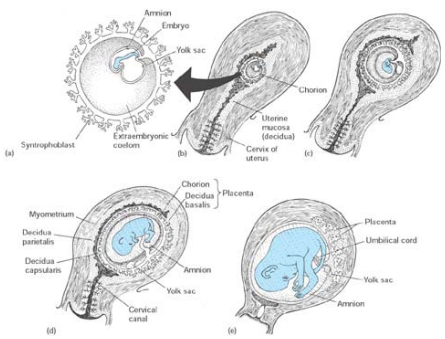
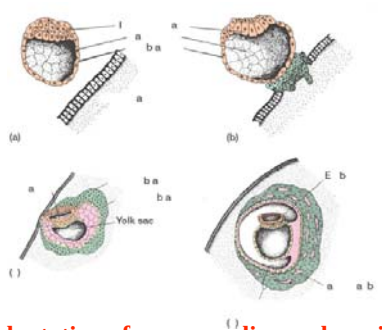
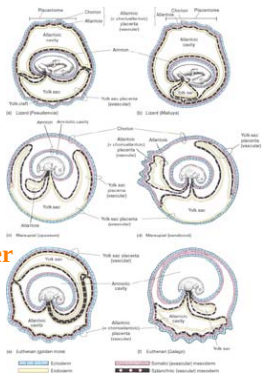


Development of a primate embryo



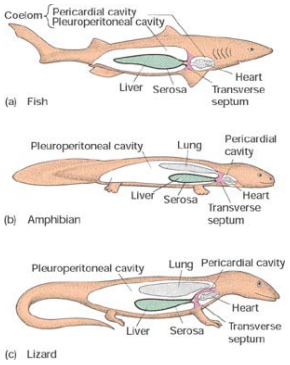
Implantation of a mammalian embryo into the uterine wall

- **Extraembryonic membranes in amniotes**
- **Different placental types have evolved**
- **Determine how nutrients from mother are transferred to growing embryo**

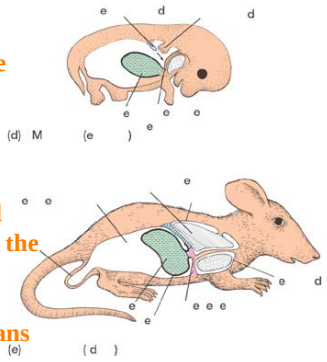


Coelom

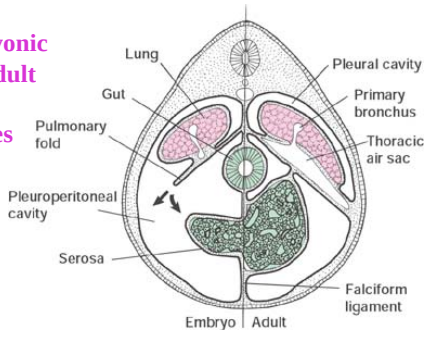
- **Main body cavity into which internal organs are suspended**
- **Produced by splitting of hypomere**



Coelomic fold grows down to meet transverse septum which grows upward They join and form the diaphragm and pleural cavities the separate lungs from the abdominal organs



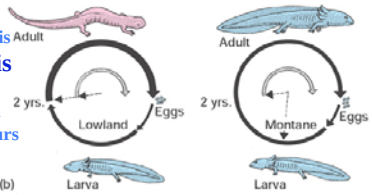
Avian embryonic and adult body cavities



Metamorphosis

– fundamental body reorganization, resulting in an adult body form

•If sexual maturity occurs without metamorphosis this is **paedomorphosis**



•**Neoteny** is when sexual maturity occurs but somatic development slows, allowing persistence of juvenile characters.

Different results from growth event timing differences

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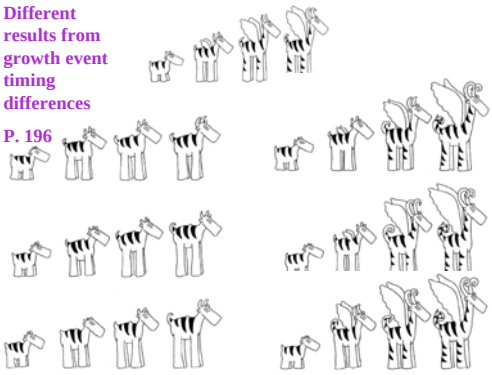
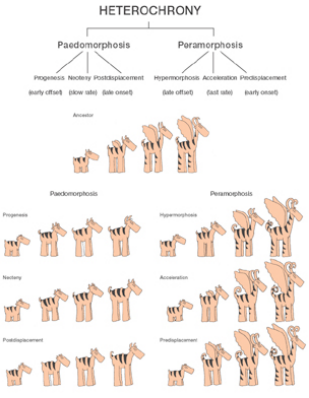
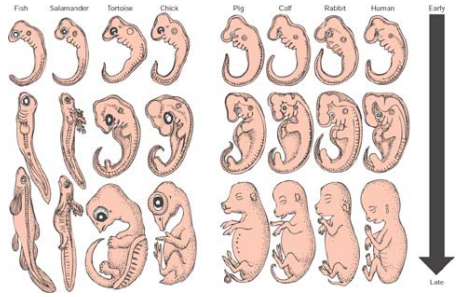






