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Origin of the Lens by Induction in the Salamander *Amblystoma punctatum.**

L. S. Stone and F. L. Dinnean.

From the Department of Anatomy, Yale University School of Medicine.

Harrison[1] demonstrated in *Amblystoma punctatum* that lens development was suppressed if the eye rudiment was excised just before or immediately after the closure of the neural folds, but that the same presumptive lens ectoderm would form lens tissue if grafted to other parts of the head. This indicated that the lens was established very early even though a prolonged association with the eye insured better development. He also showed that at this time body and head ectoderm was not transformed into lens if grafted over these eye centers. In stages after the closure of the neural folds this was corroborated by Beckwith[2] and Stone and Dinnean.[3]

The present report involving 60 experiments demonstrates lens induction by the eye in this salamander and shows how the various lens-eye relationships in cyclopia can be explained on this basis.

The presumptive lens forming region in the open neural plate (Harrison stages 15 and 16) was completely excised on the right side and replaced by ectoderm which was taken from the ventral pole of Harrison stage 12 to 13, previously stained in Nile-blue sulphate. The blue ectoderm later covered the entire side of the head including the eye. The latter induced a lens in the grafted ectoderm. In histological sections the lens contained the blue dye, therefore leaving no doubt as to its origin.

In one group of experiments in this series the prechordal substrate under the neural plate (Harrison stage 15) was excised in the manner described by Mangold[4] and Adelmann,[5] while in another group, eggs (Harrison stages 8 and 9—when involution of blastopore begins) were placed in lithium chloride (0.4% solution) for 24 hours.

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1 Harrison, R. G., Proc. Soc. Exp. Biol. and Med., 1920, **17**, 199.

2 Beckwith, C. J., *J. Exp. Zool.*, 1927, **49**, 217.

3 Stone, L. S., and Dinnean, F. L., *J. Exp. Zool.*, 1940, **83**, 95.

4 Mangold, O., *Ergebn. d. Biol.*, 1931, **7**, 365.

5 Adelmann, H. B., *J. Exp. Zool.*, 1930, **57**, 223.

The animals were killed a few days later in Harrison stages 39 to 41—when the lens is well defined. Both experiments as Adelmann[5, 6] has shown in Amblystoma produced many head deformities, particularly in the eye regions. All degrees of fusion of the eyes resulted and in a few animals cyclopia completa was obtained.

In some cases there were no eyes and when this occurred, there were no lenses. Some specimens possessed a poorly formed eye with a lens, while on the other side lens and eye development were completely suppressed. In 2 cases there were 2 fused flattened optic plates with much mesoderm lying between them and the overlying ectoderm. In these there was no lens formation. The intervening mesoderm apparently prevented lens induction. In other specimens fusion of the eyes was found in all degrees. In some of these a single eye of 2 fused components possessed a single elongated lens with 2 separated fiber forming centers. When the complete cyclopian condition existed, the lens was large with a single fiber forming pole.

The similarity in the degree of fusion between the eyes and the lenses indicates in the light of these experiments that the fiber forming pole (the center for lens formation) was a direct result of the inducing eye center. The experiments also demonstrate that so far as induction of the lens by the eye is concerned Amblystoma falls in line with that of many other amphibians. This answers the question which Spemann[7] raised regarding this species.

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[6] Adelmann, H. B., *J. Exp. Zool.*, 1934, **67**, 217.

[7] Spemann, H., 1938, *Embryonic Development and Induction*, Yale University Press, 40.