

B.Sc. Part II ~~IX~~ Paper IV A

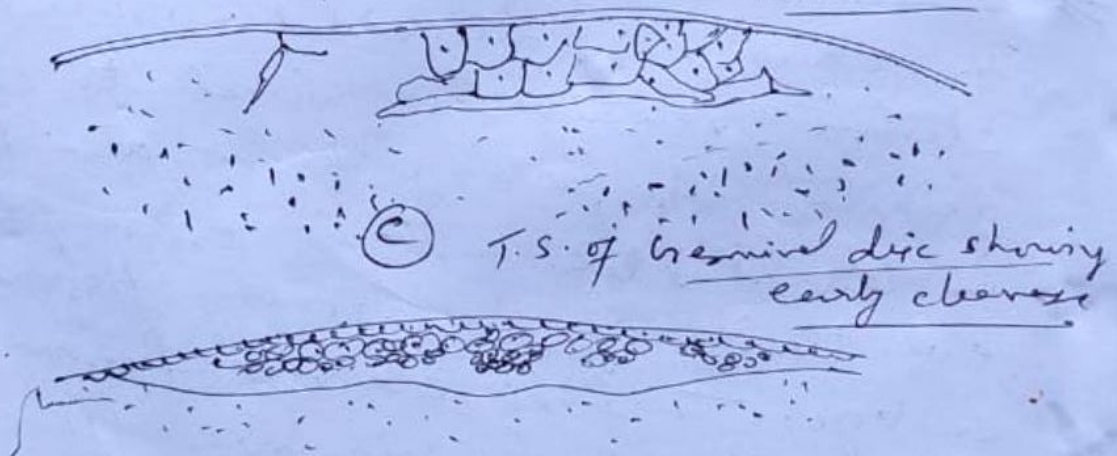
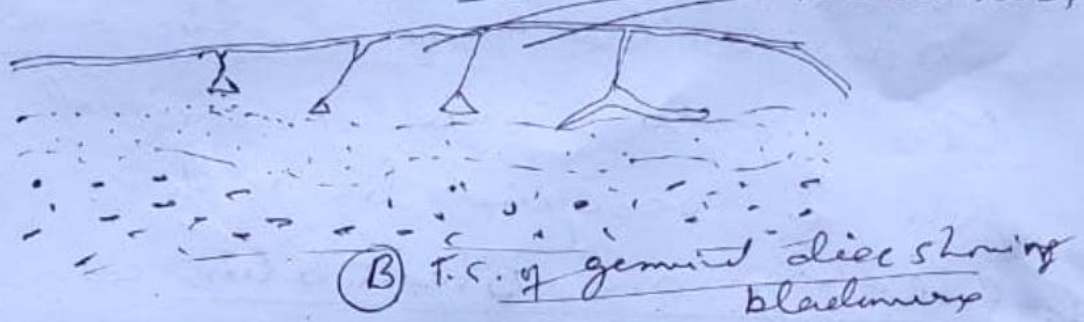
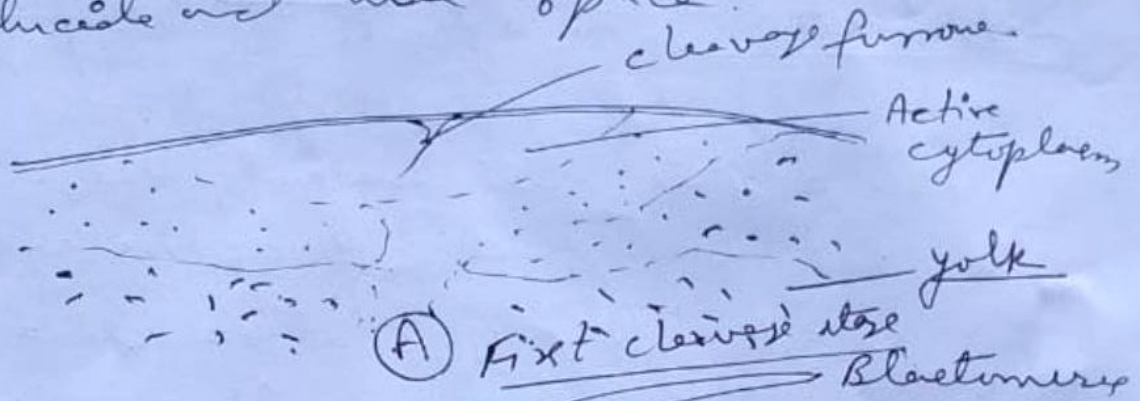
Development of chick (upto 3 germinal layers) Part - I

Introduction: The eggs of hen are polylecithal and hololecithal. The polarity of the egg is well marked, the animal pole being very small of active cytoplasm is in the form of a disc and a zygote nucleus, called germinal disc or blastodisc. Most of the space of animal or vegetal pole is occupied by yolk.

III cleavage and Blastulation -

In chick, the discoidal mesoblastula cleavage remains restricted to the germinal disc, the yolk remains in uncleaved state and is encompassed eventually by the growing tissues of the embryo. The first cleavage furrow consists of meridional incisions near the centre of the germinal disc. The second cleavage is again meridional but at right angle to the first. The third set of cleavage is vertical, cutting across the second set of meridional furrows and consequently tends to be parallel to first cleavage furrow. The fourth set of cleavage is also vertical and proceeds to form eight central blastomeres which are surrounded by twelve marginal blastomeres. Later stage of cleavage separates the blastomeres

of the vegetal area from maturing yolk. (2)  
 Hence, a blastoderm is produced with  
 a round disc, 5-6 cells deep in the center  
 (the epiblast) but only 1 to 2 cells are  
 pellucid and are opaque.



