What is the problem?
Helped by deepening reform and openness, as well as increased overall national strength, science and technology in China have developed rapidly in recent years. The number of published scientific papers has also increased year by year. Statistics released in November 2009 by the Institute of Scientific and Technical Information of China (ISTC) showed that the number of Science Citation Index (SCI) papers, Engineering Index (EI) papers and Index to Scientific & Technical Proceedings (ISTP) in 2008 from mainland China was 95,500, 85,000, and 59,299, and accounted for 6.6% (rank 4), 21.5% (rank 1), and 11.5% (rank 2), respectively. These were up, compared with 2007, by 7.2%, 12.3%, and 37.5%, respectively. Overall, in 2008, the ‘Chinese’ total of 270,924 papers accounted for 11.5% of all papers and ranked 2 in the world. This indicates that in numerical terms mainland China is near the top position. It is a pity, however, that all these papers are written in English and that most of them are published in journals of foreign countries, such as the US and the UK.

This outflow, especially of papers reflecting outstanding achievements in scientific research, has become very common, with the trend increasing year by year. (For example, in the 1990s, Chinese scientists published only about 6,000 papers per year covered by SCI,1 compared with the 95,500 quoted above.) Moreover, seldom are outstanding domestic or foreign results published in Chinese journals, and we believe that such an outflow has hindered the development of Chinese journals.

China has set up a large number of so-called ‘Key Laboratories’, and some of these have obtained high-level results, such as those on the rice and human genomes, and in paleontology. If more of these papers could be published in Chinese journals, then perhaps Chinese journals could obtain a better position in the world.

Thus we believe it is of great significance to find out the reasons for the outflow of excellent papers and then take measures to stem this flow.

Reasons for the outflow

The effect of academic evaluation methods
In China, the academic level of a university or an institution is evaluated mainly on the number of SCI papers, EI papers, ISTP papers, and the research grants it receives (e.g. from the National Natural Science Foundation of China, and the National High Technology Research and Development Program of China). Many universities and institutions use monetary rewards to encourage staff to publish more SCI, EI, and ISTP papers. The theory is simple and pure economics. Money motivates: pay people to publish in good journals and they try to do so. Monetary rewards are the best; money is a universal reinforcer. Greed, pride, and envy will all work to get academics eagerly and enthusiastically publishing in the best journals. This will, in turn, mean that the status of the institution will rise, which will enable it to charge higher fees. It works like this. Some body – perhaps a government or a university-led committee – classifies the academic journals in every discipline, perhaps into groups: top, middle, low. The higher the classifi-
cation, the more you get paid if you publish in them. Only those journals which are abstracted or indexed by SCI or EI database are regarded as top journals. Such monetary reward is not only used for the evaluation of the academic level of a university or an institute, but also used for job promotion. This practice, therefore, has caused the outflow of many high-quality papers to SCI journals or EI journals. Because most SCI source journals are in English and from foreign countries, such as the USA and the UK, only a few journals from China are sourced. As far as the the monetary reward system goes, Professor Yang, a member of the Chinese Academy of Engineering, has noted that the system is one-sided, and not good for improving the quality of Chinese science and technology journals.

This monetary reward system is open and documented. It is often based on the impact factor (IF) of the journal. The following are some examples of the monetary reward system in China. In Guangzhou Medical University the payment scale is: IF \( \leq 1 \), 3,000 RMB; \( 1 \leq IF < 2 \), 15,000 RMB; \( 2 \leq IF < 3 \), 25,000 RMB; \( 3 \leq IF < 4 \), 35,000 RMB; \( 4 \leq IF < 5 \), 45,000 RMB; \( 5 \leq IF < 8 \), 70,000 RMB; \( 8 \leq IF < 10 \), 90,000 RMB; \( 10 \leq IF < 15 \), 130,000 RMB; \( IF \geq 15 \), 300,000 RMB. The reward system of Zhejiang Medical University is: papers published in Nature or Science, 100,000 RMB; SCI papers with IF > 3, 6,000 RMB. Table 1 shows this reward system in more detail.

**Attraction of high impact factor of foreign journals**

In general, the academic influence of Chinese scientific and technical journals globally is relatively low, and hence the IF is low. The reasons include: (i) the overseas circulation is generally low; (ii) few Chinese journals are indexed or abstracted by international indexing systems, such as SCI, EI, Pubmed, Chemical Abstracts (CA); (iii) few journals have their own independent, information-rich websites, and this reduces the awareness international academics have of them. Journal Citation Reports (Thomson Reuters) in 2009 show that of a total of 7,387 journals included in SCI, only 114 (1.5%) are from China. Their IFs are not high. Only three journals have IF \( \geq 3 \) (Cell Research 8.151, Nano Research 4.370, Fungal Diversity, 3.803), nine journals have IF \( \geq 2 \); 23 journals have IF \( \geq 1 \). In the SCI database overall, CA: A Cancer Journal for Clinicians has the highest IF (87.925), and there are 127 journals with IF \( \geq 10 \). It is not therefore surprising that many scholars prefer to submit their papers to foreign journals with high IFs.

