CAREERS

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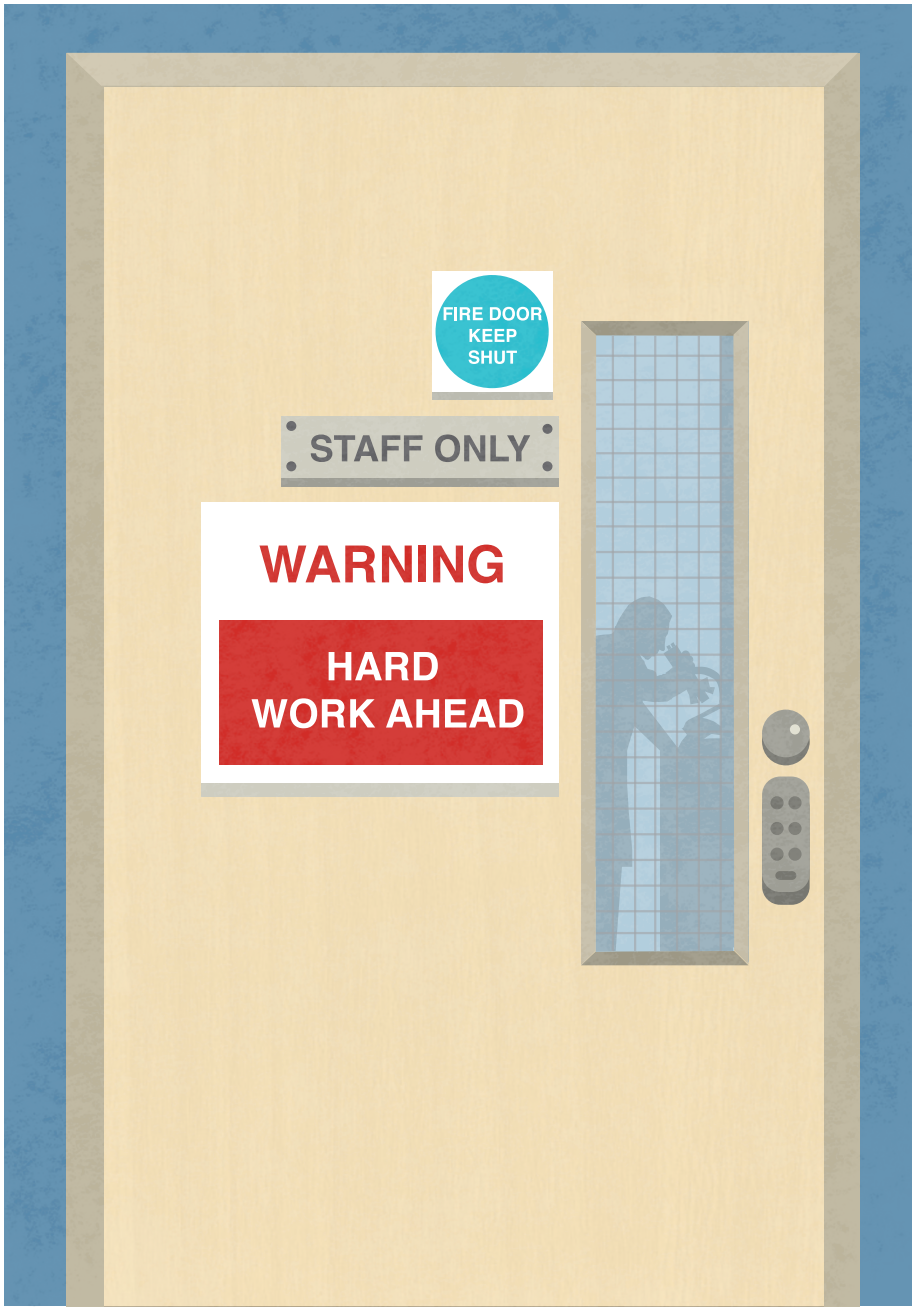


CLAIRE WELSH/*NATURE*

CAREER ADVANCEMENT

Insider knowledge

Junior researchers have a lot to learn, but talking to others about their experiences will help to avert nasty surprises.

BY CHRIS WOOLSTON

When Andrew Hires looks back on his days as a graduate student and postdoctoral researcher, he wishes that somebody had told him how unpredictable science can be. "You do experiments, and 90% of them aren't going to work. Nobody warned me about that," says Hires, a neurobiologist at the University of Southern California in Los Angeles. He had to adjust his expectations, double down on perseverance and savour the successes when they came.

