test tube showed that moderate agglutination of P. L. corpuscles was produced by as little as 1/20 volume of the M. plasma.

This observation reveals a risk in using a member of the so-called "Universal Donor" group for the first time without making a rough quantitative examination of the agglutinating power of the individual's plasma. It is advisable, therefore, in carrying out the direct matching according to Coca, to include a mixture of equal parts of undiluted recipient's citrated blood with the donor's citrated blood, diluted 1 to 5.

232 (2192)

Application of the murexide test to Amoeba verrucosa and Paramecium caudatum.

By RUTH B. HOWLAND (by invitation).

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

Observations made on the distended contractile vacuoles of Amoeba verrucosa subsequent to the application of the murexide test give no optical evidence of the presence of uric acid in the vacuolar fluid. This result is not in accord with the generally accepted conclusions of Griffiths[1] who reported the production of "prismatic crystals of murexide" on application of this test to Amoeba proteus, Vorticella and Paramecium. Mass cultures of Amoeba verrucosa, killed in 50 per cent. alcohol, show the contractile vacuoles fixed at partial or complete expansion in a large percentage of cases, but a critical examination of the fluid of the vacuoles has never revealed the presence of uric acid crystals precipitated there by this method. Dark field examination of such animals shows the fluid to be structureless. Treatment with nitric acid and ammonia in the manner described by Griffiths colors both cytoplasm and pellicle a lemon yellow. Furthermore, control slides, consisting of a small quantity of pure uric acid crystals in distilled water, when similarly treated, also give a negative result. Such controls give ammonium pur-

[1] A. B. Griffiths, *Proc. Soc. of Edinburgh*, 1888-89, xvi.

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.*

233 (2193)

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.