purate only on being evaporated to complete dryness, a procedure obviously so drastic as to render it inapplicable in the case of protozoan cells where it is essential to preserve the vacuole and its contents intact. Mass cultures so treated leave a lemon yellow residue.

Cultures of Paramecium, concentrated by brief centrifuging, and subjected to the same test also offer only negative results. Examination of the vacuolar fluid is precluded in these forms by the contraction of the vacuoles during the process of fixation.

This would indicate, therefore, either that uric acid is not an end product of the katabolic activity of these protozoa, or that the murexide test is not sufficiently sensitive to give a satisfactory optical reaction in this case. In view of the latter possibility, other and more specific methods for determining the presence of uric acid in minute quantities, are being applied at the present time.

The complete paper will appear in the *Journal of Experimental Zoology.*

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Studies on the contractile vacuoles of Amoeba verrucosa and Paramecium caudatum.

By RUTH B. HOWLAND (by invitation).

[*From Cornell University Medical School, New York City*]

The contractile vacuole of Amoeba verrucosa is formed by the union of a variable number of lesser globules. Subsequent to each contraction a new series of contributary globules may appear in the same location as the preceding vacuole, but this is not invariably the case. Random formation of new vacuoles is common, either at some distance from the original organelle, or close by. The walls of two functioning vacuoles may lie in contact for some time without confluence.

The wall of the vacuole is easily indented with a blunt microneedle. A sharp-pointed microneedle will induce artificial systole by perforation of the wall of the vacuole.

A large vacuole, or a group of contributary globules, freed into the water by ripping open a cell under slight pressure, retain their identity in this medium for some time. A quick upward thrust of a blunt needle against a large vacuole apparently causes its rupture into the surrounding endoplasm, for an increase in fluidity is observed in this area. This would imply the miscibility of vacuolar fluid and endoplasm.

The contractile vacuoles of Paramecium caudatum become dilated on the addition of Grubler's Alizarin blue to the culture. The distended vacuoles together with their feeders become set, gradually taking on a vivid blue color. This stain is specific for the vacuolar walls, and, although it appears long before ciliary action ceases, should be classified as a sub-mortem rather than a vital stain. These stained and distended vacuoles do not collapse when removed from the animal but retain their shape and may be manipulated and dissected with microneedles.

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Notes on the dissection of amoeba verrucosa.

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The specific structure and characteristic properties of the pellicle of Amoeba verrucosa may be demonstrated in the living animals by means of microdissection and injection. A high degree of resistance to mechanical pressure is exhibited by the pellicle when subjected to compression. Perforation of the pellicle without indentation of this layer can be effected only with needles having extremely fine points. Withdrawal of a needle after penetration carries the pellicle out into a long cone-shaped process, loss of endoplasm being prevented by the rapid formation of a restricting endoplasmic film at the base of this cone. Distortion of the pellicle due to compression or other injury persists for some time before the membrane resumes its