Bruce Murray of the California Institute of Technology, a geologist who has taken part in NASA's automated flyby missions to Mars, also is not ready to say that man has a role to perform on planetary missions that cannot be handled better and more cheaply by robots. "If manned planetary exploration is to be a genuine endeavor," he says, "man must perform an important function in a mission of enormous exploratory potential. At present we have not identified that function or that mission."

In reply, NASA's Administrator Paine, who is no shy advocate, says that to believe man is not going to explore space is "very unrealistic." Man will, he observes, go into space partly for scientific reasons, but also because the moon and the planets are places of intense fascination. Those who question this, he adds, display an attitude typical of the middle-aged who always say "You're not going to get me up in one of those things."

"By the end of the century," Paine says, "if you haven't been to the moon, you're not going to be with it." In Paine's view, poverty must be eliminated, but the United States' vast educational effort should have some purpose higher than of qualifying the nation "to fill 200 million alimentary canals every day." One high purpose, he adds, is to make the earth a mere "chip of rock" in the heavenly void, a base for exploring the vast reaches of the solar system. "Our space program of the 1970's is to bring this day nearer," he says. While conceding that it would indeed be possible to stretch out achievement of the Integrated Program over a longer period, he says that this would involve major drawbacks. The stretch-out would make the program ultimately cost far more, he explains, and it would transform NASA from an "organization of young men in a hurry to an organization of old men enjoying the leisurely pace of their work."

In trying to assess NASA's future prospects, one must remember that the Soviet Union remains a competitor in space and that NASA's manned flight program continues to be regarded as a safeguard against "technological surprise." The Nixon Administration's recent cancellation of the Air Force's Manned Orbiting Laboratory (MOL) program indicates that, insofar as there is a military requirement for man in space, the basic capabilities and hardware will be developed through NASA's Integrated Program (though Paine says NASA will remain an open, civilian-oriented agency).

Even though predicting the decisions of the President and the Congress is risky, one may guess that NASA, as a going organization which has just demonstrated an extraordinary competence in Apollo, will find its proposals treated kindly. To the plans for the Mars venture, the verdict is less likely to be Yes than Maybe, but NASA expects this. And if the pace of development allowed for its Integrated Program is not quite so brisk as it would like, the agency knows that Mars will still be out there.—LUTHER J. CARTER

Lead Poisoning: A Preventable Childhood Disease of the Slums

Lead poisoning was once an occupational disease commonly associated with painters, devotees of moonshine liquor, and an occasional curious child. But lead as a health hazard has come under increasing scrutiny. New York City once averaged 500 cases of lead poisoning a year; the City Health Department now estimates that a "silent epidemic" of lead contamination may be affecting as many as 25,000 slum children, who pick up the lead from chipping leaded paint in old buildings. Lead poisoning has sparked local political skirmishes and suggestions for increasing federal regulations and aid.

The diagnosis of classical lead poisoning includes a high blood content of lead, plus convulsions, vomiting, anemia, and cramps—external symptoms that can be readily confused with those of other, less dangerous illnesses if a physician is not looking specifically for lead. In severe cases, the marrow and central nervous system can be damaged, and death or mental retardation can result. Since lead often accumulates slowly over a period of months, a child can carry a dangerously high level of lead without exhibiting any of the external symptoms. No one is quite certain how widespread lead poisoning is, but the number of U.S. children with abnormally high blood levels of lead may be as high as 225,000. Children accumulate the lead by eating nonfood objects, such as chips of leaded paint, even if they are not hungry—a phenomenon known as "pica" (a reference to the magpie and its indiscriminate eating habits).

Since the 1940's, leaded paint has been replaced by cheaper, titanium-dioxide-based paints, and many localities have banned the use of leaded paint for interior surfaces. But in some older cities where, in the poorer sections, many house walls have peeling coats of old leaded paint, several studies have indicated that some 5 to 10 percent of children between the ages of 1 and 6 have abnormally high blood levels of lead.

Once a lead-poisoning case is detected, the child is usually hospitalized for several days and treated with chelating agents—chemicals that bind the lead ion and remove it from body tissue. These chelating agents include BAL, an anti-nerve-gas drug, and EDTA, a chemical familiar in biochemical research. Before chelation therapy was developed, 66 percent of severe lead poisoning cases were fatal, said J. Julian Chisholm, associate professor of pediatrics at Johns Hopkins Medical School. With early detection and treatment, this figure has probably dropped to less than 5 percent, he added.

But of the survivors, brain damage still occurs in more than 25 percent of the children. After returning home from treatment, children often resume their paint-eating habits, and if they again come down with lead poisoning, the risk of permanent brain damage increases to "virtually 100 percent," Chisholm said.

