lying in the line of this interchange would be settled by Scandinavian, boreal-Ural and alpine-Carpathian plants. Naturally, also, during the fluctuations of the last glaciation, and especially during the retreat of the ice, a mixture of the highest forest and lowest subalpine societies would take place.

Traces of the steppe period, exemplified in the dry hill and rock plants, correspond with the 'præalpine' societies that occur on the limestone and dolomite slopes of the northern Alps. If we picture to ourselves the time when, after the warm interglacial period, a later glaciation took place, it must be taken for granted that the præalpine grove and rock plants were driven down before the ice and settled on other limestone hills at a lower level. These afterwards mixed in various places with plants of Pontic origin, which also chose dry marl and calcareous soils to settle on. These Pontic elements came in from the east along paths which may still be traced with a considerable degree of assurance. Thus along the Elster, the plants of the Saale (including various præalpine and Pontic species) are not most thickly distributed simply where there is the greatest extent of limestone rocks, but rather in places that these plants could most easily reach, and this depends on the position of valleys free from forests. Along the shortest line from the Saale to the Elster extends a plateau of muschelkalk, and it is exactly in this direction to the eastward that the hills on the Elster reproduce most fully on their south and west sides the flora of the hills along the Saale. Thus the natural geographical paths for post-glacial settlement have been reinforced by favorable edaphic and climatic conditions, and all of these must be taken into consideration in attempting to account for the history of the present Hercynian flora. But until the geological history is more fully and certainly known it is impossible to construct, with any hope of accuracy, such a system as, for example, that attempted by Schulz, who assumes four periods of warmth alternating with as many of glaciation, and undertakes to trace the periods and course of immigration for single species.

Since the glacial period the orographic features of Hercynia have not been essentially altered, and then, as now, climatic and edaphic factors were together determining the immigrations of plants. It is very probable that at the time of the Pontic invasion the region of the lower Saale had a more distinctly steppe climate than other parts of Hercynia, and that the triassic soils which to-day favor the plants inhabiting them offered corresponding advantages to such settlers then. In manifold other ways the continuity of present with past physiographic conditions becomes increasingly obvious, and the present study is a noteworthy recognition of the necessity of admitting this principle to the fullest extent in attempting to construct a satisfactory picture of the historical succession of plant societies. The attainment of such an ideal, though beset with extraordinary difficulties, is being brought nearer through the indefatigable labor embodied in this and the companion volumes of the 'Vegetation der Erde.' V. M. Spalding.

The Archeological History of Ohio. By Gerard Fowke. Columbus, O. Published by the Ohio State Archeological and Historical Society, 1902. 8, XVI.

Mr. Fowke's book is not written, so he claims, for scientists or specialists, but to give laymen an idea of the extent and characteristics of the prehistoric remains found within the borders of the state of Ohio. It fulfils its mission and presents in its 760 pages a complete résumé of all the antiquities of the state, and also refers to nearly every publication upon the subject. The work is well done, and as Mr. Fowke compassed a task which required a great deal of time, and would not have been possible to any person who had not studied the Ohio field, as he has, for twenty years, he is deserving of our meed of praise.

But while the above is true, the book itself may not further the study of archeology in the United States. Unfortunately the author is even more than controversial, he is dogmatic, and to most of the writers and authorities on Ohio antiquities, he is unjust. Such a book as this is, evincing years of study in

its preparation, may do a deal of harm or an equal amount of good. That is, it may give an erroneous conception of the culture of the mound-building tribes in Ohio. A scientific critic should be infallible. Mr. Fowke is not infallible. Beginning with the year 1803 and coming down to the present, he has resurrected the published opinions of scores of writers, and has held up their theories to ridicule and contempt. But they were the pioneers in American archeology. These men made many mistakes. It would be as logical for one interested in the development of steam navigation to contrast Fulton's steamboat with the *Kaiser Wilhelm der Grosse* to the detriment of Fulton, as it is for Mr. Fowke to measure these pioneers by our present standard of knowledge.

The whole tone of the book is that prehistoric man in Ohio is scarcely worthy of study; that nothing new has been learned regarding him; that (p. 148) "Our museums are filling up with material from all these sources, and yet, for years, the accumulation has added nothing in the way of real information to what we already knew."

If this is true, why continue work in prehistoric anthropology?

Mr. Fowke does not believe the prehistoric earthworks and mounds required the time in their construction assigned by other investigators, who made many exaggerations. But he presents a rather illogical argument. I have space for only part of it.

"Forty deck hands on a western steamboat, working steadily, will transfer ten thousand bushels of corn from the bank to the vessel in one day. An equal weight of dry earth will make a mound forty feet in diameter and ten feet high" (p. 85). No Indian ever worked as deck hands work. The corn in sacks and usually handled on trucks, is rushed from the deck into the warehouse, the negroes stimulated to run by the curses of the mate. Mr. Fowke places the natives, who had no shovels, no trucks, and no inclined planes or board floors on which to move the 'dry earth'—even as negroes hustle sacked corn—on a par with the fastest workers of modern times. The field testimony is that the earth for mounds was scooped up in the immediate neighborhood and carried in baskets or skins. This was naturally a slow process, as the natives used stone or shell digging tools.

