

CHICKEN EMBRYONIC DEVELOPMENT



PRESENTED BY:

- **AMIR MOHAMMAD ARSH(17/IBT/003)**
- **VARNIT CHAUHAN(17/IBT/042)**
- **PARAS SAMANT(17/IBT/024)**

**GAUTAM BUDHA UNIVERSITY,
GREATER NOIDA, INDIA**

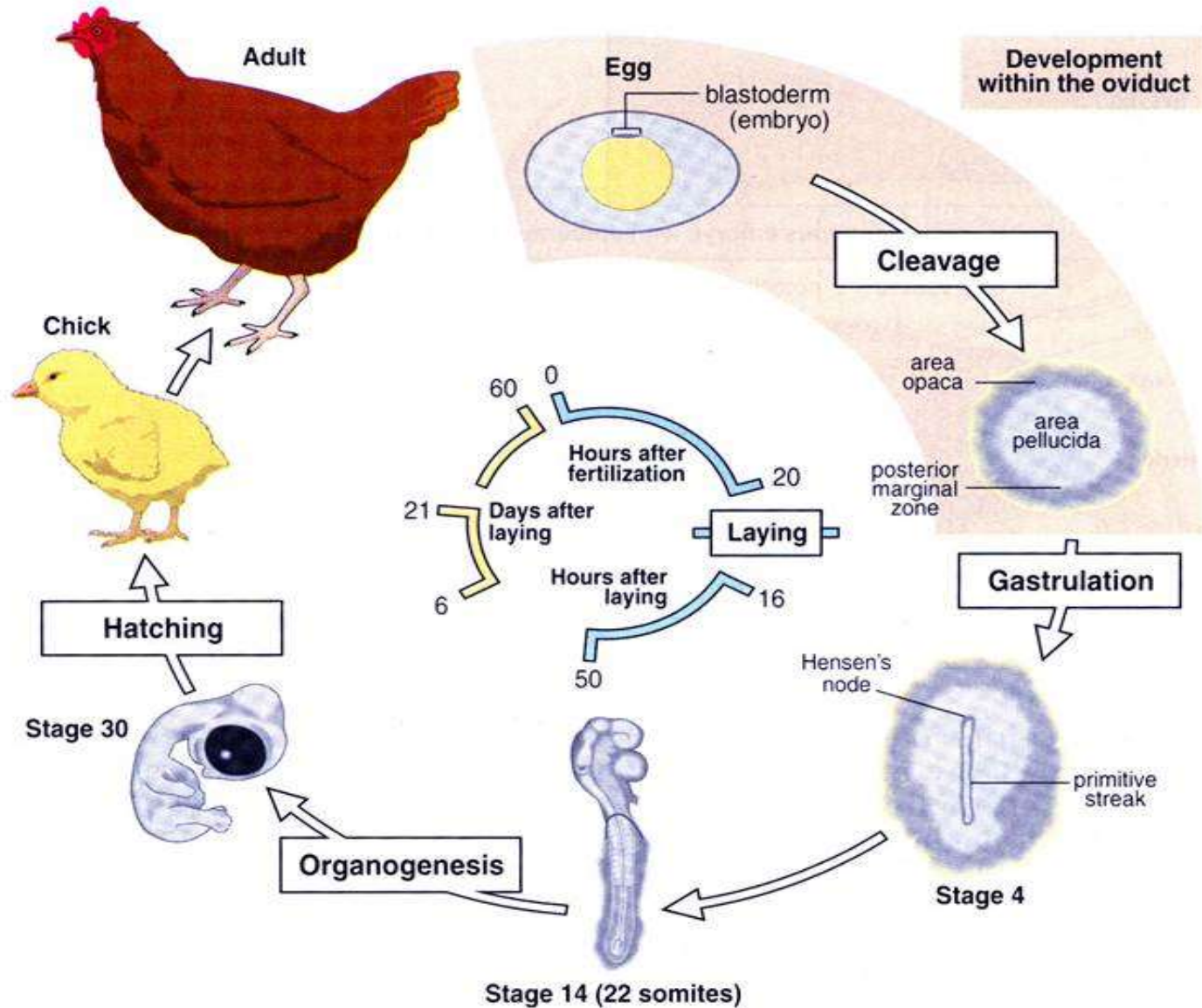
CHICKEN

- Is a domesticated **fowl**
- As one of the **most** common and **widespread** domestic animals

CLASSIFICATION

- Kingdom: **Animalia**
- Phylum: **Chordata**
- Class: **Aves**
- Order: **Galliformes**
- Family: **Phasianidae**
- Subfamily: **Phasianinae**
- Genus: ***Gallus***
- Species: ***G. gallus***
- Subspecies: ***G. g. domesticus***

GENERAL OVERVIEW



CHICKEN EGG

EGG

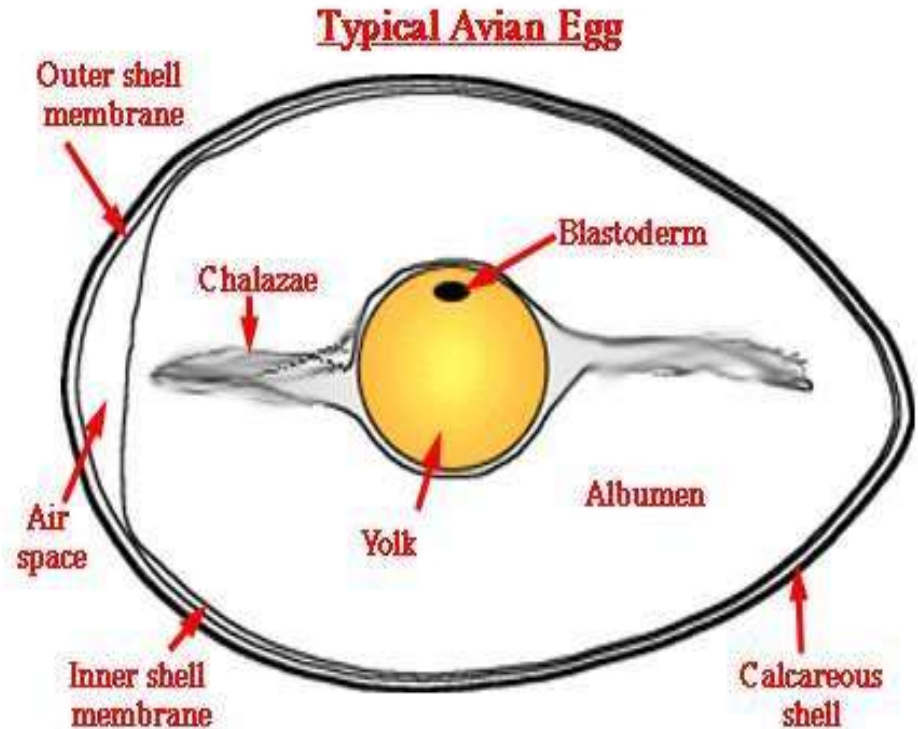
A fully formed and newly egg is large and **elliptical** with one end (broader than the other).

TYPE

The egg of chick is **telolecithal** (having a large yolk situated at or near one end)

RELEASE

The egg is released from the ovary, it takes 24 hours to pass down the oviduct, before being laid.



CHICKEN EGG

FERTILIZATION

The fertilization is internal, upper part of the oviduct, resulting two polar bodies degenerate and disappear.

STRUCTURE OF EGGS

It is oval in shape

SIZE

3cm wide and 5cm long

SHELL

Made up **95% calcium carbonate**, white and porous and exchange of gases occur, soft and flexible in a freshly –laid egg but soon become hard and brittle.

MEMBRANE

Two types of membrane, shell membrane and vitelline membrane, separated at the broad end of the egg to enclose an air space

YOLK MEMBRANE

The layer of yellow yolk is thicker than those of the white yolks. Yolk contains about 50% water.

