

# Precautionary principle stifles discovery

*Sir*— The so-called ‘precautionary principle’ (PP) has gained currency in discussions about environmental protection and genetic manipulation, but it should be treated with caution.

The principle has been endorsed in international treaties, including the consolidated version of the treaty establishing the European Union. In many of these documents the PP has not been explicitly defined, but the Wingspread conference attempted to define it<sup>1</sup>. We believe the following definition would be accepted by most proponents:

“When an activity raises threats of serious or irreversible harm to human health or the environment, precautionary measures that prevent the possibility of harm (for example, moratorium, prohibition) shall be taken even if the causal link between the activity and the possible harm has not been proven or the causal link is weak and the harm is unlikely to occur.”

In our view, there are problems with the

PP as so defined. The PP tells us to balance evidence in a specific way. The weight given to evidence is ordinarily thought to be a function of its epistemic warrant (the degree to which we have reasons for believing the evidence). The PP instructs us to change this normal balancing by giving evidence pointing in one direction more importance than evidence pointing in the other direction, even in cases where the evidence has the same epistemic warrant. Such discounting will distort our beliefs about the world, and will lead us to hold false beliefs. The PP cannot therefore be a valid principle for evaluating evidence.

As a principle of rational choice, the PP will leave us paralysed. In the case of genetically modified (GM) plants, for example, the greatest uncertainty about their possible harmfulness existed before anybody had yet produced one. The PP would have instructed us not to proceed any further, and the data to show whether there are real risks would never have been

produced. The same is true for every subsequent step in the process of introducing GM plants. The PP will tell us not to proceed, because there is some threat of harm that cannot be conclusively ruled out, based on evidence from the preceding step. The PP will block the development of any technology if there is the slightest theoretical possibility of harm. So it cannot be a valid rule for rational decisions.

This fatal weakness of the PP illustrates a common problem in attempting to convert moral choices into legislation. The temptation is great to try to find one absolute and easily applicable principle, but such a principle will often be simplistic and will, when applied, lead to unjustifiable conclusions. Many moral choices are complex, and in making political decisions we should not lose sight of this complexity.

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1. <http://www.wajones.org/wingcons.html>

## Funding agencies must use their muscle

*Sir*— Your decision to let authors cite their contributions to papers is a welcome change in policy (*Nature* 399, 393; 1999). Statements clearly allocating credit and responsibility for the research done can only help to promote the health of science.

But it is likely that many authors will need persuasion before they embrace the idea of citing contributions. Such persuasion is unlikely to come from the journals themselves. Although some (notably *The Lancet*) courageously require the contributions of each author to be cited in papers, most do not — presumably for fear of alienating their clientele. It is probably too much to expect journals to threaten their livelihoods by imposing a rule that is unpalatable to many (particularly to senior) scientists.

But such persuasion might legitimately come from the agencies that fund research. If the US National Institutes of Health and the UK Wellcome Trust, for example, were to require every grant recipient to cite each author’s contribution to any paper resulting from the research funded, this would promote the adoption of the new authorship policy. Because the major funding agencies need fear no reprisal from researchers who object to the policy, and because they have a vested interest in maintaining the health of the scientific

enterprise, they stand in a unique position to bring change in this important area.

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## Substance versus style in scientific papers

*Sir*— Antonio J. Herrera complains about referees’ criticisms of the English of papers by non-anglophones (*Nature* 397, 467; 1999). Scientists of any nationality can produce verbose and dull writing in their mother tongue, although it is naturally harder to write in a foreign language.

But manuscripts with outstanding scientific content are never rejected because of the prose. If you think that the English in your paper has been overcriticized, or that rejection is based on judgements of style, you should inform the editor.

Rather than dreaming up an Institute for Correct English Style, I believe all scientists should be taught to write while at university. Students should learn the attributes of good writing, grammar and composition, and the logical development of scientific argument. Once these skills have been ingrained in one’s native language, faults in English will be perceived and corrected.

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## Flood warnings

*Sir*— Proffering the tantalizing nomenclature of zettabytes and yottabytes as though they were exotic new species, you warn of the tidal wave of data that threatens to engulf science<sup>1</sup>.

We read that, while the physics and remote-sensing communities are getting ready to ride the wave, “many biologists are still in denial”. This may be so, but visionary biologists support the inspiring concept of a Global Biodiversity Information Facility (GBIF)<sup>2</sup> that has been developed by the Megascience Forum of the Organization for Economic Cooperation and Development. This distributed facility has been proposed in response to the challenges of the vast domain of biodiversity information. It aims to provide orderly and structured access to our knowledge of the millions of species, and is vital if we are to keep pace with, for example, our burgeoning knowledge of genomes.

Every deluge needs a Noah’s Ark. How successfully biology survives the flood will depend upon recognizing that systematic biology underpins our ability to understand the living world<sup>3</sup>, whether it is represented by genome sequences or ecosystems. We must build and float the GBIF soon.

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1. Reichhardt, T. *Nature* 399, 517–520 (1999).

2. <http://www.york.biosis.org/gbif/index.htm>

3. [http://www.nhm.ac.uk/hosted\\_sites/uksl/web\\_of\\_life/index.htm](http://www.nhm.ac.uk/hosted_sites/uksl/web_of_life/index.htm)