

keel on one or both margins. In some cases, nearly always in other lots of eggs than those which developed into larvæ having definite tail-like accessory appendages, the accessory structure was distinctly dorsal or cephalic in position. In some of the cases the structure was merely a broad-based, blunt, fleshy protuberance; in others it was wholly epidermal,—a more or less slender, sac-like epidermal projection. In still others the protuberance was longer,  $1/8$  to  $1/10$  the length of the larvæ, and extended distinctly forward from the frontal, dorso-frontal, or ventro-frontal region of the head. In some of these cases the myomere structure was evident although no fin-like margins occurred and the structures were approximately round in cross section.

In certain cases in which early gastrula stages of *Ambystoma punctatum* had been centrifuged, a number of the larvæ lacked the anterior region of the head including the eyes and, in fact, most of the head anterior to the gill region. A single lot of eight larvæ contained five possessing this abnormality.

Interpretations of these structures will be suggested in a larger paper.

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### Further observations on the toxicity of tin.

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In a preliminary communication<sup>1</sup> from this laboratory, the results of experiments with the double salt of tin tartrate were announced. Experiments performed since with tin tartrate have shown that like the double salts, it caused marked injury to the kidneys. Large amounts of albumin were present in the urine of rabbits when administered subcutaneously and intravenously but larger doses of the normal salt were required to produce this effect.

The amount of tin as the double salt necessary to produce a very marked albuminuria was 20 to 30 per cent less than in the form of tin tartrate. Observations on the action of stannous and

<sup>1</sup>Salant and Smith, *J. Pharm. and Exp. Ther.*, 1914, Vol. 5, p. 517.

stannic salts failed to show any noteworthy difference. The effect of concentration indicated marked differences both when injected intravenously or subcutaneously. Thus 20 milligrams of tin per kilo, injected intravenously, produced a moderate albuminuria when the amount of tin per c.c. was 1.5 milligrams; much greater amounts of albumin and large amounts of sugar when each c.c. contain 8 milligrams of tin; acute death when each c.c. contained 20 milligrams of tin.

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**The influence of tartrates, citrates and oxalates on the isolated heart.**

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Sodium tartrate and citrate in Locke's or in Ringer's solution or in defibrinated blood perfused through the isolated heart of the frog, dog and cat caused a decrease of cardiac activity which became more marked with increased concentrations. The action of the citrate was considerably greater than that of the tartrate, the ratio being about 5 : 1 with weak solutions. The difference was even more marked when the action of more concentrated solutions was compared, an  $N/100$  citrate was as active as  $N/10$  tartrate, as observed on the frog's heart. The action of citrate and oxalate was compared by its effects in calcium-free solutions (Ringer and Locke minus calcium). The effect of citrate and oxalate was found to be the same in some experiments but in others the action of the oxalate was distinctly less toxic than that of the citrate. Since the solubility in water of calcium citrate is twice as great as calcium tartrate, while calcium oxalate is practically insoluble, it is apparent that the action of these salts is not due to the precipitation of the calcium. Again since the equimolecular solutions, calcium tartrate and calcium citrate, have the same effect as  $\text{CaCl}_2$  it would also indicate that a possible decrease in ionization of the calcium in the tissues is not a factor which determines the action of tartrate, citrate and oxalate on the heart.