SPECIAL ARTICLES

THE NATURE OF LYSOZYME ACTION[1]

THE lytic action on certain bacteria of a supposed enzyme, lysozyme, present in tears, egg white and various body tissues and fluids, has been described and studied by Fleming and others.[2] We have tried to determine whether the action of lysozyme is physical or enzymatic. A polypeptide in the form of an amorphous white powder, obtained by the purification of egg white, completely dissolved a suspension of air sarcinae (barium sulfate standard No. 8) in a concentration of 0.12 gamma per cc. An aqueous solution of the purified lysozyme did not change the surface tension of water and had no proteolytic, lipolytic or amylolytic action. It did not activate the action of papain or of the endoproteases of the bacteria. It did not act on lecithin or on the alcohol-ether soluble fraction of the sensitive sarcinae; it gave no evidence of a phosphatase action. It did split off a reducing sugar from ovomucoid and from a polysaccharide obtained by hydrolysis of the test organisms. The corresponding mucoid of the bacteria has not yet been isolated. The defatted bacteria are extremely insoluble, apparently consisting chiefly of a mucoid yielding a large carbohydrate fraction. Cartilage and chitin were not attacked.

Apparently lysozyme is an enzyme or an enzyme mixture which splits a reducing sugar from certain mucoids and from the polysaccharides derived from them. Its occurrence in tears, nasal, bronchial and gastro-intestinal mucus, egg white and semen[3, 4] can thus be understood, the bacteriolytic action being incidental. The same enzyme was obtained from a polypeptide fraction of the sensitive bacteria. The possible relation of this factor to bacteriophage action is being investigated. It is possible that this ferment may furnish an important tool for the study of mucins. It is to be expected that a series of such mucinases[5, 6] will be found in various tissues and organisms. A commercial pepsin preparation was found to split gastric mucin independently of peptic activity. It is possible that the specific bacterial polysaccharides are derived from capsular mucoids and that the enzyme described by Dubos and Avery[7] which decomposes the capsule of Pneumococcus III and hydrolyses its specific polysaccharide belongs to this group of ferments.

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[2] A. Fleming, *Proc. Roy. Soc. Med.*, 71: 26, 1932. Review.

[3] Kurzrok and Miller have shown that semen dissolves the mucous plug of the cervical canal.

[4] R. Kurzrok and G. Miller, *Am. Jour. Obstet. and Gynec.*, 56: 15, 1928.

[5] The term "mucinase" has already been applied to a ferment which coagulates mucin. The existence of such a ferment is not, however, well established.

[6] Oppenheimer-Kuhn, "Die Fermente und ihre Wirkungen," Vol. 2, Leipzig, 1925.

EFFECTS OF FEEDING SODIUM BICARBONATE OR LACTIC ACID UPON THE SEX RATIO IN RATS

SEVERAL articles have appeared recently in the newspapers to the effect that the ingestion of sodium bicarbonate during pregnancy influences the sex of the offspring both in the human and in the dog, males being produced exclusively. While there appears to be no physiological basis for such a belief, the necessity of increasing our rat colony gave an opportunity to test the question experimentally.

Animals to be bred were placed upon our stock diet, which consists of a mixture of ground grains, dried milk, mineral salts and cod liver oil, with which was incorporated either sodium bicarbonate or lactic acid. Following breeding, the animals were continued upon the same diet until parturition. The food seemed perfectly palatable, 15 to 20 grams being consumed per day.

The results are given in the following table:

Material and concentration	No. of litters	Males	Females	Total
2½ per cent. sodium bicarbonate	15	61	67	128
5 " " " "	20	85	101	186
2½ " " lactic acid	10	38	42	80
5 " " " "	28	107	128	235
Totals	73	291	388	629

Sex ratio, sodium bicarbonate animals, $\frac{\text{Females}}{\text{Males}} = \frac{168}{146} = 1.15$

Sex ratio, lactic acid animals, $\frac{\text{Females}}{\text{Males}} = \frac{170}{145} = 1.17$

In a group of 14 control litters the sex ratio of females to males was 1.03. Donaldson[1] quotes a table from King which includes data covering some 815 litters, showing a variation in female to male sex ratio of from 1.06 to .66.

[7] R. Dubos and O. T. Avery, *Jour. Exp. Med.*, 54: 51, 73, 1931.

[1] "The Rat," page 25, table 6.