

Crosby Lockwood and Son.—Lockwood's Builder's Price Book for 1918, edited by R. S. Ayling, illustrated. *Scott, Greenwood, and Son.*—A new edition of Grammar of Textile Design, H. Nisbet.

MISCELLANEOUS.

G. Allen and Unwin, Ltd.—Scientific Synthesis, Dr. E. Rignano, translated by W. J. Greenstreet. *Cambridge University Press.*—The Collected Papers of Sir Benjamin Browne, containing, among others, the following contributions:—Education from the Employers' Point of View, Labour Problems, Co-partnership, Insurance, and the Scientific Training of Young Workmen. *Constable and Co., Ltd.*—Man's Redemption of Man, Sir W. Osler, Bart.; Science and Immortality, Sir W. Osler, Bart.; A Way of Life, Sir W. Osler, Bart. *John Murray.*—The Herring: its Effect on the History of Britain, A. M. Samuel, illustrated.

PRIMITIVE CULTS.

MISS M. A. MURRAY contributes to *Folk-Lore* (vol. xxviii., No. 3) a paper on the "Organisations of Witches in Great Britain." The author brings forward certain facts which appear to show a connection between witches and fairies—not the little beings which the fancies of poets have evolved; the fairies of the witch trials are the fairies of Scotch and Irish legend. The ritual of the witches is like the ritual of the fairies: both sacrificed children to their god, whom Christians stigmatised as the devil; both stole up-baptised children for the sacrifice; both sacrificed their god or devil every year, apparently on May Day; both had ritual dances of the same type. "If, as many authorities contend, the fairies are really the aboriginal inhabitants of these islands, there is nothing surprising in their ritual and beliefs being adopted by the invading race. And in that case I am right in my conjecture that the rites of the witches are the remains of the ancient and primitive cult of Great Britain."

Mr. T. J. Westropp, who is doing excellent work in investigating on scientific lines the early remains in Ireland, has republished from the Proceedings of the Royal Irish Academy (vol. xxxiv., Section C, No. 3) a paper entitled "The Ancient Sanctuaries of Knockainey and Clogher, Co. Limerick." Here a cairn commemorates the cult of the goddess Aine, of the god-race of the Tuatha de Danann. She was a water spirit, and has been seen, half-raised out of the water, combing her hair. "She was a beautiful and gracious divinity, 'the best-natured of women,'" and is crowned with meadowsweet (*Spiræa*), to which she gave its perfume. She is a powerful tutelary spirit; protector of the sick, and connected with the moon, her hill being sickle-shaped, and men, before performing the rites at her shrine, used to look for the moon—whether risen or not—lest they should be unable to find their way back. They used to visit her shrine on St. John's Eve, carrying wisps of lighted straw, in order to bring good luck to crops and herds. One day some girls saw her, and she showed them through a ring that her hill was crowded with fairies. Her son, the magic Earl of Desmond, is still seen riding over the ripples of Loch Gur until his horse's golden shoes are worn out. This is a valuable instance of the survival in an attenuated form of the primitive figures of Irish mythology.

The beginnings of religion are discussed in an interesting paper by Dr. E. S. Hartland in the *R.P.A. Annual*, published by the Rationalist Press Association, on religion among the Indian tribes of Guiana, based on the researches of Mr. Walter E. Roth, Protector of Indians in the Pomeroon district, British Guiana. "This attitude towards their external and material en-

vironment is reflected in their religion—if we may call it religion, which is merely distrust and dislike of the spirits that are believed to surround them, for the spiritual environment can be less steadily and distinctly contemplated than the material, and therefore is even more the subject of surmise and distrust. The unknown is magnified; the strange, the unusual, the unfamiliar, is regarded with uneasiness, with anxiety, evolving into hostility, with wonder and awe, leading not to inquiry and deliberate scrutiny, but to aversion and terror. Such is the mood, and such are the experiences, to which modern psychology is inclined to trace the beginnings of religion."