Yolk consist of phospholipids, lecithin

- Yellow yolk shows 60% fats and 70% proteins.
- White yolk contains less fat and also less of fat soluble carotene.

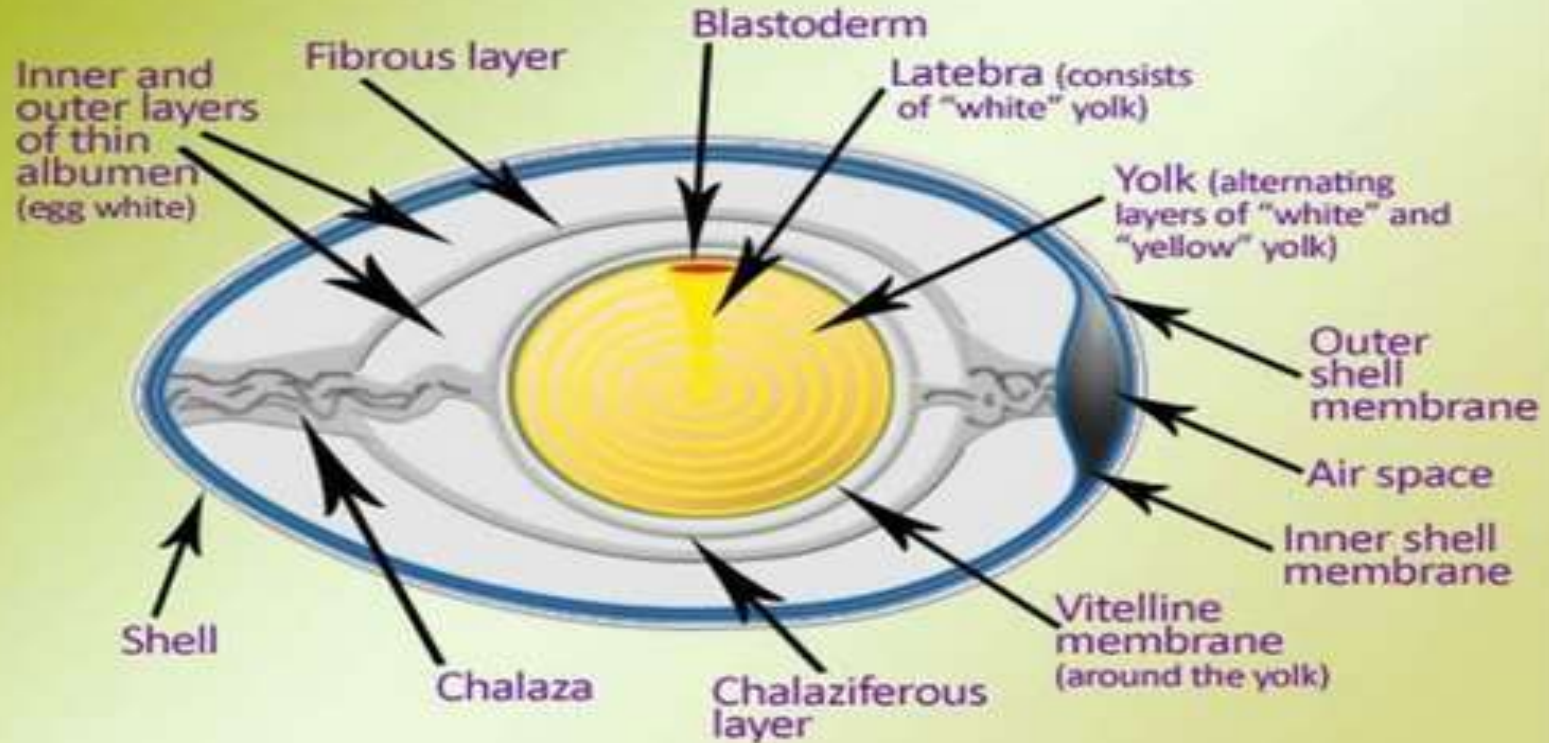
CHALAZA

Two end of the egg are some fibrous ,rope like twisted structure formed during journey of the oviduct

LATEBRA

The central flask shaped area that is enclosed of white yolk is called latebra.

CHICKEN EGG ANATOMY



ALBUMEN

It has two types :

Thick albumen and thin albumen

GERMINAL DISC OR BLASTODIC/ Blastoderm

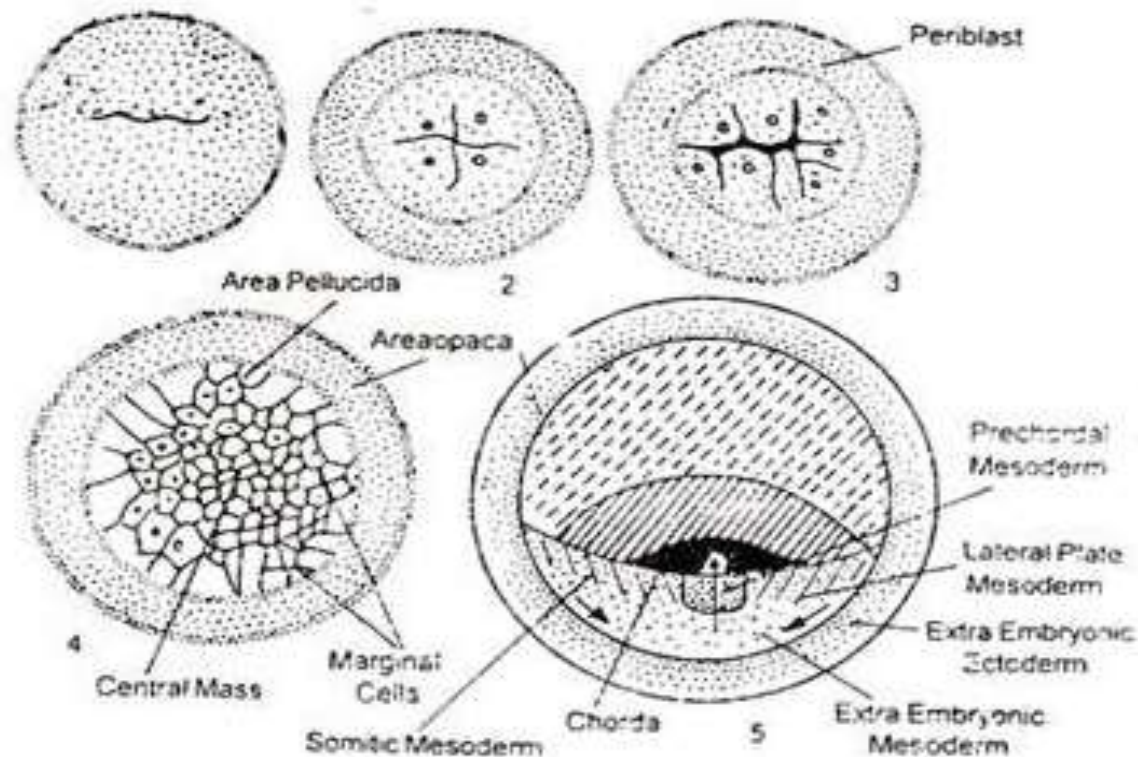
Nucleus of the egg is surrounded by the negligible amount of yolk free cytoplasm called germinal disc

DEVELOPMENT OF CHICKEN

CLEAVAGE OR SEGMENTATION

- It starts with the cleavage. It is meroblastic means confined to small area of **blastodisc**. Duration it takes 12-16 hours
- First cleavage forms **two cells**
- Second cleavage occurs after **20 min** of first cleavage **four cells** formed
- Third cleavage **eight cells** formed
- Irregular cleavage occurs in four hours at the end cleavage **256** irregular cells formed

