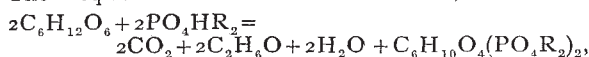


holic fermentation, probably the aldehyde-group participates in the formation of the ester-acid. Dr. Harden remarks (p. 46),

"the identity of the products from glucose, mannose, and fructose may be explained by regarding the acid as a derivative of the enolic form common to these three sugars, or by supposing that portions of two sugar molecules may be concerned in its production."

The "equation of alcoholic fermentation,"



whilst recording the experimental facts, scarcely affords an explanation of the formation of alcohol, as it is not obvious why, when one of two glucose molecules forms hexose-phosphate, the other should yield carbon dioxide and ethyl alcohol. Perhaps the part of the above quotation which the reviewer has put in italics furnishes a clue.

Chapter iv., dealing with Harden and Young's discovery of the coenzyme of yeast-juice and its remarkable properties, is of considerable interest, and the possibility of this containing the phosphate group referred to, though it is admitted that experiments have so far yielded only negative results. The next chapter is devoted to the action of inhibiting and accelerating agents on the enzymes of yeast-juice, whilst in chapter vi. the by-products of alcoholic fermentation are dealt with. The results of F. Ehrlich's brilliant work on the production of higher alcohols are clearly expounded, and production of aldehydes and glycerol referred to. It is a matter of interest that only living yeast appears to be capable of producing alcohols from the amino-acids, and even then only does so in presence of fermentable sugar. The discovery of zymase has furthered the solution of the fermentation problem, but the stability of the amino-acids in the absence of the living organism, and the superiority of yeast itself over preparations of its enzymes in effecting the conversion of hexoses into alcohol and carbon dioxide need further explanation.

The chemical changes involved in fermentation are dealt with in chapter vii., and the various explanations put forward at different times are recorded; the reader cannot fail to be struck with the small measure of success which has so far attended these efforts.

Chapter viii., on the "Mechanism of Fermentation," is rather condensed in comparison with the rest of the work; here, however, one departs somewhat from the biochemical aspect of the problem which has been treated by Dr. Harden in so successful a manner.

J. T. H.

#### A CRITIC IN GEOLOGY.

*L'Évolution des Théories géologiques.* By Prof. S. Meunier. Pp. 366. (Paris: F. Alcan, 1911.) Price 3.50 francs.

THIS is one of the most useful works that Prof. Stanislas Meunier has given to his geological colleagues, and at the same time it will be appreciated by the general reader. The latter, however, must be constantly on his guard, lest he cry out, "A hit, a very palpable hit," every time that Prof. Meunier tilts

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against the theories of to-day. In an introduction intended to show the inexactitude of the works of nature when compared with the demands of mathematics, the author seems to include in the same order of things the forms of basalt columns and those of crystallised minerals; he rightly points out the irregularity of the former, but says of man (p. 12),

"à la place des formes toujours variées des objets naturels, il a inventé les formes géométriques . . . tétraèdre, cube, rhomboèdre . . . auxquels il rapporte les objets véritables."

Prof. Meunier doubts the conclusions of the chemist when he remarks, "De même, à la place des composés naturels, il a inventé des composés définis; oxydes, acides, sels," &c. All this is harmless Meunierism to the trained geologist, and will be taken in good part, like the author's rejection of the reality of the Ice age; and it is undoubtedly good for us to have the erroneous conclusions arrived at in the past by the "unanimity of geologists" pointed out as a warning for our later age.

The history of geological thought exhibits to us a science more cumbered by theory in its earlier stages than it is at the present day, and Prof. Meunier does well to begin with cosmogony, tracing the study from Moses to Sir George Darwin. The form of the earth and the nature of its interior are then discussed, with references in the main to French authors. But in succeeding chapters the literature of the world is freely drawn on, and is often criticised as freely. The chapter on mountain building is of special interest, though a more regular chronological arrangement would have aided the reader. The author hails with complete approval the views of Suess on horsts, and of Schardt and Termier on horizontal overfolds, and justice is done (p. 99) to Reyer's theory of gravitational sliding.

The chapter on earthquakes is still more injured by lack of systematic arrangement, and cannot be regarded as complete. In that on metamorphic theories we should have liked to find the names of Scrope and Darwin, both of whom had such clear views on foliated rocks; but Hutton, Lossen, Lehmann, and Michel Lévy are similarly passed over, and the chapter is a brief essay rather than a history. Rivers and glaciers are more adequately dealt with. The chapter on the latter concludes (p. 282) with the following amazing statement as to the striated pebbles found in boulder clays:—

"Or il est maintenant démontré que les stries . . . ne sont aucunement d'origine glaciaire et qu'elles dérivent entièrement du phénomène d'érosion réalisé dans la masse des éboulis par l'infiltration des eaux de pluie."

