

CAREERS

IMBALANCES Male scientists publish and earn more than do female scientists p.140

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Winners of *Nature's* mentoring awards are chosen for their exemplary dedication to channelling talent.

MENTORSHIP

Super catalysts

Nature celebrates Spain's transformational lab leaders.

BY ALISON ABBOTT

In the 1980s, Alicante was known only as a beach resort in southern Spain. Carlos Belmonte made it into a place where researchers could carry out international-level work in neuroscience. And in the 1970s, Margarita Salas created a school of molecular biology in Spain at a time when that science did not exist in the country's minimal and internationally isolated research environment.

But these were not the main reasons that these two eminent researchers were jointly selected for the 2017 lifetime achievement award of the annual *Nature* Awards for Mentoring in Science.

Belmonte, the founding director of the Institute of Neuroscience in Alicante, and Salas, a former director of the Spanish National Research Council's Severo Ochoa Centre for Molecular



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Biology (CBMSO) in Madrid, were recognized by a panel of judges for their exemplary personal mentoring.

Throughout their careers, judges said, both recipients have given appropriate and individual attention to the scientific development

of the PhD students and postdocs under their supervision. In many cases, this support continued even after the trainees' own careers were well under way.

For similar reasons, judges also co-awarded the *Nature* mid-career achievement mentoring prize to molecular biologist Carlos López-Otín at the University of Oviedo and physicist Lluís Torner, founding director of the Institute for Photonic Sciences (ICFO) in Barcelona. Nominators spoke of the ability of these scientists to instil confidence in self-doubting trainees, and of their motivational skills.

KEEPING THE FLAME

Judges said that all four winners have helped to develop a stronger science base in a country that remained at a scientific standstill during the 36-year military dictatorship of Francisco Franco, who ruled from 1939 until his death in 1975.

"It is very important to Spain to recognize the value of mentoring. As an evolving scientific society, we need to enhance mentoring as a relationship of support and trust between senior and junior scientists," says ecologist Josep Peñuelas at the Autonomous University of Barcelona, who chaired the panel of judges. Although Spanish science is excellent in some fields, he adds, it remains poorly funded, yet excellent mentoring "helps to keep the flame".

The *Nature* mentoring awards were founded in 2005 to draw attention to the importance of mentorship, a crucial component of a junior scientist's career development that often goes overlooked and unrewarded. The awards are given in a different country each year. Each contender has to be nominated by five of their former trainees, from different stages of the mentor's professional life; these five must describe the support they received while launching their own scientific careers. This year, awards were bestowed in Spain, and the two pairs of joint winners each share a €10,000 (US\$12,000) purse. Winners received the awards on 4 December, in Madrid.

Each of the four winners, judges pointed out, developed new institutes or schools in which subsequent generations of scientists have matured under their supervision.

All four award winners fostered a sense of 'family' within their laboratories, mentees noted. Salas's trainees, for example, are known colloquially as 'the Margaritos', and Torner's as the 'Icfonians'. Many of the winners' nominators have taken up top positions in labs in Spain and elsewhere. Yet they have continued ►

► to benefit from their mentors' advice and guidance, they say, long after leaving the labs where they were once trainees.

Mentees emphasized how their mentors always made themselves available to listen, advise and give practical support — offering encouragement when assays failed to work, when things went wrong in the lab or in their personal lives, and when they felt like giving up. *Nature's* recent global survey of PhD students (see go.nature.com/2j0fu9e) demonstrates the crucial importance of mentorship to early-career researchers. Effective mentoring — including guidance from and recognition by an adviser — contributes more to respondents' overall satisfaction with their PhD programme than does any other factor, the survey of 5,700 students found.

A NEW AND BETTER WAY

Belmonte's nominators appreciated his creation of a strong scientific direction for the region of Alicante. "Academic life in the last years of Franco's regime was extremely poor and dull, if not dead," wrote one of Belmonte's mentees. "Carlos arrived as a breath of fresh air into an impoverished atmosphere."

Many also remarked on his personalized mentoring style. "He provided guidance, insight and criticism and at the same time allowed the development of my personal interests and space," wrote one former trainee.

Salas, whose career also spanned Spain's transition from dictatorship to hopeful democracy, worked to maintain the CBMSO as a thriving hub of science. "She ultimately constituted a school that cemented the field of molecular biology in the whole country," said one of her mentees.

One of the people who nominated Salas said that, as a junior researcher in the molecular biologist's lab, she had failed to get reproducible assays and had questioned her ability to be a scientist. "Margarita looked me in the eyes and said, 'I trust you: you have good hands and these experiments will work.' I calmed and tried again," the mentee wrote. "Not long after that conversation, my first paper came out."