On page 88 there is a sentence which is calculated to prejudice the author in the eyes of fair-minded men. Mr. MacLean, in one of his books, refers to the mound-builders as selecting the region between the lakes and the gulf, the reason for which is apparent to any observer. As to this opinion, Mr. Fowke says, 'The last quotation is about as sensible as to say that a man displayed great literary inclination by electing to be born in Boston.'

He contends that the number of rings in a tree is no evidence as to its age, to all of which we may subscribe. But, unfortunately, he cites all the trees of rapid growth in support of his argument, even bringing in trees of tropical regions, as in Yucatan, where M. Charnay found trees twenty-two years old two feet in diameter. As to the great oaks four or five feet in diameter, found on some of the earthworks, he has nothing to say.

Mr. W. C. Mills's important investigations of the last few years are almost entirely omitted. In many places Squier and Davis are cited because their measurements are not in accord with those of the author, who ignores the fact that the diameter of an embankment or of a mound may have been enlarged many feet through continuous cultivation. The Hopewell exploration, for example, showed that the Effigy mound was originally much higher and narrower than even in Atwater's time; to-day it is nearly one half larger and broader than it was found to be in 1891. Applying to this Mr. Fowke's method of reasoning, the structure could never have had the dimensions assigned to it by early observers.

The chapter on Flint Ridge gives an exhaustive account of that famous site. The pages devoted to the manufacture of implements and to the finished products are also, with the exception of a few remarks on ceremonial stones, above criticism. In such descriptions and in field work the author is seen at his best, and the critical student would be

unjust did he not accord due praise in these directions. It is only in Mr. Fowke's attitude toward others, in which there is manifest such a spirit of intolerance, that he is open to severe criticism.

His conclusions are that several tribes may have occupied Ohio (p. 470), yet he does not agree with the 'long and short heads' theory.

He uses the terms 'tribe' and 'race' interchangeably throughout his book. He says mound finds and surface finds differ little—a statement not borne out by field testimony. Different sites present varying degrees of culture, and the Turner site where Putnam found so many evidences of a considerable advance in art, and the Hopewell where substances from the Yellowstone, the Gulf and other distinct points, together with beautiful carvings in stone and bone, were exhumed, are classed with sites which evince a very low degree of culture.

No sensible person believes in 'civilization of the Mound-builders' or that there was a 'race of Mound-builders.' But to swing to the other extreme and classify a tribe able to construct the strange 'combination-works' of the Lower Scioto with the Pai Utes or the Comanches is manifestly wrong.

Warren K. Moorehead.

Andover, Mass.

The Minerals and Mineral Localities of Texas. By Frederic W. Simonds, Ph.D., Professor of Geology, the University of Texas. Bulletin No. 5, The University of Texas Mineral Survey, December, 1902. Pp. 104.

In the 'Letter of Transmittal' Dr. Wm. B. Phillips, director of the survey, says: "In view of the deep interest now being shown in the mineral resources of the state, we thought it advisable to issue a special publication dealing with the mineral and mineral localities. Dr. Simonds has been engaged upon this work for some time, and it is believed that the list he now presents covers the entire field as well as it can be done at present."

The task Dr. Simonds set for himself was a very arduous one, and it is to his credit that the list 'covers the entire field as well as can be done at present.' It is by far the most comprehensive, and at the same time authentic, list of the minerals and mineral localities of Texas that has been published, and Dr. Simonds has done the state a real service in putting in accessible form so much valuable information concerning these particular resources of the state.

The minerals are listed alphabetically, with numerous cross-references, and this list covers eighty-four pages of the bulletin. Next follows 'A Summary of the Minerals of Texas by Counties'; then notes on the scale of hardness, specific gravity, streak, luster, fracture; and the bulletin closes with a discussion of 'The Commercial Aspects of Certain Ores in Trans-Pecos, Texas,' by Dr. Wm. B. Phillips, Director of the Survey.

The work is well done, and is worthy of better treatment than it received at the hands of the printer. The poor quality of the paper used and the numerous typographical errors —errors solely attributable to gross negligence on the part of the printer—must be a disappointment to the author. The neglect of the printer to follow 'copy' with regard to proper spacing in a large number of the chemical formulæ is very reprehensible. On page 72 the omission of the letter 'y' in the word pyroxene is inexcusably bad in a list alphabetically arranged, but the insertion, on page 94, of the word 'pounds' instead of the word 'points' under the scale of hardness, is infinitely worse.

H. W. Harper.

February 23, 1903.

SCIENTIFIC JOURNALS AND ARTICLES.

The March number of the *Botanical Gazette* opens with a contribution from the Cryptogamic Laboratory of Harvard University by Dr. Roland Thaxter, entitled, 'New or Peculiar North American Hyphomycetes.' In this, the third paper of the series, he describes two new genera, containing three species, *Heterocephalum aurantiacum, Cephaliophora tropica* and *Cephaliophora irregularis,* illustrated by two lithograph plates.—In the conclusion of his paper on 'Chemical Stimulation and the Evolution of Carbon Dioxid,' Dr. Edwin B. Copeland shows that metallic poisons drive off CO_2 from the carbonates in