us from Garret County, Maryland. In northern New Jersey, where both species of toad occur, the American toad is conspicuous only during the breeding season. In midsummer almost all the toads that are found hopping along the roadside at dusk are Fowler's toads. This apparent scarcity of the northern toad may be due to its habits; it may stay more in the woods, or come out later at night.

At Newton, N. J., in mid-June, a number of fine specimens of *americanus* were found in the long grass of a moist meadow bordering a cat-tail marsh, associated with pickerel and leopard frogs. No individuals of *fowleri* were found in the meadow, all, with one exception, being seen along the roads in the evening, where also a few examples of *americanus* were taken.

The difference in the time of breeding of the toads is well known. On Staten Island the song of Fowler's toad is first heard about April 20, when the American toads at Van Cortlandt Park, N. Y., have already begun to leave the water.

Bufo americanus and *B. fowleri* are certainly to be looked upon as distinct species rather than as geographical races, yet we have taken a number of toads on the Palisades, and on the northern end of Manhattan Island, which we can not refer satisfactorily to either. Most of them are intermediate in regard to the size of the warts, and a few are as smooth as Fowler's toads but with black spots on the breast. They may represent only the extremes of variation, or they may perhaps be hybrids. This is a question which could be settled only by experimental study, but that there is some possibility of hybridization is shown by the following incident: A male American toad, during the spring of 1909, which was put in a cage with some frogs, was later found clasping a female pickerel frog (*Rana palustris*) to which he clung for several days. Would not such an individual, if unsuccessful in securing a mate of his own species, be quite likely, a little later, to fertilize the eggs of a female Fowler's toad?

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FURTHER PROOFS OF THE INCREASE IN PERMEABILITY OF THE SEA URCHIN'S EGG TO ELECTROLYTES AT THE BEGINNING OF DEVELOPMENT

USING Kohlrausch's method, I observed an increase in electric conductivity of the sea urchin's egg at the beginning of development, indicating an increase in permeability to ions. Although only one proof is necessary to establish a fact, it is interesting to see other data fall into line.

If an electric current is passed through the egg of *Arbacia punctulata,* the cytoplasm begins first to disintegrate in the region nearest the anode. The red pigment diffuses out of the plastids in this region and turns an orange hue.[1] This is most probably due to the accumulation of anions, which dissociate water, forming acids, and indicates a poor permeability of the plasma membrane to anions. As no corresponding disintegration takes place at the cathode end, the plasma membrane must be more permeable to cations than to anions.

If fertilized and unfertilized eggs in sugar solution be placed on the same slide under the microscope and an electric current of gradually increasing strength passed through, the unfertilized eggs begin to disintegrate sooner than do the fertilized eggs. This difference is also true after the fertilization membrane has been shaken off. Therefore, the unfertilized eggs are less permeable to anions than are the fertilized eggs.[2] A low permeability to anions means a low permeability to electrolytes, since the cations on leaving the egg would be pulled back by the negative field produced by the excess of anions confined, and only the undissociated molecules could diffuse freely.

Since it has been shown that unfertilized eggs are less permeable to anions than are fertilized eggs, we should expect it to be more difficult to plasmolyze unfertilized than fertilized eggs with solutions of non-electrolytes. In solutions of non-electrolytes, the electro-

[1] A solution of the pigment turns pale orange in acid and deep purple and is precipitated in alkali.

[2] Or the electrolytes have diffused out of the fertilized more than from the unfertilized eggs, in either case showing increased permeability.

lytes would diffuse out of fertilized eggs, thus lowering the internal osmotic pressure to a greater extent than from unfertilized eggs. This would make the ratio of external to internal osmotic pressure greater in the former than in the latter case.

In testing this prediction by experiment, urea solutions were found to be so toxic as to interfere with the observations. Sugar solutions, however, gave the expected results. If fertilized and unfertilized eggs be placed in a molecular solution of cane or invert sugar (approximately isosmotic with sea water) and observed under the microscope, the fertilized eggs appear small and sometimes irregular in outline, whereas the unfertilized eggs appear normal. This difference is observed before the formation of the "hyaline plasma layer" in the fertilized eggs, so their shrinking is real, *i. e.*, not due to a receding of the granules toward the interior.

I made series of measurements of the diameters of eggs treated in this manner, of which the following are specimens:

One drop of a molecular solution of dextrose contained eggs of the following measurements: unfertilized, 85, 84, 81, 84, 82, 84, 85, 85, 80, 85, 83, 85, 83, 85, 84, 83, 82, 86, 83 (mean = 83); fertilized, 80, 85, 80, 80, 75, 74, 70, 66, 67, 66, 80, 67, 78, 80, 80, 69, 70, 68, 80, 77 (mean = 75). As a control, a drop of sea water containing fertilized and unfertilized eggs was investigated and recorded as follows: unfertilized, 88, 85, 82, 90, 90, 82, 75, 82, 75, 85 (mean = 83); fertilized, 83, 80, 83, 90, 90, 82, 93, 82, 95, 80, 92 (mean = 86).

It thus appears that whereas in sea water fertilized eggs are not smaller than unfertilized, in a molecular solution of sugar fertilized eggs are plasmolyzed faster than are unfertilized eggs, indicating greater permeability of the fertilized eggs to electrolytes, or of the unfertilized eggs to sugar. As the former alternative agrees with previous data above mentioned, we assume it to be the correct one.

We thus have three demonstrations of the increase in permeability of the egg to electrolytes at the beginning of development: (1) the decrease in electrical resistance, (2) the less rapid disintegration of the anode region and (3) the increased plasmolysis.

The second demonstration, if found true in other cases, would account also for the difference in electrical potential between the interior and exterior of the living cell, and the negative variation in nerve and muscle. The anions (of any electrolyte in greater concentration in the interior than on the exterior) that are prevented from escaping would make the interior negative in relation to the exterior; and a surface area of increased permeability would be negative in relation to the remainder of the surface. A band of increased permeability causing increased surface tension around the equator of the dividing egg would account for the constriction of the first cleavage furrow.

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August 8, 1910

San Francisco Meeting of the American Chemical Society

The meeting of the American Chemical Society in San Francisco and the sightseeing and entertainments enjoyed there and en route will always be remembered by those who attended as one of the pleasantest memories of their lives.

The members taking the special train, some 110 in number, gathered at the La Salle Hotel in Chicago on July 4, where they were entertained at luncheon as the guests of the Chicago Section.

The special train, furnished by the Santa Fe Road, was composed of the Pullman Company's finest equipment, electric-lighted throughout, with observation, library and buffet cars.

The first stop was made at Colorado Springs, where most of the members took the trip to Pikes Peak and to the Garden of the Gods, while others contented themselves with the attractions around Manitou and the Cheyenne Canyon.

On the following morning the train stopped for a short period at Albuquerque and reached Adamana at one o'clock, where carriages and wagons were in waiting to take the party to the Petrified Forest, some twelve miles distant. Although the sun shone brightly, no inconvenience was experienced, owing to the altitude and the dryness of the atmosphere, and all were repaid by the wonders awaiting them.