

Choosing a Thesis Lab

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The lab is a place that you will spend much of the next several years of your life. The work you do in your thesis lab and the perspective you get on how to do science may influence the rest of your career. Choosing a lab is an important decision, so take it seriously and make it carefully.

Different stages in your scientific career have different purposes. Choosing a lab can therefore have different considerations depending on the stage of your studies. For example, the purpose of a good rotation is NOT to achieve results, but rather to get to know a lab- and see if it's a good fit for you, as well as learn new schools of thought. The purpose of your Masters and PhD research is not only to produce papers (although writing a paper is an important part of the research). Think of it as giving yourself a gift, time to work on a project you find fascinating without external concerns. It can be the best years of your life. The precise subject is less important than learning how to do science (and keep sane) by being close to good (and supportive) scientists. If you want to continue in an academic career, the postdoc is where you choose the field that you will work on as a Principal Investigator (PI), not the PhD. Most successful scientists switch to a new field in their postdoc, so choose PhD labs by mentor more than by subject.

So – how do you take such an important decision?

FIRST: KNOW YOURSELF.

What is your personality and work style?

Labs are not one size fits all. Some students excel in labs where other students would flounder. One of the most important relationships you are going to have in the next few years is with your PI - so seriously consider what kind of mentor it is you're looking for. Do you work better with a PI who is very hands- on or would you prefer a PI who lets/expects you to solve your own problems? Do you want a PI who motivates you by encouragement or by criticism? Would you prefer a large lab or one that is smaller? There are no right or wrong answers; just be aware of what you prefer. And consider that personality and work style conflicts are probably the most common reasons why students leave thesis labs, so choosing a PI and lab that are a good fit for you is essential.

What are your research interests?

What areas of research really interest you? Which labs are doing research that you find compelling? If you choose thesis work that you find interesting and exciting, you will enjoy discussing your research with others. You will enjoy thinking up experiments to test your ideas and carrying them out. You will enjoy reading journal articles, going to seminars, and attending meetings in your field. By the end of your thesis work, you will be an expert in your area, and you will have enjoyed getting there.

If you feel like biology is too big and wide to decide what interests you, try to define at least several parameters:

1. What kind of science do you find rewarding - basic or applied?
2. Are you a risk-taker in which case you may prefer a lab that conducts nonstandard, risky research, or do you prefer to go with safer options in which case mainstream research may fit you better?
3. Are you prepared to work with mammals (mice, rats, monkeys)?
4. What do you enjoy telling to others that you read or “science gossiping” about with your friends. Is it cool animal behavior? The environment? New technologies? Stem cells? This gives an excellent insight into what you are really interested in.

MOST IMPORTANT: When you read the latest paper from a lab, think: **DO I WISH I WOULD HAVE DONE THAT WORK?**

What are your career goals?

What would you eventually like to do with your PhD? Are you interested in doing research in industry or academia? What are the skills you want to learn – experimental, mathematical, or other skills? Think about the kinds of research that are compatible with your career goals.

A QUESTIONNAIRE TO HELP YOU ASSESS A POTENTIAL LAB CAN BE FOUND AT THE BOTTOM OF THIS DOCUMENT

SECOND: KNOW THE LAB

Here are a couple of aspects to think about when looking at a lab:

Research area: Are you interested in the area? Will it fit with your career and life goals? Is it interesting to others?

Publications: What journals does the PI publish in? Are the journals peer-reviewed and well-respected? Is there a history of the lab publishing something every (or about every) year?

Track record: How many graduate students has the lab had? How many have graduated with what degrees and how long has it taken them? What are they doing now?

Lab size and age: Would you prefer to join a lab that's already fully functional and running, or would you like to join a younger lab where you'll have a more active role in shaping the lab's personality? Are you looking for a large lab, where you'll get input from many outlooks and backgrounds, or will you thrive in a smaller lab, where you'll get more personalized attention from the PI?

Physical resources: Is the lab well equipped (including equipment, lab space, computers, meeting space)? Do the graduate students spend the majority of their time doing research, or dealing with the technical details around research (making buffers, mediums, filling tip boxes, etc.)? Is the lab well-funded?

People resources: Are there enough people in the lab to help you out/ make it fun to work (including, where relevant: an ordering person, technicians, post docs, other grad students, etc...).

Lab meetings: Does the lab have them? Are they regularly held? Are they effective in providing useful feedback from others on your project?

Safety: How safety conscious is the lab? Do you prefer a lab that is a super-stickler for every safety regulation or do you prefer a lab that is more relaxed about safety?

