

ELEVEN SUGGESTIONS FOR A PRODUCTIVE RESEARCH EXPERIENCE IN THE BLOCH QAZI LAB

Research is a process of discovery both about the living world and about how you think and communicate. A research experience presents opportunities to learn about a particular biological topic, research methods, the process of scientific investigation and what you may (or may not) aspire to do after you graduate. Research can be a wonderful (if sometimes somewhat maddening) experience. Some people love it and can't get enough of it while others, well, not-so-much. This document is intended to help you develop habits of practice that favor a successful (i.e. safe, productive and positive) laboratory experience. With this in mind, I recommend that you be...

- **SAFE**

Your health and that of other members of the lab is of paramount importance. Know what chemicals are being used in the lab and where MSDS forms (material safety data sheets) are located. Do not bring any food, water, candy, etc. into the lab when food is declared off-limits for safety reasons. Know where broken glass is disposed (nope...not the trash) and be certain to clear up any broken glass promptly to prevent others from getting cut. Please let me know if you have health issues that might affect your safety in the lab (latex allergies, severe diabetes, insect allergies, etc.). When you work in the lab at night either have a buddy with you or keep the lab door locked. Know where the phone numbers for Safety & Security and my home are posted in the event of an emergency.

- **PROACTIVE**

Anticipate the next step in your scholarly work. Next steps include: materials (types and quantities) you will need, a timeline for experimental work, skills needed to complete planned work, a sense of the format by which data will be analyzed (comparing means of two or more groups? Examining the strength of the relationship between two variables?) and presented, and what experiments might be completed next.

- **PREPARED**

To paraphrase the biologist Louis Pasteur, *chance favors a prepared mind*. To increase the probability of making a novel discovery, an insightful observation, or a critical flaw in reasoning, learn as much as you can about what you are doing. Be proactive (see above), ask questions, identify and read relevant material, discuss & think about what you are doing as well as what it means in a biological context. This also includes being prepared to make mistakes and that your work may go more slowly than you anticipate. It's important not to get frustrated, but to have the perspective that every mistake is an opportunity to learn something new.

- **RESPONSIBLE**

Demonstrate stewardship for your experiments and the laboratory in general by

- Maintaining a current, well-organized and accurate lab notebook (see attached instructions)
- Promptly washing/autoclaving/putting away materials (e.g., glassware, dissecting instruments, reagents, etc)
- Turning off and returning equipment to its rightful location when you are done using it
- Alerting me when materials are low but **before** they are completely depleted.
- When the inevitable happens and something breaks/gets depleted/needs remedy, tell me promptly (preferably in person) and ask how you can help be a part of the solution.

- **RESPECTFUL**

Other people are sharing the laboratory space and we are all very busy. Kindly respect others'

- *Time* and arrive promptly to meetings and honor due dates (generally, these can be easily modified by prior arrangement)
- *Materials* and do not 'borrow' someone else's supplies or flies without first receiving permission
- *Right to use shared laboratory equipment* (microscopes, computer, hot plate, etc.) by keeping equipment clear if you are not immediately using it

- **REALISTIC**

Most of the time, the wheels of science often turn ever-so-slowly. You can expect to learn a great deal about the process of science, the wonder of *Drosophila* genetics, and the biology of reproduction. Your work is important and contributes to a larger body of work focused on understanding the regulation of female reproduction. This work is presented in a variety of venues. Do not expect to have publishable results in the first semester, first year or (gasp!) even longer.

- **CREATIVE**

Effective scientists are creative problem-solvers. Creativity involves resolving challenges in unique ways. This requires one to analyze a problem from different perspectives and synthesize a novel solution. As a student of the liberal arts, you are becoming skillful at examining topics from multiple perspectives. This takes practice, so think and talk about problem solving with other Fly Pushers, your roommate, friends, family or anyone else who will listen to you! Ultimately, this will help you become a stronger and more flexible scientific thinker.

- **HONEST**

Science works as a scholarly endeavor because we trust that information is reported accurately and its sources identified clearly. The results are the only 'real', tangible, outcome of our work. Since so much rests on their values, it is imperative that you report them accurately/honestly. Even negative results (results of no effect) can be very informative. It is sometimes difficult to decide the most accurate and objective way to design & conduct experiments (What should I do if the flies for an experiment differ in age – and I am not examining age effects?), analyze results (What's pseudoreplication? Can I exclude this fly from the analysis if she...?), and interpret results (My p value is 0.052, but the means look really different. Should I just round it to $p=0.05$?). **Ask.** Even if you are certain you know the answer, it may be a very instructive experience for other Fly Pushers.

- **FOCUSED**

*The blizzard of the world
has crossed the threshold,
and it has overturned
the order of the soul.*

-Leonard Cohen

The school year is an incredibly busy time for everyone. If only there were more hours in the day or you had clones to help you meet all of your commitments! Think of the lab as an igloo of calm in a blizzard of activity.

Stay engaged

Have both your head and hands ‘in the game’. Actively follow the guidelines suggested in this document. Listen carefully to other Fly Pushers. Ask questions to clarify your understanding of a topic and to explore a topic more deeply. In the words of a former research student from this lab “my first year in the lab I felt very timid to ask questions because I always felt that I would come across as "unintelligent" and I should just innately know everything. ...*[It is very important]* to ask questions, and understand not just your own experiment, but the experiments of others' in the lab. Everything is connected and you'll understand what you are doing more if you know how it relates to everyone else's project.”

Practice uni-tasking

When you enter the lab, set your things down and take a moment to focus on the laboratory procedure or analysis you will be conducting. Briefly read over your notebook to remind yourself ‘where you are’ in an experiment. Then, with a clear idea of what you are setting out to accomplish, focus on one lab activity at a time. It is okay to have media on the hotplate while doing a small task like dishwashing or labeling vials, but do not divide your attention among activities requiring accurate and/or precise work. Focusing on the task at hand also means refraining from engaging in conversations while collecting flies/data. It is simply too easy to become distracted and mislabel a vial, collect the wrong genotype/sex, miscount or record incomplete information ultimately resulting in inaccurate data and less-interpretable experimental results.

- **CONVINCED THAT THE WORK YOU DO IN THIS LAB IS REAL & MATTERS.**

What you do becomes a part of the legacy upon which the laboratory research program and future research students depend. Think of this as a type of laboratory immortality – your Fly Pushing spirit remains in the lab and a part of the presented work from the lab - long after you have graduated and moved on to do other fabulous things!