

the fact that one of the most expert of the assistants of the Bureau of American Ethnology spent a whole season in the great ditch dug through this gravel without finding a single specimen, is a powerful argument in favor of the contention of Holmes and McGee that those found are from the talus or within a few feet of the surface.

The finding of pottery, arrow and lance heads, and axes with Koch's mastodon in Missouri can not be said to be a scientific argument in support of a paleolithic period during which Dr. Wilson asserts man did not possess three of the four objects enumerated, it appears equally true that the drilled objects of Bourgeois hardly strengthens the theory of tertiary man if we follow correctly the argument.

European drilling, all things considered, appears to have been accomplished with better tools than were those of America, and the holes were commonly larger and drilled through harder stone than were those drilled in America. We can not expect to find any of the remains of man in the gravel of the drift which has usually ground to powder all other stones softer than flint, and the Calaveras skull alleged to be found in the auriferous gravel could hardly have survived; even the pestles and mortars found with it were like those of to-day and the skull is said not to present the appearance of a fossil.

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A NATURALIST'S DIRECTORY.

A BOOK which recently came to this library was called to the author's attention a few days' ago. The book is entitled 'The Naturalist's Directory' and is published by L. Upcott Gill, London, 1899. In the preface it is stated that the object and purpose of the book has been so enlarged as to include all naturalists, especially of Great Britain, and we were lead to believe by this preface that the book might be of value as a directory to naturalists in general. When, however, we turned to the lists of naturalists outside of Great Britain, we were at once impressed with the incompleteness of the work, and this incompleteness is especially noticeable in the case of the United States.

Under the general head of zoology, which

includes entomology and mere collectors, as well as scientific zoologists, only thirty-three names are mentioned as pursuing this line of work in the United States. Of these names only eight or ten are of men who are at all well known. In the subjects of Microscopy and Botany, we were astounded to find that only three men in the United States were pursuing these branches of science. Of these names two are well known. According to the lists of workers in geology and paleontology, we find that the United States can boast of six men to grace these professions. Besides these interesting discoveries, we notice that there is one gentleman in the United States who is interested in Indian relics, and one other gentleman who is making a study of anthropology.

It would seem as if even in such a far away town as London, more complete information might be obtained concerning the status of scientific work in this country.

E. V. WILCOX,

U. S. DEP'T OF AGRICULTURE.

DR. G. W. FOSTER AND THE 'LAKESIDE MONTHLY.'

TO THE EDITOR OF SCIENCE:—I have read with much interest, in your issue for November 17th, the sketch of my old friend Dr. J. W. Foster. One statement, however, needs correction: that "he was the editor of the *Lakeside Monthly*." Dr. Foster was for a year or two a frequent and valued contributor to the *Lakeside*, but was at no time its editor.

FRANCIS F. BROWN.

BOTANICAL NOTES.

THE WILT DISEASE OF COTTON, WATERMELON AND COWPEA.

A FEW days ago Dr. Erwin F. Smith, of the Division of Vegetable Physiology and Pathology of the United States Department of Agriculture, issued an important contribution to our knowledge of the fungi which produce plant diseases. After about five years of investigation enough facts are known to warrant the publication in a pamphlet of seventy-two pages of what the author calls a condensed account of the disease, and the fungus which causes it. The gross symptoms of the disease in the water-

melon "are those of a plant transpiring freely, and insufficiently supplied with water, although at the same time there is an abundance of water in the soil." This condition is brought about by the clogging of the vessels of the plant by the threads of an internal fungus parasite, thus checking the current of water which otherwise would supply the transpiration loss. The leaves of the plant sometimes wilt suddenly in large numbers, "so that a healthy-looking vine may lose all of its foliage in twenty-four to forty-eight hours."

The fungus concerned is a *Nectria*-like plant related to *Nectriella* and *Melanospora*. Its closest relationship is with Rabenhorst's genus *Cosmospora*, from which it differs in its non-septate ascospores. Dr. Smith proposes the name *Neocosmospora* for the genus. Accordingly the scientific name of the fungus is *Neocosmospora vasinfecta* (Atk.) Smith. Ten fine plates (one colored) illustrate the paper.

THE FERTILIZATION OF *Albugo bliti*.

In the September and October numbers of the *Botanical Gazette*, Mr. F. L. Stevens publishes an important paper which adds to our knowledge of the fertilization of the Peronosporæ. As is well known, these plants are non-septated, branching tubes, containing multitudes of minute nuclei. The behavior of the nucleus is everywhere an interesting phenomenon, and it is especially so in these multinucleate plants. In ordinary plants and animals in the process of fertilization there is a union of two nuclei, *i. e.*, the oosphere, or *egg*, and the sperm, or male nucleus. In the plants studied, the oögone contains about 300 nuclei at the time when it is cut off from the remainder of the fungus thread, and these are materially increased by subsequent mitotic division. By a process of differentiation most of these nuclei come to lie outside of the oosphere, but fifty or so remain within it. The antheridium contains at first about thirty-five nuclei, which increase by mitotic division to four times the original number. On the opening of the antheridial tube the male nuclei fuse with the female nuclei in pairs. The oosphere is, therefore, to be regarded as a compound sexual organ.

THE OTTAWA ARBORETUM.

