little doubt that their assumption as to the late, possibly Pliocene, age of these beds is correct, though it can only be proved by further and paleontological evidence, but this decision is merely an equivalent of the ideas above cited from Hilgard, and therefore not new.

That the Pascagoula horizon is Miocene rather than Pliocene is probable from the character of its scanty fauna, which is not of the sub-tropical type of the Pliocene of our southern coast, but indicates a cooler temperature, such as prevailed during the Miocene of that region.

The very great difficulties which the southern coastal plain offers to geological study are sufficient excuse for the slow progress which has been made, but it cannot be too often emphasized that no determination of the age of its beds not based on their fauna, or the fauna of beds both above and below those in question, can be regarded as more than tentative; and such determinations in the past have almost invariably proved erroneous.

WM. H. DALL.

THE SQUIDS FROM ONONDAGA LAKE, N. Y.

A FEW days since the newspapers told a story of how a citizen of Syracuse, while drawing a net in Onondaga Lake, got a strange looking fish, which upon being brought to Professor John D. Wilson, a well-known teacher of science in the city, was pronounced a squid. Professor Wilson has followed up this discovery, lest perchance some one connected with the affair were not too wise to be mistaken or too honest to deceive, and he assures me that he and his scientific friends are satisfied of the genuineness of this find. Professor Wilson learned from Mr. Terry, the discoverer, that he caught the creature in a net while fishing for minnows in shallow water. A second specimen was afterward found at the same place by a Mr. Lang who keeps a restaurant on the iron pier at the southeast corner of the lake. Both, as I understand, were caught alive. The first specimen was cooked (!) and then put in alcohol, the second is now in possession of the writer. The whole story makes a 'devilish fishy' first impression. Should there be no reason to doubt the verity of the discovery, its bearings are most suggestive. The place where the squids were found, Professor Wilson says, is just where the first salt springs were discovered and the first salt made in the Syracuse region by the early settlers long before salt wells were bored. Onondaga Lake is a shallow body resting on the Salina shales and unquestionably receiving at all times a considerable amount of saline seepage from the rocks below; for all we know to the contrary its bottom layers may be decidedly saline. These squids are not to be at once cast out as a 'fake' simply because they are marine animals alleged to have been caught in a fresh-water lake. Too many similar occurrences are known at the present to justify such procedure. There was a time in post-glacial history when there was communication from this body of water to the sea by the way of the St. Lawrence valley. It is within the limits of possibility that at such a time marine animals entered the present basin of Onondaga Lake as they did that of Lake Champlain, and that the saline condition of the lake waters has permitted their existence till the present. If such a presumption can be verified it will be by additional discoveries of these creatures supplemented by expert zoological determination of the specific characters and possible variations of these specimens, so that this discovery may prove to have a very important paleontologic bearing. Professor Wilson calls attention further to the fact that there are several hotels about the edge of the lake from which oyster and clam shells are thrown into the lake waters, but it hardly seems that this fact opens a possibility for the introduction by this means of the eggs of one of our Atlantic squids into conditions which would permit of their hatching. There are a number of considerations to be carefully weighed before the genuineness of this discovery can be accepted; if it is the work of some wag, he has shown acuteness in selecting Onondaga Lake rather than any other of the lakes of New York state. As very much, perhaps all, will depend upon the determinations of the zool-

ogist, the specimen in my hands will be turned over for examination to an expert.

JOHN M. CLARKE.

SHORTER ARTICLES.

PRELIMINARY RESULTS ON THE CHANGES OF ATMOSPHERIC NUCLEATION.*

1. LAST May, Mr. Harvey N. Davis, at my request, put up an apparatus in this laboratory for counting the number of nuclei in the atmosphere by measuring the coronas producible with such air under appropriate conditions. The apparatus gave promise at once, but Mr. Davis was unexpectedly called away before the observations became fruitful and the project was temporarily abandoned. Believing that an instantaneous method of at least estimating the degree of atmospheric nucleation is a desideratum,† and must throw light eventually on the origin and character of the nuclei in the atmosphere, I have recently undertaken the work myself, and the results obtained in October, after the indications of the apparatus had become warrantable, are given below.

I may add that Mr. Davis, and later Mr. R. Pierce, Jr., had been at work for some time on the measurement of the daily variation of the solar constant (a project recently set on foot by the U. S. Weather Bureau) and that I hoped from a coordination of the two classes of data to reach conclusions of interest.

2. *Apparatus.*—The original apparatus was of an improvised kind, consisting of a large, horizontally placed aspirator flask or receiver (about 10 liters in capacity, 30 cm. long and 20 cm. in diameter) in which the coronas were produced, an exhaustion reservoir and appurtenances. Atmospheric air entered by a quarter-inch lead pipe, and after passing through a coil of pipe in a water-bath, kept at room temperature as shown by a thermometer, entered the receiver and was there saturated with water. Some of the nuclei may be absorbed in this necessarily long and thin influx pipe, though the tests made did not bear this out. At all events the absorption is proportional to the nucleation and will not affect the ratios of successive nucleations in the lapse of time which are here chiefly in question. In later experiments the receiver was replaced by a cylinder 50 cm. long and 15 cm. in diameter, the walls of which, in the absence of plate glass apparatus, produced less distortion. To measure the apertures of the coronas produced in the receiver, a horizontal goniometer was placed about one meter in front of it and the small circular source of light about two meters behind, all being at the same level.

3. *Method.*—It is necessary to take in the air at some feet from the laboratory; whenever the house is colder than the atmosphere, there is a draft outward and one is apt to catch the ventilation. The influx pipe must be scrupulously without leaks for the same reason.

Since coronas actually run as far as the green centered types, considerable variation is detected and a skilled eye may often dispense with the goniometer. For this reason distortion of the coronas due to the walls of the flask is of little consequence at the outset.

In the tables the date and hour, the aperture of the corona, the character of the weather and the temperature of the influx air were taken. From these, the number of nuclei, n, per cubic centimeter was computed. The measurements showed (if s is the chord of the aperture on the given goniometer),

$$d = .002/s \qquad (1)$$

in centimeters, where d is the diameter of the fog particle. At mean atmospheric temperature (21° C.) one may put $m = 79/10^{7}$ grams, as the moisture precipitated per cubic centimeter of air, for the pressure difference $\delta p = 17$ centimeters of mercury, used throughout. From this the number of nuclei per cubic centimeter becomes by equation (1)

$$n = 189 \times s^{3}. \qquad (2)$$

4. *Errors.*—The occurrence of s^{3} in (2) makes it unreasonable to expect very sharp data for n, since s is not obtainable from sharp lines. Differentiating equation (2)

* Read to the American Physical Society, October 18, 1902.

† The pioneering work of Aitken is well known. His apparatus, however, would be inconvenient for the purposes here in view.