

companies intend to achieve neutrality and how progress will be measured.

Parts of the ancient world were made with concrete, and the material was used to build much of the modern world, too. Researchers and governments must work with the cement industry to slash its carbon footprint, driving the climate-resilient construction the world now sorely needs.

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3. Ellis, L. D., Badel, A. F., Chiang, M. L., Park, R. J.-Y. & Chiang, Y.-M. *Proc. Natl Acad. Sci. USA* **117**, 12584–12591 (2020).
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What a personal saga reveals about scientists' lives

Two scientists allowed *Nature* to follow their lives for three years. Their story speaks to the epic professional and personal struggles involved in establishing a career in research.

In 2018, a team of *Nature* reporters and editors began documenting, in real time, the lives and experiences of two scientists at the University of Sheffield, UK. Alison Twelvetrees, a neuroscientist, and molecular biologist Daniel Bose are on a path to establishing their own research laboratories. They are also a married couple, and their stories – the highs and lows, the triumphs and tribulations – are told in a Feature on page 608 (and can be heard in a four-part *Nature Podcast* series).

The intention, with Ali and Dan's agreement, was to present their lives in science over a year or more. Documenting such a process is not very common in science reporting, where the emphasis is more often on describing results. Our aim was to chronicle the journey involved in becoming a principal investigator (PI). But neither we at *Nature*, nor Ali and Dan, knew whether they would be able to build up their research groups, or that the story would run for more than three years. In addition to other crises that arose, the pandemic would shut down their experiments.

The United Kingdom's universities – like those of many countries – are powered by people such as Ali and Dan, who were employed as PIs on fixed-term contracts. In the United Kingdom, some 74,000 academic staff – out of a total of 223,000 – are on such contracts. In the smaller group of staff that do just research, 35,000 out of 50,000 are on fixed-term contracts, according to data from the UK Higher Education Statistics Agency. For the aspiring academic researcher, such a precarious existence is, sadly, a rite of passage.

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As if that wasn't hard enough, applying for a PI position – leading, eventually, to a professorship – is not like applying for a permanent job in many other professions. Researchers wanting to become PIs in universities are required to show evidence of a multiplicity of skills. They must be leaders and managers; entrepreneurs; mentors and teachers; accountants and administrators. And all the while, they must be doing world-leading research and building their publication list. Moreover, not all PI posts are permanent positions. In some cases, candidates must compete with their peers to secure income from external grants to pay their salary.

Cycle of precariousness

Ali and Dan's attempts to win funding provide some of the most revealing aspects of the narrative – for example, having to face questions from up to 20 interviewers for a fellowship worth more than £1 million (US\$1.4 million). The researchers had a one-in-five chance of success. If they were successful, their funding would support new research talent in the form of PhDs and postdocs. But, as Ali and Dan's story indicates, these newer entrants would also be employed on temporary contracts – thus perpetuating the cycle of precariousness in future generations of researchers.

The employers of doctors, teachers, architects and engineers do not expect candidates to raise funding to pay their own salaries. Scientists working at universities should not be expected to do that either.

In the United Kingdom, a previous generation of research planners anticipated a situation in which researchers might one day find themselves struggling to pay the rent. A funding principle called the dual support system followed. Its architects established two sources of public funding: one funding pot to pay salaries for staff, and a second for grants and fellowships. It meant that researchers had access to a secure income stream to support their families while applying for grants. Today, that principle is under strain. Ali and Dan's story emphasizes why something closer to the original plan, which provides greater job security, is needed.

But Dan and Ali's story isn't just one of funding. It is also a chronicle of the process of science. Media reporting of science typically covers major findings or policy decisions. But, as researchers know only too well, such outcomes are the final steps in a much longer and more-complex process that typically doesn't make it into news stories: the joy of receiving a new microscope, or seeing a student's experiment succeed; the stress of explaining complex science to a lecture theatre packed with students; or the disappointment of getting a funding rejection. These don't always get covered, and that can create an unbalanced view of what science is.

We're grateful to Ali and Dan for allowing *Nature* a glimpse into their lives, to witness the day-to-day struggles, the anxieties, the crises and the victories, large and small. None of us expected this project to last three years. In publishing Ali and Dan's experiences, we hope to redress some of the imbalance, and to provide a key missing piece of the picture of what it means to be an academic scientist today.