

We understand the economic and practical barriers faced by U.S. sponsors, as much as we acknowledge their need to maintain profits. Nonetheless, we see an urgent need for international consensus on ethical guidelines for entities conducting clinical experiments overseas. Such guidelines must cover all phases of a trial, from the design to the follow-up, through the review process, but they cannot be mere recommendations, as seen so far. Compliance with these rules must become a prior binding condition for the approval of any study proposal. This would constitute an important step taken against scientific capitalism, ethical relativism, and, in general, toward a fairer world.

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References and Notes

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2. World Medical Association (WMA), "Declaration of Helsinki: Ethical Principles for Medical Research Involving Human Subjects," adopted in June 1964; last note of clarification in 2002.
3. P. Lurie, S. M. Wolfe, Letter to the National Bioethics Advisory Commission regarding their report on the challenges of conducting research in developing countries (Public Citizen Health Research Group Publication No. 1545), 13 Nov. 2000 (available at [www.citizen.org/publications/release.cfm?ID=6746](http://www.citizen.org/publications/release.cfm?ID=6746)).

## Climate Change and Malaria

**SIR DAVID A. KING'S CLAIM THAT "CLIMATE change is the most severe problem that we are facing today—more serious even than the threat of terrorism" ("Climate change science: adapt, mitigate, or ignore?," Policy Forum, 9 Jan., p. 176) is based, in part, on UK government-sponsored impacts analyses (1, 2) that estimate that by the 2080s, because "of continued warming, millions more people around the world may in future be exposed to the risk of hunger, drought, flooding, and debilitating diseases such as malaria. Poor people in developing countries are likely to be most vulnerable" (p. 176). But the very studies underlying the latter quote, and which King cites, show that, for the most part, many more millions would be at risk in the absence of climate change (2). For instance, the population at risk of malaria (PAR-M) in the absence of climate change is projected to double between 1990 and the 2080s, to 8,820 million (2). However, unmitigated climate change would, by the 2080s, further increase PAR-M by another 257 to 323 million (2).**

Thus, by the 2080s, halting further climate change would, at best, reduce total PAR-M by 3.5% [ $=100 \times 323/(323 + 8,820)$ ] (3). On the other hand, reducing carbon dioxide emissions with the goal of eventually stabilizing carbon dioxide at 550 ppm would reduce total PAR-M by 2.8% (2) at a cost to developed nations, according to King, of 1% of GDP in 2050 (p. 177), or about \$280 billion in today's terms (4). But malaria's current annual death toll of about 1 million could be halved at an annual cost of \$1.25 billion or less, according to the World Health Organization, through a combination of measures such as residual home spraying with insecticides, insecticide-treated bednets, improved case management, and more comprehensive antenatal care (5). Clearly, implementing such measures now would provide greater malaria benefits over the next few decades than would climate stabilization at any level. It would also reduce vulnerability to malaria from all causes—man-made or natural—now and in the future (3). Similarly, reducing present-day vulnerabilities to the other risk factors mentioned by King (i.e., hunger, water shortage, and flooding) could well provide larger benefits at lower costs over

## A Bit of History About Edwin A. Link

### I WAS INTERESTED TO READ THE NEWS FOCUS

discussion regarding the fiscal and educational challenges being undertaken by many U.S. marine laboratories, including the Scripps Institution of Oceanography (SIO), Harbor Branch Oceanographic Institution (HBOI) and Woods Hole Oceanographic Institution (WHOI) ("Saving Scripps," D. Malakoff, 9 July, p. 166). It is important that the contributions of the pioneering engineers and scientists who helped found these institutions not be overlooked, though.

For example, the photo caption accompanying the sidebar on p. 167 notes that the Harbor Branch submersibles were named after Seward Johnson Sr., but neglects to mention that they were also named after the late Edwin A. Link (1904–81), the engineer and inventor who designed the Johnson-Sea-Link (JSL) submersibles, as well as many other novel marine engineering devices (e.g., the submersible decompression chamber and the first pressurized diver lockout small submersible). Link and Johnson worked hand in hand from their respective engineering and financial backgrounds during the founding and initial operation of HBOI, and the name of the submersibles reflects the importance of their dual contributions.

The Link Foundation, established by Ed Link and his wife, Marion, continues to provide vital financial support to Harbor Branch, including sponsorship of their Summer Internship program, which this year celebrates its 30th year of launching the careers of future marine scientists and ocean engineers.

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### CORRECTIONS AND CLARIFICATIONS

**News Focus:** "Telescopes break new ground in quest for cosmic rays" by D. Clery (3 Sept., p. 1393). The location given for the Whipple telescope was incorrect. The Fred Lawrence Whipple Observatory is on Mount Hopkins, Arizona, not Kitt Peak.

