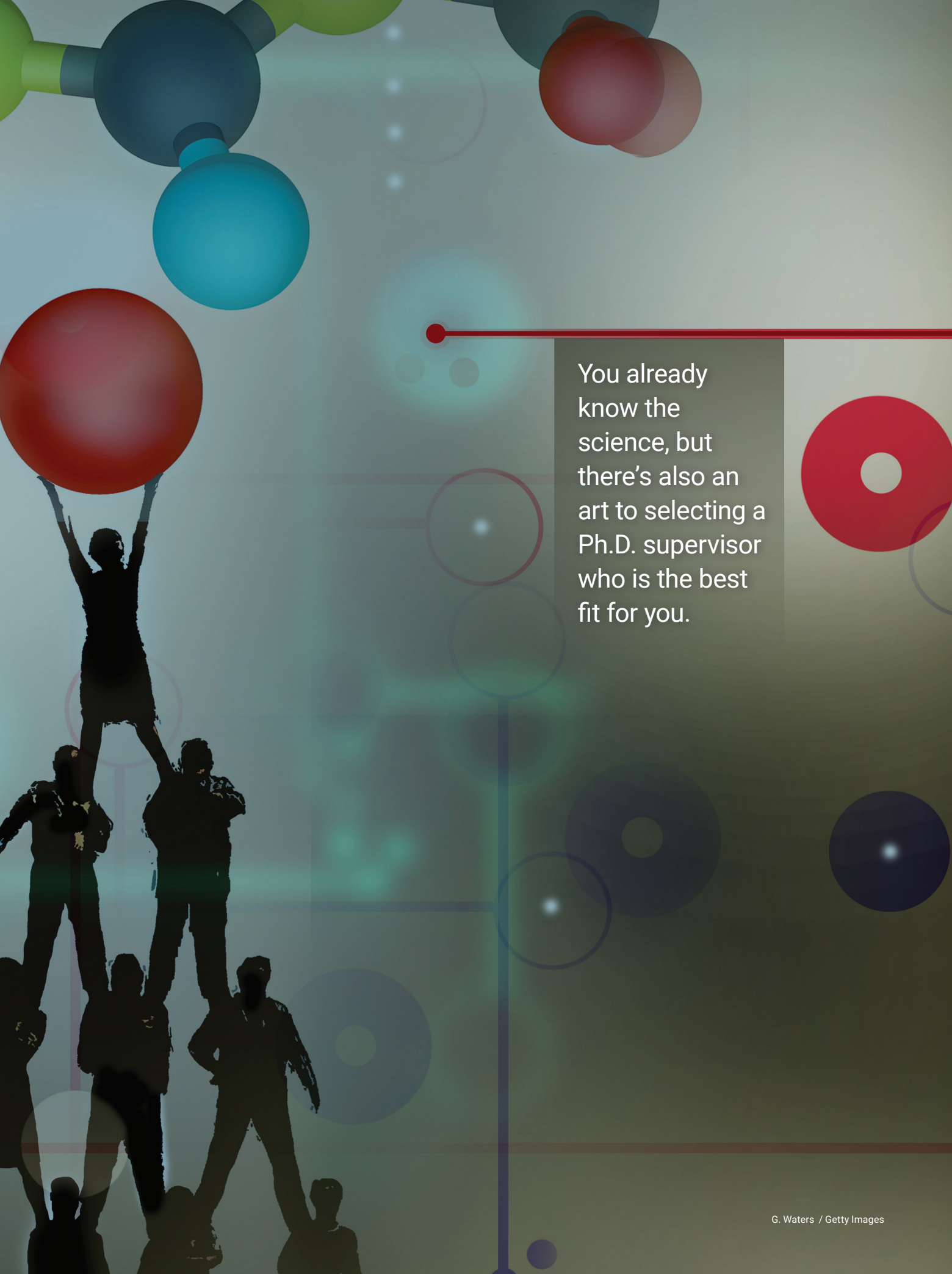Nathaniel Kinsey, Christian Haffner,
Kartik Srinivasan, Amit Agrawal
and Justus Ndukaife

Finding the Right Ph.D. Advisor

You already know the science, but there's also an art to selecting a Ph.D. supervisor who is the best fit for you.

