

realise the claims of practical application to health, morals, and livelihood, and seek to imbue school work and school life with the research habit and attitude of mind.

The volume is pleasant to read and handle; our main regret is that the essays are not twice their present length. We hope that this most opportune book will be widely read.

CLASSIC WALL-PAINTING.

Greek and Roman Methods of Painting: Some Comments on the Statements made by Pliny and Vitruvius about Wall and Panel Painting. By Dr. A. P. Laurie. Pp. vi+124. (Cambridge: University Press, 1910.) Price 2s. 6d. net.

DR. LAURIE, who is principal of the Heriot-Watt College at Edinburgh, has devoted much time and considerable ingenuity to the study of the materials and methods of painting. Many of his results are recorded in the *Journal of the Royal Society of Arts* and in other periodicals. But in the little book now before us we possess, in a detached and accessible form, an account of Dr. Laurie's latest studies on fresco- and wax-painting as described by Pliny and Vitruvius and practised in classic times. As the volume is not supplied with a table of contents, and is not divided into chapters, it may be well, in the present notice, to describe, in the order followed by the author, the several topics which he discusses.

The book opens with a review of the conditions under which the inquiry into ancient painting methods should be conducted. Then we pass on to the consideration of the pigments, both natural and artificial, which were available for use in early days. Dr. Laurie's list and his observations on several of the items which it comprises are of considerable interest. The murex purple, lately ascertained to be a dibrom-indigotin, and Egyptian blue, which was investigated by the late Dr. W. H. Russell, are important constituents of the ancient palette. A madder pigment was also in use, as well as indigo.

Primitive vehicles are next discussed, size, gum, milk, white and yolk of egg being included in the series of available mediums. Both bitumen and turpentine, or liquid resins and balsams, were known, but neither drying oils nor spirit varnishes. Beeswax played an important part as a painting vehicle; our author's studies and experiments confirm the modern view as to the process of encaustic painting as described by Pliny and illustrated by the wax portraits brought from the Hawara cemetery in the Fayum by Prof. Flinders Petrie. The doubts once expressed by Eastlake and other authorities as to the feasibility of painting with melted coloured waxes may now be regarded as not warranted. In some places the wax was mixed with a liquid resinous body, such as Venice turpentine; this mixture was more easy to manipulate than wax alone, but acquired greater hardness in the course of time.

Wax-painting was, however, not the ancient process in use for the decoration of walls; this was painting on wet or wetted lime-plaster with pigments mixed with water, or possibly on occasion with glue or size.

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Such fresco-painting is discussed by Dr. Laurie at some length. The process is not precisely that of the fourteenth century and the Italian Renaissance, the *buon fresco* of the historians of art. There are no joins or seams in the ground, and the painting could not have been completed on the freshly spread plaster while its surface was in the best state to receive and incorporate the paint. The surface must have been wetted with water admixed with a little slaked lime from time to time, while later applications of colours must have contained milk of lime. Such a process approaches closely to that known as *fresco secco*, and can be traced back to a much earlier date than can the true *buon fresco*.

We must not linger over the technical questions connected with fresco-painting as discussed by Dr. Laurie, but may now pass on to consider his criticism of the views as to old mural painting advocated by Herr Ernst Berger, in his "Maltechnik des Alterthums." These views are shown to be untenable, deriving no support either from the chemical examination of ancient examples, from modern experimental trials, or from the careful study of the language used by Pliny and by Vitruvius. The method imagined by Herr Berger was allied to the modern *stucco lustrato*, and involved the use of an emulsion of beeswax, oil, and soda or potash; our author shows (pp. 107-9) that there is no valid evidence in favour of the use of this dangerous and ineffective mixture.

Dr. Laurie will, we hope, pursue his interesting and illuminating inquiries into the materials and methods of ancient painting, and of modern painting also; but in his next book will he not give us, besides such an adequate index as appears in the present work, a table of contents? This will involve the arrangement of his material in chapters or sections, which will prove more easy to study or to consult than an unbroken discussion occupying no less than 112 pages.

A. H. C.

OUR BOOK SHELF.

A Monograph of the Foraminifera of the North Pacific Ocean. Part i., *Astrorhizidæ* and *Lituolidæ*. By J. A. Cushman. Pp. xiv+134. United States National Museum Bulletin 71. (Washington: Government Printing Office, 1910.)

THIS is the first instalment of a work on the foraminiferal fauna of the North Pacific. It embodies the results of Brady, in the *Challenger* report, in so far as concerns this area, and of Goës, Flint, Rhumbler, Bagg, and others, and presents the outcome of the author's own investigations. These are based on the examination of material dredged by the United States s.s. *Albatross*, *Nero*, and *Alert*, parts of which have been already used in the reports of Goës, Flint, and Bagg.

In many cases the author extends the range of previously known species, and several are regarded as new. New generic names are given to divisions of recognised genera, particularly of the Lituolids *Haplophragmium* and *Trochammina*. Of wider interest is the author's identification of *Ammodiscus tenuis* as the megalospheric form of *A. incertus*, under which name the microscopic form has been described.

Each species is illustrated, and the figures are in most cases quite sufficient.