

Biology 257 Immunology Final Project Fall 2008

Goals

1. To **delve more deeply** into an **interesting aspect of immunology**.
2. To **practice searching, reading, and analyzing** the **scientific literature**.
3. To **hone scientific presentation skills** in a poster symposium.

Key deadlines

Fri., Oct. 17:	Project topic selections (top 4 choices) due by 5 (email)
Fri., Oct. 31:	Descriptive paragraph and literature search due by 5 pm (hard copy)
Fri., Nov. 7:	Paper analysis due by 5 pm (hard copy)
Fri., Nov. 21:	Project outline due by 5 pm (hard copy)
Wed., Dec. 3:	Project abstract due by 5 pm (email)
Mon. Dec. 8:	Poster symposium in the Atrium during class; reviews due by 5 pm

Topics

Immunity and self-non-self recognition in non-mammalian systems

We only have time to scratch the surface of mammalian immunology, but the question of how immune systems evolved is fascinating. One way to starting thinking about the evolution of the immune system is to look at how other organisms distinguish self from non-self and how they fight infection. Here are a number of systems used for non-mammalian immunological research that would be interesting to study:

Plants (<i>Arabidopsis</i> , <i>Brassica</i>)	Birds (chicken)
Roundworms (<i>Caenorhabditis elegans</i>)	Reptiles (turtle, lizard)
Insects (<i>Drosophila melanogaster</i>)	Amphibians (<i>Xenopus</i>)
Sea sponge	Fish (rainbow trout)

Animal models for human diseases

Much of what we know about human diseases and how the immune system combats disease comes from experiments with animal models. Mammalian model systems, such as mice, guinea pigs, rabbits, and pigs, have been used to investigate diseases of the immune system (e.g. autoimmune diseases like lupus) and the immune response to infectious diseases and cancer. The list below includes recommendations for both.

<u>Diseases of the immune system</u>	<u>Infectious diseases</u>
Insulin-dependent diabetes mellitus	Influenza
Systemic lupus erythematosus	Lyme Disease
Multiple sclerosis	Candidiasis
Rheumatoid arthritis	Tuberculosis

If you want to select a topic that is not on these lists, come talk to me by **Fri. Oct. 17** with your ideas and abstracts from literature searches supporting your topic choice.

Poster presentation

You will work in **pairs** to research a topic and you will **select two related papers** from the literature to present in a poster symposium at the end of the semester. For example, you might choose two sequential papers that investigate a certain phenomenon (i.e. anti-bacterial peptides in *C. elegans*) or two papers that give conflicting data about the same phenomenon (does a certain influenza vaccination technique elicit the same type of immune response in pigs in two separate experiments?).

You will select **4-5 important figures** (total) from the two papers to present. I **strongly recommend** including your own **schematic representation** of each experiment in addition to the figure from the paper. The poster will also include **your own**:

1. title
2. abstract/summary
3. introduction
4. conclusions
5. future directions
6. reference (literature cited) list



These items work well as bulleted lists on which you can elaborate while presenting the poster.

There will also be a **special section** to highlight either what is similar/different to mammalian immunology in the non-mammalian system explored by your papers or what about the human disease is not reflected in the animal system used in your papers

I'll give you more poster presentation hints in a few weeks, but there are also some on the Bio. Dept. website: <http://academic.bowdoin.edu/bio/resources/html/posters.shtml>

The poster symposium will be in the Atrium during class time the last week of class and each person will be responsible for explaining the poster for part of the class period. Two **peer reviewers** will be assigned to evaluate each presentation (total of 4 per poster).

In addition, there will be a **self-evaluation** after the poster for each of you to address **your and your partner's overall effort** as well as **percentage effort in each aspect of the project** (literature searches and choice of topic; descriptive paragraph; obtaining and reading papers; outline; poster text; figure design (schematic diagrams and figure adaptation), poster printing/assembly). **Teamwork** is key!

Scientific literature

PROPER REFERENCES AND CITATIONS are crucial, both for the poster and the paper (see "Scientific Citations and References" handout). Although one should always cite the primary literature (the original papers containing data that support the ideas you are discussing), you will not have time to read much of the primary literature. You should find **at least 3 additional articles** (either review articles or articles from the primary literature) that relate to your topic and use these papers to enhance your poster (e.g. for background information). This **requirement for five cited references** should **not** stop you from **consulting** and **citing more articles** if you so desire. **All the articles** you use should be **handed in** on the last day of class.

Paper analysis

At the beginning of November, you will use the analytical skills we have been practicing by writing an **analysis of one of the articles that you think you might choose for your poster**. Although the analysis will be similar to a discussion preparation, rather than writing about every figure, you will choose the **two most interesting figures** to discuss. You should also write the analysis as a **paper** (rather than subdividing the ideas by numbers). Here are the ideas you should include in the paper.

What **biological question** were they addressing?

What was their **general approach**?

For the **two most interesting figures**:

What was **specific question** being addressed?

What was the **experiment**?

What were the **results**?

Why are these results **interesting**?

How would you **improve the experiment**?

Are there any **scientific questions** this experiment **raises** for you?

What were the paper's **major conclusions**?

What **additional/next experiments** do you think should be done?

Why did you **choose** this paper and what are its **experimental strengths** and **weaknesses**?

Your **paper is due by 5 PM** on Fri. Nov. 7. You should shoot for about **1500-2000 words**. If you use **12 pt. Times, 1.5 space, and 1" margins**, this word number corresponds to **~4-6 p.** **Good writing is important**: in addition to answers to the questions, **appropriate use of citations and references, spelling, grammar, clarity and other aspects of good writing** will be factored into the final paper analysis grade.

You and your partner will write analyses of **different papers**, but I encourage you each to read both papers and to discuss them before writing your analysis. You will hand in a **copy of the paper** with your analysis on Fri., Nov 7.