opment of new types of medical equipment and drugs and an exchange of laboratory specimens. Frank J. Rauscher Jr., the new director of the National Cancer Institute, says the United States is getting ready to send to the Soviet Union samples of some hundred cancer viruses, including several suspected of causing human cancer. American scientists are anxious to receive samples of a virus that Soviet scientists say they discovered in patients suffering from leukemia and that proved capable of causing cancer in monkeys and baboons.

Environment: Sharing different approaches

Gordon J. F. MacDonald, a member of the President's Council on Environmental Quality and a major architect of the new U.S.-Soviet environmental agreement, told SCIENCE NEWS there is no doubt that both countries have a great deal to gain by it.

Envisioned in the agreement are actual joint studies, as well as the more usual information exchanges, in a variety of environment-related areas, including air and water pollution, agricultural pollution, urban problems, preservation of natural areas, climatological and genetic effects of pollution, earthquake prediction, arctic and subarctic ecology and legal and administrative approaches to environmental problems.

"Soviet approaches to technology, to population problems, to urban planning are very different from ours," MacDonald said. In one area, arctic and subarctic ecology, "by virtue of their geography, they have done a great deal more than we have."

The Soviets have also moved much further along than the United States in dispersing population into new cities in previously unsettled areas. MacDonald believes this was not accomplished through blunt coercion of Soviet citizens, but rather through incentives, such as better housing, which might work equally well in the United States.

Although U.S. and Soviet actions in pesticide regulation appear to be similar, it is possible, suggests MacDonald, that Soviets may have done more about water pollution from agricultural runoff. Air pollution from stationary fuel burning is not serious in the Soviet Union because of its abundant natural gas, but auto-caused air-pollution is growing there and the United States has valuable expertise to share regarding that complex problem.

In addition to the new cities studies, there will be unprecedented joint social scientific studies of urban problems, including mass transit needs, open space, suburban sprawl and others. □

Stockholm: Toward an ecologically aware world

The United Nations Conference on the Human Environment, which starts in Stockholm June 5, is, in a way, an anticlimax. Simply because the conference was scheduled, a great deal of environmental action has already occurred. Some 70 nations, for instance, are submitting reports on domestic environmental problems. In many cases, these reports are first efforts by these nations to assess the state of their environments.

The special agencies of the United Nations have also prepared reports on subjects of international interest, ranging from deforestation to marine ecology. Other groups have written reports on environmentally significant institutional problems, running the gamut from environmental aspects of industrial growth to proposed organizations for an international environmental effort. British economist Barbara Ward Jackson has drafted a broad conceptual paper called "Report on the State of the Environment" with the guidance of an international group of scientists headed by microbiologist René Dubos of the United States.

As pointed out in earlier SCIENCE NEWS articles and in another article in this issue (p. 364), the main benefit of much of this preparation may lie more in creating public awareness of

Astronomy: The next 10 years

From time to time, the National Academy of Sciences empanels boards of specialists in one field of science or another to draw up a comprehensive report of the state of their art with recommendations for the next 10 years' progress. This week the Astronomy Survey Committee made public volume I of their report, *Astronomy and Astrophysics for the 1970's,* the first such consideration of astronomy since 1963.

Astronomy has developed rapidly in the intervening decade. There are branches of astronomy that did not exist or had only begun to exist in the early 1960's, and the report recommends new specialized equipment for them. It also appears to mark the beginning of the end of the centuries-old trend toward larger and larger single telescopes and the beginning of the beginning of the end of optical astronomy's century-old reliance on photographic plates.

For centuries optical astronomers and for decades radio astronomers have sought telescopes with larger and larger mirrors because the larger collecting area increases both resolution and sensitivity. Now it appears that the technological limit on size of fully steerable mirrors is being reached. The report does recommend two large radio mirrors. One would be rather colossal: a 440-foot dish for observations at one centimeter and longer wavelengths. The other would be a 215-foot reflector for millimeter waves, specifically to serve the new field of molecular astronomy. But these two are numbers 5 and 10 on the list of 11 priorities.

The success of other methods of acheiving high resolution, notably aperture synthesis, in which signals from a number of small mirrors are combined to simulate the aperture of a much larger one, is reflected by the report's giving first priority to the very large radio telescope array that has already been approved by the Government (SN: 3/25/72, p. 196).

A shadow no bigger than the image of a twentieth-magnitude star lies over the use of photographic plates to record data in optical astronomy. Emulsions just do not give reliable data from faint sources. A number of electronic devices similar to television cameras are under development to do the job (SN: 5/6/72, p. 300). The report gives second priority to development of these devices. If they are successful it may become possible to import aperture synthesis into optical astronomy, combining outputs from an array of small mirrors to simulate a large one. The report recommends ultimately an equivalent aperture in the 400-to-600-inch range. Failing this, another 200-inch conventional mirror should be built.

The new field of infrared astronomy should have a large ground-based telescope (three to four meters), says the report. Continued pursuit of space and high-altitude programs for X-ray, infrared, ultraviolet, radio and optical wavelengths is urged, as well as more support for theoretical studies, and, in eleventh place, a number of new astrometric instruments for better determining the positions of stars.