(D) Hypoblast stage

II Gastrulation → The process of gastrulation  
 in chick is in a highly  
 modified form than that of Amphioxus  
 and frog. The gastrulation in chick  
 embryo includes two types of  
morphogenetic movements.

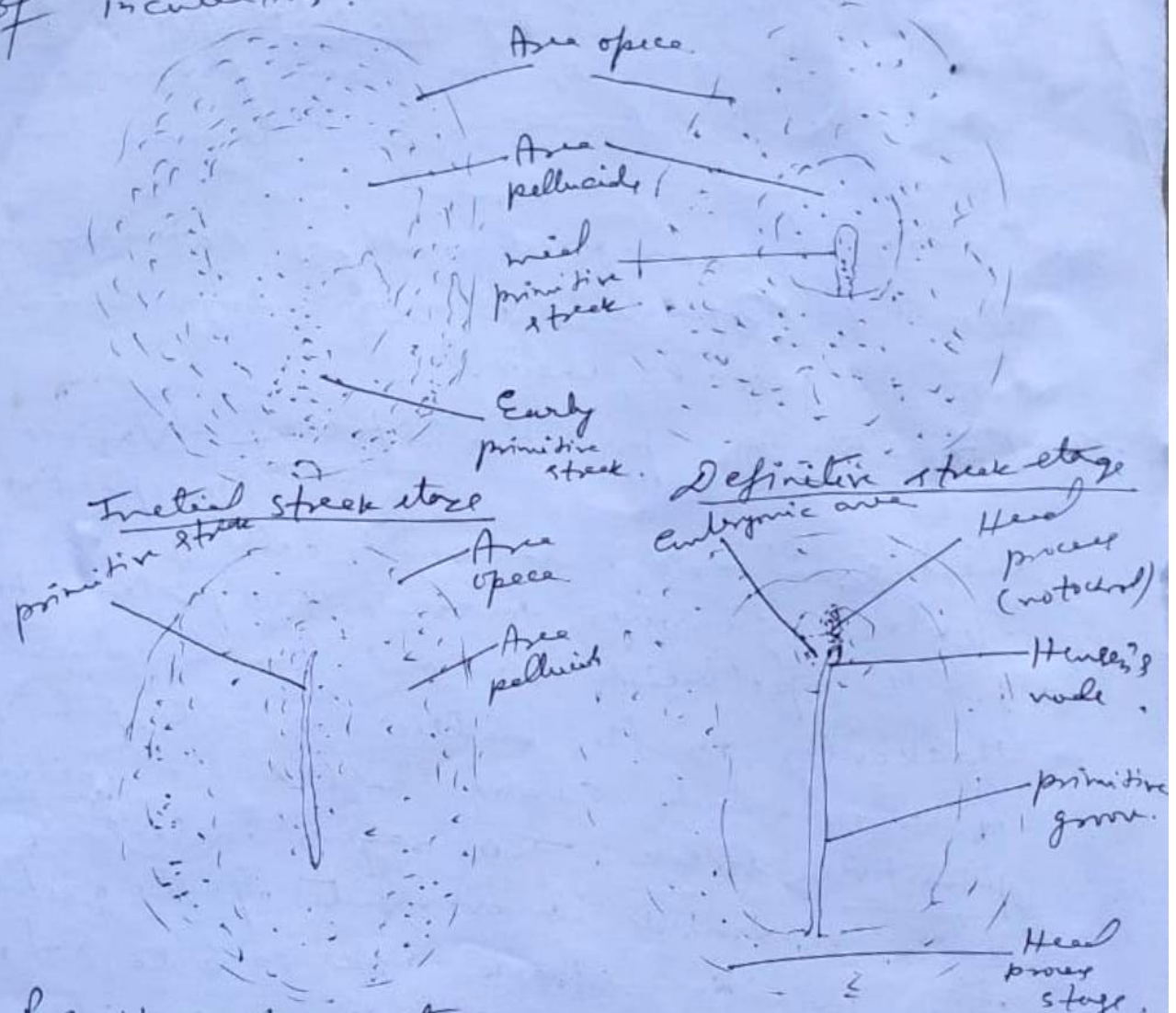
a. Emboly - It involves only the epiblast  
 and includes convergence,

invagination and involution through bottling process by the mesentoblast cells. Thus, Emboly is exhibited by the formation, elongation and ultimate recession of the primitive streak and also the formation of the head process. It results in the formation of embryonic ectoderm, mesoderm and notochord.

b) Epiboly includes overgrowth of ectoderm and also of hypoblast or extraembryonic ectoderm over the yolk mass.

III Formation of primitive streak - Various prospective mesodermal and endodermal cells of the epiblast converge towards the posterior border of the pellucid area and form a conical thickening in the middle as cells pile up is a morphogenetic centre called the initial primitive streak. This region initiates the definitive embryonic movements of the gastrulation. The primitive streak appears 6 to 7 hours of incubation. The formation of primitive streak is a progressive affair. After 12 to 13 hours of incubation, the primitive streak has attained an inter-mediate stage, extending from the posterior margin to the centre of the pellucid area. At this time, a longitudinal groove called primitive groove flanked on both sides by the primitive folds, appears in the middle of the streak. The most anterior portion of the groove thickens into Hensen's node. In this region, the primitive groove terminates

is a funnel shaped primitive pit. This stage is called definitive primitive streak and it is usually completed after 18 to 19 hrs of incubation.



Primitive streak stage

Head process stage

IV

Formation of Head process - Hensen's node

is indicative of a special type of morphogenetic movement. The pattern of morphogenetic movement represents a mid line movement. Prospective notochordal tissue converges on the node, sinks through it, and then passes directly forward as a tongue of tissue known as the head process or notochord process. This then gradually thickens and transforms into head parts.