But when last summer the spirit of this new world which has been created by modern science, the spirit of reason, of cooperation, or internationalism, was submerged in the wave of blind nationalism which swept the world back a thousand years towards barbarism, when the crowning glory of science, the objective, impartial search for truth was forgotten, and prejudice and hate alone dictated the words and acts of men, then it was felt necessary to abandon the plans for the Röntgen celebration.

But here in America where, let us hope, the spirit and the method of science still find some advocates, it is fitting that on the twenty-seventh of March we bring honor and appreciation to the seventy-year-old author of one of the world's greatest discoveries—Conrad Röntgen.

R. A. MILLIKAN

UNIVERSITY OF CHICAGO,
March 18, 1915

THE CONTENTS OF A SHARK'S STOMACH

TO THE EDITOR OF SCIENCE: I have received from Mr. W. F. Cameron, of Zamboanga, P. I., a Stanford engineer, a photograph of a rare shark, *Rhinodon typicus,* a specimen about twenty feet long, taken on the island of Cebu. A notable feature about this shark, which has a very big mouth and small teeth, is that it had in its stomach 7 leggings, 47 buttons, 3 leather belts and 9 shoes. He had probably captured the cast-off garments of some company, otherwise the question arises—What became of the odd legging and the odd shoe?

DAVID STARR JORDAN
LELAND STANFORD JUNIOR UNIVERSITY

THE SCALED AMPHIBIA OF THE COAL MEASURES

THE preservation of scales among true Amphibia has been well known for many years, and their presence has been commented on by Huxley, Cope, Dawson and others. Recently the question of the crossopterygian ancestry of the Amphibia has received considerable support through the researches of Gregory, Watson, Broom and Williston, so that it will be of interest to state here the conditions of the scales among the few species of Amphibia from the Coal Measures which show these structures. Scales are known on several genera of diverse relationship and seem to have been present independent of any common ancestry. These structures, presently to be described, are true scales, and are not to be confused with osseous scutes and ventral scutellæ. These latter structures will be dealt with more fully in another place.

Small scales hexagonal in form have been observed in a branchiosaurian genus, *Micrerpeton,* from North America, though this discovery has not so far been confirmed on additional material, although known to occur in another genus, *Eumicrerpeton.* From the Coal Measures of Ohio come two scaled microsaurian genera, one of which is *Cercariomorphus,* described by Cope, though never figured. The scales in this genus do not show many of the fish characteristics, though they resemble remotely some of the more aberrant forms. The scales are dermal tubercles inserted in the skin, without any definite plan of imbrication, such as is common among the fishes, although the scales have a definite arrangement simulating the fishes. The pattern shows a remote resemblance to some of the early ganoids. They are, moreover, true scales, and as such possibly indicate one more link added to the already full chain of facts which ally the Amphibia and the fishes.

The other genus from Ohio possessing scales is imperfectly known, but was tentatively allied, some years ago, to the genus *Ichthyerpeton,* described many years ago by Huxley from the Coal Measures of Ireland. There is no assurance that the forms are so closely related. They both possess scales of a similar pattern and have an identical form of vertebra. The scales in the only known American species are so badly scattered that nothing can be said of their arrangement. Dawson's work on the scaled Amphibia of the Coal Measures of Nova Scotia is well known. He has figured and described very completely the scales of *Hylonomus.* They bear a great resemblance to the scales of *Cercariomorphus.*

The question now before us is whether the

scales of these few species of Coal Measures Amphibia are sufficiently fish-like to be of service in the derivation of the Amphibia from the fishes. One would think that they might be, and it is the intention of the writer to describe and illustrate these structures fully; clearly distinguishing between scales, osseous scutes and ventral scutellæ. These latter may be scale-like, but are always confined to the myomeres of the abdomen, thorax and throat. That some of the ventral scutellæ have a scale-like arrangement is certain, but this arrangement can be accounted for on other grounds. The writer is confident that the ventral scutellæ have an entirely different origin, ontogenetically and phylogenetically, from true scales.

Roy L. Moodie

University of Illinois,
Department of Anatomy,
Chicago

THE COTTON WORM MOTH IN 1912

An enormous migratory flight of the cotton worm moth, *Alabama argillacea* Hubn., was recently reported by Dr. A. P. Saunders[1] as occurring at Clinton, N. Y., on October 10, 1912, the moths swarming into town about 3 A.M. He states also that two or three days earlier a large invasion of the moths occurred at London, Ontario.

It is therefore of especial interest to note that another huge swarm, probably of the same wave of migration, appeared at Hanover, N. H., two days later than at Clinton, N. Y., viz., the early morning of October 12, 1912. Windows and doors of business houses that had been brightly illuminated during the night were literally covered in the morning with these handsome brown moths.

The facts, so far as they go, seem to warrant the conclusion, or at least the hypothesis, that a great wave of these insects from the cotton growing Gulf States was moving in a northeasterly direction at the rate of about 80–100 miles per night. This would require an average rate of flight of only 8–10 miles per hour. Continuing on the same course at the same rate the wave would have reached Augusta, and perhaps Bangor, Me., on October 14, though it is quite possible that the rather heavy rain that fell in New Hampshire on the night of the 12th and 13th may have delayed the flight or changed the direction of its course. Records from that region will be awaited with much interest. Clinton, N. Y., is roughly 300 miles due east of London, Ont., lat. 43° N. Hanover, N. H., is about 160 miles northeast of Clinton, and 43° 42′ N. The part of the wave front that passed through London, Ont., presumably passed considerably to the north of Clinton, if the moths were guided at all by the prevailing winds of October 9 in that vicinity, and traveled, as would be expected, in a northeasterly direction over the length of Lake Ontario.

In a case of this kind, in which winged creatures wander far from their native habitat, it is natural to suppose that the wind has played a prominent part in the dispersal, as when an occasional murre is driven inland by the storms of winter. So far as I have been able to learn, however, from a somewhat superficial examination of the records of the weather conditions of the time, I have found no evidence of any notable atmospheric disturbance sufficient to account for this apparently large and extensive migration. In Ontario and the northeastern states the moths would seem to have encountered only moderate southwest winds, followed on the 10th–12th by unsettled weather and variable winds of no great velocity.

It is impossible at present to say whether light, which has such a powerful control over the movements of butterflies and, to a more limited extent, of moths, was or was not an important factor in this case, but it is a matter worth considering.

This migratory wave seems to have passed to the north of Massachusetts, if one may judge from the scanty data at hand, though Professor Fernald[2] has reported that earlier in the season (Sept. 21–25, 1912) a few of these moths were taken in that state. He mentions a large invasion in 1911, during the last week in September, and another on October 17, 1914,

[1] Science, January 8, 1915.

[2] Science, November 27, 1914.