

Staying the course

We can't predict the future but we can prepare for it. **Shanta Barley** identifies unexpected obstacles that could arise during your PhD and finds out how to overcome them

THERE is no getting around it: embarking on a PhD is a daunting prospect. You'll be committing three years of your life, or longer, to study your passion in minute detail. When you have finished you will be a world expert on anything from the velocity of ultrasound in cheddar cheese to the attractiveness of female feet. Hurrah!

Three years is a long time, so what about the stumbling blocks you could run into along the way – situations that you couldn't possibly have envisaged when deciding which project to choose? To pre-empt these pitfalls, and show you how to deal with the ones that catch you unawares, *New Scientist* has talked to those in the know to ensure you sail through all the way to your viva.

What if... I'm getting no recognition?

On 1 April 1948, a PhD student named Ralph Alpher published a paper that laid the foundation for the big bang theory. Such a major discovery so early in his career should have meant instant scientific superstardom. Yet Alpher's contribution to the study was quickly forgotten because of a prank by his supervisor, George Gamow. Gamow added the famous physicist Hans Bethe as the third co-author, not because Bethe was involved but because his inclusion would turn the author list into Alpher, Bethe and Gamow – a play on the first three letters of the Greek alphabet. The joke cost Alpher his fame, with Bethe and Gamow remembered as the paper's authors.

While most supervisors would think twice about playing a prank on their students,

almost every PhD student has a story about the time they felt they deserved to be acknowledged but weren't. In the first year of his PhD in genetics, Sam Johnson (not his real name) conducted a study in collaboration with a high-profile microbiologist from a different university. "I wrote up my findings as a paper and put it on my supervisor's desk. Five months later, the microbiologist calls me up, furious. He wants to know why there is a two-page spread in *New Scientist* about our research and why my supervisor is featured in the article, taking all the credit," says Johnson.

According to Julia Newth (not her real name), who recently completed her PhD in biochemistry, PhD students should expect to be cheated of recognition by their supervisors at least once or twice. Diplomacy is the best way to tackle the problem, Newth says. When she felt she deserved to be lead author on a paper, she made her case to her supervisor calmly and in private. "Your supervisor may have their own reasons for choosing someone else, and you need to hear these," she says. "If you did more work than anyone else and deserve to be first, you can only hope that they change their minds."

If a civilised discussion with your supervisor fails to resolve the problem, you should try to get objective advice from someone else, says Janet Metcalfe, head of Vitae, an organisation devoted to advancing the careers of research staff and doctoral researchers. "One of the first things you need to do is get a sense of proportion. These issues are rarely one-sided. You should find someone who is at a similar level to your supervisor, preferably in a

