scopic examination always revealed vegetative hyphae among the wood fibers (Fig. 1). In three cases, fungi were isolated from marine organisms, although I do not know whether the fungi were parasitizing the organisms or living saprophytically. Algae yielded a *Tritirachium* and a *Pestalotiopsis,* and a tunicate bore fruit-bodies of the Ascomycete that Meyers (*10*) has provisionally called "Form No. 2."

Most of the genera thus isolated are imperfect fungi, and some, perhaps most, of the species have been found previously on land or in fresh water. However, they can and do inhabit salt water, they grow well on sea-water agar, and they are easily obtained throughout the year in this latitude. The genera in cultivation are *Aspergillus, Tritirachium, Pestalotiopsis, Fusarium, Scopulariopsis, Phoma, Gonatorhodum, Mucor,* and some forms whose affinities are still unknown. Meyers (*11*) has also found *Halophiobolus* in my collections. So far, no species of *Penicillium* has been isolated, despite the extraordinary ability of the genus to tolerate wide osmotic variations. Several of the species collected here are apparently undescribed. They may simply be unknown land forms or they may be strict salt-water inhabitants. Specific determinations are being made.

One result of past marine fungus surveys that has retarded investigation is this common discovery, particularly close to shore, of forms already known from terrestrial habitats. These have been unanimously rejected as not "true" marine species, because they may also be found in habitats other than salt water. An interpretation of *true* that puts such a special meaning on the word is not strictly followed in other biological fields. To reject a terrestrial *Aspergillus* as a marine form because it does not occur exclusively in the sea is like rejecting the typhoid bacillus as a pathogen because it can live in water. One might, with equal justification, not accept *Aspergillus* as a terrestrial genus because it can be found in the ocean. A somewhat similar situation obtained in soil mycology in the early part of this century when the idea of a fungus flora of the soil had a doubtful reception until living hyphae were clearly demonstrated (*12*).

Sparrow (*13*) has emphasized that clear distinctions do not exist between aquatic, amphibious, and terrestrial fungi. There is certainly an active fungus flora in the sea; and although some of the species are halophiles, many are able to thrive and reproduce in salt water or out of it.

Fig. 1. Photomicrograph (×500) of vegetative fungus hyphae in fresh mount of wood, teased from a board submerged for 2 mo in Limon Bay, Panama, about 2 ft below the low-tide level.

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## Submarine Photography in Puget Sound

There is no published information available on the operation of submarine bottom cameras from shipboard in the Puget Sound region. The present study (*1*) was undertaken to determine the feasibility of obtaining bottom photographs and to ascertain the most successful techniques to use. Subsequently, it is planned to utilize bottom photography as an aid in examining the bottom during biological, geologic, and physical studies.

Immediate use of the photographs obtained during this study is being made in an engineering study for the 230-kv cross-Sound electric power cable that is being contemplated by the Bonneville Power Administration. Depths of more than 700 ft at the 3½-mile crossing site just north of Seattle make direct examination of the bottom difficult. A second use has been found in assisting in the enumeration and identification of bottom-living organisms and in correlating the results of various bottom-sampling techniques near Anacortes, Wash. This is part of a study to determine biological conditions prior to establishment of industries that may cause pollution to the water.

An early Ewing type (*2*) shallow-water suspended assembly was strengthened for use in depths up to 1000 ft. A glass reflector (*3*) was substituted for the original reflector. The camera was a Robot rapid-sequence single-frame 35-mm camera with a Xenar *f* 2.8 lens. Plus x film developed in Microdal, No. 5 flashbulbs, and Kodabromide No. 4 enlarging paper developed in Dektol proved satisfactory. Results of numerous trials indicated that the most consistent results were obtained with the following camera and light settings: (i) aperture, *f* 8.0; (ii) exposure time, 1/100 sec; (iii) slant distance from camera to bottom, 7 ft; (iv) camera angle, 35° from vertical; (v) vertical distance from reflector to bottom, 3 ft; (vi) reflector angle, 70° from vertical.

Photographs were obtained in depths down to 850 ft at a number of locations in the Sound and neighboring waters. More than half of the exposures resulted in intelligible photographs. Two of the clearer and more detailed bottom photographs are shown in Figs. 1 and 2. Owing to the turbidity of the water, the region is marginal from the standpoint of underwater photography. Even when the camera was set at only 7 ft slant distance from the bottom, most of the pictures show some haze and only a few are extremely sharp.

