

## China's hopes and hypes

**The scientific potential of China is great. Recent initiatives reflect the government's justified ambitions for research. They also highlight unjustified secrecy and misguided policy agendas.**

Scientific research in China stands to benefit greatly from a recent push by the government. Since the beginning of this year, the government has been piecing together a major initiative in nanotechnology. Drawing on the momentum of the Human Genome Project, the possibility of sequencing various other genomes is being investigated, and post-genomic projects are becoming widespread. Universities, especially those of Peking and Tsinghua, home to a recent large-scale biochip initiative, are being developed as hubs of collaboration between industry and academia. Just two weeks ago, the Ministry of Science and Technology announced a 15 billion yuan (US\$1.8 billion) investment in civil programmes for research and development. This will continue the agenda of the "863 Program" — China's first high-tech R&D plan, announced in March 1986 — which targeted eight scientific disciplines, including the biosciences, information technology and aeronautics.

But there is a danger. Close government involvement, without an adequate external review system, could lead to fruitless projects and could even stall scientific development. The risk is that big projects will become an end in themselves, where both politicians and scientists demonstrate their power by the size of the budget they acquire for their project, regardless of its scientific merit. A desire for big projects is not uncommon. But in China many decisions about budgets and new projects are made in back rooms, so that people often do not know the justification for the choice of one programme over another. Researchers with experience of both countries compare China unfavourably to the United States in transparency: China's decision-making processes need greater accountability and openness.

### Heroes, and others

In such circumstances, self-promoters reign. Researchers come up with sometimes outlandish projects, and sell them to bureaucrats and politicians. The politicians use scientists to further their own ambitions, hailing the researchers as new heroes of Chinese science and giving them ever-bigger budgets. Chinese researchers in Beijing and Shanghai, as well as those overseas, condemn this "insiders' game".

The recent funding boom included several programmes aimed at bringing scientists home from abroad; there is no shortage of Chinese science success stories, especially in the United States. But although many of these returnees are China's most qualified and experienced researchers, there are also many — known in the overseas Chinese community as "scientific scammers" — who overstate their experience and expertise in order to gain the ear of the right government official. With that done, all is settled: a new hero of Chinese science emerges.

Once a project starts, it is difficult to criticize. Failed projects continue because the government will not acknowledge their failure — it does not want to lose face. A few years back, "nucleic acid biscuits" became a hot item, based on the logic that nucleic acids were essential nutrients. This was supported by some academic reports, and the biscuits were sold with government blessing, while criticism from those who doubted that DNA made good food was ignored or hushed up. As one overseas Chinese said: "fake drugs based on fake papers."

There is unlikely to be much benefit from the new rewards for productivity from the Knowledge Innovation Program, which began in 1998. In the 1990s, publication in Western journals was encouraged, reversing a past policy by which Chinese researchers were obliged to publish in Chinese journals. But the current policy goes too far. Monetary rewards are given for publications, and their value is based on the level of the journal in which a paper is published. Many researchers fear the effect of this short-term pressure to produce results. One member of the Chinese Academy of Sciences said he felt he was being micro-managed. Some ideas cannot develop in such a short-term fashion, and those with ideas requiring longer to come to fruition will be unable to get the required funding.

What is worse, the pressure to publish, for money or for status, along with an inadequate (or corrupt?) screening system, has led to the problem of plagiarism. This has even spread to the upper echelons of academia, tainting the name of a top executive at a company associated with Peking University.

### Finding solutions

China is taking dramatic steps to catch up with the West. It supports many start-up companies through university spin-offs. But often the university is a major shareholder, and there is justified scepticism about the profitability of such companies. More probably, they will continue to depend on government support.

In the absence of an appropriate base for decisions, new initiatives with apparently exciting potential will lead to failed projects, loss of confidence and further obstacles. The National Natural Science Foundation of China and the Chinese Academy of Sciences are making some moves to improve the peer-review system. But even with attempts to encourage peer review of anonymous papers, the community is so small that reviewers can easily tell who the applicant is. A larger community of researchers needs to be tapped as reviewers. Possible candidates are Chinese people in the United States (and in Taiwan, in an ideal world). And if proposals were prepared in English, they could have an even larger pool of reviewers.

The Chinese scientific community has great scientific potential. But the government risks alienating the very people who have this potential. Researchers seem willing to leave good jobs in the United States — for the good of China and Chinese science. But their good intentions are likely to be dashed if the government is too closely involved in too many areas. One returning scientist was cautioned by his Chinese mentor in the United States: "It's great to go back, but just don't become an official."

The latest investment package from the Ministry of Science and Technology is aimed at original research rather than following up on high-technology trends. This attempt at self-reliance is understandable. But cross a thin line, and you get what many Chinese themselves would say is an essential Chinese trait — the desire to do everything oneself. Overcentralization and a concentration of decision-making could greatly inhibit progress. China needs to open up its science policy, to delegate more of its science management, and to establish and maintain more channels of communication inside and beyond its borders. ■