does not preclude the possibility of protein damage. Morgan[4] and Fixsen and Jackson[5] have demonstrated that heating lowers the biological value of casein, but the nature and extent of such damage, under given conditions, are not clear. The possibility of a change in the digestibility of the protein, similar to that found with animal tissues (Seegers[6]), is not excluded. The supplementary value of alcohol extracts of wheat germ is less well explained by such considerations than on the generally accepted grounds that such extracts provide a labile factor (B_4?)[7, 8] which is removed from casein by alcohol extraction and which is present in only small amounts if at all in yeast.

7949 P

Tyrosinase in Ontogenesis (Orthoptera)

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Variations in concentration of tyrosinase throughout the entire embryonic development of the grasshopper, *Melanoplus differentialis,* have been determined by measuring the oxygen uptake of the tyrosinase-tyrosine reaction with the Barcroft-Warburg apparatus. Tyrosinase activity of eggs at different developmental stages has thus been expressed as the amount of O_2 consumed per 100-minute interval at 25°C. in the oxidation of a given amount of tyrosine by the enzyme extracted (in phosphate buffer pH 8.0) from 20 eggs.

The growth curve for tyrosinase in the whole egg is sigmoid during the first 3 weeks. Maximum enzyme concentration is reached on the 20th day and is maintained at this level throughout a period of suspended embryonic development (diapause) which occurs then. The post-diapause developmental period, during which the embryo pigments and hatches, is characterized by a decrease in concentration of tyrosinase.

The largest part of the tyrosinase content of the egg is found in the yolk and in the serosa cells and fluids surrounding the embryo. The amount of tyrosinase in the embryo alone is low but increases

[4] Morgan, A. F., *J. Biol. Chem.*, 1931, **90**, 771.
[5] Fixsen, M. A. B., and Jackson, H. M., *Biochem. J.*, 1932, **26**, 1923.
[6] Seegers, W. H., in press.
[7] Reader, V., *Biochem. J.*, 1929, **23**, 689.
[8] Halliday, N., *J. Biol. Chem.*, 1934, **106**, 29.

during growth. During post-diapause development the embryo engulfs yolk and serosa cells so that it eventually contains most of the enzyme rich egg components. Apparently a gradual transfer of enzyme from yolk to embryo then occurs. The amount of tyrosinase in the egg membranes is low and remains practically static during the whole of development.

Attempts to obtain the enzyme from nymphs (after the 3rd instar) and from adults have been unsuccessful.

7950 C

Effect of Skim-milk, Lactose, Vinegar and Iodine on the Quantitative Character of a Coccidian Infection.*

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Skim-milk and lactose supplements in the diet were recommended by Beach and Davis[1] as affording a considerable degree of protection against coccidiosis in poultry. The explanation of the claimed benefits was the production of an abnormal degree of acidity in the caeca of the birds, which in turn injured or destroyed the sporozoite or merozoite stages of the parasites. Since the rat is a favorable host for the study of a coccidian infection, an experiment was planned in which one series of hosts received the regular growing ration made up to 40% with skim-milk beginning 4 days before the date of the first infection and continuing throughout the experiment, and another series received its regular ration without skim-milk. Infection was accomplished by forced feeding of from 1,500 to 3,000 oocysts of *Eimeria miyairii* daily for 4 or 5 successive days. The counts of the oocysts eliminated in the fecal pellets were taken as the index of the infection intensity. Seventeen rats on the skim-milk diet eliminated from 94 to 376 million oocysts each; mean, 203.24 millions. Sixteen controls on the regular diet eliminated from 72 to 464 million oocysts each; mean, 237.25 millions. The difference in the means divided by the standard deviation of the difference ($34.01 \div \sqrt{737.25 + 381.334}$) was 1.02, a nonsignificant value. Through the kindness of Dr. Donald Starr of the Chemistry Department it was possible to determine the

* Project No. 40, Industrial Science Research Fund, Iowa State College.

1 Beach, J. R., and Davis, D. E., *Hilgardia*, 1925, **1**, 167.