SULPHUR IN THE UNITED STATES.

THE Smithsonian Institution issues for publication in the Press interesting descriptive articles upon subjects dealt with in many of the bulletins distributed by it. These articles keep the people of the United States in close touch with the activities of the National Museum and other scientific departments and enable them to appreciate the interest and value of the work being carried on. We print below, in a slightly abridged form, an article upon the subject of Bulletin 102, part 3, of the U.S. National Museum, as it deals with a subject of particular importance at the present time, and refers to the ingenious method by which two sulphur deposits near the Gulf Coast in Louisiana and Texas are worked. The success of the process is such that the Gulf deposits are supplying practically all the crude sulphur in the United States, and its development has shifted the world's largest sulphur industry from Sicily to that country.

Few people realise the extent to which sulphur enters into the manufacture of the materials of everyday life that surround them. Yet it is not primarily because sulphur is necessary to convert the sap of a tropical plant into resilient and versatile rubber or wood-pulp into miles of news-print paper that this substance claims our attention at this time; rather because it is numbered among those substances of prime importance, absolutely essential to the carrying on of war, as entering into the very fabrication of explosives themselves. Hence it is not only a matter of curiosity, but also one of urgent interest, to inquire into the sources of this war mineral.

In this connection the appearance is timely of a publication of the U.S. National Museum under the title "Sulphur: An Example of Industrial Independence." This is by Mr. Joseph E. Pogue, of the Division of Mineral Technology, and presents in a few pages, in a simple and non-technical manner, the striking aspects of one of the most interesting mineral industries in the United States to-day. At the outbreak of the war in 1914 the United States was producing each year about 350,000 tons of sulphur, valued at a little more than 6,000,000 dollars. This quantity not only was sufficient to supply the needs of the country, but also contributed about 100,000 tons to European markets. With the development of war activities, however, the production has increased to meet the growing needs of munition-makers, while the exports have decreased as a result of disturbed trade conditions and the need for building up reserves of this essential material at home.

It is a singular fact that the chief raw materials of explosive manufacture are localised in a remarkable manner, and sulphur is no exception to this rule. In the United States practically the entire supply comes from a number of deposits in Louisiana and Texas, near the Gulf Coast. These deposits are similar in

nature, and consist of a series of beds and lenses of pure sulphur at a depth of several hundred feet from the surface.

The discovery of the occurrence of sulphur of this type was made so far back as 1865, in connection with a well drilled for oil. All attempts at mining the sulphur failed, however, until some fifteen years ago, when a highly ingenious method was devised for winning this substance without recourse to the ordinary costly underground operations usually prosecuted in mining. This process makes use of the fact that sulphur melts at a relatively low temperature. By drilling a well through the overlying rock until the sulphur bed is tapped, and then sinking a series of interpenetrating pipes through which superheated steam is forced, the sulphur is melted and forced to the surface as a hot liquid, where it is piped to large bins, into which it pours and cools. This process, which is known as the Frasch process after its inventor, has been described as one of the triumphs of modern technology, and its successful application to the Gulf Coast deposits has in the past fifteen years transferred the centre of the world's sulphur industry from the island of Sicily to the United States, making the States absolutely independent of the rest of the world in this important particular.

With the development of the world-war, the sulphur deposits of the Gulf regions have, of course, assumed special importance as supplying the sulphur needed in the manufacture of gunpowder and other explosives. But in addition to this, these deposits have quite unexpectedly during the past few months been able to meet and solve a critical resource problem arising out of the submarine campaign. This problem concerned the raw materials of the large and very vital sulphuric acid industry, and arose from the fact that most of the several million tons of sulphuric acid used in the United States was made from sulphur-bearing minerals called pyrites, brought as ballast in quantity from large deposits in Spain. The restricted shipping conditions resulting from recent events as a matter of course seriously affected this source of supply, and since sulphuric acid is a product nearly as fundamental to industry as iron or coal, the situation bade fair to assume critical proportions. But it so happens that crude sulphur can also be used in making sulphuric acid, and accordingly the Gulf sulphur deposits have come forward to tide over the dearth of Spanish pyrites until the domestic supplies of pyrites, which are adequate, but as yet only in part developed, can be brought up to a suitable measure of productiveness.

