hail-storm was approaching and while the peculiar shelf or cornice which projects from the base of the storm-mass was in the zenith. This shelf has a flattish and rather smooth surface on its under side and when seen from a distance appears to consist of a mass of cloud having an under-pavement of low domes or flattish billows, and the broader and more peaceful it looks, the worse is the wrath of the storm above and within it. Lightning seldom comes from it, yet it is in a state of intense electrical excitement. While it is passing, there is a loud hissing from stretched wires (not connected with the earth), a stream of sparks, and at night a glow like St. Elmo's fire. A herd of cattle can sometimes be seen in the darkest night by their own light.

The fact is, the physiolgical effects of electric induction are so common in the higher mountains, and are often so ludicrous, that we are in danger of throwing aside these phenomena as of no special scientific interest. Yet we here have a complex problem involving not only the electrified clouds and the air as dielectric, but also the electrical properties of the ground itself. Now many of the prospectors for metalliferous veins declare that the behavior of lightning on veins containing certain kinds of ores differs from the ordinary. Some of them profess to be able to know the nature of the minerals in a mountain by observing the buzzing and other phenomena on the passage of electric clouds, but it is difficult to get them to talk about it, as they appear to regard the matter as a trade secret. Even experienced prospectors leave a certain peak on the approach of severe thunder storms, they declaring their sensations of shock to be unendurable, even when the lightning does not strike the mountain. They report that stones are loosened from the cliffs and fall in dangerous fusilades down the mountain side. No doubt these are in part land-slides, but some of them are reported to take place when no rain fell, only snow or hail, or before the rain reached the place. My informants used this language: "The mountain split and threw off those rocks." I have been desirous of determining the truth of these matters by personal observation, but thus far have not found the opportunity. It is at least a supposable case that electric attraction or repulsion dislodges blocks already loosened. Have any of your readers made observations on these matters pertaining to the effects of different kinds of rocks or minerals on electric clouds, or vice versa?

Perhaps a nearly related problem is furnished by the causes (electrical or otherwise) of the restlessness and often sleeplessness and oppressed breathing that accompanies the warm westerly or Chinook winds over the mountains. GEO. H. STONE.

Colorado Springs, Oct. 24.

The Gila Monster.

THERE has been considerable discussion as to the poisonous character of this lizard, and of late it seems to be accepted that it is not poisonous by the scientific people from the fact that the animal has no poison-sack or fangs, this does not by any means settle the question, for many of us know by personal experience that it is poisonous, and very much so at times. There are several people almost every year in Arizona and elsewhere who either lose their lives by it or suffer intolerable agony from it, and the notion that it is not poisonous does not lessen the number of sufferers. If the animal is in its normal condition and bites a person, no harm usually comes from it. It is a very pugnacious animal and is easily excited to frenzy, and especially so when it is being captured alive; at such times it emits a yellow and very rank-smelling saliva, which, if it enters the circulation by a wound or otherwise, produces death or great suffering in human beings. One case that came under my observation was that of a young man, in Arizona, who was bitten under those circumstances and who was sick for several months and had the disintegration of the blood and the effusion of serum that so frequently occur in those suffering from a rattlesnake's bite. I have no doubt that this explanation accounts for the poisoning of people by other "non-poisonous" lizards of our arid region. I should not be at all surprised to hear that even the horned toad that the boys so delight to torment is also poisonous under such circumstances.

MARCUS E. JONES.

Salt Lake City, Nov. 10.

Grand-Gulf Formation.

I AM glad to see that Judge Johnson accepts my determination of the brackish water character of the fauna of his Pascagoula clays, as it is a matter of some importance in the genesis of the tertiary strata of the Gulf border; and I am not disposed to quarrel with him if he chooses to retain the term "formation" for them provided it is made clear exactly what he understands by that term. His original communication was somewhat obscure on both these points and by placing a species of *Venus* in the bed (which is a strictly marine genus) I was led to suppose that he regarded the bed as (not deep sea but) purely of salt water origin.

In saying that I have permitted "conjecture" "to outrun and forestall positive discovery" in my brochure of January last, Judge Johnson simply indicates that he is not aware of the material in my possession and which though published (for the most part) during the last ten days, has been nearly two years in manuscript awaiting the printer's opportunity.

My short paper on the Pliocene of the Carolinas gave merely a tabular view of the results to which seven years of field-work and study of the material collected by numerous other workers in the field had led me. This may be found substantiated in Bulletin 84 of the Geological Survey just printed, but the portion relating to Florida had been type-written for the use of Messrs. Eldridge and Jussen before they entered upon their field-work, and it is, therefore, not exact to state that the differences between the older and the newer Miocene were "established" by those gentlemen, who had the essential solution of this question in their hands to begin with, Mr. Jussen having devoted under my direction some time to the study of the Old Miocene fauna of the Chipola beds before he entered the field at all.

