permitting growth in dilution of 1:1,000, and retarding growth slightly in dilution of 1:10,000. The above results are not strictly comparable, as the degree of chemical purity of each of the compounds is unknown.

Although the bacteriostatic action of Zephiran against tubercle bacilli is high, its bactericidal action is low. To 4.5 cc of a 1:1000 dilution of Zephiran was added ½ cc of an undiluted 3-day growth of tubercle bacilli, which previously had been well shaken to break the surface film into small particles. This mixture was incubated at 37°C for ½ hour, then centrifugalized, washed twice with normal saline, and the sediment planted on Lowenstein's egg media. The growth was positive.

The superior bacteriostatic action of Zephiran over that of the other wetting agents is not due entirely to its ability to reduce surface tension or to superior wetting qualities, as these qualities are approximately the same in all the compounds tested. Its superior action is probably inherent in its molecular structure.

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Functional Transplants of Epithelial Hypophysis in Three Species of Amblystoma.

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Previously it has been shown[1, 2] that transplantation of the primordium of the epithelial hypophysis, independent of brain and foregut, may be followed by differentiation and function of the transplant in 2 species of frogs, *Rana sylvatica* and *R. pipiens*. Although numerous transplants were attempted with embryos of *Amblystoma punctatum* no unequivocally successful cases were obtained. This seemed to confirm the conclusions previously reached by Blount,[3] who held that the epithelial portion of the hypophysis is dependent upon an association with the neural lobe for its differentiation and functioning.

More recently Blount[4] has presented evidence to show that hypo-

[1] Atwell, W. J., PROC. SOC. EXP. BIOL. AND MED., 1935, **33**, 224.

[2] Atwell, W. J., *Anat. Rec.*, 1937, **68**, 431.

[3] Blount, R. F., *J. Exp. Zoöl.*, 1932, **63**, 113.

[4] Blount, R. F., *Anat. Rec.*, 1939, **73**, Sup. 1, 7.

physeal transplants in *A. punctatum* may produce thyreotropic hormone. Regarding the pars intermedia, however, he states that this lobe "does seem dependent upon the pituitary floor of the diencephalon for its development." Burch,[5] by operations performed on *Hyla regilla* in the gastrula stage, was able to suppress the differentiation of the pars intermedia and thus to produce silvery animals. Eakin[6] undertook experiments upon *Triturus torosus,* to confirm Burch's findings. At a stage corresponding to Stage 36 in Harrison's series gelatin was injected into the fore-gut. Following this procedure a single case of 'albinism' was found. This, together with the histological picture, was taken to indicate that the differentiation of the epithelial hypophysis is dependent upon the inducing power of the infundibulum.

The present experiments were performed upon embryos of *A. jeffersonianum, A. tigrinum,* and of the white axolotl (partial-albino strain of *A. mexicanum*). Operations were done at the tail-bud stage, corresponding approximately to Harrison's stages 30-32 for *A. punctatum.* Using care not to remove any of the brain floor the solid primordium of the epithelial hypophysis with some of the associated ectoderm was transplanted in the same animal to a position between the right otocyst and the hind brain. A small incision through the epidermis permitted the insertion of the transplant. The point of entrance was dorsal and rostral to the otocyst. Animals were reared in the laboratory for from 2 to 4 months. Completely hypophysectomized animals without transplants and normal, unoperated salamanders served as controls.

For a transplantation experiment to be considered successful it was required that study of the animal and of the serial sections show: (1) entire absence of the epithelial hypophysis from the orthotopic position, (2) characteristic hypophyseal tissue in the region into which the transplant had been placed, and (3) some evidence of function of the transplant as described below. Forty such 'successful' cases are included in this report, 35 being of *A. jeffersonianum,* 3 of *A. tigrinum,* and 2 of the white axolotl. These 40 cases are from 72 operated animals studied at autopsy.

Most of the transplants were contained in the cartilage surrounding the internal ear. A few were dorsal, ventral, rostral or medial to the otic capsule. Only 2 were contained in the cranial cavity. Histologically the transplants showed the structure of the pars intermedia and/or of the pars anterior. In no case could a neural

[5] Burch, A. B., PROC. SOC. EXP. BIOL. AND MED., 1938, **38**, 608.

[6] Eakin, R. M., *Growth,* 1939, **3**, 373.

lobe or a distinct pars tuberalis be recognized. Some of the transplants consisted in part of epithelial cysts or vesicles, the derivation of which is not always clear. Some of them, however, exhibited the structure of the epidermis. A few may have been derived from cells inadvertently removed from the brain floor and included with the transplant.

The successfully transplanted cases gave evidence of function of the pars intermedia by being dark in color in striking contrast to the silvery condition of hypophysectomized animals without transplants. The dark color was observed to be due to dispersion of pigment in both dermal and epidermal melanophores. Several animals with transplants exhibited a more intense pigmentation than normal, unoperated controls.

In a number of cases the living animals showed a spot of still darker coloration, 3-4 mm in diameter, in the dorsal skin, caudal to the right eye. In a few instances this dark spot was located in the roof of the mouth or pharynx ventral to the internal ear. In each of the above cases study of serial sections revealed that the transplant was located in relation to the center of the dark area, being either subepidermal or submucosal. This was taken to indicate that in certain cases at least the transplant may exert a local as well as a systemic effect on pigment cells.

The function of the pars anterior of the transplanted hypophysis was evidenced by the normal size of the thyroid glands as contrasted with the atrophic condition found in hypophysectomized animals without transplants. None of the animals had completed metamorphosis although several had made noticeable progress in that direction.

Summary. Autoplastic, heterotopic transplants of the primordium of the epithelial hypophysis have been made in three species of Amblystoma. These transplants differentiated without contact with the brain, and gave evidence of chromatophorotropic and thyreotropic activity.