means of half-tint blocks, for the most part of a very clear and satisfactory character, of photographs taken by the author. Each plate is accompanied by a letter-press description, calling attention to the principal phenomena which are illustrated in the plate. In a short introduction upon "Photographic Methods," the author gives a number of valuable hints, which cannot fail to be of service to every geologist who wishes to go abroad armed with the camera. Dr. Tempest Anderson's remarks on the lenses to be employed, on the importance of the use of a firm stand, and on the relative advantage of plates and films, should be read by everyone desirous of doing good work in this direction.

Of the photographs reproduced in the 105 plates of this volume, seventeen are taken from Vesuvius and the surrounding country, two from Etna, eight from the Lipari Islands, eleven from the Auvergne and Central France, eight from the Canaries, thirty-two from Iceland, five from the Eifel and Central Germany, eight from the Yellowstone Park and other parts of the Western Territories of North America, ten from various ancient volcanic districts in the British Isles, and four from the West Indies.

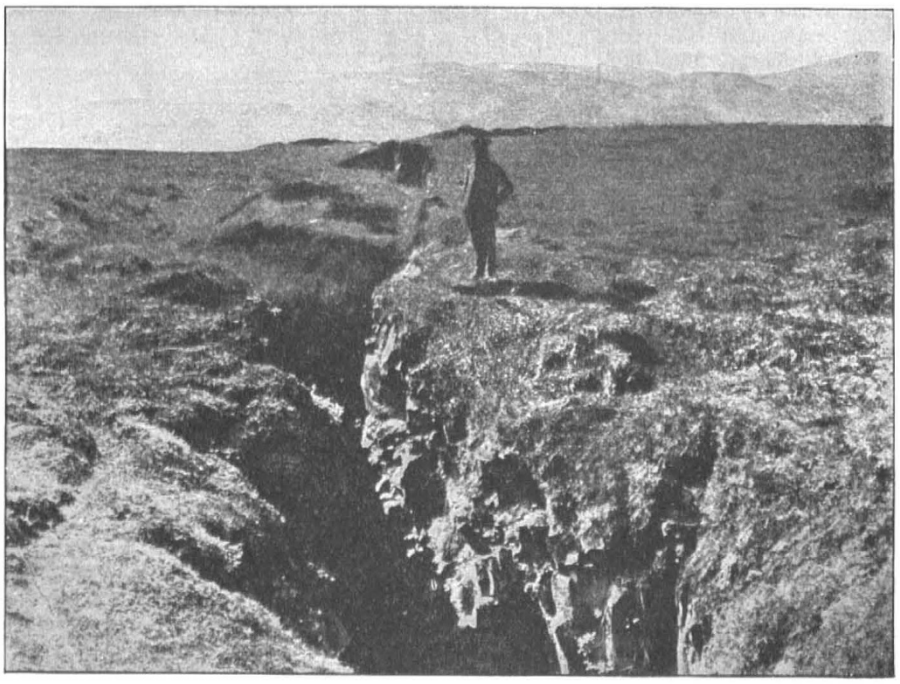

FIG. 1.—A Gáj (pronoun Gey), Reykjanes Peninsula, Iceland.

Most of the pictures are wider than the page of NATURE, but the one here reproduced will give a good idea of their general character. Those who have seen reproductions as lantern-slides of these photographs thrown in an enlarged form upon a screen can testify to their excellence and value. The fact that in many cases—notably in Iceland and the West Indies—the work has had to be carried on under most unfavourable conditions, while it increases our admiration for the skill and perseverance of the author, cannot but greatly enhance the value of the results obtained. The author of this work is to be congratulated upon having discovered a field of work in which he is able to make such valuable contributions to science. J. W. J.

THE AFTERMATH OF THE PARIS EXHIBITION.

THE size and importance of the Paris Exhibition of 1900 is beginning to be appreciated in its true significance. Many who visited the exhibition in a casual way were greatly impressed with its vastness and came away with the feeling that the exhibition was a marvellous illustration of the Frenchman's power of organisation; but that, owing to its very immensity, it lost much of its practical value. The aftermath of the exhibition is still with us, and we begin to see—from the number of special reports upon the different departments—that although not a financial success, the exhibition has left its mark upon commerce and science in a way that bids fair to rival, in its economic results, the immense advantages that accrued to this country from the Great Exhibition of 1851, and justly to warrant the enormous labour put forth in its inception and organisation.

In the *Revue générale des Sciences* (November, 1902) Prof. A. Haller, of the Paris University, contributes the first part of a most interesting and suggestive article upon the "Chemical and Pharmaceutical Industries" at the Paris Exhibition. He commences with a reference to the retrospective stand, where apparatus and substances of historical interest were exhibited. Amongst these exhibits were specimens of aluminium as prepared by Wöhler, sulphuric anhydride by Winckler, the first specimen of magnesium which was prepared electrolytically by Bunsen, and many other products and apparatus of historical interest. He then goes on to refer to artificial substances such as ultramarine, synthetical perfumes, pharmaceutical preparations and a very complete collection of coal-tar dyes.

The article is mainly devoted to the German chemical industries, and by far the most interesting paragraphs are those in which Prof. Haller reviews the great advance in German science, and endeavours to assign a reason for this phenomenal development. *En passant*, he regrets that Great Britain did not see her way to send apparatus and specimens of historical interest, which she, who can boast of the great names of Priestley, Cavendish, Davy and Faraday, might so easily have done.

