By system or entity I refer to viruses, cells, animals and plants, ecologies and societies."

Specifically, he foresees the creation of higher plants with a capacity for fixing nitrogen and thereby eliminating the need for nitrogen fertilizers; tailor-making of organisms to treat sewage and desalinate water; production of human hormones or proteins that are in short supply, by the artificial manufacture of microorganisms able to make these products.

In addition, the Welsh-born scientist predicts the synthesis of human genes and the possibility of man "ending the genetic deterioration of the human race."

Because of the potential for misuse of such skills and because they may become available sooner than many scientists now think—"as soon as 10 or 20 years"—Dr. Danielli urges formation of a public body, possibly under the auspices of the National Science Foundation or the National Academy of Sciences, to oversee research in artificial life synthesis.

Most scientists agree that some type of genetic or cellular engineering of higher organisms, including man, is inevitable. Many, including Nobel laureates Marshall Nirenberg and Joshua Lederberg, have previously called for public consideration of its implications in advance of its reality. But whether Dr. Danielli's experiments themselves have actually hastened that day to the degree he claims is open to question. Not all of his colleagues in the scientific community share his unbridled enthusiasm over the reassembly of amoebas of the same strain.

Dr. Danielli himself acknowledges other steps taken in this direction, including the recent synthesis of a gene by Nobelist Har Gobind Khorana (SN: 6/6, p. 547). Within the last decade, in fact, a series of advances have come about to move man closer to the age of cell synthesis and control. Dr. Nirenberg deciphered the code for DNA. In 1965, Dr. Sol Spiegelman synthesized bits of RNA (SN: 10/9/65, p. 227). In 1967, Dr. Arthur Kornberg accomplished the synthesis of a piece of viral DNA (SN: 12/30/67, p. 629). Dr. Robert Merrifield of Rockefeller University and Dr. Robert Denkewalter of the Merck Institute for Therapeutic Research independently synthesized an enzyme, ribonuclease, in 1969 (SN: 2/1/69, p. 112). Even on the clinical level, scientists moved in the direction of manipulating or changing human genes when a team of European investigators injected the Shope virus into two children in hopes of reversing an inborn metabolic error (SN: 9/5, p. 198).

Thus, a number of steps have already been recorded. Assessing the Danielli achievement, one scientist commented, "Dr. Danielli's success in reassembling amoebas is surely a neat and useful experiment, but it hardly opens a new era in artificial life synthesis. That has been done." □

ASSESSING PRIORITIES

The SST rejection

Boeing Co.

SST mockup at Boeing plant: Suddenly, new technology is no longer sacred.

Modern man almost always has given the go-ahead to new technology. One assumption has been that a technological advance is, per se, an improvement in the human condition. Another is that the national interest or national ego requires technological preeminence, either for defense, prestige or a favorable balance of trade. The actual decision makers, of course, have been governments, legislatures and corporations. But the citizenry has usually gone along.

The decade of the 1970's in the United States has shown some promise of being different. Environmentalist sentiment has gained strength and been translated, more quickly than anyone believed possible a few years ago, into legislative action. Although the Administration, the military and the corporations often remained as enamored as ever of new multimillion-dollar hardware, the people and their representatives, particularly in the Senate, were becoming disillusioned. Anti-pollution bills passed almost unanimously, projects such as the antiballistic missile system barely squeaked through and space budgets were cut.

Then last week came what may be one of the more significant decisions of all. The Senate voted 52 to 41 to accept an amendment introduced by Sen. William Proxmire (D-Wis.) to the transportation appropriations bill. The vote deleted the $290 million asked by the Administration for this year's costs in developing a prototype supersonic transport. The 11-vote edge won by the SST opponents surprised everyone, both because it was such a complete departure from previous years when SST appropriations passed handily and because it gave such a wide margin to the opponents. There was jubilation in the offices of environmentalist groups such as the Sierra Club, which had led the efforts against the SST.

But the Senate vote does not assure the death of the SST. Backers—led in the Senate by Washington Sens. Henry M. Jackson and Warren G. Magnuson—promised all-out efforts to sway the Senate-House conference committee on transportation appropriations toward at least a subsistence appropriation for SST. But because the earlier House vote in favor of the SST appropriation had been narrow, SST opponents claimed any restoration of funds would have to be small; Sen. Jacob Javits (R-N.Y.), who voted against the $290 million, indicated he might vote for a compromise $100 million appropriation. An effort in the House this week to reverse its earlier pro-SST vote failed, 213 to 174.

The SST debate has from the beginning involved a variety of side issues. Backers pointed, for example, to severe unemployment in Seattle, the home of Boeing Aircraft Co., prime contractor for the SST. They also claimed that United States failure to develop an SST would give the Anglo-French Concorde, or even the Russian TU-144, an immense future world market for SST's and thus damage the United States' world trade posture. Opponents, on the other hand, suggested that public money for the SST could be better spent on social needs and that England and France might well follow the United States and halt development of the Concorde.

On the strictly environmental issues, both sides, when pinned to the wall, have to admit that the area is filled with unknowns. Precisely because so little is known of the SST's environmental effects, an edge was given to opponents, who were able to make a

good case that development should be halted at least until there is certain knowledge one way or the other. And about some environmental effects there could be little doubt: The SST would cause sonic booms and it would require major rebuilding of airports.

A summary analysis of possible atmospheric effects of the SST came earlier this fall in the report of the Study of Critical Environmental Problems (SCEP) by an interdisciplinary group centered at the Massachusetts Institute of Technology (SN: 10/31, p. 344).

