ing all the spectrophotometric analyses mentioned in this paper. This is a preliminary report.

[1] For a discussion of the apparent dissociation constant of methylene blue *cf.* Clark, W. M., Cohen, B., and Gibbs, H. D., *Public Health Reports,* 1925, xl, 1131.

[2] Clark, W. M., and his collaborators (see footnote 1) state that methylene blue is difficult to purify. It is stated that another dye in the methylene blue may be active in staining (Scott, R. E., and French, R. W., *The Military Surgeon,* 1924, August, p. 1). The writer has tried to obtain methylene blue free from other dyes by repeated extraction with chloroform but at pH 9 it was impossible to obtain such a sample owing to the fact that a certain amount is being converted to another form at such a pH value.

[3] Irwin, M., *J. Gen. Physiol.,* 1925-26, ix, 561.

[4] This result is contrary to the result obtained by Brooks, M. M., *Am. J. Physiol.,* 1926, lxxvi, 360.

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Action of Narcotics on the Ameba by Means of Microinjection and Immersion.

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Comparative studies were made on the influence of the narcotics: ethyl alcohol, chloretone, ether, and chloroform on the protoplasm of *Amoeba dubia,* with special reference to their action on the plasmalemma.

Immersion Experiments: Very weak concentrations (subnarcotic) cause the Amebae to spread out and continue their movements in an expanded condition. This may be an effect of lowered surface tension. Ether in its narcotic concentration, approximately 2 per cent, produces a reversible gelation accompanied by the cessation of all movements. Lethal concentrations of all the narcotics cause the Ameba to round up followed by a sinking of its granules and a disintegration of the plasmalemma.

Injection Experiments: No narcotic effect was observed by injection into the interior of the Ameba. Chloretone in all concentrations increases the fluidity and streaming movements of the interior. Eighty per cent alcohol produces a coagulation which is localized and reversible, when small amounts are injected, and irreversible

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with large amounts. Pure chloroform and ether, when injected into the cytoplasm, form spherical drops which go into solution more rapidly than when injected into water. The protoplasm is irreversibly coagulated in the environment of the dissolving droplet. Chloroform is more potent than ether in causing coagulation. The irreversible coagula produced by the alcohol, chloroform and ether are pinched off by the living portion of the Ameba.

Local Application of the Narcotic on the Exterior of the Ameba: With saturated chloretone solution and 95 per cent alcohol no local effects were obtained. All the pseudopodia are withdrawn and the Ameba was converted into an actively moving limax form.

Concentrated, aqueous solution of ether produces a local blister on the plasmalemma with a coagulation of the cytoplasm at the base of the blister. A drop of pure ether dissolved the plasmalemma, on remaining in contact with it for five seconds or more. This occurs most rapidly at the tip of a newly forming pseudopodium. As the ether droplet goes into solution there appears in its place a wrinkled pellicle enclosing several highly refractive globules. Both the pellicle and the globules are insoluble in water and in cold 95 per cent alcohol.

Chloroform similarly but more rapidly dissolves the plasmalemma. A small drop on touching the plasmalemma quickly passes through it and the endoplasm in its vicinity becomes coagulated.

An interesting phenomenon, which possibly relates to the problem of pseudopodial formation, occurs when chloroform is allowed to diffuse against the Ameba from the tip of the micropipette. A local elevation of the pellicle takes place, into which the granular endoplasm flows. As the pipette is gradually withdrawn the incipient pseudopodium enlarges and extends in the direction of the moving pipette. In this way the entire Ameba can be made to move, to all appearances, in a normal fashion along any path taken by the tip of the pipette. This is a preliminary report.

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