

experiments the ablated side was slightly more sensitive, $\frac{1}{2}$ cm. on the coil and in one experiment the normal side was slightly more sensitive. Twelve experiments were done on Animal No. 8, with sensori-motor ablation. In 3 experiments the normal side was slightly more sensitive, $\frac{1}{2}$ cm. on coil, and in one experiment the ablated side was more sensitive to the same degree. Nine experiments were done on Cat No. 12, which had massive electro-coagulation of the right cortex. In 7 of these experiments the animal showed a greater sensitivity when the leg projected to the ablated side was stimulated. This increased sensitivity showed a gradual decrease during the 4 months this animal has been studied, during which time the normal side retained a comparatively constant level of response. Whether this is an individual response or a general tendency of such preparations is to be further investigated. Further experiments involving conditioned reflexes, frontal lobe ablations, and histological study of the brain have been initiated.

Conclusion. Ablation of the sensory cortex alone, or of the sensory and motor cortex, does not raise the threshold to pain reaction. In one animal massive unilateral ablation of the cortex made the animal more sensitive to painful stimuli applied to a body surface projected upon the ablated cortex.

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Respiratory Quotient of Diabetic Liver.

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Studies have been published on the metabolism of the liver tissue excised from animals in various nutritive states; on normal diet, or during high fat feeding, as well as of fasted animals. Gemmill and Holmes¹ have reported the respiratory quotients of rats on well-balanced rations to average 0.78, and high fat diet, 0.58. Marsh² obtained similar results with fasted rats whose respiratory quotients average from 0.59 to 0.60. Elliott and Baker³ noted a respiratory

¹ Gemmill, C. L., and Holmes, E. G., *Biochem. J.*, 1935, **29**, 338.

² Marsh, M. E., *J. Nutrit.*, 1937, **13**, 109.

³ Elliott, K. A. C., and Baker, Z., *Biochem. J.*, 1935, **29**, 2433.

quotient as low as 0.46 in rats fasted for 20 hours. It is the purpose of this paper to extend these studies to include the respiratory quotient of the liver of the depancreatized animal.

Liver slices from cats depancreatized 48-72 hr. were studied in the Warburg respirometer. The respiratory metabolism was determined with the tissue suspended in saline solution buffered with phosphate at pH 7.4. Because of the reduced oxygen consumption of the fatty tissues it was found necessary to use 250 mg. instead of the usual 150 mg. Nevertheless, in some experiments the respiratory exchange was too small to be used to calculate the R.Q.

Thirty-nine significant observations yielded an average R.Q. of 0.59 ± 0.04 ; 5 observations fell within the range of 0.42-0.49; 27 were between 0.50 and 0.69 and 7 between 0.70 and 0.75. The average oxygen uptake of liver per 100 mg. tissue per hr. is 48 cu. mm., with values varying from 24 cu. mm. to 83 cu. mm. It should be mentioned that this average is much lower than that obtained from normal cats, which is 94 cu. mm. per 100 mg. tissue per hr. The diminution of oxygen consumption may be correlated with the unusually high fat content of the diabetic liver.

The determination of R.Q.'s of excised tissues in general yield results between the physiological values of 0.7 and 1.0. Of all the excised tissues examined, only the liver yields values consistently below 0.7 when fat constitutes the chief part of the foodstuffs oxidized by the animal. Since the R.Q. is an indicator, not only of the substrates oxidized but also of the intraconversion of foodstuffs, it is important to evaluate the significance of these low R.Q.'s. Gemmill and Holmes¹ observed rats on a high butter intake and noted that after the first day, during which time the glycogen content of the liver decreased to practically zero, there is a gradual increase of hepatic carbohydrate reaching the level of almost 1% on the fourth or fifth day of butter feeding. Taking these data in conjunction with the low R.Q., they concluded that fat was transformed to carbohydrate. Cori and Shine² were able to show that the glycerol fraction, which is 1/10 of the weight of fat, might be the substance used in the formation of this glycogen. In a more recent paper by Bach and Holmes³ the increase of the glycogen content was also correlated with changes in protein metabolism, namely, the deamination of amino acids and the subsequent conversion of the acid remainders to glycogen. Thus, it is apparent that the increased

¹ Cori, C. F., and Shine, W., *Science*, 1935, **82**, 134.

³ Bach, S. J., and Holmes, E. G., *Biochem. J.*, 1937, **31**, 89.

glycogen need not necessarily be imputed to the conversion of fat to carbohydrate.

The low R.Q. may be ascribed chiefly to the incomplete combustion of fat. Both *in vivo*⁶ and *in vitro*⁷ it has been demonstrated that the liver is a source of acetone substances, products of incomplete combustion of fat. The complete combustion of fat yields a R.Q. of 0.7. However, the combustion to the 4-carbon stage would give a R.Q. below 0.7, since the acetone substances themselves possess R.Q.'s above that value. According to Knoop's classical theory of β -oxidation, the R.Q. of palmitic acid with the production of diacetic acid would be 0.63. However, with Jowett and Quastel's conception⁸ of multiple alternate oxidation the R.Q. may fall to any level.

Another factor which must be taken into consideration for the production of low hepatic R.Q.'s is that of the function of the liver to produce urea, for the carbon utilized in this process would not be eliminated in respiration. This phenomenon may, therefore, lower the R.Q. Whatever the exact processes involved in the production of this low R.Q. may be, there is a striking correlation between the average values of the R.Q.'s of the liver of fat-fed (0.58), fasted (0.59-0.60), and depancreatized animals (0.59),

Summary. Thirty-seven observations of the R.Q. of the liver of cats depancreatized 48-72 hr. revealed an average R.Q. of 0.59.

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Gastric Vagi in the Dog. Erroneous Assumption of Uninterrupted Vagal Innervation in the Pavlov Pouch.*

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The fundamental difference in concept between the Pavlov pouch and the Heidenhain pouch is that the vagal innervation of the former is intact. Fig. 1, reproduced from Khigine¹ and Pavlov,^{2, 3}

⁶ Goldfarb, W., and Himwich, H. E., *J. Biol. Chem.*, 1933, **101**, 441.

⁷ Jowett, M., and Quastel, J. H., *Biochem. J.*, 1935, **29**, 2181.

⁸ Jowett, M., and Quastel, J. H., *Biochem. J.*, 1935, **29**, 2159.

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¹ Khigine, P. P., *Arch. des Sciences Biol.*, 1894, **3**, 461.

² Pavlov, I. P., *Ergeb. d. Physiol.*, 1902, **1**, part 1, 246.

³ Pavlov, I. P., *The Work of the Digestive Glands*, 2nd ed., London, 1910.