

Preimplantation and Early Implantation Laboratory – 31 July 2018

In this practical class, we will rotate along 1 of 4 work stations and complete the worksheets below. Annemiek and Mark will be available for help, and you can also consult your lecture notes and the internet.

Station 1: preimplantation (models)

Identify and draw the 4 pre-implantation stages of mouse embryos. *For instance:*

- *Zygote (1-cell stage)*
- *2-cell stage*
- *4-cell stage*
- *Morula*
- *Compacted morula*
- *Blastocyst*

Name the key anatomical features of the embryos of these 4 stages.

- *Zygote: zona pellucida, pronuclei, polar bodies*
- *2- and 4-cell stage and morula: zona pellucida, blastomeres*
- *compacted morula: zona pellucida, embryo*
- *blastocyst: zona pellucida, trophoblast, inner cell mass*

Where in the female reproductive tract does fertilization take place?

First third of the oviduct

What are the polar bodies, and up to how many are formed per embryo?

- Each polar body contains genomic material that is set apart from the oocyte during the meiotic cell divisions. 2 or 3 polar bodies are formed, eventually leaving a 1n zygote.

What is the zona pellucida? What does it do?

Coat of glycoproteins around the oocyte and the developing preimplantation embryo that:

- *allows fertilization*
- *prevents polyspermia*
- *induces meiosis 2 in the oocyte*
- *prevents ectopic implantation*

At what stage is the embryo ready for implantation?

Blastocyst stage after hatching

Station 2: early implantation (worksheet and models)

Implantation:

Name the two tissues that make up a blastocyst.

1: *trophoblast*

2: *inner cell mass/embryo proper/embryoblast*

The embryonic tissue of the blastocyst gives rise to two other structures. Which?

1: *epiblast*

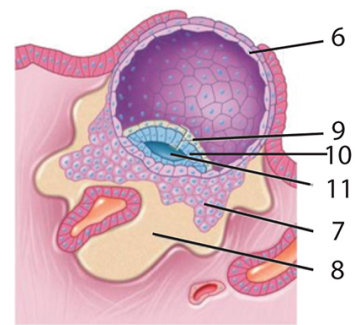
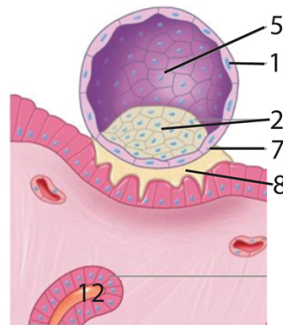
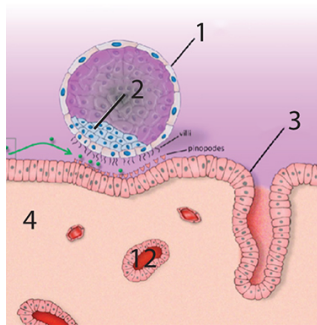
2: *hypoblast*

The non-embryonic tissue of the blastocyst gives rise to which two other tissues?

1: *cytotrophoblast*

2: *syncytiotrophoblast*

Name all the numbered structures below.



1 *trophoblast*

2 *inner cell mass/embryo proper/embryoblast*

3 *epithelium of the endometrium*

4 *endometrial stroma*

5 *blastocoel*

6 *Heuser's membrane*

7 *cytotrophoblast*

8 *syncytiotrophoblast*

9 *hypoblast*

10 *epiblast*

11 *amniotic cavity*

12 *uterine gland*

What are the functions of the 4 embryonic cell types?

