

sideration, it is evident that the head and neck have grown more proportionately than the body as a whole in the embryonic period, while the thorax has undergone about the same relative amount of growth as the body as a whole. The lower part of the abdomen, the pelvis and the extremities have grown relatively less. This forms a quantitative demonstration of the application of the law of developmental direction to the growth of the human body in prenatal life.

## 172 (2695)

**The antigenic properties of pneumococci and streptococci treated with sodium ricinoleate.**

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The property of sodium ricinoleate to neutralize bacterial toxins and destroy the pathogenicity of some of the pathogenic bacteria has been emphasized in a series of papers published from this laboratory.<sup>1, 2, 3</sup> The present paper concerns the effect of sodium ricinoleate upon the pathogenic and antigenic properties of the pneumococcus and streptococcus scarlatinæ.

If a solution of sodium ricinoleate is added to a virulent culture of the pneumococcus, so that the final dilution of soap is 0.1 per cent, the micro-organism loses its pathogenicity instantly. Ten cc. or more of such a culture may be injected into rabbits intraperitoneally without ill effects. Twenty-four hours after such an injection, large amounts of agglutinins are present in the blood stream. Following such treatment, the animals resist many lethal doses of pneumococci. The serum of rabbits thus immunized protects normal rabbits against intraperitoneal and intravenous infections.

We have studied the effect of sodium ricinoleate upon one strain of streptococcus scarlatinæ. It loses its power to grow upon culture media in less than five minutes when treated with

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<sup>1</sup> PROC. SOC. EXP. BIOL. AND MED., 1923, xx, 229.

<sup>2</sup> Ibid., 1924, xxi, 278.

<sup>3</sup> Ibid., 1924, xxii, 194.

0.5 per cent sodium ricinoleate. Streptococci so treated with soap produce agglutinins in rabbits within twenty-four hours following intraperitoneal injection.

### 173 (2696)

#### Observations on the measurement of the pH of soap solutions.

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Coincident with Larson's studies<sup>1</sup> on the neutralization of toxins with sodium ricinoleate, studies on the chemical properties of this soap have been conducted. One phase of this work has concerned itself with methods of determining the pH of solutions of this compound. In this work certain important anomalies in the measurement of pH of soap solutions have been observed which are here reported.

All measurements were made with a Leeds and Northrup, Type K. potentiometer, using a .1N Calomel electrode. To investigate the problem thoroughly it was decided to carry out measurements with a series of electrodes instead of relying upon the results obtained from a single one. In all cases the various electrodes were tested with a sodium borate, boric acid buffer. Only those were used that gave correct readings on this buffer solution. From the following table it will be seen that electrodes which gave check readings on the buffer solution would not give check readings on the soap solution:

TABLE NO. 1.

Measurement of pH of a 5 per cent Solution of Sodium Ricinoleate using the Bailey Electrode.<sup>2</sup>

Electrode No.	pH of Buffer before making readings on Soap	pH of Soap Solution			pH of Buffer after making readings on Soap
		1st reading	2nd reading	3rd reading	
1	8.99	6.99	7.01	6.96	8.99
2	8.99	7.64	7.62	7.65	8.99
3	8.99	7.92	7.90	7.96	8.99
4	8.99	7.98	7.96	8.00	8.99

<sup>1</sup> See Page 357.

<sup>2</sup> *J. Am. Chem. Soc.*, xlii, 45.