Bio 351: Eukaryotic Genetics (Fall 1998)
MECHANICS OF COURSE

GENERAL INFORMATION

Meeting times: TR 8:15 A.M. – 9:30 A.M., S-215

Instructor: Jeff Elhai (I am not a doctor)
Office: S-202. Lab: S-203/S-205.
Hours: Mon 2:30-3:30; Wed 12:30-2:00; Fri 1:35-2:30
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Text: *Principles of Medical Genetics,* 2nd edition (1997). Thomas Gelehrter, Francis Collins, David Ginsburg
An Introduction to Genetic Analysis (1996) Griffiths et al, or some similar text will be useful as a reference
Various research articles

OBJECTIVES -- Skills in Communication and Analysis

1. Input: To develop in you an attitude of skepticism towards scientific claims and the need to understand the experimental basis of such claims before making a judgment.
2. Input: To solicit an understanding of how to find and read scientific papers and extract meaning from them.
3. Output: To develop skills in communicating a scientific story.
4. General I/O: To learn some molecular genetics, the way eukaryotes do it.

ASSIGNMENTS

Questionnaire: Please return the attached questionnaire by August 31.
Library Exam: Introduction to information resources of the Science Library
Sequence Analysis: Introduction to DNA sequence resources
Presentations: Each based on one paper from the primary literature
Written summaries: Each a coherent story, based on a paper from the primary literature

PRESENTATIONS

You might wonder why this course places so much emphasis on communication and so little on the subject matter of molecular genetics. Imagine yourself 10 years from now, when you've long since forgotten the intricacies of transcription initiation factors. Even so, whether you're preparing an acceptance speech that you, a world renowned neuroscientist, will deliver at Stockholm or instead preparing a more pointed speech that you, a harried houseparent, will deliver to your obstinate child, you will unquestionably find continued use for the ability to explain what you are doing in simple, understandable language. It is not a skill that comes naturally to most of us. We need practice.

Twice during the semester you will be asked to deliver a short (about 15 minutes) presentation of an article from the primary literature. Your presentation should accomplish four things:

1. Identify an important question of general interest and connect that question to a specific question that was addressed experimentally by the authors.
2. Describe one experiment that answers part of the specific question and the methods used in that experiment. The description should aim at enabling us to understand the principles behind the experiment and the tools used in it. Details that do not add to our understanding, subtract from it and should be avoided.
3. Present the results of that experiment in the form of a story.
4. Draw conclusions from the results and relate them to the important question you identified earlier.

You might think of these four responsibilities as "Introduction", "Methods", "Results", and "Discussion".

I have given below a timetable that I strongly suggest you follow. All of us have gained facility in pulling together projects at the last minute, and no doubt you could, if necessary, figure out the paper a day or so before the presentation. However, if you go this route, you, like the vast majority of your colleagues in the past, will fail to consider the equal amount of effort required after understanding the article, to make it understandable to your listeners. As a result, for fifteen minutes you will cause your friends to suffer, wishing they were somewhere else, and you will be surprised to realize, in a very public way, the many important details of the presentation that you understand less well than you thought.

I wish to spare you this experience and to offer you a strategy by which you can plan a presentation in the detail sufficient to get the job done.

Steps in preparing a presentation:

1. CHOOSE THE PAPER you will present, and get started early! Look ahead to Point 10!
2. SKIM THE PAPER a few times to get the basic idea of what it's about, without worrying about the parts or techniques you don't understand.
3. GET AN IDEA OF THE LARGER CONTEXT of the paper. What big question is it trying to address? If you can't figure out the answer from the paper alone (usually the case), then get help! How?
    a. Find a review article on the topic
    b. Look up key articles the authors cite
    c. Read up on the topic in an appropriate text book
    d. ASK ME
4. CHOOSE ONE EXPERIMENT from the paper that you might be interested in presenting. Notice that I haven't suggested yet understanding anything in the paper very thoroughly. How do you identify such an experiment? One way is to choose a figure or table and ask how was the data obtained?

5. INTERROGATE THE PAPER, rereading it not as a novel but as a reference that you use to understand the chosen experiment. No doubt there will be a list of things about the experiment and resulting data you don't understand. Demand that the paper clear up each element on the list. For example, the figure talks about enzyme activity? Scan the paper with the sole purpose of discovering how that activity was measured.
6. DEVELOP A STORY about the experiment, addressing the four objectives listed above. There will probably be holes, maybe major holes, in your story. Recognize them, but don't worry about them. Your story will probably throw out 90% of the article. That's fine. No, that's necessary. If you don't, you will not have enough time in your presentation to do more than skate over the surface of the topic. It is much better to follow a small part of a paper from beginning to end.
7. MAKE A LIST OF HOLES, the things you need to find out to complete your story. Find them out (see Point 3 for suggestions how to do this).
8. WRITE AN OUTLINE, with four major headings, something like this:

    I. Introduction: What question are you addressing and why?
        A. What broad scientific topic of obvious interest does the authors work fall into. Explain to us why we should be interested.
        B - Y. Proceed by a series of logical steps, aiming at a means of making progress in that broad area, leading to…
        Z. A statement of the specific question the authors experimentally addressed. If the previous steps were well done, then this question should be almost obvious.