There are numerous lean deposits of sulphur in many of the Western States, but these as yet have practically no effect upon the output of the country. It is certain, therefore, that without the Gulf deposits and the ingenious method of making them available, the United States would have scarcely been able to meet successfully the war needs of sulphur and sulphuric acid, which goes to show, of course, the pressing necessity for widespread appreciation and understanding of the importance of proper development of the mineral industries of the nation.

SCIENCE AS A VEHICLE OF EDUCATION.¹

THE tendency of the modern school of political thought is to attribute the majority of the great historical events which have attended the various phases of human development to the operation of unseen underlying economic forces. The recognition of this fundamental truth represents a noteworthy

¹ By Prof. T. Brailsford Robertson. Reprinted from the *University of California Chronicle*, vol. xix., No. 1.

advance towards the completer understanding of the factors underlying and determining the evolution of man and of human institutions, but, admitted that economic forces wholly or very largely determine the political evolution of mankind, the question still remains: To what in turn are we to attribute the incessant fluctuations of the ever-urging economic forces? It is not that one consistent economic pressure, incident everywhere and operating in a definite direction, has continually urged mankind towards some undeviating goal; quite the contrary—the economic pressure upon mankind has been fluctuating, variable both in incidence and in direction, and not always advantageous in its immediate outcome.

Not infrequently attempts have been made to correlate these economic forces with geographical conditions, with the happy or unhappy conjunction, here or there, of river, plain, and sea. But the ever-changing aspects of political geography are not to be interpreted so easily. In relation to the brief life of man, the geographic contour of the earth is well-nigh eternal and immutable. Setting aside, without underrating their possible importance, the very few historical instances of decisive variation in geography and climate, such as the desiccation of Central Asia and the extraordinarily rapid shrinkage of at least one great inland sea, Lake Tchad, it is evident that in the long run, were geographical contour and climate the sole factors underlying and determining the incidence of economic forces, the political geography of the world would ere this have become as static as its physical geography, of which it would be the inevitable and deducible outcome. The ceaseless ferment of international politics, never more turbulent than now, would then remain utterly inexplicable.

To find any analogy corresponding with the bewildering intricacy and rapid fluctuations of political history and geography, we must turn to the inward workings of the human mind, of which economic forces are in ultimate analysis merely the outcome and expression, deviated or constrained, but not created by the geographical, climatic, or biological environment in which they find their outlet. Behind the economic forces which have fashioned human destiny we must seek again the more potent forces of human energy, curiosity, and inventiveness.

It is related that when recently the untutored savages of a certain region of East Africa first saw an aeroplane hovering over their heads they worshipped it as a god, or the expression of a god-like power. A group of high-school or university students would have regarded that same aeroplane with mild curiosity or supercilious indifference, so greatly has education, or what passes for education, blinded our eyes to underlying verities, to truths which are patent to the savage! For, if we regard it aright, every automobile, every passing electric street-car, every ray of light we cast into the darkness with the touch of a finger, is a miracle and a monument to the creative intellect of man.

It is these things and such as these that determine the economic forces which fashion the history of man. The discovery of America was not an accident; it was the outcome of measurement and invention, directed by an inspired curiosity regarding the structure of the universe. The discovery of the steam-engine was not an accident; it was the outcome of countless patient investigations inspired by no thought of ulterior gain. Electricity was not harnessed by financiers, but by the monumental intellectual labours of Oersted, Ampère, and Faraday. These things did not happen by chance; they did not, like Athena, spring full-armed from the brain of Zeus; they did not rain down upon earth from heaven, nor have they always been. They were not fashioned in the market-place, nor yet achieved