5935

Lens Induction in Ectoderm Transplanted from Rana Palustris to Amblystoma Punctatum.

DOROTHY C. HEWITT. (Introduced by R. G. Harrison.)

From the Osborn Zoological Laboratory, Yale University.

Geinitz[1] showed that, if the dorsal lip of the blastopore is transplanted from an anuran gastrula to the gastrocoel of a urodele, it not only differentiates into typical axial organs but also induces the formation of a neural tube and somites in the urodele tissue with which it is in contact. Lewis[2] attempted to obtain lens induction by implanting an anuran optic vesicle beneath epidermis in the region between the eye and the ear of an Amblystoma embryo but he himself was not sure of the source of the lenses which developed after this operation. Since Geinitz's demonstration of xenoplastic induction, renewed attempts have been made to show that lens formation can be induced by xenoplastically transplanted optic vesicles. Cotronei and Spirito[3] and Mangold[4] have performed experiments bearing on this subject but have not obtained positive results in the species which they used.

In the experiments here reported, *Rana palustris* and *Amblystoma punctatum* were used as donor and host respectively. The operation involved removing epidermis from over the left optic vesicle of the urodele host at stage 22-23 and substituting for it a piece of head epidermis from the anuran donor. The donor, which was at approximately the same stage of development as the host at the time of operation, was, however, considerably smaller than the host. Therefore, in order to cover the host's optic vesicle, it was necessary to transplant an extensive piece of the donor's head epidermis.

Animals which had been operated upon were preserved at various stages during embryonal and early larval life, *i. e.*, from 4 to 23 days after operation, and were subsequently examined histologically. Xenoplastic lens induction was found to have taken place in 11 cases. Since the nuclei of anuran cells are markedly smaller than those of urodele cells, the discrepancy between the sizes of the nuclei in the Rana and Amblystoma lens epithelium furnished a reliable criterion

[1] Geinitz, B., *Roux' Arch. f. Entwicklungsmechanik*, 1925, **106**, 406.

[2] Lewis, W. H., *Am. J. Anat.*, 1907, **7**, 270.

[3] Cotronei, G., and Spirito, A., *Atti della Reale Accademia Nazionale dei Lincei*, 1930, **12**, 70.

[4] Mangold, O., *Ergebnisse der Biol.*, 1931, **7**, 277.

for determining from what source a lens was derived even after the stage at which it had separated from the epidermis.

The results of these experiments fall into 2 groups. The first includes those cases where only one lens developed in association with the Amblystoma eye over which Rana epidermis had been placed. These lenses were quite normal in shape and structure. They showed none of the signs of histolysis which Lewis[5] and Cotronei and Spirito[6] have found in xenoplastically transplanted optic cups.

The second group includes cases where 2 lenses, one of Rana and the other of Amblystoma origin, developed in association with the Amblystoma eye over which Rana epidermis had been placed. In the light of Cotronei and Spirito's demonstration that xenoplastically transplanted organs, histologically similar, have a definite affinity for one another and tend to fuse, particular interest attaches to one of the animals in this group. In this animal actual fusion took place between the Amblystoma and Rana lenses which were developing in association with the same Amblystoma eye. The lens fibers of the 2 components of the composite lens which was thus formed were contiguous and the uninterrupted sheet of epithelium surrounding the lens showed, by the sizes of its nuclei, that it consisted partly of urodele and partly of anuran cells.

The results of these experiments show that the eye rudiment of a urodele embryo can induce lens formation in anuran epidermis with which it is in contact and that the lens which is thus induced maintains its own histological characteristics.

A few operations were done in which *Amblystoma punctatum* epidermis was transplanted to the eye region of *Rana palustris*. In these cases no lenses developed since the grafts became necrotic very soon after the operation.

---

[5] Lewis, W. H., *Am. J. Anat.*, 1907, **7**, 270.

[6] Cotronei, G., and Spirito, A., *Atti della Reale Accademia Nazionale dei Lincei*, 1930, **12**, 72.