OCEANOGRAPHY

'Desert' in the Sea

A miniature "Dead Sea" in which animal life is nonexistant has been discovered off the coast of North Carolina.

Less than 30 feet below the surface is more than 60,000 square yards of putrid sediment giving off a gas that has killed every living creature in the area. The basin, called Cape Lookout Bight, is one of four known major areas in the world's oceans where nature—though with man's help—has polluted the water to such an extent. The other three are some of the Norwegian fjords, a basin off the coast of Venezuela and the Black Sea.

One theory of the lifeless area's formation is that of Dr. Robert Menzies, of Duke University's marine laboratory. He believes that when a man-made inlet was opened between the bight and Core Sound, organic material, washed out to sea in rivers, piled up around the bight, virtually cutting off the ocean currents.

The currents were a source of oxygen. When they became greatly reduced, the organic material was able to burn up the limited oxygen faster than it could be replenished. The result is that hydrogen sulfide, a toxic gas that smells like rotten eggs, is being formed on the bottom, and animal life has disappeared. Hydrogen sulfide will not form in the presence of oxygen.

(Hydrogen sulfide poses problems on the surface world as well. As a by-product of making coke from coal, it pollutes the air around many large manufacturing centers and peels the paint off houses in steel-mill towns.)

There may be other such areas forming off North Carolina's coast in spots which, while not "dead," have dangerously low oxygen content. Increased industrial wastes or other organic mat rials being dumped into rivers might easily upset the precarious balance, Dr. Menzies said.

The area is more than just a tragedy of water pollution, however, he believes.

Conversely, it could also be a valuable natural laboratory that could offer a unique opportunity to study the formation of undersea life.

By simply altering the bight to let in fresh currents, a fresh supply of oxygenated water could be allowed to start circulating. "Once oxygen is present," Dr. Menzies says, "it is safe to predict that this ocean floor will be quickly populated by species of animal life of benefit to man, such as clams and shrimp."

He intends to ask that a study of Cape Lookout Bight be made part of the International Biological Program, a multi-nation project similar to the International Geophysical Year of 1957.

SPECTROPHOTOMETRY

Pollution Detection

The sophisticated techniques of ultraviolet spectroscopy applied to the question of pollution in the Great Lakes is turning up the possibility that Lake Ontario may be more polluted than even the eutrophying Lake Erie.

Spectroscopy is a process of identifying chemical compounds by the fingerprints they leave in a beam of light—that is, the particular light frequencies they absorb.

A shipboard team under the direction of P. H. Jones and G. W. Heinke of the Department of Civil Engineering, University of Toronto, made several cruises of the two lakes, using a Beckman ultraviolet spectrophotometer, aboard the Canadian Coast Guard vessel Port Dauphine. Continuous recordings of absorbance of surface waters were obtained, first in polluted and then in clear waters.

The size of the vessel and the low concentration of pollutants in the huge areas of the lakes made more conventional scanning techniques impractical.

Higher absorbance readings were obtained consistently in Lake Ontario than in Lake Erie, despite the fact that the latter is popularily believed to be the most polluted lake in the chain, the researchers reported. The reason for this apparent contradiction, they say, will not be known until more data is gathered and a statistical correlation between specific pollutants and ultraviolet absorbance is obtained.

The implication that Lake Ontario is more heavily polluted than Lake Erie is borne out to some extend by the chlorine concentrations that were recorded. Chlorides are contained in sewage and salt from city streets.

The highest chloride concentration in Lake Ontario was recorded at 25 percent higher than the equivalent concentration in Lake Erie. Similarly, the lowest concentration in Lake Ontario is over 70 percent higher than the lowest in Lake Erie. Measurements on pollutants such as phosphates and chlorides were also taken.

HIGH ENERGY PHYSICS

Quark Hunt

Some 60 physicists from all over the world gathered at the University of Miami in Florida last week to bring some order into the chaos of subatomic particle physics. The attempt is a yearly event; progress is slow.

As at past conferences—this is the fourth—there were both theoretical attempts to explain experimental results, and reports of experiments to test the theories. This year, one theory—the idea that a theoretical unit called a quark is the building block of all the myriad particles that physicists produce when they operate atom-smashers—received primary attention from the experimentalists.

Quarks were an invention of Dr. Murray Gell-Mann of the California Institute of Technology, Pasadena. He suggested several years ago that the many particles observed in high-energy collisions could be described better if they were considered to be made up of different combinations of a single basic particle, fancifully named a quark, and its opposite, an antiquark. According to Dr. Gell-Mann's theory, no particle thus far observed would involve more than three quarks and antiquarks.

In the first session of the three-day Coral Gables conference, experiments designed to expand the quark hypothesis were described by Dr. Gerson Goldhaber of the University of California at Berkeley. Dr. Goldhaber and his colleague, Dr. G. H. Trilling, also of Berkeley, constructed imaginary particles made up of four and five quarks, then ran experiments to see if they could find the particles in nature. None of the particles hypothesized by Drs. Goldhaber and Trilling were observed in the experiments, which did not necessarily mean they do not exist. Dr. Goldhaber said experiments are continuing on other hypothetical particles, at least one of which is "a good candidate" to be discovered.

Dr. Goldhaber and other experimentalists at the conference expressed hope for finding a quark to be more than a mathematical idea with the new 200-Bev accelerator which the U.S. is planning to build.

Present accelerators are not nearly powerful enough to do the necessary experiments. And until the larger ones are built, quarks will remain a mystery. With the 200 Bev machine on the way, planners are already looking beyond, to the 600 to 1,000 Bev range.