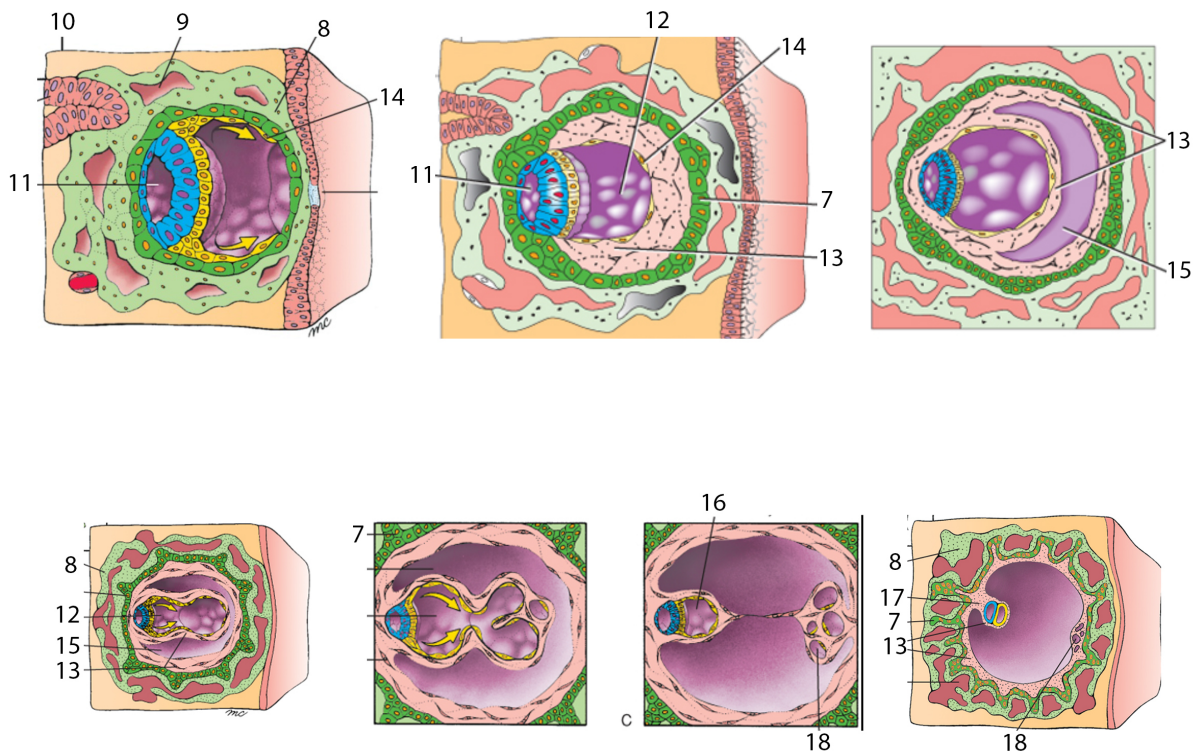
1 *epiblast: form the embryo proper*

2 *hypoblast: forms Heuser's membrane, is replaced by endoderm after gastrulation*

3 *syncytiotrophoblast: produces proteolytic enzymes for implantation, produces hCG to maintain the corpus luteum*

4 *cytotrophoblast: implantation*

Station 3: Embryonic cavities: worksheet and models



Name structures, and identify all embryonic cavities. Compare with models at the table.

8 syncytiotrophoblast

9 lacuna

10 endometrial stroma

11 amniotic cavity

12 primitive yolk sac

13 extraembryonic mesoderm

14 Heuser's membrane

15 chorionic cavity

16 Definitive yolk sac

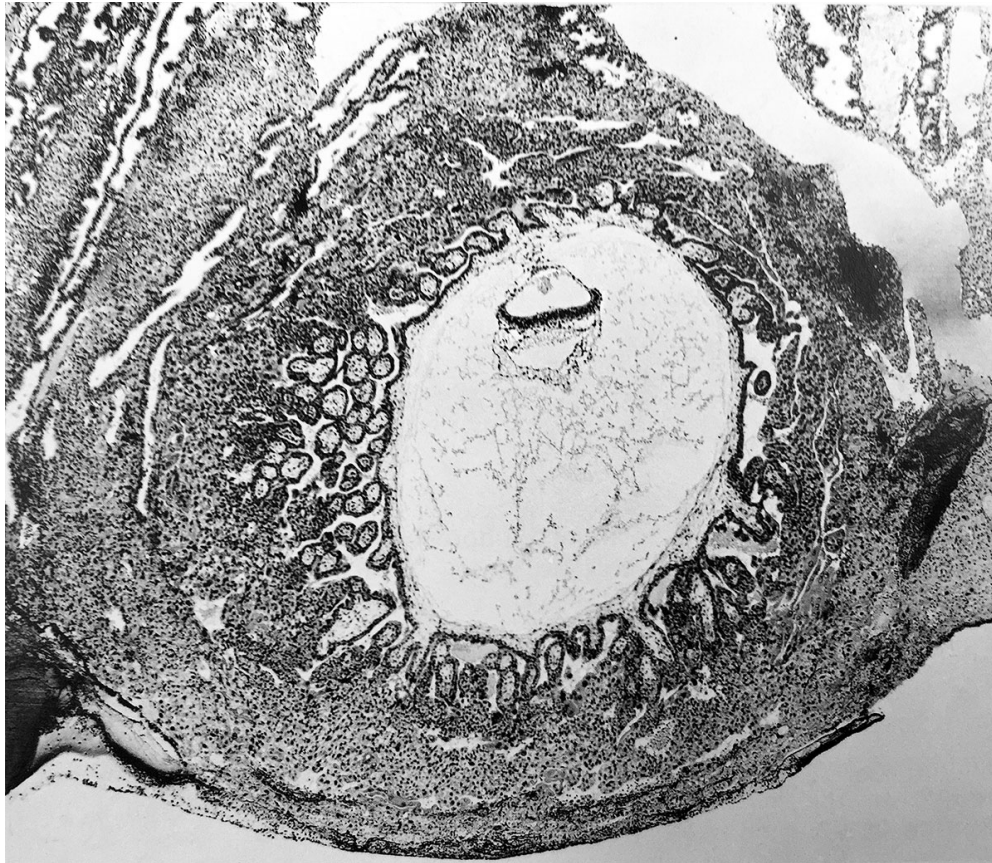
17 connecting stalk

18 remnants of the primitive yolk sac



Identify:

