

results for 4 males were 26.3 mg. (4.3-50.2) for the first fast day and 60.7 mg. (16.5-89.5) for the second one. The similar high levels which obtained in the 4 females were 10.5 mg. (0.6-22.4) and 46.1 mg. (3.8-113.4) for the 2 fasting days respectively. On one case an excretion of 113 mg. was found, which is the highest level of fasting ketonuria we have ever observed in the rat.

So far we have been unable to prevent the onset of the ketonuria by the administration of choline hydrochloride in doses of 60 mg. per day. The effect of the liver diet is probably to be ascribed to the mobilization of the fat in the liver as indicated by the experiments of Blatherwick *et al.*<sup>2</sup> Comparative studies on the relationship between the level of liver fat and the extent of fasting ketosis after employing diets high in various fats is in progress.

### 7901 P

#### Sexual Variation in Carbohydrate Metabolism. VII. Effect of Alkalosis on Fasting Ketonuria in the Rat.

J. S. BUTTS, H. J. DEUEL, JR., AND L. HALLMAN.

*From the Department of Biochemistry, University of Southern California School of Medicine, Los Angeles.*

Booher and Killian<sup>1</sup> first reported that abnormally large amounts of acetone bodies were associated in human subjects with conditions of uncompensated alkalosis which arose either from an excessive alkali administration or from the loss of HCl by excessive vomiting. Butts and Deuel<sup>2</sup> previously showed that no sex differences occurred in the slight ketonuria which occurs in fasting rats previously fed on a high carbohydrate liver-free diet although a definite sex variability was demonstrated in rats to which diacetic acid was administered. In the present tests sodium bicarbonate was fed to fasting rats in a dose of 2.17 mg. per sq. cm. of body surface by stomach tube in 3 divided doses daily. This corresponds with the alkali intake in tests in which sodium acetoacetate was administered in an amount of 1.5 mg. per sq. cm. per day (calculated as acetone). The acetone body excretion with the male rats over a 4-day experimental period

<sup>2</sup> Blatherwick, N. R., Medlar, E. M., Bradshaw, P. J., Post, A. L., and Sawyer, S. D., *J. Biol. Chem.*, 1933, **103**, 93.

<sup>1</sup> Booher, L. E., and Killian, J. A., *PROC. SOC. EXP. BIOL. AND MED.*, 1923, **21**, 528.

<sup>2</sup> Butts, J. S., and Deuel, H. J., Jr., *J. Biol. Chem.*, 1933, **100**, 415.

averaged 5.3, 8.6, 5.8, and 6.1 mg. per day for 14 rats on the first day and 11 animals on the other days which corresponds with an excretion of 0.14, 0.24, 0.16, and 0.17 gm. per sq. meter of body surface respectively. The females developed an appreciable ketonuria in distinction to the almost blank values on the males. Thus, the acetone body excretion in the urine gave a mean of 21.3, 39.6, 39.2, and 37.4 mg. of acetone of 14 rats on the first day and 11 on each of 3 following days. The values calculated on the basis of grams per square meter of body surface per day were 0.77, 1.39, 1.39, and 1.32 gm. respectively. A normal response to diacetic acid administration was demonstrated on a control day. The experiments show the greater susceptibility of the female rat to alkalosis than the male.

## 7902 C

### Effects of Short Wave Electric Fields on Cataphoretic Velocities of Streptococci.

CHARLES SHEARD AND CAROL B. PRATT.

*From the Division of Physics and Biophysical Research, The Mayo Foundation and The Mayo Clinic, Rochester, Minnesota.*

A type of radiotherm developed in the Research Laboratories of the General Electric Company was used for the production of the high frequency fields. The oscillator delivered approximately 0.1 ampere per square inch of plate surface at a frequency of 27.3 million cycles (wavelength 11 meters). Cataphoretic measurements were made at level 0.211 D, where D is the total depth of the flat cataphoretic cell in the Mudd assembly of the Northrup-Kunitz apparatus. Measurements during a long series of experiments indicated a mean potential gradient ( $v/l$ ) of  $7.0 \pm 0.4$  volts per cm. for the field strength, or driving force, in the center of the cataphoretic cell. The mobility,  $u$ , is calculated from the relationship:

$$u = \frac{d}{t_c \times (v/l)} = \frac{48.1}{t_c \times 7.0} = \frac{6.87}{t_c}$$

in which  $t_c$  is the "cataphoretic time," that is, the time required by the streptococcus to move over a distance "d" under the influence of the electric field of the cell. Throughout these experiments the room temperature was  $25^\circ\text{C}$ ., with a variation of  $\pm 2^\circ\text{C}$ .