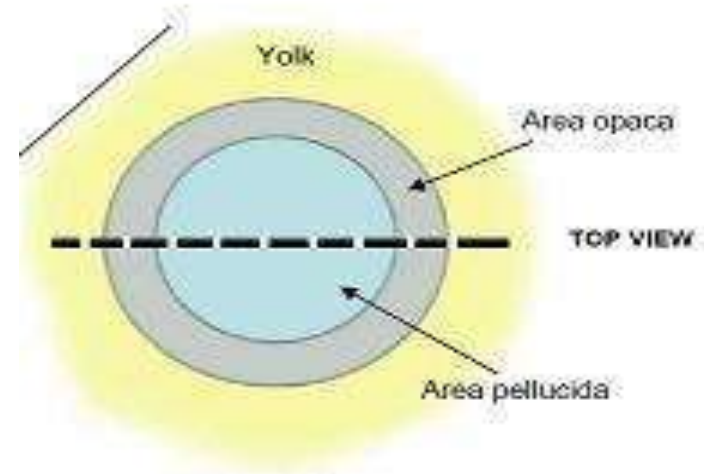
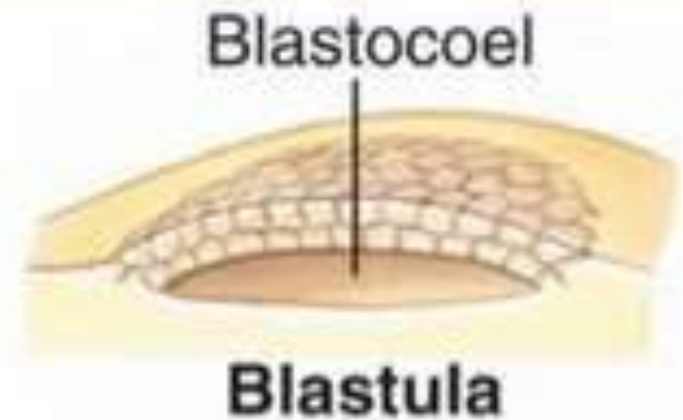
CLEAVAGE OR SEGMENTATION



Cleavage in egg, 1-4 early stages, 4-blastula; 5, prospective map and later formative movements.

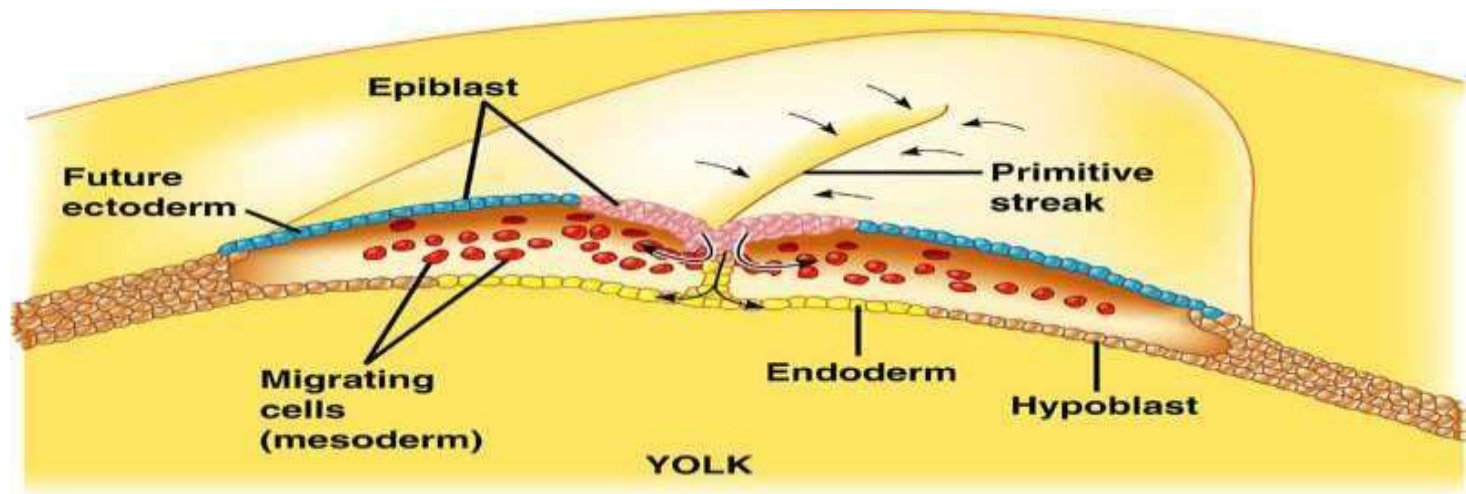
BLASTULATION

- After cleavage, blastulation occurs, due to blastulation following structure formed
- **Sub-germinal cavity:** it is similar to blastocoel
- **Area pellucida:**
The translucent central area of the blastoderm. Form the body proper
- **Area opaca:**
The opaque area of the blastoderm surrounding the area pellucida.
Help in the formation of extra embryonic membrane such as yolk sac.



PROCESS OF GASTRULATION

- Conversion of monoblastic egg into triploblastic gastrula.
- Gastrulation involves the formation of ectoderm, endoderm and mesoderm

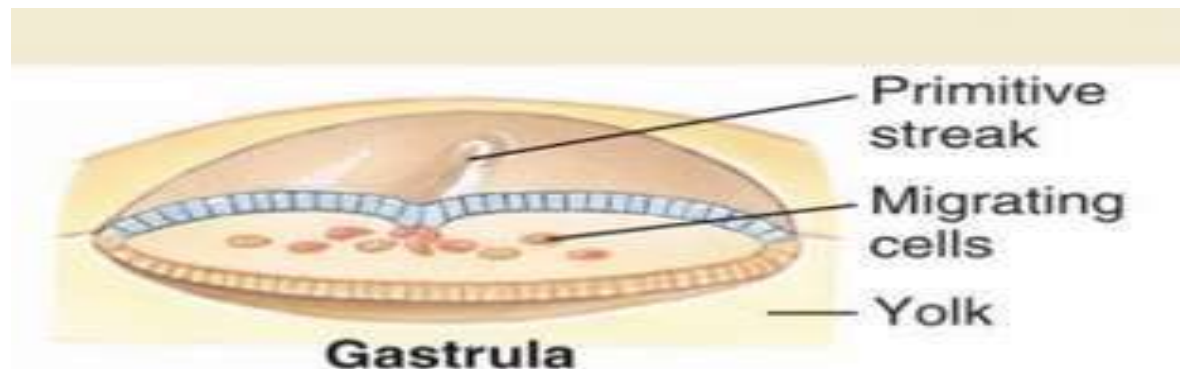


- **PRIMITIVE STREAK**

- It is groove on the surface along the (future) anterior-posterior axis.

- **PRIMITIVE STREAK FORMATION**

- The primitive streak is formed from the posterior marginal region cells .The streak first becomes visible as the epiblast (ectoderm) thickens at the posterior pole.



PRIMITIVE STREAK FORMATION

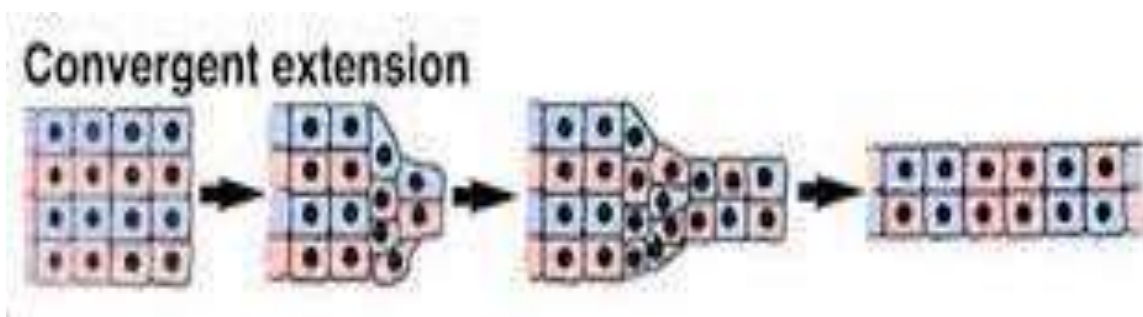
8 HOURS AFTER FERTILIZATION

- The epiblast (ectoderm) is separated from the hypoblast(endoderm) by the blastocoel. The epiblast will give rise to the three germ layers the embryo, while the hypoblast will give rise to extra embryonic structure.