On the way from the first failed experiment to a tenured or tenure-track position at a major research institution, scientists who intend to remain in academia must learn about a lot more than just frogs, or photons, or whatever they are investigating — they must also accumulate hard-won lessons about publication, funding, promotions and a host of other subjects. Academic scientists who have already gone through the wringer have much to tell newcomers, but are likely to do so only if young scientists can put aside any ill-placed discomfort and ask. "They get plenty of guidance in the field and in the lab," says Andrew Hendry, a newly tenured ecologist at McGill University in Montreal, Canada. But when it comes to the rest of the science life, he says, junior researchers are often stumbling in the dark, or at least walking slowly in a poorly lit room. "People don't ask enough questions. They're embarrassed," he says.

It is crucial, experienced scientists say, that junior researchers ask questions of their mentors, supervisors, lab and department heads, senior colleagues and members of their network. The answers can add up to a handy guide for navigating up the ladder.

MAKE A MARK

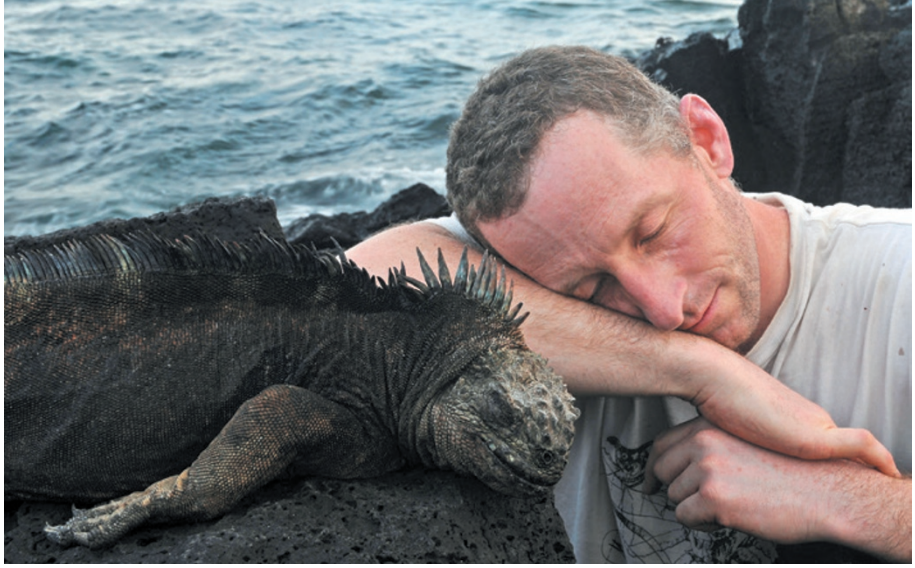
Clara Nellist, a particle-physics postdoc at the Linear Accelerator Laboratory in Orsay, France, wishes that she had known how hard it is to stand out when working in large collaborations. And she would have liked to have known in advance how to turn all the meetings she is expected to attend into an advantage. Earlier this year, she co-authored an important paper that estimated the mass of the long-sought Higgs boson (G. Aad *et al. Phys. Rev. Lett.* **114,** 191803; 2015).

The problem: she had to share the glory with 5,153 other authors (see *Nature* http://doi.org/4sn; 2015). "The only person who's ever going to find my name is my dad," she says. ▶

Still, she is making a name for herself in two projects: refining the pixel detectors at the Large Hadron Collider at CERN, Europe's particle-physics laboratory near Geneva, Switzerland, and studying the properties of the Higgs boson in ever-greater detail.

That combination of practical and theoretical physics should give her an edge in the job market, she says, although it doubles the number of meetings that she needs to attend. Many, many meetings — another surprise of the particle-physics world. "CERN knew that meetings were a problem, so they formed a committee to address it. The first thing the committee did was call a meeting," she says.

Still, those meetings have given her a chance to add her voice to the field and to learn a few things in the process. At first, she was reluctant to speak up. "I would have questions, but I wouldn't ask them in front of an audience. I didn't want to admit to any gaps in my knowledge," she says. An adviser finally pulled her aside to share one of the important life lessons of science: ask questions. "It shows that you're interested in the topic," she says.



ANDREW HENDRY

Ecologist Andrew Hendry thinks that being a professor is the best job in the world.

Chenjie Wang, a condensed-matter physics postdoc at the University of Chicago in Illinois, had even more trouble finding his voice. He managed to get his PhD without speaking to anyone other than his adviser. The language barrier was a problem, he says — Wang emigrated from China in 2007. But, more fundamentally, he had yet to appreciate how much other students would have to offer. "I had been told that Americans weren't very strong in maths and physics," he says with a laugh.

