FOSSILS OF THE CANEY SHALE.

Studies by the Geological Survey.

The baffling nature of some of the problems with which geologists have to deal is well illustrated by certain conditions existing in Oklahoma, where the Arbuckle and Ouachita mountains, though in sight of each other, contain rocks whose sequence radically differs. Two great formations in the Ouachita Mountains, aggregating more than 10,000 feet in thickness, seem to have entirely disappeared before reaching the Arbuckle Mountains. That is to say, while 10,000 feet of sand and mud were settling from the turbid waters of some vanished sea which stood where the Ouachita Mountains now rise, the Arbuckle area, only a few miles distant, was receiving no sediments at all; or if the area was receiving sediments they have been removed without leaving a trace. It is even difficult to determine the position in the Arbuckle strata which these missing beds would have occupied if they had been deposited there. The singularity of this occurrence will be best understood when it is recalled that this accumulation of sediments represents a mass far higher than any mountains east of the Rockies.

The latest contribution to the study of this region has just been issued by the United States Geological Survey as Bulletin 377, under the title "The Fauna of the Caney Shale," by George H. Girty. Mr. Girty has investigated the fossils that have been obtained in the Caney shale, which occurs in both these groups of mountains, and draws certain conclusions as to the position in the Arbuckle Mountains which would be occupied by the formations that are absent there but present in the Ouachita Mountains. The Caney shale has this peculiarity—its lower portion contains in certain areas huge boulders, clearly derived from older strata and brought there when the shale was soft mud. The only known agency that could transport such masses of rock is moving ice, and these boulders seem to indicate that there may have been another ice age on this continent, long preceding that which so plainly left its marks on the northern part of America.

The region discussed by Mr. Girty is of so great interest that all investigations regarding it are important to the geologist, to whom the paper will be of greatest value.—*U. S. Geol. Survey.*

PLASTER OF PARIS WORKS—REPORT ON EXCURSION TO.

BEN M. JAQUISH, SECRETARY.

The gypsum, from which Plaster of Paris is made at the works of the Newark Lime and Cement Manufacturing Company, is obtained from Nova Scotia. There part is mined and the rest obtained from an open quarry. It is brought to Newark by boat and unloaded at a wharf belonging to the company. As it reaches the mill it is in lumps of varying sizes, some of them weighing 100 lbs. The gypsum seen here illustrates all the varieties, but most of it is granular and compact, white, pink, gray, or blue. Some of it is beautifully banded or color stratified. There is also a large amount of selenite and a large amount of alabaster.

The gypsum before grinding is sorted, and different grades of Plaster of Paris are made. After sorting, the lumps are crushed in a Blake jaw crusher to 2" size. The product of this crusher is fed to a reducer of the coffee mill type, and the product of this pulverized by mill-stones; 50% of that which passes the stones will pass through a 100-mesh sieve.

The calcining is done in kettles. These kettles, of which there are six, are 10 ft. in diameter and 8 ft. high, cylindrical in form, and made of boiler iron $\frac{3}{8}$ " thick. The bottom, curved upward, is of cast iron. The kettle is built over a fireplace and is surrounded by a circular brick wall, leaving a space which is used as a part of the furnace flue. Each of the kettles has four circular flues 12" in diameter, running horizontally through the kettles near the bottom. In this way the hot flue gases pass all around and through the kettles, thus heating the contents uniformly. The top of the kettle is covered with a sheet iron plate with two openings, one for escape of steam and the other for charging. The kettles hold about ten tons and require from two to three hours to calcine properly. Near the bottom on the side is an opening for discharging the calcined product. It is necessary to keep the contents of the kettle constantly stirred, and this is done by means of horizontal paddles attached to a vertical shaft. The temperature is determined by thermometers and is kept at about 340°F. Some Plaster of Paris is carried off with the escaping steam and is recovered in settling chambers. After the calcining is completed, the hot material is run into a fireproof pit. From here it is carried by metal elevators to a revolving copper wire mesh cylindrical screen and the coarse screenings (1 to 2%) reground in mill stones. From the screens the material goes to a storage house, where it is packed in bags or barrels for shipment.

THE SHAW SCHOOL OF BOTANY.

The recently issued administrative report of the Missouri Botanical Garden, and an announcement of Washington University concerning the Henry Shaw School of Botany, indicate that the Shaw foundation is on the eve of entering on a much increased activity. Although Henry Shaw in 1885 endowed a school of botany in Washington University, to the head of which Professor Trelease was called from the University of Wisconsin, the provision made was practically for only a chair of botany. Four years later, on the death of Mr. Shaw, his fortune, appraised at several million dollars, passed to the care of trustees, for the maintenance of his long-established and well-known garden and the further development of an institution of research and instruction in botany and allied sciences, the head of the School of Botany being selected as its director.

In the twenty years that have since passed, the trustees of the Shaw estate have been compelled to administer their trust on a maintenance basis, seeing approximately a quarter of their gross income absorbed in general taxes and nearly as much more claimed for street improvements, sewers and similar purposes, a large part of which

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