"After treatment they become complete vegetables," said Hyman Merenstein, associate professor of pediatrics at the

New York Downstate Medical Center. During his lifetime, a severely retarded individual can cost health agencies $250,000 in special training and custodial care, Merenstein said. "The horror of it is that lead poisoning is a completely preventable disease. . . . When we used to have ten polio cases, the whole city rose up in arms, but when 30,000 kids are affected with lead poisoning, nobody notices."

The long-term solution to the problem is to remove the old leaded paint or to replace the houses. But paint removal is often expensive and, when done at all, often does not include removal from the ceiling or upper walls, social workers say.

In New York, several rent strikes have been organized after a lead-poisoning incident. "Since the City is not about to enforce the rules, the citizens have to take it upon themselves," said Wendel O. Richel, coordinator of a lead-detection project near New York. Such rent strikes can be particularly successful, Richel said, because "a landlord can always accuse the tenant of putting a hole in a wall, but he can't accuse him of putting lead in a building."

As a stop-gap measure, several communities have launched screening programs to detect lead early in young ghetto children. In Chicago, the City Board of Health has screened over 100,000 children since 1966. Henrietta Sachs, director of the lead-poisoning clinic, said that the number of high lead levels detected had dropped by roughly a half during each year of the program, and that the cases detected were less severe than might ordinarily have been expected before the screening program. By contrast, the New York City Health Department tested blood samples from only 5,000 children last year, and these were referrals from city hospitals and clinics, and not children tested as a result of an extensive neighborhood screening program. Community health groups have complained that the city was moving too slowly in establishing a screening program, especially after the city postponed a decision on a biochemical supply company's offer of 50,000 free lead testing kits until late in August, when the optimum testing season was closing. Felicia Oliver-Smith, director of the city's lead-poisoning program, explained that the city had doubts about the test's reliability and also suffered from a lack of technical manpower to handle a mass screening program. Several community groups complained that the test was the best available, at least for the summer of 1969. "The bureaucratic wheels are so rusty that they can't even move with free oil!" said one laboratory worker.

On the federal level, 19 congressmen have submitted a series of three bills to provide federal aid for testing programs and assistance in eliminating peeling paint from ghetto dwellings. The bills have not been scheduled for committee action and have received little general support, but many community leaders feel confident that they could deal with the problem even within the present legal framework.

At a national conference on lead poisoning, sponsored by the Scientists' Committee for Public Information and other groups, René J. Dubos of Rockefeller University said that "the problem is so well defined, so neatly packaged with both causes and cures known, that if we don't eliminate this social crime, our society deserves all the disasters that have been forecast for it."

—MARK W. OBERLE

Technology Assessment: NAS Panel Asks New Federal Mechanisms

The 1960's have seen an eruption of opposition, often by lone critics and groups of "outsiders," to technological innovations that threaten social or environmental damage as side effects. This opposition has been aimed at such targets as nuclear weapons testing, use of insecticides, development of a supersonic transport, the location of atomic power plants, and the building of highways. In Congress, the past few years have produced landmark legislation on environmental pollution and consumer protection.

The view that technological innovation can be a decidedly mixed blessing, therefore, has been gaining ground steadily. The new skepticism is sufficiently widespread by now that it comes as no great surprise to learn that technological assessment—the evaluation of the adverse along with the beneficial effects of innovation—is the theme of a National Academy of Sciences (NAS) report released Sunday.

Titled *Technology: Processes of Assessment and Choice*, the report was prepared by a panel on technology assessment created by the NAS Committee on Science and Public Policy (COSPUP). The request for the report came from the House Science and Astronautics Committee chairman, Representative George P. Miller (D–Calif.), doubtless with the encouragement of Representative Emilio Q. Daddario (D–Conn.), chairman of the subcommittee on science, research, and development, who is the chief congressional advocate of technological assessment. That the subject is of special interest to the academicians is proved by the fact that COSPUP chairman Harvey Brooks of Harvard chaired the technology panel* and left a strong imprint on the report.

The report is clearly influenced by the steady broadening in the definition of the "public interest" brought about by the events of recent years. But the panel concentrated mainly on the process of making technological decisions at the federal level and on suggesting ways to improve the apparatus for making such decisions.

Technological change in the United States has been governed primarily by the market mechanism. Damage done to individuals or adverse consequences

* Other members of the panel are Hendrik W. Bode, Harvard; Raymond Bowers, Cornell; Edward C. Creutz, Gulf General Atomic, Inc.; A. Hunter Dupree, Brown; Ralph W. Gerard, University of California, Irvine; Norman Kaplan, Northeastern; Milton Katz, Harvard; Melvin Kranzberg, Case Western Reserve; Hans H. Landsberg, Resources for the Future, Inc.; Gene M. Lyons, Dartmouth; Louis H. Mayo, George Washington; Gerard Piel, *Scientific American*; Herbert A. Simon, Carnegie-Mellon; Cyril S. Smith, M.I.T.; Morris Tanenbaum, Western Electric; Dael Wolfle, AAAS; Laurence H. Tribe, Harvard, executive director.