

DEVELOPMENT OF EYE AS AN EXAMPLE OF RECIPROCAL AND REPEATED INDUCTIVE EVENTS

1. What do you mean by reciprocal induction? How this type of induction is related to eye development?

This is a type of induction where the inducer becomes the induced.

Once the lens has formed, it induces other tissues (e. g; optic vesicle). Under the influence of factors secreted by the lens, the optic vesicle becomes the optic cup and the wall of the optic cup differentiates into 2 layers (the pigmented retina and the neural retina, Strickler *et al.*, 2007). Such interactions are called reciprocal interactions.

2. Briefly describe the development of eye in chick with special reference to lens formation. (Example of repeated inductive events).

I. Time and site of origin: at 30 hours after incubation, as paired lateral outgrowths on the lateral sides of prosencephalon.

II. Stages of development:

*Paired regions of the brain bulge out and approach the surface ectoderm of the head. (the head ectoderm is competent to respond to the paracrine factors made by these brain bulges, **the optic vesicle**. The head ectoderm receiving these paracrine factor is induced to form the lens of the eye)*

(A) Development of sensory areas

(B) Development of lens and (C) Development of associated structures.

(A) Development of sensory areas: This stage can be described under the following headings—

a. OPTIC PLACODE—

i. Rudiments of primordial eye lie at the very anterior end of the neural plate in the form of 2 closely packed oval areas on either side of the midline in prosencephalon. They are lined below by mesoderm.

ii. At about **30** hours of development these areas become thickened and called optic placode.

INDUCTION: This placode formation is under the induction of roof of archenteron.

b. OPTIC VESICLE—

i. Placode then extends laterally as paired, small blunt bulging, called optic vesicle. These vesicle further extend outward laterally through loose mesenchyme cells until they reach the superficial ectoderm.

c. FORMATION OF OPTIC STALK—

i. At about **38** hours of development proximal part of each optic vesicle constricts from above downwards to form a narrow stalk, called OPTIC STALK.

ii. Constriction become much more marked at ~ **55** hours of development.

d. FORMATION OF OPTIC CUP—

i. at ~ **55** hours of development the external surface of the optic vesicles flattened out and invaginate inward. So the single walled vesicle transform into a double walled, cup like structure, called optic cup.

ii. The invaginated walls of the cup is much more thicker than the external.

iii. This first develops into sensory retina and later into the pigment coat & Retina (Taptum nigram)

CHOROID FISSURE

i. Concavities of the caps are directed laterally and ventrally due to incomplete invagination near the optic stalk develops a slit or groove, called 'choroid fissure'.

ii. The fissure serves for entry of blood vessel and mesenchymal cells into the posterior chamber of eye and these are found later in the vitrous body.

COLOBOMA OF IRIS

This tissue in some abnormal cases may persist and as a result a gap is left on the ventral edges of the pupil. This deformity is called coloboma of iris.

iii. Rim of the eye cap later becomes the edge of the pupil.

iv. Rim of the optic cup surrounding the pupil, becomes the IRIS.

(K 2902768588)