When you start a Ph.D. program, you may be thrilled to be studying a fancy topic that you love—and you should be! But don't let that prevent you from carefully considering the impact that your Ph.D. supervisor has on your educational experience and career. To set yourself up for success, it's worth taking the time to select someone who aligns well with your professional goals, work style and personality.

In fact, the relationship you have with your advisor forms the basis for your early research, career development, personal growth, networking opportunities and more. In this article, we aim to improve the pairing of students and advisors by examining the relationship from both points of view.

Understanding supervisors' motives

Academia is highly competitive. Regardless of the advisor you choose, that individual is likely to be under pressure to keep up—not to mention that supervisors are working to advance their own career goals. Whether they aspire to get promoted or obtain tenure, they're committed to executing cutting-edge research that will help them to generate grant funding, get published in high-impact journals, secure invitations to give talks and other tasks.

However, because faculty members have multifaceted jobs that extend beyond conducting experiments every day, they need their Ph.D. students to help them

achieve their goals. Ideally, this leads to a symbiotic relationship, wherein the advisor benefits from the success of the student and vice versa.

While that sounds simple enough, conflict can arise—especially when you and your advisor have different goals or definitions of success. To minimize the potential for clashing, students should enter the relationship with a strong grasp of two key areas that can be sources of friction: group finances and knowledge transfer.

Group finances

Advisors are typically responsible for finding funding (for instance, grants) to support the students and postdocs in their group. This is a challenging and competitive task, with the average success rate for grants in the low double-digit percentage range. Teams that generate strong research results are in the best position to secure financial support. That means that falling behind in research can restrict your team's ideas and capacity, which in turn further diminishes future funding opportunities and research.

For students, this negative feedback loop can force them to finish their thesis under constraints on their time and finances. For example, they might have to squeeze in their dissertation while working their next job or dip into their savings to pay rent.

Advisors know this reality all too well. It's one of the reasons they tend to push students to produce key results—they want you to maintain pace and deliver on active projects to keep research activity high, for the sake of both you and the group. While this dynamic is

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not inherently bad, it should be understood, given that it can occasionally put strain on the advisor–student relationship.

One way to avoid this challenge altogether is by receiving a scholarship or fellowship that covers your own cost. Not only does this free up funds for other students, it provides you with more technical flexibility. Another is to inquire during the interview about the funding source for the position; many institutions have internal rules for a minimal funding duration.

Knowledge transfer

As you approach graduation, it's important for you and your advisor to have a shared understanding of who owns specific ideas and the best way for you to go about forming your own collaborations moving forward.

For example, as you look to build your research portfolio, you may need to demonstrate your individual impact by being recognized as a corresponding author on a paper or getting named on a grant or patent. Because your research may directly build from your advisor's work, your taking on these roles requires some concession from the advisor, giving rise to a potential conflict of interest. Keep in mind that not all advisors are willing to support these activities, so choose wisely.

While the importance of solo recognition will depend on your career path, you can minimize the chances for conflict by demonstrating early independence in your pursuit of academic positions. Create the time and space to cultivate your own ideas from the beginning. You might even ask potential advisors if they're willing to support students who engage in individual activities while being a part of the group. Again, understanding the dynamics at play—and how supervisors react to them—from the outset will reduce the challenge.