Has Prof. Meunier ever consulted an agriculturist as to the penetration of boulder-clay by rain, or has he seen the scratched blocks in a modern glacial deposit, newly revealed from Arctic ice? He continues the discussion when dealing with "théories sédimentaires," and asserts firmly (p. 301) that "pratiquement les glaciers ne strient pas de galets." French tourist steamers now penetrate the fjords of Spitsbergen, and Prof. Meunier should certainly ask one of these to land

him on the arid shores, strewn with striated boulders, of Tempel Bay or Cora Island.

The transport of boulders and striation of rock-floors by ice are, of course, fully admitted, and we have interesting references to Playfair, Perraudin, and de Charpentier. A short account of the origins of sedimentary rocks follows, in which, by a slip, freshwater shell-limestones become included under "roches argileuses." This part of the book may be regarded as consisting of somewhat scattered notes, all of which have an interest for the professed geologist, but which do not systematically express the growth of geological opinion.

The absence of an index is astonishing. Perhaps the publisher quailed before the proper names, which are very imperfectly corrected in the text. We have Leibniz, Hitchcock and Hitchcock, Mayer-Aymar, Uscher, Revenier, Spalanzani, Moris Davis, d'Aubuisson de Voisin, and Deshayes. One or two dates seem erroneous by about a century.

G. A. J. C.

#### LEAD SMELTING.

*The Metallurgy of Lead.* By H. F. Collins. Edited by Sir W. C. Roberts-Austin, K.C.B., F.R.S. Second edition, thoroughly revised and enlarged. Pp. xx+538. (London: C. Griffin and Co., Ltd., 1910.) Price 21s. net.

WE welcome a revised and enlarged edition of this useful work, as the progress of metallurgy is now so rapid and great improvements have been made in smelting during the last decade. A too brief reference has been made to the physical properties of lead and that of its alloys, and much recent work has been overlooked, probably due to the aim of the author in making the work chiefly a compendium of information on lead smelting, which is here brought well up to date. Ore roasting has received the attention it deserves, and we are glad to find that pot roasting is clearly described, and the chemical reactions occurring in this novel process fully discussed, since a correct knowledge of the chemical changes that occur in any process often leads to advancement and discoveries. Useful data are given as to costs in the various modifications developed from the Huntingdon-Heberlein process.

The most suitable fuel for a given ore is here rightly considered, as well as the proper amount to be used in each case. But the twyer ratio and twyer efficiency are also of great significance, and it is a pity more attention has not been given to the pressure and volume of air supplied to each furnace.

The principles of blast-furnace lead smelting are clearly expressed, as the method of dealing with each constituent, according to its quantity, is essential for economic working. It is also equally important that the proper flux should be applied in order to produce the most suitable slag and to obtain the maximum quantity of metal. This is dealt with in a plain and lucid manner. A comprehensive description of modern furnaces with plentiful illustrations is a good feature in this edition, the parts being described in considerable detail. The important subject of water-jackets receives due attention as more refractory ores have

now to be dealt with, necessitating greater height of jacket than formerly. It is shown that with increase of size of furnaces and amount of output larger hearths are required and greater facilities for separating matter and slag. The treatment and disposal of slag are also given due prominence. Formerly the production of matte was considered a necessary evil, but it is now esteemed a desirable thing, since the lead is better reduced and the slag more free from lead and silver.

The various products of lead smelting are amply described, as well as the methods adopted for dealing with them at different works.

In chapter xi. examples of lead smelting in the chief European and American works form the subject of narration, and the following chapter deals with costs and losses.

As all lead ores carry silver and sometimes gold, it often becomes more profitable to work for their extraction than that of the lead itself. The author devotes about 100 pages to a consideration of this important subject. A valuable part of this section is the description of the methods of separating gold from zinc crusts.

In chapter xix. works assaying and analytical methods are dealt with.

In the following chapter the difficult subject of treatment of zinc-lead sulphides is considered, and various methods of separation discussed.

The last chapter deals with flotation processes, which have in recent years assumed great importance.

We consider this work a valuable contribution to the metallurgy of lead, in which so much new matter has been introduced, and it can be confidently recommended as a trustworthy guide to anyone who is interested in the subject.

#### THE TRISECTION OF AN ANGLE.

*The Trisection of the Angle by Plane Geometry: Verified by Trigonometry with Concrete Examples.* By Dr. J. Whiteford. Pp. 169. (Greenock: J. McKelire and Sons, Ltd.; Edinburgh and Glasgow: J. Menzies and Co., Ltd.; Cambridge: Bowes and Bowes, 1911.)

THE *Paralogistes pseudomathematicus* has become so rare, or possibly so shy, that it is a real pleasure to find that the species is not extinct. Alack! that De Morgan is not with us, to do justice to this latest attempt at solving one of the three famous problems that have been proved to be beyond the power of Euclidean constructions. The curious thing is that the author, in his introduction, gives two long quotations from De Morgan, in which he states the conditions of the problem with the utmost precision, except that he does not explicitly say that the trisection must be performed by a finite number of operations. It is here that Dr. Whiteford has come to grief, for his method is nothing more or less than successive approximations, each of which involves a Euclidean construction. It is only fair to add that the author is no vulgar paradoxer, and that his method, as an approximation, is sound, and leads to accurate values with a comparatively small number of