*SCIENTIFIC JOURNALS AND ARTICLES.*

THE May number of the *Botanical Gazette* contains a paper by Dr. A. A. Lawson, of Leland Stanford University, on 'The Relationship of the Nuclear Membrane to the Protoplast,' in which he holds that the typical nucleus of the higher plants is a water cavity, structurally similar to the vacuole, the chromatin being the only permanent constituent, while the nuclear membrane originates by the cytoplasm coming in contact with the karyolymph, just as the tonoplast is formed by the cytoplasm coming in contact with the cell sap. Dr. B. M. Davis concludes his paper on 'Oogenesis in *Saprolegnia*,' with an extended theoretical discussion of the homologies, origin and evolution of the coenogamete, the occurrence of coenogametes among the Ascomycetes, the phylogeny of Phycomycetes and Ascomycetes, and the nucleus of Phycomycetes in ontogeny. An ecological paper by Mr. J. Y. Bergen, now residing in Naples, discusses the thickets of under shrubs known locally as *macchie* of the Neapolitan coast regions. Dr. F. L. Stevens, of the Agricultural College of North Carolina, describes the occurrence of 'Nutations in *Bidens* and Other Genera,' quite similar to the well known nutations of the sunflower. Fernow's 'Economics of Forestry,' Boulger's 'Woods'; 'Postelsia' and other current works are reviewed.

THE July number of the *American Journal of Mathematics* contains the following articles:

'Isothermal-Conjugate Systems of Lines on Surfaces.' By L. P. Eisenhart.

'Some Differential Equations connected with Hypersurfaces.' By G. O. James.

'On the Forms of Sextic Scrolls of Genus Greater than One.' By Virgil Snyder.

'Geometry on the Cuspidal Cubic Cone.' By Frederick C. Ferry.

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*DISCUSSION AND CORRESPONDENCE.*

THE PROPOSED BIOLOGICAL STATION AT THE TORTUGAS.

TO THE EDITOR OF SCIENCE: In the marine biological stations (which carry on, it must be remembered, only a portion of all biological work) two tendencies, opposite at first sight, but really directed toward the same high aims, are discernible. The one tendency is to investigate the phenomena of structure, development and function in the individual; the other is to consider individuals in masses as species, as form-units bearing the imprint of environment, and adapted thereto, and as constituents of faunas. For students of the first sort of marine zoology what is required is one large central laboratory, with an extensive library and the requisite cytological and physiological apparatus, where students of anatomy, embryology and physiology may work together and give mutual aid and stimulus. The needs of the workers on the other side of marine zoology call for several laboratories, widely separated, in diverse environments. These will assist the first sort of laboratory by furnishing particular kinds of material found only in the locality. But their chief work will be to study the fauna, determining the laws of geographic distribution of organisms, the variation of species in different environments and the interaction of organisms. Such laboratories will, of course, be exclusively for research, and should be equipped with everything requisite for the collection, the study alive and the rearing of organisms.

While the Woods Holl Laboratory provides a home for the first-mentioned investigations, and will, with increased resources, be able to provide still better for them in the future, the needs of the second sort of biology are still imperfectly met. On the middle Atlantic coast there is a series of laboratories that are of value for this work, as at Harpswell, Woods Holl, Cold Spring Harbor, Beaufort and Bermuda. And on the Pacific coast we have the Hopkins Laboratory and that of the University of California. The pressing needs are now for one or more stations on the Gulf of Mexico and the Caribbean Sea—those vast mediterranean seas our failure to investigate whose fauna remains to-day one of the great reproaches to American zoology. Every zoologist who is more than half a zoologist will be glad to see this reproach removed.

In Europe individual enterprise or university initiative backed by government support has established a magnificent chain of biological research stations reaching from Tromsö, Norway, and even the White Sea, along the North Atlantic, the Baltic and North seas, the Irish Sea, the Channel, the Bay of Biscay, and the Mediterranean, Adriatic and Black seas. In this country, where the idea that a university should be primarily a research institution is slow in taking root, we can not look for the establishment of such stations far from university centers. The founding of the Carnegie Institution leads us to hope that now America can do her plain duty in the investigation of our adjacent tropical seas. Just where these laboratories should be located may be left to the consensus of opinion of zoologists, if such can be obtained. There seems to be a nearly unanimous agreement that the Tortugas are the best place for one of them. Certainly any one looking at the map and seeing their position in the middle of the out-portal of the great breeding ponds of the Atlantic tropical fauna would predict that here would be one of the best places in the world for a marine station. Twelve years ago Mr. Agassiz named it to the writer as the ideal place for a marine station, and every zoologist that has been there since has brought home the same report. So it clearly *is* an ideal spot, and the first tropical marine station should go to the Tortugas.

It is to be hoped that, in addition, the desirability of establishing a marine station at Jamaico, Porto Rico or another of the Antilles may be considered; and while we are planning a chain of marine stations, certainly the island of Grand Manan or the coast of Newfoundland and Puget Sound should be considered. Also, it would be well to have a party to explore in successive years the fauna of Davis Strait, Hudson Bay, Bering Sea and the Gulf of California, and to report on the feasibility of establishing marine stations at those places. But it seems to me the first step is certainly to establish a laboratory at the Tortugas.

