

grees east longitude. Time of origin was 12:48.4 p.m., EST, on Friday, Dec. 28.

Observatories in England and Australia announced on incomplete data that the earthquake took place in the Antarctic regions. This was an entirely natural mistake, for when earthquake locations are given on the basis of observations by only one station they may be fully 180 degrees off the compass bearing estimated by the observer. Only when reports from three or more stations are available is it possible to strike

intersecting arcs and pin the epicenter down to a definite locality.

Seven stations reported to Science Service. They were the observatories of the Jesuit Seismological Association at St. Louis University, Weston College in Massachusetts and Spring Hill College in Alabama; the observatories of the U. S. Coast and Geodetic Survey at Honolulu, Tucson, Ariz., and College, Alaska; and the observatory of the California Institute of Technology at Pasadena.

Science News Letter, January 12, 1946

PLANT PATHOLOGY

Could Attack Food Crops

Fungus-spore blasting of Japanese rice and other food crops could have followed atomic bomb if Japs had put up a fanatical resistance.

By FRANK THONE

► IF THE Japanese had put up the fanatical, last-man resistance on their home islands that many expected of them and used the biological warfare they were preparing, atom-bomb blasting of their cities might have been followed by fungus-spore blasting of their rice and other food crops, to starve out the scattered resistance forces hiding in the hills.

By the same token, that kind of starvation strategy might be used against any people in a future war, if cities are broken up and populations dispersed to make the concentrated attack of atomic missiles difficult and unprofitable.

Although no specific kind of disease-producing organism is mentioned by name in the just-released report by George W. Merck, special consultant to the War Department, his definition of biological warfare explicitly includes the use of bacteria, fungi and other disease germs against plants as well as against men and animals. The scope of biological warfare might properly be extended to include larger organisms, such as insects and parasitic worms, whether they cause disease directly, serve as carriers of diseases like malaria and typhus, or produce crop failures by ravaging the fields.

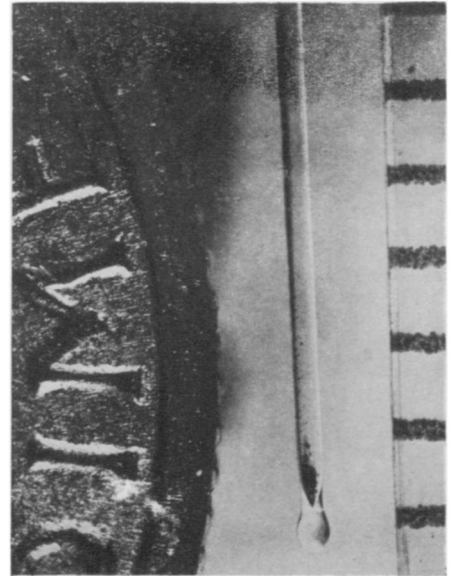
One of the advantages that lies with the attacker, in this kind of warfare, is the enemy's inability to determine what is harming him until the mischief has actually commenced. For any given crop, several distinct kinds of plant-disease germs are at the choice of the attacker, no two of which can be met

with exactly the same means of defense.

As a specific example, rice is attacked by half-a-dozen fungus diseases bearing such depressing names as blast, black smut and mildew. Sweet potatoes, another highly important food crop in Japan, has to contend with black rot, dry rot, ring rot, soft rot and white rust, which are all fungus-caused; also with burrowing nematodes, which are small, soil-infesting worms; with several virus-caused diseases, and with one or two bacterial rots. Soybeans, a third great standby in the Orient, are attacked by at least five different kinds of fungi, four or five kinds of bacteria causing blights and leaf spots, a virus causing mosaic disease, and finally by a nematode that causes root-knot.

This array of farmers' woes affects only three crops, and does not include the insect enemies of even those. Probably not all of these fungi, bacteria and viruses could be pressed into service for the purposes of biological warfare, but certainly enough of them could be to make the lot of the Japanese farmer even more unhappy than it normally is.

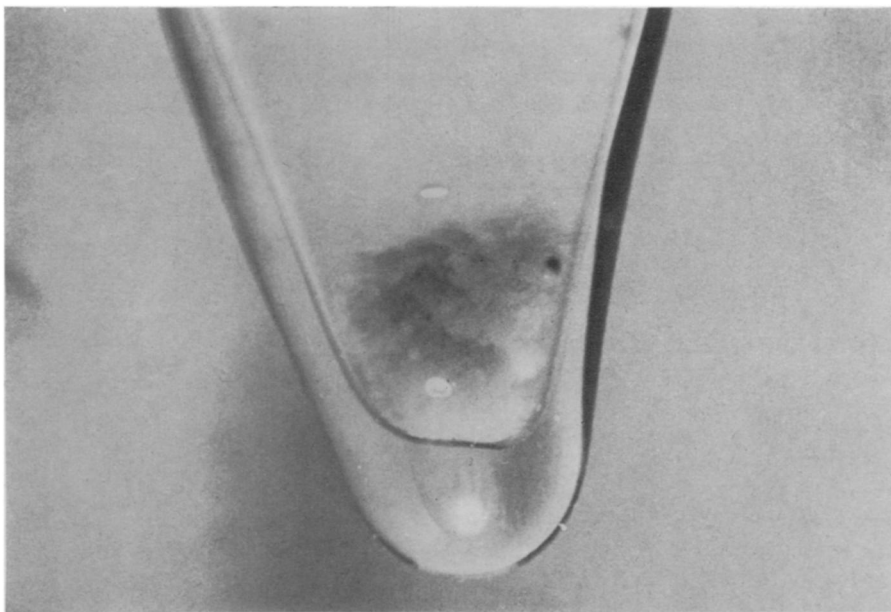
In Europe, different crops have major importance, and different diseases would be used against them. The attack would probably center on the grains, potatoes and sugar beets. All the grains, including American corn which is extensively grown in the Danube and Po valleys, are susceptible to smuts, rusts and root rots, all of which are fungus-caused. There are plenty of other grain diseases, but these alone would cause plenty of trouble. Potatoes are liable to the blight that caused



