PERSPECTIVE

Give youth a chance

Despite the growth in science spending and research output in China, young researchers are struggling to prosper, says **Chuan-Chao Wang**.

Given the decades of continued growth in spending on research and development and huge investments in buildings and equipment, it is no wonder that Chinese scientists, officials and the general public are expecting great advances in science and technology. Yet the reality is that an increasing number of young researchers, including graduate students and postdoctorates, are choosing to escape from research — a situation that has become a topic of heated national debate.

Many recruitment notices for senior research positions require a candidate to have a good publication record, impact factor and citation metrics. Young scientists strive to have a paper published in *Cell*, *Nature* or *Science* — elite, peer-reviewed journals known collectively in China as CNS. A paper in a CNS journal is an unwritten requirement for a better salary or a promotion — especially in China's top universities and institutes. A CNS paper could change a young researcher's academic career — or even his or her life.

Focusing evaluation on such inflexible terms leads us, as scientists at the beginning of our careers, to adopt utilitarian rather than academic motives. Rather than follow our natural curiosity for research, we choose small, straightforward projects so that we can obtain results quickly. We need a flow of publications to ensure continued financial support. But every researcher also wants the opportunity to make a CNS splash.

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HOW TO RETAIN TALENTED SCIENTISTS

The irony is that although investment in science is rising in China across the disciplines, there are few funds or fellowships for newly graduated PhDs. The largest is the Young Research Fund, which represents about 20% of the budget of the National Natural Science Foundation of China (NSFC). However, each project receives only 240,000 yuan (US$38,000) over three years. The second option is a grant from the China Postdoctoral Science Foundation, in which a successful applicant can secure 50,000–80,000 yuan for two years' work. Neither amount is sufficient to purchase the necessary laboratory reagents and consumables to conduct research. For this reason, many young researchers apply for overseas postdoctoral positions, giving some of their best years of research to other countries — and often staying there.

As a consequence — and in contrast to most Western countries — research projects in China rely on graduate students rather than postdocs. Exacerbating this trend, many Chinese universities and institutes hire as faculty only those candidates who have overseas research experience. China is, in effect, outsourcing the training of its young researchers. But the reality is that most scientists who graduate with a PhD from a Chinese university will not receive overseas offers; their choice is to stay at home and find work in a domestic laboratory and be paid a low salary with little hope of promotion, or give up their academic career entirely to seek alternative employment.

Thirty years ago, Ray Wu, a molecular biologist at Cornell University in Ithaca, New York, initiated the China–United States Biology and Biochemistry Examinations and Applications (CUSBEA) programme, which allowed for the first time large numbers of young graduates from China to pursue PhDs at leading universities in the United States. Many CUSBEA students have since become leading biologists in the United States as well as in China. Following Wu's death in 2008, the Ray Wu Memorial Fund established a prize in his honour to inspire and reward PhD students who wish to further their education at universities in China, Hong Kong, Taiwan or Singapore. Unlike China's typical evaluation system, the Ray Wu Prize — an award of US$3,000 plus the opportunity to apply for up to $5,000 to attend international conferences — does not focus on a student's history of journal publications, overseas experience or examination results.

Instead, the prizewinners, of which there could be ten or more each year, are determined by peer review by a selection committee consisting of eminent Chinese biologists who assess each candidate's capacity for creative ideas, independent thinking and dedication to his or her field of interest. Applicants submit a statement describing why they chose to study science, the academic projects they would like to pursue at university, and their intended future career. They also have a face-to-face interview with the committee. In the years, or even decades, after the prizes have been awarded, the committee remains available for advice as the researchers develop their scientific careers.

The Ray Wu Prize is a comprehensive and impartial evaluation process that also offers advice and support. Moreover, it is starting to be recognized by Chinese universities and institutes as a factor in faculty appointments. In 2014, a scientist who was awarded the Ray Wu Prize was appointed as assistant professor (tenure-track) at ShanghaiTech University, despite not having overseas research experience.

For decades, the minds of Chinese students have been shaped by passive rote education. But scientific progress requires not recitation of known concepts, but new ideas. The capacity to break the mould and truly innovate — the features that the Ray Wu Prize emphasizes — are crucial for the Chinese scientific community to deliver the results that the government and the people expect from their investment. The potential of new graduates cannot be fully reflected by publication metrics or overseas experience and as a consequence, China is currently losing their contribution. China must invest more in its promising young scientists, and in more effective ways of measuring their achievements. ■

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