

metamorphosed. It would also account, in a large measure, for the considerable variation in oxygen consumption of individuals of the same metamorphic stage. This variation in oxygen consumption made it necessary to base the consumption at any given stage on the average of a considerable number of animals.

#### CONCLUSIONS

1. *Rana pipiens* tadpoles, metamorphosed with desiccated thyroid-diiodotyrosine exhibit a progressive rise in metabolic rate as evidenced by oxygen consumption per gram weight. In stage 8 the metabolic rate reaches a maximum increase over that of stage 1 of approximately 79 per cent.
2. Precociously metamorphosed tadpoles increase their total oxygen consumption regardless of decreasing weight.
3. Thyroid-diiodotyrosine-fed tadpoles undergo a gradual decrease in weight amounting to 57 per cent in stage 8.
4. Etherization of stage 1 tadpoles (normal animals) results in approximately 19 per cent increased oxygen consumption.

### 17 (2249)

#### The study of hemolytic streptococci associated with scarlet fever.

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The present work was undertaken subsequent to the work of Gordon, Bliss and of Tunnicliff in the study of hemolytic streptococci associated with scarlet fever. The object of the work was to study the agglutination of streptococci from the throats of patients with scarlet fever, and to study the phenomenon of agglutinin absorption with these bacteria. The strains were gathered from numerous sources. The technique was similar to that of Bliss.<sup>1</sup>

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<sup>1</sup> Bliss, W. P., *J. Exp. Med.*, 1922, xxxvi, 575.

The first part of the work consisted in a survey of scarlatinal patients designed to determine the percentage of agglutinable strains in acute cases of scarlet fever, and to determine the number of patients who had agglutinable streptococci in their throats at the end of the quarantine period. Forty acute cases were included in the first group. Hemolytic streptococci were isolated from 87.5 per cent of these throat cultures. 74.3 per cent of the strains isolated from these acute cases were agglutinated by immune sera prepared with two scarlatinal strains. Among the convalescents, streptococci were found in 47.3 per cent. 55.0 per cent of these strains could be agglutinated with scarlet immune sera.

The second part of the work consisted in cross agglutination reactions between strains obtained from scarlet fever occurring in several large cities of the United States and Europe. A series of strains obtained from a milk borne epidemic of scarlet fever, both from the throats and from the suspected milk, were included in the series. The strength of the reaction varied with the various combination of sera and strains, but in the main the cross agglutinations were consistent and strains obtained from conditions other than scarlet fever were not agglutinated.

The absorption of agglutinin was carried out at 55° C. Fresh immune sera and strongly agglutinable strains were necessary for agglutinin absorption. All the combinations of sera and strains did not give absorption but each strain was represented in the absorption experiments, since absorption of agglutinin from several immune sera was accomplished with each strain, or immune serum prepared with a given strain was absorbed by several other scarlet strains.

Since the strains represent cases of scarlet fever occurring in New York City, Chicago, Baltimore, San Francisco, and Copenhagen, Denmark, as well as cases occurring during a milk borne epidemic, it is to be concluded that the strains of hemolytic streptococci associated with scarlet fever are closely related biologically, and probably constitute a single unit group.