THE Catalogue of the Trees and Shrubs in the Arboretum and Botanical Garden at the Central Experimental Farm, at Ottawa, Canada, prepared by Wm. Saunders and W. T. Macoun, is an interesting contribution to the subject of experimental forestry. It contains a list of the trees and shrubs, 3071 kinds, which have been tested at Ottawa during the past ten years. Of these 1434 have been found to be hardy, 361 half hardy, 232 tender, 307 winter killed, while 737 have not been planted long enough to admit of an opinion as to their hardiness. Among the species reported as hardy, contrary to our expectations, are the following: *Æsculus glabra*, and other species of the genus; *Catalpa bungei* and *C. kœmpferi*, *Castanea dentata*, *Halesia tetraptera*, *Morus alba* and *M. nigra*, *Rhus cotinoides* and *Ginkgo biloba*.

THE SPREAD OF FORESTS IN NORTHEASTERN IOWA.

In an interesting paper on the forest trees of Dubuque county, Iowa, in the forthcoming tenth volume of the Report of the Iowa Geological Survey, Professor Macbride first discusses the forest conditions of the past with narrow belts of trees along the streams and protected bluffs. He then says: "On the advent of civilization, the checking of prairie fires gave the forest here as elsewhere great relief. Young trees came up in every direction, partly from seeds, partly from so-called bench-grubs, old stump-like stocks which had been in the days of prairie fires again and again burned off, only to start again in shoots and suckers with the advent of spring; but destined so long as fires swept over them, never to attain tree-like dimensions. These bench-grubs sometimes were very old and possessed an extensive root system. This accounts in part for the rapidity with which the forests of Iowa began to spread with the arrival of civilized man. In the case before us the early farmers selected, of course, the more level country; the steeper and poorer hills were left to nature and became quickly forested, covered with what is called second-growth, an assemblage of trees denser and darker than ever occur in nature under any other circumstances. In Julien and Peru town-

ships some of these second-growth forests may yet be seen which have been growing at least fifty or sixty years. So that the oft repeated remark as to the number of Iowa trees, to the effect that their number has greatly increased since the country has been settled, is strictly true."

CONTRIBUTIONS FROM THE NATIONAL HERBARIUM.

THE Division of Botany of the United States Department of Agriculture has issued another of its series of Contributions from the National Herbarium which have done so much to raise it in the estimation of the scientific men of the country. The present bulletin (Vol.V., No. 4) is mainly from the pen of J. N. Rose, and deals mostly with Mexican plants. In his studies of Mexican and Central American plants, the author proposes a rearrangement of the genera of the difficult group Agaveae, illustrating each with one or more wood cuts. Another interesting division of this paper is that on 'Some Mexican species of *Thalictrum*.' Perhaps the most attractive paper in the bulletin is that entitled 'Notes on Useful Plants of Mexico.' This takes up in order the cereals and vegetables, fruits, beverage plants, seasoning and flavoring plants, medicinal plants, soap plants, tanning and dye plants, fiber plants, brush and broom plants, fence and hedge plants, plants, yielding wool, and miscellaneous useful plants. The principal fence plant appears to be the giant cactus bearing the name *Cereus pecten-aboriginum*, which often reaches 15 to 20 metres (45 to 60 feet) in height, and sends up a multitude of long, naked branches. These are cut into lengths of 18 to 20 dm. (5 to 6 feet) and set in rows where they root and form fences of the most impenetrable kind. Several fine photographs of this cactus, reproduced in half tone give one an excellent idea of its appearance. The text and half tone illustrations of fibre plants are equally instructive. One is struck with the ingenuity displayed by the people in utilizing the fibre plants of the country, and at the same time with the primitiveness of the methods employed.

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UNITED STATES GEOLOGICAL SURVEY.

IN forwarding Part II. of the 19th annual report of the U. S. Geological Survey, which we hope to review later, the director, Dr. Chas. T. Wolcott writes:

Of its contents (five papers), the first 'Physiography of the Chattanooga District, in Tennessee, Georgia and Alabama,' by C. W. Hayes, sets forth the results of a study of a region in which several distinct types of land surface are characteristically developed under such conditions that the part taken by the several factors can be fairly well determined; it traces the process of drainage development and the origin of the present land forms upon rocks of diverse erodibility and diverse structure; and, finally, by a concurrent examination of drainage and surface, reviews the recent geologic history of the region.

The second 'Principles and Conditions of the Movements of Ground Waters,' by F. H. King, contends that the water which occupies the interior of the earth's crust, is, like that of the ocean and of the atmosphere, constantly in motion. These motions are at once numerous, extended and very complex, and are brought together and discussed under three categories, gravitational, thermal and capillary.

The third, 'Theoretical Investigation of the Motion of Ground Waters,' by C. S. Slichter, relates to an investigation of the general problem of the flow of water through porous soils of rock.

The fourth is entitled, 'Geology of the Richmond Basin, Virginia,' by N. S. Shaler and J. B. Woodworth. The Richmond area is important from the economic as well as the scientific point of view. It contains the only freely burnable coal lying immediately adjacent to tide water in the eastern portion of the United States. The quantity and quality of this fuel appear sufficient to give it a value in the industrial arts.

The final paper, 'The Cretaceous Formation of the Black Hills as indicated by the Fossil Plants,' by L. F. Ward, with the collaboration of W. P. Jenny, W. M. Fontaine and F. H. Knowlton, presents a brief historical review of the investigations of earlier explorers, followed by specific chapters on the Minnekahta, Blackhawk