while denudation comes under rivers and valleys. In general the chief novelty has been the omission of structures as a separate group. The result is separations as well as connections. We learn of river deposits in connection with the study of rivers as agents, but to learn about sandstones we must go to three or four separate parts of the book. If there are gains there are losses to set over against them.

From the reviewer's point of view this is a very beautifully illustrated volume in which physiography is unusually prominent. Omit the historical third part, the weakest part of the book, and add a little here and there about man, plants and animals and the book would fall perfectly into a class of recent text-books of physical geography, all with some general similarity to Davis's 'Physical Geography,' but lacking its classification and evolution of the forms of the earth's surface. The physiographic half-tones are mostly very beautiful both in appearance and in teaching value. 'A Lake well-nigh effaced, Montana' and 'A level Meadow, Scotland,' pages 71 and 72, seem to me unsurpassed as illustrations. All localities are rather vaguely referred to as here, though it is hard to see why. Professor Norton evidently knows where these places are and students would certainly find some interest in sharing his knowledge. There are practically no references to other books, either. The presswork is of course admirable, though a beginner will wonder at a 'parted laver' (p. 217). The diagrams are less satisfactory, some of them stiff and difficult to read. The map of Niagara gorge at page 60 has evidently been copied from Gilbert's paper in the National Geographic monographs though it is not so credited. Unfortunately, it has been redrawn and badly redrawn, so that it quite conceals the variations in width that are very marked in the original and afford even better evidence of varying erosion by the river than the depth of the gorge does, as Taylor has shown. A similar thing appears to have been done with the cut of the silurian scorpion at page 339. It strongly suggests the woodcut figured 347 in Geikie's manual, but redrawn with the omission of the artist's name, which in Geikie shows very plainly. There is no acknowledgment to any one, though about one third of the cuts are acknowledged borrowed, a dozen from the author! Most of the illustrations in the 'Historical Geology' have a familiar look. Dana and Geikie come quickly to mind at sight of figures 331, 338, 339 and 336. None of them, however, are credited.

The historical part does not seem to have received so much of the author's attention as the earlier portions of the book, nor even so much attention as its importance merits. This undertreatment disappears when we come to the Quaternary and the Ice Age. The physiographic is everywhere the part best developed. In matters of fact the work seems painstakingly accurate. That it is somewhat dogmatic is, perhaps, pardonable in an elementary text-book. Yet, if alternative views had been stated occasionally it would help the student avoid the 'common error' referred to by Professor Davis in his godfatherly note, of thinking 'authorities' have a private road to information. Thus 'lateral secretion' appears to be the only view of the origin of mineral veins that Professor Norton cares to entertain. For him Posepny does not exist, nor waters from the depths. Yet Professor Gregory has just been returning from Australia, stating that the so-called artesian waters of New South Wales are all deep waters soon to be exhausted. At page 331 Professor Norton calls the waters artesian that ascend in borings after gas has given out! There is no doubt that many teachers could find this volume helpful in giving students interest in earth science without necessarily appreciating at the author's estimate the particular need he has sought to fill.

MARK S. W. JEFFERSON.

YPSILANTI, MICH.,
October 17, 1906.

SCIENTIFIC JOURNALS AND ARTICLES.

The Botanical Gazette for October contains the following leading articles: George F. Atkinson gives a detailed account of the development of *Agaricus campestris*, illustrated by six photographic plates. William Crocker publishes the results of an investigation of

delayed germination of seeds, discovering that the cause generally lies in the seed coats, rather than in the embryos. In the case of the well-known 'upper seed' of the cocklebur, it is found that the delay is secured by the seed coat excluding oxygen; while in many seeds it is secured by the coats excluding water. John Donnell Smith publishes his twenty-eighth paper entitled 'Undescribed Plants from Guatemala and Other Central American Republics.' Clayton O. Smith describes with the aid of half-tone illustrations a bacterial disease of Oleander occurring on young Oleanders in California, which proves to be the same disease that causes knot-like growths on the olive.

The November *Journal of Nervous and Mental Disease* opens with a discussion of the cerebral element in the reflexes and its relation to the spinal element by Dr. G. L. Walton and Dr. W. E. Paul. Dr. Wharton Sinkler contributes the report of a case of Landry's paralysis with the unusual result of recovery, and Dr. Morton Prince gives an account of a case of brain tumor characterized by a circumscribed limited area of anesthesia, marked muscular atrophy appearing early, epileptiform attacks of hemialgesia of a peculiar nature; loss of the muscular sense, astereognosis, ataxis and paresis, increasing to ultimate paralysis. A study by Dr. Harvey Cushing of sexual infantilism with optic atrophy in cases of tumor affecting the hypophysis cerebri completes this part of the number.

DISCUSSION AND CORRESPONDENCE.

A DEFINITION OF FLUID.

In discussing Professor Elihu Thomson's paper on vulcanism Dr. Alfred C. Lane[1] asks: "Are we clear as to where we are to draw the line between viscous fluid and solid?" and he then gives a definition of fluid which is certainly an improvement on the old description of a fluid as a substance which will conform to the shape of the containing vessel and will present a level upper surface.

Dr. Lane's definition, however, does not answer the question: Where shall the line between solid and fluid be drawn? He cites molasses candy and tar as bodies which apparently are solids but which really are fluids; but he takes no account of the fact that it is changing conditions external to matter which determine the appearance and disappearance of many of its physical and chemical properties. At the temperature of liquid air both molasses candy and tar would lose the property of highly viscous fluidity, which they assume under the ordinary conditions whereunder we have become familiar with them, and would acquire a rigidity which would make them solids in the most approved sense. The place to draw the line between solid and fluid is at the junction of conditions which determine the supercession of the solid by the fluid state. This point was long ago recognized as a physical constant of matter and has received a name—plastic yield-point. This point, like melting-point, boiling-point and simple gas-point, separates two of the phases or states of aggregation through which matter passes in the course of its transformation from the highest to the lowest degree of polymerization.

Plastic yield-point, like melting-point and boiling-point, is a function of both temperature and pressure, and can, therefore, be represented graphically by a curve drawn with reference to temperature and pressure as rectangular coordinates. Under conditions fixed by a point on the curve of its plastic yield-point, a substance is on the dividing line between its solid and fluid phases. An increase of either temperature or pressure would (if a path be open) occasion molecular shearing—that is, differential motion between *molecules*—at any point in the mass. A decrease of either temperature or pressure would place the substance under conditions represented by the area on the other side of the curve, where the intermolecular locking is strong enough sensibly to resist (within the time considered) the force tending to make the molecules glide over one another; this is the distinctive property of solids. For all purposes of mechanics, including cases arising in dynamic geology, a fluid may be described as matter exposed to conditions which place it in the region beyond

[1] Science, N. S., Vol. XXIV., No. 613, p. 404.