    II. Methods: How did they answer the question?
        A. Using the specific question as a launching pad, ask, in principle, what kind of experiment could answer it?
        B. What is the basis behind the experimental techniques the authors employed?
        C. What kind of answers might anticipated from such experiments?

    III. Results: What came from the experiment?
        A. A reminder of the specific question the authors wished to answer
        B. What were the specific experimental conditions?
        C. What specific results might the experiment have produced and what would they have meant?
        D. (finally) What results were obtained?
            1. (If a figure) What do the axes mean? (If a table) What do the columns and rows mean?
            2. What part of the data do you wish to talk about?

    IV. Discussion: What does it all mean?
        A. Recall the specific question and the juxtapose it with the answer that came from the experiment.
        B. To what extent is the specific question answered? What are the limitations on the result?
        C. How does the answer impinge on the major question?

9. IMAGINE AND ROUGH OUT VISUAL AIDS for every point on your outline. Some hints:
    a. Important statements (certainly the broad question and the specific question) should be written out, either on the board or on an overhead.
    b. Use visual aids to make the logic of your talk transparent to the listener.
    c. For text visuals, use short phrases, not sentences.
    d. It is a rare table or figure in a research paper that can readily be grasped by a naïve audience in a short period of time. In general, you will need to augment a figure with additional labels and text, or rewrite the data in your own more comprehensible way.
    e. Consider making a flow diagram to describe the experiment.

10. MEET WITH ME, AT LEAST 5 DAYS BEFORE THE PRESENTATION, outline in hand. You need not have the visual aids all prepared but should have at least a rough version of each. Of course, you're invited to meet with me earlier than this, at any stage of your preparations.

11. PREPARE VISUAL AIDS. I have overhead plastic if you need any.

12. Plug any remaining holes.

13. GO THROUGH THE PRESENTATION. Some hints:
    a. Be sure to leave time for the listeners to soak in important points or new ideas. You can do this by redundancy. Let me say that again, you can give listeners time by repeating what you have said in different words.
    b. Be sure to leave time to go through visual aids, imagining you are seeing them for the first time. Don't fall into the trap of saying to yourself, "Then I'll go over the figure." Actually take the time to go over it, pointing out every aspect you wish us to take away. Be sure, if you don't point it out, it will be lost.
    c. Note the time required to cover what you wish to cover and make necessary adjustments.
    d. Consider making use of the Speech Center, which provides consultants to help you prepare presentations. An appointment is required. Contact Linda Hobgood at 289-8814. Be sure to bring with you this description along with your presentation.

14. GIVE THE PRESENTATION/HAND IN OUTLINE. By this time it should be a walk in the park.

WRITTEN SUMMARIES

A summary should communicate the nature and significance of the problem addressed by the paper, the strategy employed to address the problem, the tools used in the study, the primary results, and important implications. If this sounds reminiscent of what I just said about a presentation, then consider that good communication is good communication. Young Hemingways in the class are free to use any appropriate format to realize these goals, but the rest of us should seriously consider following the general outline in Step 8 in the description of Presentations.

The summary should be written for an audience of people much like yourself, avoiding jargon and defining any terms you wouldn't expect your colleagues to be familiar with. It should end up about 1½ pages, double spaced, but the optimal length really depends upon the complexity of the paper.

Each paragraph should have a goal. If a phrase does not contribute towards the goal, then it detracts from it and should be deleted. Many people profit from writing an outline before attempting to write deathless prose. The outline need not be formal -- just setting down the

substance of each paragraph without needing to worry about the niceties. Doing this after writing a rough draft may also be useful: if you find it difficult to outline the logic of your paragraph, there is a strong possibility there isn't any logic to outline.

GRADING

All assignments will be assigned a numerical grade based on the usual scale of 90-99=A, 80-89=B, etc. The final grade will be calculated based on a weighted average of all assignments. The weights used in this calculation are given below.

Presentations/Outlines	90	(= 40 for first, 50 for second)
Summaries	80	(= 20 x 4)
Library Exam	10	
Sequence analysis	10	
TOTAL	190	

This is a new course, and I beg your leave to change the number and weights of these assignments should there prove a compelling need.

Late assignments

Turning in assignments late makes life difficult for those of us who have to grade the assignment, and, eventually, to those of you who would like to receive the assignment back in a timely fashion. The purpose of late penalties is to discourage antisocial behavior but at the same time to encourage you to turn in SOMETHING, SOMETIME. To this end, every day late costs, but it is always much better to turn in the late paper than to not do it at all (which would generate a zero). An assignment is deemed late if it is turned in later than 5:00 P.M. on the day due. The maximum grade obtainable by a late paper will be calculated according to the formula:

$$\text{maximum value of an assignment} = 60 + 40\times(0.9)^{\mathbf{d}}$$

where **d** is the number of weekdays late.