

obtained now, the laboratory will be opened next summer. The following is a list of the lecturers and their subjects: Jan. 18, Prof. W. H. Niles of the Massachusetts Institute of Technology, 'Mountain Sculpture'; Jan. 25, Maj. J. W. Powell, director of the United States Geological Survey, 'Savagery, Barbarism, and Civilization'; Feb. 1, Prof. H. N. Martin of the Johns Hopkins University, 'A Hen's Egg'; Feb. 8, Prof. George L. Goodale of Harvard College, 'Seeds'; Feb. 15, Prof. F. W. Putnam, director of the Peabody Museum of American Archaeology and Ethnology, at Cambridge, 'The Serpent Mound and the Ancient People of the Ohio Valley'; Feb. 22, Prof. Alpheus Hyatt, curator of the Boston Society of Natural History, 'A practical Example of the Evidence for Evolution'; Feb. 29, Dr. Henry P. Bowditch, dean of the Harvard Medical School (subject to be announced); March 7, Prof. Edward S. Morse, director of the Peabody Academy of Science, Salem, 'Reptilian Affinities of Mammals.'

## LETTERS TO THE EDITOR.

\*.\* Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.

Twenty copies of the number containing his communication will be furnished free to any correspondent on request.

The editor will be glad to publish any queries consonant with the character of the journal.

### The Trinity Formation of Arkansas, Indian Territory, and Texas.

DURING the past field-season the writer has had an opportunity to study the small mesozoic area in the south-west corner of the State of Arkansas and south-eastern Indian Territory, which is the north-eastern termination of the great area so well developed to the southward in Texas. By courtesy of Dr. John C. Branner, State geologist, I am permitted to publish the following note in advance of the more detailed official report which will soon be published by him.

In previous papers (*American Naturalist*, Feb. 1887; *American Journal of Science*, April and October, 1887) I have shown that the mesozoic strata of the Texas region, instead of belonging to the uppermost cretaceous as had been previously supposed, really embraced a large series of lower cretaceous and perhaps Jurassic beds. To the last-named period I intimated that the strata in Parker County, Tex., provisionally termed in my section the 'Dinosaur Sands,' would probably be found to be related. The studies of the past season in Arkansas have shown that these strata exhibit great uniformity of deposition along the paleozoic and mesozoic parting from south of the Brazos River in Texas, to the Little Missouri River near Antoine, Pike County, Ark., a distance of over three hundred miles, and that they rest directly upon the highly disturbed carboniferous rocks. In Texas the areal extent of this formation coincides with the eastern half of the Upper Cross Timbers, and in Arkansas it extends from the point above mentioned westward to beyond Ultima Thule. Its width, except for a few miles on each side of Red River, never exceeds a few miles. The formation consists of alternations of fine, closely packed white sands and red and blue gypsiferous marls, with occasional alternations of thin but extensive, fissile, arenaceous, and crystalline limestones, highly fossiliferous, often wave-marked, and seldom more than ten inches in thickness. Extensive strata of pure saccharoidal gypsum also occur in places, and the formation is the source of the salines and salt licks throughout its extent, and probably also of the 'brackishness' of the rivers which intersect it.

This formation is clearly distinguished from the overlying cretaceous (which deposits are later and later as we proceed eastward along the contact) and the underlying carboniferous. West of Weatherford the basal Comanche series may be seen resting directly upon it, while, at the point of its disappearance under the newer strata in Arkansas, it is directly covered by the uppermost cretaceous of Hilgard's Mississippi section.

The fauna of this formation is littoral and of great uniformity throughout its extent, and, upon hasty observation, conveys an impression that it is later than it really is. It consists of characteristic molluscan species which are hardly distinguishable from certain characteristic European forms specially indicative of the Upper Jurassic and Wealdan. I hope to give more detail concerning these

fossils in a special paper hereafter. In Texas I found what are at present supposed to be dinosaurian remains; and occasional vegetal remains are met with.

To the continuous formation the name of 'Trinity' is applied, from the rivers of that name which arise in it. This includes the strata which I termed 'Dinosaur Sands' in my Texas section.

The discovery of these trans-Mississippi beds of Jurassic affinities is of importance, in that it indicates a close relation and possible continuity between the pre-cretaceous mesozoics of Colorado and the Texas Pan-handle, and the Tuscaloosa and Potomac beds of the cis-Mississippi region.

ROBT T. HILL.

U. S. Geol. Surv., Washington, D.C., Jan. 6.

### Children's Development.

RECENTLY I became interested in the vocabulary of my boy, thirty months old, and for one day noted all words used by him, except proper names. No effort was made to exhaust the child's stock of words by questioning. He used three hundred and fifty-two words, of which fifty-four per cent were nouns, eighteen per cent verbs, and eleven adjectives. It is probable that the child's entire vocabulary of dictionary words includes four hundred or more.

G.

Washington, D.C., Jan. 4.

### Is there a Venomous Lizard (Heloderma)?

THIS animal has been an object of considerable interest to naturalists because of the question whether or not it presents the anomaly of a venomous lizard. Just before leaving the United States, last September, I had under my care about twenty so-called 'venomous lizards' of various ages and sizes; and, as I believe the biography of this animal has been but slightly touched on, a few observations in regard to them may not be out of place.

They varied in length from 19 to 49.5 centimetres. The larger ones, say above 43 centimetres, were all females. Their colors ranged from almost a brick-red to pale pinkish white, with markings from black to vandyke brown, which showed no regularity in details, appearing as if each lizard had been the subject of some Chinese artist who aimed only at the general effect. They all came to my father's establishment, in Rochester, by express; and the shaking-up and lack of freedom that they had undergone served to make them very irritable. When first liberated from their confining boxes, their first desire was to get hold of the nearest person, and, although usually very sluggish, they would then move with surprising agility, turning end for end, and making short dashes hither and thither with great swiftness. When one succeeded in fastening its teeth in my clothes, it held on with the tenacity of a bull-dog, occasionally giving a vicious shake to its head, as if trying to tear away a piece of the cloth. Nor was this pugnacity confined alone to the time of their arrival, but continued in lesser degrees during the entire time that I had them under observation. Once I saw a pitched battle between two. One had its teeth firmly fixed in the throat of the other, who, in turn, had a leg of the first in its jaws. Together they rolled and twisted over the floor, neither relaxing its hold for a period of fifteen minutes. Blood was drawn on both sides, yet neither afterwards appeared the worse for the conflict. I then tried two of them on a hen, to ascertain if they would prove poisonous to her. Having first shaved the thigh of the hen, so that the feathers might not interfere with the entrance of any poison, I induced one of the lizards to take hold. This it readily did, and retained its grip for five minutes, occasionally shaking its head in a savage manner. During the operation the hen appeared quite impassive, and, although not tied, made no attempts to escape, evidently charmed by the lizard. A little blood was drawn, showing that the flesh had been thoroughly pierced. For perhaps a half-hour afterwards the hen appeared a trifle stupid, but soon regained its normal condition, and gave no signs at all of poisoning. Two days later I repeated the experiment with another lizard, with a similar lack of results. I then caused one of them to bite the edge of a saucer, and, with a hypodermic syringe, injected the fluid obtained in the breast of a pigeon. No effect. Then, exciting one so that it viciously bit a small piece of wood, I drew a considerable quantity of fluid direct from its mouth, which, injected into the pigeon's breast, produced no results.