

Rising to the climate challenge

The award of a Nobel prize to an advisory body in the science of climate change rightly reflects the organization's many virtues, and should spur it on in its mission to assess and address global warming.

The Intergovernmental Panel on Climate Change (IPCC) is not a household name but it deserves to be. Its important and altruistic work during the past two decades fully merits this year's Nobel Peace Prize, which it shares with the former US vice-president Al Gore (see page 766).

The current understanding of anticipated climate change and its effect on ecosystems and societies, uncertainties and all, is not anecdotal. Rather, it is articulated explicitly as a consensus view of a worldwide community of researchers. Too few politicians and members of the public appreciate this. And although not every individual scientist involved will fully agree with each sentence and each probability estimate in the IPCC's reports, few if any will seriously question that what the IPCC delivers is as good a chunk of scientific advice on climate change as anyone could hope to get.

In its latest, fourth assessment, a synthesis of which will be released next month, the IPCC has compiled the strongest evidence so far that the current warming trend is the increasingly dangerous result of human activity. This is an apolitical statement. Taking the appropriate political steps is the responsibility of the countries that, in Bali in December, will continue negotiating a follow-up agreement to the 1997 Kyoto Protocol on climate change.

The challenge of climate change urgently demands a coherent political response. But no matter whether and how soon an agreement on stabilizing greenhouse-gas emissions at safe levels might be reached, the IPCC should continue its successful work in informing policy-makers on how the science is developing, and on further climate signals and trends as they are uncovered.

Even if policy-makers can mitigate the effects of climate change, adaptation to them will still be a necessity. But how much, and when, and where? Perhaps the biggest challenge for the climate-research community over the next five years will be to use new scenarios of mitigation and adaptation to generate predictions about how climate change will affect specific regions. Climate modellers are already

gearing up to address the problem of predicting regional climate change out to 2030 or so. The results of their increasingly detailed projections are likely to become the core of a fifth IPCC assessment in five or six years.

Although much of the IPCC's strength lies in the very scale and thoroughness of its assessments, reports of more restricted scope may also be desirable in the shorter term. There are a number of specific threats that merit deeper assessment, such as the risks of rising sea level and retreating sea-ice in the Arctic, and the effects of feedback loops on the climate system.

There are other important issues that would also benefit from being reviewed promptly by the IPCC. The economic costs of mitigation scenarios, including doing nothing, should be addressed, as should the vexed but persistent debates surrounding engineered attempts to influence the climate system.

Many climate scientists would like to move away from an IPCC process in which three independent working groups that investigate science, impacts and mitigation, respectively, work almost entirely independently of each other. But the established process is difficult to avoid in drawing up a full-scale assessment, and any suggestion of a merger should be resisted: assessing mitigation is best kept separate from assessing science if only to support the objectivity of the latter. More focused studies can involve greater interaction between, say, climate modellers, impact researchers, economists and coastal engineers.

Climate science — both measurement and modelling — will develop rapidly over the next few years, and alarm may grow with further insights. But a fifth assessment by the IPCC should not be rushed. This Nobel peace laureate is an organization whose strengths include an understanding that, however urgent the challenge, robust scientific advice, like science itself, needs patience. ■

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Do-it-yourself science

How much involvement can patient advocates have in genetics?

Some of the hype that accompanied the first publications of the human genome sequence in 2001 may have worn off. But these are still heady times for genomics, as demonstrated this week by the release of a greatly enhanced haplotype map or HapMap, which describes the most common forms of human genetic variation (see page 851).

The map builds on an earlier version published in 2005. It may,

for example, shed some light on aspects of the genome that help to account for certain differences between people of different geographical origins (see page 762). There have been plenty of other research findings this year that demonstrate the power of genomics to deliver clues that could yield better medicine, including studies based on the HapMap that have uncovered lists of multiple genes that may be associated with the risk of developing specific diseases.

But there remain relatively few examples where this has led to better treatment options for patients and doctors. The difficulties of selecting relevant gene and protein markers, and then developing them into marketable tests that doctors will use, remain formidable (see page 770). And for patients, doctors and even some geneticists, there is growing frustration at the lack of clarity in some research

findings, the difficulty in discerning which findings are of medical value, and the slow pace at which fuller knowledge of the links between genetics and disease is actually providing better diagnosis and treatment options.

On page 772 of this issue, *Nature* tells the story of Hugh Rienhoff, a trained geneticist and biotechnology entrepreneur, whose daughter was born with a collection of congenital defects. He has taken it upon himself to try to find out what the genetic cause might be — actually buying lab equipment and having her genes sequenced himself. He has even posted information about her condition, his theories as to what's causing it, and parts of her genetic sequence on the Internet.