Like Belmonte, López-Otín ended up not in one of Spain's major scientific centres, but in a provincial town in Asturias, where he created an important centre for cancer and the biology of ageing. "Carlos has been a constant catalyst of scientific activities in Asturias, a region marked by decades of economic and social distress," wrote one of his mentees.

PATHS TO INDEPENDENCE

López-Otín's mentees praised his ability to draw out and encourage even the shyest lab member. "Carlos gave me the strength to pursue an independent career as a principal investigator," one wrote. "He made me feel that my career was a priority for him, and it is thanks to him that my career has advanced further than I would ever have imagined." Another noted

how López-Otín had encouraged trainees to read widely and think big. "Carlos told me that ground-breaking work comes from broad scientific knowledge, while overspecialization is the path to small science."

Nominators said that López-Otín insisted on celebrating every accepted paper or project in the lab and was widely generous with advice. One scientist who was not in his lab, but who had found himself in difficulties, turned to him anyway. He found López-Otín clearly busy, with lab members coming in for advice and e-mails pouring into his inbox. "But he still spent hours talking with me," said the nominator. "He helped me refocus my passion for science."

Science in Barcelona was underdeveloped when Torner accepted an offer in 2002 to be ICFO's founding director. Today, the city is a thriving centre of scientific excellence, thanks to ICFO and other institutes that the regional government established around the same time.

Torner's mentees commented on how he persuaded them to join ICFO instead of choosing more high-profile scientific institutes abroad. "Lluís's unique leadership convinced us that something different was being created

"We need to enhance mentoring as a relationship of support and trust between senior and junior scientists."

and we wanted to be a part of it," one mentee wrote. "None of us have regretted that decision." Another mentee had been a visiting undergraduate from abroad when he first met Torner. "At the time, it was fair to say that Barcelona was not the best place in the world to do science," the former trainee wrote. "Then I met Lluís and talked to him for five minutes — long enough to change all my plans, and switch to his field."

MAXIMUM MOTIVATION

One of Torner's nominators recalls his "five-point take-home message: work hard, don't settle for easy goals, get the most out of ICFO, pursue your dreams and let me know how I can help you get there."

Philip Campbell, *Nature's* editor-in-chief, notes that the awards competition has now taken place in 13 countries or regions, including the western United States, the Nordic countries, South Africa, Japan and China. "These are very varied cultures — and yet the key characteristics of outstanding mentors are remarkably similar. Spain's great examples are no exception," says Campbell, who established the awards. "They are extraordinary in their ability to nurture emerging scientists of great diversity." ■

Alison Abbott is *Nature's* senior European correspondent and is based in Munich, Germany. She was a member of the judging panel for the 2017 *Nature Awards for Mentoring in Science*.

ACADEMIA

Uneven hiring and pay

Three US studies shed light on efforts to increase diversity in academic hiring and on differences between female and male scientists' publication rates and salaries. One study finds that female PhD holders in the United States submit and publish fewer manuscripts, including as first author, than do men. The study found lower submission and publication rates for women in physical sciences and engineering; natural and biological sciences; and applied health and social sciences (S. T. Lubienski *et al. Educ. Res.* <http://doi.org/cgsb>; 2017). The authors analysed 1,285 responses to a survey given to recent PhD graduates from one large research institution that aimed to gauge respondents' satisfaction with PhD programmes and measure their scholarly output.

The study authors found that, on average, men submitted 5.9 manuscripts for publication during their PhD programme, whereas women submitted 3.7. And, of the manuscripts accepted or published, more were from male than from female students, with an average of 4.9 accepted or published for men compared with 2.9 for women. The study found that men were more likely than women to report that faculty members encouraged them to publish. Its authors theorize that male PhD students might be more confident in their abilities than women are in theirs, and therefore more willing to submit their work for evaluation.

Representation increased significantly in the United States for female and Hispanic faculty members between 1992 and 2015, but more slowly for black and indigenous faculty members, according to a review (M. Gumpertz *et al. PLoS ONE* <http://doi.org/gchbpw>; 2017) of personnel records from four large US research institutions. The study also found that the time taken to be promoted from associate to full professor averaged one to two years longer for women than for men in biological and biomedical, agricultural and natural sciences.

A study of US physicists found that female academic physicists' salaries are 18% lower on average than those of their male counterparts. The survey was conducted by the American Institute of Physics in College Park, Maryland, and reported in *Physics Today* (T. Feder *Phys. Today* **70**, 24; 2017). The report says that women do not negotiate as aggressively as men and that men favour one another when it comes to recommendations, salary rises, evaluations and reference letters. ■

CORRECTION

The Career Feature 'Super catalysts' (*Nature* **552**, 139–140; 2017) misspelled the colloquial term for Margarita Salas's trainees: they are 'Icfonians', not 'Infonians'.