

ILLUSTRATION BY DENIS CARRIER



PRIDE IN SCIENCE

The sciences can be a sanctuary for gay, lesbian, bisexual and transgender individuals, but biases may still discourage many from coming out.

BY M. MITCHELL WALDROP

“I was the golden child,” says Justin Trotter, thinking back to his teenage years living near the Kennedy Space Center in Brevard County, Florida. The handsome, articulate son of a devout Mormon family, he earned top grades, assembled winning projects for science fairs and worked in university laboratories from the age of 14.

But he was also wrestling with a secret. Trotter, now a neuroscience postdoc at Stanford University in California, says that as early as

the ages of 11 or 12 he had begun to sense that he was attracted to boys — a feeling that he had always been taught was shameful. So all through his teens and early twenties, he says, he struggled to keep his sexuality hidden, to appear masculine, to blend in.



"I dreaded dealing with it," says Trotter. By his undergraduate years at university he was suffering from exhaustion, depression and panic attacks. "My only escape was to work in the lab," he says: "It was my haven." But the stress took its toll even there. "I felt my memory wasn't good. I wasn't as sharp as I could be."

It was not until the last two years of his graduate studies, at the University of South Florida in Tampa, that Trotter finally came out, confiding to a few close friends that he was gay. As the word spread, he found his depression lifting. His energy improved. His work became more focused.

"When I felt I could just be who I am, a full person," says Trotter, "then it was definitely good for the science."

That message is being heard in more and more laboratories and research centres around the world. People who identify as lesbian, gay, bisexual or transgender (LGBT) have long faced discrimination or worse: they are still considered outcasts or even outlaws in most Muslim nations, as well as in Russia and parts of Asia. But attitudes are changing. According to a survey published last year by the Pew Research Global Attitudes Project, openly gay individuals have high levels of public acceptance across broad swathes of Western Europe, Australia, Canada and Latin America (see 'Degrees of acceptance'). Nowhere is this change more visible than in the United States, home of the world's largest research enterprise, where public attitudes are shifting towards acceptance of LGBT people faster than in almost any other nation. Courts and legislatures are lifting restrictions on same-sex marriage in state after state, often in the face of vehement opposition from social conservatives, and LGBT equality has emerged as a dominant civil-rights issue.

"This is an important time in history for the LGBT community," says Trotter — not unlike the period several decades ago when women and under-represented ethnic minorities began their push for greater recognition in science. Just as those groups once did, LGBT researchers are trying to seize the moment by creating an infrastructure of organizations and interest groups geared towards helping one another with information, support and networking (see *Nature* 505, 249–251; 2014).

OUT IN THE OPEN

In this newly open environment, LGBT scientists are finding it easier to declare themselves — or at least, to think about doing so. "I'm getting a constant stream of e-mails from young scientists: 'Can I meet with you?'" says Ben Barres, a Stanford neuroscientist who transitioned from female to male in 1997, and who has become a prominent spokesman for LGBT issues in science.

But just as for ethnic minorities and women, there is still a long way to go. Many LGBT

scientists fear coming out — if only because publications, career progression and promotion are based heavily on the judgement of fellow scientists, which might be influenced by conscious or unconscious bias. And many students may be avoiding a research career entirely — although no one knows, because no one has counted.

"I worry that there is a vast pool of talent that might be being lost to science," says Trotter. The only way to change that, he says, is for the scientific community to reach out to its LGBT members, and have an honest conversation.

The lab can be an excellent place for that dialogue, says Kale Edmiston, a neuroscience graduate student at Vanderbilt University in Nashville, Tennessee. "The cool thing about scientists is that we try to withhold judgement and gather information," he says. That is exactly what happened when Edmiston began transitioning in 2010. He told everyone in his research group that he would be taking hormones and that his appearance would change. They responded with a combination of sympathy, interest and curiosity. "A lot of my peers and colleagues have really listened and heard what I'm saying," says Edmiston. Rachael Padman had much the same experience in the early 1980s, when she transitioned from male to female while a graduate student in astrophysics at the University of Cambridge, UK. "One colleague was never able to say 'she' instead of 'he,'" says Padman. "But that was just one in the last 35 years. From almost everyone else, I just never get any vibes at all."

