

Biology of Reproduction Spring 2010



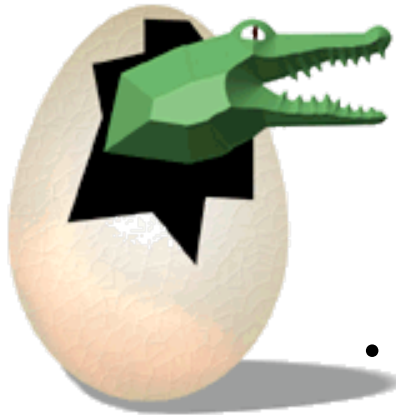
Instructors

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- **Ashley Boggs**

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Guillette laboratory

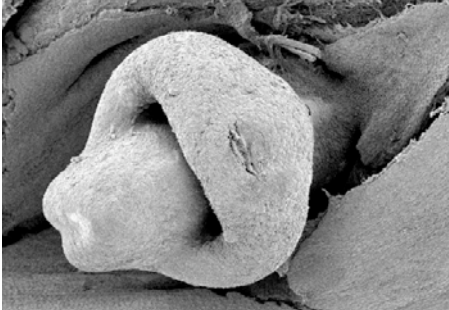
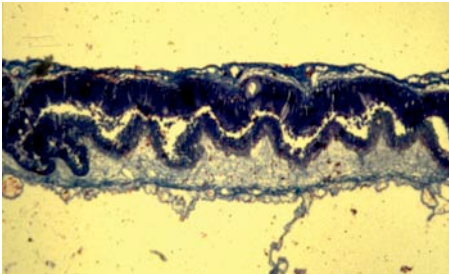
- 25th year at UF
- Research focus on reproductive biology
 - Molecular to organismal physiology/endocrinology
- Teaching: general biology - graduate studies



TA: Ashley Boggs

- PhD candidate in SNRE
- Effects on heavy metals and PCBs on thyroid hormone and development of the reproductive system
 - Research based out of NASA's Kennedy Space Cnt

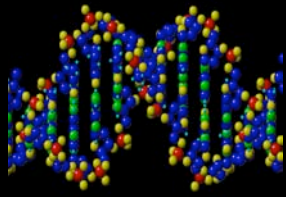




Laboratory Projects

- Evolution of the Reproductive System
 - Environmental sex determination
 - Maternal-fetal communication
 - Genitalia development
- Endocrine Disruption & Birth Defects
 - Phallic abnormalities
 - Ovarian follicle defects
 - FSH/Inhibin/activin abnormalities
 - Hypothyroidism
- Endangered Species Reproduction

The World of Reproductive Biology



Molecular

Biosphere

Laboratory-based Studies

Field-based Studies

↑ seconds

↑ eons

Cellular

Ecosystem

↑ minutes

↑ centuries

Tissue

Community

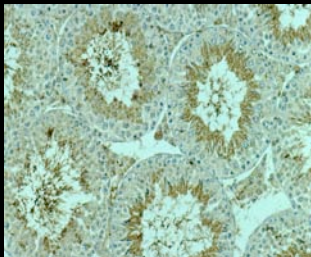
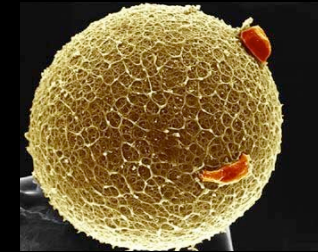
↑ hours

↑ decades

Organ ← Organism → Population

years

Lab or Field-based Studies



Evolution: Darwin's main ideas

- 1) Natural selection is "differential success in reproduction"
 - a) Unequal ability of individuals to survive and reproduce



Reproduction

- central to biology and evolution
 - "differential reproduction"
- involves production, growth and differentiation of new individuals
- interdisciplinary in scope



Evolution: Darwin's main ideas

2) interaction between the **environment** and the **variability** inherent among individuals making up a population



