sample was obtained from patients who had been treated with local application of ointments, containing crude coal tar. The values of linolic acid were definitely higher in these treated groups, being in the same range as found for normal subjects. It seems only reasonable to believe that this increase in the linolic acid content is explained by the fact that diets of these subjects for the most part contained fats which were rich in linolic acid. This finding, however, does not prove that the return to normal values of the linolic acid content is concerned with changes in the clinical picture noted in these cases. There was no effect on the arachidonic acid content of these specimens, although in one instance the values were definitely lower. Our conjecture is that linolic acid (or at least the unsaturated fatty acids), which may be necessary for normal skin nutrition, is probably one of the many factors disturbed in eczema.

Summary and Conclusions. Linolic acid (tetrabromides calculated as such) is present in human serum to the extent of about 5% of the total fatty acids, and arachidonic acid (polybromides calculated as such) about 3% of the total fatty acids in pooled samples of blood serum from normal children. The content of both these fatty acids is definitely diminished in children with eczema. In those cases of active eczema which were clinically cured either by the internal administration of oils rich in the unsaturated fatty acids or by the local application of ointments containing crude coal tar, or both, the arachidonic acid was not increased while the linolic content was the same as that found in normal subjects. These findings indicate a possible reason for the low iodine number of the serum fatty acids in eczema and further suggest that a disturbance in the metabolism of the unsaturated fatty acids may be one of the many factors at fault in this condition.

9137

Determination of Staphylococcal Types by Fermentation of Mannite.*

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The recent demonstration that different strains of staphylococci elaborate chemically distinct carbohydrates[1] has made it possible to

* Conducted under a grant from the Commonwealth Fund of New York.

[1] Julianelle, L. A., and Wieghard, C. W., PROC. SOC. EXP. BIOL. AND MED., 1934, **31**, 947; also, *J. Exp. Med.*, 1935, **62**, 23.

separate these organisms into immunological types.[2, 3] Differentiation of the types, however, is dependent upon precipitation of the specific polysaccharides in homologous antiserum, a technic requiring the extraction of the reactive substances. Since this procedure is somewhat cumbersome, necessitating time and facilities not always available, it seems desirable to introduce a simpler and more rapid means for the determination of types. Consequently, several methods have been studied for this purpose, and while none possesses an absolute accuracy, the reaction of fermentation of mannite appears to offer the best possibilities from the aspect of simplicity, rapidity and precision. It is proposed, therefore, to report in this communication the correlation of staphylococcal types to fermentation of mannite.[4]

The data bearing on this study, arranged in the form of a protocol, are presented in Table I. It will be seen that an analysis has been made of 102 strains of staphylococci, which were tested in sequence as they were isolated in the diagnostic laboratory of Barnes Hospital. In 47 strains, the type was determined by precipitation of carbohydrates, while in 55, the staphylococci were separated presumptively into Type A or B depending chiefly on their derivations.

TABLE I.
The Relation of Staphylococcal Types to Fermentation of Mannite.

Source	No. of strains	Pigment		Type		Reaction in mannite	
		Albus	Aureus	A	B	+	-
	(a) Type determined by precipitation-test						
Pathogenic	31	4	27	31	0	30	1
Non-pathogenic	16	16	0	0	16	1	15
	(b) Type determined presumptively						
Pathogenic	31	2	29	31	0	30	1
Non-pathogenic	24	24	0	0	24	2	22

In deciding upon pathogenicity of the given strains, complete reliance was placed on source, since attempts to differentiate the different organisms by animal-inoculation revealed frequent discrepancies between virulence for man and animal, thus indicating a species-variation difficult of reconciliation. Since the figures for both determined and presumptive types are closely comparable, it seems fair in summarizing to consider them as one. Thus, then, of 62 pathogenic strains, all Type A, 6 produced white pigment, and 56, varying de-

[2] Julianelle, L. A., and Wieghard, C. W., *J. Exp. Med.*, 1935, **62**, 11.

[3] Thompson, R., and Khorazo, D., *J. Bact.*, 1937, **33**, 51.

[4] Julianelle, L. A., *J. Bact.*, 1937, **33**, 49.

grees of yellow pigment. Two strains were unable to ferment mannite after a period of incubation of one week, and 60 caused fermentation in intervals of less than 24 hours to 3 and 5 days. In many instances, prolonged incubation following fermentation was accompanied by an alkalinization sufficient to overcome the acidity originally formed. Of the 40 non-pathogenic strains, all Type B, and all *albus,* only 3 fermented mannite. It is interesting to note that while a slight variation from yellow pigment occurred among the Type A strains, all of the non-pathogenic strains of Type B observed remained constant in elaborating only white pigment.

The data reveal, therefore, that of a total of 102 cultures of staphylococci studied, it is possible to differentiate the immunological types A and B by fermentation of mannite within an error of 5%. This is in close agreement with the results observed by both Thompson and Khorazo[3] and S. T. Cowan of England.[5]

9138 P

Formation of Glucose-1-Phosphoric Acid in Muscle Extract.

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In recent experiments[1] on minced and washed frog muscle, adenylic acid, in amounts corresponding to 4 mg. P per 100 gm. muscle, increased very markedly the formation of hexosemonophosphate. The small amount of phosphorylation which occurred without addition of adenylic acid was attributed to the presence of nucleotides which had not been removed by washing, since the washed muscle contained 2 to 4 mg. % of organic P.

The first phosphorylation product was found to be glucose-1-phosphoric acid which was isolated as the crystalline brucine salt and which has since been synthesized and identified as an α-compound. This is of significance in view of the fact that glycogen, the carbohydrate from which this ester is formed, consists of α-glucosidic linkages.

Glucose-1-phosphoric acid, when added to fresh muscle extract, is converted in a few minutes to hexose-6-phosphoric acid by a wan-

[5] Personal communication.

[1] Cori, C. F., and Cori, G. T., PROC. SOC. EXP. BIOL. AND MED., 1936, **34**, 702.