English words is found in the final *e*, which always denotes the long sound of the preceding vowel, as in *tone, bite, hate,* etc. It is true that recent writers on botany have frequently attempted to simplify the spelling of technical terms to the detriment of phonetic principles, and so we have such forms as *mestom, plerom, hadrom,* etc., which must be admitted to our dictionaries as variants of the infinitely preferable *mestome, plerome, hadrome,* still employed by careful writers. The fact that there are two Greek words κλών and κλόνος (the latter giving us the English adjective *clonic*) merely emphasizes the importance of properly indicating the long *o* in English derivatives of κλών. I therefore suggest *clone* (plural *clones*) as the correct form of the word to be adopted in dictionaries, lexicons and general writings. It is to be hoped that the 'shackles of philology' to which Mr. Webber so feelingly refers will not prevent him from accepting this suggestion in the friendly spirit in which it is offered.

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SPECIAL ARTICLES.

PRELIMINARY NOTE ON THE ARAUCARINEÆ.

IN my paper on the megaspore-membrane of the Gymnosperms[1] a footnote refers to the occurrence of supernumerary nuclei in the pollen-tube of *Agathis*. Recently I have found that the number of nuclei in the pollen-tube of *Araucaria* may be even greater than that observed in the former genus, being over thirty in number in one instance at least. The supernumerary nuclei are placed fore and aft of the generative group in a parietal stratum of protoplasm not unlike that of the megaspore. Again the behavior of the pollen-tube in *Araucaria* is peculiar. The pollen-grains do not fall into the micropyle but are found at the distal end of the ligule more or less entangled in its serrated edge. From this point the tubes pass in grooves on the surface of the ligule or the scale, a distance of an inch or more, to the micropyle, which they enter and after penetrating the long beak of the nucellus arrive at the archegonia. This method of pollination and growth of the pollen-tube is unique among the Gymnosperms so far as is known and its bearing on the problems of fertilization important—notably on what may for convenience be termed the 'free-growth' theory of chalazogamy.

The double nature of the integument is very apparent in young ovules of *Agathis*, as Strasburger[2] long ago observed. The micropyle in some cases at least extends almost to the base of the nucellus on its upper surface, though usually not so far on the lower, in the form of V-shaped slits.

The archegonia are peculiar in structure arrangement and development. Their study is throwing new light on the character and relationship of these organs in the subgroups of the Conifers.

The vascular supply to the ovules worked out by series of celloidin sections is found to be different from the descriptions already given of it and promises very material aid in settling the vexed question of the primitive or specialized nature of the subgroup under consideration.

These features and other chiefly anatomical ones, added to the peculiarities presented by the megaspore-membrane and the tapetum, as described in the paper to which reference has been made above, place the Araucarineæ in a very isolated position among the subgroups of the Coniferæ. The forthcoming monograph, it is hoped, will make this clear and aid materially in the establishment of the phylogenetic position of the Araucarineæ.

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June 20, 1905.

[1] 'The Megaspore-Membrane of the Gymnosperms,' by R. B. Thomson. University of Toronto Studies, Biological Series, No. 4, pp. 85–146, Pls. I.–V. 1905.

[2] Strasburger, E., 'Die Angiospermen und die Gymnospermen,' p. 91, 1879.

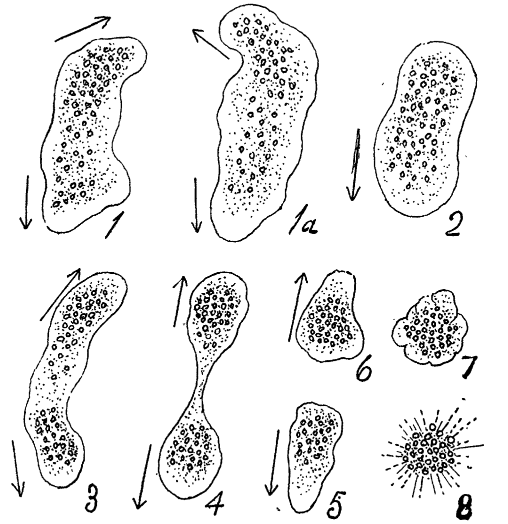
THE DEATH (?) OF AN AMŒBA.

WHILE watching some amœbæ on February 8 I observed one which was behaving in a singular manner. Instead of progressing in one direction this one appeared to be in a state of indecision. One end, which for convenience I shall call the anterior, was consistently trying to go in one direction. At the other end there was in progress an active formation of pseudopodia and an apparent endeavor to move in the opposite direction. The parenchyma of the amœba contained a rather larger amount of granular material than usual, and this was a little more abundant towards the posterior end.

The formation of pseudopodia at the posterior end was first in one direction (Fig. 1), and then in another (Fig. 1, *a*). This was accompanied by simultaneous formation of pseudopodia at the anterior end. The intracellular struggle which then ensued, during which the granular protoplasm flowed from the central region into both posterior and anterior pseudopodia, would continue for a few seconds, to be followed by the retraction of the pseudopodia and a few seconds of quiet. At last (Fig. 3), after two or three such trials, there appeared to ensue a determined struggle between the opposing ends of the animal. Soon the central portion became narrow and thread-like (Fig. 4). This connecting bond at last broke, and it was then seen that the animal had divided into two approximately equal parts. The part which had been the posterior region contained more than half of the coarse granules. The new individuals moved away from each other in opposite directions, each following the direction of its previous efforts. The one that had been the anterior end of the undivided animal not only contained fewer granules than the other, but it also had a larger proportion of clear protoplasm at its anterior end. It behaved normally and quickly moved out of the field. The other (Fig. 6), after moving in a normal manner for a few seconds, ceased to form pseudopodia, and assumed an irregularly spherical shape (Fig. 7).