**Journal internationalization**

Journal internationalization has a number of facets: international editorial board, international editors, international peer-review, international authors and readers, and also language (usually English). A report released on 9 June 2010 by the People’s Daily said that at present in China there are more than 4,800 scientific and technical journals, most of which (about 4,600) are in Chinese, with about 200 in English. Apart from the language issue, the editorial board members, editors, and peer-review team of most Chinese journals are located in, and mainly come from, mainland China, so it is very difficult for Chinese journals to become internationalized. Researchers pay great attention to their research results, and want to let more people to know about their results. It is therefore natural that Chinese researchers like to submit their papers to international journals, in order that their papers can obtain international attention and thus be highly cited.

**Effect of a poor editorial system**

On the one hand, the editors of academic journals in China are not active in soliciting contributions – they just wait for authors to submit. On the other hand, editors from foreign countries have noticed the development of Chinese science, and they have strengthened their soliciting of contributions from China. Philip Campbell, chief editor of Nature, said they have always regarded Chinese authors as a priority, and promised that they would deal with papers without regional bias. In addition, however, the service provided by Chinese journals is not satisfactory. This is manifest as: (i) the processing of papers is slow; (ii) reviewers take a long time to review; and (iii) publication times are very long. All of these affect

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**Table 1 Monetary reward system in Zhejiang University**

<table>
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<th>Journal classification</th>
<th>Monetary award</th>
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<tr>
<td>Nature or Science</td>
<td>200,000 RMB (first author); decreased by 50% according to the sequence of authors</td>
</tr>
<tr>
<td>SCI journals (first author)</td>
<td></td>
</tr>
<tr>
<td>IF &lt; 1</td>
<td>2,000 RMB</td>
</tr>
<tr>
<td>1 ( \leq IF &lt; 3 )</td>
<td>3,000 RMB</td>
</tr>
<tr>
<td>3 ( \leq IF &lt; 5 )</td>
<td>4,000 RMB</td>
</tr>
<tr>
<td>5 ( \leq IF &lt; 10 )</td>
<td>5,000 RMB</td>
</tr>
<tr>
<td>( IF \geq 10 )</td>
<td>14,000 RMB</td>
</tr>
<tr>
<td>EI journals (first author)</td>
<td>1,800 RMB</td>
</tr>
<tr>
<td>ISTP (first author)</td>
<td>600 RMB</td>
</tr>
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</table>
authors' attitudes towards submission. In China, most academic journals are published quarterly or bimonthly, with few journals being monthly or semi-monthly, and the issues themselves are comparatively smaller. Prestigious journals from foreign countries, especially world-famous journals such as Nature or Science, have short publication times. Other things being equal, authors will submit their papers to journals with fast publication.

Measures to prevent the outflow of papers

Resetting the academic evaluation standards

In the 1980s, Nanjing University, China first introduced SCI into academic evaluation. This was an innovation in scientific research management. However, the use of SCI has now become distorted, and has become the main or the only indicator of academic quality. Because of this, an academic's quality can be far removed from simply an increased number of SCI papers. Evaluation based on SCI has caused much academic 'froth', and it has thus become necessary to reset the academic evaluation system in China, so that Chinese journals can have a fair competitive platform with SCI-indexed journals. At the same time, universities and research institutions should improve the scientific reward system to eliminate the negative effects of the current system, reform the promotion system, and abolish journal classification. Only by taking these measures can outstanding achievements be published first in Chinese journals.

Improving the competitive sense of Chinese journal editors

In order to achieve the right competitive approach, an editor must not be put off by the difficulties, and persevere in tracking hot topics and research. Editors should identify the new research frontiers, and actively solicit original manuscripts from researchers. For excellent manuscripts, editors should give rapid feedback and open a 'green channel' for publishing. Editors should strictly follow international practice, and adhere to a serious and rigorous attitude in editorial work.

Shortening the review and publishing period

In general, the review and publishing process in Chinese journals takes longer than that of foreign journals. Chinese journals need to set up online editorial systems. In addition, the frequency of Chinese journals is generally very low. For example, the Chinese Academy of Science sponsors 303 journals, 75% of which are published bi-monthly or quarterly.7 If possible (as we have said, this can depend on the number of papers available) journals should therefore increase their frequency of publication.

Improving the level of English

If published papers want to gain international recognition, they must have some accurate information in English besides being of high quality. This can be the abstract, keywords, brief contents listing, titles of figures or tables. However, as Zhang et al.8 reported, Chinese authors have difficulties in writing English, so editorial departments need to have some personnel with good English who can help edit abstracts and other information in English.

Enriching online information

With the popularity of the Internet, editorial departments should establish a website with excellent search functions, full-text retrieval, and an online reading system, so that awareness is increased and the papers published in Chinese journals can be rapidly disseminated, and fully exchanged. At the same time, the website should provide rich information in English, which will help to increase the influence of the journals.

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