

Reading List and Schedule of Student Presentations

Week 1 (August 30) Introduction to genomics

Gibson text: chapter 1.

van Nimwegen, E. (2003) Scaling laws in the functional content of genomes. *Trends Genet.* **19**, 479-484.

Week 2 (September 6) Sequencing methods, BAC fingerprinting, physical maps and FISH

Gibson text: pp. 65-94.

Lander, E.S. *et al.* (2001) Initial sequencing and analysis of the human genome. *Nature* **409**, 860-921 (we will focus this week on pp. 860-875)

Week 3 (September 13) cDNA libraries, EST clusters, gene prediction and functional annotation

Gibson text: pp. 95-132.

Nekrutenko, A. (2004) Reconciling the numbers: ESTs versus protein-coding genes. *Mol. Biol. Evol.* **21**, 1278-1282.

Lander, E.S. *et al.* (2001) Initial sequencing and analysis of the human genome. *Nature* **409**, 860-921. (we will focus this week on pp. 894-903).

Week 4 (September 20) Single nucleotide polymorphisms, population genetics and human genetics

Gibson text: chapter 3.

Bentley, D. B. (2003) DNA sequence variation of *Homo sapiens*. *Cold Spring Harbor Symp. Quant. Biol.* **68**, 55-63. (A PDF copy of this article will be posted on the course web site.)

Week 5 (September 27) Gene expression analysis

Gibson text: chapter 4.

Kenan Ozcan will present - Birney, E. *et al.* (2007) Identification and analysis of functional elements in 1% of the human genome by the ENCODE pilot project. *Nature* **447**, 799-816.

Santosh Goud will present - Ozsolak, F., and Milos, P.M. (2011). RNA sequencing: advances, challenges and opportunities. *Nat Rev Genet* **12**, 87-98.

Week 6 (October 4) Alternative splicing and RNA structural studies

Katherine Doyle will present - Yeo, G. *et al.* (2004) Variation in sequence and organization of splicing regulatory elements in vertebrate genes. *Proc. Natl. Acad. Sci. USA* **101**, 15700-15705.

Sarah T. will present - Nilsen, T.W., and Graveley, B.R. (2010). Expansion of the eukaryotic proteome by alternative splicing. *Nature* **463**, 457-463.

Gavin Sampey will present - Wan, Y., Kertesz, M., Spitale, R.C., Segal, E., and Chang, H.Y. (2011). Understanding the transcriptome through RNA structure. *Nat Rev Genet* **12**, 641-655.

Week 7 (October 11) Columbus Day break – Tuesday classes do not meet

Week 8 (October 18) Midterm Examination - covers weeks 1-6

Week 9 (October 25) Epigenetics

Bonasio, R., Tu, S., and Reinberg, D. (2010). Molecular signals of epigenetic states. *Science (New York, NY)* **330**, 612-616.

Tim Stotish will present - Lister, R., Pelizzola, M., Dowen, R.H., Hawkins, R.D., Hon, G., Tonti-Filippini, J., Nery, J.R., Lee, L., Ye, Z., Ngo, Q.M., *et al.* (2009). Human DNA methylomes at base resolution show widespread epigenomic differences. *Nature* **462**, 315-322.

Virginia Espina will present - Northrup, D.L., and Zhao, K. (2011). Application of ChIP-Seq and related techniques to the study of immune function. *Immunity* **34**, 830-842.

Week 10 (November 1) Proteomics, functional genomics, and systems biology

Gibson text: chapters 5-6.

Robert Murphy will present - Kondrashov, N., Pusic, A., Stumpf, C.R., Shimizu, K., Hsieh, A.C., Xue, S., Ishijima, J., Shiroishi, T., and Barna, M. (2011). Ribosome-mediated specificity in Hox mRNA translation and vertebrate tissue patterning. *Cell* **145**, 383-397.

Week 11 (November 8) Microbial genomes

M. Haris Niaz will present - Dujon, B. *et al.* (2004) Genome evolution in yeasts. *Nature* **430**, 35-44.

Moushimi Amaya will present - King, N. *et al.* (2008) The genome of the choanoflagellate *Monosiga brevicollis* and the origin of metazoans. *Nature* **451**, 783-788.

Week 12 (November 15) class does not meet (Society for Neuroscience)

Week 13 (November 22) Characterization of the human genome: codon bias, gene density, GC content, recombination, CpG islands

Lander, E.S. et al. (2001) Initial sequencing and analysis of the human genome. *Nature* 409, 860-921. (we will focus this week on pp. 875-879; 885-887; 892-894).

Gordon, G. *et al.* (2007) Comparative analysis of chicken chromosome 28 provides new clues to the evolutionary fragility of gene-rich vertebrate regions. *Genome Res.* **17**, 1603-1613.

Week 14 (November 29) Characterization of the human genome: noncoding DNA, transposable elements, *Hox* genes, chromosome rearrangements and gene families

- Lander, E.S. et al. (2001) Initial sequencing and analysis of the human genome. *Nature* 409, 860-921. (we will focus this week on pp. 879-885; 887-889).
- Waterston, R.H., K. Lindblad-Toh, E. Birney et al. (2002) Initial sequencing and comparative analysis of the mouse genome. *Nature* 420, 520-562.

Week 15 (December 6) Comparative genomics. Term papers due today! Late penalty is 10% per day!

- Jimmie Logan will present** - Mikkelsen, T. S. *et al.* (2005) Initial sequence of the chimpanzee genome and comparison with the human genome. *Nature* 437, 69-87.
- Caroline Chen will present** - Reich, D., Green, R.E., Kircher, M., Krause, J., Patterson, N., Durand, E.Y., Viola, B., Briggs, A.W., Stenzel, U., Johnson, P.L., *et al.* (2010). Genetic history of an archaic hominin group from Denisova Cave in Siberia. *Nature* 468, 1053-1060.
- Thuy Phuong T. Tran will present** - Green, R. E., J. Krause, A. W. Briggs, T. Maricic, U. Stenzel *et al.* (2010) A draft sequence of the Neandertal genome. *Science* 328, 710-722.

December 13 - Final Exam - 4:30 pm to 7:15 pm. Covers weeks 9-15.