PRIMITIVE STREAK EXTENSION

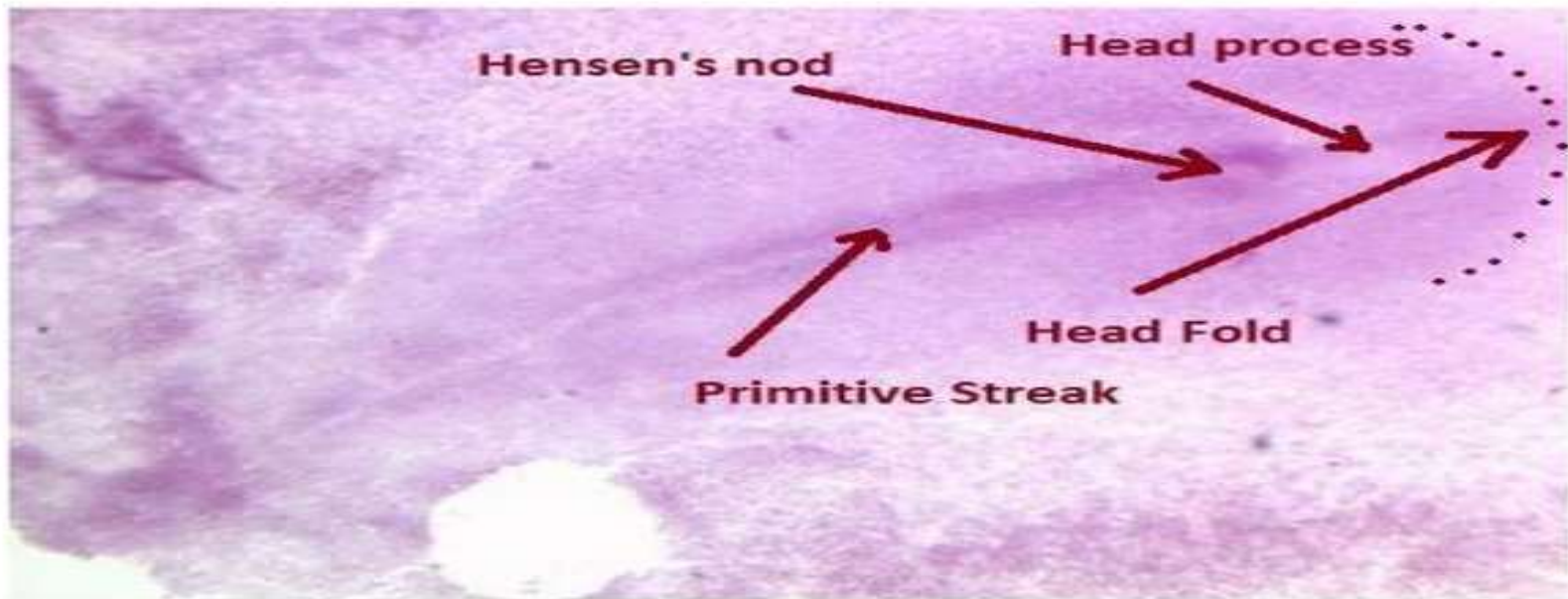
15-16 HOURS AFTER FERTILIZATION

- The primitive streak extends by convergent extension from the posterior to anterior pole. A **depression** forms along the primitive streak called **primitive groove**.



18Hrs Chick Embryo

18 hour Chick Embryo



- Longitudinally oriented Primitive Streak is more obvious.
- Primitive fold is observable
- Primitive groove is the invagination between primitive fold.

FORMATION OF HENSON'S NODE

19- 22 HOURS AFTER FERTILIZATION

- This bird egg view shows the primitive streak and Henson's node. At this stage ingression through the primitive streak of cells destined (fated) to become endoderm and mesoderm has begun.
- **HENSON'S NODE**
- It is formed by cells of presumptive notochord and floor of neural tube and is located posteriorly.
- Carnial end of the primitive streak is thickened and called **Hensen's Node**, which partially surrounds the depression called **Hensen's pit**.
- A distinct curved line, anterior to the hensen's pit called **Head fold**.
- And between the hensen's node and head fold is **head process**.

FORMATION OF NOTOCHORD (NOTOGENESIS)

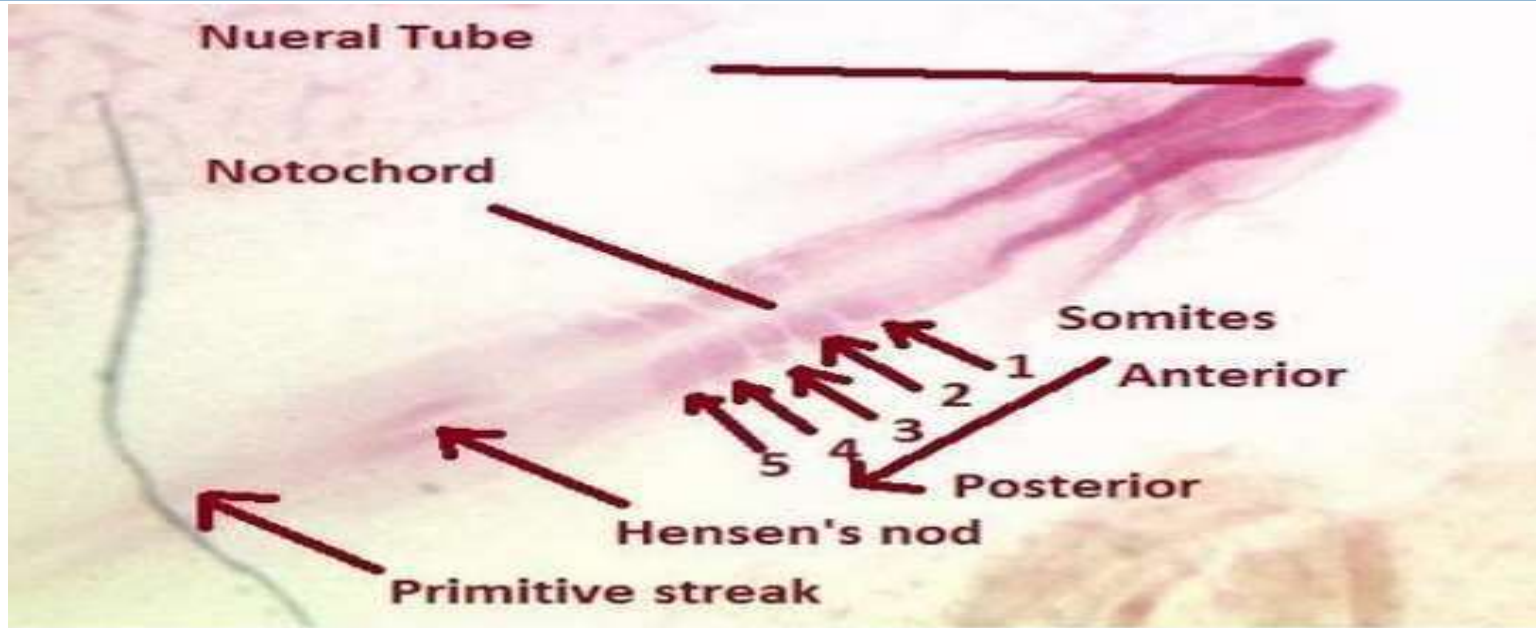
- A narrow strip of blastoderm just in front of primitive knot, consist of presumptive notochordal cell responsible for the formation of notochord.
- Notochord is visible **caudal** to the Hensen's node and in between the neural fold.
- Notochord is rod-like supporting structure.

