

*Summary.* The addition of sulfanilamide to sterile broth or to cultures of the hemolytic streptococcus is accompanied by an elevation of the oxidation-reduction potential. This rise can be eliminated when the cocci are grown anaerobically or in cysteine broth. The addition of serum will slightly diminish this effect. Compounds related to sulfanilamide but lacking in bacteriostatic action are without effect upon the culture potentials. The relation of these potential effects to the action of the drug in streptococcal infections is discussed.

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### Heteroplastic Transplantation of the Hypophysis Between Different Species of *Ambystoma*.\*

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The differences in metamorphic activity of the axolotl (*Ambystoma mexicanum*) and the related species, *A. tigrinum*, are well known. That the thyroid of *A. mexicanum* will metamorphose thyroidless frog tadpoles although not able to metamorphose the axolotl itself was shown by Swingle.<sup>1</sup> It is also known through the work of Uhlenhuth and Schwartzbach<sup>2</sup> and others that the axolotl can be metamorphosed by anterior pituitary substances. The establishment of the pituitary's influence upon the thyroid-releasing mechanism makes it probable that the difficulty is in this relationship between these glands. The question arises as to which gland is primarily different. Witschi<sup>3</sup> joined axolotl and tigrinum embryos in parabiosis. These pairs metamorphosed when they were normal but did not when the tigrinum was hypophysectomized, thus showing that the pituitary gland of the tigrinum was responsible for the metamorphosis. The tigrinum thyroid was, however, present and must be considered. Bytinski-Salz<sup>4</sup> interchanged the pituitaries of these 2 species at the orthotopic position. His results showed no effects of the interchange. He concluded that the *Ambystoma tigrinum* with

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<sup>1</sup> Swingle, W. W., *J. Exp. Zool.*, 1922, **36**, 397.

<sup>2</sup> Uhlenhuth, E., and Schwartzbach, S., *Brit. J. Exp. Biol.*, 1927, **5**, 1.

<sup>3</sup> Witschi, E., *Anat. Rec.*, 1933, **55**, Suppl., 88.

<sup>4</sup> Bytinski-Salz, H., *J. Exp. Zool.*, 1935, **72**, 51.

an *A. mexicanum* hypophysis will metamorphose and that conversely the axolotl with a tigrinum hypophysis will remain neotenic. This he explained by assuming that the pituitary does not act independently and that the connections between the hypophysis and the thyroid are not quantitatively fixed, but are probably controlled by another factor within the host. It would seem that the simplest explanation of his results would be on the basis of degeneration of the transplant and regeneration of the host's hypophysis. This is made more probable by the rest of his results and he admits that one can not tell the glands of the two species apart histologically.

In the present experiments the differences between the hypophysis of *Ambystoma tigrinum* and *A. mexicanum* have been brought out by comparing the results of heteroplastic and homoplastic transplants. These embryonic transplants have been made heterotopically in order that there may be no question as to which species the graft belongs. These transplants have been made in a manner described before.<sup>5</sup> The differences in results have been noted in pigmentation, growth and metamorphic activity.

Pigmentation of the *A. mexicanum* with an extra pituitary of its own species is definitely increased, but with an extra gland of tigrinum the melanophores show much greater expansion.

The growth changes in the axolotl are moderate under the influence of additional axolotl pituitary tissue. There is a definite slowing of growth and a shortening of gills and narrowing of tail fin and other such changes which result from additional pituitary tissue, as shown earlier.<sup>6</sup> However, the *A. mexicanum* with tigrinum grafts often shows extreme changes. The reduction of growth is very marked and the animal is very short and broad. The tail is specially affected and the limbs are very short and stubby. The lower jaw may protrude. These extreme individuals have not lived to metamorphic age.

In these experiments the metamorphic activity is definite. None of the animals carrying additional axolotl glands has shown any tendency to metamorphose although kept for many months. The surviving axolotls carrying tigrinum hypophyses were not extreme individuals. Of these, 2 have completely metamorphosed. They underwent their metamorphosis in a slightly longer time and somewhat later than tigrinum controls. The pituitary of *Ambystoma maculatum* as a transplant brought 2 other axolotls to metamorphic stasis. It is interesting that here the donor species is a much smaller

<sup>5</sup> Blount, R. F., *J. Exp. Zool.*, 1932, **68**, 113.

<sup>6</sup> Blount, R. F., *J. Exp. Zool.*, 1935, **70**, 131.

animal and that this stasis is known to occur with inadequate hormone supply. The graft content of these animals has not yet been studied in comparison with that of the individuals which did not metamorphose.

The thyroids of these animals have the character to be expected from their activity. That of the normal control tigrinum shows higher epithelium and some folding of follicles following the discharge associated with metamorphosis. The control axolotl shows the characteristic low epithelium and well filled follicles. In the axolotls which metamorphosed under the influence of the tigrinum hypophysis, there is some folding of follicles and a moderately high epithelium. The animal with stasis shows low epithelium with some indications of partial discharge.

These experiments present further evidence that the hypophysis of the axolotl is responsible for the non-occurrence of metamorphosis owing to inactivity in the production of the hormone associated with the releasing mechanism of the thyroid. The hypophysis of the axolotl is also less potent in the production of hormones associated with pigmentation and certain growth factors.

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#### Effect of Pregnancy Urine Extract on Lactation in the Rat.\*

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Numerous papers have appeared reporting success in inhibiting lactation by hormone treatment. With the exception of Nelson's<sup>1</sup> work on the guinea pig, these investigations have not indicated whether the inhibitory action was (1) directly on the secretory epithelium of the mammary gland, (2) by the suppression of the secretion of the pituitary hormones necessary for the maintenance of lactation or (3) by the suppression of the release of pituitary hormones required for lactation. Reece and Turner's<sup>2</sup> work indicated

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<sup>1</sup> Nelson, W. O., *Am. J. Anat.*, 1937, **60**, 341.

<sup>2</sup> Reece, R. P., and Turner, C. W., *Mo. Agr. Exp. Sta. Res. Bull.*, 1937, 266.