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Exchange of Eyes Between Adult Hosts of *Amblystoma punctatum* and *Triturus viridescens.**

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It has been shown by one of the authors that functional eyes can be successfully exchanged between the larvae of 2 closely allied species, *Amblystoma punctatum* and *A. tigrinum.*[1] Since we have also demonstrated that homoplastic eye grafts of adult *A. punctatum*[2] and *Triturus viridescens*[3, 4, 5] can be made with return of vision, it was of interest to see what success could be obtained in these 2 very different species if their eyes were exchanged. In the present experiments the right eyes were exchanged between 34 pairs of animals. The Amblystoma hosts were young adults around 10 to 11 cm in length. The Triturus animals were about 9 cm in length. The eyes were studied daily while living and the hosts were preserved from 14 to 141 days after operation for histological studies.

In Amblystoma eyes on Triturus hosts return of circulation was observed as early as the fifth day. In the majority of cases it was recorded during the first 2 weeks. In Triturus grafts it was first seen on the sixth day and recorded in one-half of the cases during the first 2 weeks. In some cases temporary opacity in the cornea in both groups delayed the observation of the first visible signs of circulation. In some Triturus eyes the opacity, when it appeared, lasted for many days. Corneal reflex was obtained in Amblystoma grafts after the first month. This appeared to be present in a few Triturus eyes also.

The experiments demonstrated that Amblystoma eyes were far better adapted to their new hosts than the Triturus grafts. Although there was sloughing and resorption of both types of grafts the Triturus eyes on Amblystoma if kept long enough beyond the sixth or seventh week ended in this way.

In the Triturus iris the pigment pattern of black and yellow broke

* Aided by grants from the John and Mary R. Markle Foundation and the Fluid Research Fund of Yale University School of Medicine.

1 Stone, L. S., *J. Exp. Zool.*, 1930, **55**, 193.

2 Stone, L. S., and Cole, C. H., PROC. SOC. EXP. BIOL. AND MED., 1931, **29**, 176.

3 Stone, L. S., and Ussher, N. T., PROC. SOC. EXP. BIOL. AND MED., 1927, **25**, 213.

4 Stone, L. S., Zaur, I. S., and Farthing, T. E., PROC. SOC. EXP. BIOL. AND MED., 1934, **31**, 1082.

5 Stone, L. S., and Chace, R. R., PROC. SOC. EXP. BIOL. AND MED., 1937, **36**, 830.

down during the first 2 weeks, just as it does when homoplastic grafts were made.[4] An attempt to repair this pattern was later made but subsequent degeneration usually overtook it. In the Amblystoma eye the iris, which is brownish black with a few golden spots, usually changed very little.

The pupil of the normal Triturus eye is rather large and oval in shape. It does not react to light.[4] After operation it decreased maximally in size as in homoplastic grafts. In the present experiments it never recovered. In the adult Amblystoma eye there is a marked pupillary light reflex. In most of these transplanted eyes the pupillary reflex continued after the operation. In some there was a temporary resting stage of dilation. In one case this remained as a permanent condition although the pupil did give a response to light. In a few cases between the third and twelfth days after operation the pupil in the resting stage was much smaller than normal. It remained in this condition for about a week before it recovered. No pathology in the iris or ciliary body was found histologically in specimens killed during such periods.

The retinal picture obtained from histological studies showed early stages of degeneration in both types of eyes, such as exist in homoplastic grafts.[2, 4] In the Triturus transplants on the twentieth to twenty-fifth day the degenerative processes were continuing further. At this time in homoplastic grafts the more resistant ciliary region of the retina ordinarily is regenerating a new retina. This is inhibited when the eye is in the Amblystoma host. Blood vessels begin to invade all of the deeper tissues and progressive resorption takes place.

Amblystoma eyes on Triturus hosts reacted entirely differently. They followed more closely the course of homoplastic grafts. The undegenerated ciliary region of the retina began regenerating a new retina during the third week. Although some eyes showed slower regeneration than others a new retina began differentiation into its various layers during the second month. As early as the forty-first day a completely regenerated optic nerve was seen extending from the graft to the chiasma of the new host.

The regenerated retina was thinner than the normal. The ganglion layer had less cells than normal, for there were spots in it devoid of cells. The inner nuclear layer also appeared to have less cells than the normal retina. The rod and cone cell layer appeared normal. As late as 141 days after operation there were no signs that the Amblystoma eye on a Triturus host was undergoing any degeneration.

No tests for vision were made in this group of animals. Such tests will be made in further experiments when a larger group of animals is available.