

Don't count on World Bank initiatives

Sir — As a Chilean scientist working overseas, I read with interest your articles about the initiatives of the World Bank to develop science and technology in Third World countries^{1,2}. These initiatives include lending funds to create elite centres called Millennium Institutes. Prototype institutes will be set up in Chile. I believe this is the wrong approach.

I collaborate with scientists in Third World countries and am familiar with the vagaries of the development of science in Latin America. I wish to put forward the dissenting notion that publicly funded policies to develop science and technology in Third World countries should not differ from those proven successful in industrialized countries. These include: a focus on funding innovative investigator-originated peer-reviewed research; transparency of all procedures and full public accountability of those involved in the funding process; and societal inputs to create economic and social conditions that ensure the availability of resources for the development of science and technology.

Third World countries need to narrow the knowledge gap that separates them from industrialized countries. But the creation of one or two elite Millennium Institutes in each country will do little to close that gap. In most Third World countries the technological and scientific gap has widened during the past 20 years, in part as a result of the economic and social engineering prescriptions of the World Bank and the International Monetary Fund (IMF). These prescriptions in general stimulate the creation of export economies based on unskilled labour, intensive exploitation of natural resources, and export of raw materials without industrial transformation and technological

innovation. These prescriptions undercut the creation of market conditions basic to scientific and technological development³.

In Chile, for example, recent economic growth has been based mainly on exporting minerals, fish and fish meal, timber and fruit, all products with little or no industrial transformations, that do not require technological innovation, and whose production has generated environmental degradation. The World Bank and the IMF foster policies that, under the guise of 'restructuring and modernization', shift government funds from activities essential for the development of science and technology, such as education and public health, towards servicing foreign debt⁴. They further weaken a poor country's capacity to develop the scientific and technological bases needed for economic development.

In Chile, these policies have led to deterioration of the educational system and crumbling infrastructure. The increases in tuition fees that have resulted from World Bank and IMF-supported policies have excluded many talented individuals from the system. The same policies have caused teachers and scientists to live on the margins of poverty. The implementation of these economic policies in Chile was also accompanied by the destruction of democratic institutions and the abolition of human rights. The incomplete recovery of these institutions and human rights still scars and undermines scientific work⁵.

In this context the creation of Millennium Institutes in Chile, and perhaps in other countries, appears to be more a cosmetic than a well designed initiative. This plan fails to address the economic and social foundations of the host of problems that hamper the development of education and science in Third World countries.

Another matter of concern is that the directors of these institutes will be selected by scientists from outside the country. In the case of Chile these institutes will be funded with loans that will eventually be paid by the Chilean treasury. It is therefore worrisome that the manner of selection will remove accountability from the Chilean scientific community and Chile's democratic processes. Despite the undermining of education, science and technology resulting from the policies of the Pinochet dictatorship, and from the relentless 'restructuring and modernization' induced by World Bank and IMF economic and social engineering, the Chilean scientific community within the country and in the diaspora has reached a stage that makes outside tutelage unnecessary.

Who is in a better position than Chilean scientists and politicians to determine whether the focus of the research is "of direct relevance to that country's needs"? As you note, "the Chilean government will not decide the disciplines in which the institutes will specialize", making it all the more necessary that the Chilean scientific community should make these decisions.

The closing of the knowledge gap in Third World countries will require drastic modifications of present economic policies. The consensus to create these changes will require the participation of scientists and politicians in each country.

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Harvest time is over for UK agricultural research

Sir — English agricultural researchers can be pleased with the international comparison of research impact (*Nature* **396**, 615-618; 1998). Looking at 47 subjects from 1988 to 1996, the analysis shows that agriculture was one of only five subjects in which England came top of the list. Within England, agriculture came second only to pharmacology/pharmacy.

However, towards the end of that period and subsequently, there has been decreasing emphasis on agricultural research in England. The former Agricultural and Food

Research Council has omitted the word 'Agricultural' from its name and changed its orientation accordingly. Some university departments of agriculture have become subsumed into biological schools and some are unable to fill vacant agriculture chairs. The Ministry of Agriculture, Fisheries and Food (MAFF) has terminated its Postgraduate Agricultural Studentship Scheme for training agricultural researchers.

The former MAFF extension service has been privatized: will its researchers now have much interest in diverting time from income generation to publication in refereed journals?

In the light of the above changes, it is difficult to see the international success of

English agricultural research being maintained.

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Evolutionary forces behind human infertility

Sir — Westendorp and Kirkwood¹ studied data on the British aristocracy and conclude (probably correctly) that there is an evolutionary trade-off between longevity and fecundity. There is another significant

conclusion to be drawn, and that is that humans have a strong hereditary predisposition to infertility.