Hasty generalization and hasty writing of all sorts are "baneful" I willingly admit, and an excellent example of what is to be avoided by lack of haste is shown by Judge Johnson himself in the letter alluded to (p. 247).

I have nowhere asserted that the Pascagoula clays are of Chesapeake age. As a matter of fact, they have nearly the whole of the Grand Gulf series between them and the Chesapeake formation. Judge Johnson's Waldo formation comprised beds belonging to two different epochs, the typical locality at Waldo, from his own specimens, being Chesapeake, and other localities mentioned by him, in his definition of the formation, are Old Miocene. I do not know what he refers to by the expression "overlying clays" at Aspalåga on the Appalachicola River, and certainly have never "shown" them to "be Chesapeake." Aspalåga lies in the region of the oldest Old Miocene, the fossils which I have seen from there are those solely of the Chattahoochee group. On the other hand, the Miocene discovered by Johnson at De Funiak Springs and eastward to Abe's Springs on the Chipola River is not the Older Miocene but the Chesapeake, with a typical Chesapeake fauna so far as yet developed. Still further, the Chattahoochee beds of Langdon distinctly underlie the Chipola beds, so far as they have yet been identified, and the fauna, while related to that of Chipola proper, is not the same.

In short, the Miocene limestones of Florida are so closely similar that the only way of identifying them (short of continuously tracing the beds, which is for the most part impracticable in Florida) is by their fossil contents, which can only be adequately studied in what Judge Johnson calls the "closet," that is to say, a museum supplied with the literature and specimens for comparison.

As the Grand Gulf lies probably above both the Older and the Chesapeake Miocene, I fail to see how the water-bearing sands at its base can serve to discriminate or define the distinction between the two older formations. Some part of the Grand Gulf is very likely contemporaneous with part of the later Miocene, but as yet information is absolutely deficient on this point. What we have called the "upper bed" at Alum Bluff, or the "Ecphora bed" of my Bulletin 84, is typical Chesapeake Miocene, identical with that at Waldo so far as its fossils are concerned. Lithologically, the beds are quite different. As for the Hawthorne and Ocheesee beds, both contain fossils, and we have fossils from the former collected by Judge Johnson himself. For details, the enquiring reader is referred to Bulletin 84, above mentioned.

Finally, in regard to Judge Johnson's "outline of the evolution of the Florida Peninsula," I confess to being ignorant of its existence either in print or otherwise, until long after my own views had not only been verbally communicated to many members of the U. S. Geological Survey and presented to the Biological Society of Washington, but had been circulated in type-written copies for the use of Mr. Eldridge's field-party. It is proper to say that while I had for some time entertained the theoretical view of the insulation of the Eocene island of Florida, the final proof was supplied by the field observations of Mr. T. W. Stanton of the U. S. Geological Survey, while the exploration of the Chipola beds, for material by which their age was determined, and the discovery of their existence in the typical locality on the Chipola River were first made by Mr. Frank Burns of the U. S. Geological Survey; though Langdon had previously observed the lower bed at Alum Bluff, which proves to be of the same age.

WM. H. DALL.

Smithsonian Institution, Oct. 31.

BOOK-REVIEWS.

A Course on Zoölogy. Designed for Secondary Education. By MONTMAHON and BEAUREGARD. Translated from the French by WM. H. GREEN. Phila., J. B. Lippincott Co. 75 cts.

THE introductory books of science of Paul Bert for use in the lower schools are very well known in this country, and have been of very great value in introducing science into the lower grades of education. The above course of zoölogy by Montmahon and Beauregard is designed as a second book in the same series, and is planned to give to a higher grade of students a somewhat extensive study in zoölogy. The translation of this book into English will be of great value to many of our high schools where an elementary text-book in zoölogy is desired and one interesting to students. The plan of the book is the natural method of proceeding from the known to the unknown. It begins with an outline of the study of human anatomy and physiology, and passes from this subject to the study of the dog, the chicken, the lizard, the frog, the fish, and then to the invertebrates, beginning naturally with insects and crustacea and then passing through the lower orders of invertebrates somewhat more hurriedly. After having thus given a general study of a type illustrative of each of the large groups of animals, the last half of the book is occupied with a popular study of the larger and better known animals, chiefly mammals and birds. This part of the book is very abundantly illustrated with figures of the animals mentioned and described, and throughout the illustrations are abundant and good. For the purpose designed this book is open to the criticism that it attempts to crowd rather too much detailed information and too many scientific terms into a short compass. But, on the whole, the style is simple, easily understood by the student for whom the book is designed, and the book seems to be admirably adapted for exciting an interest in zoölogical subjects among students of the secondary grade of schools. The scholar will hardly get a systematic knowledge of zoölogy out of the book, but this could not be expected of any zoölogy adapted to the secondary schools. The work can hardly fail to excite an interest, however, in the scholar and lead him to using his own eyes in the observation of nature, which is, of course, the chief design of scientific instruction in the lower schools. This book can thus certainly be recommended for introduction into high schools and even into schools of lower grade.

