

first time, of a crystalline bacterial toxin, which has opened the way for the preparation of a more highly purified immunizing toxoid.

5. Development and production of an effective toxoid in sufficient quantities to protect large scale operations should this be necessary.

6. Significant contributions to knowledge concerning the development of immunity in human beings and animals against certain infectious diseases.

7. Important advances in the treatment of certain infectious diseases of human beings and animals, and in the development of effective protective clothing and equipment.

8. Development of laboratory animal propagation and maintenance facilities to supply the tremendous number of approved strains of experimental animals required for investigations.

9. Applications of special photographic techniques to the study of airborne microorganisms and the safety of laboratory procedures.

10. Information on the effects of more than 1,000 different chemical agents on living plants.

11. Studies of the production and control of certain diseases of plants.

Still more is to be learned about biological warfare, the report warns, and the research "must be continued on a sufficient scale to provide an adequate defense."

In organizing the world for peace, the report declares, "the potentialities of biological warfare cannot be safely ignored."

"Unlike the development of the atomic bomb and other secret weapons during the war," the report warns, "the development of agents for biological warfare is possible in many countries, large and small, without vast expenditures of money or the construction of huge production facilities. It is clear that the development of biological warfare could very well proceed in many countries, perhaps under the guise of legitimate medical or bacteriological research."

*Science News Letter, January 12, 1946*

#### BIOLOGY-MEDICINE

## International Effects

**Germ warfare is bound to have widespread effects. Medical discoveries useful in peacetime are likely to justify war researches.**

By WATSON DAVIS

► WE KNOW THAT Pandora's box of germ warfare actually exists. Although the lid was not opened in war, it is potentially as frightening as the atomic bomb. The scientists are not yet permitted by the War Department to tell what they found in their supersecret medical and biological war researches.

Until there are scientific reports naming diseases, telling about counter measures and giving hints for peacetime usefulness, we can neither assay fully the dangers nor tell definitely whether biological warfare researches will bring more good than evil.

The Merck report released by the War Department, giving no credit to either the disease organisms studied or the scientists who studied them, is an obviously abbreviated document. In all probability it was strenuously edited and bluepencilled in what Army officers conceived to be the interests of military security. It tells far less about biological warfare than the Smyth report does about atomic warfare.

Conflicts are bound to rise and be aired in public between the scientists who want their traditional freedom of scientific publication and the military who wish to hold on to "secrets." Biological warfare scientists may find themselves joining the atomic bomb scientists in fighting for their scientific liberties.

The biological warfare research was one of the most extensive coordinated medico-biological investigational programs in history. Probably it cost somewhat less than a twentieth as much as the atomic bomb researches. The cost was certainly in the scores of millions of dollars.

If there had been a relatively full revelation of what has been done, the whole undertaking might have a different public reception.

At the same time the U. S. preparation for and against biological warfare—fighting with bacteria, fungi, viruses, rickettsiae, and toxic agents from living organisms—was announced, there was also made known by another agency the triumph of American chemistry over malaria through the development of a

suppressive drug, SN 7618, better than both atabrin and quinine. This is a most constructive war research, useful in peace.

Probably a half-dozen similarly great medical achievements are hidden by the present biological warfare secrecy. If they are announced promptly they might immunize the public against some of the horror of the idea of protecting ourselves against the use of diseases as weapons.

Undoubtedly far more good than harm will come out of America's biological warfare researches. It would have been

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foolish not to have developed all defensive and offensive angles of this potential weapon. Our enemies were or could have been at work in their medical laboratories.

On the eve of the United Nations Organization's first general assembly, even the facts about biological warfare so far developed may seem to add to the diffi-

culties of building the peaceful world. Like the atomic bomb, however, biological warfare makes a united peaceful world all the more urgent.

The only hope is to bring germs and atoms alike into the open so that they may be controlled in the interest of all peoples.