So, what are advisors looking for? From their perspective, ideal Ph.D. candidates have the technical know-how, organizational talent, communication skills and intrinsic motivation to address a scientific question independently. At the same time, students should also have the ability to innovate beyond the scope of the initial task. You may not be strong in all these areas right now, and that is okay. The right advisor will help you to develop and strengthen these skills during your Ph.D.
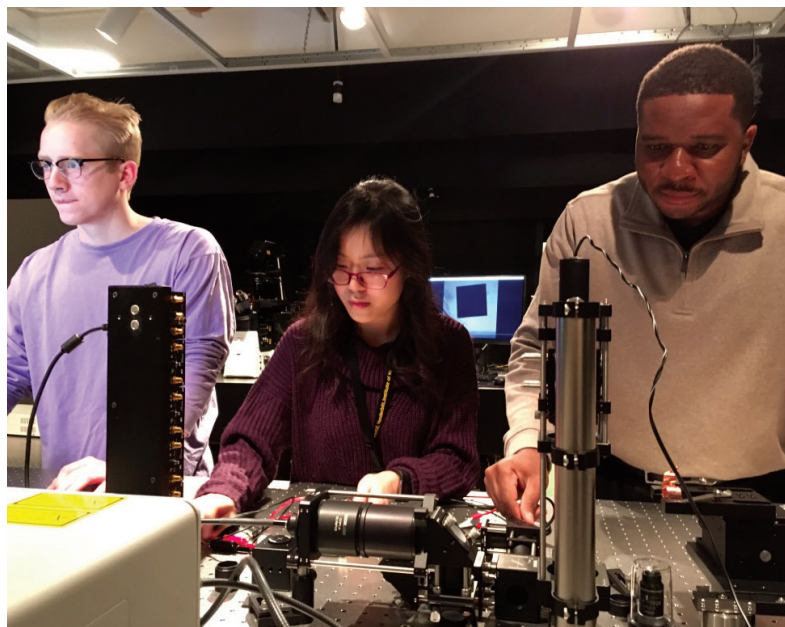
Justus Ndukaife (right) with team members in the lab at Vanderbilt University, Nashville, TN, USA.
Courtesy of J. Ndukaife

Questions to ask yourself

Central to the task of identifying potential institutions and advisors is to look for research groups whose goals align with yours, so they can help you develop your desired skillset. Here are two questions you can pose to yourself to guide you in this process.

Do I want to be part of a big group or small team?

It is not unheard of for supervisors to manage groups of 20 or more students. In this case, there is likely a good infrastructure, with processes and know-how you can learn from. To run such large groups, professors need to be well-established and have good networks—another possible benefit for students.

On the other hand, if having frequent, direct interaction with your advisor is important to you, a smaller team might have more to offer. In large groups, your engagement with your advisor could be limited to weekly or biweekly group meetings, with day-to-day guidance coming from senior members of the group. By contrast, smaller groups of only a few Ph.D. students

Questions to ask during interviews

An interview with a potential advisor is a two-way street. Make sure you prepare questions that can help you judge how each supervisor fits into your goals.

Potential supervisors

Some possible questions to ask prospective advisors include:

√ What do you think a student needs to be successful (characteristics, work habits, accomplishments, etc.)?

√ What are your expectations of me?

√ How is your group organized and managed?

√ Does your group have the equipment it needs to perform the research?

Other students

We also strongly encourage you to reach out to current and former students to obtain a realistic picture of what it will be like to partner with each advisor. Think about asking:

√ Would you work with your advisor again?

√ How was your advisor as a technical leader?

√ How often do you have personal-development meetings?

√ Does the advisor support students' independence and shared credit in research?

This conversation can get personal, so make sure to schedule a time and place by email in a discreet environment. In our experience, most former students will be honest, although they may sugarcoat their answers a bit. So, if you are not sure what they mean, don't be afraid to ask for clarification.

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may be run by early assistant professors. While there may be less infrastructure in this scenario, you would be in a great position to learn directly from the advisor and gain firsthand experience with establishing a research group.

Where do I want my career to go, and how can I get there?

A good supervisor will challenge you early with questions about your future plans—for example, whether you're interested in pursuing industry or academia—and you should have answers, at least in broad terms. Knowing this information allows the advisor to steer you toward research projects and conferences where you can establish the appropriate connections. Being able to trust your advisor to be focused on your well-being in these conversations is critical. Also consider which skills you want to learn and which type of expert you'd like to be (for instance, a generalist or specialist).

A checklist to consider

Regardless of your specific goals and preferences, look for Ph.D. advisors who will be willing to do the following:

Help you become independent.

