78 (2310)

The role of the nucleus in the locomotion of an entozoic ameba.

By ELERY R. BECKER (by invitation).

[*From the Department of Biology, Princeton University, Princeton, N. J.*]

There is a large ameba, oval or circular in cross section, entozoic in the rectum of the bull-frog tadpole, which averages well over 100 μ in length, and from one-fifth to one-fourth as wide as long. It is strikingly peculiar in that it possesses an axial stream which flows swiftly and uniformly toward the anterior end, from which it is reflected about itself as a hollow cylinder of protoplasm either flowing posteriorly or remaining stationary with respect to particles on the substratum, depending on whether the ameba as a whole is "marking time" or moving forward. The large conspicuous nucleus always lies in a crescentic zone of clear ectoplasm at the extreme anterior end of the ameba, so that its posterior surface appears to be contiguous with the endoplasm.

That the nucleus plays a definite rôle in directing protoplasmic streaming, and thus possesses potentialities which influence strongly the shape of the ameba and the direction and manner of its movements is suggested by the following observations and experiments.

1. It can be observed that the nucleus oscillates from side to side in the anterior end of the ameba (though not in one plane as it appears to the observer through the low powers of the microscope). The endoplasm flows into the portion just previously occupied by the nucleus, the nucleus moving (presumably being forced) to a new position, into which the endoplasm immediately follows it. The process is steady and continuous. Thus the nucleus and anterior tip of the ameba both describe spiral paths.

2. Amebas which have been cut in two transversely, so that the anterior portion containing the nucleus presented about one-fifth the area of the entire ameba, show that the part containing the nucleus is able to resume normal shape and movements. The posterior portion always rounds up somewhat, undergoes some

violent and uncoordinated streaming movements, extends and retracts numerous pseudopods, without accomplishing any appreciable change of position or resuming the normal method of endoplasmic streaming or locomotion. It eventually rounds up completely, and streaming ceases, while the anterior portion may still be behaving quite normally.

3. If the nucleus and a negligible amount of ectoplasm be excised, the enucleated ameba behaves very much like the enucleate portion above. This eliminates the possibility that differentiation of the anterior cytoplasm is the factor which distinguishes its behavior from that of the posterior end.

4. If the nucleus be dislocated by pressure on the anterior end, it commences to travel posteriorly in the peripheral stream. After a moment the streaming is arrested. Then suddenly the ectoplasm bulges at the point where the nucleus has stopped, the endoplasm flows into the new pseudopod, and the ameba with the nucleus in its tip, travels away in the direction of the new pseudopod.

The nucleus seems in some way to play a rôle in directing endoplasmic streaming, presumably by its ability to slightly liquefy the ectoplasmic gel, lowering its resistance at certain points to the force of the endoplasmic stream.

79 (2311)

The synergistic toxicity of local and general anesthetics.

By DAVID I. MACHT.

[*From the Pharmacological Laboratory, Johns Hopkins University, Baltimore, Md.*]

The author has had occasion to determine the lethal dosages of cocain and alypin for cats by intravenous injection. Solutions of the drugs, generally 1 to 1000, were injected into the femoral vein at regular intervals and the lethal dose of each drug per kilo weight of cat was determined. It was found that the toxicity of both cocain and alypin was very much increased or potentiated when the animals were kept under complete gen-