

INSTITUTE OF MICROBIOLOGY

MH 42 I

Annual Report

Submitted by: Michael Heidelberger

Period: July 1, 1955 -
June 30, 1956

Specific polysaccharides of pneumococcus

Galactose has been identified in the Type IV substance, and evidence for the presence of amino sugars obtained. The Type VI substance contains galactose, glucose and rhamnose, as well as phosphate linkages and a possible sugar alcohol. It is sensitive to alkali. The Type VII substance appears also to be made up of galactose, glucose, and rhamnose, with one or two amino sugars present as well. Nothing had hitherto been known of the chemistry of these substances.

Cross reactions of antipneumococcus sera

The reactivity of the Khaya gums in Type I antiserum indicated that they contained galacturonic acid, and this was subsequently confirmed by Professor Hirst, of Edinburgh. Work on the fractionation of gum arabic by Type II antipneumococcus serum was completed and published. This study necessitates a revision of the current belief in the relative homogeneity of gum arabic. The slime produced by Aerobacter aerogenes reacts strongly in Type II antiserum, indicating that part of its glucuronic acid at least, is linked similarly to the known glucuronic acid linkages in the specific polysaccharide of Type II pneumococcus. This will lighten the task of the Birmingham chemists studying the aerogenes substance. The cross reactions of Azotobacter and Rhizopus radicicolum polysaccharides are not entirely in accord with the published structures of the substances, and the questions raised are being discussed with the English chemists involved. A polysaccharide isolated from anthrax cells obtained from infected animals gave a precipitate in Type XIV antipneumococcus serum, while similar material from bacilli grown in culture failed to do so. The difference is not due to the presence of Forssman antigen in one and its absence in the other. Data on the composition of the precipitates of glycogen and anylopectin in various antisera are being prepared for publication.

Cross reactions of anti-typhoid and anti-paratyphoid B sera

The selective precipitation of one or another of these sera by the capsular polysaccharide of Type II pneumococcus, yeast mannan, glycogen, gum arabic, and carob mucilage in particular, has permitted deductions as to the linkages of galactose, glucose, and mannose in the typhoid O-polysaccharide and certain differences in the linkages of mannose in the para B polysaccharide. Dr. A. M.

Staub, of the Pasteur Institute, Paris, who is studying the chemistry of these substances, reports that her data on the methylation and periodate oxidation of the carbohydrates are entirely in accord with the conclusions drawn. A paper on these cross reactions has been accepted by the Journal of Experimental Medicine.

In September and October, 1955, Dr. Heidelberger gave lectures in Denver, Honolulu, Hong Kong, Bangkok, Tokyo, Kyoto, Osaka, and Sapporo and presented, with some apparent effect, the point of view of the Rutgers Foundation to four Japanese manufacturers of streptomycin. In March, 1956, he was awarded the Degree of M.D., honoris causa, by the University of Oslo.

Papers published during the period, in addition to those in Dr. Pleascia's report:

Immunochemistry and the Structure of Lung Galactan, Heidelberger, M., Dische, G., Neely, W. B., and Wolfrom, M. C., J. Am. Chem. Soc., 77, 3511 (1955).

Immunological Specificities Involving Multiple Units of Galactose II, Heidelberger, Michael, J. Am. Chem. Soc., 77, 4308 (1955).

The Immunological Specificity of Type II Pneumococcus and its Separation into Partial Specificities, Heidelberger, M., and Adams, J., J. Exptl. Med., 103, 189 (1956).

Fractionation of Gum Arabic by Chemical and Immunological Procedures, Heidelberger, M., Adams, J., and Dische, Z., J. Am. Chem. Soc., 78, 2853 (1956).