

Assignments [Hartl & Jones (2005). *Genetics - Analysis of genes and genomes*, 6th ed]
Developmental Genetics I: Ch. 13 ("Genetic control of development"), pp. 552-559
DG II: pp. 559-568; Problems 13.1, 13.2
DG III: pp. 569-576, 578; "Problems 1 & 2" (p 586-7); Problems 13.4, 13.6, 13.12, 13.15
DG IV: Ch. 8 ("Human . . . chromosome behavior"), pp. 301-304, Problems 8.4, 8.8
DG V: Ch. 11 ("Molecular mechanisms of gene regulation"), pp. 478-481

Office hours: Rm. 401 Gould-Simpson (NE corner) or by appointment
• THURSDAYS, 1-2:30 pm

Development: fundamental concepts and introduction to genetic mechanisms, cont.

- Use of **model organisms** to study principles of developmental genetics
 - phylogenetic tree: <http://www.informatics.jax.org/silver/index.shtml> – go to Fig. 1.3
 - where are *C. elegans*, *D. melanogaster*, *Mus musculus* and *H. sapiens*?
 - strengths and limitations of different genetic model systems
- *C. elegans* (nematode) examples
 - ~1,000 cells: lineage is almost invariant; **lineage diagrams** are like pedigrees
 - cell lineage mutations: effect of cell fate transformation
 - **programmed cell death:** active suicide mechanism!
 - failure of programmed cell death → developmental defects (worse in flies, mice)
 - **P lineage** illustrates cell-autonomous and cell-signaling modes of development
 - polar granules segregate differentially between daughter cells
 - what's the risk (to the organism) of cell-autonomous development?
 - P cells develop autonomously, but control development of other cells by signaling to them
 - *lin-12* controls the cell fate of AC/VU
 - either of two neighboring cells becomes AC, other becomes VU ("coin toss")
 - affect of cell ablation: what is the default cell fate?
 - phenotypes of **loss-of-function** mutations vs. **gain-of-function** mutations
 - what is normal function of LIN-12 protein (a transmembrane receptor)?

Pattern formation in Drosophila: a transcriptional cascade during embryogenesis

- Drosophila lifecycle; embryogenesis; segmentation of embryo, larva & adult
- how does an embryo become visibly segmented?
 - Nüsslein-Volhard & Wieschaus' screen for dead larvae with weird patterns!
 - phenotypes: abnormal A-P and/or D-V patterns