TABLE I.
Isolation of Hemolytic Streptococci in 131 Throat Cultures.

	Plates inoculated directly from swabs	Plates streaked from broth cultures
Total positive cultures	16 (12.2%)	51 (38.9%)
Group A	6 (4.6%)	26 (19.8%)
,, C	8	17
,, F	0	2
,, G	3	4
Not grouped	0	2

of hemolytic streptococci. In one instance both Group A and Group C organisms were isolated from the direct plate but only the C was recognized on the plate from broth. From another swab, the direct plate yielded Group A and the plate from broth, Group C.

The Group A carrier rate of 19.8% in this limited series is high as compared with that recorded by other investigators.[11-14] Further studies, now in progress, may indicate an even higher rate in winter months.

Summary. By culturing 131 throat swabs from normal children in a partially selective broth prior to plating, the observed hemolytic streptococcus carrier rate was tripled. Group A streptococci were isolated from 19.8% of the swabs.

11 Hare, R., *Lancet*, 1940, **1**, 109.

12 MacDonald, I., Simmons, R. T., and Keogh, E. V., *Med. J. Australia*, 1940, **1**, 849.

13 Rantz, L. A., *J. Inf. Dis.*, 1941, **69**, 248.

14 Schwentker, F. F., Janney, J. H., and Gordon, J. E., *Am. J. Hyg.*, 1943, **38**, 27.

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Sesame Protein in Chick Diets.

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In a previous note[1] the mutual supplementary action of soybean meal and sesame meal was reported, together with the results of preliminary experiments with sesame protein as the only source of protein in the diet of the chick.

The first experiment of the present series (Table I) was carried out concurrently with the last experiment in the previous report. To the basal diet in which sesame meal was the only protein source, 10% of casein, gelatin, or zein was added. After the chicks had been receiving the diets for 4 days, it appeared that the zein was ineffective in increasing the growth rate over that observed on the basal diet, while casein promoted optimal and gelatin slightly suboptimal growth. From these results and from recent data on the amino acid content of casein,[2] gelatin,[2] and zein,[3] a lysine deficiency in sesame meal was suspected (Table I). On the fourth day of the experiment, $l(+)$-lysine monohydrochloride was added to the zein-supplemented diet to provide 0.9% of the free amino acid. After 24 hours, the chicks in this group had gained enough to make their growth curve parallel to that of the casein group, and they gained at this rate for 4 more days. When the chicks were then returned to the unsupplemented diet, growth practically ceased, as in the beginning of the experiment. When 0.45% lysine was added after 5 more days, the growth

1 Almquist, H. J., and Grau, C. R., *Poultry Sci.*, 1944, **23**, 341.

2 Block, R. J., and Bolling, D., *J. Am. Dietetic Assn.*, 1944, **20**, 69.

3 Vickery, H. B., *Compt. Rend. trav. lab. Carlsberg, Ser. chim.*, 1938, **22**, 519.

TABLE I.
Effect of Protein Supplements on Diets Containing 20% Sesame Meal Protein. There were 8 chicks per group; the experiment lasted 16 days.

Diet	Total gain g	Rate of gain per day %	Lysine added by supplement to diet %
Basal	18	1.5	—
,, + 10% casein	148	6.5	0.62
,, + 10% gelatin	103	5.3	0.42
,, + 10% zein	*	0.3 (days 1-4) 0.8 (,, 9-14)	0.03

* This pen was used to study the effects of lysine supplements. See text.

TABLE II.
Effect of Lysine Addition to Diets Containing 20% Raw Sesame Seed Protein. There were 8 chicks per group; the experiment lasted 10 days.

Diet	Total gain g	Rate of gain per day %	Gain per g feed eaten g
Basal	41	3.2	0.112
Basal + 0.5% *l* (+)-lysine	104	7.4	0.470

curve again became parallel to that of the casein group.

As the partial lysine deficiency of sesame meal became apparent, it seemed possible that the protein might have been heat damaged during oil removal, since the resulting meal was of a dark brown color, and the overheating of proteins is known to reduce the availability of lysine.[4] Intact sesame seeds were ground, extracted with ethyl ether and reground, yielding a product tan in color and containing 40.0% protein (N × 6.25).* When fed to provide 20% protein, raw sesame seed also appeared to be deficient in lysine, since supplementation with pure lysine was necessary for the attainment of optimal chick gains (Table II).

The chick requires approximately 0.9% of the natural form of lysine in the diet.[5] Since half this amount is sufficient to supplement sesame protein for optimal growth, the sesame protein at a 20% level apparently contributes at least half of the lysine requirement. This estimate is also indicated by the results of casein and gelatin supplementation in the first experiment (Table I).

