of the anesthesia. The increase was 2 to 3 times the original level. A return to normal limits occurred within 24 hours. On the other hand, in 4 patients subjected to avertin anesthesia (3 supplemented with ether) and in 2 patients with spinal anesthesia no change in blood amylase was detected. In one patient with avertin anesthesia supplemented by ether, a slight rise in amylase was noted at the end of 14 hours; in this case the operation was a very difficult and prolonged one and there was considerable post-operative shock.

Conclusions. Following ether in man, there is a definite increase in blood amylase which does not occur after avertin or spinal anesthesia. According to the results obtained in dogs with fistulas, this is due to the fact that ether causes a cessation of the transport of pancreatic juice to the intestine while pancreatic secretory activity continues, resulting in a temporary accumulation of amylase in the blood.

5848

Differences in Bactericidal Power of the Blood Within an Inbred Strain of Rats.

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During the course of experiments on the rôle of heredity in the resistance of rats to infection with *S. enteritidis,* some discrepancies from the uniform mortality rate to be expected in a highly inbred strain of animals were encountered.[1] An immunological study of the animals from this strain showed marked differences in the bactericidal power of the whole blood. Loeb and King[2] had previously found marked differences in reaction to tissue transplants in rats within each of the Wistar "A" and "B" strains.

The animals used in our experiments were descended from one pair of rats of the Wistar "A" strain, obtained in 1924 from Doctor Helen Dean King. These rats were then in the 48th generation of brother-sister matings. These brother-sister matings have been continued in our tests. All rats used have been shown not to excrete *S. enteritidis* in their feces and were carefully kept free from ex-

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[1] Irwin, M. R., *Genetics,* 1929, **14**, 337.

[2] Loeb, Leo, and King, H. D., *Am. J. Path.,* 1927, **3**, 143.

posure to this infection. Blood taken from the heart of each animal was mixed with just sufficient sodium citrate to prevent clotting, and drawn into capillary pipettes previously coated with a thin layer of a saline dilution of an 18 hour culture of *S. enteritidis,* the method being that proposed by Heist and Solis-Cohen[3] for determining the pneumococcidal power of blood. After the open end of the pipettes had been sealed in the flame, they were placed in the 38° incubator for 4 hours. The contents of each pipette were then expelled into a Petri dish of fluid agar and incubated over night, then the number of colonies counted. Suitable control tubes were inoculated to demonstrate the viability of the organisms and to indicate the numbers of organisms present in each dilution. Duplicate tests, after time intervals of 10 days to 2 weeks, gave consistent results.

For classification the animals have been divided into 2 groups: a "high" group whose blood destroyed more than 250 organisms per cc., and a "low" group, whose blood destroyed less than this number. However, nearly all of those falling within the "low" group showed no bactericidal power whatever—in most cases there was marked growth of the organisms in the blood. On the contrary the blood of most of the "high" group destroyed many thousands of organisms per cc. The result of a survey of 21 individuals of the inbred strain showed 17 to fit into the "low" group and 4 into the "high" group. These differences were so marked that matings were made to determine whether hereditary differences might explain the departure from a uniform reaction. Matings could not be made, at that time, among members of the "high" group. The blood of the offspring of these matings was tested when the individuals had reached 2 months of age and gave the following results:

Matings	Low	High	Total
Low × low	11	0	11
High × low	12	6	18

There appears to be some basis for attributing the differences shown above to heritable influences. The probability that the 2 sets of progenies are of the same population is well outside the limit generally taken as significant ($P = 0.03$), from which it may be inferred that the type of mating was a determining factor in producing individuals of the "high" group. Such differences occurring in an inbred strain may be attributed either to a result of mutation, or as a result of the continuous mating of heterozygotes. A further

[3] Heist, G. D., Solis-Cohen, S., and Solis-Cohen, M., *J. Immunol.,* 1918, **3**, 261.

study of the appearance of such marked differences in reaction in inbred animals of uniform exposure to the infectious agent is being made from both the immunologic and genetic points of view.

5849

Plant Pigments in the Nutrition of the Chicken.*

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Karrer, Euler and Rydbom[1] have demonstrated that carotene has provitamin A properties for the chicken but that xanthophyll is without effect in this regard. Evidence has been presented by Capper[2] that carotene is converted to vitamin A by the chicken.

The present experiment was an attempt to confirm the results of Karrer and his associates and to extend the study to include chlorophyll. In addition a study was made of the uric acid[3] content of the blood, it having been observed in earlier studies that this constituent increases in amount in the vitamin A deficient condition. Newly-hatched White Wyandotte chicks were placed upon a vitamin A deficient ration: 52.5% white corn, 20% wheat middlings, 10% dried skim milk, 10% meat scrap, 5% wheat bran, 0.5% sodium chloride, 1% calcite flour and 1% steamed bone meal. Sufficient irradiated ergosterol was used to protect against leg weakness. On this ration retardation of growth begins between 3 and 4 weeks of age. The pigments were dissolved in ethyl laurate and dilutions made with cottonseed oil. The daily allowance of each pigment was 0.03 mg. by capsule. Supplementation with carotene (M.P. 170°-173°) began at 26 days, with xanthophyll (M.P. 173°), at 27 and with chlorophyll at 31 days. An immediate growth response took place when carotene was fed but the birds which received the xanthophyll and the chlorophyll not only failed to grow, but lost weight and died within 2 weeks. Their behavior was essentially that

* Journal Series Paper, N. J. Agricultural Experiment Station, Department of Agricultural Biochemistry.

[1] Karrer, P., v. Euler, H., and Rydbom, M., *Helv. Chim. Acta*, 1930, **8**, 1059.

[2] Capper, N. S., McKibbin, I. M. W., and Prentice, J. H., *Biochem. J.*, 1931, **25**, 265.

[3] Folin, O., *J. Biol. Chem.*, 1930, **86**, 179.