Schedule, Spring 05
Bio 4342, Research Explorations in Genomics

Note: M 1:30-5:00; W 1:30-5:00; F 1:30-2:30

1/19 W Course structure, research problem (S Elgin, 30 min).
Lecture: general sequencing (chemistry) intro; the pipeline (E. Mardis, 1 hour).
20 min break
Lab: intro to laptop computers, OS, intro to Unix, hand out Unix command sheet
and HW1 (C Shaffer, 2 hours).

1/21 F Lecture: different approaches, current WU/GSC sequencing strategies: BAC vs.
WGS vs. map-assisted (E. Mardis).

1/24 M Tour of the Genome Sequencing Center (Virtual Tour, Biocel Robot, etc.)
Computer help session.

1/26 W Lab: Prep samples (96 well plates, hand prep, one fosmid per student); demo
Biomek robot; loading the ABI3730 sequencer (D. O’Brien).
Lecture (interspersed): source of D. virilis fosmids (L. Slawson)

1/28 F Lab: Using Consed Graphically; hand out Consed tutorial (C. Strong and C.
Shaffer)
HW1 due

1/31 M Lecture: Intro to Phred, Phrap, Consed and Assessment of sequence quality (B.
Fulton)
Lab: Consed tutorial (C. Strong and C. Shaffer)

2/2 W Lecture: prefinishing; alternative chemistries (R.Maupin, A. Reilly)
Lab: Hand out HW2 group exercise with common weak points (C. Strong, C.
Shaffer)

2/4 F Lecture/lab: Continue Consed exercise (HW2)
WI subgroup: discussion on scientific writing, peer review

2/7 M Lecture: Comparative Genomics (Johnston)
Lab: HW2 due. Introduce mid-term class report requirements (including
Finishing Checklist), obtain file for own fosmid, run Phred, Phrap, Consed. Add
GSC reads, phrap and compare results.

2/9 W Lab: Prefinishing own fosmid with help from GSC finishers available, must order
reads today.

2/11 F Lecture: Genomes: presence and distribution of repetitious elements (S. Elgin).
Hand out HW3 (Cot curves, Elgin).
WI subgroup: 1000 word intro paper due

2/14 M Lecture: Chromosome Y lessons, finishing problems (R. Wilson)
Lab: Finishing (C. Strong, C. Shaffer) – student calls vs. Autofinish calls

2/16 W Lab: Finishing own fosmid; receive new data, assemble; must order any
additional reads today, GSC finishers available for help

2/18 F Lecture: Chromatin Structure (S. Elgin) HW3 due
**WI subgroup:** peer review of intro paper

2/21 M  Lecture: Heterochromatin / silencing (S. Elgin)
Lab: Finishing own fosmid. Discussion of HW3
2/23 W  Lab: Receive additional data, assemble, compare to GSC autofinish and finish.
Final day for help from GSC finishers
2/25 F  Lab: Help with problem areas of fosmids as needed

2/28 M  Lecture: Quality control (K. Pepin)
Lab: Preparation of reports; L. Slawson presents prototype
3/2 W   Lecture: Drosophila dot chromosome; goals in analyzing *D. virilis* (S Elgin)
Lecture/Demo: More UNIX and Genomics/BLAST (C. Shaffer, 2 hours)
Preparation of reports as time permits
3/4 F   **Class reports** (10 min) “Finishing my fosmid; problems identified and solved; comparing my analysis to the computer and the GSC.”

March 7-11 Spring Break

3/14 M  Lecture: Gene finding: detecting and interpreting genetic homology (begin HW1) (J Buhler)
3/16 W  Lab: continue HW1 (J Buhler)
Lecture: Visualizing BLAST output and using EST’s.
3/18 F  Begin HW2 (J Buhler); **HW1 due**
**WI subgroup:** peer review of finishing papers.

3/21 M  Lab: continue HW2 (J Buhler)
3/23 W  Lecture: gene finding by Twinscan, use of UCSC browser (train with chimp Contig95) (M Brent)
Lab: continue with Twinscan lab as group **HW2 due**
3/25 F  Lab: challenge: annotate fragments of the chimp genome (HW3 data sets)

3/28 M  Lab: introduce Drosophila browser (M Brent), Flybase (C Shaffer).
Lab: help session for preparation of reports
3/30 W  **HW3 class reports** (10 min) “Genes and pseudogenes in mammals.”
Lab: begin work with own fosmid to identify genes.
4/1 F   Lecture: Running a sequencing center: information management, quality control, cost control (L. Fulton)

4/4 M   Lab: continuation of work on own fosmid, particularly genes
4/6 W   Lecture: design and use of Repeat Masker; other ways to find repeats (J Buhler).
4/8 F   Lab: De novo and pairwise searches for repeats (J Buhler)
**WI subgroup:** peer review of gene/psuedogene papers.

4/11 M  Lab: Continue analysis and annotation of own fosmid
4/13 W  Lecture: introduction to multiple sequence alignments; use of Clustal (C Shaffer)
Lab: comparison of *D. melanogaster*, *D. pseudoobscura*, *D. virilis* for genes from own fosmid.

Lecture: the ENCODE project (analysis for all features) (S Elgin)
Lab: Continue annotation of own fosmid

Lecture: SNPs (E Mardis)
Lab: preparation of final reports.

Lecture: heart disease (A Templeton)

Lecture: the $1000$ genome: new sequencing technologies (E Mardis)
Lecture: Human evolution: out of Africa again and again (A Templeton)
Lab: preparation of final report

WI subgroup: exchange drafts

Lab: preparation of final report

WI subgroup: peer review of drafts

5/5 – 5/11, TBA. Final reports: your fosmid, with a map of genes, middle repetitious elements, and alignment to *melanogaster* and *pseudoobscura*. As time permits, investigation of the nature of the repetitious elements; search for endpoints of genes; search for regulatory elements.

Reading

Papers will be handed out and are available on the web. Reading these papers prior to the following class period will provide greater understanding of the lecture material and will help you to develop an understanding of the foundations of the experimental approaches we are using, as well as providing the antecedents for the scientific problem we are studying.

GSC protocols (skim through)


GSC single step DNA prep protocol


The following papers may be helpful during the second half of the course:


