'Anthropomorphic' was a weapon word biologists used when it was erroneously believed that humans were very different from animals, therefore one used different terminologies when speaking of mice and men. Charles Darwin acted and wrote like a true biologist, which is not surprising since he had read thoroughly the writings of the botanist Hooker and geologist Lyell. Erwin Bunning (1906–90) liked to be called a biologist and so did his role model Wilhelm Pfeffer (1845–1920). In comparison, the biologists of today (especially of the botany–zoology varieties) appear to be an insecure and demoralized lot. These authors are only making a plea, a case for plant ethology, and suggesting newer ways of studying the biology of plants. And the sociobiological methodology in studying plants appears to me to be more rigorous than that of botanists of antiquity. Right on Ganeshaiah and Uma Shaanker are welcome to the field of ethology – a house of lost causes – and add to its variety and richness.

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SCIENTIFIC CORRESPONDENCE

Regeneration potential of hypocotyl-derived long-term callus cultures in groundnut (*Arachis hypogaea* L.) cv TMV-2

Plant tissue culture, one of the important aspects of biotechnological approaches, is of much importance as it helps develop improved crops faster than conventional breeding. Application of different aspects of *in vitro* techniques – callus, cell, protoplast, anther and meristem cultures – in crop improvement depends upon somatic embryogenic capacity of callus at different subcultures. A fairly good number of crops are developed as somaclones obtained from long term callus cultures.

Groundnut (*Arachis hypogaea* L.), an important oil-seed crop, is susceptible to pests, diseases, salinity and aridity and hence yield levels are low. Improvement of this crop is time-consuming and arduous. Application of tissue culture in groundnut depends on regeneration of plantlets from long term callus cultures, which enables selections under selection pressure. Earlier reports on regeneration are largely confined to the development of plantlets directly from embryo axes and cotyledons[1], immature embryos[2,3] shoot tips[4] and from intervening callus[3], besides differences in varietal responses. However, there are no reports on regeneration from long term hypocotyl-derived callus cultures, which is reported here.

Hypocotyl segments from aseptically germinated seedlings of *A. hypogaea* L. cv TMV-2 were planted on MS[5] medium supplemented with NAA (2 mg/l) and kinetin (0.25 mg/l) and incubated at 26 ± 3°C in light (16 h). Callus obtained was subcultured on the same medium, every 30–35 days. After four subcultures, the callus (100 mg) was transferred to MS medium containing IAA (0.25 mg/l) and kinetin (2.5 mg/l) and incubated as described above.

Figure 1. Green compact mass of groundnut callus

There was development of compact masses of green tissue in 2–3 cultures out of 10. Embryoids and small plantlets appeared 20–25 days after inoculation (Figure 1). Subsequently, plantlets became well developed (Figure 2) and visible on the compact tissue. However, on subsequent transfer of compact tissues or incipient plantlets to the same medium, there was a tendency for rapid cell proliferation, rather than regeneration

Figure 2. Plantlets of groundnut on compact callus

Regeneration of plantlets in our study was from well-dedifferentiated cells of hypocotyl origin, cultured for a long time, unlike in previous reports, where regeneration was either directly from explants[1-4,6] or from interveining callus[7]. This indicates the persistence of somatic embryogenic capacity in long term callus cultures of groundnut and the possibility of developing a programme to obtain plants from long term hypocotyl callus cultures in the cv TMV-2 in order to develop improved crop lines, through somaclonal selections

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COMMENTARY

China: Also a power in science and technology?

Wu Yishan

The past decade has witnessed China rapidly changing in many aspects, including science and technology. Some Indian scholars have even used the title 'The sleeping dragon wakes up' to describe the progress in China's science and technology[1] I think it is indeed an appropriate metaphor. China is waking up, yes, but she has not stood up yet

Not strong enough in science and technology

There were 17 million scientists and engineers in China in 1991 (ref. 2). By absolute terms it is quite impressive, but in terms of the number of scientists and engineers per million population, China's rank would be lower than that of South Korea and Brazil[3].

As far as the output of scientific and technological activity is concerned, China produced 6630 papers in 1991 according to *Science Citation Index*, which put China at the fifteenth place in the world In comparison, India yielded 10,468 papers, ranking eleventh Furthermore, China's papers have so far had only a slight impact on world science A study by the Institute of Scientific and Technical Information of China (ISTIC) based on *SCI* indicated that among China's 16,810 papers produced in 1988-1990, only 3608 papers got cited in 1991 (ref. 4). That is to say, for every five papers published only one paper attracted any attention.

China's patent applications are increasing at a high speed year by year. In 1991 the Chinese Patent Office granted patent rights to 21,178 Chinese applicants and 3438 foreign applicants. Out of a total of 21,178 patents, however, only 1311 were for inventions, accounting for 6%, while 82% (2811) of the foreign patents were for inventions[2]. Most of China's patents are in the utility models or designs category. China is not very strong in technological inventions

As in business, competition in science is also tough. In this arena, not forging ahead means lagging behind Mainland China's rank in terms of papers covered by *SCI* was 14th in the world in 1988, and 15th in 1989, 1990 and 1991.[4] In contrast, Taiwan failed to enter the list of 30 most productive nations (areas) in 1988, but it quickly raised its status to 27th place in 1991. Brazil's rank changed from 26th to 22nd over the same period

Chronic problem in reward systems

It goes without saying that basic physical needs must be satisfied before scientists can devote themselves to scientific research However, for many years, China's intellectuals, including scientists and engineers, have been paid too low a salary for their contribution. Currently, the monthly salary of a typical scientist would not surpass 300 yuan (roughly 80 US dollars at the official exchange rate). For some scientists the actual income may be double this figure through moonlighting, though 600 yuan a month is still not encouraging In contrast, an ordinary secretary working in a joint-venture company could earn a monthly income of 600 to 800 yuan quite easily, plus good dividends and bonuses at the end of the year It is estimated that the salary standard in enterprises is 20% higher than that in government institutions[5]. Most Chinese scientists work in government institutions. What is more, many upstarts who get rich at astronomical speed since the economical reform are poorly educated and this the educated people find hard to accept psychologically. A pun (no longer a pun in English version) very popular today reflects their sentiments 'Both using sharp instruments, a barber is better off than a surgeon, both producing things round in shape, a tea egg (egg boiled with tea leaves and other ingredients) peddler is better off than a missile designer '

In the face of such irrational, big income gap, the motivation of many scientists does get damped Although