TABLE II.
Comparison of the rates of absorption of hexoses (glucose = 100).
Absorption time, 1 hr.

Sugar	Rats	Closed loops (dogs)
d-galactose	115	108
d-glucose	100	100
d-fructose	91	92
d-mannose	64	49

rates of absorption of these 4 sugars in rats. On the basis that glucose = 100, he states the absorption rate of galactose as 110, fructose 43 and mannose 19. On this basis (glucose = 100) our findings are summarized in Table 2. There are probably 2 factors that enter into this difference of results, namely, the number of experiments necessary in this type of work to allow one to arrive at a dependable average and the method necessary to accurately estimate small quantities of mannose.[2] While the Shaffer-Hartman method for glucose determinations may be applied to levulose and galactose since the error remains fairly uniform throughout the range of concentrations used, no uniformity was found when applying it to mannose determinations.

The marked difference in reaction of glucose and mannose to a common reagent emphasizes the importance of their stereoisomerism and at once suggests this as the probable factor in the difference in absorption rates rather than the so-called "selectivity" (preference for glucose) on the part of the intestinal mucosa.

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The Head Pattern in Amblystoma Studied by Vital Staining and Transplantation Methods.

ESTHER CARPENTER. (Introduced by Ross G. Harrison.)

From the Osborn Zoological Laboratories, Yale University.

Local vital stains were applied to the prospective head region in the late yolk plug stage of *Amblystoma punctatum* by Vogt's[1] method. From the records obtained by making camera lucida drawings of the position and extent of the stained areas in the stages following, composite diagrams were constructed showing the arrangement of the parts of the prospective ectoderm involved in the

[1] Vogt, *Arch. f. Ent. d. Org.*, 1925, 106.

formation of the nose, lens, ear, balancer, gills and stomodaeum. Two of these, Harrison stages 13 (slit blastopore) and 22 (shortly after closure of neural folds), are shown in the figures.

The wheeling about of the head epidermis due to the dorsal convergence of the neural material which lies almost out at the equator of the embryo in the gastrula stage, takes place in *Amblystoma punctatum* in a manner similar to that observed by Vogt[2] and Goerttler[3] on European salamanders. There is a forward and downward growth of the ectoderm of the head region anteriorly in such a way that the material at the middle of the transverse fold comes to lie just in front of the stomodaeum and ventral to the eye—a shifting of the material nearest the dorsal midline in an anterior and ventral direction while that originally ventral moves caudally and dorsally.

The results obtained for Amblystoma are much less diagrammatic than those Röhlich[4] gives for Triton but the arrangement of the anlagen is essentially the same in both forms. The position of the lens agrees with that given by both Manchot[5] and Röhlich for Triton. In Amblystoma however the nasal ectoderm seems to extend up on the outer side of the neural fold (stage 15) for a short distance and the ear ectoderm not quite to reach the fold. The latter may also be slightly farther anterior in Amblystoma than in Triton.

On the basis of the vital staining results transplantation experiments have been undertaken, using stained and unstained embryos of *Amblystoma punctatum* of the same age (donor and host) to test the relative determination of the balancer, lens and nasal ectoderm during the neurula stages. The results so far obtained indicate that nasal ectoderm is determined earlier than either balancer or lens as shown by the test of self-differentiation when transplanted to other parts of the head region. This capacity was evident in nasal ectoderm from stage 14 (just before appearance of medullary folds) on. Nasal placodes developed in the balancer region, between the balancer and the eye, in the mouth region and on the surface of the first gill. From stage 14 on replacement of part of the nasal ectoderm by other head ectoderm brought about a reduction in size and retardation in development of the nasal placode. The lens ectoderm becomes a segregate in Lillie's[6] sense of the word

[2] Vogt. *Arch. f. Ent. d. Org.*, 1929, 120.
[3] Goerttler, *Arch. f. Ent. d. Org.*, 1925, 106.
[4] Röhlich, *Arch. f. Ent. d. Org.*, 1931, 124.
[5] Manchot, *Arch. f. Ent. d. Org.*, 1929, 116.
[6] Lillie, *Arch. f. Ent. d. Org.*, 1929, 118.

later than either the nose or balancer. Lentoids, i. e. partially differentiated lenses, were the usual result of transplantation of lens ectoderm to other parts of the head region even as late as stage 20 (contact of neural folds), although one case of apparent self-differentiation into a vesicular lens was obtained as early as stage 14. Lenses normal in state of differentiation but decreasing in size with the increase in age at which the operation was performed were obtained when lens ectoderm was completely replaced between stages

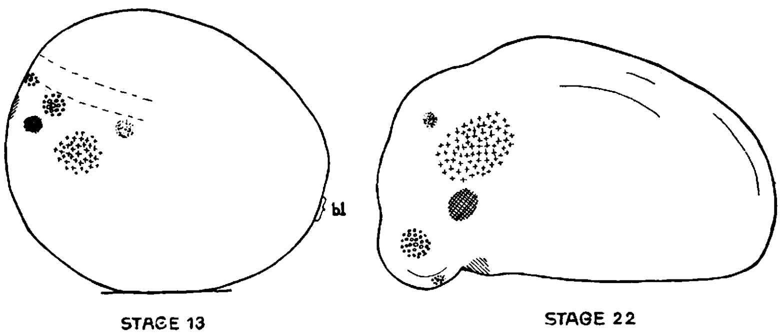

FIG. 1.

The areas of the ectoderm indicated are as follows: Large stippling—nasal; open circles—lens; small stippling—ear; slanting lines—stomodaeum; cross-hatching—balancer; crosses—gill mound; broken lines—medullary fold. The position of the blastopore is indicated by the letters—bl.

14 and 20. Up to stage 19 as much as 2/3 of the lens ectoderm can be replaced by other head ectoderm without interfering with the development of a lens normal in size and stage of differentiation. In one case suppression of the balancer was effected by covering the region with other head ectoderm at stage 13 + (before the appearance of the medullary folds). Sections made after the balancer on the unoperated side was well developed showed a thickening of the basement membrane on the opposite side and an increase in the thickness of the lower layer of the ectoderm similar to that observed during the early development of the balancer.[7] No cases have yet been obtained of self-differentiation of balancer ectoderm at stages before the formation of the medullary folds.

[7] *J. Exp. Zool.*, 1925, **41**.