GENERAL SCIENCE

Ultraviolet Barrages Urged As Means of Preventing Flu

National Academy of Sciences Learns That Army May Be Protected From Epidemics By Lamps in Barracks

ULTRAVIOLET barrages from mercury vapor lamps, sweeping the air of barrack rooms, mess halls and other places where soldiers of the new American army will be crowded together during the coming winter, were suggested as a means of minimizing epidemics of influenza, pneumonia, measles, mumps and other plagues that scourged the army camps of 1917-18, by Dr. William F. Wells of the University of Pennsylvania, before the National Academy of Sciences meeting at the University of Pennsylvania.

Dr. Wells feels that it is highly likely that many of the so-called infectious diseases are air-borne, and that their germs or viruses can be kept down by flooding spaces where they float with ultraviolet radiation of germicidal wavelengths. In keeping with this theory, he has tested various types of ultraviolet installations, first in hospitals, more recently in schools. Results have been decidedly encouraging.

He and his associates are engaging in further careful tests of the method in new environments. They intend to pursue their theory to scientific proof. They believe however that enough is now known to warrant the recommendation that ultraviolet radiation apparatus be installed in buildings designed to house large companies of men. The bearing of this recommendation upon the coming national situation is obvious.

Science News Letter, November 2, 1940

Why TB "Runs in Families"

AN ANSWER to the riddle of why tuberculosis seems to "run in families" was sought by Dr. Max B. Lurie of the University of Pennsylvania, who told the Academy of his results.

Dr. Lurie produced six closely inbred families of rabbits by several generations of brother-sister matings. Two of these families were highly susceptible to tuberculosis, one was highly resistant, and the remaining three were intermediate.

When the rabbits were infected with TB germs, it was found that resistance centered largely at the port of entry. The disease was confined to the lungs in the resistant family, and made but slow progress even there. In animals belonging to the susceptible families, however, it readily spread from the lungs to other tissues, traveling by the circulatory system.

Further experiments showed the resistant rabbits to be strongly allergic to dead tuberculosis bacteria and their products, whereas the susceptible animals were quite tolerant and gave little allergic reaction.

Science News Letter, November 2, 1940

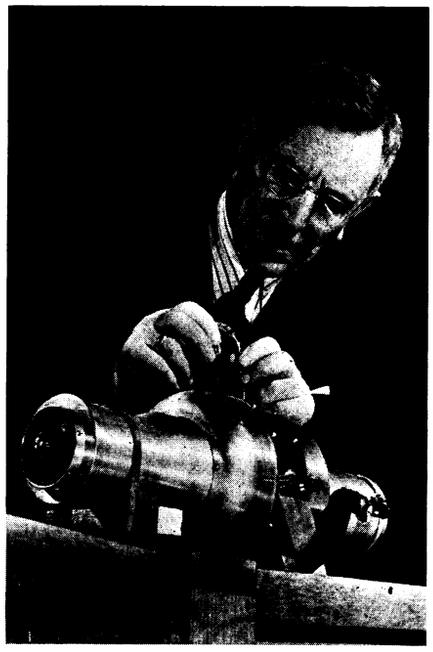
Dance of Life in Protoplasm

LIFE as a dance, a rhythmic to-and-fro motion of protoplasm, was demonstrated in a series of striking motion picture films shown before the meeting of the National Academy of Sciences, by Prof. William Seifriz and Noburo Kamiya of the University of Pennsylvania. Not only the time of the rhythm, but the force with which it moves the fluid stuff of life, have been measured by the two researchers.

The organism studied by Prof. Seifriz and Mr. Kamiya is one of the lowliest of living things, known as a slime-mold. Slime molds are so far down on the evolutionary scale that biologists are not agreed whether they are plants or animals. To the naked eye, they look rather like bits of egg white, or blobs of spilled mucilage. Nevertheless, they are alive, and the naked protoplasmic masses of which they are composed are in slow but ceaseless streaming motion.

Prof. Seifriz and Mr. Kamiya have succeeded in making motion pictures of this protoplasmic streaming, speeding up the apparent motion by exposing frames of their film at longer than normal intervals, and then running the film at normal speed—what is known as the time-lapse method, which is the reverse of a slow-motion picture. The speeding up has shown many things about the streaming of protoplasm that have not been known before.

Basic is the rhythmic ebb and flow of the life-tides in the (*Turn to page 282*)



POWER BY RADIO

Transmission of power by radio has been successfully accomplished with this tube in a demonstration by Westinghouse scientists. It is shown with I. M. Mouromtseff, one of the engineers who developed it.

RADIO

Power Is Sent By Radio With New "Klystron Tube"

A FORWARD step on the road to radio transmission of power was demonstrated to a group of college deans and professors attending a conference at the the Westinghouse Lamp Research Laboratories. As they sat in the conference auditorium, each member of the audience held aloft a flashlight bulb to which was attached a short wire antenna. On the platform was the transmitter from which the electrical waves, focussed like a searchlight beam with the help of a six foot horn, were aimed at the little lamps, causing them to light as though connected to a storage battery.

The waves carrying the energy are from four to 16 inches long, much less than the ordinary short radio waves, which are 10 to 300 yards in length. Unlike the radio waves, they cannot penetrate non-metallic materials. This was demonstrated by holding a block of wood between the lamp and the transmitter. Then the lamp went out.

