

dry tissue per hour for the first hour, but which fell off 61.7%, 25.5%, and 4.8% during the second, third, and fourth hours, respectively. In the present series of experiments the average rates of decline per hour were 7.5% for normal and 8.8% for thyroxinized animals. When lactic acid was added these declines were somewhat lower, 6% and 7.9% respectively.

The possibility of thyroxin acting as a catalyst is not ruled out, but evidence in agreement with the above expressed point of view is found in the results of Ahlgren,⁶ Adler and Lipschitz,⁴ Neuschloss,⁵ and by previous work from this laboratory.^{7, 9}

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Adrenal Cortical Hormone and Tissue Respiration.*

J. A. DYE.

From the Department of Physiology, Cornell University.

Aub, Forman, and Bright¹ reported a 25% decrease in basal metabolism in totally adrenalectomized cats. Injections of extracts at that time available were without effect in increasing this diminished metabolism.² Variable results have been reported by others.³⁻⁶ Swingle, Pflfner, and Webster⁷ have shown that the basal metabolism of bilaterally adrenalectomized cats falls progressively from the 6th day postoperative to a level approximately 50% below normal when the animal becomes prostrated. Administrations of adrenal cortical extract to prostrate animals raises the metabolism within 24 to 48 hours, this may reach a point from 10 to 18% above normal in 48 to 72 hours. Upon discontinuing the injections the metabolism returned to normal. These same

⁹ Dye, J. A., and Waggener, R. A., *Am. J. Physiol.*, 1928, **85**, 1, 365.

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¹ Aub, J. C., Forman, J., and Bright, E. M., *Am. J. Physiol.*, 1922, **61**, 326.

² Aub, J. C., Bright, E. M., and Forman, J., *Am. J. Physiol.*, 1922, **61**, 249.

³ Golyakowski, Vrach., St. Petersburg, 22, 1017.

⁴ Marine, D., and Bauman, E. J., *Am. J. Physiol.*, 1921, **57**, 135.

⁵ Scott, W. J. M., *J. Exp. Med.*, 1922, **36**, 199.

⁶ Gracinescu, A. V., *Pflüger's Arch.*, 1913, **152**, 187.

⁷ Swingle, W. W., Pflfner, J. J., and Webster, B., *PROC. SOC. EXP. BIOL. AND MED.*, 1930, **28**, 728.

changes occurred in animals previously thyroidectomized.⁸ Subcutaneous injections of large amounts of cortical hormone were without effect in increasing the respiratory metabolism of normal cats or rabbits, but similar injections in thyroidectomized animals increased metabolism 15 to 30% in 80% of the animals. They suggest that the cortical hormone possibly acts directly on the oxidation-reduction processes which occur within the tissues themselves, an action which is more rapid than that of thyroxin.

Engle, Britton, and Kine⁹ were able to demonstrate that injections of adrenal cortical hormone increased the endurance capacity and energy output of treadmill-exercised dogs by about 100%. This effect persisted for 10 to 15 days.

The present investigation was begun to determine whether the cortical hormone has any effect on the QO_2 of surviving muscle fasciculi. Fasting cats were given single intraperitoneal injections of 5 to 10 cc. of eschatin after which they were permitted to survive for periods varying from 2.5 to 6 hours. They were killed by bleeding through the carotid artery under amyntal anesthesia. One animal was given an injection of 2.5 cc. of eschatin with a second similar dose on the third day and was sacrificed 7 days later. The general methods were identical with those described in the preceding paper.

These results show no consistent differences in the QO_2 of the tissues from treated and non-treated animals under the present dosages and survivals. The averages for 7 eschatin treated and 2 control animals were 1.97 cm. and 1.98 cm. per mg. of dry tissue per hour, respectively. From 2 experiments on totally adrenalectomized cats, one of which died on the 9th day and the other was sacrificed while in coma on the 11th day postoperative, the QO_2 values were found to be no lower than could be accounted for by the long premortal fast of the animals. When suspended in saline, where the tissue must depend upon its own substrates, the values were 1.92 cm. and 1.70 cm. for normal and adrenalectomized animals, respectively. When, however, an artificial substrate was added in the form of sodium lactate (0.9 mg. per cc.), the values were 1.90 cm. and 2.08 cm. respectively. There would seem to be no inability of the tissue to oxidize a substrate if one were present. This evidence supports the conclusion that the adrenal cortical hor-

⁸ Webster, B., Piffner, J. J., and Swingle, W. W., *Am. J. Physiol.*, 1932, **99**, 710.

⁹ Engle, E., Britton, S. W., and Kline, R., *Am. J. Physiol.*, 1932, **102**, 707.

mone has no direct action on the oxidation-reduction processes of the tissues themselves.

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Effect of Various Bacteria Upon Growth of Planarian Worms.

ALICE M. BAHRs. (Introduced by H. J. Sears.)

From the Department of Bacteriology, University of Oregon Medical School.

Dr. Wulzen and the author have been engaged over a period of years in testing the growth-promoting power, for planarian worms, of the tissues from various animals. We have found that the growth response of these worms varies markedly when different tissues¹ or the same tissue from animals reared under different conditions,² are fed as the entire diet.

As bacteria produce definite effects upon the growth of mammals when the tissues are invaded, it was of interest to test the effect upon planarian worms of adding various bacteria to a food of known growth-promoting power. The following organisms were selected: 2 strains of *Staphylococcus aureus* (No. 47P, isolated from raw beef liver, and No. 6, from a human case of mastoiditis), *Proteus vulgaris*, *Bacillus subtilis*, and *Sarcina lutea*, all grown upon plain agar slants for from 48 to 72 hr. before being fed to the worms.

The technique used in planarian nutritional studies has been described.^{1, 2} Each experimental diet was fed to a group of 30 measured worms, over a period of one month. The worms were kept in finger bowls, in sterilized tap water, at a temperature of 25°C. The experimental groups of worms were fed twice per week, the food being allowed to remain in the dishes with the worms for about 3 hours. After feeding, the excess food was removed and the worms washed in several changes of sterilized tap water.

In these experiments raw beef liver, an excellent food for planarian worms, was used as the basal diet. It was made into a fine brei by mashing upon a glass plate and removing connective tissue and blood vessels. One gram portions of liver brei were weighed

¹ Wulzen, Rosalind, *Univ. of Calif. Pub. Physiol.*, 1926, 7, 1.

² Bahrs, Alice M., *Physiol. Zoology*, 1931, 4, 189.