

terpreted by those that have studied his writings, is to be regretted, but is excusable; that his views are judged upon without his works being read, as is sometimes the case, is inexcusable.

Aside from the above objection to Dr. Cook's use of the term 'evolution,' I wish to emphatically object to his idea of the 'actuating causes' of 'evolution' (or variation). He believes that they are not to be sought in the 'pressure of environment,'⁸ but that they are 'inner' causes, supported by interbreeding.

This view is not new at all, indeed we may say that, by this time, *it is venerable on account of its antiquity*, for it is the view held by the earlier Weismannian school, which assumes that variation is due to inner causes (germinal variation, spontaneous variation, Keimvariation), aided by amphimixis (interbreeding). I have demonstrated⁹ that this view, which, as it is proper to state, is not held any more by Weismann himself, is entirely illogical; but I do not see the necessity of repeating here my arguments for Dr. Cook's benefit. This much, however, may be said, that the assumption that only inner causes are 'actuating' in the production of variation, expressly excludes a class of causes which is absolutely necessary for every process in this world, namely the 'causæ efficientes.' That Dr. Cook has entirely forgotten what a 'causa efficiens' is is shown by the distinction he makes between *occasion* and the *true, actuating cause*.¹⁰ But he may be excused on the ground that the discovery of the difference of these terms, and of the fact that what he calls *occasion*, is no *true cause*, is not his: it is a perpetuation or repetition of a blunder committed first by Weismann,¹¹ and by von Graff,¹² in making a distinction between *Bedingung* and *Ursache*, or *condition* and *cause*.

⁸ C. H. Merriam, *SCIENCE*, February 16, 1906, p. 244.

⁹ 'Ueber Keimvariation' in *Biolog. Centralblatt*, 18, 1898, p. 139 ff.

¹⁰ *Proc. Wash. Acad. Sci.*, 1906, p. 305.

¹¹ 'Ueber Germinalselection,' 1896, p. 48, footnote 2.

¹² 'Zoology since Darwin' in *Ann. Rep. Smiths. Inst.*, 1896, p. 486.

Indeed, it is too bad that this discovery of Dr. Cook, that the *occasion* (or *condition*) is no *actuating cause*, can not stand in the face of philosophical criticism. For, if the *occasion* of Dr. Cook is the same thing that is called *causa efficiens* (*actuating cause*) by people trained in logic, then, of course, *external influences must be admitted as the causæ efficientes of variation*.

A. E. ORTMANN.

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April 2, 1906.

THE DISTRIBUTION OF GOVERNMENT PUBLICATIONS.

To the Editor of Science: The letter on page 545 of *SCIENCE* for April 6, 1906, from Junius Henderson, of Boulder, Colo., relates to a subject that has always had a personal interest for me. I can never forget the advantages that I myself derived from the generosity of a father who enabled me to begin the accumulation of a scientific library. Equally advantageous have been the gratuitous publications of the government, and the comparatively cheap publications of scientific societies, as contrasted with the very high prices charged by many publishing firms for strictly technical scientific documents. It is to the best interests of our national government, our state governments and our endowed universities that they should, in every way possible, stimulate the publication and distribution of researches that, taken collectively, mark the steady progress of man in wresting her secrets from nature.

Perhaps to an equal degree is it the duty of the citizens, so far as is any way practicable, to stimulate the establishment of scientific and technical libraries in localities where they may be accessible to large numbers of students. The increase and diffusion of knowledge should not be left to the Smithsonian alone, or to the government, or to the university as an organization, but has become the duty of each individual scholar. Many men have considerable collections of valuable books that they should make accessible to students, rather than keep them locked up on their own shelves. I know of several who are

looking about for the best university or library in which to deposit their own scientific collections. If the wants of our universities and observatories and research stations could be fully made known, *through the columns of SCIENCE*, they would find a ready response on the part of individuals who have been profiting by the generous distribution of expensive volumes during many years past. Such volumes, whether published by the government or by societies, are, as it were, loaned in trust to past recipients, who, having benefited by them, should now in turn pass them on to others, rather than hoard them, or sell them as merchandise.

CLEVELAND ABBE.

THE MENTAL DEVELOPMENT OF INDIVIDUALS.

TO THE EDITOR OF SCIENCE: I wish to learn at what age, under what circumstances and to what extent people of different climes, races, civilizations and temperaments have changed their views as to whence we came, whither we go, and what we are here for. Any statement, elaborate or short, regarding an individual's mental development will be a welcome contribution to a proposed 'Natural History of the Thinker.' I have been obliged to thus appeal to my contemporaries because autobiographical documents so far extant do not yield enough accurate descriptions of the inner life. To illustrate my purpose, I beg to refer to my article on 'The Interpretation of a System from the Point of View of Developmental Psychology,' in the *Journal of Philosophy, Psychology and Scientific Methods*, February 15.

EDWIN TAUSCH.

OHIO UNIVERSITY, ATHENS, O.

SPECIAL ARTICLES.

QUARTZ GLASS.

PURE quartz when melted down to a glass has three properties which make it of immense value in the chemical and physical laboratory, and were it not for the technical difficulties attending its production, it would certainly displace ordinary glass wherever a transparent medium capable of withstanding heat is re-

quired. It expands less than one tenth as much as common glass when heated; it can be heated to 1,000° C. without softening; and finally, it transmits ultraviolet light freely.

It has not proved easy to make quartz glass, even in small quantities in the laboratory. Quartz is one of those peculiar minerals¹ which show no sharp melting temperature, but soften very gradually, and when pure, never become thin liquids, even at the temperature of the electric arc. Furthermore, quartz begins to vaporize rapidly in air at about the temperature of melting platinum, while it is still much too viscous to release the included bubbles. A mass of quartz fragments, when melted in air in the electric furnace, comes out resembling solidified sea-foam or volcanic pumice. It is quite opaque, dirty and useless for mechanical or optical purposes, and very persistent efforts in a number of laboratories have so far failed to produce a clear product except from single fragments treated individually. Small globules of glass can be obtained from single crystals, pieced together in the oxyhydrogen flame, and blown into thin quartz glass vessels such as are now in quite common use. Discs suitable for small lenses have also been obtained at Jena by heating small clear crystals with such rapidity as to produce a thin enclosing film of liquid before cracks develop in the body of the crystal, thereby preventing the entrance and subsequent enclosure of air. It is, of course, plain that such devices can have but limited usefulness. We must somehow manage to melt larger masses of random fragments to a clear glass before the technical problem can be regarded as solved.

This problem is somewhat outside the proper scope of the Geophysical Laboratory, but our plant is perhaps better adapted to its solution than most others, and the demand for clear quartz glass is so general that it seemed best to spend a limited time in an effort to find the difficulty and to try to ascertain the direction in which the solution lies. No effort at refinement of method has yet been made.

¹ See Day and Allen, 'The Isomorphism and Thermal Properties of the Feldspars,' Publ. 31, Carnegie Institution.