Competition in Civilian Space Activities." OTA dismissed some giddy predictions about the future of space manufacturing and noted with sobriety that "neither the scientific nor the commercial value of materials research in microgravity is fully understood."

OTA calculated that the two most promising areas for commercialization were purifying pharmaceuticals and growing crystals for use in electronics.

The research situation is fluid, illustrated by the fact that companies in these two areas recently said they find earthbound research more promising. Louis Lanzerotti, a vice president of AT&T Bell Laboratories, told the Senate appropriations subcommittee on 20 May that "the space environment offers no advantages for the manufacturing of electronic materials. Certain important basic research opportunities in materials science may exist [by] using the microgravity environment available on a space station," he said. But " 'scientific projects' should not be carried out just because the space station may exist."

Glenn Kiplinger, vice president of the Johnson & Johnson's subsidiary, Ortho Pharmaceuticals, wrote in a letter to the subcommittee that his company dropped out of space-based research on erythropoietin in 1985. "The decision to stop work . . . was purely an economic decision based on advances in other technology [gene-splicing] which had occurred in intervening years."

NASA's Marshall Space Center in Huntsville, Alabama, lists ten companies that have signed up with the agency to conduct microgravity research on the shuttle. The Minnesota Mining and Manufacturing Company is the oft-cited model, with plans for 60 shuttle experiments over 10 years and a staff of 14 to handle the data. A company spokesman makes clear that this is basic research, and that no commercial prospects are in sight. NASA officials, too, now take care to avoid describing the space station as a potential center of commercial investment. It is, Stofan says, strictly a research laboratory in space.

It will be an expensive research lab, and the benefits to come from it elude description. However, the rule of unpredictability applies to every new field of research. The venture may be, as skeptic Senator William Proxmire (D–WI) insists, a "blind leap of faith." It may also be, as David Black of NASA argues, a means to empowering Nobel-quality research.

One thing the project surely will provide is information on how to build and inhabit a space station, which at bottom is all that NASA can guarantee. ■ **ELIOT MARSHALL**

Mixed Views on Biotech

Despite warnings raised by activists about the safety of field experiments involving genetically altered organisms, a recently completed survey suggests that 82% of the American public supports such tests. The poll, conducted for the Office of Technology Assessment, indicates that a majority of Americans believe that the benefits to be derived from biotechnology—whether it be in agriculture or human health care—outweigh the risks.

Conducted by Louis Harris and Associates between 30 October and 17 November 1986, the survey indicates that 55% of Americans are willing to chance isolated ecological damage, such as the extinction of individual plant or fish species, at risk levels of 1 in 1000 so long as the potential risks are known. In contrast, where the risks are not well characterized, but thought to be "very remote" public approval drops to 45%.

*Public Perceptions of Biotechnology** is the second of a series of reports entitled *New Developments in Biotechnology*. This latest study is based on interviews with 1273 American adults and has a margin of error of 2 to 3%. Participants were queried on their attitudes toward science and the environment, as well as on matters directly related to biotechnology. Whereas public interest in science has eroded slightly, there is increased optimism about the benefits to be derived from science. Some 62% of the sample thought the benefits will outweigh the risks, whereas in 1980 a Harris survey indicated that only 58% of the country held this view.

The basis for Americans' confidence in science is called into question, however, by other survey results. For example, public understanding of the term "genetic engineering" is poor. Some 63% of the participants said they knew relatively little or almost nothing about it. This lack of understanding is most prevalent in those 50 and older, and in people without college degrees.

Only 26% of the respondents expressed any concern about the use of genetically altered microbes in agriculture, but OTA cautions that this may change. The survey showed that 70% of those polled were unfamiliar with the practice. As public awareness rises, however, OTA says concern may increase.

A majority of the country (68%) is not opposed to using recombinant DNA methods to produce hybrid plants and animals. A large portion of people who are against the idea oppose it on moral grounds. The OTA survey indicates that these opponents also tend to be less educated, religious, or both. Not everyone who is religious opposes recombinant DNA technology. In fact, a majority of people claiming to be "religious" or "very religious" are not troubled by DNA manipulations in plants and animals.

The survey also reveals inconsistencies in the way the American public views biotechnology and its application. Some 42% of the sample said the concept of altering human genes to combat disease is morally wrong, while 52% favored it. But Robyn Y. Nishimi, an OTA analyst who helped interpret the Harris data, says the survey indicates that people's views on the application of human gene therapy are governed in part by self-interest.

When asked about specific applications, such as preventing a child from inheriting a birth defect, 77% said they found it acceptable. The switch may be explained by the fact that 37% of the participants indicated there were genetic problems in their respective families.

Although the public is generally supportive of biotechnology, it continues to see a need for regulation by state and federal goverment agencies and external scientific bodies. Only 13% of those polled were willing to allow a company to decide on the suitability of large-scale applications of genetically engineered organisms.

With respect to evaluating risks, the report notes that university scientists are trusted most, followed by public health officials, and then federal government agencies. Where federal officials and environmental groups clash over safety matters, OTA says that a majority of Americans are more likely to believe environmentalists. ■

MARK CRAWFORD

*Copies of *New Developments in Biotechnology: Public Perceptions of Biotechnology* (OTA-BP-BA-45; GPO stock number 052-003-01068-2) may be obtained from the U.S. Government Printing Office, Washington, D.C. 20402–9325.