*Science News Letter, January 12, 1946*

#### BIOLOGY-MEDICINE

## Harmful Effects Persist

Biological warfare doesn't stop with surrender or armistice; once it is let loose it cannot be brought under control again like other forms of war's destructiveness.

By FRANK THONE

► BIOLOGICAL warfare, loosing the germs of pestilence against whole peoples, will undoubtedly strike humane-minded persons as the ultimate in atrocities. It isn't, necessarily: people suffer just as agonizingly from flame-hurt and bomb-blast as they would from plague or cholera—or whatever diseases might be sown among them by an enemy.

No, the worst horror about biological warfare is that once loosed it cannot be brought under control again. Other forms of war's destructiveness are more or less self-limiting: they run their course and stop. The most awesome of them all, the atomic bomb, strikes with the suddenness of a thunderbolt. Most of the thousands who died in Hiroshima and Nagasaki did not even have a hundredth of a second in which to realize that they were dying. Other explosives, though more limited in scope, can be almost as instantaneous in effect.

Incendiary fires, though self-propagating, are also self-limiting. A town or a factory may burn for days, but when everything combustible has been consumed the fire goes out. When the victor moves in, he finds the ruins charred, but cold.

Even the worst of the poison gases, like lewisite and the nitrogen mustards, are limited in their effects. They may contaminate an area so severely as to interfere with the advance of the user's own troops, but after a couple of good rains their curse is washed from the countryside.

Not so, however, with the germs of disease that man may launch against his fellow man, or his ox and his ass, or his wheatfield and vineyard. These are self-propagating but not self-limiting, except

in the mysterious fashion that some epidemics have, of "running their course". But even then, there always remain some reservoirs of the disease, in which it remains latent for a time and then breaks forth again.

The same would be true of artificially propagated diseases of crop plants or of forest or orchard trees. Once an infestation is let loose among them it is almost never eradicated. One or two such plagues have been stopped, but only by most drastic methods and in limited areas, like the outbreaks of citrus canker and the Mediterranean fruit fly in Florida some years ago. For the most part, however, the story is one of heroic effort and final failure: black stem rust of grains, late blight of potatoes, codling moth in fruits, are only three out of a thousand possible examples. And their mischief was wrought blindly and spontaneously; they had no aid from a malicious enemy in getting started.

We must face the fact that if one nation launches such uncontrollable agencies of harm against its neighbor, the war will never stop. Plagues and pests recognize no surrender, know no armistice. A germ-conquered people will make occupation unsafe for the conqueror's troops unless they are thoroughly immunized; and although the weakened survivors may offer no resistance to the victor's will they will be too inert to give obedience to his decrees. Their wasted fields, with blights still sweeping on unchecked, will have little capacity to pay reparations.

Such pestilence-ridden lands could easily forbid entry to victorious armies, even though the exhausted losers could not fire a shot against them, simply through fear of the black tributes of defeat that homegoing troops might carry



**PROTECTION NEEDED**—Resembling a "Man from Mars," a man wearing a rubberized protective suit prepares to go about his duties at the Naval Medical Research Unit.

back with them. If intercontinental war is ever waged with biological weapons, it may become necessary to maintain intercontinental quarantines for years afterwards, with communications (if any) maintained only by cable and radio, and even the magnanimous victor's charity gifts of food and medicine dropped hastily from speeding planes or impersonally hurled across the oceans in rocketcraft.

Biological warfare can be terribly devastating. But it is a two-edged weapon, not to be lightly unsheathed.

*Science News Letter, January 12, 1946*

#### SEISMOLOGY

## Last Earthquake Of 1945 "Got Lost"

► THE LAST big earthquake of 1945 "got lost" and has only now been turned up by seismologists of the U. S. Coast and Geodetic Survey, after a study of data transmitted by wire and radio through Science Service. It was a very heavy shock, but probably produced no harm, for it shook the ocean bottom off the northern coast of New Guinea.

Epicenter location was in approximately 5 degrees south latitude, 147 de-