Learning to operate independently is a basic requirement of getting your Ph.D. Look for advisors who will help you to move on when you reach this crucial stage. One way to gauge this is to look at the time-to-graduation period of students who work with a particular advisor. If all the students stay at or near the maximum period allowed by the institution to complete their degree, this could be a red flag.

Of course, ultimately the decision of when to move on should be driven by your goals, along with the skills, experiences and accomplishments you want to gain during your time as a Ph.D. student. There can be benefits to remaining in your post or in taking an interim step to bolster your CV or broaden your network. Navigating these decisions is again a point where a trusted advisor is critical.

Improve themselves.

Professors must lead scientifically, but they have many other responsibilities as well, including managing people, acquiring funding, teaching and so on. While one person cannot excel in all of these areas, a good supervisor tries to improve on their weaknesses. Look for advisors who are willing to do this.

By understanding your own goals and the motivations of faculty, you'll be able to identify the best next step in your career journey and build a connection that strengthens you both.

Broaden your network.

Getting connected is a key component of advancing your career—and one that your studies do not prepare you for. Good supervisors will help you expand your contacts by inviting you to meetings with collaborators or introducing you to professionals within their networks. Some supervisors even send high-performing students as representatives for an invited talk, which is a great way to gain visibility and expand your network.

Mentor you beyond your Ph.D.

A good supervisor will help you to brainstorm and provide feedback on new research trajectories that could be yours. In addition, today's work environment requires life-long learning, which works best with a good trainer. Most supervisors are more than happy to continue to mentor you after your dissertation is finished.

Once you've thought through all of this, you're ready to interview potential supervisors. Yes, that's right. Advisors aren't the only ones who get to ask questions, so be sure to come prepared for any exploratory meetings (see "Questions to ask during interviews").

Also plan to speak with former students, who will give you a unique and valuable perspective. They may be managers themselves or have experience with multiple managers, allowing them to anchor key traits of your potential supervisor. In addition, they are often motivated to respond to your request for feedback, either because they want to tout the merits of your potential supervisor or they want to protect you from a bad experience. You can find the names of former students via a graduation list or by cross-checking the first author names of the papers with the advisor as the corresponding author.

Carefully selecting both your research area and your advisor are the keys to a good Ph.D. experience. While
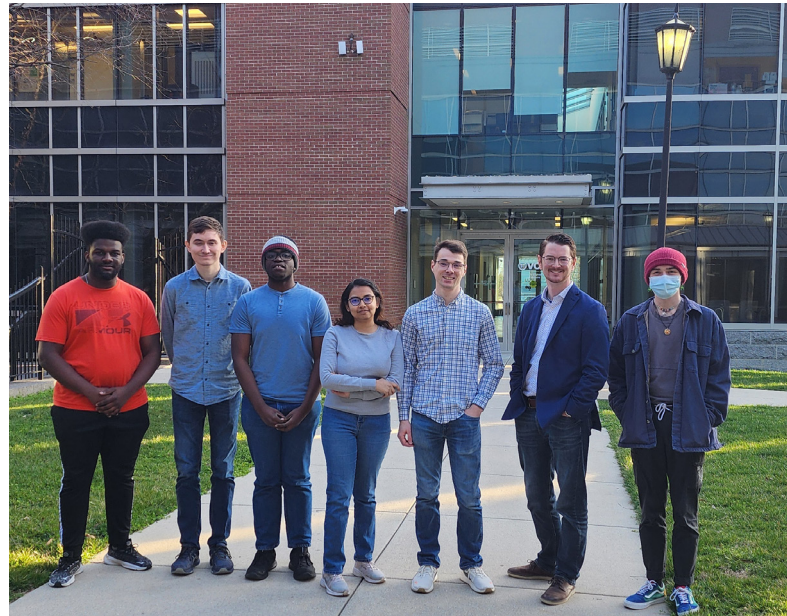
The group of coauthor Nathaniel Kinsey (second from right) at Virginia Commonwealth University, USA.

Courtesy of N. Kinsey

it is easy to focus on your desired research area alone, we encourage you to look deeper. By understanding your own goals and the motivations of faculty, you'll be able to identify the best next step in your career journey and build a connection that strengthens you both. OPN

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