Genes AND Environment



Phytoestrogen: genistein

Evolution: Darwin's main ideas

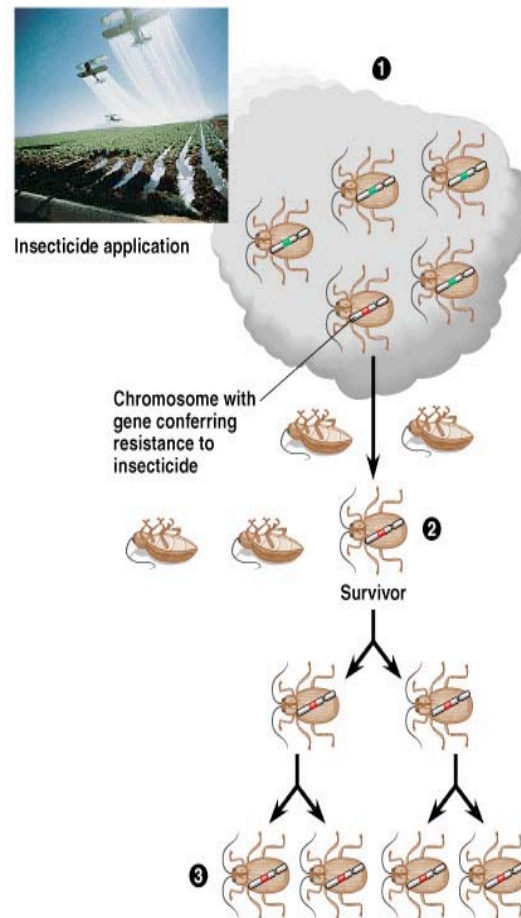
3) adaptation of populations of organisms to their environment



insecticide resistance in insects

Insects with chromosome for resistance **differentially** reproduce

Figure 22.12 Evolution of insecticide resistance in insect populations



Model Systems

- 90% of the recent research in mammals is focused on 10 species
 - 0.02% of present day vertebrate species!
- these 'models' have "pointed the way" but do not clearly represent the diversity present



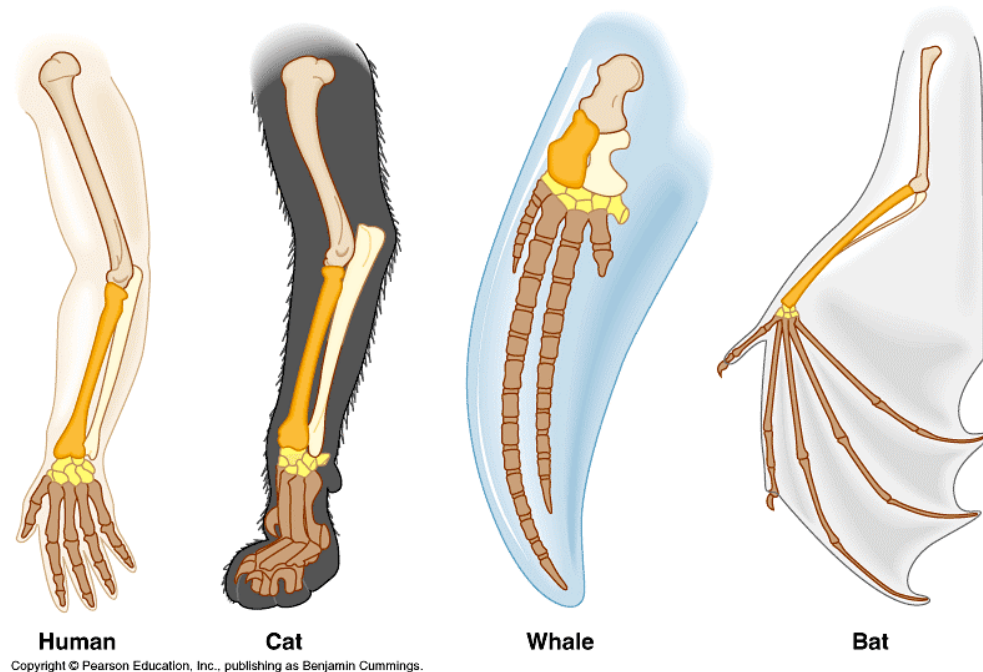
Terms You Should Know

- **PLESIOMORPHIC** - primitive
- **APOMORPHIC** - derived
- **HOMOLOGY** - characters share similar design and common evolutionary origin
- **ANALOGY** - independent evolutionary origin of structures that have similar form or function