He now sees that silence as a missed opportunity. Conversations around the labs at Chicago have given him a new outlook on science, and perhaps even a better understanding of maths. "Americans are wild thinkers, and they keep chasing answers," he says. Where he might be content with a single solution, other researchers would continue to approach a problem from different angles, leading to new questions and possibilities. "It's very important to talk to people," he says. "It will keep your mind open."

Had he known that earlier, he says, he could have pushed his research — and himself — even further.

STRESS CONTROL

The value of conversation has also become clear to Christine Lattin, a postdoc at Yale University in New Haven, Connecticut, who studies stress responses in live sparrows using radiological images. Her entire research project sprang from a chat about stress hormones that she had during a party.

She says that talking to other researchers has also helped to ease her loneliness, an aspect of the postdoc life that she wished she had been prepared for. "As a postdoc, you don't really have a cohort. You're on your own," she says, adding that at least graduate students or their institutions regularly schedule social get-togethers.

It didn't help that her postdoc meant taking on a new project in a new lab, even a new city. "I didn't even know where the pipettes were," she says. She soon found the pipettes, and, after a while, she found some like-minded people. She joined the board of Women in Science at Yale, and reached out to faculty members, postdocs and graduate students who might be open to collaboration. "That has made me feel more like I am part of a research community," she says.

Hoping to help junior researchers to avoid some common pitfalls and missteps, Hendry has written a 10-part (and counting) series of posts on his popular Eco–Evo Evo–Eco blog (see 'How to get ahead'). He drew on personal experience for a post on how to choose a journal. At the time, he had been involved in 45 manuscripts that were submitted to top-tier journals, and had just one accepted. As he notes in his blog, "rejection is an ever present companion in science".

Too many proposals and papers lack a sense of purpose, he says. His advice: every piece of scientific writing should employ the 'baby–werewolf–silver-bullet formula'. In other words, the work should have a clear problem (the werewolf), a definitive solution (the silver bullet) and a strong sense of the stakes (the baby). "There has to be something we all care about," he says.

Hires wishes that he had known more about when to publish, not just what. As a graduate student, he created a sensor that measures the release of glutamate in brain cells. That development was certainly worthy of a paper, but he decided to wait until he could demonstrate the sensor in a key experiment, a process that took another four years.

In the meantime, someone else came up with the same idea and published a paper before Hires ever got his experiment to work. "I got scooped," he says. "If I had been more realistic and less ambitious, I would have published immediately and left the application for another paper."

Andrew Jackson, a theoretical ecologist at Trinity College Dublin, wishes that he could have given his younger self advice about writing his first grant proposal. "I was naive. I thought, here's a cool idea that I'll just throw at you. I fired it off, and it came back covered with comments. I was rightly slammed for it." The lesson: "Have senior colleagues read your proposal."

He recovered from that misstep and was in time offered a tenured position. But he had yet to learn the art of negotiation. "When I got

ADVICE

How to get ahead

Junior researchers tend to have many questions about science — so many that they do not always know what to ask. Andrew Hendry, an ecologist at McGill University in Montreal, has tried to fill in those knowledge gaps with a series of 'how to' posts at his popular Eco–Evo Evo–Eco blog (ecoevoevoeco.blogspot.ca). Topics include 'how to do statistics' and 'how to respond to reviewers'. Here are some highlights.

- Don't throw out your data just because they don't seem to fit a particular statistical model. "The data are the real thing," he says. "The stats are just a tool to aid in interpretation."
- For maximum citations, he advises, don't be afraid to submit a good study to a top-tier journal, even if rejection seems likely. The challenge will inspire you to make the paper as solid as possible, and the reviews might sharpen it even more. This route does entail more time and stress, but the potential payoff is greater.
- Beware the 'grass-is-greener' syndrome. It can be tempting to give up a messy, complicated project for a venture that seems clear-cut and straightforward. But the new project is bound to have problems, too. "A given project always looks best before the actual work starts," he says.
- Whenever possible, he says, finish what you start, and publish what you finish. C.W.

the call, they asked me what kind of salary I wanted. I suggested a number, and they immediately accepted," he says. "I realized later that if people aren't saying 'no' to you, you aren't asking for enough."

SELF CONFIDENCE

Meghan Duffy, an evolutionary biologist at the University of Michigan in Ann Arbor, is a self-assured, widely acclaimed authority on aquatic ecology. But as a graduate student, she had many of the same doubts that plague other young researchers. Was she really cut out for this business? How could she live up to the standards of the senior scientists around her? And, most pressingly, would she ever catch up on the maths?