The mores of research can work the other way, too, says Vivian Underhill, a field

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hydrologist with the University of Colorado Boulder's Institute for Arctic and Alpine Research, and author of 'Queered Science': a blog series about LGBT researchers. "As scientists we like to think that we're objective," she says — that personal and social issues should be kept separate from the real work. "And mostly that's a good thing," she says, but too often it leads people to assume that they can eliminate biases by not talking about them. "That just enables the fear to propagate."

It can also make it hard to comprehend the stark loneliness that comes with being LGBT in a majority-straight world. Unlike women or ethnic minorities, LGBT people are not automatically born into a peer group, says Darrin Winstead, director of operations for the Point Foundation, an LGBT scholarship

and mentoring fund based in Los Angeles, California. Almost always, he says, "they come home to a family that does not share their identity" — and may not understand or accept it. Everyone has to come to terms with their sexuality as they grow up. But LGBT individuals often have to begin that journey in isolation.

Gay, lesbian and bisexual feelings typically emerge around the time of puberty — although they may start much earlier. "When you're a kid, you just aren't as aware of who you're attracted to," says Eli Capello, an undergraduate neuroscience major at Centenary College of Louisiana in Shreveport. Transgender issues, by contrast, can become obvious at a very early age. "I knew something was up when I was 3 and 4," says Capello, who transitioned when he was 18. "I just didn't know what."

GROWING PAINS

Many people lack basic knowledge about gender identity, which is different from sexual orientation. The latter concerns who a person is attracted to; gender identity is about the body someone is born into and whether it matches what the brain is insisting. Either way, LGBT individuals typically find themselves struggling to deal with all this in their teens and early twenties — precisely when science students are also supposed to be mastering their fields. Some respond by throwing themselves into their coursework. "College was a great place to distract myself," says Underhill, who did not tell close friends that she was lesbian until just before her graduation. "I didn't even allow myself to look for online sources that might have been helpful, because I didn't want to go there."

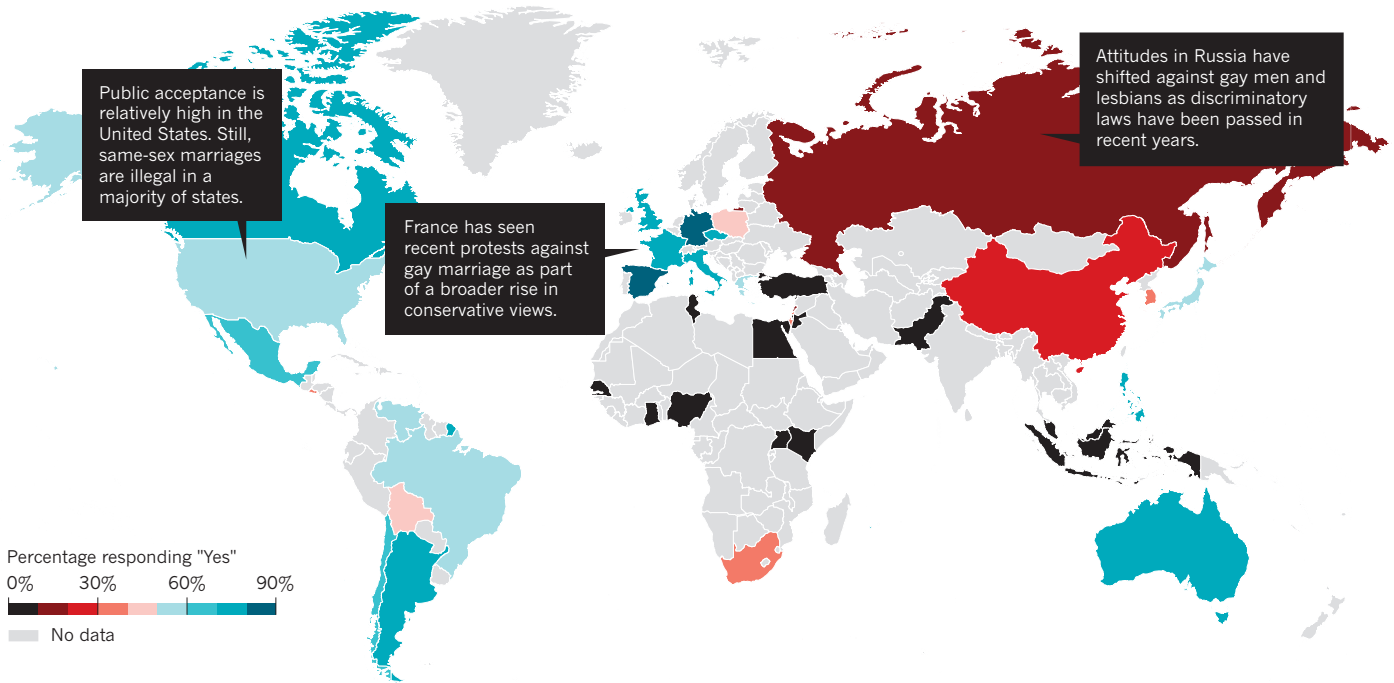
But the kind of emotional turmoil that Trotter describes is also very common. According to the US Centers for Disease Control and Prevention in Atlanta, Georgia, gay, lesbian and bisexual teenagers generally experience high levels of bullying and drug abuse, and are more than twice as likely to attempt suicide as their heterosexual peers. The lack of data means that there is no way of knowing how often this leaves promising students too stressed to attempt challenging science, technology, engineering or mathematics (STEM) degrees. But anecdotal evidence suggests that it does happen. At the Point Foundation, says Winstead, "we found out that some areas of studies, like law, medicine and STEM, were much more challenging" for scholarship recipients trying to maintain their grades. And that, in turn, may help to explain why only about 10% of the foundation's applicants were in STEM fields until five years ago, when the foundation began vigorous outreach efforts that helped to raise the fraction to around 20%.

