Recombinant DNA: Clashing views aired

Genetic engineering, that future possibility of deliberately altering the inherited characteristics of human beings, surfaced last week as a major factor in the continuing dispute about gene-splicing experiments. At a forum sponsored by the National Academy of Sciences, heated discussion went beyond considerations of whether the current research is potentially hazardous to argue about possible applications of the research and whether they will be morally acceptable.

The forum found little consensus among the many scientists and laymen in attendance about scientific, political or moral aspects of the recombinant DNA issue. There was general agreement, however, that gene-splicing is a powerful research tool and that concern for public protection should be top priority.

The forum participants also seemed to agree that some sort of federal regulation would be desirable, rather than a patchwork of local laws or voluntary guidelines. Bills controlling DNA research have already been introduced in both houses of Congress, and last week a committee representing 16 federal agencies also drafted legislation, which it urged the Secretary of Health, Education and Welfare to recommend.

The range of regulation proposed at the National Academy of Sciences forum extended from flexible guidelines to a complete ban on research creating combinations of DNA from organisms that do not exchange genes in nature. A new group, the Coalition for Responsible Genetic Research, was among those favoring a ban.

Concern about genetic engineering applications, in addition to safety considerations, were in evidence from the start of the meeting (SN: 3/12/77, p. 165). A spokesman for the People's Business Commission, a public interest group strongly opposing the research, said that the ultimate genetic future of humanity was at stake. The group suggested that recombinant DNA techniques might lead to attempts at producing a perfect race, as Hitler attempted with eugenics. Jon Beckwith, a researcher on bacterial genetics at Harvard Medical School, explained why he and workers in his laboratory had decided not to use the technique in their own experiments. "I do not wish to contribute to the development of a technology which I believe will have profound and harmful effects on this society," he said.

Another Harvard scientist objected that recombinant DNA is not equivalent to genetic engineering. The technique has, however, removed some stumbling blocks, David Baltimore said. Baltimore argued that genetic engineering might be desirable in curing disease. "Not to make it available, if it is feasible, seems inhumane to me," Baltimore explained. "Should we forego the benefits because of possible misuses?"

Other scientists argued that any applications of genetic techniques to people is far in the future and should be controlled when they become feasible. Stanley Cohen, a Stanford geneticist, pointed out that society does not apply all technology that is available; some it finds abhorrent.

Another difficult question that laced the discussion was the apparent conflict between scientists' responsibility for application of research results and their commitment to the bold pursuit of knowledge. "If this research gets banned, it will be as disastrous to genetics in this country as Lysenkoism was in the Soviet Union," Stanford researcher Paul Berg told SCIENCE NEWS.

Ethan Signer, a biologist at the Massachusetts Institute of Technology, reminded the meeting, "Recombinant DNA is a technique, not truth." Robert Sinsheimer of the California Institute of Technology developed that idea with an analogy. While he wouldn't object to the project of mapping the Sierras, Sinsheimer said, he might object to a method that employed, "for example, moving them mountain by mountain to Long Island in order to measure them." At a news conference, however, Sinsheimer admitted that for some experiments today recombinant DNA techniques were the only available approach.

Much of the meeting was spent debating potential benefits of recombinant DNA techniques in research and pharmaceutical applications versus risks to workers, the general public and the environment. Three classes of hazards of recombinant DNA research were stressed: the danger to laboratory and pharmaceutical workers, the possibility of creating an epidemic and the alteration of evolution. The dispute involved the likelihood of each hazard and what would be acceptible risk.

The probability of laboratory workers being infected with bacteria containing recombinant DNA is low, according to Bruce Dull of the Center for Disease Control and Bernard Davis of Harvard Medical School. Dull said infections in laboratories working with agents known to cause disease have become less and less common in the last 20 years because of safer techniques and equipment. Davis feels that the NIH guidelines for research with recombinant DNA are more than sufficient precaution, "The guidelines are based on many years of experience with pathogens," Davis emphasized.

Other scientists, including Sinsheimer, argued that infection is a serious possibility because *Escherichia coli*, the bacteria used in much of the research, is a normal habitant of the human bowel. Although special strains of bacteria (including one named 1776 in honor of last year's Bicentennial) were bred to be unable to survive outside strict laboratory conditions, Sinsheimer was still uneasy. "The validity of this claim for persons on antibiotics or persons suffering from various debilitating ailments, or human infants, or other animal species, is itself uncertain," he said.

The experts also disagreed about the chances that bacteria containing recombinant DNA could cause an epidemic. Davis pointed out that few secondary cases and no epidemics have resulted from laboratory infections with known disease-causing agents. Because the bacteria used in recombinant DNA experiments were chosen for their inability to survive in nature, and because adding foreign DNA generally makes bacteria less robust, Davis concluded, "While the proposed kinds of experiments present a small but finite danger of causing a laboratory infection, the danger to the public is infinitesimal and does not warrant the current public anxiety."

A spokesman for the Oil, Chemical and Atomic Workers International Union disagreed. "When scientists argue over safe or unsafe, we ought to be very prudent," said Anthony Mazzocchi. "If the critics are correct and an Andromeda scenario has even the smallest possibility of occurring, we must assume it will occur on the basis of our experience." Mazzocchi complained that information about potential epidemics is rarely conveyed to the population at risk. The workers usually find out, he said, by the "body-in-the-morgue method."

The final objection which Sinsheimer raised is that the recombinant DNA experiments create new forms of life that, once they escape, may upset the evolutionary process. Sinsheimer stressed our ignorance of the broad principles of evolution and of the security or insecurity of our own environmental niche. "How many microbes or viruses now exist which are one mutation away from human pathogenicity? Or two? Or five? Or one gene, or two?" Sinsheimer asked.

Sinsheimer was not convinced by the argument that natural selection will probably not permit survival of new, laboratory-created varieties of organisms. Those who hold that belief, he says, "assume in effect that in each case, nature has already achieved the highest possible level of adaptation. I have little doubt that had they been aware of it, the buffalo and the dinosaurs would have felt protected by the same principle."

One of the last speakers noted that the forum was a point of transition. Roger G. Noll, an economist from Stanford, predicted that the meeting would be the last large public discussion dominated by biologists. The issue of recombinant DNA research would either lose importance or become political. From the range and depth of feelings expressed last week, recombinant DNA seems to have found a viable niche in public concern. □