Given the sharply falling costs of equipment and the wealth of information that is publicly available, we are getting to the point at which almost anyone with access to the Internet can do this. If that sounds a little scary, then perhaps it ought to. Scientists and patient advocates have always enjoyed a delicate relationship. Researchers are not prone to welcome what they may see as the intrusion of the public in the laboratory. And there is every chance that some people in Rienhoff's position will waste money pursuing dead ends. On the other hand, as more people begin to take an interest in rare or undiscovered

disorders, more useful information is likely to be unearthed about both their genetics and their treatment.

But this means that clinical geneticists will have to revise the professional and ethical framework for collaborating with patients and their advocates, to help ensure that the information from the public provides clarity and not confusion. Some scientists are already thinking about how best to organize such information. On page 783, for example, Steven Brenner of the University of California, Berkeley, proposes a 'genome commons' to aggregate the accumulated knowledge on human genetic and phenotypic diversity.

At the same time, members of the public who choose to embrace a do-it-yourself approach to science need to be aware that they should not abandon existing, rational treatment options. And they should know that the fruits of their labours will rarely include the cast-iron answers that they may be seeking. For, as is so often the case in science, the most likely result of their efforts will be yet more unanswered questions for others to probe. ■

"Scientists and patient advocates have always enjoyed a delicate relationship."

Criteria creep

The politically motivated extension of a US stem-cell registry makes no scientific sense.

A steady lament from American biologists is that the human embryonic stem-cell lines that they can work on using federal research money are too old, and too few in number. But researchers will draw scant comfort from a White House executive order, issued on 20 June, that could sharply increase the number of cell lines on the Human Embryonic Stem Cell Registry — the list of cell lines that can be studied with support from the National Institutes of Health (NIH).

The executive order was issued by President Bush on the same day that he vetoed legislation that would have permitted funding to be used on research with additional embryonic stem-cell lines. It will replace the word 'embryonic' with 'pluripotent' in the registry's name, and thus add adult stem-cell lines to the registry — even though these are already eligible for federal funds. This political sleight of hand seems intended to increase the number of cell lines listed without adding new lines of embryonic cells.

For this to happen, senior NIH officials must now waste time trying to establish unarguable criteria that will affirm a cell line as pluripotent (see www.nature.com/stemcells). By the end of this month, they are expected to release an application form for researchers wishing to add new, non-embryonic lines to the list.

Pluripotency — which basically means that a cell can grow into any sort of body cell — is commonly evaluated in mouse cells by mixing candidate cells into mouse embryos and observing their subsequent development. But equivalent experiments cannot be ethically conducted with human cells, leaving no robust method for confirming their pluripotency. Indeed, pluripotency has yet to be formally proved

in human cells *in vitro* — including in embryonic cells. There is also currently no way to prove that cells derived from embryonic and non-embryonic sources have equivalent capabilities to generate the specialized cells that could be useful in drug discovery and cell therapy.

The executive order calls for the thorough cataloguing of stem cells derived in what it calls "ethically responsible ways" — meaning, in the White House's parlance, that they are derived without creating, harming or destroying an embryo. The order further calls for the prioritization of new grants to study these lines. But no additional money is being allocated for this work, meaning that it can only proceed at the expense of other research supported by the NIH.

Flexible cells from non-embryonic sources do offer exciting possibilities: perhaps adult human cells can be reprogrammed, and cells from the testis and amniotic fluid can be coaxed into an array of functioning tissues. If such cells can be derived from individual patients with diseases, these non-embryonic sources could be of great value. But this value is more likely to be unleashed if they are studied alongside embryonic stem cells, rather than in their place.

On 9 August 2001, when Bush first announced his restriction of federal research funding to embryonic stem-cell lines already derived by that date, his officials suggested that researchers would be able to work with about 60 lines. But the true number has turned out to be about 20, of which only a dozen are commonly used. NIH director Elias Zerhouni told a Senate committee back in March that the range of embryonic stem cells currently available to US researchers is insufficient, and is hampering scientific innovation and biomedical research.

The NIH has been obliged by law to come up with a plan for implementing the executive order. It will no doubt make the best of a difficult situation, and come up with some criteria for pluripotency. It is regrettable that one of the world's leading research agencies should be required to make avowedly scientific distinctions along lines drawn up to suit the administration's political requirements. ■