Chemical Theory for Beginners. By LEONARD DOBBIN and JAMES WALKER. New York, Macmillan & Co. 8°. 248 p. 70 cents.

THE study of chemical theories should be based upon a wide range of experimental facts; and the title of this little volume is unpromising. The theories, however, are supported by numerous experiments. The beginner may find some things hard to understand, but much that is profitable. Those who are familiar with

CALENDAR OF SOCIETIES.

Philosophical Society, Washington.

Nov. 26.—F. L. O. Wadsworth, Method of Determination of the Metre in Terms of a Wave Length of Light; B. E. Fernow, Recent Contributions Towards the Discussion of Forest Influences; R. T. Hill, The Occurrence of Iron in Mexico.

New York Academy of Sciences, Biological Section.

Nov. 14. — The papers were: Arthur Hollick, On Additions to the Palæobotany of Staten Island. About forty species were presented, of which half had been already described from Greenland Cretaceous and from the Laramie. The fossils, leaf-fragments, fruits, and seeds, occur in fire-brick clay, or in ferruginous sandstone or concretions. The genera notably represented were Populus, Platanus, Myrica, Kalmia, Acer, and Williamsonia. H. F. Osborn, Report upon a Collection of Mammals from the Cretaceous (Laramie). The multituberculates, Meniscoëssus and Ptilodus, were assigned to the Plagiaulacidæ, the former a probable ancestor of Polymastodon. The relations of these mammals were shown to be closer to Puerco than to Upper Jurassic forms. Arthur Willey, On the Significance of the Pituitary Body, and made the suggestion, founded on researches on the Ascidians and Amphioxus, that, if the Amphirhinic condition of the higher vertebrates was preceded by a Monorhinic condition, the nose in the latter case was not represented by the small nasal sac of Petromyzon, of which the unpaired character is undoubtedly secondary, as shown both by its development (Dohrn) and by its nerve-supply; but the nose in the Monorhinic ancestor of the Vertebrates was the organ which we know as the Pituitary Body or Hypophysis cerebri in all existing Vertebrates, this being represented in the Ascidians, as shown by Julin, by the subneural gland and its duct, and in Amphioxus by the so-called olfactory pit. The Pituitary Body is to the lateral Nares what the Pineal Body is to the lateral Eyes. Bashford Dean exhibited an entire Cladodus, a unique specimen recently collected in the Cleveland Shales. The tail, for the first time shown, indicates historically the origin of this part in modern elasmobranches.

Publications Received at Editor's Office.

ADDISON, STEELE AND BUDGELL. Sir Roger de Coverley Papers. English Classics for Schools. New York, American Book Co. 148 p. 12°. 20 cents.

ALLSOP, F. C. Practical Electric-Light Fitting. New York, Macmillan & Co. 275 p. 12°. $1.50.

BABET. 99 Methods of Utilizing Boiled Beef. Tr. from the French. New York, John Ireland. 122 p. 8°. 75 cents.

BARKER, A. S. Deep-Sea Sounding. New York, Wiley. 133 p. Maps. 8°. $2.

BARKER, GEO. F. Physics; Advanced Course. Second Edition. New York, Holt. 902 p. 8°.

CAMPBELL, H. J. Elementary Biology. London and New York, Macmillan & Co. 284 p. 12°. $1.60.

CONTRIBUTIONS from the Botanical Laboratory of the University of Pennsylvania. Vol. I., No. 1. Philadelphia, University of Pa. 72 p., pl. 8°.

DINGLE, EDWARD. A study of Longitude. Plymouth, Eng., Geo. H. Sellick. 24 p. 8°. 1s.

GALTON, FRANCIS. Finger Prints. London and New York, Macmillan & Co. 216 p. 8°. $2.

HOSKINS, L. M. Elements of Graphic Statics. London and New York, Macmillan & Co. 191 p., pl. 8°. $2.25.

IRVING, WASHINGTON. Ten Selections from the Sketch-Book. English Classics for Schools. New York, American Book Co. 149 p. 12°. 20c.

MCLENNAN, EVAN. Cosmical Evolution. Chicago, Donohue, Henneberry & Co., 1890. 399 p. 8°.

SCOTT, SIR WALTER. Ivanhoe. English Classics for Schools. New York, American Book Co. 484 p. 12°. 50 cents.

SHAKESPEARE, WM. Julius Cæsar. English Classics for Schools. New York, American Book Co. 114 p. 12°. 20 cents.