OCEANOGRAPHY

Undersea Regions Studied

Life and conditions in the vast regions under the surface of the sea, hitherto little known, are important to future planning for peace or war.

By DANIEL WILKES
Science Service Crossroads Correspondent

➤ THE VAST reaches of water under the surface of the sea are a highway to war or a frontier beyond which scientific conquistadores may enrich the lives of all men.

This is indicated by Comdr. Roger P. Revelle, in charge of the oceanographic section for Joint Task Force One, and in peacetime a staff member of the Scripps Institution of Oceanography at La Jolla, Calif.

While Comdr. Revelle stressed the peacetime aspects of oceanography, he indicated that the sea, which covers about 70% of the earth's surface, cannot be overlooked by nations if means for survival in atomic warfare are being sought. Speaking of this negative side of oceanography, he pointed out that atomic-powered submarines with very long ranges may not be too far in the future. He added, too, that it may be possible to track such submarines by means of their exhaust, which might emit fission products.

Fission products can be tracked in the water. Even now, several members of Comdr. Revelle's staff are making a tracer study of the currents and the movement of radioactive fission products, using vessels equipped with Geiger counters and devices for taking samples of deep water.

The science of oceanography is only about 65 years old and there are only about a dozen important oceanographic institutions in the world. In some respects more is known about the topography of the moon than about the bottom of the sea and of distant stars than of ocean currents.

While the surface of the sea has been man's most important highway for centuries, its great depths and the storms that rage within it and create weather are only beginning to unfold.

During the war a great deal was learned about the extent to which the environment — temperature, weather, plant and sea life—changes at different levels and in different areas of the sea.

One of the methods of study during the war was with new sound devices, such as sonar. In water as in air, the velocity of sound increases with increasing temperature, pressure and salinity.

Using their sound equipment, scientists at the Naval Electronics Sound Laboratory at San Diego found that there is a great temperature change a few hundred yards below the surface. Here there are great waves, somewhat like those on the surface, but much longer and slower moving. The lengths of these waves are up to a few hundred yards, and because of the geat distance between their crests, they appear to be flat. Actually these crests are as high as 300 feet. This refutes all ideas that the ocean consists of somewhat stationary layers of water in the sea, with waves at the surface.

The importance of exploring the sea thoroughly is indicated by many practical considerations. It is filled with minerals of every imaginable sort. Salt, already mined from the ocean in important quantities, is present in an abundance sufficient to cover all the continental United States to a depth of nearly a mile. Bromine, essential to making high octane motor fuels, is economically already being extracted from the sea. Each cubic mile of the ocean has a quarter of a million tons of this element.

Weather forecasting, vital in so many of man's activities, is dependent to a great extent on knowledge of the sea. The movement of water, vertically and horizontally, and differences in temperature influence the humidity of the atmosphere creating pressure areas, rain, great air movements.

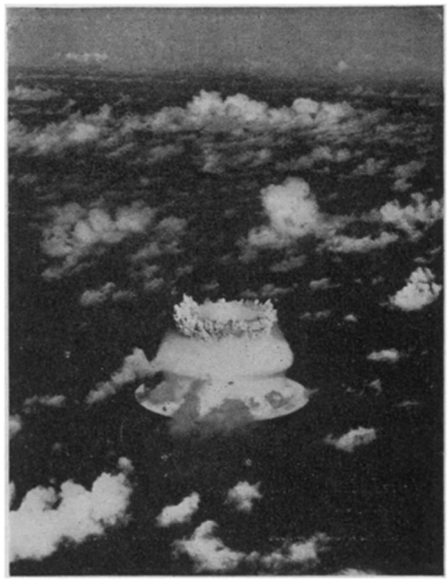
In many ways the sea is more spectacular than the land. The greatest depression, Mindanao Deep, off the coast of the southern Philippines, is 35,400 feet deep, while the highest mountain on land, Mt. Everest, is 29,000 feet. If irregularities of the earth's crust were smoothed into a rounded ball the earth would be covered by 7,500 feet of water.

If the threat of atom bombs compels all future naval vessels to be submersible, they may play hide-and-seek with enemy craft by taking advantage of "deaf spots" known to exist in ocean water. These areas of different water density, caused by combinations of currents, make it impossible to detect the presence of submarines or other submerged large bodies by the echo-searching methods usually found dependable, declares Capt. Logan McKee, in charge of ship design in the Navy's Bureau of Ships.

Special maps of ocean stratification may enable submarines to find and hide under or behind these numerous "deaf spots" as bodies of troops ashore now use topographic relief maps to find and use ravines and valleys for concealment from enemy observation and protection from gunfire.