SOMITES



- Somites are present, they are the blocks of the mesoderm.
- They appear on either side of the notochord.
- They give rise to the no. of structures, including **skeletal muscle, bone and dermis of skin.**

23Hrs Chick Embryo

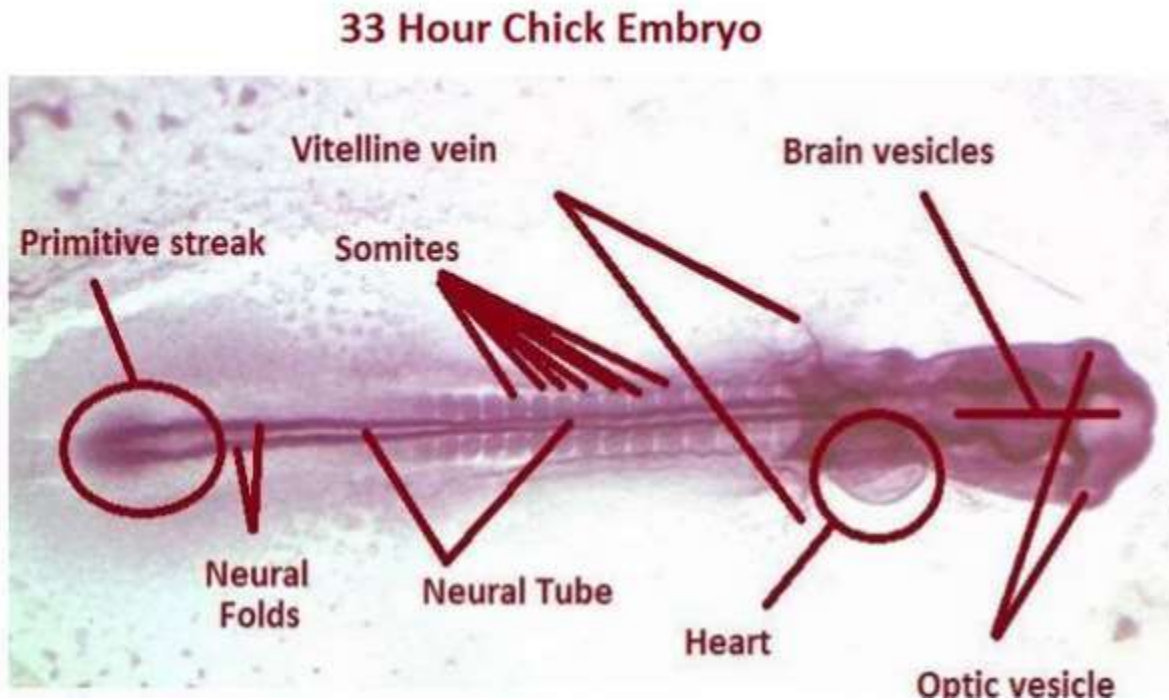


- Neural fold fuse dorsally and form neural tube.

FORMATION OF NEURAL TUBE (NEUROGENESIS)

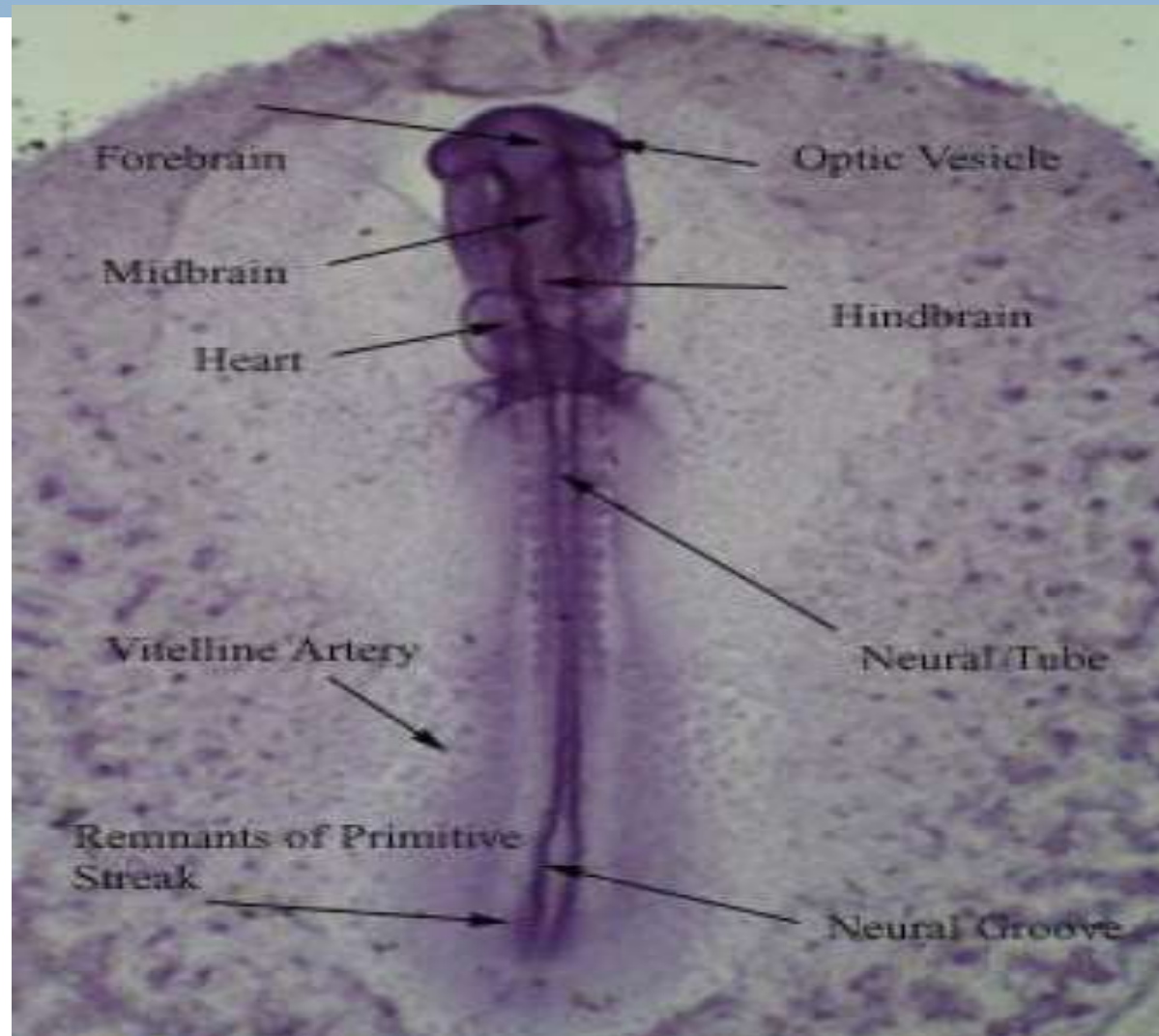
- In front of the primitive streak lie neural plate cells. These cells folds roll up and unite mid-dorsally ,enclosing a neural tube , forming fore brain , mid and hind brain.

