

1884. Wright, Ramsey. On the Nervous System and Sense-organs of *Amiurus*.
Proc. Canadian Instit. Toronto. Vol. II. fasc. 3.

The above list is as complete as I could make it and includes all the important papers on the subject. For the titles of some of the articles which I was unable to consult, I am indebted to the papers of Sorensen and Francotte and Prenant's "Eléments d'Embryologie."

THE SNOWBIRD AT NIGHT. BY W. P. SHANNON.

ON THE OCCURRENCE OF SEVERAL FAMILIES OF AQUATIC ANIMALCULE IN
NEW STATIONS. BY ELWOOD PLEAS.

On February 25, 1896, while searching a small lichen for diatoms that might have found a possible lodgment, it was a matter of much surprise to find a large and active *Rotifer vulgaris* measuring its length across the microscopic field. Further examination of this lichen, as well as others from the same and neighboring trees, logs, stumps, board and rail fences, disclosed the fact that the *Rotifera* (in several genera and species), *Anguillula fluvialis*, *Macrbiotus americanus*, *Paramecia*, and many more minute flagellate *Monads* (some or all of them) might be expected in every lichen, in short, compact, growing mosses, and in fact wherever a cryptogam can be found.

The temperature was below freezing when the first lichens were collected, and had been 15° below zero a few days earlier, but upon soaking the lichens for a minute or two in about as much water as they would absorb, and squeezing into a small dish and transferring two or three drops (dregs and all) with the dipping tube to a slip or cell, it was generally found that some or all of these strangely domiciled animals had already resumed the functions and activities of life.

A few of these microscopic animals had become quite familiar as denizens of almost every ditch and pool in the land, but the astonishment was scarce greater at finding *such* creatures in *such* a habitat than at the great variety and vast numbers of them on exhibition.

On March 22 a lichen about 1 x 1½ inches, pared from the upper edge of a fence board, yielded 203 rotifers, besides other living forms.

Examination was not resumed until December 4, when a lichen about 1½ x 1½ inches, yielded 69 rotifers, 18 water eels, 7 water bears, several *Paramecium* and many minute flagellate protozoa.

On December 13, a fragment of lichen $1\frac{1}{4} \times 1\frac{1}{4}$ inches square slipped from the bark of a May cherry, yielded 828 "wheel bearers," 10 "water eels," 25 "water bear," and greater numbers of minute infusoreæ; while on the same day, from a minute greenish yellow lichen, estimated at $\frac{1}{8}$ inch in diameter, there were taken 65 rotifers, 4 eels, 1 bear and 4 mites.

So universal seems to be the distribution of some of these forms that the difficulty is to find a spot where lodgment is possible not already occupied.

On December 19, from the calyx of an apple that had been in a dry cellar for a month 2 rotifers and 6 eels and other things were obtained, and 3 apples yielded 32 of these forms, fragments of insects and the wreckage of various filamentous fungi, and innumerable unknown spores and bacteria.

The writer of this paper has neither the fine microscopic appliances nor works of reference necessary for a close study and determination of the most minute forms observed, and the names of a few in the list which follow are given provisionally. We are, however, indebted to the distinguished microscopist and widely known writer and author of several splendid books on microscopic subjects, Dr. Alfred C. Stokes, of Trenton, New Jersey, for having examined material sent and identified a dozen or more of the species in the list, which is as follows:

INFUSORIA.

Amphileptus, sp. ?.

Heteromita, sp. ?.

Tellina, sp. ?.

Vorticella, sp. ?.

Paramecia, sp. ?.

Chilodon, sp. ?.

Free swimming *Monads*, several sp. ?.

RHIZOPODS.

Euglypha Ciliata.

Euglypha alveolata. ?.

Arcella vulgaris.

Amoeba verrucosa.

Acanthamoeba.

Diffugia pyriformis.

Diffugia corana ?.

EELS, MITES, ETC.