Work style: Some labs are absolutely silent. Some labs play music or the radio loudly. Will it drive you nuts if someone else in the lab likes playing loud music that you dislike? Do members in the lab have cleaning duties? Does everything in the lab have a proper place? How much neatness or disorder do you prefer?

THIRD: KNOW THE PI

A good advisor will serve as a mentor as well as a source of technical assistance. A mentor should provide, or help you to find, the resources you need (financial, equipment, and psychological support); introduce you and promote your work to important people in your field; encourage your own interests, rather than promoting their own; be available to give you advice on the direction of your thesis and your career; and help you find a job when you finish. They should help you to set and achieve long-term and short-term goals.

Guidance level: Are graduate students expected to completely develop their own project or does the PI get them started? Is the lab a "sink or swim" environment or does the PI try to offer ideas and assistance when a project isn't going well? How hands-on, hands-off, or micromanaging is the PI?

Expectations of graduate students: "What is expected of a graduate student in the lab?" Ask both the PI and the students in the lab. Do the answers match? If they don't match be careful.

Honesty and trustworthiness: Does the PI do what they says they will? Can you trust them to give you credit for the work you do? Does the PI have your best interests in mind? Will the PI look out for you professionally and personally? Can you always believe what they say?

Communication style: Is the PI confrontational or non confrontational? Is the PI flexible or inflexible?

Temperament: Is the PI moody or even-tempered? Are they generally an optimist or pessimist? Does the PI play favorites or treat everyone the same? Does the PI motivate students by praise and encouragement or by criticism and blame? Are these done in public or private?

Management competence: Does the lab run smoothly? Will your work constantly be interrupted by having to take care of administrative duties that the PI has failed to address?

Accessible or inaccessible: Is the PI physically present or traveling every other week? Is the PI in the office, the lab, or in meetings all day long? Can you speak with them if necessary?

Approachable or unapproachable: Do people feel comfortable talking with the PI?

Scientific reputation: Is the PI well thought of by his peers? Are the PI's scientific beliefs shared and/or respected by others in the field? Is this a PI with a reputation for groundbreaking work?

Collaborations and contacts: Does the PI collaborate with other groups? – in Weizmann or abroad? Does the PI have contacts that will help you further your career goals?

FOURTH: KNOW YOUR PROJECT

While the project offered to you at the beginning of your rotation/Masters/PhD has been thought up by the PI, you should be certain that you're happy to be conducting this line of research. Try not to go after a project just because you think it touches upon a scientifically fashionable subject, or because you would like to learn the techniques it involved; hot subjects will change with times, and some techniques can be picked up in weeks. (although other techniques take years to master). Make sure that you're excited by the topic; do you think that it's relevant and interesting? When you read a paper on this subject, do you feel engaged, or are you just flipping forward to see how many more pages there are?

The topic first thought up at the beginning of your work may be the stepping-stone for your later work. Try and think if you can attack this topic from several angles, and connect it to several systems. At the same time, the beginning stages of your research should be as simple as possible - look for projects that will allow you to glean the most amount of information in the least amount of time. Building systems from scratch can be immensely rewarding, but take into account that even deceptively simple systems can have their kinks that must be worked out before any data can be collected.

Finally, if you have a project that you think might be wonderful - don't be afraid to suggest it to the PI.

Special Points for Choosing a Rotation Lab

Choosing a rotation lab is very confusing. Often students will not have prior experience in research or working in a lab environment, do not yet have solid ideas of what they want to do in science and are not given enough tools to assess the quality of laboratories. This all is in addition to the fact that there are tens or hundreds of labs to choose from and pressure (external and internal) to make the “best” choice.

Remember: there is no “best” choice. Different labs fit different people and you never know where you will thrive. SO...make sure you choose a lab that you are happy to go to. However, one of the best tools to figure where you'll be happy is gaining experience both in lab work and in how different lab style suits you. That's why its recommended NOT to pick your rotation projects in advance. Give yourself the opportunity to be exposed to new ideas and new attitudes, which can only be done when you've been attending seminars and talking to people about their work.

However, the first rotation lab must still be selected with little to no prior experience. To try and do this without reading hundreds of web pages you can:

1. Limit yourself to the type of science that you want to do (i.e.: only experimental biology and not computational biology or only theoretical physics and not experimental labs).
2. Limit the departments that you consider. Remember that the department you are in has a lot of influence of what you will be exposed to. It guides the types of talks you will hear at seminars, the types of people you can ask questions about your work and the types of interests that will be in the lab
3. Try to choose three different departments (but NO more than three to scan at first) for the three rotation projects – this will give you a feeling of how for the very different approaches conduct in science and will give you chance to get to know different work environments from the inside. Since you don't have to choose your Masters lab from the rotations – knowing these different departments will also also give you a chance to know more people in case

none of the three rotations suited your needs, and you need to choose a Masters lab from scratch.