She started her graduate work with just one university maths course and no programming under her belt. "My undergraduate self didn't realize that those skills would be useful," she says. Duffy checked out a book on calculus, did a theoretical-ecology course to get a better grasp of the mathematical side of aquatic science and taught herself how to program.

More importantly, however, she learned that she was not the only one to doubt herself — and that there was usually no need. "So many people have impostor syndrome," she says. "You can't compare the turmoil inside you to someone else's confident exterior."

Hendry, too, advises an upbeat outlook. "Being a professor is probably the best job in existence," he says. "The research, the day-to-day life, it's all up to you. I can't imagine a job with more freedom than I have."

"My undergraduate self didn't realize that those skills would be useful."

Groundbreaking research at the top of a field is a hyper-competitive arena, he says, but a scientist can do great work without a huge level of stress. "I'm not a global high-roller," he says. "You can have a more relaxed and fun life."

He now also has a take on science that would have come as a surprise to his younger self — and a lot of other junior researchers. "If you really want to be a professor, and you have a half-decent research record, and you aren't picky about where you want to work, you will eventually get a job," he says. "Don't give up."

So getting ahead in science is easier than many people think. Junior researchers often try to work things out for themselves, but if they seek out advice, they will find that people are willing and eager to share what it takes to succeed. They just need to ask. ■

Chris Woolston *is a freelance writer in Billings, Montana.*

TURNING POINT
Mike Runge

US Geological Survey (USGS) wildlife ecologist Mike Runge co-chairs a team that released a species-recovery plan on 6 July for the polar bear — one of the first high-profile mammals to be listed as threatened in connection with climate-change projections. He explains how he learned to balance science with policy.

SHARON R. RUNGE

What best prepared you to work in science policy?

I taught secondary school for five years after getting my undergraduate degree in molecular biology and philosophy. You can't teach calculus to 17-year-olds at 8 a.m. unless you think about their motivations and what will engage them. It was an extraordinarily valuable job that taught me how to listen, be fair-minded and communicate effectively with people in different settings — skills that are crucial for me today.

How did you get into the field?

In my PhD programme in wildlife science, my project was to develop quantitative models of beaver-population dynamics. I combined population models with factors that affect trapping efforts, such as pelt price and cost of gas, which New York wildlife managers could use to help to regulate beaver trapping. I use that approach to integrate quantitative scientific methods into real-world settings.

When did you begin to work on polar bears?

After I started a postdoc with the USGS, I got a call to work on predictive population models of manatees. They are protected under both the US Endangered Species Act and the US Marine Mammal Protection Act, so I learned about the legal frameworks under which science is used. In 2007, when the US Fish and Wildlife Service was petitioned to list polar bears as threatened, the USGS was tapped to study the bears' current and projected population numbers in the face of climate change. Thanks to my manatee experience, I was asked to join the polar-bear population-modelling team and, later, the recovery-plan team.

What was the biggest challenge in writing the recovery plan?

Polar bears are an icon of the Arctic. Everybody cares about them. And there are diverse groups of people — from Alaska's natives to its oil-and-gas industry to Polar Bears International, an advocacy organization — that are passionate about different aspects of the Arctic. It was a challenge to identify and bring together such a broad array of voices so that each one can be heard. But it is also an opportunity to create something enduring — a shared vision for how polar bears should be managed.

Were negotiations tense?

The hard part was getting everyone to lay their cards on the table so that we could work out a solution together. I've tried to create a template for facing contentious issues and trade-offs straight on and with respect. At first, I thought that the politicians at the top would be the worst when it came to cooperation. But I've found that many lawmakers — those who work on the big, highly visible issues every day — know how to disagree respectfully and seek solutions through compromise.

What advice would you give to scientists who work in politically sensitive areas?

To be fair-minded. I've had the privilege to meet with different groups and to learn how aspects of wildlife management affect their lives. Lots of these situations are political and tense and require a non-judgemental understanding of multifaceted interests in the natural world.

Are you writing the rules for how climate-change-related recovery plans should proceed?

We didn't set out to create the template. The US National Oceanic and Atmospheric Administration fisheries service released a recovery plan for coral species early this year, which was the first to address species-level impacts and mitigation strategies in the face of climate change. We want to do the best that we can for polar bears. I think that a number of other recovery teams will have to go through a similar process. ■

INTERVIEW BY VIRGINIA GEWIN

This interview has been edited for length and clarity.