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*As of 15 March, joining Advanced Cell Technology.
†Nobel laureate

Editors' note

Stem cell research is one of the areas being pursued by the company Advanced Cell Technology. Another letter supporting stem cell research, led by Paul Berg, representing the American Society for Cell Biology, and signed by 33 Nobel laureates (many of them also signers of the above letter) was sent directly to President Clinton and Congress on 8 March.

Basic Research in China

It is with great pride that I see science and technology in China rapidly moving forward and being one step closer to that in the developed countries (Zhu Lilan, Editorial, 29 Jan., p. 637). The rapid pace of science in China in recent years can be attributed to its outward-looking policy in general. China did, as Zhu, its Minister of Science and Technology points out, contribute greatly to ancient science and technology, but it fell behind in modern times. This may have been largely due to political interference and, sometimes, the lack of understanding by the government. In order to ensure the continued success of science and technology development in China and to move at an accelerating pace, several crucial principles need to be ensured. Scientific researchers and technological innovators must (i) be free of political interference and top-down interference from management; (ii) be free to access information on the Internet; (iii) have no charges for Internet access (especially students); (iv) have easy access to the latest research journals and books (especially young researchers and students); (v) have freedom of selection of research projects; (vi) have a system of merit-based promo-

tion and funding, not promotion based on seniority or political connections; (vii) have generous provision of state-of-the-art equipment and training; (viii) have rapid provision of necessary materials for research; and (x) have free exchange of ideas, so as to attract other researchers to form productive collaborations.

China's achievements in some areas of science in the 1960s were significant. Biomedical research made big strides, improving health for a large segment of the population. All that changed overnight because of oppressive political interference.

Building the foundation of a national science and technology program takes decades, but it can be destroyed in a few months. I sincerely hope that China's leadership will ensure the continued success of science and technology by safeguarding its precious scientific base and allocating sufficient funding where the rhetoric says it will go.

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Free Electrons?

Equation (1) in the Perspective "Biological hydrogen production: Not so elementary" by Michael W. W. Adams and Edward I. Stiefel (*Science*'s Compass, 4 Dec., p. 1842) almost certainly should have read

$$2H^+ + 2e^- \leftrightarrows H_2$$

The journal text was

$$2H^+ + 2 \leftrightarrows H^2$$

There is some humor in this error, as the authors assert that "Electrons are not 'free,' as implied in Eq. 1." Nevertheless, two of them were able to escape their equation. Or is it possible that someone at *Science* has been lifting electrons?

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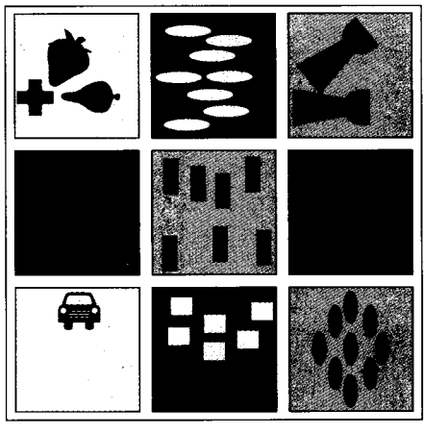
Editors' note
Indeed, the electrons were "lifted" at *Science* during the production process. We regret the error.

Monkey Numeration

E. M. Brannon and H. S. Terrace (Reports, 23 Oct., p. 746) conclude that "rhesus monkeys represent the numerosities 1 to 9 on an ordinal scale." Numerosity is defined as the number of discriminable elements a stimulus contains and is related in the report to the number of visually separate images (for example, that of rectangles, ovals, or bananas) appearing in a single group. A stimulus consisting of a number of groups, each of different numerosity, was shown on a touch-sensitive screen to a monkey, whose task was to touch the groups in order of increasing numerosity.

Although the results elegantly establish that a consistent behavior pattern can be learned and extended to novel stimuli, imputing numerical capability such as ordinal representation may not be justified. Two major unresolved areas arise from the fact, mentioned in the report, that the mental process or processes that a monkey uses remain to be determined. First, it could be argued that these experiments demonstrate solely the monkeys' ability to recognize systematic differences in complexity, which is a more general concept that may be strongly, or weakly, or even inversely related to humanly defined numerosity, depending on the stimuli used. As an example of complexity, one approach to mammalian brain functioning (*1*) posits the generation through the central nervous system of three-dimensional electromagnetic standing wave patterns in the brain by either aural or visual stimuli. For certain stimuli, stimulus numerosity may be related to the resulting pattern complexity in a monotonic increasing manner, leading to experimental results such as those observed. Potentially, such complexity could be defined numerically, but this does not appear possible with our current state of knowledge.



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Samples of stimuli used to investigate how rhesus monkeys view numerical representation.

Second, a discriminable element for a human may differ from a discriminable element for a monkey. While a strong argument can be made for the physiologically similar visual apparatus of monkey and human, the operative brain mechanism is perception, not quantitively well understood at present. When one considers the many innate difficulties in this type of ex-