

chines will come through the substitution of electron tubes and electrical circuits for the cogs and gears of mechanical devices hitherto in use, he said.

New types of vacuum tubes, designed especially for these machines, are likely to be evolved, Dr. von Neumann predicted. Such special tubes will be needed especially for the parts of the machines that "remember" and carry over data for further operations.

The machines will require several thousand tubes each.

These electronic "super-brains" are, of course, unable to do any actual thinking. They accept problems at the hands of their human masters. But once a problem is set up they will simply run away with it, for they operate not with the speed of lightning but with the speed of light.

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#### PLANT PATHOLOGY

### Alliance Wages Warfare On Stem Rust of Wheat

➤ CANADA, the United States and Mexico have found it necessary to form a three-power alliance in an unending war against a sub-human enemy, the black stem rust disease of wheat, Prof. E. C. Stakman, University of Minnesota plant pathologist, told the meeting of the National Academy of Sciences.

This is because the greatest wheat-growing area of the three countries is itself international. It starts in the northern states of Mexico, runs up the map of the United States in a wide zone from Texas to Montana and the Dakotas, and extends far up into the prairie provinces of Canada. An epidemic of wheat rust can get started in Mexico, become airborne through its billions of spores, and wind up by plaguing farmers in Saskatchewan. Under other circumstances, the spores may fly with the wind from north to south.

Plant breeders are constantly at work to produce new rust-resistant varieties of wheat, but their efforts are often set at naught by the wheat rust fungus, which is constantly evolving new strains, some of which are able to attack previously resistant wheat varieties. Hence it is necessary for wheat breeders and plant pathologists of the three countries to be constantly in touch with each other, exchanging information on the movements of the enemy and sharing their means for saving the wheat.

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#### BACTERIOLOGY

## Disease Spread Studied

Germ warfare equipment and techniques developed during the war will be used to study transmission of disease germs through the air.

➤ EQUIPMENT developed during the war to handle the deadly "bugs" of bacteriological warfare has provided science for the first time with the means for studying the airborne transmission of the world's greatest scourges.

With the airtight chambers and elaborate equipment for washing "bugs" out of the air, University of California and Navy scientists have started a new approach to the study of such diseases as bubonic plague, influenza, psittacosis, and streptococcus infections such as rheumatic and scarlet fevers.

"We have a unique opportunity, with the war-developed equipment, to study airborne diseases under conditions which would have been impossible before the war," Dr. A. P. Krueger, leader of the new research program, says.

"The study of the transmission of these infections by air has been impossible because equipment did not exist which would eliminate the serious dangers to research personnel.

"During the war we had to develop equipment for safe handling of dangerous infectious agents, and this has

opened up a new field of great promise to medical science."

The University of California laboratories for airborne research were developed during the war when Prof. Krueger, as a captain in the Navy, led a group of scientists in the development of bacteriological warfare techniques.

To prevent infection of the researchers, experimental animals are handled in airtight chambers similar to those used in handling plutonium. Manipulation of animals and equipment is done with long rubber gloves which are sealed into holes in the chambers, a glass plate giving good visibility.

All air in the laboratories is washed through a bank of precipitrons, which separate all the "bugs" from the air, after which the air is passed over a bank of ultraviolet lights to kill any remaining disease agents. Any air which is suspect is burned in gas.

The isolation apparatus is of the type developed at the University of Notre Dame by Prof. James A. Reyniers, who served in California as an officer in the Navy during the war.

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#### AERONAUTICS

## Pressure Pattern Flying

➤ A NEW technique, "pressure pattern flying," is now available to air pilots on the Atlantic route from Europe. It depends upon weather reports received from planes on the route, which are compiled and rebroadcast from New York to all craft in the air.

These radio reports from the pilots, digested and edited by personnel of the U. S. Weather Bureau, are broadcast from station WSY, operated by the U. S. Civil Aeronautics Administration. The service has just been put into operation by the CAA. It comes as a result of a request from the Meteorological Committee of the Air Transport Association of America.

This new technique consists in determining the shortest flight-time path to the destination by a series of late ac-

curate reports from other pilots flying the route which locates pressure areas and enables a pilot to take advantage of the airflow circling around them.

The principle of this technique is not entirely new. It has been experimented with by the Army and Navy air forces, and by several airline companies. The new broadcast over WSY, however, marks the first time that weather information from other craft has been collected and rebroadcast for this purpose.

Pressure pattern flying is considered advisable only for long overseas or trans-continental flights. The present service covers only about 800 miles on the trans-Atlantic route, but additional frequencies are being studied to give coverage over the entire distance.

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