environmental sciences

DEEP-SEA VERTEBRATE

Depth record set

A deep-sea research program sponsored by the University of Miami and the National Geographic Society collected a rare fish at a depth of 26,132 feet in the Puerto Rico Trench, setting a record for depth at which a vertebrate was recovered from the ocean.

The fish is a member of the genus *Bassogigas*, of which only three or four specimens exist in biological collections, says Dr. Gilbert L. Voss, one of the directors of the program conducted from the research vessel John Elliott Pillsbury.

The fish is about 6.5 inches long and has two small eyes, although it lives in an area of total darkness. It is still to be studied and described in detail. No species designation has yet been assigned.

In addition, the expedition collected in the trench the remains of a squid, estimated to have been 15 to 18 feet long. It is the first-known record of an animal of this size being recovered from such a depth.

AIR POLLUTION

Cancer increase in zoo

Air pollutants have been suspected of causing a number of pathologies in man, including cancer. There is now evidence that indicates air pollution may be a factor in increased lung cancer rates in animals in the Philadelphia Zoological Garden.

Dr. Robert L. Snyder, director of the zoo's Penrose Research Laboratory, says that lung cancer rates have increased significantly among zoo animals that stay out of doors during all of their lifetimes. The increased rate is particularly pronounced among waterfowl, but was also detected in lions, otters, skunks and other animals.

Autopsy records have been kept for waterfowl since 1901. During the period 1901-1935, there was only one lung cancer death, but there were 13 in the period 1936-1970.

Although the total number of waterfowl during the two periods was different, Dr. Snyder says statistical analysis shows the increase to be significant.

Dr. Snyder speculates that particulate pollutants fall to the bottom of ponds where waterfowl feed. He says particular carcinogens are specific for particular tissues and that for lung cancer could be introduced orally.

EUTROPHICATION

Small lakes bounce back

Preliminary results from new research at the New York State College of Agriculture in Ithaca indicates that reversing the eutrophication of lakes may not be the slow process it was thought to be.

Dr. Hugh F. Mulligan, aquatic ecologist at the college, says small lakes and ponds appear to return to nearly normal conditions a year or so after the addition of nutrients stops.

Eutrophication is the process by which waterways become clogged with algae and other plant life due to addition of nutrients, especially phosphates (SN: 4/25, p. 408).

Dr. Mulligan says that tests he has conducted in experimental ponds indicate that when nutrient flow into the pond stops, nutrients become tied up in the plant life. When the plants die and become part of the bottom sediments, nutrients are released only very slowly and do not stimulate rapid plant growth.

ANIMAL PHYSIOLOGY

Ducks not good swimmers

The saying, "He swims like a duck," suggests that ducks are viewed by man as highly efficient at propelling themselves through the water.

But a Duke University zoologist has shown that ducks, in fact, are far less efficient at traveling in water than are ships.

Dr. Henry D. Prange put mallards on a stream of flowing water and then trained them to swim against the stream so as to remain in one place, thus creating a kind of treadmill on water. He measured their energy consumption by monitoring oxygen use.

Using hydrodynamic principles to calculate the amount of energy it should take the ducks to overcome water resistance, Dr. Prange discovered the ducks, in fact, used about 20 times as much energy in reaching their top speed as was hydrodynamically required. Put another way, only about five percent of the energy they expended actually served to propel them through the water to their top speed—which is governed by the length of their bodies.

Ships achieve 20 to 30 percent efficiency in the use of the energy of their propulsion systems, he says. He speculates that a sacrifice of hydrodynamic efficiency is necessary for the ducks to achieve their aerodynamic efficiency.

NITRATES

Agriculture not a source in Rio Grande

Nitrate pollution of lakes and streams has been cited as a contribution to eutrophication. In California's San Joaquin Valley nitrates in groundwater are viewed by some scientists as a health hazard when they enter community water supplies. Agricultural fertilizers have been named as the source of the nitrates.

A Department of Agriculture study of nitrate levels in the Rio Grande River below drainage from three irrigation projects indicates use of nitrates as an agricultural fertilizer on the projects has not contributed significantly to nitrate pollution of the river.

During a 30-year period when fertilizer application rose from nothing to a high level on the projects in New Mexico and Texas, levels in the river have increased scarcely at all. There was a slightly higher nitrate level below the El Paso Valley project, but soil scientists say this may be due to sewage entering the river from the city of El Paso.

Dr. Jess Lunin, soil scientist with the soil and water research branch of the Agriculture Department in Beltsville, Md., says farmers are apparently applying the nitrates in quantities that allow them all to be taken up into plants, to be absorbed by organic materials in the soil or to be released back into the air as free nitrogen. Thus there is little of the fertilizer left over to get into irrigation water.