Homology

- characters share similar design and common evolutionary origin
 - bird wing and mammal limb
 - sexual homologies - mammalian external genitalia

Figure 22.14 Homologous structures: anatomical signs of descent with modification

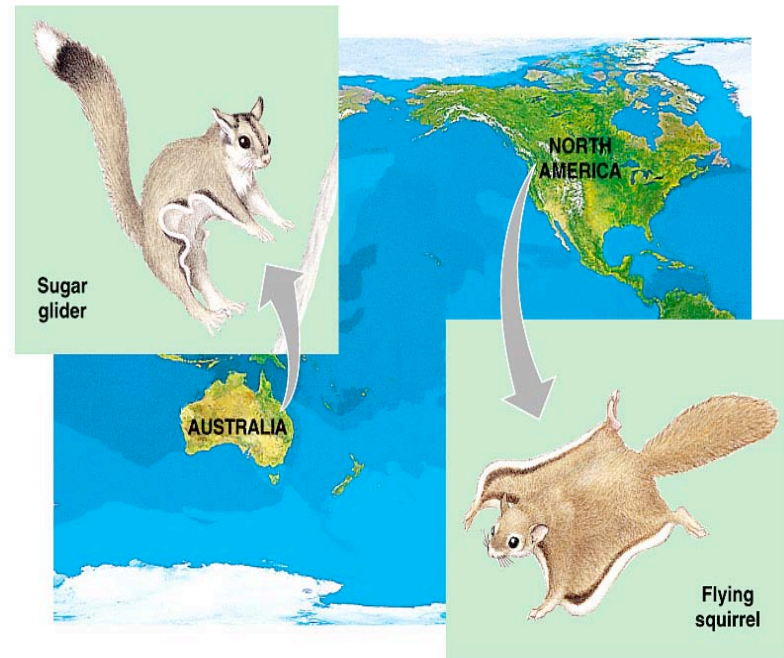


Analogy

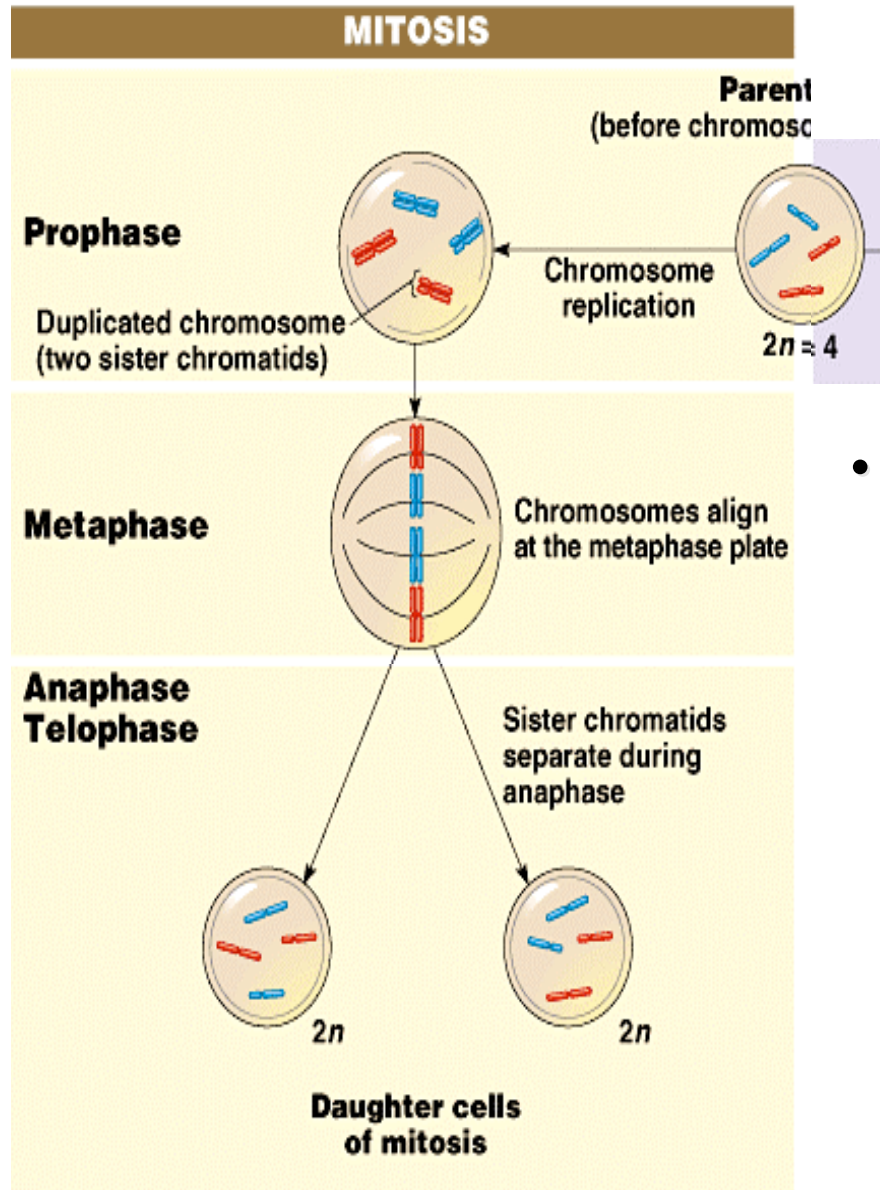
- Independent evolutionary origin of structures that have similar form or function
 - wings of birds and bees
 - convergent evolution