The committee estimates the whole high-priority program would cost $884 million over 10 years, less than the cost of one new aircraft carrier.

environmental problems than in producing solid international agreements. As Maurice Strong of Canada, United Nations under secretary for the environment, has said, the UN has generally failed in efforts to make nations change their ways internally; it has been successful only in dealing with problems that cannot be dealt with any other way but internationally.

So the conference is likely to have little impact, for instance, on Brazil's apparent resolve to secure industrial development of the polluting kind now common in Europe and North America. Nor could one imagine that any international police action would be possible against the apparent determination of U.S. oil companies and the Department of the Interior to ship Alaska's North Slope oil to the U.S. West Coast via a partly marine route, despite ecologists' objections.

However, the conference may require the United States to commit itself to participation in an international marine monitoring system and to eventual ratification of conventions against ocean dumping of harmful materials. In the case of the former, the United States might then be obliged by international agreement to do baseline studies of Alaska's Prince William Sound. Such studies are not now included in Interior's environmental impact statement for transfer of the Alaskan oil. And conventions against ocean dumping, if ratified by the United States, might require a revision in some future Alaska-type scheme.

But areas where progress may consist mainly of only public education or public relations include those involving necessarily internal matters, or subjects not amenable to international control: migration from rural to urban areas with consequent impoverishment to both, the environmental aspects of natural resource management, and government support of economic practices which result in pollution or harmful resource depletion. The United Nations is not a world government, and Stockholm will not make it so.

There are some strong indications that the United States may be among the nations doing the most foot-dragging in securing effective movement in this direction. "I'm disturbed," Sen. Edmund S. Muskie said on the Senate floor last week, "that there will be little opportunity for the exchange of views and recommendations [at Stockholm] because U.S. positions have been predetermined in detail by the Administration." Muskie charges that there are no well-known nongovernment environmentalists in the U.S. delegation and that pollution control measures the United States is willing to support at Stockholm are far less stringent than ones already adopted domestically. Muskie contends that the U.S. delegation is committed to a weak UN environmental agency and that it goes to Stockholm with instructions to oppose adamantly any formula for additional foreign aid from the industrialized nations to developing nations for pollution control or nonpolluting economic development. □

Tryptophan repressor: Therapeutic potential?

If cells in different parts of an organism have the same genetic information, why do they differ so much in form and function? One hypothesis is that there is a class of regulatory genes that makes repressors, each of which functions to prevent a structural gene from making its product. In other words, when a protein repressor sits on a gene, the gene does not work at its usual capacity. It took a decade to bear out this theory, but in 1967, the first repressor was isolated by Mark Ptashne of Harvard University in material from bacterial cells. Since then, some dozen other protein repressors have been isolated, mostly by investigators at Harvard and Columbia Universities. Now a team of biologists from both schools, including Geoffrey Zubay, Daniel Morse, W. J. Schrenk and J. H. M. Miller, has isolated the repressor for the several sequential genes, or operon, in the bacterium *Escherichia coli* that shut off the production of tryptophan when the cell does not need it. Tryptophan is one of the 20 amino acids that form proteins in all living systems.

The work of Zubay and his colleagues is reported in the May PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES. Their paper shows that their method of repressor isolation is probably the method of choice for isolation of most repressors. But their work, seen within the larger context of biochemical research and genetic diseases, holds more significance. This is the first time that a repressor for enzymes that make products, such as an amino acid, has been isolated. The other repressors that have been isolated are for enzymes that break down, rather than build up, molecules in a cell. Of more interest, their accomplishment raises the question whether a gene repressor for tryptophan production might have use in the treatment of schizophrenia.

Columbia Univ.

Zubay: Isolating gene repressors.

In recent years the Lafayette Clinic in Detroit, the nation's largest center for schizophrenic research; the First Institute of Psychiatry of the Soviet Academy of Sciences in Moscow, the largest schizophrenia research center in the world; Lund University in Sweden, and the University of Oslo in Norway have been gathering evidence that schizophrenia may have a biochemical basis, specifically, an overproduction of tryptophan in brain cells. Might the tryptophan repressor isolated by the Columbia and Harvard researchers be injected into the brains of schizophrenics and improve their condition?

Zubay asserts that it would not work, because the tryptophan repressor as well as all others isolated so far have been taken from *E. coli* and other bacteria. "The bacteria repressor proteins will not cross-react with sites on human genes. They have evolved in a different way. In other words, human repressor proteins would have different amino acid sequences from bacteria repressors." Nonetheless Zubay acknowledges that if a tryptophan repressor is ever taken from human cells, it might have potential for schizophrenia treatment. However, he says, it would be virtually impossible to get a repressor into the cell of a schizophrenic, and even if one could get the repressor through the cell wall, the repressor would probably be destroyed by the normal breakdown processes in the cell. So, he concludes, probably the only way to get the repressor into the cell would be by sending the gene for the repressor in via a virus.

The problem, Zubay explains, is that biochemists and geneticists currently do not have the tools to pinpoint genes and repressors in higher organisms. "Not one gene in animals or in humans has had its mechanisms of control worked out yet," he declares. Yet since scientists have reached the point where they can map genes and their functions and can isolate gene repressors in bacteria, Zubay is hopeful they will soon be able to do the same in animals and humans. Thus, while the work of Zubay and his colleagues may not provide a direct practical use in genetic disease therapy, it is contributing to an incredibly detailed mosaic of information that will ultimately lead to treatment at the cellular level for schizophrenia and other metabolic diseases. □