Adding to the loneliness and stress is the highly charged decision of whether to come out at all. To stay in the closet perpetuates the

SOURCE: THE GLOBAL DIVIDE ON HOMOSEXUALITY (PEW RESEARCH CENTER, 2013); AVAILABLE AT GO.NATURE.COM/DJRZTA

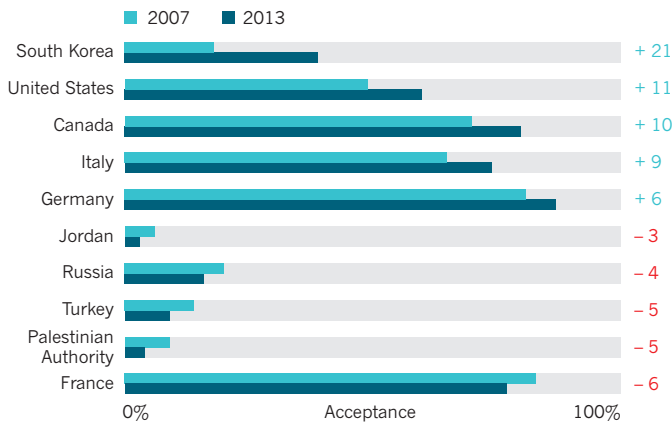
DEGREES OF ACCEPTANCE

In 2013, as part of a survey on global attitudes, the Pew Research Center in Washington DC asked people in 39 countries: "Should society accept homosexuality?" (It did not ask about transgender people.)



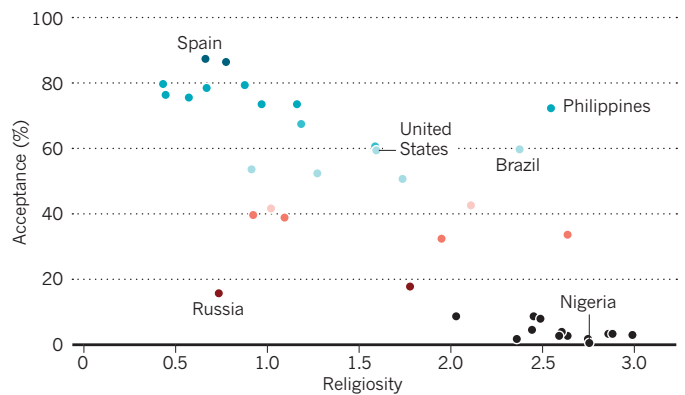
STABLE VIEWS – MOSTLY

Opinions had not changed much since 2007. But there were some notable exceptions: South Korea, the United States and Canada each increased acceptance by ten percentage points or more.



