How to choose the “right” research mentor

11/10/2021

Sandy Chang MD/PhD

Associate Dean of Science and QR Education, Yale College

Professor, Depts. of Lab Med, Pathology and MBB, Yale Medical School
Explore the SC/QR website!

https://science.yalecollege.yale.edu/
Yale Summer Fellowships

Yale College **First Year** Summer Research Fellowships

- Everyone encouraged to apply-no prior research experience required.
- 10 weeks of independent research with Yale faculty.
- Fellowships pay $430/week.
- All basic science, CS, engineering research are eligible.
- ~85% of applicants receive funding.
STARS Summer

• 9-weeks of independent research with a Yale faculty

• SCIE 101 course on scientific communication (1 WR credit)

• Social events (weekend trips to CT attractions)

• Stipend, tuition, and room and board provided

**STARS SUMMER BY THE NUMBERS**

30 STUDENTS

57% FEMALE

40% URM

Class: SCIE S101, Scientific Research - Process and Presentation (1 writing credit).

Program costs; on-campus housing, board, course tuition, and stipend are covered.

Students present their research at a symposium on campus to peers and faculty.

Community building activities organized by STARS summer counselors.
Yale Summer Fellowships

Yale College Dean’s and Rosenfeld Research Fellowships

• Supports *sophomores and juniors* doing basic science research in Yale labs.

• **10 weeks** of independent science research with Yale faculty.

• Rosenfeld scholars also receive funding to present their research findings at national meetings

• ~70% of all sophomores and juniors receive funding.
Yale Summer Fellowships

Tetelman Summer International Fellowships

• Supports 10-week long STEM based summer research fellowships.

• Students identify a research mentor in a foreign institution and submit a proposal.

• Up to $7,000 provided per fellowship.
How do you find the “right” research mentor?

What do you hope to get out of your research experience?

What do you expect of your mentor(s)?

What do your mentor(s) expect of you?
Typical lab structure

Lab Principal Investigator (PI)

Usually a PhD, MD or MD/PhD tenure track professor of some rank

Postdoc or Research Fellow
Usually a PhD, MD or MD/PhD
Getting more research training
Highly independent researcher

Lab manager
Usually a PhD
Runs the lab

Graduate student
getting a PhD, or MD/PhD
Getting research training

You
research novice
Amos Jones was accepted to an excellent graduate program in molecular biology. The faculty was relatively small but there were two outstanding professors, Claire Cheng and Patricia Slocum, who really determined the quality of the graduate program. Amos had been encouraged to train under Dr. Slocum by his undergraduate advisor.

Amos planned to do rotations in both the Cheng and Slocum laboratories. When inquiring about the research activities in the labs, Amos was told by Dr. Slocum’s trainees that whether for a rotation or a thesis, Amos would be given a specific project, he would be expected to communicate results only to his direct supervisor, and he would have to give a formal presentation on the progress of his research once every two months. They noted that daily handwritten and dated entries were required for their laboratory notebooks. Much of the work had potential for commercial applications, so the laboratory was locked even during the day, with entry limited to the staff. The graduate students were reluctant to describe their experiments. The pace was very intense and trainees were required to prepare abstracts for the two important national meetings every year. The trainees also noted that many famous investigators visited the lab, spending time in formal and informal scientific discussion. Trainees were allowed to examine copies of papers that Dr. Slocum had received for review and to discuss them at lab meetings. They also saw an occasional grant application that she was asked to review. The trainees expected to be in great demand for postgraduate fellowships.

Professor Cheng’s students reflected on the openness of the laboratory and her constant and immediate availability. They thoroughly enjoyed broad scientific interplay within the lab and with investigators on campus and elsewhere. They indicated that they were encouraged to explore their own ideas and expected to select their own thesis project. The students gave no formal presentations except when rehearsing for meetings. Progress in the laboratory was episodic rather than steady as various concepts were explored. Although their notebooks were not specifically examined, Dr. Cheng knew about every experiment and provided constructive criticisms and suggestions. Dr. Cheng did not go to many meetings and refused to show papers she received for review to her trainees. The students admitted that they felt a little out of touch with the newest developments in the field. Although Dr. Cheng did not enjoy the same prestige and reputation as that of Dr. Slocum, the trainees said Dr. Cheng’s lab was a much more pleasant and collegial environment in which to work.
How do you find the “right” research mentor (PI)?