1. Bilaminar embryo
2. Epiblast
3. Hypoblast
4. Heuser's membrane
5. Cytotrophoblast
6. Extraembryonic mesoderm
7. Primitive yolk sac
8. Endometrium



Identify:

Bilaminar embryo

Amnion

Definitive yolk sac

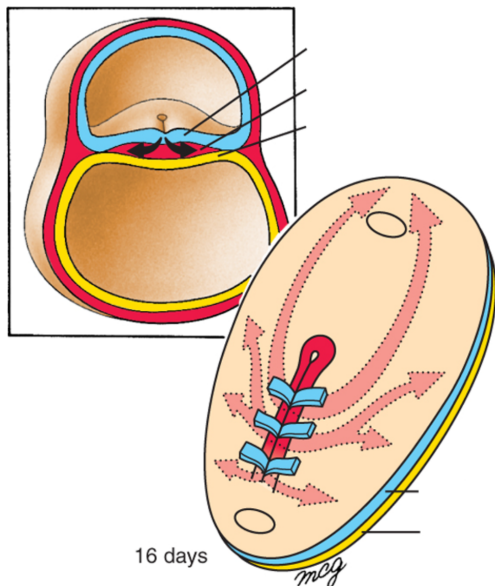
Chorion

Connecting stalk

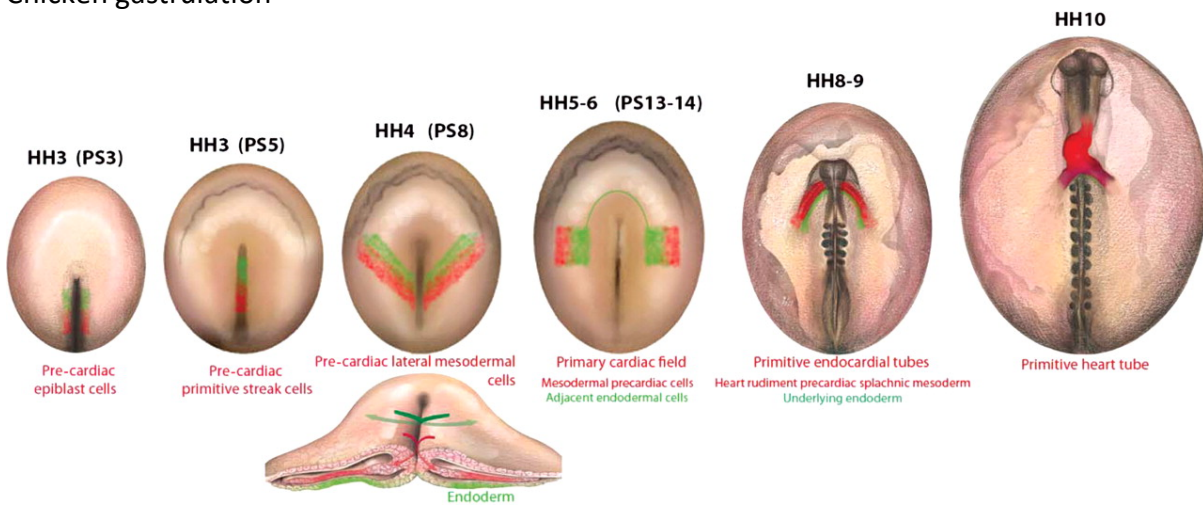
Cytotrophoblast

Endometrium

Station 4: Gastrulation: worksheet, chicken embryo preps, and models



Chicken gastrulation



What embryonic tissues are formed at gastrulation?

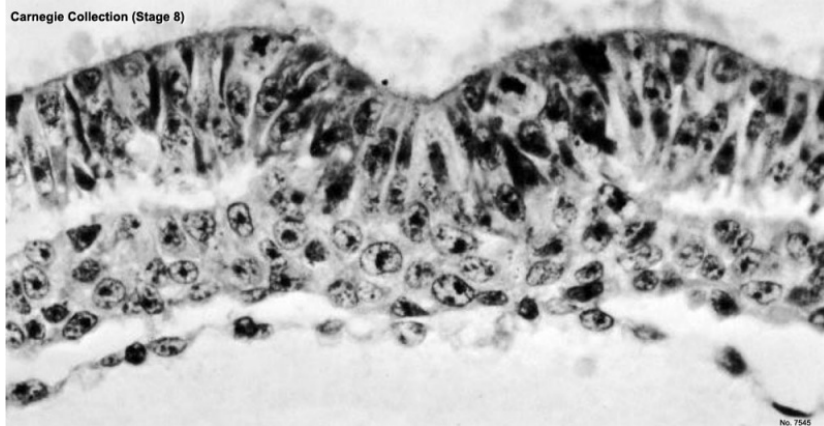
Ectoderm, endoderm, mesoderm

In the images above, locate node, primitive streak.

Draw the chicken embryos, and mark the embryonic structures.

Indicate the anteroposterior orientation of the embryos

Carnegie Collection (Stage 8)



Identify:

Epiblast

Primitive Streak

Endoderm

Mesoderm