Agglutination tests showed most of the variants to be antigenically similar to the normal strains from which they had been obtained.

All attempts to demonstrate a filterable stage in association either with the normal or the variant strains were unsuccessful. The organisms were grown in various media including Kendall's K medium and filtrations were carried out both with very young and old cultures. Growth could not be detected in any of the media, either liquid or solid, inoculated with filtrates from variant or from normal cultures.

It is suggested that these small colony forms occur as the result of injury to an occasional cell of the normal culture which results in a lowered rate of reproduction and the loss of several physiological properties.

7364 C

Ordinary and Mucoid Encapsulated Hemolytic Streptococci from Scarlet Fever.

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A series of strains of hemolytic streptococci and mucoid encapsulated streptococci was obtained from the throats of scarlet fever patients at Cook County Contagious Hospital.

Laboratory studies were made on a group of these strains to determine. (1) the results of their growth on chocolate agar, (2) their effect on the sugars sorbitol and trehalose and (3) the influence of mouse passage on capsule formation and colony characteristics.

Using chocolate agar Tunnicliff[1] found that hemolytic streptococci of scarlet fever produced no color change in this medium except occasionally a slight greening after several days' growth. The colonies almost always were conical in shape and slightly granular. Occasionally, however, a strain dissociated and produced atypical colonies that were large, moist, smooth and convex and turned chocolate agar green. These atypical colonies were not scarlatinal by the opsonic, agglutination or toxin neutralization tests.[2, 3]

[1] Tunnicliff, R., *J. Am. Med. Assn.*, 1930, **94**, 1213.

[2] Tunnicliff, R., *J. Inf. Dis.*, 1931, **48**, 511.

[3] Tunnicliff, R., *J. Inf. Dis.*, 1931, **49**, 357.

With these investigations in mind, we studied the colony formation on chocolate agar of 62 strains of mucoid encapsulated streptococci and of 27 strains of ordinary hemolytic streptococci. Of the 62 strains of the mucoid type, 57 produced colonies resembling those considered typical by Tunnicliff. A second type of colony was noted in 34 of the 62 strains. This was large, distinctly white, glistening, smooth and convex and produced a greening of the surrounding media. Of the 27 strains of ordinary hemolytic streptococci, 23 produced the normal colony. In 18 the large, white green-color producing variant was noted. On ascitic fluid blood agar, no difference in colony formation could be noted.

A study of the toxin production of the variant was made to determine whether it possessed scarlatinal properties. From a satisfactorily stabilized colony of the variant of the mucoid strain, a 7-day broth filtrate was obtained. The toxin was diluted 1:1000 in sterile saline and 0.1 cc. was injected intradermally into 6 children known to be Dick positive. In 5 of the 6 children the filtrate from the variant produced a positive reaction. The Dick controls with commercial skin test scarlatinal toxin were all positive.

This emphasizes the results of an earlier investigation in which we reported that the specificity of the toxin of a scarlet fever streptococcus is retained not only when the strain becomes mucoid and encapsulated but also when it has completely lost its hemolytic property.[4]

In fermentation studies 26 of our mucoid strains were found to ferment trehalose but not sorbitol by using the Edwards[5] method of differentiation. This demonstrates a likeness in the reaction of the human mucoid type to the ordinary human hemolytic type. A group of 7 animal strains used for control purposes fermented sorbitol but not trehalose.

The final step in the study of the biological characteristics of these organisms was a consideration of the capsule formation and its relation to the type of colony produced on ascitic fluid blood agar pour plates.

Twenty-one ordinary hemolytic strains were studied for capsule formation by the India ink method. In 13 of these strains capsules of small size were demonstrable. Forty strains of saline washed organisms from 5 cc. broth cultures were injected into mice intraperitoneally. At death a loop of heart's blood was inoculated into 20% ascitic fluid infusion broth and into melted ascitic fluid blood agar

[4] Pilot, I., and Stocker, S., PROC. SOC. EXP. BIOL. AND MED., 1933, **31**, 181.

[5] Edwards, P. R., *J. Bact.*, 1932, **23**, 259.

tubes. After 18 to 24 hours the former cultures were examined for capsules and the pour plates were studied for colony formation. In 28 strains (70%) capsules could be demonstrated. Of the 8 strains in which capsules could not be identified before mouse inoculation, 7 showed them after this process. Mouse passage also increased the size of the capsules already present in a majority of cases.

Twenty-nine strains of the pour plates developed colonies of the mucoid type. Four plates were unreadable, 3 showed colonies of an intermediary type and 4 produced colonies unchanged from the original. In 3 of these 4 strains it was likewise impossible to demonstrate capsules in broth cultures.

7365 C

A Study of the Relation of Dietary Fats to Action of Thyroid Extract in Rats.

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A relation between dietary fats and thyroid activity has been reported by several investigators.[1-4] Jaffe[5] has reported interesting variations in the lipoid content of the thyroid in various diseases of the gland. Several reports have suggested the possibility that cod liver oil[1] or vitamins A and D in combination with iodine or iodized fat exert a favorable influence in Grave's disease.[6, 7, 8] These reports stimulated the author to test the effect of various oils including cod liver oil on rats rendered toxic by the administration of thyroid extract. The results are briefly reported here.

Methods. Both growing (3 months old and weighing from 100-110 gm.) and adult (150-195 gm.) rats were used in different groups of experiments. They were fed the standard Steenbock diet and kept in individual cages. One hundred mg. of thyroid extract

[1] Mellanby, *J. Physiol.*, 1921, **55**, 7.

[2] McCarrison, *Ind. J. Med. Res.*, 1923, **11**, 1.

[3] Abelin and Kurosteiner, *Biochem. Z.*, 1928, **198**, 19.

[4] Abelin, *Biochem. Z.*, 1930, **228**, 88.

[5] Jaffe, *Arch. Path. and Lab. Med.*, 1928, **5**, 13; 1927, **3**, 955.

[6] Adamson and Cameron, *Canad. Med. Assn. J.*, 1928, **19**, 420.

[7] Fraser and Cameron, *Canad. Med. Assn. J.*, 1929, **21**, 153.

[8] Rabinowitch, *Canad. Med. Assn. J.*, 1929, **21**, 156.