

to elaborate toxin diminishes with increases in P. D. and is enhanced when the P. D. is decreased with suitable reagents. If P. D. and M. L. D. of broth cultures are determined daily for 12 days a direct parallelism is shown to exist.

Rapid identification of virulent diphtheria bacilli can be effected by determinations of P. D., especially of distilled water suspensions prepared from 18 hour glycerin agar cultures.

## 3170

**Influence of anti-serum and of animal passage upon virulence and electrophoresis of pneumococci.**

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In earlier publications<sup>1</sup> we discussed at length the parallel relations between the virulence and the electrophoretic potentials of pneumococci. We reported that variant strains (Blake) of type I pneumococci, which differ in their virulence for mice, also differ in a parallel manner in their electrophoretic potentials.

In the studies reported here we have undertaken to determine whether "rough" colony varieties could be produced from the Blake Type I pneumococcus (designated as A) and its variants (designated as B and C respectively). These variants are derivatives of the A strain, and were obtained by Blake and Trask by growth in the presence of specific anti-serum. We have also undertaken a series of experiments to determine changes in virulence and P. D. upon successive passage through white mice of cultures of significantly different virulence and P. D.

We have found that the sequence of decreasing virulence for white mice, decreasing P. D. and increasing agglutinability is: A, B, C. The A, B and C strains form "smooth" colonies on peptone, serum or blood agar plates. Strains which give "rough"

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<sup>1</sup> Falk, I. S., Gussin, H. A., and Jacobson, M. A., *J. Infect. Dis.*, 1925, xxxvii, 481; Falk, I. S., Jacobson, M. A., and Gussin, H. A., *ibid.*, 495, 499; Falk, I. S., and Jacobson, M. A., *ibid.*, 507; 1926, xxxviii, 182, 188.

colonies on blood agar plates have been produced from the A, B and C cultures by growth in broth to which specific anti-serum had been added. After 23 transfers in serum broth, none of the cultures were completely converted to the rough varieties. Organisms of both the S and R varieties could be recovered. Some of the S varieties, which were recovered after 23 transfers in broth containing anti-serum, showed the virulence and the electrophoretic potential characteristic of the original cultures. Some of the S varieties show reduced virulence and potential. The rough varieties recovered after 12 transfers of B and C strains in broth plus anti-serum showed the same virulence and potential as the original B and C cultures. Hence, it appears that strains of pneumococci which differ significantly in virulence are not necessarily correspondently separable into S and R categories.

The original A strain gives a prompt precipitation reaction with specific anti-serum. The original B and C strains and the "rough" derivatives of A, B and C strains give only a slight, delayed reaction after 24 hours.

The A and B strains showed no significant changes in virulence, potential or agglutination after 4 and 8 passages through mice. Passage of the C strain through mice resulted in a reversion of its characteristics to those of the A strain.

In all cases studied, alterations in the virulence of pneumococci for white mice are accompanied by parallel alterations in electrophoretic potential and by reciprocal alterations in agglutinability.

### 3171

#### **Modification of development in chick embryos induced by ultra-violet radiation.**

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This is the sixth of a series of studies on radiation, four of which have concerned themselves with differential modification

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