

Bio113 Term Paper Assignment:

For this assignment, you are asked to write a five page term paper on a topic of your choosing. The topic should be a question fundamental to molecular evolution, though it can be as broad or as narrow as you like. For the paper, you are asked to present a literature review of previous work related to your question and suggest promising directions for resolving the remaining problems. That is, you should clearly state the question you have chosen to explore, justify the importance of this topic in the broader context of molecular evolution, provide sufficient theoretical background, and describe the findings (to date) of relevant research. In addition, please explain why further research is necessary (which could include a description of the limitations of previous research), and provide your ideas for future research. Try to think what evidence would allow you to adjudicate the main uncertainties.

This assignment should not exceed 5 single-sided single-spaced pages in length, not including your references. There is no page limit for the cited references section. Any citation style that lists all reference information (including title) can be used, provided that you are internally consistent.

In coming up with a topic, please feel free to use papers in your course reader and/or papers mentioned in your textbook as springboards for thinking about larger issues in molecular evolution. In addition, your readings from Li and Graur also suggest potential term paper topics; please do use this as a resource. If you are having difficulty generating ideas for your term paper, you are more than welcome to consult with any of the TA's or with Dmitri. Further, if you have a topic and would like guidance on conducting a literature search, consult the teaching staff as well. Some sample topics are listed below.

SOME SAMPLE TOPICS:

1. WHAT DETERMINES RATES OF PROTEIN EVOLUTION?
2. EXISTENCE OF THE MOLECULAR CLOCK? OVERDISPERSION.
3. EVOLUTION OF GENE DUPLICATIONS. NEOFUNCTIONALIZATION VS. SUBFUNCTIONALIZATION. WHICH GENES TEND TO DUPLICATE? WHAT EFFECT ON GENOME EVOLUTION AND FUNCTIONING THIS MIGHT HAVE?
4. IMPORTANCE OF MUTATIONAL BIASES IN EVOLUTION.
5. HOW PREVALENT IS POSITIVE SELECTION IN PROTEIN EVOLUTION?
6. IMPORTANCE OF HORIZONTAL TRANSFER IN GENOME EVOLUTION
7. WHAT DETERMINES THE NUMBER OF GENES IN THE GENOME?
8. WHAT DETERMINES THE ABSOLUTE GENOME SIZE?
9. EVOLUTION OF GC CONTENT. ISOCHORE EVOLUTION IN MAMMALIAN GENOMES.
10. EVOLUTION OF THE GENETIC CODE. EVOLUTION OF CODON REASSIGNMENTS.
11. GENE TRANSFER FROM MITOCHONDRIA TO THE NUCLEUS IN FLOWERING PLANTS.
12. EVOLUTION OF NEW GENES.
13. EVOLUTION OF CODON BIAS.
14. NEUTRAL THEORY. CURRENT STATUS.
15. NEARLY-NEUTRAL THEORY AND COMPENSATORY EVOLUTION.