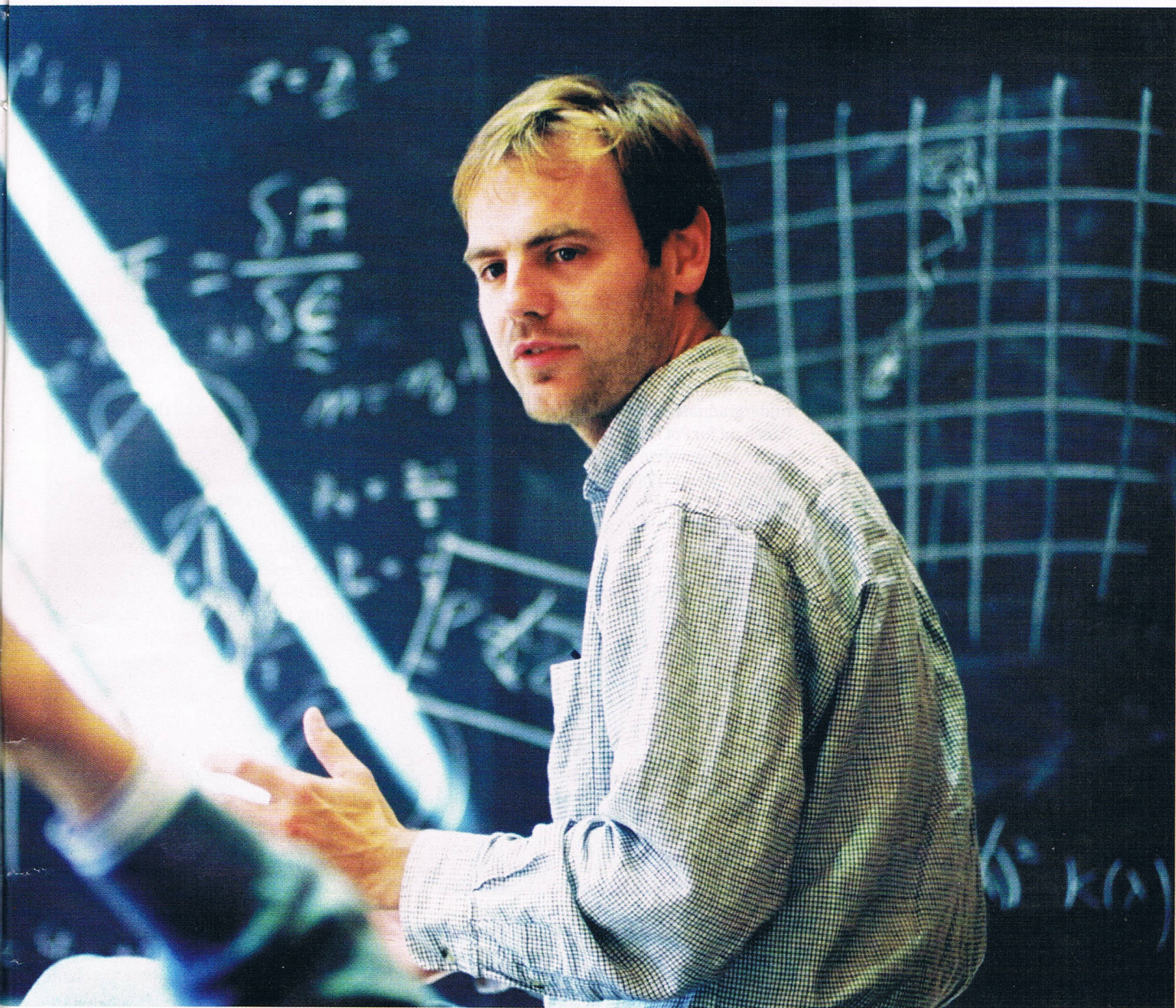


Head-scratching and board-scribbling are an essential part of the mentoring process

different department, who will listen and advise you on the best way to solve the problem." If they can't help, try your student union adviser or postgraduate officer.

What if... there's no one to talk to?

Going from an undergraduate degree or a master's where you attend lectures most days of the week to a solitary, lab-based PhD can be a shock. It is all too easy to feel isolated,



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especially if you have moved to a new institution, or even a new country. According to a recent survey by the Higher Education Academy, an organisation dedicated to improving the learning experience of students while at university, just 49 per cent of postgraduate students feel integrated into their department's community (see "Room for improvement", page 50). "I think the hardest aspect of a doctoral degree is the sense of isolation, that you have to do it on your own, which can make you question whether you are capable," says Metcalfe. "This is why having support structures [like mentors or

societies you can join] and a sense of community is so important."

But if your supervisor doesn't have time to give you feedback, you'll feel lonely in your work no matter how many friends you have or how well you know the university you are working at. "It's a kind of intellectual isolation," says Newth, whose supervisor rarely turned up for their meetings. "Most of our meetings happened because I heard him

"Most students put more thought into buying a house than they do into whether they're cut out to do a PhD"

talking or coughing in his office. I would run over and ask him a few questions about my work. That was pretty much all of the feedback I ever got," she says. "As a result, I wandered along with no input for months and months, utterly unsupervised."

Having a good understanding of what is expected from each party is one way to avoid communication problems, says Metcalfe. She recommends that students and supervisors have an honest discussion about what lies ahead early on. "Most students put more thought into buying a house than in thinking through whether or not they are cut out to do ➤

a PhD. So when they start their doctorate they have unrealistic expectations of what their supervisors will do for them."

Check out your supervisor's schedule to see how much they are likely to be around. If they are jetting off to international conferences twice a month, try to find other colleagues in the lab or department who can help you when the supervisor is away. "For the PhD student, the supervisor will be the most important person in their lives over the next four years. But that feeling is clearly not going to be reciprocated by the supervisor," says Metcalfe. "It's best that a student learns this in their first week, rather than later on."

If something really is going wrong, know your rights. Most students are too scared to complain about their supervisors, says John Wakeford, head of the Missenden Centre in Buckinghamshire, which runs seminars for doctoral students and their supervisors. "There's far too much deference towards supervisors. Students are terrified of rocking the boat. Thankfully, there's a trend now for students to act more as critical customers and to seek compensation for mistreatment." Wakeford recommends that you don't wait until you fail your viva to complain about your supervisor. "That is a big mistake. Many students don't realise that you can't appeal against a fail on the basis that your supervisor failed to provide support."

What if... I run out of money?

Unless you are sponsored by a company to carry out research that will make them a lot of money, chances are you are not much richer as a PhD student than you were as an

Before you sign up

■ Decide what sort of supervisor you would prefer: a big name with lots of connections but not much time, or a junior professor with less experience but perhaps more enthusiasm.

■ Meet any potential supervisor face to face but don't forget to have a beer with their students and postdocs as well. Now is the

time to get the low-down on what their mentoring style is and a feel for the mood of the research group.

■ Look at the Research Assessment Exercise rating of your intended department.

Three or four stars mean that the research carried out is internationally excellent or world-leading.

■ Try to have an overall aim but don't worry if you don't have the exact title of your thesis nailed at the start. The PhD is a continually evolving beast. As you gain more knowledge, your interests may change.