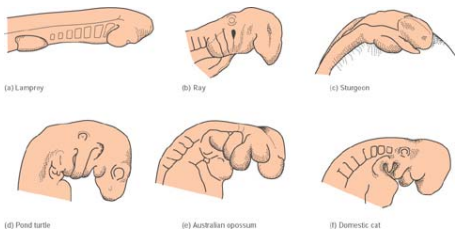
Ernst Haeckel – Ontogeny recpaitulates ontogeny = BIOGENETIC LAW

Von Baer's Law

- **Development proceeds from the general to the specific**

Modification of Biogenetic law

- **Embryos of ancestral and descendant forms resemble each other, but not necessarily the adults**



Early stage embryos resemble each other more closely than do later stages or adults

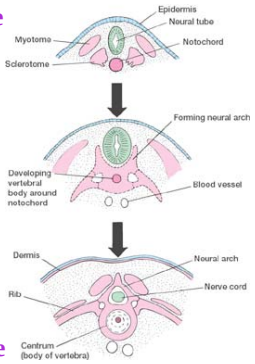
Vertebrae replace the notochord in mammalian embryos

Vertebrae develop around notochord

Arise from sclerotomes

Protect nerve cord

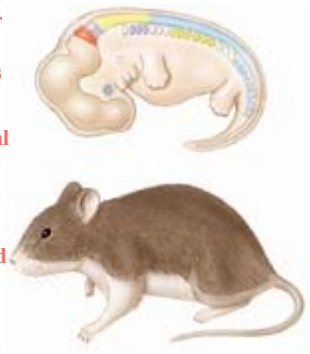
Provide origin sites for muscles that move column



HOX genes are master control genes that determine where parts of the organism form

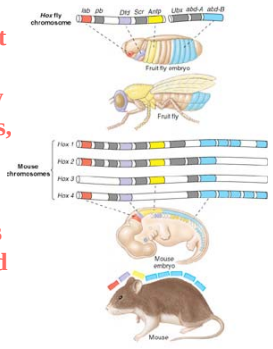
They control structural genes that build the structures

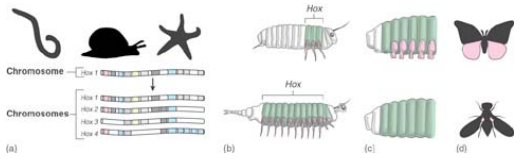
Effects are greater further posteriorly and can add up to large changes downstream



Regulate development of front-to-back structures in the body in different organisms, vertebrate or not.

Can permit appearance of what is considered to be rapid evolutionary changes





Mechanism by which *Hox* genes effect evolutionary change

Changes in the number of *Hox* genes

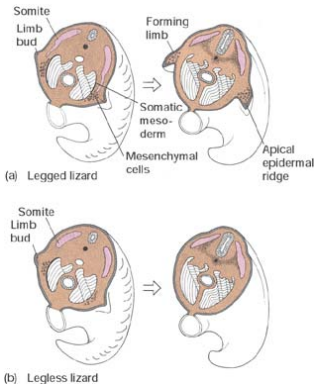
Changes in *Hox* gene expression over body regions

Changes in downstream regulation of genes or function

Limb formation in embryos

Structures grow outward

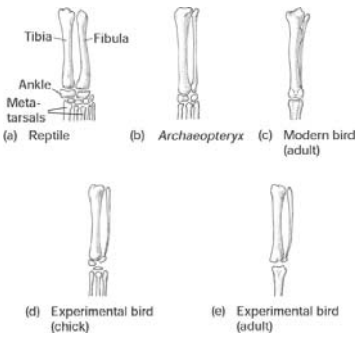
Other cell types migrate into limb bud



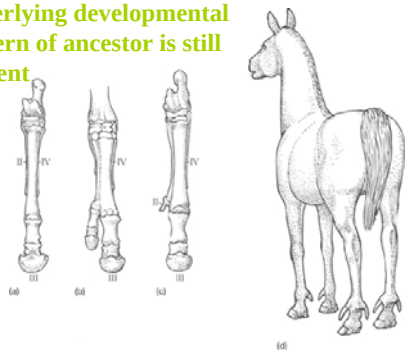
- **Take blood supply with them**
- **Blood vessels are most variable system because many paths allow them to reach and drain tissues of the limb.**

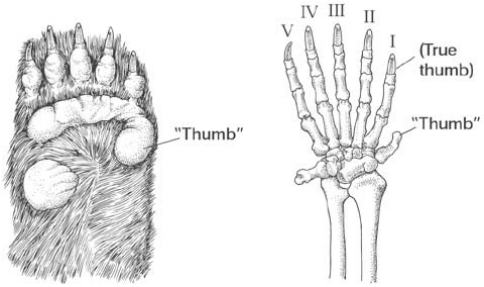
Apical ectodermal ridge interacts with mesoderm to produce limb type

Mechanical barrier to this interaction can mimic production of ancestral conditions



Extra toes in horses show that underlying developmental pattern of ancestor is still present





Panda's thumb is derived from a carpal bone that has elongated and become larger.