*Anguillula fluviatillis.**Alacroboties americanus.**Water Mite*, sp. ?.*Mite*, sp. ?; probably terrestrial.*Entomostraca*, resembling *Diopomus*.

ROTIFERA.

Rotifer vulgaris,*Rotifer*, 2 sp. ?.*Philodina aculeata*.*Rotifer*, eggs, sp. ?.

ALGÆ.

Nostic lichenoides, ?.*Pratococcus viridis*.*Spirogyra*, sp. ?.*Oscillaria*, sp. ?.*Diatomes*, species, ?.

Examples of lichens rich in the aquatic organisms above listed were sent to half a dozen prominent microscopists with the request that they report the things found in them, and whether the finding of such creatures in such habitats was new; and if not they were requested to cite some article or work of reference giving information upon the matter.

All expressed surprise at the find and failed to cite any work of reference, save a distinguished lady of Pennsylvania, who referred to Dr. Joseph Leidy (XII vol. Hayden's Geol. Rep., 1870), where, in speaking of Rhizopods, he says, substantially: "While essentially aquatic," they occur wherever there is moisture, commencing with one's own doorstep and extending to ocean's depth, and even upon the bark of growing trees, etc., etc.

The theory generally advanced to account for the sudden appearance of countless numbers of *Bacteria*, *Infusoria*, *Rhizopoda*, etc., in cisterns, watering troughs, transient pools and puddles of water, is that they or their eggs or germs have been gathered up from dried-up ponds and ditches by the summer winds and carried for long distances and deposited on walls and roofs, etc., from whence they are washed by copious rains and afterward germinated, or are developed or revived.

While this may be true in part as to some of the almost structureless Protozoa, it would seem scarcely sufficient to account for the appearance of the more highly organized *Rotifers*, *Anguillula* and mites, in the driest of dry lichens, in every stage of development from egg to the full-grown animal, and that in the

dead of winter. One of the correspondents reporting on material sent for examination, twice reported Rotifer eggs, and the second time as being furnished with hooked spines, and the young rotifer alive within the egg and its mastax in operation; while on December 5th the writer witnessed a *Macrobrotis ovipositing* in its peculiar style, which consists of depositing a dozen or more rather large eggs in the posterior portion of its skin and frantically scrambling out at the front end, and leaving the sack for the use of its young.

The first animals found were of various sizes, last February, and must have occupied the position in which they were discovered for several months at least; and to test their capacity for withstanding great and sudden vicissitudes of weather, both those in the lichen and those soaked out have been dried within six inches of a gas stove, running day and night for two weeks, and a portion of the Rotifers, Eels, Bear and Infusoria resumed life after soaking five to ten minutes. The thermometer indicated that they were withstanding the temperature and desiccation of 75° to 110°. Some of those washed out and put to dry (in a teaspoonful of water) were resoaked and redried four or five times at intervals of twenty-four hours.

Others were subjected to zero temperature for 2½ hours, and after being thawed over a gas jet a few Rotifers and Eels were resurrected in five to 10 minutes, but no Infusoria appeared to have withstood the ordeal.

A very surprising feature of the survey taken is, that of the thousands of minute living forms forced to pass in review, certainly not one in a hundred were of such as are commonly regarded as *terrestrial*. Insects were mostly represented by fragments.

In view of the facts cited the problem, from whence came these myriads? may not be solved, but it does seem clear that the "*germ-and-egg*" transportation theory of their distribution is insufficient.

NOTES ON THE BIOLOGICAL SURVEY OF MILAN POND. BY A. J. BIGNEY.

Milan Pond is situated in the eastern part of Ripley County, one-fourth mile east of the village of Milan. The pond is an artificial one, having been constructed by the old O. & M. Railroad in 1854 as a watering station. It is nearly one-half mile long and one-fourth mile wide. Its greatest depth is twelve feet. It receives water from four small streams, but is drained at a certain height, so that it keeps at the same stage most of the time, except in dry seasons. In the summer of 1895 it would have gone dry had not the railroad company kept it supplied with transported water. This is the only time it has been very low.