

GENERAL SCIENCE

USSR Subs Threaten Korea

Russia may have up to 100 submarines in her Far Eastern bases. The submarine now has a decided advantage over any known method against it.

See Front Cover

► DEADLY, modern Russian submarines, operating from bases in Siberia and possibly Red China, are an ominous threat to our forces in Korea. At the end of World War II, the pendulum swung once more, giving the submarine a decided advantage over methods of defense against it.

Allied forces in World War II, through intensive application of science and great effort, were able finally to control the Nazi subs. But the late-in-the-war development by Germany of the snorkel breathing device, the long range torpedo and subs which could move faster underwater than the majority of their prey, have once more swung the balance so that the situation for transports and surface naval units in and around Korea is serious. Russia grabbed off many models of these modern subs and took into custody many German submarine engineers at the end of the war.

As Dr. Vannevar Bush, who directed our scientific effort in World War II, put it in a recent book: "If we entered a war soon, against a technically and industrially strong enemy, and if that enemy could effectively apply modern devices at sea, we should have the whole job of overcoming the submarine to do over again on a new and unattractive basis.

"Again we should face the severe threat that a nearly immune submarine fleet might determine the outcome of the war in favor of the enemy. Many of the successful methods of the last war are now obsolete against the truly modern submarine. There is no cure-all."

Russia may have anywhere up to 100 submarines in her Far East bases, many of them now equipped with snorkels and the latest type of speedy underwater engines.

The modern submarine's snorkel is the device that supplies fresh air to engines and crew, thus enabling submarines to remain submerged for almost indefinite periods. The snorkel's nose is shown on this week's cover of SCIENCE NEWS LETTER. Only top-most part of snorkel projects above the water.

Just as Russia has given the North Koreans tanks and planes, so she could turn over to the North Korean "navy" her Far Eastern submarine fleet. As United Nations troops and materiel are built up in South Korea, it would become a greater temptation to Russia to try to cut our sea supply lanes with submarines.

There are all sorts of gadgets for use in defense against submarines. Sonar sends out high frequency sound waves which come back as echoes when bounced off a sub. Sono-buoys work on the same principle and can be strewn over wide areas to give anti-sub ships and planes warning of the whereabouts of enemy undersea craft.

But sonar is relatively useless against a modern sub equipped with torpedoes with a range greater than sonar's range. And sono-buoys cannot cover the immensely greater areas over which a snorkel-equipped sub can roam today.

The best defense against submarines is to attack their bases. Russia has a large naval base at Petropavlovsk, on Kamchatka pen-

insula, facing the open Pacific to the north of Japan. Another base is at Vladivostok, only a few miles from the North Korean border. And there are other bases on the mainland coasts of the Seas of Japan and Okhotsk.

But this method of defense is barred so long as we are not at war with Russia and if the submarines are dubbed "North Korean."

Since the end of the war, when we realized that the submarine once again had the potential advantage, scientists and naval experts have been working hard to overcome that advantage. But peacetime progress has been relatively slow and hampered by interservice and intraservice arguments.

The war against the submarine today is more than ever a war of science, of developing new devices which will hunt out the lurking sub, new weapons and explosives which will hit and penetrate the attacking sub. Whether that war has yet been won, on paper, of course we do not know. Knowledge of the post-war development of the Russian submarine service and a glance at United States naval budgets make it reasonably certain the battle has not been won in terms of ships afloat and weapons at hand.

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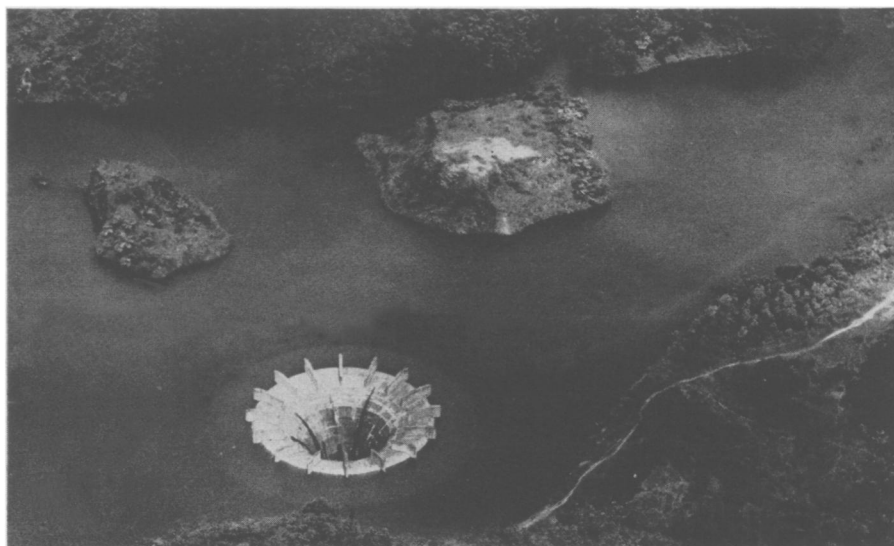
CONSERVATION

Puerto Rico Waters Land

► PUERTO RICO, Uncle Sam's Caribbean outpost, is stretching its coastline by piping water through mountains. In a \$24,000,000 project to be launched soon, the island hopes to add 35% more acreage to its irrigated lands available for agriculture.