Upon completion of the chick tests, data on the amino acid content of sesame seed proteins became available.‡ These are listed in Table III. The lysine content reported is sufficient to furnish 0.56% lysine to a diet containing 20% sesame protein, which is in good agreement with the estimate based on chick growth results.

The requirements of the chick for arginine,[6]

TABLE III.
Amino Acids in Sesame Seed Proteins.†

Amino acid	Amino acid in the crude protein (N × 6.25) %
Arginine	8.7
Histidine	1.5
Lysine	2.8
Tyrosine	4.3
Tryptophane	1.8
Phenylalanine	8.3
Cystine	1.3
Methionine	3.1
Threonine	3.6
Leucine	7.5
Isoleucine	4.8
Valine	5.1
Glycine	9.3

‡ The analyses were reported to us by Dr. R. J. Block. Cost of the analyses was supported by the Pacific Vegetable Oil Corporation and W. R. Grace & Co., San Francisco.

4 Greaves, E. O., Morgan, A. F., and Loveen, M. K., *J. Nutr.*, 1938, **16**, 115.

* The sesame seeds were kindly donated by the Pacific Vegetable Oil Corp., through the courtesy of Mr. B. T. Rocca, President.

5 Almquist, H. J., and Mecchi, E., PROC. SOC. EXP. BIOL. AND MED., 1942, **49**, 174.

histidine,[6,7] tyrosine and phenylalanine,[7] tryptophane,[6,8] methionine plus cystine,[9] threonine,[7] leucine,[7] isoleucine,[7,10] valine,[7] and glycine,[7,11] are, evidently, approximately met by the quantities of these amino acids in sesame seed protein when it is fed at a level of 20% of the diet. In conjunction with other proteins which are relatively richer in lysine (*i.e.*, soybean meal, fish meal) sesame seed meal is capable of supporting optimal chick growth rates.

6 Klose, A. A., Stokstad, E. L. R., and Almquist, H. J., *J. Biol. Chem.*, 1938, **123**, 691.

7 Almquist, H. J., and Grau, C. R., *J. Nutrit.*, in press.

8 Grau, C. R., and Almquist, H. J., *J. Nutrit.*, in press.

9 Grau, C. R., and Almquist, H. J., *J. Nutrit.*, 1943, **26**, 631; Klose, A. A., and Almquist, H. J., *J. Biol. Chem.*, 1941, **138**, 467.

10 Grau, C. R., and Almquist, H. J., *Poultry Sci.*, in press.

11 Almquist, H. J., and Mecchi, E., PROC. SOC. EXP. BIOL. AND MED., 1942, **49**, 541.

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Effect of Cadmium and Fluorine on the Rat Dentition.

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Wilson *et al.*[1] reported that the addition of cadmium to the diet of rats caused a loss of tooth pigmentation. According to them, the condition resembled the mottled enamel that results from ingestion of excessive amounts of fluorine. Although the latter relationship has been established, the nature of the mechanism by which the pigmentary changes are produced is not clearly understood. Our interest was aroused by the apparently isolated observation of the same authors that cadmium ingestion also produces a marked fall in blood hemoglobin values. Since hemoglobin is an iron-containing protein and since there is evidence that rat incisor enamel pigments are of a similar structure,[2] it seemed plausible that both observations might be related to the ability of cadmium to interfere with normal iron metabolism. Likewise, it seemed possible that the pigmentary changes in fluorosis could be explained on a similar basis. Partial confirmation of this belief would be enhanced by the demonstration of a depression of blood hemoglobin following the ingestion of fluorine.

At the same time it appeared logical to test the ability of cadmium to inhibit experimental rat caries, especially since it has been shown that fluorine can effect such a change. Cadmium in addition to producing mottled enamel also resembles fluorine in its ability to inhibit various enzyme systems. Included among these are those concerned with lactic acid fermentation,[3] a process believed by some to be of considerable importance in the etiology of dental caries.

In addition it seemed opportune to make certain supplementary observations as to the effect of cadmium on the general appearance, body weight, and incisor eruption rate of the rat.

Methods. At weaning 4 groups of rats each containing 18 littermates were placed on a modified Hoppert-Webber-Canniff diet[4] (Comet brand rice was substituted for the coarse corn component).

Group I served as a control. Groups II, III, and IV were maintained on the same diet but received 50 p.p.m. of cadmium ($CdCl_2$) in the food, 50 p.p.m. of cadmium ($CdCl_2$) in

1 Wilson, R., DeEds, F., and Cox, *J. Pharm. and Exp. Therap.*, 1941, **71**, 222.

2 Ratner, S., *J. Dental Res.*, 1935, **15**, 89.

3 Athanasui, J., and Langlois, P., *Arch. Physiol.*, 1896, **8**, 251.

4 Hoppert, C. A., Webber, P. A., and Canniff, T. L., *Science*, 1931, **74**, 77.