TOLERANCE AND RELIGION

The Pew data show that tolerance tends to be low in countries with high 'religiosity', a measure of how much importance people place on prayer, ritual and belief. Countries with low religiosity tend to have high acceptance.



turmoil, but the consequences of not staying there can be awful. After Capello came out as transgender at age 16, for example, his relationship with his family deteriorated to the point at which he had to leave home and attend a boarding school paid for by his grandmother.

Jun Ding, a Stanford neuroscientist who grew up in Shanghai, China, before moving to the United States for his PhD relates a different kind of experience. Although Chinese laws that were used to discriminate against gay people were repealed in 1997, there are no protections and very little public discourse on the subject. Ding says that his parents still do not understand when he tries to explain that he is now living with his husband, whom he

married under California law. "It's not like the US, where almost every movie has a gay role," he says. "In China, a lot of people just don't have the concept of gay life."

PEER PRESSURE

Even if family rejection is not a concern — and it seems to be less common than it once was, says Wilstead — the decision is not necessarily any easier. More than in almost any other field, a researcher's career is based on peer review in the widest sense, says Eric Patridge, a chemist at Yale University in New Haven, Connecticut, and president of Out in Science, Technology, Engineering, and Mathematics, a national LGBT student group. Colleagues' opinions weigh heavily when it comes to

funding, collaboration, publication, hiring, promotion and almost every other decision. In a highly competitive environment, every LGBT researcher has to worry that coming out will trigger unconscious biases that could ruin his or her chances. Studies from the US National Institutes of Health over the past few years suggest that such bias may well be a problem for other minorities (see *Nature* 512, 243; 2014), and there is no reason to think that LGBT researchers are exempt.

That may be why Barres hears from many young LGBT scientists who are afraid to come out, even in the San Francisco Bay Area of California, historically one of the most tolerant regions in the United States. And it is worse in the more socially conservative

regions of the country: “When I talk to people from down south, the fears are so much stronger,” he says.

Those fears are justified, says Trotter. After he came out during his graduate studies in Florida, he says, some of the more religious, socially conservative students in his research group became noticeably reticent around him. “The scientific community is still comprised of people at varying stages of social progress in ideas,” he says — a reality that he has not escaped. He is very comfortable at Stanford, he says. But once his postdoc appointment there is over, he may well have to apply for tenure-track jobs back in Florida or another less-tolerant part of the country — “where my ability to acquire tenure or run a successful research programme would be in question”.

And that is just in the United States. Scientists and science students seem to be equally reticent in LGBT-friendly Western Europe — and even more so in China. In many parts of the Middle East and Africa, moreover, LGBT activity is punishable by law — in some cases, with execution (see *Nature* 509, 274–275; 2014). “So if you’re a chemist or geologist for an oil company, you’d better be in the closet if they send you to one of those countries,” says Rochelle Diamond, who chairs the board of directors of the National Organization of Gay and Lesbian Scientists and Technical Professionals in Pasadena, California.

DIFFICULT CONVERSATION

Coming out can be even more daunting for transgender people — especially if the announcement coincides with the start of sex-reassignment treatments. Added to the emotional stress and professional concerns are the physical effects of interventions such as taking hormones. “There’s a reason you’re supposed to go through puberty before you get to college,” says Capello. Kate Forbes, who now works for a medical information-technology company, transitioned while she was earning her doctorate in ecology at the University of Wisconsin–Madison; she describes nights curled up in pain on her futon after electrolysis treatments to get rid of the hair on her legs.

Then there are the awkward conversations. “Every time I’d start a course I would have to have a very personal discussion with the professor about things like male pronouns,” says Lucas Cheadle, a neuroscience postdoc at Harvard University in Cambridge, Massachusetts. Making the situation doubly difficult was that he transitioned while he was an undergraduate at Smith College — a women’s university in Northampton, Massachusetts. “I missed out on a lot of mentorship relations because of the difficulty of explaining,” he says.