4. In each department quickly “weed” out labs that you will never consider, such as those which don’t fit your research style or work style (see above). Try to remain with 2-3 labs that are high on your list and invest more time in researching them. Read their webpages in depth, read several abstracts of their latest work, read their entry in the Weizmann Life Science book (http://www.weizmann.ac.il/Biology/open_day/book/) talk to students in the lab or to people who know that lab and read what former rotation students had to say about that lab at the student council services page (but remember to take this with a grain of salt).
5. **DO NOT OVERWHELM YOURSELF** – 3 labs from each department is still a lot of labs to go through. Don’t make decisions on all three rotations at once. It is better to start working and learn more about labs as you go along. With time you will get more of an idea of what you prefer in a lab or a project and this will make it easier for you to make the choice for the second or third rotation lab. Still – try to talk to at least 2 or 3 PIs before making a decision on your first rotation. You can use the questionnaire below as a guideline, but of course you should not feel pressure to ask as many questions as when looking for a PhD lab as it may seem too detailed for such a short time.
6. Remember that you can learn great things in each and every lab. Nobody discovers the “cure for cancer” or wins the “Nobel prize” from their rotations – so just enjoy them and learn as much as you can. When used correctly, they can give you a lot of power for shaping your later projects and interests. Even bad experiences are important for guiding you on what you **DO NOT** want from your project or lab experience – sometimes more important than good experiences. So – just make the most of each rotation!

HOW TO APPLY FOR A POSITION

The first impression a PI will get from you will usually be from your request letter, so make sure to send a letter that is polite, gives enough background on yourself and is specific about your interests (i.e., do you want to rotate, do a Masters degree or a PhD) as well as expresses how and why you are interested in the lab and its research.

Specifically:

1. Oftentimes, you'll decide on which labs to approach based on scanning the labs' webpages to get an idea of what they do. However, keep in mind that this information isn't always up to date, so it's always good to read an abstract or two of the labs recent papers. In your request letter, be sure to state what particular aspect of their research/ experiment it is that caught your attention.
2. **ALWAYS** attach a CV (resume) to your request letter. Make sure someone goes over your CV as it makes a bad impression if it contains many typos and/or looks sloppy. Remember – the resume is what presents you so make it look good. A resume in English makes a better impression. Moreover – Often a PDF file (and not a word file) looks more professional as you don’t see the nonprinting characters (tabs, spaces etc..).
3. If you've done any work that's similar to the lab you are applying to, point that out.

4. Include contact information for yourself (some PIs prefer to get in touch via phone rather than e-mail), and names, titles (i.e.: my previous boss, teacher from BA course etc...) and telephone numbers of at least one referee (who has been updated in advance that they might get a call). If you make life easy for the PI there is a greater chance they will take the time to consider you.

If it's been a couple of days and your e-mails have yet to be answered, don't take it to heart. Some PIs are so busy they cannot open all of their emails or perhaps your emails ended in the PI's SPAM folder (it happens) and weren't noticed at all. Be persistent. Send another email and if that doesn't get a reply - pick up the phone or drop by the lab. Make sure to actually get an answer and not assume that you've been rejected.

QUESTIONNAIRE:

Questions to Ask a PI before Joining the Lab

1. What do you see as your role as a thesis advisor?
2. What do you expect from graduate students in your lab? Or: What do you think makes a successful student in the lab?
3. How many slots do you think you'll have open for masters' students this upcoming year? And doctorate positions in two years?
4. How many graduate students have joined your lab as a thesis lab? Did those students do well in your lab? How long did it take them to graduate? What degree(s) did they receive? What are they doing now?
5. What do you think are the strengths or weaknesses of the lab as a whole?
6. Do you have scheduled weekly one-on-one meetings with your graduate students? Or do you prefer to talk to them spontaneously / according to need?
7. What level of participation is expected of the student in choosing a thesis project?
8. I know that I am year(s) away from it now, but how do you handle journal article writing—do graduate students actually do the writing or do you prefer to do it some other way?
9. What participation levels in journal clubs, seminars are expected? Is attendance at international meetings encouraged?

Of course this is not an exhaustive list of questions to ask. The first questions help you understand what the PI sees as his role and what they expect from their graduate students. If your views on topics differ greatly from what the PI expresses, then you should be very careful about choosing that lab as a thesis lab. Your relationship with your PI is very important for the next steps in your career, and if you and the PI disagree fundamentally on your expectations, it is unlikely that you and the PI will have a good working relationship while you are in the lab.