■ Choose a project that you are passionate about. There will be times you hate it, but ultimately a PhD must be a labour of love.

undergraduate – despite no longer having a penchant for Pot Noodle three nights a week. So, what happens when you get to the home stretch of your PhD and realise the pot is empty?

"Most PhDs are only funded for three years, which is ridiculous because almost all postgraduates take four years to finish all of their experiments and write up their results," says Newth. Her funding ran out six months before the end of her fourth year. "I did try to find more funding, but there isn't much available for PhD students in their fourth year." As a result, she was forced to take out a loan. "If I was doing it all again, I would only apply for PhDs that are funded for four years. More and more PhDs are funded for this length of time, so this is a real option."

There's a simple way to avoid running out of money: finish on time. "Running out of funding is hellish and it can actually damage your chances of employment," says Wakeford, who runs workshops for new PhD students.

"Students think they've got all the time in the world, so I get them to calculate exactly how much time is left before their funding runs out. After they subtract weekends, holidays and football matches from a three-year PhD, they tend to find out that there are just 500 days left." Wakeford tells students to decide on what date they want to finish and write it in big letters on the kitchen wall. "I tell them to book a holiday for the day after, so that there's no way out, and you know what? It works."

What if... I feel like a phoney?

While procrastination is a major problem among PhD students, self-doubt can also stymie progress. If you spend a lot of time worrying that you are not good enough to be part of the lab team, that someone will discover you are an intellectual phoney despite your having an academic record that suggests otherwise, you could be experiencing

Room for improvement

My supervisor provides helpful feedback on my progress

74% agree

I know who to approach if I am dissatisfied with anything to do with my research

62% agree

There is appropriate financial support for research activities

52% agree

I feel integrated into my department's community

49% agree

I am encouraged to think about career opportunities

37% agree

Based on an online survey of 18,500 postgraduate students based at 82 UK institutions



JEAN LUC BERTIN/PICTURETANK

"impostor syndrome". Newth knows what it's like. "I don't think I will ever feel as though I've 'made it'," she says, despite having just been awarded a substantial grant. "I think I got it based on my publication record, great references and interesting project proposal, but I somehow still feel as though I'm going to be 'found out' – as if I don't deserve any of it."

A supportive network of supervisors and colleagues can banish many of the insecurities that come with doing a PhD, says Adam Wilke (not his real name), a postdoc criminal psychologist. "I work in a very rapidly evolving field, so I'm always scared that someone else will publish my research before me, or that they will publish a study that contradicts my research". Wilke deals with this fear not by pushing other researchers in the field away but by collaborating with them. "Luckily, my

supervisor is very supportive. He tells me that I'm still learning and that there will be plenty of time in the future to make 'original' contributions. For now I should focus on building up a network of collaborators."

What if... I fancy my colleague?

Working long hours in a small research group inevitably leads to some PhD students striking up romantic relationships with each other. There are no rules against it, but becoming an item with one of your colleagues can make others wary of you, says Simon Barker, a PhD student at Newcastle University who works in the same lab as his girlfriend, as well as running a start-up with her. "Although we've never had any domestic scraps at work, some people are shocked that we spend so much

time together." He can see how a relationship in the lab could backfire. "I can imagine that if you are new to the relationship, working with a partner could be distracting to other people."

Newth's experience of love on the job isn't as positive as Barker's. Tongues started wagging when she got together with a fellow delegate at the party on the final night of a conference. "I don't regret it but I blush every time I see him at a conference, which is a few times a year. Word spread pretty quickly, and my colleagues are constantly joking about it. I would advise people to think twice about letting loose at conferences," she says.

...Or have a baby?

Stories abound about women being refused maternity leave because their funding would run out before they returned. Universities need to do more to convince women that raising a family and being a scientist are compatible, says Rachel Tobbell at the UKRC, a government organisation that aims to promote gender equality. "Many women decide in their late 20s and 30s that the long, inflexible hours and financial insecurity

"Subtract holidays and weekends from a three-year PhD and there are only about 500 working days left"

associated with the early stages of a research career are incompatible with having children. You can't pick up the kids from school and be at the lab bench at the same time." Men also feel the pressure of juggling a research career with being a hands-on dad, with some choosing to work flexible hours; but it is the women that tend to walk away before they get to fill the senior positions, says Tobbell.

Help is out there for parents who decide to stay. The Royal Society's Dorothy Hodgkin Fellowships are intended for young researchers who need flexibility because of parenting responsibilities or health issues, while the Daphne Jackson Trust offers grants for those who have had a break of more than two years.

Most graduate researchers enjoy their PhDs, even those who have met problems along the way. Things may appear problematic initially, but they will probably improve as you become more confident and knowledgeable about the subject. "Doing a PhD is like banging your head against a wall," says one student who is about to submit his thesis. "Over time, you learn where the softer parts of the wall are." ■

Shanta Barley is a science writer based in London