

illustrative specimens; and, indeed, a good collection of typical meteorites is inaccessible to most students. But, further, meteoric irons are very prone to deteriorate, through oxidation, and the perpetuation of the characters of a freshly etched face is thus especially to be desired. The excellence of the photographs is beyond all praise. The details, whether of the chondritic structure or of the Widmanstätten figures, are most beautifully shown. A brief description of the salient features of the sections is furnished with each plate.

The third work is nominally a Catalogue of the Vienna Meteorites, but, by reason of the completeness of that collection, is virtually a survey of the petrographical characters of the meteorites of all the known falls. The classification adopted is in the main that suggested by Gustav Rose in 1864, and developed by Tschermak in 1872 and 1883. The detailed description and definition of the groups is preceded by a history of the Vienna Collection, and also by a sketch of the various theories which have been proposed relative to the mode of formation of meteorites. As a result of his microscopical researches, Dr. Brezina supports the view that the structural features of meteorites are due to hurried crystallization, and not to a slow agglomeration of fragmentary matter. Dr. Brezina adds a chronological list of the meteorites preserved in the known collections, and also a lengthy index of names, synonyms, and localities. The work extends over 126 pages, and is accompanied by four plates. L. F.

Introduction to Chemical Science. By R. P. Williams A.M., and B. P. Lascelles, M.A., F.C.S. (London: Ginn and Company, 1889.)

THERE could hardly be a more concise and well-digested summary of elementary chemical principles and applications than that contained in this work. It is a manual intermediate between the natural philosophy primer and the minute and detailed text-book, and fills the gap pointed out in the Report on Chemical Teaching of a British Association Committee in 1888. Hence, as an outline of chemical science to be filled up in greater detail from larger works, and as an introductory text-book, this volume will be found exceedingly useful. The experiments described are such as should be performed by everyone beginning the study of chemistry, and would also serve as an excellent introduction to a course of qualitative analysis. In addition to the treatment of metals and non-metals, the work includes chapters on organic chemistry, and others on photographic chemistry, the chemistry of rocks, and electro-chemistry. Indeed, Mr. Williams, the author of the American edition, and the reviser, Mr. Lascelles, may claim to have produced a most comprehensive little work, and one deserving considerable commendation.

The Cradle of the Aryans. By Gerald H. Rendall, M.A. (London: Macmillan and Co., 1889.)

THE question as to the primitive home of the so-called Aryan race has lately excited so much interest that many students must have wished for a short and clear account of the controversies relating to the subject. This is exactly what Prof. Rendall supplies in the present essay, the substance of which was originally communicated to the members of the Liverpool Literary and Philosophical Society. Prof. Rendall accepts Penka's theory that the Aryans were a European people who, at the close of the glacial epoch, followed the ice northwards, and settled in Scandinavia; and that Scandinavia was the centre from which, at various subsequent periods, groups of the Aryan race were dispersed. All the arguments marshalled by the German writer in favour of this hypothesis are here briefly and effectively stated. The philological part of the case is presented in a more

scholarlike spirit by Prof. Rendall than by Penka himself, whose rash philological conjectures have prevented a good many people from doing full justice to the weight of his anthropological and ethnological evidence.

LETTERS TO THE EDITOR.

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Mr. Cope on the Causes of Variation.

MR. E. D. COPE'S letter in NATURE of November 28 (p. 79) is a fair sample of his writings on biological theory, in so far as I am acquainted with them.

Mr. Cope proposes to teach Mr. Wallace and others the first principles of both logic and biology. The tone of his letter encourages a similar frankness in reply. Mr. Cope must not take it amiss when he is charged with two of the gravest faults of which a critic can be guilty—namely, complete misapprehension of the matter which he is attempting to criticize, and no less complete ignorance of the recognized and elementary facts of the branch of science to which that particular matter relates. I do not hesitate to assert that Mr. Cope puts forward an argument which could not possibly be entertained by anyone who is acquainted with the most notorious and admitted facts of heredity and variation. I venture to express myself thus emphatically, because it is a matter for sincere regret that American biology should at this moment be identified with what is sometimes called "a school of philosophy" which owes its distinction to a deliberate ignoring of the writings of Mr. Darwin. By all means let us have discussion and criticism of Mr. Darwin's conclusions, but let it be understood that those who enter upon such discussion have at any rate an elementary acquaintance with the works of Mr. Darwin himself, if not with those of Weismann and Wallace; otherwise, much time and much of your valuable space will be wasted.

That Mr. Cope has not the necessary elementary acquaintance with the admitted facts of heredity and variation will appear from what follows. The discussion in which he has intervened is one as to whether certain structural peculiarities exhibited by flat-fish are due to the transmission to their offspring of a form and position of parts acquired by muscular efforts by the ancestors of flat-fish, or whether these given structural peculiarities suddenly appeared in the ancestors of flat-fish as a "congenital variation" having no adaptive relation to any efforts or experiences of a preceding generation, and were advantageous to their possessors, so that the individuals thus born were favoured in the struggle for existence, survived to maturity, and transmitted their peculiarity to some of their offspring with such intensification as is found experimentally to be the result of breeding from parents both of which possess a given congenital peculiarity.

The question raised is, in short, whether in this case Lamarck's hypothesis of the transmission of acquired characters is the necessary explanation, or whether the case can be explained by the action of the known causes (not hypothetical causes) on which Mr. Darwin founded his theory of the origin of species, viz. the occurrence of congenital variations unrelated to any like variations in parents or ancestors, and the selection and intensification of such variations in subsequent breeding. There has been here no ambiguity—such as unfortunately arises sometimes when like questions are discussed—as to the sense in which the term "acquired characters" is used. It is clear enough that by the "acquired characters" of a parent we do not mean characters congenital in the parent, but expressly exclude them; it is clear that we refer on the contrary (as did Lamarck) to new characters acquired by the parent as the direct consequence of the action of the environment upon the parental structure, and exhibited by that parent as definite measurable features.

Now let us consider Mr. Cope's contribution to the discussion. He accuses Mr. Wallace—who is one of those who refuse to adopt Lamarck's gratuitous hypothesis of the transmission of acquired characters—of being guilty of the sin of "non-sequitur" and "paralogism." He then proceeds to make a general statement, the truth of which neo-Darwinians (or post-Darwinians, or anti-Lamarckians), in common with all men, recognize,