Commit to mentoring!

Not everyone can be a great mentor, but leaders of research groups should be supported and guided in this activity.

Calling all researchers: what type of mentoring did you receive during your early career? Were you nurtured in a way that balanced supervision and independence? Were you left to sink or swim, and perhaps rescued by a kindly postdoc? Did your supervisor test your results and claims to destruction, or just assume or hope you had done the job right? Were they perpetually invisible or always available? And, if your experience was less than great, who could you turn to for help?

Every year since 2005, *Nature* has held a competition to find outstanding scientific mentors in a particular region, with local judges drawn from across disciplines. Awards are given for a lifetime's achievement and at the mid-career stage. Each nomination includes independent narratives by five researchers who were mentored at different stages of the nominee's career; these narratives detail the nominee's output of successful scientists, and provide anecdotes about their mentorship practices and key moments in their relationship with the nominator. This year's competition was in Spain, and the four winners are celebrated on page 139.

These awards have not acquired the same public profile as some given for discoveries. But they have attracted high-level attention. The prizes have been handed over by a Nobel laureate (Canada), government ministers including heads of science ministries (Germany, South Africa and Spain), and even a president (Italy). And justly so, given the importance that researchers themselves attach to mentoring (see *Nature* **550,** 549–552; 2017).

So who wins? Judges of the Australasian competition in 2006 decided to capture the characteristics from the dozens of entries received (see *Nature* **447,** 791–797; 2007). Common features include a nominee's absolute commitment to the well-being of individuals in their group, a spirit of generosity in allowing credit, and the ability to adapt their approach to the character of the trainee. (For the exemplars who have won the awards, see go.nature.com/mentoring.)

These are character strengths rather than skills that can be easily taught or learnt. Other aspects of mentoring are more practical and can be encouraged: a level of availability; attention to the framing of a new project; methods by which lab members can help to maintain objectivity by checking each other's data; a balance between giving advice and nurturing independent-mindedness; and support for trainees gaining experience in peer review and in writing grant applications, without turning such experience-gathering into exploitation of labour.

In too many university departments, the experiences of younger researchers are left to the inclination of the head of their research group. Too often, there is no departmental culture of support and good practice in research mentoring. It may be only by luck that one young researcher finds colleagues in other groups who experience shared challenges.

One reason for this is the fierce independence of principal investigators. That independence is one of the strengths of academia, but it can be accompanied by a rejection of potentially helpful central initiatives. Even worse, some academics who resist training in mentoring do so because they wrongly believe that they already know how to do it. A proportion of research group leaders combine their independence with equally tenacious support for their group members, as the *Nature* awards demonstrate. And credit is due to those principal investigators who seek out others for informal meetings to share and develop practices. There are even government-funded regional support groups for mentors, such as the Atlanta Society of Mentors in Georgia.

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Some foundations and government funding agencies require that the young scientists they fund have mentoring plans. That's good news, even if some funders do too little to spot-check how well the plans are being followed. Ultimately, it is to deans and heads of department that one should look for research-cultural leadership. More universities, for example, should consider mentoring when assessing promotions.

Meanwhile, congratulations to the winners of the *Nature* mentoring awards, this year and over previous years, who just do it superbly. ■

Niche appeal

Plants might be able to survive in more varied climates than was thought.

Officially, Peru's most important export is copper ore. Unofficially, its most significant contribution to nations across the Americas is probably the pepper tree. Before the iconic palm trees came to Los Angeles, the streets of southern California were known for the knotted trunks and pink berry clusters of the Peruvian pepper (*Schinus molle*). And after it was introduced alongside the potato to sixteenth-century Mexico, the pepper tree became so common there that many Mexicans today see it as a national symbol.

To botanists, the pepper tree is technically an invader in Mexico, and has been studied as such. Last year, for example, a study used its geographical range to analyse how scientists model the spread of such invasive plants. The authors found that the tree was doing better than expected and was managing to grow in parts of Mexico that models suggested should have an unsuitable climate. The expected climatic constraints, in other words, weren't constraining the spread of the tree at all. The researchers put this down to human activity: people were deliberately planting and nurturing the tree and helping it to survive otherwise inhospitable conditions

(J. E. Ramírez-Albores *et al. PLoS ONE* **11,** e0156029; 2016).

The impact of human activity on plants and trees is often presented as more problematic, especially when seen through the lens of climate change. A warmer world offers a challenge to all species that have evolved to flourish in certain weather conditions, including humans. And whereas fauna such as some fish and birds can up sticks and shift with the climate — suitable habitat permitting — flora anchored to the ground faces a more enduring crisis. Or does it?