The tendency for low fecundity among the English aristocracy was in fact first studied systematically by Galton in 1869 (ref. 2). There was general concern at the time at the rate of extinction of English hereditary peerages. Galton examined the links between social status and reduced fecundity, and concluded that it was largely due to the tendency for peers — and the sons of peers — to marry heiresses as a means of accruing estates. He speculated that in a patrilineal society heiresses are more likely to arise in small families of reduced fertility, and that marriages with such women would also have a tendency for low fecundity.

Fisher³ later analysed Galton's data and other genealogical findings in some detail, and concluded that human reproductive success is extremely unevenly distributed and therefore subject to very strong selective pressures. In the 1912 Australian census, for example, 50 per cent of the children were the offspring of one in nine of the men and one in seven women. Three-fifths of all children that were born died unmarried and 11 per cent of marriages were sterile⁴.

While Fisher and Galton's writings were tarnished because of their links with the eugenics movement, one clear message is that subfertility is endemic within human populations — albeit hidden in ancestral communities by child-sharing and other devices such as serial polygamy⁵. Moreover, reduction of investment in reproduction is a powerful force for wealth consolidation within a family: a concept that Fisher³ traced back to Hesiod in the eighth century BC! The link between longevity and reduced fecundity is entirely consistent with the disposable-soma hypothesis discussed by Westendorp and Kirkwood¹.

In an era when infertility is increasingly emergent as a social problem and is now eminently treatable by technological means, we should perhaps be aware of the evolutionary forces that may have helped amplify it.

For males, the strong selective pressure for critical genes controlling fertility on the Y chromosome⁶, coupled with highly uneven reproductive success between individuals in any generation, should be considered in any attempt to reconstruct genealogies based on Y sequences. Rather than differential migration rates between women and men, this could possibly explain part of the discordant convergent times for human Y sequences and mitochondrial DNA⁷. While Y chromosome variations are generally considered to be neutral, close scrutiny of actual patrilineal reveals that long-term

male reproductive success is strongly influenced by politics and social dominance⁸.

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Why Spanish science is at a standstill

Sir — You reported the case of Antonio Ferriz Mas, a Spanish astrophysicist who has taken the University of Salamanca to court after being rejected for an associate professorship¹. Your editorial² made comments on the appointment process in Spanish universities and its alleged role as a significant obstacle to the development of science in Spain. You identified two main problems that prevent Spain's being influential in modern science: cronyism, the practice of favouring one's friends (internal candidates) in university appointments, and the "intellectual sclerosis" of a system based on tenured positions.

Support for the theory of cronyism comes from the fact that two of the five members of an appointment board come from the department or university involved. This suggests that social networks and unspoken agreements cause the selection, not of the most meritorious candidate, but of the one with the appropriate connections. A more adequate alternative might be to have panels that include just one member from the institution offering the position, or no-one at all. However, is it fair to limit so severely a university's contribution to decision-making on strategic issues which affect their long-term functioning, notably the appointment of tenured staff?

Decisions by any appointment board imply value judgements which are accepted, not because of their objectivity, but because their subjectivity is shared to a great extent by the scientific community. Common design is achieved through clear-cut, publicly visible criteria. Stability — permanence over time — is also a desirable criterion, especially when appointments are

made on the basis of long-term activities, as is usually the case in science. But even if these requirements are fulfilled, disagreements are still likely to occur. (See, for instance, the recent controversy over the exclusion of Salvador Moncada from the Nobel Prize³.) It is also plausible, as in any human activity, that from time to time regulations implemented to maintain fairness are overtaken and that biased decisions are intentionally made and adopted. If that is so in Ferriz Mas's case the court should say so. But to cast the slur of cronyism on the entire appointment procedure means casting doubts and allegations of corruption on the hundreds of university teachers who have participated in the process, either as panel members or as candidates. To us, that seems audacious, to say the least.

We could certainly debate the adequacy of the criteria followed by different appointment boards, and introduce improvements to the Spanish appointments system, not only at universities but at other research institutions. Certainly, it would be useful to establish some form of broad scientific/academic profile that young researchers can use as a reference for career planning. For university appointments, such a profile should, of necessity, include both research and teaching profiles, especially as tenure positions in Spain imply 240 hours' teaching per year, a significant amount of total labour time.

We fear, however, that even if this goal is achieved Spanish scientific development will still be at a standstill. Why? Because despite Spanish economic advances over the past years, investment in research and development, as a percentage of gross domestic product, is lower now than it was in 1991. It is the second lowest in the European Union, far below the EU average⁴, and even lower than in some eastern European states (such as the Czech Republic, Slovak Republic and Slovenia⁵). Furthermore, 43.8 per cent of university teachers, many of whom are highly qualified and experienced, face a dim future as most are under short-term non-tenured contracts⁶.

Meanwhile, postdocs like Ferriz Mas are sent abroad: 4,554 in the period 1984–94 (ref. 7). But, if the scientific structures and the political will at home remain the same, what's the point?

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