"Very little is known about the way particles will form from SST exhaust products," said the SCEP report. A major problem, it said, will be the formation of sulfate particulates in the atmosphere from sulfur dioxide released from the SST exhausts. Another is a possible increase in water vapor in the lower stratosphere of as much as 10 percent. The global climatic impact of the increased particulates can only be guessed at, the report warned. The SCEP recommendation: Any large-scale use of SST's should be deferred until there are more clear-cut answers to these questions.

With the scientists still guessing, perhaps the most valid anti-SST argument is the one that environmentalists say is based on simple common sense: Why, they ask, do men need to go so fast? □

CANAL COMMISSION REPORT

Diggers beat nukes—by default

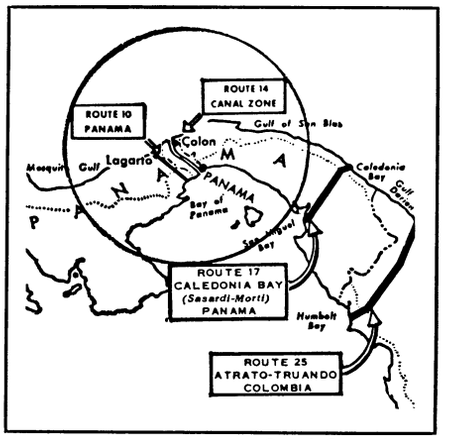
For almost a year it has been clear that the chances of an early start on a sea-level canal to supplement the present installation in Panama were slim. Nuclear excavation, looked on originally as the economical key to the project, has not been pushed; conventional excavation seemed likely to cost too much (SN: 4/11, p. 363).

With the submission of its final report last week, the Atlantic-Pacific Interoceanic Canal Study Commission confirmed the present unreliability of nuclear technology. Cratering tests so far, the report says, are just not adequate to show that the technique will work on a large scale. And in view of the halt in cratering experiments—no tests are planned for fiscal 1971, and the Atomic Energy Commission says none are included in the fiscal 1972 budget—nuclear means simply cannot be counted on.

It is, however, technologically feasible to build a sea-level canal using conventional excavation means, the commission concluded after five years of study and examination of various canal site possibilities. And, on a positive note, the report recommends conventional construction of a sea-level passage near the present lock canal in Panama, along the so-called Route 10.

In its study of the need for another canal, the commission concluded that use of the present installation will reach full capacity in the decade following 1990. Construction is estimated to take about 15 years, and there are many problems concerning responsibility for operation, maintenance and defense of the installation in Panama—the present canal has been the cause of much international friction in recent years. The commission's selection of a particular route is thus aimed at making a start on the diplomatic moves necessary to assure a timely beginning.

But scattered throughout the report's hundreds of technical pages are wistful references to the presumed economic advantages of nuclear excavation. The conventional canal along Route 10 would cost approximately $2.88 billion at 1970 price levels. A combination of nuclear blasting and cheap hydraulic excavation along Route 25 through Colombia is estimated to cost only $2.1 billion.



Canal Commission

A nonnuclear Route 10 looks best.

Nevertheless, although the AEC said that with adequate funding nuclear technology might be available, the canal commission decided that its perfection for use in canal excavation on Route 25 would probably be many years away.

Another location, Route 17, 100 miles southeast of the Canal Zone in Panama, turned out to be impractical by any means because the clay shales in the area presented the danger of slides.

"At one time," says Gen. Richard H. Groves, the commission's engineering agent, "it was thought that you could build that canal for less than $1 billion. If nothing else, we've learned that you can't. And that almost makes the whole study worthwhile in itself." □

REENTER GREAT BRITAIN

Europe's maxiaccelerator

For most of the last decade European physicists have talked about constructing a large proton accelerator similar to the one the United States is building at the National Accelerator Laboratory in Batavia, Ill. In the mid-sixties a plan for such a machine with an energy of 300 billion electron-volts (GeV) was recommended by the European international laboratory, CERN, to its 12 member governments.

The British Government's withdrawal from that plan (SN: 7/13/68, p. 30) dealt it a blow from which it never recovered. Last week the British reversed themselves. Approval of a revised plan seems to assure that European physicists will at last get their big accelerator.

After the first plan expired in a wrangle over where to put the new machine, the CERN designers went back to their work and came up with a revised plan for a flexible machine that could at some time in the future be boosted in energy beyond 300 GeV but yet be cheaper to build and smaller than the original proposal. The machine called for in the new plan can be built on a site across the road from CERN's present laboratory in Geneva (SN: 10/31, p. 350).

The designers hoped that the changes would overcome the two main impediments, British money problems and the siting wrangle, and it now appears that that hope is being fulfilled.

On Dec. 4 the British Government announced in the House of Commons that it would go into the revised project. Lower costs and technical improvements are given as the reason why the Government accepted the enthusiastic recommendation of its Science Research Council.

Britain will pay about a fifth of the total cost of the new accelerator, or about 20 million pounds ($48 million) over a seven-year period. This will make its annual contribution to CERN something over 9 million pounds instead of the present 7 million.

The Science Research Council says it will find the money by making economies in Britain's two national high-energy physics laboratories, the Rutherford Laboratory in Berkshire and the Daresbury Laboratory in Cheshire. Observers speculate that the new European accelerator will mean the eventual closing of Britain's largest national accelerator, the 7-GeV Nimrod at the Rutherford Laboratory, but the SRC has not said outright that it will do this.

The CERN council meets in Geneva Dec. 22 to decide whether to begin the project. With British approval a favorable decision seems a forgone conclusion. □