33Hrs Chick Embryo

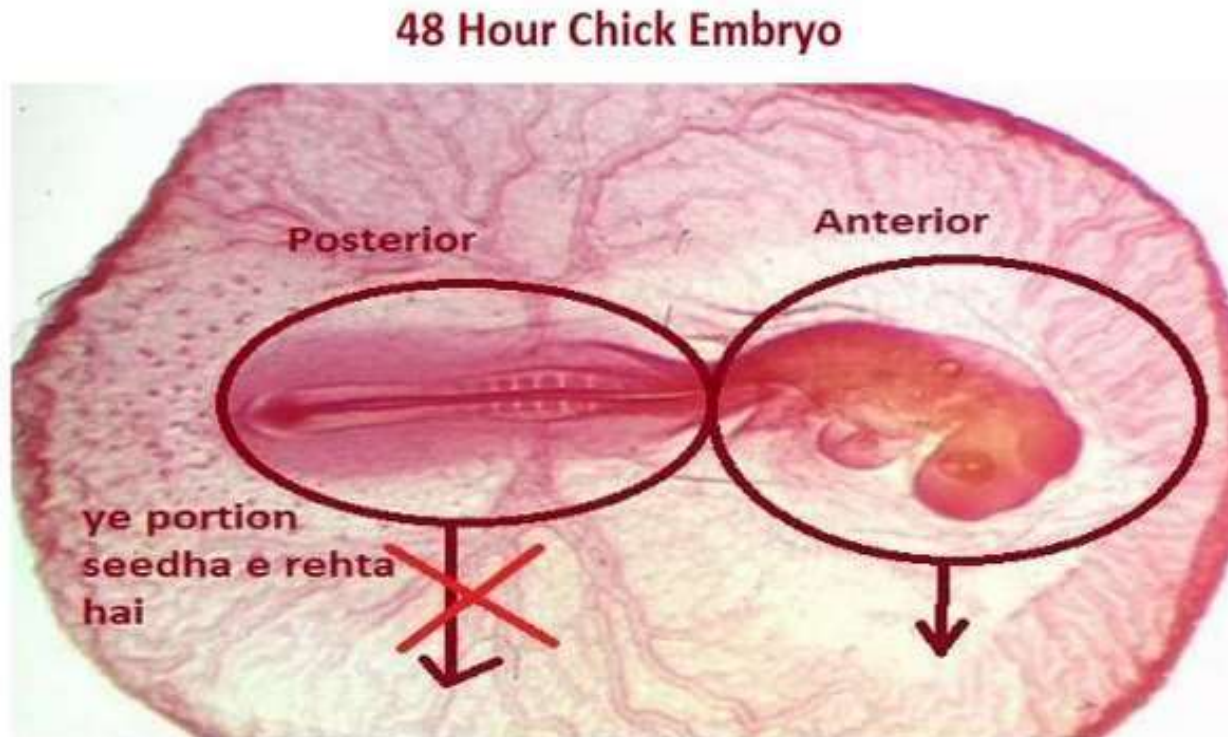


- Heart , formed on the posterior of brain vesicles, and 2 vitelline veins are entering in the heart from blood islands that is supplying blood to heart.
- Opticle vesicles are formed that indicates the eye formation starts. Two **opticle vesicles** emerge out from brain.
- Heart could be observed near the posterior of hind brain.

Chick Embryo after 40-45 hrs



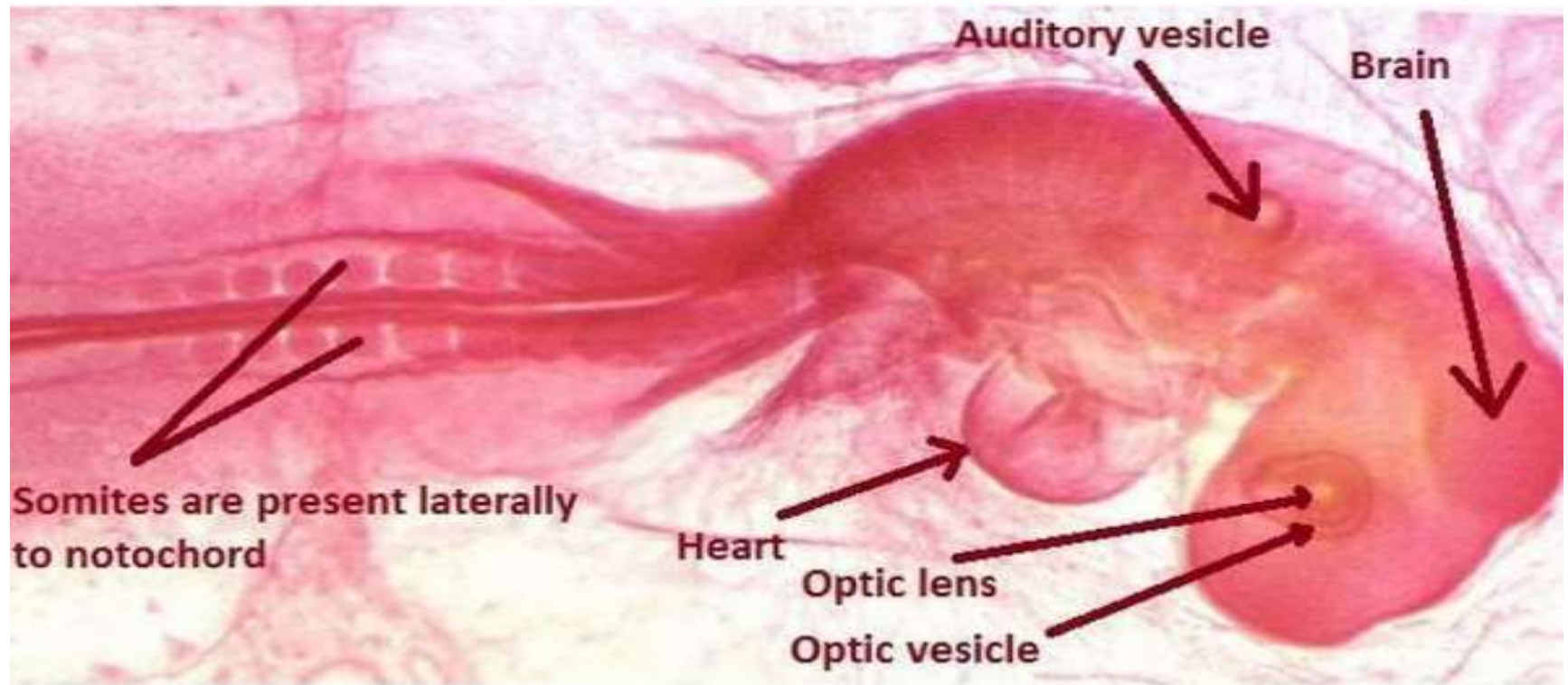
48hrs Chick embryo



- Viewing from lateral side. TORSION occurs

48 Hour Chick Embryo

In High Magnification



EXTRA EMBRYONIC MEMBRANE OR FOETAL MEMBRANE YOLK SAC



ORGANOGENY

Formation of organs is called organogeny.

The chief embryonic food is yolk which is surrounded by the sac like investing membrane called yolk sac. Yolk sac is made up of **splanchnopleure**.

Function:

The function of yolk sac is to protect the yolk keep it in position, digest and absorb it. Yolk sac serves as a primary organ of nutrition of embryo.

AMNION :

- It is made up of inner ectoderm, the space between amnion and embryo is filled with amniotic cavity having amniotic fluid.

FUNCTION

- It protect the embryo from mechanical jerks and prevent its desiccation.

