

# EXPERIMENTAL OBSERVATIONS ON THE DEVELOPMENT OF THE AMPHIBIAN EAR VESICLE.

BY

GEORGE L. STREETER,  
*University of Michigan.*

The accompanying figure represents a reconstruction of the brain, eye and two ear vesicles of a tadpole about one month old, in which the experiment was made of transplanting the left ear vesicle to the right side in the space between the normal right ear vesicle and the eye. This experiment was made as a supplement to a series of



similar experiments showing the effect of change in environment upon the posture and development of the labyrinth, and which have been previously reported (*Jour. Exper. Zool.*, Vol. IV, 1907).

In the present experiment the effort was made to determine the influence of two adjacent ear vesicles upon each other; to see if on transplanting a very young ear vesicle, while still a simple primitive epithelial cup, and placing it against another similar ear vesicle, whether the two would fuse and develop into a single large labyrinth, as has been supposed to occur in cyclopia, or whether the transplanted vesicle would retain its individuality and continue to develop as a separate structure.

The experiment was carried out on *Rana pipiens* larvæ during the premitile stage, at a time when the ear vesicle consists of an invaginated epithelial cup just in the process of being pinched off from the deeper layer of the skin. The procedure adopted was similar to that used in the experiments previously mentioned; in this case the left vesicle being loosened from its natural bed and transplanted in a pocket in the loose tissue closely against the front

surface of the right ear vesicle. After the operation the specimen was reared and at the end of a month was killed in preserving fluid, embedded in paraffin and prepared in serial sections. A model was then made as shown in the accompanying photograph by means of the wax-plate reconstruction method of Born.

Examination of the sections and the model immediately shows that ear vesicles under the circumstances of this experiment maintain their identity. There is no trace of fusion or communication between the two. The experiment was repeated on other specimens and the specimens dissected with results to all appearances the same, though the duplicate specimens were not modelled. It may be pointed out that this result is in harmony with Stockard's recent experiments (*Science* p. 455, 1908), in which he produced cyclopia by the action of magnesium salts, and found that the defect was not due to a subsequent union or fusion of the two eye elements after they had become free and distinct. In all his cases where the cyclopic defect was present it could be recognized at the first appearance of the optic vesicles.

In addition to the original problem, the result of such a modification of environment upon the individual growth of the two vesicles is worthy of note. The effect produced upon the right labyrinth by the presence of the foreign one is limited to an abnormality of the anterior semicircular canal. A protruding pouch, corresponding to this canal, was formed in the normal way, but the central part of its walls failed to approximate and there was consequently no absorption area, such as is necessary for the completion of the closing off of the canal.

As regards the transplanted vesicle it can be seen, in the first place, that it has developed into a characteristic labyrinth. Furthermore the two canals, seen in the figure, possess the characteristics of the lateral and posterior canals respectively, that is, the labyrinth is a left-sided one. It may be pointed out that the distinction between the anterior and posterior canals can be easily made out by their relation to the lateral canal; the ampullæ of the anterior and lateral canals branch out together from the utricle like the two arms of a "Y," while the lateral canal is completely separated from the

posterior canal by a sharp cleft. Thus, in this instance the transplanted vesicle maintained its left-sided characteristics. It is next to be noted that, though in the transplantation it was placed haphazard as regards the planes of space, it has developed, like those described in previous experiments, in nearly a normal posture, with the endolymphatic appendage toward the brain. The tip of the appendage can be seen in the figure. The only serious defect in the transplanted vesicle is found in the region of the ampullæ of the anterior and lateral canals, where they press against the other labyrinth. The labyrinth wall here is markedly retarded in growth and there is a very incomplete development of the anterior canal. Otherwise we have two practically normal labyrinths, and both are connected with the brain by well developed separate ganglia and nerves.

THE EXPERIMENTAL METHOD AS APPLIED TO THE  
STUDY OF THE DEVELOPMENT OF THE  
NERVOUS SYSTEM.

BY

ROSS G. HARRISON,  
*Yale University.*

No abstract of this paper is given here, as the paper itself in amplified form was published in *THE ANATOMICAL RECORD*, Vol. II, No. 9, December, 1908.