Up to this point I supposed I had been witnessing an ordinary case of division. Then occurred what looked like the dissolution of this bit of supposedly immortal living substance. The ectosarc and protoplasm disappeared suddenly as if by a disruptive explosion, the larger globular granules remaining as an inert mass (Fig. 8).

It would appear that the posterior half of the original animal was too heavily charged with granular bodies. The ruptured surface probably failed to heal over. Rapid osmosis



Sketches of a dividing amœba made from memory a few minutes after the events which they illustrate had been observed. 1, 1*a*, pseudopodia at opposite ends of the animal with energetic flow of the endosarc in opposite directions; 2, cessation of struggle, movement in only one direction; 3, renewal of struggle with elongation of animal; 4, beginning of division; 5 and 6, division completed, 5 normal, 6 abnormal new amœba; 7, position assumed by 6 a few seconds later; 8, spontaneous disruption of 7. No nucleus was seen.

took place. The dense protoplasm increased in bulk rapidly until the ectosarc, no longer able to resist the pressure from within, gave way suddenly.

There was sufficient vegetable debris present to keep the specimen from being crushed by the cover-glass.

No signs of life could be seen in the disintegrated part. It was simply a cluster of granules with no coherence and no connecting material.

The length of the undivided animal was about 0.03 millimeter. Several other amœbæ of the same size and appearance were observed in the culture, but none were seen behaving in an abnormal way. As I did not realize that I had been witnessing anything unusual until the final catastrophe, the time occupied by the division and the subsequent events up to the disruption of the short-lived half was not noted. The whole operation lasted but a short time, probably little longer than one minute.

EDWIN LINTON.

HOMING OF FISSURELLA AND SIPHONARIA.

The *Patella* is the only mollusc whose homing powers have been investigated. *Fissurella,* a rhipidoglossate prosobranch, and *Siphonaria,* which stands on the border line between the opisthobranchs and the pulmonates, while differing more or less widely from *Patella* in structure, closely resembles it in the form of the shell and in their littoral habits. It was, therefore, an interesting question whether they resemble it also in the possession of the homing power. A stay at the Bermuda biological station in the summer of 1903 gave an opportunity to answer this question, although a few days only being available for the investigation, it was by no means as complete as could be wished. Such as it is, however, I present it for the benefit of future students of the subject.

The specimens studied were *Siphonaria alternata* Say and *Fissurella barbadensis* Gmelin.[1] Both are abundant at Bermuda, where they live clinging to the exposed faces of the bare rocks between tide marks. Bare rocks, I say, for to a New England eye one of the most striking features of the Bermuda coast is the entire absence of the larger algæ, which upon our own rocky shores shelter so large and varied a fauna. The rocks are calcareous, soft and of irregular surface and the home of *Siphonaria* is recognizable by a greenish spot where the foot has rested. That of *Fissurella,* as my notes show, is also clearly marked, though I have carelessly omitted to note how it may be known. Both species, as will be seen from the following notes, exhibit undoubted though limited homing powers.

[1] These specimens were kindly identified for me by Mr. Charles W. Johnson of Boston.

In marking animals and scars Higgins's water-proof ink was used. White paint, which was used by Davis, was not accessible, but as the ink marks last about three days they are fairly satisfactory. *Siphonaria,* being comparatively small, was readily removed from its scar; *Fissurella* I was seldom able to detach uninjured, and, accordingly, my observations upon this species were limited almost entirely to watching its voluntary departures and returns. As might be anticipated, the animals, unlike *Patella,* remain motionless on their scars during low tide, moving, if at all, only when the incoming water has moistened and cooled their immediate surroundings.

Siphonarias did not home when removed to a distance of more than six inches and were most likely to return when removed not more than two inches. A quiet and shallow tide-pool furnished the most favorable conditions for their return. If the animal, on being transferred, was set down with its head away from the scar, it turned in the proper direction and, so far as I could judge, those headed away were quite as likely to get back as those headed toward the scars. In general, animals which lost their way seemed to crawl restlessly about for two or three days; each time one was visited it was found in a new place. One, however, settled down at once in a new home and at the end of the third day had made a discolored spot. On being transferred to his old home he apparently failed to recognize it and immediately crawled away. Usually the scar was recognized at once by a returning wanderer, and on reaching its edge he would turn about, if necessary, so that his shell might fit the scar, would slip on to it and settle down. *Siphonaria alternata* thus appears to have a sense of direction, the ability to recognize its own recently-left scar, and the power of homing when removed not more than six inches.

Experiments with *Fissurella,* as I have said, were usually unsuccessful. That these molluscs have the power of homing is seen, however, by watching them. As soon as the tide has so covered him that he is not exposed to the wash of the waves a *Fissurella* is very