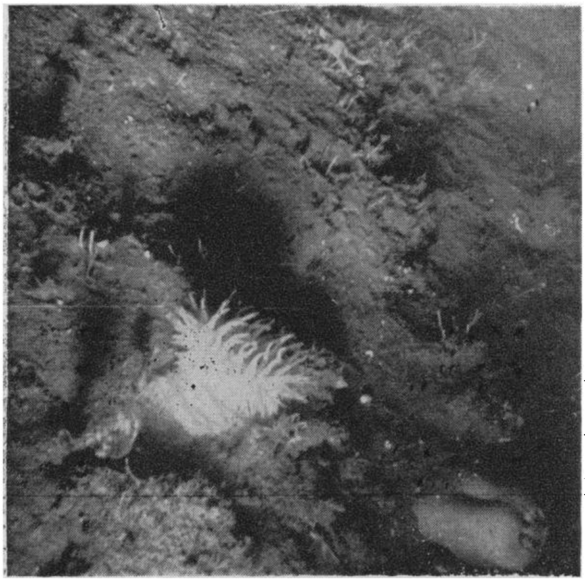

Fig. 1. Bottom photograph taken in 76 m of water. The sloping firm mud bottom with a growth of sea anemones and hydroids is probably underlain with sand and gravel.

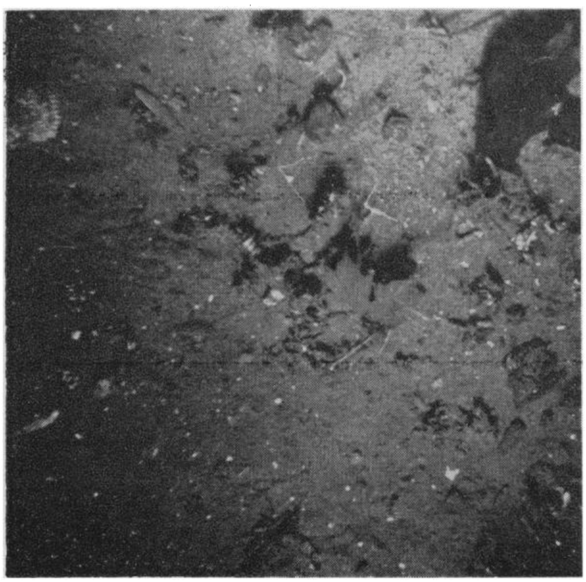

Fig. 2. Bottom photograph taken in 19 m of water. The undulating coarse sand bottom contains shell fragments, whole shells, and organic debris. Note the maple leaf in the center.

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## Effect of Eruption of Hawaiian Volcanoes on the Composition and Carbon Isotope Content of Associated Volcanic and Fumarolic Gases

An opportunity was afforded during some recent eruptions of Hawaiian volcanoes to examine the gases issuing from a solfataric fumarole (Sulfur Bank, Hawaii National Park, Kilauea, Hawaii) that is in close physical association with the two active volcanoes of the island of Hawaii (Mauna Loa and Kilauea). The desirability of a systematic routine of analysis of fumarolic gases has long been recognized, and a start was made on such a project at Sulfur Bank by Ballard and Payne (*1*). These investigators also noted that the appearance of hydrogen sulfide at this fumarole seemed to be coincident with the eruption of nearby Mauna Loa (*2*).

In the present work (*3*) samples of gas were secured from pipes that were sunk at Sulfur Bank around 1922. Representative samples were obtained in gas sampling bulbs of both the evacuated and the sample-isolation types. These were removed to the laboratory and were subjected to analysis by a low-pressure technique (*4*) that was capable of analyzing gas samples as small as 0.01 $cm^3$, STP, and of detecting components present to the extent of 0.2 percent by volume. Some of the carbon dioxide was retained from certain of the samples and was purified by repeated complete distillation from liquid air traps for use in carbon isotopic analysis.

In one instance a sample of gas was secured from a still-hot lava flow (about 700° to 800°C) in an evacuated metal collecting tube. Also a sample of rock from the same lava flow was heated in vacuum, and the gases evolved were collected. In each of these cases, the carbon dioxide was isolated and purified as described in the preceding paragraph and was submitted for isotopic analysis. By means of standards, the isotopic content of the samples was compared with the