

Bio 111 Lab 10: Reproduction and Development

Intro to fertilization and development: pig uterus and fetuses.

Identify and know the function of:

ovary placenta (*inner layer is the allantois (with blood vessels) and outer layer is chorion*)
uterus vagina amnion
oviduct chorion cervix uterine horn

What are some key differences between humans and pigs?

Number of eggs released, location of implantation

I. Reproduction

A. Compare human reproductive system models to pages 186-191.

Work together to identify and know the function of:

testis epididymus vas deferens pelvic bone prostate gland
bulbourethral gland urethra bladder penis colon

Work together to identify and know the function of:

ovary uterus vagina urethra
oviduct cervix bladder
clitoris (*notice blue color on both models: same tissue as glans penis*).

II. Introduction to Development: fertilization & membranes

A. Read p. 245-246 and Figure 19.1... describe:

growth *cell division and increase in number of cells; increases size of a structure*

differentiation *stems cell become cells specialized for a specific function*

morphogenesis *body parts acquire a specific shape*

zygote *a fertilized ovum, becomes a morula*

morula, *ball of cells; becomes blastula*

blastula. *hollow ball of cells; becomes gastrula (gastrula= has three germ layers of tissue... this is the stage that implants in the uterus)*

B. Read p. 250 ("extraembryonic membranes"), Figure 19.4 and Figure 19.5

Be able to identify on a diagram (see back bench illustration) and tell the function of:

amnion *innermost membrane, filled with fluid: cushions fetus against bumps or temperature changes*

yolk sac *membrane filled with nutritious yolk (bird) OR cells that become blood cells (mammal)*

*** in mammals, the yolk sac is reduced in size and is packaged inside the umbilical cord early in development... later it essentially disappears***

allantois *vascularized membrane that fills with wastes (bird) OR fuses with the chorion to become the vascularized inner layer of the fetal placenta (mammal)*

chorion *outermost membrane used for gas exchange in chick OR outer layer of placenta in mammal. (In chick, chorion is the connection between the fetus and the albumin, in mammals the chorion is the connection between the fetus and the mother.)*

albumen contains dissolved oxygen and carbon dioxide... CO₂ will diffuse out through the shell, O₂ will diffuse to fetus through the chorion. Also provides moisture to developing chick.

fetal/maternal placenta in most mammals: chorion and allantois makes up the fetal portion of the placenta. The uterine lining becomes the maternal portion of the placenta. Thus in mammals the chorion is used to pass products between mother and child: nutrients, wastes, anything that gets in mother's blood including drugs.

What portions of an *unfertilized* chicken egg = the ovum **the yolk and germinal vesicle** (inside the germinal vesicle of the yolk is cytoplasm and the nucleus of the ovum)... all is surrounded by a cell **membrane**

What portions of a *fertilized* egg are a part of the

zygote **embryo, amnion, yolk sac** (chick grows this and chorion around the ovum's yolk), **allantois, chorion**. Remember: extra-embryonic membranes are fetal tissues... they are NOT a part of the mother mammal or the bird egg.

the ovum **the remaining yolk** (cell membrane, etc is gone)

neither **albumin, shell membrane, shell** (these are produced by the mother's body)

C. Compare Figure 19.4 with Figure 19.10

What are the key differences in the bird and mammal arrangement and function of membranes?

--yolk sac reduced inside umbilical cord, rather than growing around yolk; different functions (see above)
--allantois a part of the fetal placenta rather than standing alone as a sac for waste storage (see above)
--chorion becomes placenta that lies between fetus and mother, versus lying between chick and albumin in birds.

View demonstration of the live 48 hour and 96 hour chicks:

What is the difference between an "ovum" and an "egg"? female gamete (the yolk of an egg is the female gamete—a single cell) versus structure to house developing embryo. Often, the ovum of mammals and other organisms is called an "egg".

How is the ovum fertilized? In oviduct Where is the egg put together? In oviduct

What structures are visible on each embryo? Be able to identify them!

2 day: **three regions of brain, eye** (just barely), **heart** (is beating very slowly) **somites** (will become muscle groups), the very beginnings of the **amnion** (not a closed sack yet); **neural tube** (will become spinal cord)

4 day: **three regions of brain, eye, heart** filled with blood and beating faster, **dorsal aorta**, proliferation of **vitelline vessels**, **tail bud**, **allantois**, **wing and limb buds**, **tail bud**, **yolk membrane**.

III. Development: growth, differentiation, and morphogenesis of the embryo

A. Chick development: read pages 252-259 and work together viewing slides at your desks. **Match** the following structures or processes to the appropriate age chick (some could be visible on more than one):

dorsal aorta

primitive streak,

somites,

head fold,

heart,

fore- mid- and hind brain,

eye,

*vitelline vessels first appear (on what membrane are they located? **yolk sac**),*

distinct flexure and torsion,

vessel proliferation

organ development

invagination (=folding to create neural groove)

allantois,

hind limb bud.

neural groove/tube (will become spinal cord),

24 hr (1 day)

head fold (will become brain),
neural groove (will become spinal cord),
primitive streak (where invagination—the folding of the embryo down the middle like a zipper—hasn't happened yet)
10 somites (become muscle groups)

48 hr (2 day)

curved head with fore- mid- and hind brain,
eye (barely)
slowly beating heart
edges of developing amnion
somites
neural tube

72 hr (3 day)

distinct flexure and torsion
heart
eye
tail bud
limb bud (barely)
somites
vitelline vessels first become visible—on yolk sac

96 hr (4 day)

dorsal aorta
heart
vessel proliferation
allantois
organ development
hind limb bud
fore- mid- and hind brain,
eye: very clearly developed

B. Human development: view photo series (back of room) and preserved specimens (cart).

What chick embryo looks most like the 5 week human embryo? **4 day**

Be able to identify on **5 week (37 day) human photo**: *brain, eye, heart, limb buds, somites, tail.*

What are key human fetus characteristics at:

5 weeks (37 days)

tail will respond to light
limb buds
somites
eye
heart, is beating
fore-mid and hind- brain

14 weeks (2 months)

bones starting to become calcified (before=all cartilage)

can swallow
legs and arms are distinct
fingers and toes separated

17 weeks (4 months)

will make slight movements
will sleep
external ear structures visible
may be able to tell gender

20 weeks (5 months)

all internal organs in place
can hear
has fingerprints
can move enough for mother to feel movements