A strong hint that one of the principal factors in driving all combat ships to shelter under the surface may be the deadly radioactivity released by atom bombs was contained in Adm. W. H. P. Blandy's statement. He pointed out the grave psychological problem involved in training men to go on fighting after the ship had become contaminated with fission products.

Concurring in Adm. Blandy's opinion, Col. Stafford Warren of the Army added that while present-day fire-fighting suits will keep radioactive materials from lodging on the body and getting into



Joint Army-Navy Task Force One photograph

DERBY HAT—From the air the Baker Day atomic explosion took the appearance of a derby hat for a brief instant as water, spray and steam boiled skyward out of Bikini Lagoon.

lungs and digestive tract through the nose and mouth, they do not stop direct irradiation.

Continuing in action on contaminated ships would necessitate calling on the men to risk a very high casualty rate from a new and therefore terrifying cause. In the history of American wars, volunteers have never been lacking for ultra-hazardous missions, such as underwater demolitions and parachute jumps. Nevertheless, it is felt that asking men to stick at their posts and be "rayed" to death is a serious responsibility to impose on any officer.

Science News Letter, August 17, 1946

MEDICINE

Penicillin for Skin Anthrax

Studies during the war prove skin anthrax can be cured by penicillin. Former treatments used were anti-anthrax serum and cutting out sores.

➤ RECOVERY of 25 patients with skin anthrax by penicillin treatment was achieved at Camp Detrick, Md., where biological, or germ, warfare studies were conducted during the war. Presumably the patients acquired the disease during efforts to develop anthrax as a weapon or to develop defenses against it in expectation of its use by the enemy.

The first three cases occurred before December, 1944, although dates of occurrence of the others and how the patients got the disease are not mentioned in the report by Maj. Harold V. Ellingson, Capt. Paul J. Kadull and Capt. Henry L. Bookwalter, Army, and Lieut. Calderon Howe, Navy, in the *Journal of the American Medical Association,* (Aug. 3).

In three of the patients, anthrax germs got into the blood as well as the skin sores. In the past this was considered a sign that the patient might not recover. These three patients, however, did get well through the penicillin treatment.

Anthrax germs disappeared from the skin sores in 24 hours or less in 22 of the patients, the Army and Navy doctors point out. In spite of this the sores went through the stages of getting larger, deep red, bleeding, breaking of the blisters, and drying with a tough black crust typical of anthrax before the days of penicillin treatment.

This suggested that a "tissue damaging factor" was produced by the germs before treatment was begun. Such a factor was subsequently discovered and will be reported by other scientists.

Anthrax is a disease of cattle which humans get from handling infected hides or hair. Aside from any potential use as a weapon in war, it is an important medical problem in the wool and leather industry. It used to kill 13 of every 100 attacked.

Cutting out the sores was the standard treatment years ago, but deaths ran high. Antianthrax serum, arsenical drugs and sulfa drugs were later used.

First report of penicillin treatment, by which three women wool workers were cured, was by Drs. Franklin D. Murphy, Alfred C. La Bocetta and John S. Lockwood, of the University of Pennsylvania. That report was made in December, 1944 (*SNL,* Dec. 16, 1944). The Army and Navy doctors at Camp Detrick, however, had already given penicillin to their first three patients but for security reasons no report was made public.

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CHEMISTRY

Acetylene May Be Made From Natural Gas

➤ ACETYLENE gas, best known in America for its use in welding, may soon be commercially produced in this country from natural gas instead of from calcium carbide as at present. A German process of making it from coal gas is one of the important discoveries of American scientists investigating chemical secrets of former enemies.

In addition to its use in the oxy-acetylene flame for welding and cutting metals, acetylene is the starting point in the synthesis of a large number of organic compounds, and its manufacture in America was a $15,000,000 industry in prewar days. Acetic acid is made from it in great quantities by a catalytic hydration process. Acetic acid is well known in vinegar but its greatest use is in making plastics of the cellulose acetate type, including cellulose acetate silk, the best kind of rayon.

The German methods for deriving acetylene from coal gas are said to be more efficient than American processes. The United States has large quantities of natural gas, of which only a relatively small amount is now used for the production of chemicals. Chemists feel that the German methods are adaptable to the production of acetylene from natural gas, giving America another source of this important basic chemical.

Further investigation of the German process is now being made by American chemists overseas. The findings will be made public through the Office of the Publication Board, U. S. Department of Commerce.

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