Barber's moist chamber. Release of pressure on the steel tube draws substances into the pipette. Injection and suction in microscopic quantities is accurately controllable as the meniscus of the mercury or oil in the pipette responds instantly to the pressure of the leverage clamps.

46 (1793)

The effect of experimentally induced changes in consistency on protoplasmic movement.

By ROBERT CHAMBERS.

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Agitation by means of a micro-dissection needle tends to cause the protoplasm of a living cell to pass from a more solid to a less solid phase.

In marine ova, where one can closely follow the solidifying of the protoplasm just prior to cell division, mechanical agitation will cause the protoplasm to revert to its original liquid state so that the egg reverts to the shape of a sphere. If the egg so treated be subsequently left undisturbed the solidifying process starts up again with the result that the egg undergoes normal cleavage.

In a previous communication[1] the writer has described the structural relations of changes in protoplasmic consistency of the *Amœba* to the formation of pseudopodia. The maintenance of pseudopodia depends upon a relatively solid state of certain parts of the *Amœba*.

A resting *Amœba*, with numerous slender pseudopodia all over its surface, is relatively solid. Upon mechanical agitation the pseudopodia are retracted as the *Amœba* becomes more liquid. Fresh pseudopodia in an agitated *Amœba* tend to be broad lobate and, if the agitation be continued, all of the *Amœba* liquefies. The entire body then becomes, as it were, a single pseudopodium with a peripheral current of granules flowing away from its anterior end and a central current flowing forward. An *Amœba* in this extreme state does not change in position as the back flow tends to equal the forward flow. *Amœbæ* which are experimentally

[1] Chambers, Robert, PROC. SOC. EXP. BIOL. AND MED., 1920, xviii, 66.

brought into this state have, so far, not been observed to return to their previous condition. The rate of flow of the currents gradually slows down until the animal dies.

The protoplasm of an *Amœba* exists in a certain normal state of consistency from which it may deviate so as to solidify on the one hand or liquefy on the other. This normal state may be shifted not only by agitating the *Amœba* but also by injecting certain solutions. This I have been able to do with hydrochloric acid and with sodium hydrate.

A trace of acid throws the normal state to the more solid side, while the alkali throws it to the more liquid side. An acidified *Amœba* forms long slender pseudopodia because the peripheral back flow in the developing pseudopodium is quickly arrested by a setting of the protoplasm. The area of the base of the pseudopodium is, therefore, quickly limited and the extending pseudopodium conforms to this narrow base. In an alkalinized *Amœba*, on the other hand, the peripheral back flow of a developing pseudopodium tends to be arrested much more slowly. As a result of this the base of the pseudopodium spreads considerably before the protoplasm sets. The extending pseudopodium, having a larger base upon which to build, then becomes broadly lobate.

These observations harmonize with my experiments on injecting "acid" and "basic" organic dyes. The basic dyes, which contain a relatively strong acid radicle, jelly the protoplasm, whereas acid dyes, with a strong basic radicle, liquefy it.

It is interesting to note that these changes can be brought about in protoplasm while it is yet alive and that one can thereby change the character of the pseudopodia produced.

47 (1794)

Alterations in the cardiac mechanism after administration of quinidine to patients with auricular fibrillation.[1]

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Sufficient evidence is now at hand to indicate that in a certain number of patients suffering from fibrillation of the auricles

[1] This paper was presented at the One Hundred Thirteenth meeting of the Society for Experimental Biology and Medicine, October, 1921.