

During the summer of 1903 the writer collected fossils in the Niobrara shales in South Dakota, finding the remains of many plesiosaurs. In nearly every instance a large number of siliceous stones were found associated with the bones, often embedded in the matrix en masse. In one specimen in which the largest dorsal vertebræ were four inches in diameter, there was at least half a bushel of these stomach stones, ranging from the size of a walnut to four inches across.

Considering the weight of these stones, the wonder is that so many specimens contain them. One would expect that when the flesh began to decompose, the weight of these stones would be too great to be contained by the weakened tissues and that they would be lost before the animal reached its final resting place. This may well explain the absence of stones in some cases.

Throughout the Niobrara formation in Dakota baculites are very abundant while scaphites are rare, especially in the shales. I could not be certain that any of the baculites associated with the plesiosaur remains had been eaten by these animals but in plesiosaur specimen number 5803 of the American Museum collection I found a variety of fossils representing this animal's last meal. Great numbers of fish vertebræ were scattered among the bones, while there were several pterodactyl bones, broken in small sections. But of chief interest were seven scaphites, more or less broken, which had without question been eaten by this animal. One other specimen had scaphites associated with it. The conclusion seems evident that invertebrate animals formed a large part of the food of plesiosaurs and that, in default of crushing teeth, the breaking up of the food was effected by the aid of these stomach stones, the presence of which further implies a thick-walled, gizzard-like arrangement in the alimentary canal.

BARNUM BROWN.

THE ALPINE LABORATORY OF THE BOTANICAL SEMINAR OF THE UNIVERSITY OF NEBRASKA.

THE striking diversity of conditions and of vegetation in high mountain ranges makes

them ideal places for field experiment. Their value is greatly increased, moreover, when their slopes arise directly from the plain, as in frontal ranges. This is the case at Pikes Peak in the Rampart range of the Rocky Mountains, where the distance from the plains at an altitude of 1,800 meters to the alpine summit at 4,200 meters is less than ten miles. The significance of this is evident when one reflects that these ten miles contain in miniature the habitats and formations found between latitude 40° and the arctic circle: in less than a half-day, one may pass from the temperate zone through the boreal-subalpine to the arctic-alpine zone. The opportunity for the study of the development and structure of vegetation is unique. The major zones are in evidence as nowhere else, and their ecotones are clear-cut. Weathering and erosion are at a maximum, making new habitats and destroying old ones, and the developmental history of formations may be read from hundreds of stages. Experimental methods in vegetation and in the evolution of new forms may be applied with an ease and a certainty of freedom from accidents and interference which can be obtained only with difficulty in other regions. The dream of the physiologist (ecologist) to have his laboratory out-of-doors may be realized here, and it is merely a matter of time until methods will be found by which research will deal primarily with the experiments of nature, and the walled laboratory will be relegated to a purely secondary place.

The reconnaissance work done by different members of the botanical seminar of the University of Nebraska in various parts of the Rocky Mountains from 1893 to 1898 showed that the Pikes Peak region possesses the combined advantages of accessibility and diversity to a degree found nowhere else. This country was worked over more in detail in the summer of 1899, and Minnehaha, at an altitude of 2,500 m. on the Cog railway, was selected as a base. Minnehaha is within an hour's walk of the plains, and an easy climb of two hours brings one to timber line on Mount Baldy. It is in the midst of the coniferous and aspen forests of the subalpine zone, in a locality

peculiarly rich in talus and burn successions. Within a radius of five miles are found more than twenty distinct plant formations. In 1903, stations were established at Manitou at 1,900 m., and on the top of Mount Garfield at 3,800 m., and automatic records were obtained throughout the growing season for the three zones, foothill, subalpine and alpine. During the present season, these stations are to be equipped with thermographs, psychographs and automatic photometers, while water-content determinations will be made at stated intervals. A small cabin has been acquired at Minnehaha, and it is intended to convert this into a laboratory ultimately. It is the purpose of the alpine laboratory to carry on investigations under field conditions alone, and the building will be equipped only with such books, microscopes and other instruments as are necessary to field experiment.

The general phytogeographical survey of the Colorado mountains, which was begun in 1896, has been carried out along new lines in vegetational research, and is now nearly completed. The structural characteristics of the mountain formations have already been indicated in a series of formation herbaria, entitled 'Herbaria Formationum Coloradensium,' issued in 1902, while the methods of research employed have just been published in a paper, 'The Development and Structure of Vegetation.' A large number of permanent and denuded quadrats have been established for the experimental study of invasion and competition, and considerable work in experimental ecology has been initiated by changing habitats and transferring species to diverse habitats. Special problems in succession and adaptation are under investigation by advanced students, and the results will appear during the coming year.

The facilities of the laboratory are at the disposal of botanists and students desiring to do advanced work or to carry on investigation, upon the payment of a nominal fee. Good accommodations may be secured at reasonable rates in the mountain hotels at Minnehaha and Halfway. Minnehaha is reached from Manitou by the trains of the Cog railway, over which commutation tickets may be ob-

tained at reduced rates. Detailed information will be furnished upon application to Dr. Frederic E. Clements, The University of Nebraska, Lincoln, Nebraska.

THE CULTIVATION OF COTTON IN THE WEST INDIES.

It is satisfactory to report that the experimental cultivation of cotton in the West Indies has proved a success, and that the industry is now established on a commercial basis. Plantations exist in Barbados, St. Lucia, St. Vincent, Montserrat, Antigua, St. Kitts, Trinidad, and the smaller islands, while plots have also been started in Jamaica and British Guiana. The total area estimated to be under cultivation is 4,000 acres. During the season just ended Barbados alone shipped, up to March 31, 244 bales and two bags of cotton, weighing 61,000lb., and the gins have been busy since. The Imperial Department of Agriculture, which has the work in hand, has orders from planters for Sea Island seed sufficient to plant 7,000 acres, and as this quantity has been paid for the presumption is that it will be used. In Jamaica, where the pioneer work is being carried out by the Board of Agriculture, enough seed has been disposed of to plant 500 acres. A number of Syrians, who are acquainted with cotton-growing in Egypt, are engaged in the cultivation there. Central factories for ginning and pressing the cotton have been erected in the various islands, and a cotton gin expert from the Sea Islands has just completed four months' work on the machines, all of which are now in perfect working order. He states that the factory in St. Vincent is the best-arranged and best equipped he has ever seen. A nine-hours' run of the six gins yielded 3,800lb. of lint; in Barbados, where the methods and appliances are not so scientifically complete, a similar run gave from 1,500lb. to 1,600lb. There are a few private ginneries, but the majority are government undertakings carried on under the direction of the Imperial Department of Agriculture. The cotton is ginned, baled and shipped for the planters for 3c. per lb. of lint; seed cotton is also purchased at the rate of 4c. per lb., which is