A paper published this week in *Nature Ecology & Evolution* challenges a common assumption about plants and trees: that if they are to move (or be moved) to a new home, they will demand a set of environmental conditions that are similar to where they originated. In fact, the study suggests that terrestrial plants are much more hardy than many conservationists believe, and that they manage to live in different climatic conditions across the globe (D. Z. Atwater *et al. Nature Ecol. Evol.* http://doi.org/cgx3; 2017). The scientists say that a plant's ability to survive contrasting climates in, say, North America and Oceania, can make identical plants living in different places look like separate and distinct species. For example, the bushy Scotch broom (*Cytisus scoparius*) lives in much warmer and wetter conditions in North America than in Australia or its native range in Europe.

The technical term for the willingness of a plant to live in habitats of different average temperature and rainfall is called a climatic niche shift. But when is a niche not really a niche? One answer is when, as this study of some 815 species showed, between 65% and 100% of plants would put up with climate conditions on a separate continent that were thought to be beyond them. And the researchers saw similar, but smaller, intercontinental niche shifts even for species that were within their natural range. Everything in the garden might not be rosy, but roses and other plants might be able to survive in more varied gardens than was thought.

This study is unlikely to be the end of the matter. Debate about the flexibility, or otherwise, of climatic niches has swung to and fro in recent years. It's a hot topic precisely because, as the authors of the latest study write, the results "have major consequences for applying environmental niche models to assess the risk of invasive species and for predicting species responses to climate change".

A common prediction for how plants will respond to climate change is that it is humans who got them into this mess and so it is humans who will have to get them out of it. That's why the idea of assisted migration of species, although often illustrated with the proposal to shift polar bears to the Antarctic, crops up more frequently in conversations about how to preserve iconic trees. Indeed, in one of the only real-world examples of assisted migration so far, campaigners have planted the seeds of the critically endangered conifer *Torreya taxifolia* hundreds of miles north of its Florida home.

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A more flexible climatic niche presents extra options for assisted migration when it's really needed. But that flexibility might also reduce the need for species to be moved in the first place — if they can simply adapt.

Whether they can do so is far from clear. The authors of the latest paper aren't confident about how and why the plants can survive such different climates, although they suggest that evolutionary changes and interactions on the ground with other species could play a part. Some environmental change is too great and too rapid for species to adapt to. The palm trees in Los Angeles look to be going the way of the Peruvian pepper: as the palms die off from disease and old age, city officials say they will plant replacement species that provide more shade and need less water. The trees' niche appeal is no longer enough. ■

Drive safely

Scientists must persist in pointing out the environmental dangers of gene editing.

At a meeting in Montreal, Canada, this week, scientists and green campaigners will be among those discussing how a gene-editing technology could influence the environment. And although it might not always be obvious, both critics and advocates of the technique — called a gene drive — tend to agree on many things. The science is emerging, but potentially powerful. It could offer great benefit, but it could also do much harm. It should be used with care, and only after a thorough examination of the risks. As the rhetoric heats up, both sides should remember this common ground.

The meeting is of a group of experts who advise the United Nations Convention on Biological Diversity (CBD), which last year rejected calls for an international moratorium on gene-drive research. Such calls are likely to be repeated, and those who want a freeze on the science this week claimed a major coup. More than 1,000 e-mails sent and received by US scientists working on the technology were obtained under freedom-of-information laws and released to the media. And sent with them were claims that gene-drive researchers and funders were working with a public-relations company to unduly influence how the UN biodiversity treaty tackles the technology.

This is an unfair attempt to create damaging and polarizing spin. The e-mails reveal mostly mundane discussion about research and meetings. Where they discuss the UN process, they explain how scientists can share their expertise on the technology and its potential impacts.

Discussion of those impacts has some way to run, and it is natural that observers and those directly involved might see them differently. But presenting these exchanges as nefarious, as the campaigners have done, only polarizes discussions. And it could de-legitimize scientists' role in the UN talks — one of the few mechanisms currently available for considering the implications of the technology from a global perspective.

That would severely weaken the process. Because gene drives rapidly spread genetic modifications through animal populations, they have the potential to alter entire species and wipe out diseases such as malaria. Unlike conventional genetically modified crops or animals, organisms carrying gene drives are designed to move across international borders. Over the past few years, the CBD has been considering how gene drives and other synthetic-biology tools could affect biodiversity. This week's meeting will set the scene for further discussions next year.

In the absence of regulations on deploying gene drives or even studying them safely in labs, scientists and others have been seeking to demonstrate that they are careful stewards of the technology. Last week, funders agreed on basic guidelines. And researchers have compiled voluntary biosafety rules.

Government and international controls are probably on the way. The Dutch government has adjusted legislation so that researchers are now required to seek permission to work on gene drives, after a 2016 report identified gaps in how the risks of the research are assessed. Future regulation — both on the research and on any field releases — demands proper discussion and one that scientists must contribute to.

The release of the e-mails echoes the way in which hackers released documents stolen from climate scientists before a major UN meeting in 2009. Much commentary on those documents suggested — wrongly — that scientists were up to no good. Still, damage was done and public trust in scientists declined. It would be unfortunate if the trick were repeated here, not least because it is scientists working on gene drives who have raised many of the concerns. ■