ARCTIC STUDIES

Before the deluge

One of the five areas selected for special emphasis in the interim marine science program announced by the Administration in October (SN: 10/25, p. 372) was Arctic environmental research.

The National Science Foundation has been given lead Federal agency responsibility for this function. NSF has renamed its Office of Antarctic Programs the Office of Polar Programs and requested $2 million for new Arctic research in fiscal 1971. On paper at least, the United States now has a national Arctic Research Program.

The new attention to the Arctic stems from the rapid development that is following the oil discoveries on the north coast of Alaska and Canada. The hope is to find ways to develop a frontier without ravaging its ecology.

As Dr. Thomas O. Jones of NSF told the Subcommittee on Science, Research and Development of the House Committee on Science and Astronautics last week, "A concentrated and organized effort to improve our scientific understanding of the Arctic should help avoid many of the unhappy consequences we have experienced in the development of other areas."

The agency's program will focus on six major problem areas: The polar pack ice, as an impediment to shipping and a major influence on climate; the delicately balanced tundra ecosystem; perennial ground ice or permafrost, which melts when the surface cover is disturbed, causing widespread geologic movement; the polar geomagnetic field, which can interfere with communications and navigation; the low rate of bacterial and chemical decay and the resulting slow dissipation of pollutants, and the geologic structure underlying the area.

The program will deal primarily with interdisciplinary field-research projects that require extensive cooperation and planning, says Dr. Louis O. Quam, acting head of the Office of Polar Programs. Individual research projects related to the Arctic will continue to be supported by the agency's science sections.

One proposed project is AIDJEX, the Arctic Ice Deformation Joint Experiment. Detailed measurements will seek to improve understanding of how ice deforms under stress. Lack of such information is an obstacle to numerical computer models of sea-ice behavior. An array of scientific stations will be established on the Arctic Ocean ice pack for a pilot test in the spring of 1971 and a full-scale project in the spring of 1972. Manned stations will be arranged at the corners and at the center of a 100-by-100 kilometer area, with three automated stations in a 20-kilometer isosceles triangle about the central station.

U.S. Geological Survey

Permafrost patterns on tundra.

Another effort is the Tundra Biome Program of the International Biological Program. Funding details have not been completed within NSF, but the agency does plan to support the project's investigations of the effects of development activities on tundra ecology. A team of scientists headed by Dr. Jerry Brown of the U.S. Army Cold Region Research and Engineering Laboratories hopes to begin intensive field studies at sites near Barrow, Alaska, this summer. One experiment will study the effects of oil films on Arctic vegetation as a means of preparing in a small way for oil spills.

ANTIHELIUM

Three-body success

Antimatter has had a place in physical theory for more than 40 years. Theory predicts that for every particle, nucleus or atom there exists an antimatter counterpart, a mirror image with reversed electric charge.

Experimental evidence of antiparticles has been around since the early thirties. But finding large structures like antiatomic nuclei is difficult, because antimatter does not last very long on earth. When it meets its matter counterpart, the two disappear in a burst of gamma rays.

The first real antinucleus to be found was antideuterium, or antihydrogen 2, in 1966. The next step is a three-particle nucleus, and it is this that Soviet physicists say they have found—antihelium 3.

The Soviet group, led by Dr. Yuri D. Prokoshkin, conducted experiments during the last few months at the world's most powerful particle accelerator, the 70-billion-electron-volt synchrotron at Serpukhov near Moscow. Because of

its high energy the Serpukhov synchrotron produces especially large numbers of antiparticles. In the crowd some antiprotons and antineutrons might be shielded from ordinary matter long enough to form an antihelium 3 nucleus.

From the products that resulted when the synchrotron's proton beam struck a target, magnetic fields segregated those with two units of negative electric charge, the appropriate amount for an antihelium nucleus. These particles were then analyzed to find those with the right mass. Five were found among 200 billion particles examined.

The significance of the discovery, according to Dr. Bernard Hildebrand of the Atomic Energy Commission, is that it shows that the matter-antimatter symmetry works for systems made of three bodies as it does for two-body systems like antideuterium. The forces in a system of three or more bodies have a much higher order of complexity than the forces in a two-body system. In a two-body system each particle is pulled in only one direction, but when three or more components are present, each particle is pulled in several directions. A three-body antinucleus proves that forces of this level of complexity can exist in antimatter enhancing the possibility that heavy antinuclei might exist. □

NEWSBRIEFS

Abortion; Thermal pollution

Although a number of legal challenges to the constitutionality of abortion laws are under way (SN: 1/17, p. 75), the Supreme Court is still keeping silent on the issue. This week the Supreme Court declined to review a decision of the California Supreme Court invalidating a California abortion law. The California court had ruled that the law, which permitted abortion only when "necessary to preserve life," was unconstitutionally vague.

Without waiting for the Supreme Court, the Hawaii state legislature last week passed a new law allowing women in early pregnancy to have an abortion for any reason. □

A Florida power company was warned this week that its plans for disposal of heated water from two nuclear power plants must be held in abeyance.

The warning is the first major Federal move against thermal pollution alone.

The Federal Water Pollution Control Administration action involves a Florida Light and Power Co. canal to carry effluent into Card Sound, an arm of Biscayne Bay near Miami, where there have already been indications of damage from thermal pollution. □