Figure 22.15 Different geographic regions, different mammalian “brands”



Mitosis and Meiosis

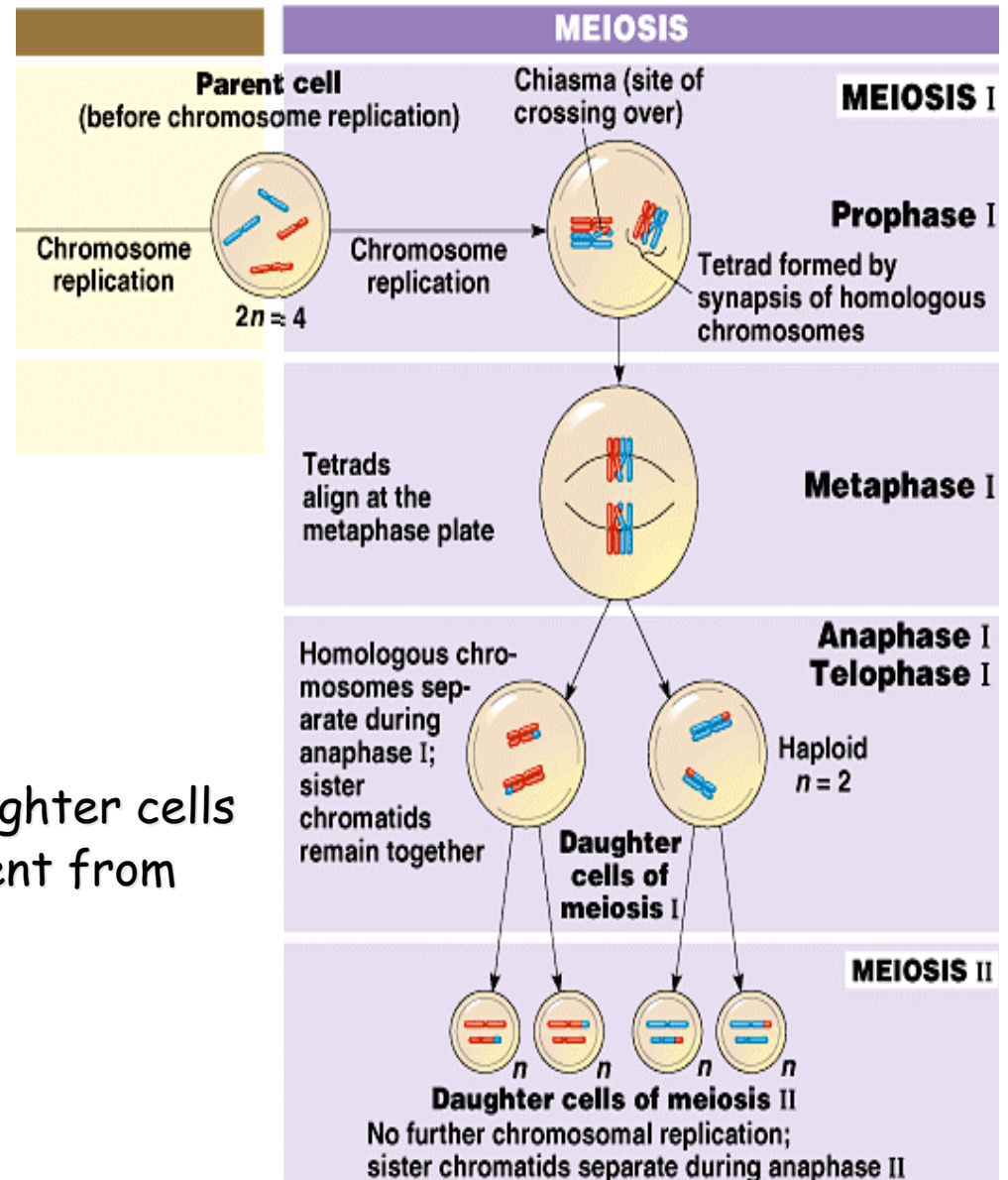


- **Mitosis**

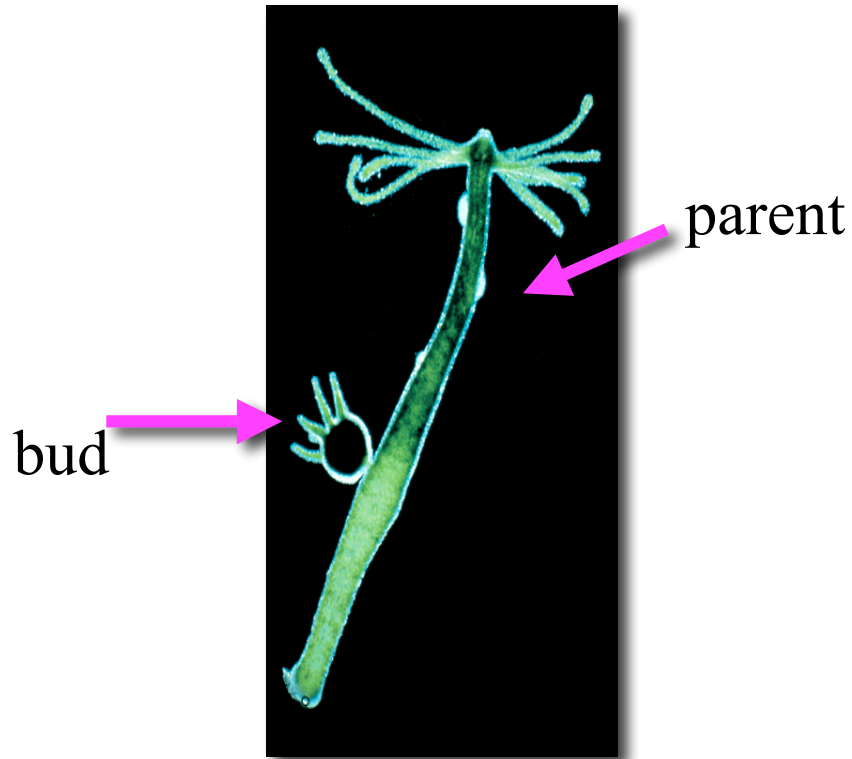
- 2 daughter cells/division
- Equal chromosomal separation - **diploid** daughter cells
- Daughter cells identical to parent cell

Mitosis and Meiosis

- Meiosis
 - Male 4 cells/division
 - Female 1 cell/division
 - 2 polar bodies
 - Unequal division - **haploid** daughter cells
 - Daughter cells can be different from parent cell