THIS IS NEPTUNIUM—Dark brown neptunium dioxide is shown at the bottom of a capillary tube. About 10 micrograms is shown and it is the first compound of this element to be isolated. This neptunium is the long-lived isotope 237 and it was isolated June 21, 1944, from uranium bombarded with neutrons from a cyclotron. Magnification is about 15 diameters. The scale shows millimeters and part of a dime appears in the photograph. Photograph from Dr. Glenn T. Seaborg, discoverer of elements 94, 95 and 96, who did chemical work on the atomic bomb elements. One isotope of neptunium is a stepping stone to the formation of plutonium, one of the atomic bomb elements.

the great Irish famine of the 1840's, as well as to several serious virus diseases; it might be possible also to sow striped American potato beetles across the fields from low-flying airplanes. Beets are susceptible to several virus diseases, to a number of rots that attack their big, juicy roots, and to such fungus-caused ills as root tumor, dry rot and leaf spot. Obviously, biological warfare might play hob with Europe's ability to feed its own population.

Still another kind of biological warfare might consist in sowing seeds of foreign weeds. America has had plenty of bitter experience with alien plants even though



ATOMIC BOMB ELEMENT—A compound of plutonium, isotope 239, one of the first pure compounds ever isolated, is shown as a colored cloudy mass resting on the rather thick bottom of a test tube. What is seen is about 20 micrograms of greenish-brown plutonium hydroxide and magnification is about 50 diameters. This compound was made about three years ago (1942) and the plutonium was made by bombarding uranium with neutrons from a cyclotron, predating by far anything made by the chain reaction used in making plutonium for actual use in the atomic bomb. The two or three white spots and black spot are merely imperfections in the photograph. Photograph from Dr. Glenn T. Seaborg, one of the discoverers of plutonium. Plutonium is one of the two fissionable elements used in the atomic bomb, the other being uranium 235.

they were not purposely introduced. We might in turn export such baneful growths as bindweed or wild morning-glory, Canada thistle and cocklebur, all of which are native to this continent.

Success in biological warfare would call for close cooperation of scientists. Biologists of all kinds would have to work as hard, and perhaps on almost as sweeping a scale, as the physicists when they made atomic energy available for military purposes. Meteorologists would have to be consulted even more closely than they are before the launching of an air attack or the use of the gases and smokes of chemical warfare; for the spores and other propagating bodies of the fungi, bacteria and crop-ruining parasites are very choosy about the conditions of temperature, moisture and sunlight under which they will operate. Geologists and soil chemists would very likely have a word to say about the chances of the germs falling on favorable ground.

Taken all round, then, biological warfare directed against the enemy's food supply would call for the intensive ap-

plication of much knowledge and skill by many scientifically trained men. But if it proved successful, its effects would be as damaging in the fields as a rain of fire-bombs over a city.

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AERONAUTICS

New Long-Range Patrol And Search Bomber

► A NEW Navy long-range patrol and search bomber, recently announced, is the first Navy land plane conceived and built especially for this particular purpose. It has a range of more than 3,500 miles with a full patrol load, a speed of over 300 miles an hour, is equipped for fighting if necessary, and carries a ton of the very latest radio and radar apparatus.

The new plane will be designated as the P2V, Neptune, and was built by Lockheed Aircraft Corporation. The first Neptune has already been extensively tested, and additional planes will be delivered soon.

Neptunes are designed to be used to

patrol regions around Navy continental and island bases, and to search waters ahead of a moving fleet. For the purpose, a self-sustaining plane is necessary, one that can fly long distances, cover wide expanses with its search radar, protect itself and deliver an accurate attack. From nose to tail, it is fitted for long-out, lone-wolf tasks.

This patrol plane is equipped with two Wright 3350 radial engines and with four-bladed propellers. It can fly on one engine in an emergency. It is armed with six 20-millimeter cannon, 16 five-inch high-velocity aircraft rockets, and four .50-caliber machine guns. It can carry 8,000 pounds of explosives, including two aerial torpedoes.

The gross weight of the Neptune is 58,000 pounds. A high degree of maneuverability is claimed for it because of its particular design. It is a mid-wing monoplane with a wing-spread of 100 feet. Its fuselage is 75 feet long, and the plane has tricycle landing gear. Its normal crew is seven.

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ICHTHYOLOGY

Only Three "Left-Eyed" Flounders on Record

► THERE ARE only three authentically known cases of winter flounders with eyes on the left side of their heads instead of on the right, states Dr. E. W. Gudger of the American Museum of Natural History. Of these, only one is now represented by an actually existing specimen, which is in the American Museum collections. (*Science*, Dec. 28.)

Flounders and their ichthyological relatives are odd fish. In early youth they settle to the bottom and lie down on one side all the rest of their lives, except for very brief spurts of swimming. Their "underneath" eyes migrate around so that both right and left eyes come to be on the same side of the head.

Some species apparently flop on either side more or less indifferently, so that "right-eyed" and "left-eyed" specimens appear in more or less equal numbers. However, in the winter flounder, known scientifically as *Pseudopleuronectes americanus*, the tendency to lie on the left side and have eyes on the right is practically universal. Only the three exceptions noted by Dr. Gudger have ever been seen.

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There are over 50 electric devices that can be used in average homes.