**Reports:** "Foundering lithosphere imaged beneath the southern Sierra Nevada, California, USA," by O. S. Boyd *et al.* (30 July, p. 660). There were errors in temperatures reported in the Fig. 3 caption. The correct sentence is "Compositions defined in the text that best match the seismic observations are garnet pyroxenite (red diamond) at 1000°C, spinel peridotite (red circle) at 1200°C, and garnet peridotite (red triangle) at 1000°C." Also, the source of the fellowship listed in the acknowledgments in reference 30 was incorrect. It should have been the Cooperative Institute for Research in Environmental Sciences.

the next few decades than would climate change mitigation efforts that go beyond so-called "no-regret" actions, that is, actions that are worth undertaking on their own merits unrelated to any climate change-related concerns (e.g., elimination of subsidies for fossil fuel usage or land clearance) (3).

The World Bank estimates that with additional annual expenditures of \$40 to \$60 billion, the United Nation's Millennium Development Goals to advance sustainable development could be reached by 2015 (6, 7). Comparing these goals (e.g., at least halving poverty, hunger, illiteracy, child and maternal mortality, and the proportions of populations lacking safe water and sanitation) (6) against what can be expected from halting further climate change (2) indicates that no matter how serious climate change is compared to terrorism, it pales by comparison with the more mundane problems poor people in developing countries face today and over the next few decades. Even advancing halfway toward those goals would provide greater benefits for environmental and human well-being from now through the 2080s, and do so more economically than would heroic mitigation efforts (2, 6). Thus, it would be far more beneficial, and cost-effective, at least for the next several decades, to reduce vulnerabilities to current problems, especially if they might be exacerbated by climate change (e.g., hunger, malaria, drought, and flooding) (3). Even with a lagtime of 50 years to account for the inertia of the climate and energy system, the aforementioned analyses suggest we may have at least a quarter century window (2080s minus 50 years) before deciding on the depth and extent of mitigation. Meanwhile, we should focus on improving mitigation and adaptation technologies and our knowledge of climate change science, economics, and responses. This way we can advance sustainable development and solve the problems of today while furthering our ability to solve the problems of the day after tomorrow.

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\*Views expressed here are the author's and not necessarily those of any unit of the federal government.

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4. World Bank, *World Development Indicators* (World Bank, Washington, DC, 2004).
5. World Health Organization, *World Health Report 1999* (WHO, Geneva, 1999).

6. World Bank, "The Costs of Attaining the Millennium Development Goals," available at [www.worldbank.org/html/extdr/mdgassessment.pdf](http://www.worldbank.org/html/extdr/mdgassessment.pdf) (accessed 25 June 2004).
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### Response

**THERE IS NO REAL CHOICE BETWEEN ACTION ON** climate change and action on poverty, disease, hunger, and other millennium development goals. These are part of the same sustainable development agenda. Climate change is already affecting developing countries, and it is the poorest regions of the world—such as Africa and Southeast Asia—that are most at risk. The many people who have died and the millions now homeless through the monsoon flooding in Bangladesh will bear witness to that. This kind of event can be expected to become more frequent and more extreme as global warming accelerates, exacerbated by rising sea levels.

To meet the millennium development goals, serious investment is needed in areas such as public health and infrastructure for water and energy. The British government under Prime Minister Tony Blair's leadership is strongly committed to that. The total UK official development assistance (ODA) will rise to almost £6.5 billion by 2007/08, which will mean that our ODA will have risen from 0.26% of Gross National Income (GNI) in 1997 to 0.47% in 2007/08.

At the same time, the clock is ticking as concentrations of greenhouse gases mount in the atmosphere. At well over 370 ppm, we are already at 50% above preindustrial levels, unlikely to have been seen on Earth for around 20 million years. Global action is needed now if we are to retain the chance to stabilize emissions at a level to avoid even more dangerous climate change than that to which we are already committed. The work of the Intergovernmental Panel on Climate Change, representing the overwhelming majority of world scientific opinion, including in the United States, has shown that we are now on track to seeing average global temperatures rise by 1.5° to 5.8°C this century as a result of human activities—burning of fossil fuels and deforestation. Failure to act will result in a price, both human and economic, that will be paid across the world for generations to come. Once CO<sub>2</sub> is released into the atmosphere, it will remain there for centuries.

That is why real climate action is needed now at a global level. As Tony Blair has announced, during our G8 Presidency, we wish to deliver real progress on both climate change and African development.

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