Even ordinary paperwork can become a major burden. Newly transitioned individuals can spend endless hours struggling to

convince sceptical bureaucrats that they have a legitimate claim to their own university transcripts, publication lists, birth certificates, driving licences, credit cards and more — all now in a different name. Even in tolerant Western Europe, officials may demand extensive documentation before making the required changes, says Padman. “Britain is quite unusual in that respect,” she adds: the Gender Recognition Act 2004 declares that each individual is the gender he or she decides to be. “They can get a new birth certificate with the new gender, and have all the legal rights of the acquired gender.” Backing that up is the Equality Act 2010, which forbids discrimination against trans people. “It discourages the tabloids from making a huge deal

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about someone’s sex reassignment on the front page, the way they used to,” says Padman.

The United States has certainly not gone as far towards recognition as Britain. But even so, the situation seems to be improving rapidly for younger LGBT people — not least because of the Internet. “When Point was founded 13 years ago,” says Wilstead, “our scholars were saying that they couldn’t find anyone who was older, gay and successful.” But today, thanks to Facebook, Twitter and the plethora of other social-media sites, it is much easier to make such connections. And one consequence, says Wilstead, is that LGBT people are coming out much earlier than they used to. Jack Andracka, for example, was a 15-year-old student in Crownsville, Maryland, when he won the grand prize at the 2012 Intel International Science and Engineering Fair, for discovering a test for pancreatic, ovarian and lung cancer. He had come out as gay when he was 13.

Another consequence is an increased sense of solidarity in the LGBT community itself. The group was once defined only by what its members are not: straight. “Aside from that,” says Underhill, “my experience as a white lesbian woman may have little in common with that of a black gay man.” That is a point echoed by many others: their ‘community’ is often riven by the same fault lines as the society around it, with gay white men dominant, and women, bisexuals and ethnic minorities each feeling marginalized in their own ways. And only in the past five years or so have transgender individuals begun to become more visible.

But the rising generation tends to be much more concerned about inclusion, says Wilstead. Witness the embracing of the once-derogatory term ‘queer’. “It’s an umbrella

term,” he says. “It’s basically saying, ‘I am just different.’” That openness and solidarity, in turn, is making it much easier for young scientists to find mentors and role models. It is impossible to overemphasize how important that is, says Trotter — “seeing that it really does get better, seeing gay and lesbian scientists who have been through it and made it”.

But the scientific establishment could give a lot more help in promoting role models than it has so far, say LGBT activists. Barres thinks that the US National Academy of Sciences missed a golden opportunity when he was elected to membership last year. “I asked if they would include in the announcement that I was the first transgender scientist to be elected,” he says. “They never did.” (Electrical engineer Lynn Conway was elected to the parallel National Academy of Engineering in 1989, although she did not come out as transgender for another decade.)

The scientific establishment could also do a lot more about collecting basic data. For example, the US National Science Foundation, which compiles detailed statistics about women, under-represented minorities and the prevalence of various disabilities among US researchers and STEM students, does not currently ask about LGBT identification. Nor do there seem to have been systematic, large-scale studies of the social environment for LGBT researchers. How much stress do they really feel if they stay closeted in the lab? What are the actual effects on their health and productivity? And if they do come out, are they really less likely to be funded, hired or promoted? At least one team — sociologists Erin Cech of Rice University in Houston, Texas, and Tom Waidzunus of Temple University in Philadelphia, Pennsylvania — is hoping to carry out a survey of 2,000–3,000 LGBT scientists and engineers, but has yet to get funding.

Without such data, says Trotter, it is impossible for the funding agencies to know whether LGBT people are over- or under-represented in the research fields, whether there is a need for more support programmes and counselling, or whether they should offer special fellowships for young LGBT researchers in the way they now do for women and minorities. “We don’t have numbers,” says Trotter, “and that’s frustrating for us as scientists.”

Still, without minimizing the challenges that remain, older LGBT scientists stress how far the world has come in a remarkably short time. “When I’m contacted by young people,” says Barres, “I always tell them that the fears are so much greater than the reality. And I always encourage them to be open, because they will be so much happier. If you’re doing good science, if you’re a great teacher — that’s what matters.” ■

M. Mitchell Waldrop is a features editor for *Nature* in Washington DC.