environmental sciences

NUTRITION

Human-bacterial symbiosis

Scientists have long known of the symbiotic relationship between leguminous plants and nitrogen-fixing bacteria, including those which convert cellulose and nitrogenous materials into protein (SN: 8/31/68, p. 218) in the digestive systems of cattle.

A report from Australia suggests that a symbiosis may exist between nitrogen-fixing bacteria and New Guinea natives—and that the symbiosis may provide a source of protein that is lacking in their diets.

Dr. E. H. Hipsley of the Austrialian Commonwealth Department of Health made the unexpected discovery that natives of the New Guinea highlands excrete about twice as much nitrogen as could be explained by the amount of protein in their diet. The diet of the highlanders consists of sweet potatoes, bananas, cassavas and green vegetables; it supplies only 16 to 20 grams of protein a day. Yet the natives have generally good physiques and are healthy.

Dr. Hipsley's team advances the hypothesis that nitrogen-fixing bacteria in the highlanders' intestines may manufacture protein components.

Scientists at the U.S. Department of Agriculture research center in Beltsville, Md., say the hypothesis is a possible explanation. They agree that such a symbiosis could be of immense importance if it could be adapted to supplying protein in underdeveloped countries.

PESTICIDES

Hickel bans 16 pesticides

Rachel Carson, in her famous book "Silent Spring," was highly critical of Federal agencies that used persistent or otherwise dangerous pesticides on the millions of acres of land administered by the Federal Government.

Since then, a number of these pesticides have been banned for use on the Federal lands. And last week, Interior Secretary Walter Hickel issued the first comprehensive ban on 16 pesticides, thus establishing clear-cut opposition by one major Federal department to their use.

Prohibited pesticides include the chlorinated hydrocarbons, DDT, DDD, aldrin, dieldrin, endrin, heptachlor, lindane and Toxaphene, the herbicide 2,4,5-T as well as inorganic arsenicals, mercury compounds and a number of others.

WATER POLLUTION

U.S.S.R. proposes tough new law

Water pollution in the Soviet Union is as severe a problem as it is in the United States, according to reports from Western visitors and scientific journals published in Communist nations (SN: 2/28, p. 223).

A tough new law, a draft of which is now being circulated, will be submitted to the Supreme Soviet after remarks and suggestions are made by interested parties, reports IZVESTIA.

The law would establish priorities for water use, giving first call to domestic uses and allowing industrial use only after domestic needs are met. If human health is endangered by water pollution from an industrial facility or other enterprise, state sanitary bodies would have the right to close down the facilities.

Water-quality standards would be established. All facilities built after the law was passed would have to install pollution-abatement equipment.

ANIMAL PHYSIOLOGY

Fish with the bends

Fish kills of possible ecological significance are taking place in the Snake and Columbia Rivers in Washington, reports Clifford Long of the Federal Bureau of Commercial Fisheries station in Pasco, Wash.

The reason: The fish get the bends.

Long, a fisheries biologist, explains: Water from spring runoff, when it flows over the spillways of the seven dams on the Lower Snake and the Columbia, is mixed with large quantities of air. Then the water-air mixture is plunged to depths of as much as 100 feet in the afterbays of the dams. The greater pressure at that depth allows much of the air to go into solution in the water. The water becomes supersaturated as much as 140 percent, with some cumulative effect taking place from dam to dam as the water moves downstream.

Fish take the supersaturated water through their gills and transfer the supersaturated condition to their bloodstreams. When they enter shallower water, the excess air comes out of solution and forms bubbles in their vascular systems. They die if the condition is severe enough.

Long says all species of fish are affected, but bass, now moving into shallow water to spawn, may be the hardest hit. Catfish, which tend to stay on the bottom, are less affected. Nitrogen appears to be the air component that causes the greatest trouble—just as it is in the case of divers with the bends.

As more electrical generators are installed at the dams, less water will be spilled and the problem will be corrected, Long believes.

BIOLOGICAL CONTROLS

Wasp against weevil

The search for biological controls for various pests has been going on since concern developed over persistent pesticides.

The Department of Agriculture's Agricultural Research Service reports success with a biological control in the Eastern United States, using small European wasps against the alfalfa weevil, formerly highly destructive to alfalfa crops.

Marvin H. Brunson, ARS entomologist in Moorestown, N.J., says a three-year study indicates a 90-percent reduction of alfalfa weevils as a result of the introduction of the wasps. The weevil, which began to afflict alfalfa crops in the United States in 1950, is also a European import. It is the wasps' natural food.

Five species of wasps are used. Some parasite adult weevils, some of the cocoon of the weevils and some the larvae. Brunson says the wasps are so highly specialized in their diets there is no danger of a wasp scourge. They are controlled by their success in wiping out their food supply.