You will encounter many mentors in your scientific career. There is not one “right” mentor, just the right one for you.

You have to do some work to find a mentor
  Look at Dept. websites
  YURA database
  Look to senior undergrads for advice
  Come to my matchmaking session in January

Area of scientific interest matters much less than quality of a mentor
How do you find the “right” research mentor: questions to consider

Assistant professors: new and upcoming, hungry, eager to work with undergrads. New to mentoring, maybe unreasonable expectations of their undergrads, esp if you are the only person in the lab.

Associate profs: more established scientifically, knows how to mentor. Might be too busy trying to get tenure or might get recruited away from Yale.

Tenured professors: stable lab with lots of postdocs/grad students/undergrads, knows how to mentor. Might be too busy to meet undergrads, lab might be too big for undergrads who are not independent already.
How do you find the “right” research mentor: questions to consider

Consider the scientific system the PI works on:
  Simple model organisms
  (bacteria/yeast/flies/worms/cells) generally easier to generate data from than mice/primates.

Consider the PI’s track records with past undergrads-ask the PI for a list of undergrads who worked in his/her labs.

Will the PI be around over the summer?

Will the PI assign me to a daily mentor who will get along with me?
Good research mentor traits

Understand that you are new to research and WILL make mistakes.

Will challenge and encourage you while offering constructive criticism.

Meet with you on a regular basis to:
- Assess your research progress/growth/independence
- Assess your research competency
- Address any changing research interests
- Give you guidance about future STEM career choices

Allow you to present at regular lab meetings

Will support you for fellowship applications, graduate/medical schools.
Good undergraduate student research traits

Be professional and respectful at all times. Be punctual at scheduled meetings.

Work hard and give their best effort

Make effort to understand the research they are engaged in—asking questions, reading papers

Be proactive and ask to present data during lab meetings.

Keep a great lab notebook. Listen carefully, take notes and follow instructions when taught new techniques.

Gradually gain independence but keep up regular communication with PI.

Be able to analyze experimental data, generate logical conclusions and propose future experiments.

Be able to work with others and contribute to lab meeting discussions.
Mentor expectations

Consider some scenarios:

Experiments have been planned for 9:00 AM tomorrow morning. I, the mentor, arrive early at 8:00 to set up. I have a busy day, but really wanted to take the time to provide this teachable moment. The student arrives around 10:15 and provides a quick apology. I know I’ll be staying late to make up for lost time. How do I, the mentor, resolve this?

I have been mentoring a student for about 3 weeks, but they have proven to be extremely capable. This student is always asking questions and is proactive in searching out the answers. They have even found a paper in the literature that I hadn’t even seen to aid in experimental design. I find that this student can handle more and more work, which makes my life much easier. What do you think about this dynamic?
A new student recently joined the lab under my mentorship. I was excited to share the details of the project with them, and we sat down on their first day to go over details of a recent presentation I had given. This entire discussion did not prompt a single question from my new mentee. Are they a genius, completely bored, or just shy about talking to me?
Steps to find the “right” mentor

Apply to at least 5 labs. Read research papers generated by the perspective mentors’ labs. Send them your CV/resume along with a letter of introduction.

Be somewhat knowledgeable about the mentor’s research area before going to the interview.

Don’t be shy to showcase your own scientific talents during the interview—HS research, STEM courses taken at Yale, etc.

Ask the perspective mentor whether they’ve mentored undergrads before, and if so, ask for an introduction.

Sit in on a lab meeting to gauge lab dynamics.

Send a thank you note to everyone who took time to talk to you.