For this second region Sir Martin Conway has revived the old English whalers' name for Spitsbergen as a whole—King James Land.

Although the routes naturally did not extend over a very large area, considering the comparatively short time available for the exploration, Sir Martin Conway had a most interesting story to tell of a fight against difficulties, such as are presented to the explorer by few, even of the most remote regions of the world. His graphic descriptions, reinforced by the unusually fine representations of scenery supplied by Mr. Garwood's photographs, brought home to his hearers the chief characteristics of the country in a way which could only be surpassed by an actual visit to the scenes described. He also gave the meeting an instructive study of the problems in physical geography which he thinks may be solved by his examination of the country. Garwood Land was first visited, a landing being effected at the foot of the Nordenskiöld Glacier, near the head of Klaas Billen Bay, one of the principal branches of Ice Fiord. The route led a little east of north, progress being difficult at first on account of the labyrinth of crevasses which intersect the glacier, and afterwards by reason of dense fog, and violent snowstorms. Particularly forcible was the lecturer's description of the white curtain of fog in which he and his companions were enwrapped for days together, and which in time caused a dazed feeling as if they had taken entire leave of the solid earth, and were floating in some unsubstantial nebula. The steep snow slopes entailed arduous labour in dragging the sledges, but after the fourth camp had been left some high snow domes were reached, from the summits of which views down broad valleys to the east and north were obtained, displaying a succession of plateau-fronts or bluffs of rock with *névé* both below and above them. The scenery, as seen by the evening light, was described as superb, the panorama being a glorious mass of colour. Returning to the coast, the travellers next proceeded to King's Bay on the west coast of the island in 79° N., and thence penetrated inland into an interesting region of peaks and glaciers, several of the former being climbed. The principal mountain group is known as the Crowns, and lies between the two main branches of the King's Glacier. The peaks of this region present striking characteristics, well shown by the photographs displayed on the screen. The weather during this expedition was the most perfect imaginable. A week at Horn Sound, near the south end of the island, during which Mount Hedgehog, one of the highest peaks of the Hornsunds Tinder, was climbed, concluded the expedition. Dense fog was again encountered here, and the difficulties of the ascent were altogether out of proportion to the comparatively small elevation above sea-level, the extent of the actual climb (in the Alpinist's sense of the word) far exceeding that in the case of many of the more difficult summits of the Alps.

The principal geographical result of his second visit to Spitsbergen is, Sir Martin Conway considers, the discovery that neither of the districts visited, nor, in fact, any large part of the islands except New Friesland and North-East Land, is covered by an ice-sheet. As long as a flowing body of ice is contained within definite mountain ranges, it is a *glacier*, and the districts visited were both merely glacial and mountain areas. The importance of distinguishing clearly between the two types of ice-bearing country was strongly insisted upon by the lecturer, on account of the different natural processes to be seen at work in the two. The insignificance of the excavating action of ice was stated, perhaps, somewhat too uncompromisingly; but at any rate, as was shown by Sir Martin Conway, the forces acting on the land-surface beneath an ice-sheet are mainly conservative; while in a glacial region, the rock-faces which rise above the general surface are exposed to rapid denudation, and great developments of surface-form are going forward. The "eating-back" processs, recognised as a powerful agent of denudation in the case of rivers, was held to be equally effective in that of glaciers, although, of course, the result is due to aerial denudation, not to glacial erosion. The work of the glacier is to carry away the débris, the accumulation of which would otherwise arrest the process of denudation. Examples were given by the lecturer from the Bernese Oberland and the Karakoram Himalayas, in which the present surface features are, in his opinion, due to this eating-back process, which has entirely modified the original longitudinal drainage of the mountain masses. The great bluffs of the Oberland—the Eiger, Mettenberg, and Wetterhorn—show a striking resemblance to those of Spitsbergen's Sassendal.

At the close of the lecture Mr. E. J. Garwood gave some interesting details regarding the geological features of the country traversed, adding besides some graphic descriptions of the marvellous effects of colour, which give to the scenery of Spitsbergen such a unique character. Among the points touched upon was the presence in Spitzbergen, contrary to the formerly accepted idea, of a snow-line some 1200–1500 feet above sea level. The contrast in the surface features above and below this line is most marked, the lower slopes showing as well-marked a denudation curve, with gullies due to flowing water, as may be seen in our own islands, while the upper regions show the abrupt rock-faces due to frost denudation. In the case of the Crowns this has acted along the vertical joint-planes of the carboniferous limestone rocks which form, as it were, a golden crown above the purple Devonian shales of which the more gradual, lower slopes are composed. Mr. Garwood also gave an account of the en-glacial streams, which often flow in a direction at right angles to that of the main valley, and which, on the retreat of the glacier might leave behind deposits similar to the kames and eskers which have so puzzled geologists in other countries. The remarkable ice-tunnels observed may be due, he thinks, to the arching up of ice-bridges over crevasses, when these are closed up by the movement of the glacier

A short discussion followed, devoted chiefly to the theory propounded by the lecturer with regard to the action of glaciers in modifying the surface features of a country.

Prof. Bonney, while allowing that the action supposed undoubtedly makes itself felt in certain cases, doubted the admissibility of a comparison between a plateau region like Spitsbergen and a region of narrow ridges like the Alps. The V-shaped Alpine valleys as a rule follow the lines of dip and strike, just as they do in unglaciated regions, while everywhere evidences of pre-glacial structure are to be found. From what we know of the climate of the Alps before the glacial epoch, we may conclude that in more remote times practically no glaciers existed. The characteristics noted by Sir M. Conway are, he considered, rather to be accounted for by the two distinct disturbances which have operated in the Bernese Oberland. The phenomenon adduced is, therefore, probably not more than a secondary cause in the moulding of the features of a country.

Mr. J. E. Marr doubted whether the side-glacier, shown in Sir M. Conway's diagram as hanging like a tear-drop on the mountain side, could be properly described as cutting back through the mountain wall behind it. It was important to keep clearly in view that the wearing-back process, even in the case of glaciers, was really due to the action of the weather at their head.

Sir Erasmus Ommanney expressed his high appreciation of the work done by Sir M. Conway and Mr. Garwood, and of the manner in which the results had been presented.

Dr. J. W. Gregory agreed in the main with Prof. Bonney, holding that though the phenomenon alluded to was no doubt a true cause, it was very uncertain whether it were a primary one.

Sir Henry Howorth considered that Sir M. Conway's theory had at least this in its favour—that it was consistent both with the laws of physics and of ice. He called attention to the change of climate which Spitsbergen has undergone in recent geological times, and to the fact of its belonging to the area of land rising in level around the North Pole.

THE LAKE SUPERIOR IRON ORE REGION.

AT the present time the conditions and prospects of American competition in the iron trade call for very serious consideration. The aggregate value of iron and steel exported from the United States to Great Britain and the continent is now considerable, the official figures for the first nine months of 1897 giving a value of 45,693,000 dollars, as compared with 34,549,000 dollars for the corresponding period of 1896. With this increase in the exports, there was a decrease in the imports from 16,361,000 dollars in the first nine months of 1896 to 10,032,000 dollars in the corresponding period of 1897. The rapidly increasing intensity of American competition is thus apparent. The exportation of iron and steel is not a result merely of depressed conditions in the United States, but of lower cost of production, brought about by enforced economy in labour, by the great discoveries of cheaply worked ore, and by the increased

© 1898 Nature Publishing Group