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A study of the biology of streptococcus erysipelatis.

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The present study was undertaken to determine the immunological reactions of streptococci isolated from erysipelatous lesions. Agglutination and agglutinin absorption were used for biological differentiation. The strains were collected from New York, Washington, and Baltimore, during the summer and fall of 1924. The technique found to be best adapted for the isolation of the streptococci directly from the lesions of erysipelas was as follows: 0.5 cc. of physiological saline solution was injected intra- and sub-dermally at the margin of the erysipelatous lesion. Fluid was withdrawn immediately from the bleb which formed and mixed with blood-agar, according to the method described by Brown.[1] Ninety-one per cent of the cultures from the deeply inflamed marginal lesion yielded *Streptococcus hemolyticus*, whereas cultures made from the central and pale portion of the erysipelatous lesion yielded streptococci only in 42.3 per cent. Culturally and morphologically, these bacteria did not differ in their general characteristics from those of the large group of pyogenic streptococci; all of them were found to ferment lactose and salicin.

For the production of immunebodies, three methods of inoculation of rabbits and dogs were employed: (A) intravenous injection, first with heat-killed and later with live organisms; (B) subcutaneous injection with live bacteria; and (C) Dochez's[2] method of subcutaneous injection of agar, with subsequent inoculation of live streptococci. The lowest agglutinin titer was obtained with the serum from animals treated by the intravenous inoculation, and the highest and most durable titer by using Dochez's method.

Of the 33 strains of *Streptococcus hemolyticus* isolated from typical erysipelatous lesions, 91.2 per cent were agglutinated by

[1] Brown, J. H., *Monograph of The Rockefeller Inst. f. Med. Research*, 1919, ix, 6.

[2] Dochez, A. R., *J. Am. Med. Assoc.*, 1924, lxxxii, 542.

the immune sera prepared with seven erysipelatous strains. Of 42 strains of streptococci isolated from non-erysipelatous sources, including scarlet fever, cellulitis, dermatitis, empyema, peritonitis, puerperal sepsis, suppurating tonsilitis, abscesses and mastoiditis, 16.6 per cent were agglutinated by the immune sera prepared with seven erysipelatous strains. The agglutinable non-erysipelatous strains were obtained from the nasal secretions of individuals with chronic and acute sinusitis, and one strain isolated from the meninges of a case of meningitis following mastoiditis. No agglutination occurred with 21 strains of streptococci isolated from thoat cultures of scarlet fever patients.

Absorption of agglutinin was best accomplished at 55° C. with fresh immune sera and highly agglutinable strains. Every strain of streptococci of erysipelatous origin was represented in the absorption reactions. The immune serum produced by a given erysipelatous strain was completely absorbed by a number of other erysipelatous strains of streptococci, and the absorption of agglutinin from a number of immune erysipelatous sera was accomplished with each strain.

These investigations demonstrate that at least 90 per cent of the strains of *Streptococcus hemolyticus* isolated from the erysipelatous lesions of erysipelas fall immunologically, as determined by the agglutination and absorption reactions, into one group. This group of hemolytic streptococci can be differentiated, by the same methods, from the type of hemolytic streptococci isolated from patients with scarlet fever.