Asexual Reproduction



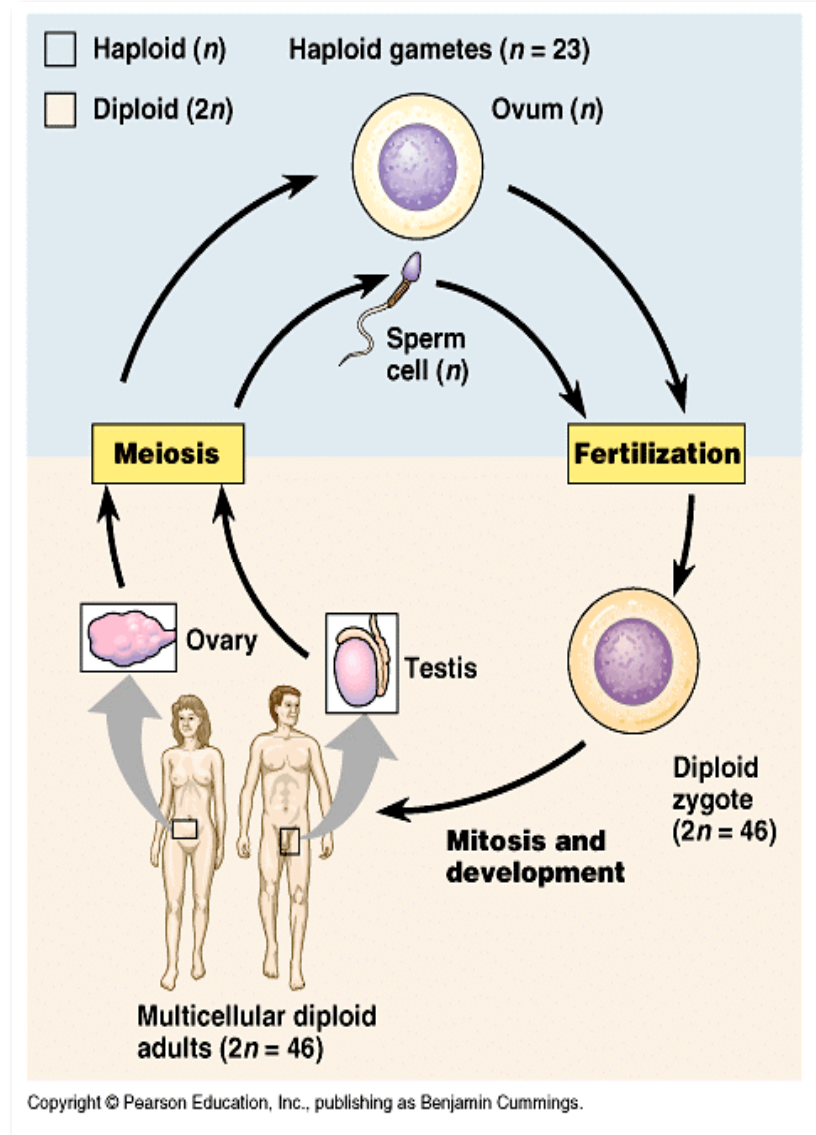
- all genes from one parent
- **fission** - a separation of a parent into two or more individuals of about equal size (mitosis)
- **budding** - new individuals split off parent

Crown of Thorns Starfish



Sexual Reproduction

- genes from two parent
- fusion of **haploid** gametes = **diploid** zygote
- male gamete = sperm
 - usually smaller than oocyte
- female gamete = ovum
 - egg/oocyte
 - usually larger than sperm
- gamete also called germ cell



External Fertilization

- requires shedding of eggs and sperm
- usually in moist environment
 - prevent egg desiccation
 - allow sperm transport
- environmental factors can initiate release
 - temperature, rainfall, salinity, lunar cycle, pheromones, behavior



Internal Fertilization

- cooperative mating
- behavior important
 - courtship
 - mate choice



Sex Ratio

- Primary - male:female at fertilization
 - only those with genetic basis for sex determination
- Secondary - at end of parental/incubation period
- Tertiary - male: female adults in population

