similating the implications of our genetic heritage in a way that will benefit individuals and society is the real challenge." However, the attempt to meet this challenge by Hudson *et al.* is disappointing. They seem at times to be on the verge of recognizing the genuine dilemmas presented by genetic information. But in the end they take recourse in the law to outlaw "discrimination" and the "misuse" of genetic information by insurers. Why is it "discrimination"? Why is it misuse? They concede that insurance companies generally incorporate medical risk factors into their actuarial calculations. Why should this not apply to risks revealed by genetic testing? Their advocacy of a "return to the risk-spreading goal of insurance" would make sense if individuals were prohibited from taking out, or increasing, insurance coverage in the light of genetic tests. Do Hudson *et al.* propose to outlaw such actions?

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As co-chairmen of the committee on bioethics of the Biotechnology Industry Organization, we believe that the discussion by Hudson *et al.* concerning the risks posed to insurability by advances flowing from genomic research is a powerful reminder to both the academic and the biotechnology communities that discoveries made in the research laboratory are hyperlinked to clinical medicine and to society at large. The four succinct recommendations offered by Hudson *et al.* concerning an approach to avert genetic discrimination in insurance are welcome. We and many of our colleagues within the world of genomics and genetic testing would strongly support legislation to implement them. A new law in Oregon (Senate Bill 276, which became effective on 9 September) is an indicator that once state legislators are educated about the dimensions of the problem, they can draft legislation that accomplishes as much as possible in the face of federal laws that preempt some aspects of insurance from state oversight.

All of us who work in genomics and genetics, whether in industry or academia, should encourage the socially responsible use of the knowledge we are generating. One good way to do this is to become involved in the public discussion of bills like the Health Insurance Reform Act (S. 1028) that seek to address the problem of genetic discrimination.

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E-Mail Privacy

In their 4 August editorial (p. 615) about scientists' use of electronic communication, Shmuel Winograd and Richard N. Zare allude to intellectual property issues raised by electronic publication on the Internet. The lack of confidentiality associated with unencrypted, or "plaintext," Internet electronic mail also raises intellectual property concerns. An author of an e-mail message should appreciate that the Internet "store and forward" service functions by passing the message from mail server to mail server in the direction of the destination address. As the message passes through various intermediate servers, it may be read or copied by an unintended party. The sender of the message cannot control the path of e-mail as it travels

through servers maintained by various universities, the U.S. and foreign governments, and even by business competitors. Moreover, the sender of e-mail should appreciate that the message is vulnerable to interception during transmission through Internet by sniffer programs that can copy text containing key words.

When one considers these risks of disclosure, it is not surprising that an e-mail message is often compared to a postcard. Many would argue, however, that the privacy associated with e-mail is actually much lower than that provided by a postcard.

Accordingly, there is a risk that the contents of an e-mail message will be transmitted to an unintended party or even enter the public domain. In this way, a message that either disseminates preliminary research results that, in effect, describe an invention, or communicates an invention disclosure can jeopardize patent rights to the invention (*1*).

If an e-mail message is a postcard, then encryption is the envelope that shields the message from unintended viewers. E-mail encryption provides control over the distribution of information and offers the level of confidentiality that hard-earned research discoveries merit.

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The Nuclear Option

In his thoughtful and informative essay on tradeoffs between economic development and environmental damage in less-developed countries (LDCs) (Policy Forum, 25 Aug., p. 1058), José Goldemberg poses a classic *Catch 22* problem. By any projected current scenario to achieve economic growth adequate to sustain political stability, energy development will inevitably expand the global emissions of greenhouse gases and produce other deleterious side effects on the environment. Without economic development, however, population stability is unattainable, and population growth will operate to exacerbate environmental impacts.

Although he concludes that "all sources of energy will be needed, despite energy conservation efforts," Goldemberg does not discuss the nuclear option, which by common consent is no longer regarded as viable. Environmentalists will tell you that it is inherently much too dangerous, and resource economists will tell you that it is also too expensive in a world where the real prices of fossil fuels, in constant dollars, have been falling steadily for several years.

Every activity, however, has its costs and all life is risky: The antinuclear philosophy, which underpins much of the present consensus against nuclear energy, was forged at a time when only a few atmospheric scientists appreciated the threat of greenhouse warming from the burning of fossil fuels and before the links between economic development and population stability were well documented.

Nuclear power is no panacea, and cannot replace liquid hydrocarbons as a cheap transportation fuel, but it can surely generate almost arbitrarily large amounts of electricity without any release of greenhouse gases. The fact that France already produces more than half of its electricity from nuclear power makes that case better than any theoretical arguments could. It is also, through breeder technology, in principle the only energy source that can produce more fuel than it consumes.