CHORION:

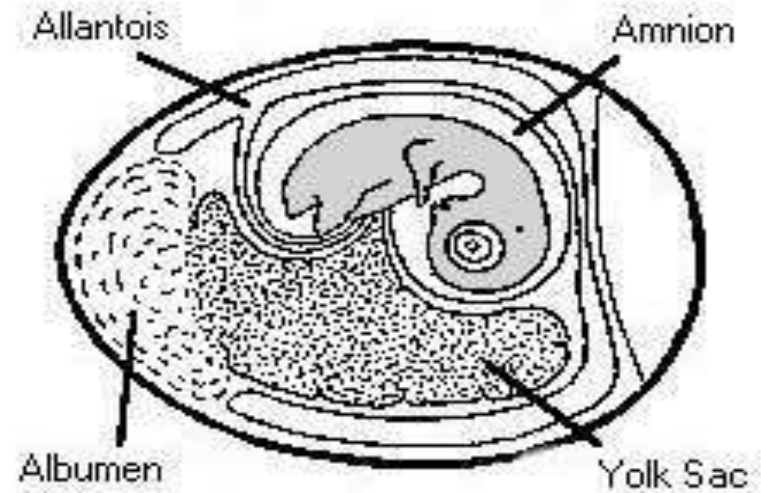
- It is made up of outer ectoderm ,the cavity between amnion and chorion is called chorionic cavity

FUNCTION

- Chorion also provides the liquid medium for the embryo.

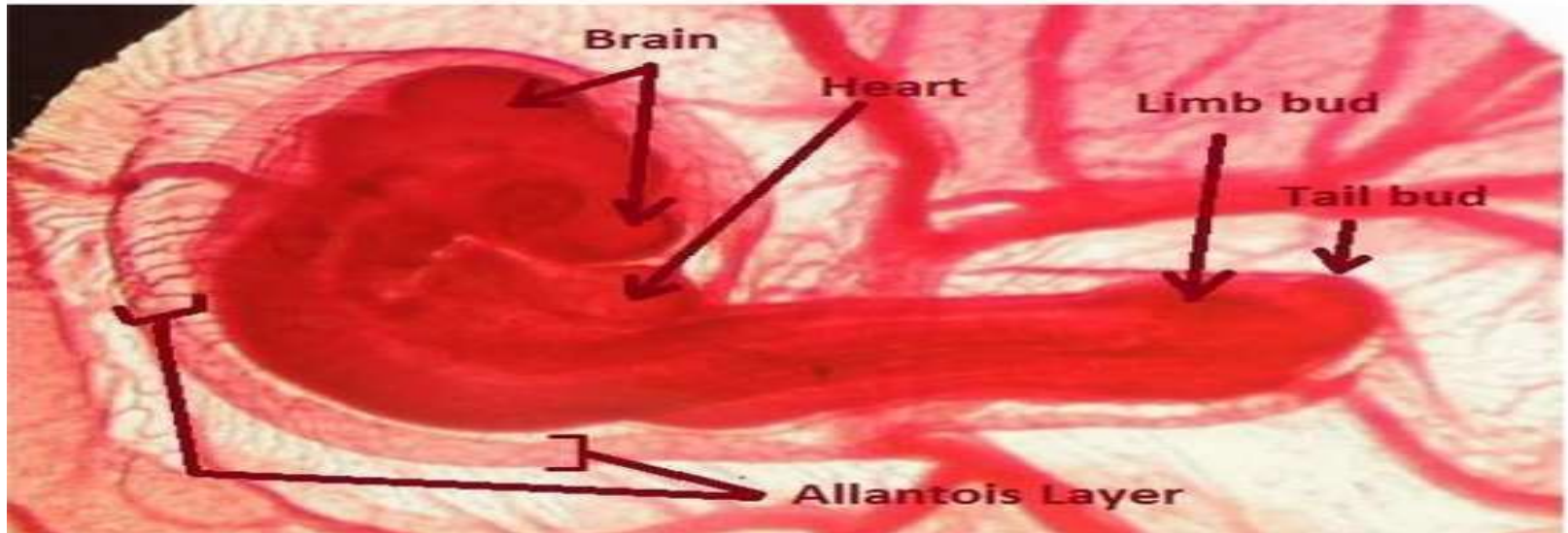
ALLANTOISE:

- The bladder like structure is called allantoise.



72Hrs Chick Embryo

72 Hour Chick Embryo



- Great increase in the size of the brain and the head region.
- Limb buds begins to form.
- **Olfactory pits** appears.
- Sac like allantoise appears which functions as the embryonic lung proving mechanism of exchanging **respiratory gases**.
- **Somites** also increase in no.

ALLANTO- CHORION:

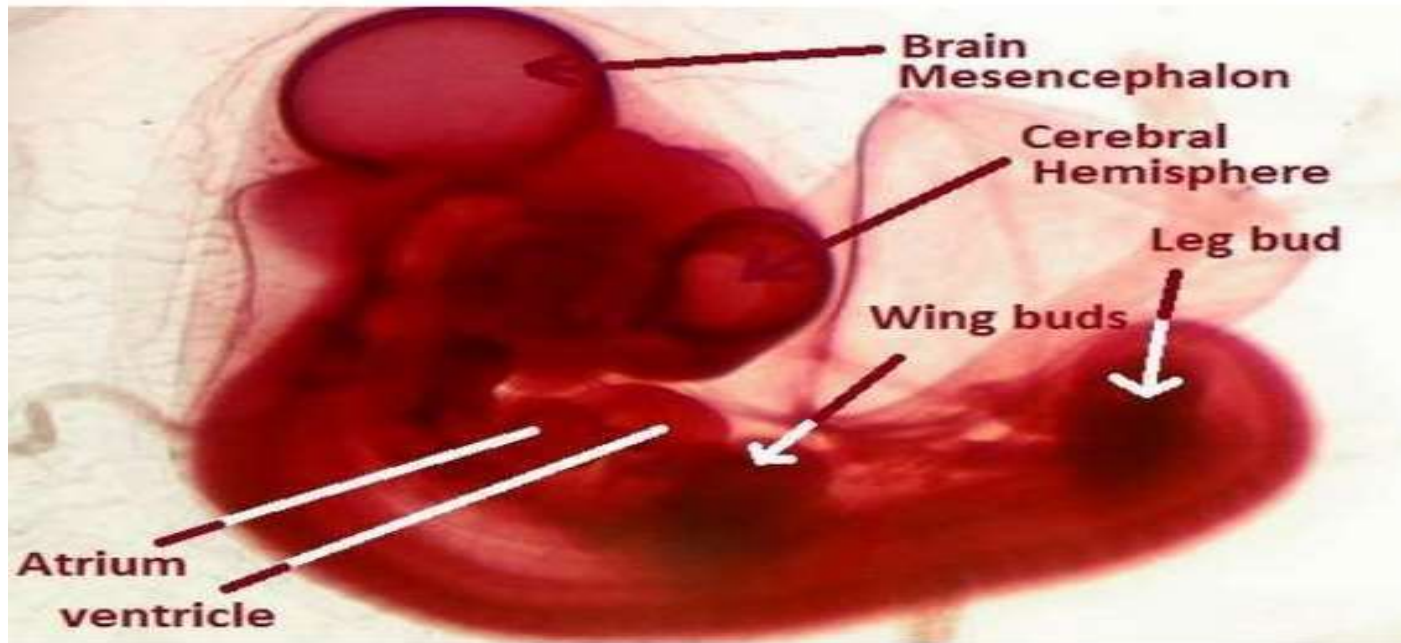
- The mesodermal layers joined the allantoise with chorion called allanto-chorion , a compound layer is formed

