10 hours. The amount of glucose given by mouth was not the same for the two animals; one received 75 gm. and the other 60 gm. The animals receiving glucose hypodermically each received 16 gm. of a 20% solution injected subcutaneously.

In no case did any of the ketone bodies diminish after glucose was given. In two cases an increase was observed in the acetoacetic acid during the experiment; in one case, hydroxybutyric acid also increased.

Since these observations indicate that glucose has no effect on ketonemia of animals deprived of their pancreas, it is interesting to account for its effect on the diabetic patient. Dr. J. J. R. Macleod suggests that it may be due to stimulation of islets of the pancreas not yet involved in the disease process; the resulting increased production of insulin is assumed to more completely metabolize the ketones. Since no islets are left in the depancreatized animal, this theory seems in harmony with the results here obtained.

3781

Expulsion of Injected Solute by Contractile Vacuole of Amoeba.

RUTH B. HOWLAND AND HERBERT POLLACK.
(Introduced by Robert Chambers.)

From Washington Square College and Cornell University Medical School.

Although it has long been the presumption that the contractile vacuole expels substances in solution in the endoplasm of the protozoon, the actual taking up and expulsion of a definite solute by the organoid has never been demonstrated. This now has been accomplished by means of the micrurgical apparatus.

If a moderate amount of saturated aqueous solution of picric acid is injected into an ameba *(Amoeba dubia)* the course taken by the solute may be traced by its yellow color. The effect on the cytoplasm has already been described by Pollack.[1] Though a part of the colored region is often injured by the pipette and thereupon pinched off by the ameba, a certain quantity of the solute diffuses into the remaining endoplasm before this occurs. This is taken up by the vacuole, the intensity of the yellow color of the vacuolar fluid increasing in proportion to the fading out of color in the endoplasm.

When a 2% solution of picric acid in 95% alcohol is injected, diffusion throughout the endoplasm is much more rapid, and the yellow color appears more quickly in the vacuolar fluid. In the

small percentage of cases where the injected region is not pinched off and the entire amount of the solute is retained, the fluid in the enlarging vacuole becomes an intense yellow. Such vacuoles progressively become very flaccid. Contact with the least obstacle, or stress exerted by endoplasmic currents easily causes their deformation. Their limp membranes may temporarily infold deeply, and the vacuoles often appear bean-shaped, long ovoid, or pyriform. Systole of these flaccid vacuoles is delayed, and a new vacuolation center appears and functions. In the meantime the original vacuole is carried about, gradually becoming more turgid and uniformly spherical, and finally contracts.

When smaller amounts of picric acid are injected, or when the ameba rids itself of the larger proportion of the solute by pinching off the injected region, the vacuole does not show any evidence of flaccidity but remains spherical and turgid although its contents are appreciably yellow. It increases in size at a rate similar to that subsequent to injections of distilled water,[2] and finally ejects the yellow fluid. After each systole, the collected fluid becomes successively paler until both endoplasm and vacuole have entirely lost the yellow color.

[1] Pollack, H., PROC. SOC. EXP. BIOL. AND MED., 1927, xxv, 145.

[2] Howland, R. B., and Pollack, H., *J. Exp. Zool.*, 1927, xlviii, 441-458.

3782

Hyperergic Tissue Response to Non-Hemolytic Streptococci.

CLIFFORD L. DERICK AND HOMER F. SWIFT.

From the Hospital of the Rockefeller Institute for Medical Research.

Two years ago in collaboration with Andrewes[1, 2] we described a peculiar response in the skin of rabbits to the inoculation of certain non-hemolytic streptococci. This was termed the secondary reaction because it occurred after the primary reaction to the inoculation had subsided. It was shown[3] not to correspond in its various phases with the Arthus phenomenon which is induced in rabbits by immunization and subsequent skin injection with various coagulable proteins. We, therefore, suggested that if this were an allergic phenomenon it was of the type seen in tuberculosis. Our subsequent investigations have been guided by this hypothesis.

The object of this report is to describe some of the concomitant phenomena of the secondary reaction and suggest their significance.