The reproduction of Clathrulina elegans.

In *Science*, iii. 55, is published a *résumé* of Miss S. G. Foulke's remarks before the Philadelphia academy of natural sciences in reference to the reproductive methods of Clathrulina elegans; her statements being app rently confined chiefly to a process by quadruple subdivision of the body into uniflagellate organisms as observed by herself, with allusion to three additional processes as observed by others. In August, 1881, the writer repeatedly witnessed two forms of reproduction with this rhizopod, in some respects quite different from what was observed or mentioned by Miss Foulke.

The body of Clathrulina in no instance withdrew its rays before subdivision, but underwent transverse binary fission; each part, even after complete separation, retaining its pseudopodal rays fully extended. Soon after dividing, however, one part became perfectly smooth, having possessed up to this point a conspicuous pulsating vacuole, which now curiously contracted, and did not re-appear. The remaining half of the original body underwent no change except that caused by the protrusion of rays from the freshly divided surface.

The recently separated portion then slowly passed out of the capsule, forming, just before its escape, two vibratile flagella of unequal length. Its movements began immediately, being only moderately active, and continuing for less than two minutes, when it suddenly lifted itself upon the flagella-bearing end, and instantaneously collapsed into a shapeless mass studded with short blunt pseudopodia, which almost as quickly became filiform; and the zooid was an Actinophrys-like creature, with two flagella trembling at its front. The latter were soon lost among the rays, and the animal at once began to form the pedicle by a slow extrusion of the body-sarcode. The whole process consumed about three hours.

From the same gathering I was also fortunate enough to learn how Clathrulina produces the colonies occasionally met with. The process, up to the escape of the biflagellate zooid, even with the strange conduct of the contractile vesicle, was as just described. The longer of the flagella, however, terminated in a conspicuous bulb-like enlargement, which remained within, but was not attached to, the parent-shell. The vibrations of the short lash gave the zooid a rapid rotatory and oscillating movement, the anchoring bulb slipping freely from side to side of the opening in the lattice. Motion continued for perhaps five minutes. The obovate body then became rounded, the smooth surface roughened by irregular protrusions extending into filiform rays, until another flagellate Actinophrys-like creature appeared, loosely anchored to a Clathrulina lattice. It remained motionless on the extremity of the apparently rigid bulb-bearing lash, which I supposed would become the pedicle; but in a few moments an unusually thick pseudopodium was extruded, and attached by an expanded base to the capsule. On this the Actinophrys, with all its rays extended, was slowly lifted to the required distance above the parent; while the anchoring flagellum became more and more attenuated, the bulb less and less noticeable, until both finally disappeared.

It seems, then, that Clathrulina elegans has six reproductive methods, — "by self-division, by the instantaneous throwing-off of a small mass of sarcode, by the formation and liberation of minute germs," by the quadruple subdivision of the body into uniflagellate organisms, by the separation from the body of a free-swimming Heteromita-like zooid for the dissemination of the species, and by a similar body-fission whose resulting biflagellate organism is anchored to the parent-capsule for the formation of a colony.

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Formation of anchor-ice.

On the 17th of January, this year, I had occasion to cross the River St. Lawrence in one of the small Indian ferryboats which ply between the Indian village of Caughnawaga, on the south shore, and Lachine, on the Island of Montreal. The current of the river at this point flows at the rate of four or five miles an hour, I think, and never freezes over. The day was quite stormy, the thermometer indicated about 12° or 15° F.; and the river was pretty thickly covered with cakes and masses of porous or very snowy ice. But the most peculiar phenomenon was the sudden and almost incessant rising of dark, muddy ice from the bottom of the river. The formation of this ice so far below the surface of the water is supposed to take place in very cold weather, when large masses of snow, descending the river, become saturated with water, and are carried by the current to the bottom, where they stick to the rocks and stones, clinging more firmly and becoming more compact as long as cold weather continues. At least, this is the theory that the Indians advanced. The ice may be seen six or eight feet under water, and often accumulates until it forms miniature islands. When it rises, it often lifts considerable quantities of small stones and gravel to the surface.

Another peculiar circumstance is, that this rising of the ice from the bed of the river always occurs a day or two before the approach of mild weather; and the Indians regard this phenomenon as an infallible presage of milder weather within forty-eight hours. The cause is most likely atmospheric, but I record the observation with the hope that it may be a hint to some one willing to make a further study of the subject.

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Manayunkia speciosa.

In this worm, described and figured by Leidy (*Proc. acad. nat. sc. Philad.*, 1883), the tentacular crown, or branchial organ, is the feature of special interest.

According to Leidy, the tentacles present in an adult are eighteen in number, besides two larger and longer tentacles situated dorsally, midway between the two lophophores. These larger tentacles are conspicuous by their bright green color, and are, in fact, external continuations of the blood-vessels extending lengthwise throughout the body. In shape these tentacles taper from base to apex, are convex on the outside, but concave on that side facing the centre of the tentacular crown; so that a transverse section would present the shape of a crescent. The two longitudinal edges thus formed are fringed with cilia. When closely watched, the green tentacles are seen to pulsate with a rhythmical motion, contracting and expanding laterally. The pulsation takes place in each tentacle alternately. At the moment of contraction the tentacle turns slightly on its axis outwards, and towards the end of the lophophore on that side, at the same time giving a backward jerk, returning to its former position at the moment of expansion. By force of the contraction the green blood filling the tentacles is forced downwards, out of the tentacle, and flows along the blood-vessel on that