

**Fall 2001 Genomics Exam #1
Genomic Medicine and Sequencing Tools**

There is no time limit on this test, though I have tried to design one that you should be able to complete within 2.5 hours, except for typing. There are three pages for this test, including this cover sheet. You are not allowed discuss the test with anyone until all exams are turned in at 9:30 am on Friday September 21. **EXAMS ARE DUE AT CLASS TIME ON FRIDAY SEPTEMBER 21.** You may use a calculator, a ruler, your notes, the book and the internet. However, you are not allowed to obtain and read journal articles as a part of your investigations. These questions are taken from the research literature and I do not want you to simply find the papers and read the answers. This is the Honor Code at its finest.

The **answers to the questions must be typed on a separate sheet of paper** unless the question specifically says to write the answer in the space provided. If you do not write your answers in the appropriate location, I may not find them. You may want to capture screen images as a part of your answers which you may do without seeking permission since your test answers will not be in the public domain.

-3 pts if you do not follow this direction.

Please do not write or type your name on any page other than this cover page.

Staple all your pages (INCLUDING THE TEST PAGES) together when finished with the exam.

Name (please print):

Write out the full pledge and sign:

How long did this exam take you to complete (excluding typing)?

20 points

1) Sequence Number 1:

mfgrdigidl gtanvliyvk gkgivlneps

Sequence Number 2:

MDSEVAALVIDNGSGMCKAGFAGDD

- a) From what protein did each of these sequences come?
- b) What are their accession numbers?
- c) Compare their overall similarities. How much sequence conservation is there?

The first protein was recently crystallized and its X-ray structure determined to be very similar to the second protein. The authors conclude that the first protein is a functional “homolog” of the second one.

Here is a photo of the first one's structure. The colors are not PDB standard colors.



- d) Compare the photo above with this PDB file (http://www.bio.davidson.edu/people/macampbell/genome_exam/exam1.pdb) and tell me if you think these two proteins are orthologs, “homologs” or neither. Explain your answer.

15 points

- 2) Go to this URL <http://www.tigr.org/tigr-scripts/CMR2/CMRHomePage.spl> and compare the Genome v. Genome Protein Hits for *Mycoplasma genitalium* G-37 and *Ureaplasma urealyticum* serovar 3.
- How many genes do they have in common?
 - Find one area of highest block of conservation in the *Ureaplasma urealyticum* serovar 3 genome and click on this part of the green circle. Tell me what kind of protein is in this region.
 - Would you expect to find this protein highly conserved? Explain your answer.

20 points

- 3) Tell me everything you can about this sequence. It is **very important** that you list all the sites you used to answer this question. For each site, tell me what you learned.
- http://www.bio.davidson.edu/people/macampbell/genome_exam/exam2.html

15 points

- 4) This sequence was obtained from a specimen collected in 1847.

AATTTCTCCAACAAAATCTTAACCTGGAATAGACATATTTGCTAATACATAAATAAA

This sequence was collected from a specimen in 1994

AATTTCTCCAACAAAACCTACTTGAACCTGGAATAGACATATTTGCTAATACATAAATAAA

- Are these two sequences related?
- Describe the amount of relatedness that you find.
- What was the source of the first sample dating back over 150 years ago?
- Find a recent paper that discussed the significance of these sequences. What does the abstract say about these sequences.

15 points

- 5) Read this short paper on fish and briefly evaluate it from a genomic perspective. Your evaluation should focus on the conclusions drawn from the data and not the data themselves. Answers over 1 page will be too wordy, so don't go for length on this one.
- [Devlin et al. 2001. Nature Vol. 409: 781-782.](#)

15 points

- 6) Go to this URL <http://devnull.lbl.gov:8888/alt/search.html> and perform a search of all listed SP fields using this term "ATC2_HUMAN".
- How many functionally different proteins can this gene produce?
 - In which tissues?
 - Are there any functional differences for these proteins?

d) Based on what you found, are similar traits found in other species or is this limited to humans? Support your answer with data.