The recent trade depression in Germany has attracted considerable attention, but although many branches of industry have been passing through a period of great difficulty, and the total German exports for 1901 showed a decrease of 240 million marks, the exports of the chemical trade showed *an increase* of 10 million marks. Prof. Haller attributes much of the success of the Germans in the chemical trade to the management and to the employment of men of high scientific

training and attainments. He illustrates his point by giving an outline of the organisation of a typical chemical works in Germany. The management consists of a business man, a chemist and an engineer, and attached to each department is a special research laboratory. Both the laboratories and workshops are splendidly fitted with every appliance necessary for carrying out the most complicated and exact operations. The expenditure upon chemicals, books and apparatus would appear to a British manufacturing company to be absolute lunacy, the Badische Anilin und Soda Fabrik alone spending more than 5000*l.* a year on glass and porcelain apparatus. The consulting library attached to the laboratories of F. Baeyer and Co., of Elberfeld, contains no less than fourteen thousand volumes and twenty-three thousand pamphlets of an original character.

As to the methods of research, when a new compound has been discovered which is found to have, say, dyeing properties, it is sent to the dyeing department, where a chemist, who has made a speciality of that particular branch of chemistry, subjects it to the most exhaustive tests, and tries its behaviour on cotton, wool, silk, paper, leather, &c. Should any of these tests turn out in a satisfactory manner, the substance is then subjected to tests on a semi-manufacturing scale. Again, a new preparation which may be expected to possess therapeutic properties is sent to the medical department, where its physiological effects are tried. These articles having successfully passed through the experimental stages, the business man is called in, and they are placed on the market. Circulars and pamphlets are sent out, which set forth the effects and uses of the articles. These circulars are printed in *all* the European languages, and often in those of Asia. Samples are sent out, and travellers, who are accomplished chemists, visit works and business houses where the articles may be used. These men place their knowledge and skill at the service of the consumer, while they demonstrate how the articles may be used to the greatest advantage. In no case do they endeavour to plant their products upon their customers against their will, and, if necessary, the articles are so far as possible modified to meet their customers' tastes and prejudices. Little or nothing is left to chance; everything that ingenuity and business experience can suggest is resorted to in order to obtain the market.[1]

Prof. Haller recognises that the patent laws of 1878 have been of great benefit to the German manufacturers. But patent laws are only useful when there are inventions to be patented and processes to be protected. He further recognises that the mineral wealth of Germany has been of incalculable value to the nation, because it has, to a large extent, rendered it independent of outside nations for its raw products. For example, the wonderful deposits of Stassfurt enable the Germans not only to supply themselves, but the world at large, with potassium salts.

Prof. Haller considers the scientific training obtainable at the universities and polytechnics to be the main reason of the astonishing development of the German chemical industry. It must not be forgotten that beside the universities and polytechnics, there are special academies where the general outlines of chemistry are taught, and where special applications of science to industry are studied. For example, the Mulhausen School of Dyeing and Printing, the Electrochemical Institute at Darmstadt, the Mining Academy at Freiberg. Then there are purely technical schools, where such subjects as sugar making, brewing, pottery, &c., are taught.

The Germans believe in an aristocracy of brains, and owing to this and the high social standing which follows educational success, many are attracted to the universities, not simply to obtain university polish, but to devote their energies to hard study and scientific research. The British man of science is inclined to look upon the commercial applications of science as beneath him. But is there not a tendency for the German man of science to go to the other extreme, and look upon science as simply an aid to commercial success? We do not want to commercialise science, but we do desire to make commercial methods more scientific.

We await with interest Prof. Haller's further article upon the chemical industry of England, Russia and the United States.

F. MOLLWO PERKIN.

[1] "The British merchant sells the goods which he deals in and has selected himself, and leaves it to the customer to adapt himself to the merchandise. The German individualises and meets the wants of his customers; he adapts his merchandise, credit, conditions of sales, decoration, packing, &c., to the wants and desires of his client. Thus he often gains a start, for the buyer is but seldom in a position to value quality and prices. Another point is forced on the observer, and this is the great start in scientific training which Germany can boast of." (Diplomatic and Consular Reports, No. 2484.)

REMARKABLE WINTERS.

THE period of winter for purposes of the present article may be defined as embracing the six months October to March, although when dividing the year into four seasons, the winter then for meteorological purposes is comprised in the months of December, January and February. Generally speaking, temperature is the most important factor in deciding whether a winter is severe or otherwise, although there are other aspects which render the weather disagreeable. When gales occur with more than ordinary frequence the winter is characterised as stormy, and similarly when rains are heavy and of common occurrence the winter is characterised as wet. Our winters in England vary to so great an extent in their general character that it is not always easy to say with scientific precision whether a winter may or may not be styled as remarkable. It generally happens that when a winter is cold the weather is fairly dry and there are fewer gales than usual, although, on the other hand, the quiet conditions are favourable to fog formation. In a mild winter the weather is usually wet, and storms are of common occurrence, the mild weather being very intimately associated with the arrival of cyclonic disturbances from the Atlantic, and as the common track of these storms takes the centres of the disturbances over the northern portion of our area we, in England, for the most part experience the south-westerly and westerly winds which bring us the moist and warm air from off the ocean to the westward of us. For the purposes of comparison the data used refer almost wholly to Greenwich, where the long series of observations made at our national observatory is eminently suitable, and, so far as the weather of a winter is concerned, there is probably no real disadvantage in restricting the area of comparison to one locality, since in a general sense it would be equally applicable to most other parts of England. The coldest winters of recent years are those of 1890-1 and 1894-5, in which there were respectively ten and eleven days with the temperature below 20° F. at Greenwich. In the last sixty years there have only been two other winters with so low a temperature on ten days; these were 1854-5 with twelve such cold days, and 1880-1 with ten days. The greatest number of days with frost during the period of sixty years was eighty in the winter six months of 1887-8, and the winters with seventy or more days of frost were 1844-5, 1846-7, 1854-5, 1874-5, 1878-9, 1879-80, 1885-6, 1886-7, 1887-8 and 1890-1. Using this as a test for the mildness of the winter, the least number