

**Biology:
Taxonomy &
Embryology
Reference**

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Zack T. Smith

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Taxa (plural of taxon) for
Modern humans

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Domain *Eukarya*
Kingdom Animalia
Phylum Chordata
Class Mammalia
Order Primates
Family Hominidae
Genus Homo
Species sapiens
Subspecies sapiens

*Kings Play Chess
On Fancy Glass
Seats.*

Monophyletic group
= clade = subtree
Paraphyletic group
= some leaves, no
branches
Polyphyletic group =
branches, not all
leaves

Carolus Linnaeus
devised a 2-kingdom
taxonomy.

R.H. Whittaker's
5-kingdom system:

Monera
Protista
Animalia
Plantae
Fungi

Recently revised
with 3 domains

Bacteria
Archaea
Eukarya

Homotroph = makes
its own food

Heterotroph = eats
to get food

Eukaryotes have a nucleus, prokaryotes do not.
Kingdom Monera = all prokaryotic cells.
Kingdom Protista = single celled eukaryotes
Bacteria produce ATP in many different ways.
Archaea are only found in intense environs,
they are probably the 1st life after protobionts.
Endosymbiotic theory: mitochondria &
chloroplasts were originally bacteria.

5 stages of development of an animal body.

- Fertilization: egg & sperm join → zygote.
- Cleavage: rapid cell division *without growth* until 32 cells.
 - Morula = solid ball o' blastomeres
 - Blastula = hollow ball o' blastomeres, hollow area = blastocoel.
- Gastrulation: makes blastoderm, then gastrula (embryo) with its 3 layers: the endoderm, mesoderm, and exoderm.
- Organogenesis: formation of organs
- Morphogenesis: ?

Cleavage can be

- *Indeterminate cleavage*: each cell makes embryo e.g. genetic twins.
- *Determinate cleavage*: each cell makes body part.

Gametes: both are haploid.

- Sperm : flagellum, nucleus, acrosome, basal body.
- Egg : has nutrients (yolk), nucleus, cortical granules, zona pellucida, follicle cells.

Structure of egg

- Outer layer *zona pellucida* molecules attract sperm (sea urchins' jelly coat). *Pellucida* sounds like *sobreproducida*.
- Sperm's acrosome eats away the z.p. and binds with the *vitelline layer*. Binding is species-specific to prevent interspecies breeding.
- Cortical (means *at surface*) granules will grow into hard shell (cortical granule membrane) due to Ca²⁺ release (cortical reaction) to block more sperm and prevent polyspermy ← requires cell be killed.

Steps in egg-sperm interaction:

- Sperm arrives.
- ZP breached.
- Vitelline layer breached if sperm type OK.
- Cortical reaction starts to block sperm.
- Cleavage. ZP disintegrates?

An isolecithal egg has evenly distributed yolk. A telolecithal egg has yolk at one end and there is a vegetal pole & an animal pole. The *embryonic disk* forms on top of the yolk in telolecithal eggs.

Amphibians, mammals and others experience *holoblastic* cleavage meaning the entire egg including yolk divides along cleavage planes.

Neurulation is the formation of the *neural tube* from the ectoderm, which becomes the brain and spinal chord and *notochord*. The notochord becomes the vertebral column.

Extraembryonic membranes

Allantois holds or carries away waste.

Amnion & amniotic fluid keep embryo warm/moist, absorbs shocks.

Chorion encloses amnion, embryo (& allantois)
Yolk sac contains the yolk.

Placenta where embryo & mother exchange fluid

Human development

Fertilization happens in fallopian tube. Morula then develops and moves to uterus (womb).

Blastula attaches to *endometrium* (uterine lining).

Implantation is when the gastrula into the tissue there. Blastula has two layers: inner cell mass (at top) and trophoblast. There is also a blastocoel.

By week 8, the embryo looks human and has external genitalia.