Five reservoirs and two hydro-electric

stations will be part of a system to bring water to the wide, arid Lajas Valley in southwestern Puerto Rico. The system will utilize heavy rainfall on the northern side of the mountains, bringing the water through eight miles of tunnels into a network of irrigation canals serving 25,000 to



IRRIGATE, RECLAIM, EXPAND—A \$24,000,000 hydro-electric, irrigation and water supply project in the southwestern part of Puerto Rico will soon be launched. This is part of Puerto Rico's agricultural and industrial "comeback."

30,000 acres.

On the southern side of the mountain divide the power stations will tap flow between reservoirs to provide electricity for industrial expansion on the island.

Puerto Rico began its program of power development in 1940 to attract industry from the United States and boost employment of its own people. The huge Caonillas Dam was completed in 1948, bringing to 18 the total of the island's hydro-electric plants. These plants supply nearly all the island's power.

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AGRICULTURE

Vanilla May Soon Come From Cultivated Plants

► THE flavoring for vanilla ice cream may soon be coming from cultivated hybrid vanilla plants from American soil in Puerto Rico instead of from wild plants in Mexico.

The first hybrid seedlings of a vanilla plant which may resist a root-rot prevalent in Puerto Rico have been produced by Dr. Lewis Knudson, head of the Department of Botany at Cornell University, in Ithaca. Dr. Knudson worked with seeds produced at the Federal Experiment Station in Puerto Rico which wishes to establish a vanilla industry to aid the territory's economy.

The vanilla plant is an orchid. No one was able to produce the plant from seeds until the 1930's. No hybrid seedlings had ever been produced. Starting in 1938, Dr. Knudson had to work out a method of germinating the seeds for himself. No hybrid plant could have been produced without discovering a workable method of germinating the hybrid seeds.

After many years of experiments, Dr. Knudson discovered that vanilla seeds would not germinate with the use of methods for germinating other orchid seeds. He found that, in addition to keeping the seeds in the proper nutrient, they had to be maintained at higher temperatures than usual for a longer period of incubation.

Once Dr. Knudson developed his method of germination, he tried it on seeds of hybrid plants produced at the Federal Experiment Station in Puerto Rico. Four years later he succeeded in producing seedlings from hybrid seeds. This was the first time hybrid seedlings of the vanilla plant had been produced.

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ANATOMY-PHYSICS

Must Understand Ear to Know Why Hearing Is Lost

► IS THE human ear a microphone for the brain, sending nerve messages of all it hears to the brain? Or does the ear pick out the different sounds like a piano operating in reverse, telegraphing to the brain when each key is sounded?

Questions such as these are very impor-

tant for understanding the reason for hearing loss, report Dr. Hallowell Davis, Dr. S. R. Silverman and D. R. McAuliff of the Central Institute for the Deaf, St. Louis. Experiments showing that the ear-brain team operates on the telegraphic system rather than the microphone system were discussed by them at the meeting of the Acoustical Society of America in State College, Pa.

A high-pitched squeak was made shorter and shorter by electronic means until the sound wave made just a few wiggles from the beginning to the end of the squeak. It then sounded like a metallic click. When the short squeaks were sent out one after the other at the same rate as the vibrations corresponding to low C on the musical scale, listeners said they heard a "buzz," or "rough metallic sound."

No listener, even when encouraged, was able to hear a low C, in spite of the fact that each click was sending a nerve message to the brain and doing so at a rate corresponding to low C.

The experimenters interpret this to mean that the brain cannot use the ear as a microphone. Instead the ear seems to separate out the different tones, and each tone is signalled separately to the brain. This explains how the sound was heard like just a lot of high pitched squeaks, making rough metallic sounds, not a low-pitched hum.

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ICHTHYOLOGY

Plankton, Fish Food, May Become Human Food

► PLANKTON, food of the fishes of the sea and a possible future substitute for human food, will be studied from a research ship in the Caribbean-Gulf of Mexico area, it was announced in Washington.

The research, sponsored jointly by the University of Miami and the National Geographic Society, will include regular seinings of the area and simultaneous observations of water and light conditions, temperatures and other factors.

Plankton are minute organisms, in both plant and animal form, which drift with the currents. The animal form, zooplankton, feeds on the plant form or phytoplankton. Sea life, from the smallest fish to species of whales, depends on these organisms for food.

The project will be headed by Dr. F. G. Walton Smith, director of the Marine Laboratory at the University of Miami. Associate director will be Dr. Hilary B. Moore, also of the University of Miami.

The scientists will try to find out how masses of plankton materialize, their relationship to fish life and their possible relationship to climate changes.

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IT'S A BATHYTHERMOGRAPH!—This mechanism will help to disclose some of the secrets of the ocean's drifting "meadows," populated by minute marine creatures known as plankton. Everett C. Jones, one of the research team, is shown adjusting the educated gadget, which measures ocean depth and temperature.