MORE IMPORTANT THAN THE ANSWERS IS YOUR FEELING after the conversation – did you enjoy talking to the PI? Do you think you will like working with them? You will spend a lot of time with this person in the future so make sure you feel like you will get along.

After you talk with the PI, your "PI research" is not over. A PI may answer your questions in ways that suggest that you may be able to have a good working relationship; however, you need to evaluate whether or not those answers match up to what actually happens in the lab. You do this by discussing the PI and lab with others. Some PIs will say one thing, but when you talk to others who are in the lab or who have been in the lab, they will tell you that this is not the way things really are.

Questions to ask other students/post docs/technicians

1. Are you happy with your project? The PI? The lab equipment? The department?
2. Would you recommend this lab as a thesis lab?
3. Does the PI keep your best interests in mind? Do you feel that you are developing into a good scientist in the lab? Do they encourage your ideas or only promote his own?
4. How do you think that the PI is thought of in his field? In the Institute?
5. Does the PI react well to your suggestions for experiments or directions for your project?
6. How does the PI handle it when the project has setbacks or isn't working?
7. What level of your participation for deciding directions for your project is expected/allowed?
8. Do grad students work primarily with a Post-Doc, with other students in the lab, with the PI himself, or on their own?
9. Do you feel that the PI pays enough attention to your project? Do they have enough time to give everyone's project sufficient attention? Or are they too busy?
10. What do you think about the scientific ideas that the PI has? Are they well thought out? Practical? Innovative? Are they of interest to other scientists?
11. Does the PI help students find post-docsdoc positions, etc..., after graduating from the lab?
12. Does the PI support students to apply for prizes and fellowships?
13. Is the PI hands-on or hands-off, moody or even-tempered, have favorites or treat everyone the same etc. (see if these answers match what the PI has said and your experience in the lab.)
14. What do you think is the best thing about the PI? The worst?
15. Is there anything about the PI that drives you nuts?
16. What participation levels in journal clubs, seminars are expected?
17. What participation level in writing journal articles is expected?
18. What other training do people in the lab get (writing reviews, reviewing papers, giving journal clubs, writing parts of grants)
19. Is attendance at international meetings encouraged?
20. Is it acceptable to have interest/activities/children outside of lab?
21. What is "work?" (some PIs measure work only by what experiments get done, not other activities such as reading articles, thinking about your project, attending seminars/journal club, or TAing.)
22. What are weekend and vacation policies?
23. How did graduate students in the lab succeed in the past?
24. Does the PI give good advice?
25. Does the PI treat lab members well?

26. Do you enjoy talking about science with the PI? Do you enjoy talking about things not pertaining to science?
27. Is he/she good at managing the lab? Does the lab run smoothly?
28. How does the PI handle disagreements between lab members?
29. How diverse are the projects in the lab? Do people readily help each other?
30. If you were able to start your project over again is there anything that you would do differently?? (sometimes this helps identify flaws a PI might have—for example, if a student says that he/she might have focused his direction better, it might indicate that this is an area in which the PI is weak.)
31. Is there anything you wish you had known before you joined the lab?
32. How do you like working with other people in the lab? Are there many people that enjoy working together? Do you like doing non-science stuff with them (lunch/lab outings etc...).

You don't have to ask every single one of these questions but DO ask questions whose answers may influence your decision. Remember to consider the source: one person's perceptions may be wrong, but if you hear the same thing from a couple of independent reliable sources, it is probably true. Rumors often have a grain of truth, but if you are talking to someone who heard the story from someone else who heard it from someone else, the truth could very well be distorted. If you can, try to find a closer source. MOST IMPORTANT IS: LISTEN AND DO NOT DISCOUNT what people tell you. If you like the lab and so think you can "overlook" major problems which lab members raise in your discussions – think again about your choice. If they are all suffering, don't think you will be different.

Other students, technicians, post-docs, PIs, and staff will be able to provide you with a clear picture of what working with the PI in the lab will be like. Students, technicians, and post-docs who are happy with their lab and PI will be delighted to tell you so. Those who are unhappy may not be as willing to discuss it; so if several lab members don't answer your questions directly or aren't willing to discuss the lab or PI, be very careful about choosing that lab. Remember that you can always go to the lab next door and ask about the atmosphere in the neighboring lab. However, it's always important to keep in mind that even in a good lab, not all grad students and their PIs will have a harmonious relationship.

Choosing your thesis lab is one of the most important decisions you will make while you are in graduate school. You must take your time and make your decision well. You must talk to others about the PI and lab before making any commitment to a lab or PI.

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You can find more information:

<http://www.artsci.wustl.edu/~sac/document/ChoosingaThesisLabii.htm>

<http://www.cs.umbc.edu/www/graduate/choosing.an.advisor>