C. B. Davenport.

Chicago.

May 13, 1903.

To the Editor of Science: Although somewhat tardy in my reply to Dr. Mayer's query, I am none the less enthusiastically in favor of the establishment of a marine biological laboratory for research in the tropics. There would be certain advantages in having it within the jurisdiction of the United States, which would narrow the choice of site to Porto Rico, the coast of Florida, or the Tortugas. In the region of Porto Rico the island of Culebra seems especially favorable, and the *Fish Hawk* found good collecting also at Mayaguez. Before a laboratory is finally established I think that these localities should be considered carefully. As to the main coast of Florida and the islands immediately adjoining, a laboratory in most localities of this region would be inaccessible and difficult to provision. Moreover, as I can testify, the water there is frequently in bad condition, becoming milky with fine calcareous material from the grinding of the coral sand by the surf.

Dr. Mayer reports the water at the Tortugas to be very pure; and, as there is a government station there, I infer that means is afforded for frequent communication with Key West, which is easily accessible and would furnish a satisfactory base of supplies. Professor Nutting has mentioned the abundant fauna of the Tortugas, but the one point in which the Tortugas seem likely to excel all other localities has not been emphasized, and that is as a place for the study of the tropical *pelagic* fauna.

It was a search for such a place that led the Johns Hopkins party of 1892 to Bimini, which is on the east side of the Gulf Stream. The Tortugas were considered, and rejected on account of the quarantine for yellow fever there at that time. We arrived at Bimini after a storm with the wind blowing from the southwest, and upon rowing out into the Gulf Stream we found an abundance of pelagic forms that more than satisfied our greatest expectations. But after the wind had returned to normal southeast and had been blowing from that direction a week or so we realized that we had selected the wrong side of the Gulf Stream, for there was a com-

plete change in the pelagic fauna within reach of the laboratory, the catch consisting chiefly of larvæ of forms living upon the Bahama Bank. Reports of the Weather Bureau show that, except during the midwinter months, the prevailing winds at the Tortugas are from east to southeast. That is, they blow diagonally across the Gulf Stream toward the station. This, with a reasonable amount of calm weather, would afford ideal conditions for the study of the truly pelagic fauna, which is the most interesting and the least known. Ordinarily one has to go out in a ship to study this fauna, but at Tortugas, as at Bimini, it would be brought to the door of the laboratory by an ocean current, and at the Tortugas there would be the additional advantage that the wind would generally be blowing across the current toward the laboratory instead of away from it.

If a laboratory is established there I shall certainly endeavor to use it, and I hope that its establishment will not be delayed by any idea of great expenditure. Very good work can be done at such a place with very modest equipments.

ROBERT PAYNE BIGELOW.
MASSACHUSETTS INSTITUTE OF TECHNOLOGY,
May 26, 1903.

HAVING spent a season in Jamaica I am disposed to advocate that island with almost unqualified commendations as a site for a research laboratory in the tropical Atlantic.

B. W. BARTON.
JOHNS HOPKINS UNIVERSITY,
May 6, 1903.

## SHORTER ARTICLES.

### THE ARC OF QUITO.

THE following statement concerning a work of international interest and importance is taken from the *Comptes Rendus, Hebdomadaires, des Séances de l'Académie des Sciences,* tome CXXXVI., No. 14 (6 Avril, 1903).*

* Report presented in the name of the commission charged with the scientific control of the geodetic operations on the Equator. (Commissioners; Mm. Bouquet de la Grye, Hatt, Bassot, Loewy; H. Poincaré, Secretary.)

"The commission formed by the French Academy of Sciences for the scientific control of the geodetic operations on the Equator had a meeting on March 9 to hear the report of M. le Commandant Bourgeois on the work executed during the year 1902." Unhappily, the progress of the work has not been as rapid as was expected last year when the previous report was made. This delay has resulted from two prinicipal causes, the first being the exceptionally unfavorable meteorological conditions. The summits of the mountains were constantly covered with clouds or mist which rendered observations impossible.

Lieut. Perrier remained three months at the station on Mirador, at an altitude of 4,000 meters, and was constantly in the clouds. During his whole stay incessant rains and a furious wind prevailed except at rare intervals. The other parties encountered the same difficulties. At Tacunga, M. Maurain was only able to observe at rare intervals. At Cahuito, M. Lacombe passed many days in the mist and snow without being able to obtain a single observation. M. Lallemand had charge of the reconnaissance and signal building and encountered many obstacles. These unfavorable conditions appeared to have an exceptional character which the reconnaissance could not make known in advance. Ordinarily the season of rain is shorter, and even in the worst months observations are sometimes possible during many hours of the day. Is it possible that the persistent bad weather should be ascribed to the recurrence of volcanic activity which showed itself in the whole of South America after the catastrophe at Martinique?

The volcanoes of the eastern Cordilleras, which ordinarily emit a little vapor, threw out columns of smoke on many occasions, and there were lava flows in the western chain.

Strong earthquake shocks were also felt. These volcanic manifestations did not directly delay the work, but perhaps they were connected with the meteorological conditions which proved to be so serious in delaying the operations.

The second cause of delay was the continued