lyze the research and development needed to bring to fruition the societal benefits of the new biology. The Hair/Mellon/Rifkin protestors appear at every possible event and provide lurid negligibly small-probability, worst-case-scenarios of new biotech products run amok. They refuse to acknowledge the extraordinary safety record of the industries that use biotechnology—new and old—and the fact that in 1974 molecualr biologists themselves established voluntary safety conditions for the practice of recombinant DNA technology. In retrospect the voluntary safety practices were and are overly conservative.

As Dr. Huttner has observed, the same professional protestors from different organizations in New York and Washington, DC appear and reappear at different events. It is disingenuous for Hair to suggest that they represent some kind of "national" concern. Public acceptance of the products of old and new biotechnology indicate exactly the opposite.

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The author replies:

Dr. Miller's letter moves significantly beyond Dr. Huttner's article by asserting that the voices of concern about biotechnology should be dismissed not only because they are so few but because of the "quality of their arguments." As evidence of the quality of arguments he cannot accept, Dr. Miller cites two remarks made by Dr. Mellon of the National Wildlife Federation (NWF) Biotechnology Policy Center staff.

The first remark that Dr. Miller refers to is one on "non-intervention in natural processes" that he remembers Dr. Mellon making in a class discussion on rabies in an NIH course on biotechnology policy. On the basis of this remark, Dr. Miller questions whether NWF would oppose diptheria vaccines for children.

Dr. Miller misinterprets or, perhaps, inaccurately recalls the remark. Dr. Mellon's "non-intervention" comment was intended to convey NWF's position generally opposing the vaccination of wild animals to protect the animals against the natural flux of infectious diseases. We are not in favor of developing wildlife vaccines for the purpose of protecting raccoons or other wild animals from the natural cycles of rabies that they experience. We stand firmly by our position on sound ecological and wildlife management principles. NWF has no objection to developing wildlife vaccines intended to protect humans from diseases—as is the case with the rabies vaccine—provided human health benefits are achieved and the vaccine is safe. It is absurd to charge that NWF would not support vaccines for human diseases like diptheria or vaccines that protect animals used as food, pets, or for recreation. Of course, we vigorously support such vaccines.

Regarding the rabies vaccine issue, the question of whether a recombinant vaccine should be tested and used in this country is far more complex than Dr. Miller acknowledges. The four-year decisionmaking process on the recombinant rabies vaccine has revealed a number of critical issues regarding the vaccine. These include, among others: (1) whether any vaccine against rabies in raccoons would actually benefit from human health in this country; (2) the risks posed to non-target animals from the widespread exposure to the carrier vaccinia virus; (3) the possibility of creating new viruses through recombination; (4) the openness of the regulatory process; and (5) the quality of the test protocols for the safety tests. NWF's views on these issues are contained in the formal comments on the vaccine tests submitted to the government during the last four years.

The other quote that disturbs Dr. Miller is one in which Dr. Mellon says that she "resists the notion of improving nature in the future just as [she] laments the loss of nature as it was in the past." It is true that NWF finds value in the idea of minimal intervention with some parts of the natural world. The concept of wilderness is grounded in this idea. While NWF does not object to the genetic manipulation of domesticated plants and animals, we do become concerned when genetic engineers turn to organisms in the wild like fish. These concerns have prompted us to recommend some limits on the deliberate introduction of genetically engineered organisms into national parks and wilderness areas.

Dr. Miller asserts that such ideas generate the kind of controversy that we have already had "too much of." Apparently, in his view, only the "scientific" issues of risk and safety should be tolerated; the discussion of values like wilderness are out of bounds. Risk and safety issues are important and NWF is committed to sound science in evaluating them in our review of products and policies. However, we reject the idea that these are the sole legitimate issues. Values, social and economic benefits, alternatives, and open government and the democratic process are vital in the ongoing debate over this powerful new technology. It is disturbing that Dr. Miller, the head of the FDA's Office of Biotechnology, should want to declare them off limits.

In his letter, Thomas Jukes asserts that bovine growth hormone (BGH) will benefit a hungry world by increasing the milk supply. It is a fact that the U.S. and European Community have run milk surpluses on and off over the past 20 years and those surpluses did virtually nothing to forestall hunger in the non-industrial world. Similarly, BGH-caused milk surpluses will not feed a hungry world; they will simply continue to drive dairy farmers in rich countries off the land.

*As reported in the pages of this magazine (J. Hodgson, Bio/Technology **10**:47), the imperatives of the marketplace dictate that the products of biotechnology will continue to be developed for the rich and the well fed rather than the poor and the hungry. Substantial increases in public sector research might change the situation, but currently the few projects underway are too small to have any real effect. Unless a vastly greater effort is made to support public sector research in developing countries, the claim that biotechnology will feed the world is little more than a cynical ploy.*

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Gene Fragments

To the editor:

The question of utility has already been raised as an issue in the patent applications NIH [National Institute of Health, Bethesda, MD] is filing for gene fragments (*Bio/Technology* **9**: 1310, Dec. '91), but there is another technical question that I haven't seen raised anywhere. If it is assumed that each fragment has some utility, then each fragment constitutes a separate invention since its utility and function will be different. In accordance with U.S. Patent Office practice, each separate invention should be the subject of a separate patent application. Looks like this decision by NIH will enrich patent attorneys and patent offices in the U.S. and abroad long before it returns any royalties!

All this is aside from the major questions of public policy that need to be addressed.

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