FUNCTION

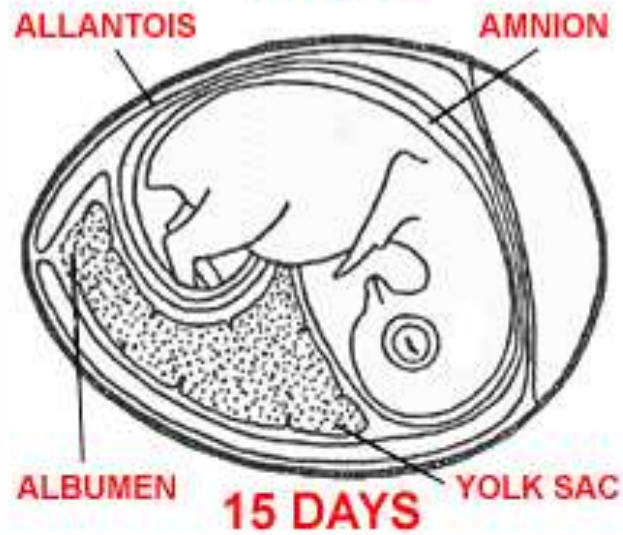
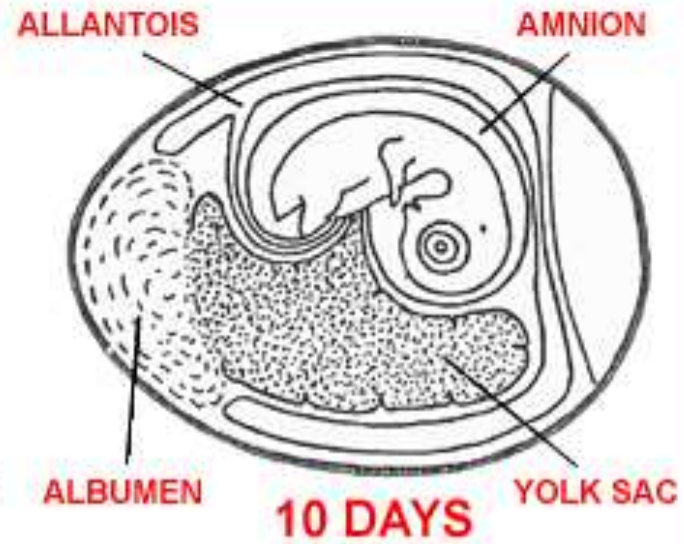
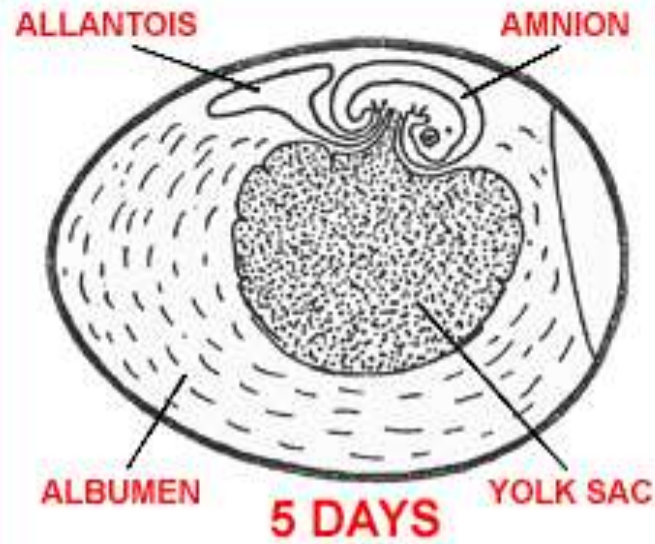
- It serves as Respiratory organ , Excretory organ, Nutritional organ

96Hrs Chick embryo

96 Hour Chick Embryo



- Wing buds appears anteriorly, while leg buds appears posteriorly.
- Cerebral hemisphere formed.
- Heart form the heart chambers e.g., atrium and ventricles.





Hatching eggs.



Infertile, unincubated egg. Blastodisc located on top of yolk appears irregular in shape.



Fertile, unincubated egg. Blastoderm larger, more regular in shape and has a "donut appearance."



Day 1
"Donut shape" greatly enlarged and embryo lies within the donut ring.



Day 2
Blood appears as "blood islets" in outer ring of developing embryo.



Day 3
Circulatory system well developed. Formation of appendages.



Day 4
Notice brain to body size relationship.



Day 5
Brain continues to develop at rapid rate.



Day 6
Wing development rapid. Development of egg tooth begins.



Day 7
Egg tooth seen on tip of beak. Eyes very conspicuous.



Day 8
Feather tracts seen on the back. Wings, feet, toes well developed.



Day 9
Beginning formation of feathers.



Day 10
Down feathers appear. Hardening of beak and egg tooth begins.



Day 11
Eyelids have overgrown eyes.



Day 12
Calcification of bone started. Toenails and down feathers on neck, thighs and wings present.



Day 13
Appearance of scales on legs. Comb and wattles present.



Day 14
Embryo acquires a more chick-like appearance.



Day 15-19
Embryo grows rapidly assuming hatching position with the head under the right wing and beak toward the air cell. Remaining yolk sac begins entering body cavity.



Day 20
Chick begins pipping through shell.



Day 21
Chicks hatch and dry.



CHICK EMBRYO DEVELOPMENT



INFERTILE

- No development.



DAY 1

- Appearance of tissue development.



DAY 2

- Tissue development very visible.
- Appearance of blood vessels.



DAY 3

- Heart beats.
- Blood vessels very visible.



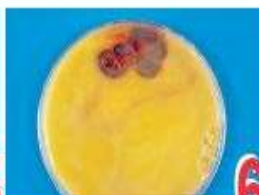
DAY 4

- Eye pigmented.



DAY 5

- Appearance of elbows and knees.



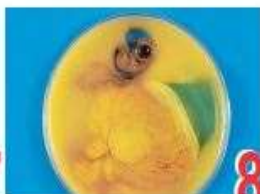
DAY 6

- Appearance of beak.
- Voluntary movements begin.



DAY 7

- Comb growth begins.
- Egg tooth begins to appear.



DAY 8

- Feather tracts seen.
- Upper and lower beak equal in length.



DAY 9

- Embryo starts to look bird-like.
- Mouth opening appears.



DAY 10

- Egg tooth prominent.
- Toe nails.



DAY 11

- Comb serrated.
- Tail feathers apparent.



DAY 12

- Toes fully formed.
- First few visible feathers.



DAY 13

- Appearance of scales.
- Body covered lightly with feathers.



DAY 14

- Embryo turns head towards large end of egg.



DAY 15

- Gut is drawn into abdominal cavity.



DAY 16

- Feathers cover complete body.
- Albumen nearly gone.



DAY 17

- Amniotic fluid decreases.
- Head is between legs.



DAY 18

- Growth of embryo nearly complete.
- Yolk sac is still on outside of embryo.
- Head is under the right wing



DAY 19

- Yolk sac draws into body cavity.
- Amniotic fluid gone.
- Embryo occupies most of space within egg (not in the air cell).



DAY 20

- Yolk sac drawn completely into body.
- Embryo becomes a chick (breathing in air cell).
- Internal and external pip.

COBB-VANTRESS, INC. • P.O. Box 1030 • Siloam Springs, AR 72761 • USA • Tel: 479.524.3166 • Fax: 479.524.3043 • info@cobb-vantress.com

COBB EUROPE LTD • Oyster House, Severalls Lane, Colchester, Essex, UK • Tel: +44 1206 835835 • Fax: +44 1206 756864 • info@cobb-europe.com

COBB-VANTRESS BRASIL, LTDA. • Rodovia Assis Chateaubriand, KM 10 • CEP: 15110-000/Caixa Postal 2 • Guapiçu-SP-Brasil • Tel: +55 (17) 3267 9999 • Fax: +55 (17) 3267 9992 • cobb.info@cobb-vantress.com.br

COBB-VANTRESS PHILIPPINES INC. • 5/F 8101 Pearl Plaza, Pearl Drive • Ortigas Center, Pasig City Philippines • Tel: +63 2 634 3590 • Fax: +63 2 634 3598

www.cobb-vantress.com



THANK YOU