The apparatus, called the Klystron, originated about two years ago in the laboratories of Stanford University, in California. The Sperry Gyroscope Company was designated by the University to promote the practical use of the instru-

CHEMISTRY

Phenol Now Made in America By German Raschig Process

Chemical Important in Manufacture of Explosives And Plastics Yields a Minimum of By-Products

See Front Cover

SYNTHETIC phenol, needed in manufacture of plastics and also of some explosives, can now be made in large quantities from air and two common chemicals, benzene and hydrochloric acid, in a new plant just opened in North Tonawanda, N. Y. It assures American manufacturers of an independent and controlled source of the important compound.

Built in the past two years, costing more than $2,000,000, the plant is housed in several large buildings, with towers and distillation units connected by forty miles of pipe. Three miles of the piping is made of glass porcelain or rubber, to withstand the corrosive action of hot acids. Its capacity is 15,000,000 pounds of phenol per year. Yet the most modern control methods are employed, so that only six men and a supervisor are required for its operation.

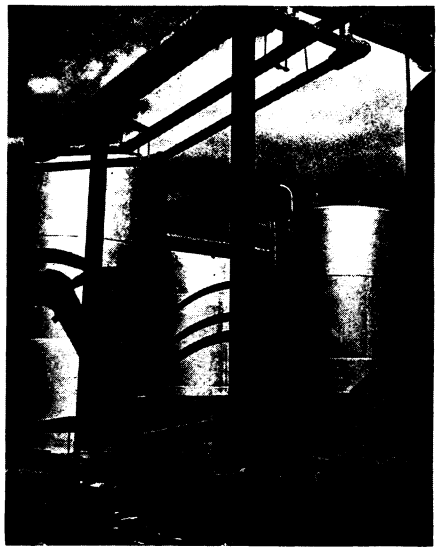
The new plant is part of Durez Plastics and Chemicals, Inc. It uses the so-called Raschig process of phenol manufacture, which was invented in 1930 by Dr. W. Prahl and Dr. William Mathes, of the Raschig G. m. b. H., Ludwigshafen a/Rh., Germany. The Durez firm owns the exclusive United States rights to the process.

Though quite complicated, the Raschig process has two important advantages over older methods for the preparation of phenol, which is another name for carbolic acid. Its product is of high purity, considerably greater even than that approved for medical use. Unlike older methods, which yield at least several pounds of by-product for each pound of phenol, this gives less than a tenth of a pound of by-product for each pound of the desired chemical.

The process has two main stages. In the first, a vapor mixture of benzene, hydrochloric acid and air is converted to mono-chlor-benzene. In the second stage, this is mixed with steam which is converted into phenol and hydrochloric acid. The latter can then be used over again with a new batch of benzene. Also, the catalysts, materials which themselves are not changed, but which make certain of the reactions possible, are used many times.

In 1921, only 2,000,000 pounds of synthetic resins were produced, compared with more than 200,000,000 pounds last year. Those made from phenol have had the fastest growth and were the first to be made on a mass production basis it is said. Cameras, radios, brake linings, binders for plywood, telephones, paints and adding machines are a few of the common articles now made from them.

Science News Letter, November 2, 1940



STORAGE TANKS

After synthetic phenol is made in the new Durez plant it is stored in these huge tanks prior to its use in making plastics.

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protoplasmic mass. The protoplasm streams in one direction for about 50 seconds, then reverses itself and streams back again. There seem to be several rhythms at work, but the 50-second one rules the dance.

The slime-mold moves from place to place by the very simple device of flowing forward a little farther each time, and not retreating all the way to its original position when it reverses. It is like the traditional penetential march of ancient pilgrims going to Jerusalem—three steps forward and two steps back.

Measurement of the force involved in the streaming was accomplished by caging a single strand of the slime-mold in a divided chamber, and applying pressure to one half of it, while the other half was left free. The pressure that will just stop the flow is considered a measure of its force. This proves to be the equivalent of a column of water 25 centimeters high.

Science News Letter, November 2, 1940

Dance of Four Stars

A STRANGE and intricate dance of four stars with the shortest part of the rhythm only a week long and the longest a million years, was described before the National Academy by Dr. Peter van de Kamp and Miss Janet M. deVilbiss of Swarthmore College.

Part of the circling star group has long been known. It is one of the visible stars in the constellation Corona Borealis, the northern crown, and has been considered a double star.

However, it now proves that one member of the double star is itself a double, with the two bodies quite close together and revolving around each other once in eight days. At a greater distance is another member, with a rotational period of about 1200 years. Finally comes the newly discovered fourth partner, a star too faint to be visible to the naked eye, and so distant from the rest of the system that its membership therein is traceable only by its apparent path, which would sweep it around the other three once in a million years.

Science News Letter, November 2, 1940

Diving Animals Studied

STUDIES on the physiology of diving seals, porpoises and manatees or sea-cows were reported to the Academy by Dr. Laurence Irving and associates, of Swarthmore College. They made their studies largely on animals in the great tanks at Marineland, Fla.

As soon as a seal dives, they found, its heart-beat drops to about a tenth of the normal rate. The hearts of porpoises and manatees, however, slowed down by only about one-half. On emergence, normal rates are restored.

Oxygen in the arterial blood is steadily exhausted during a dive, and when it reaches a minimum point the animal of course has to come up for air. Oxygen in

the muscles vanishes within five minutes, but is restored quickly in recovery. Blood flow in the muscles diminishes markedly during the dive, but apparently the brain's supply of blood is not diminished. Apparently the muscles get along without new oxygen during the diving period, burning part of their substance down to lactic acid, which rapidly passes into the blood as soon as the animal emerges and begins breathing air again.

Associated with Dr. Laurence in the research were Dr. P. F. Scholander and Dr. S. W. Grinnell.

Science News Letter, November 2, 1940

METALLURGY

Grain Size Affects Degree to Which Steel Can Be Hardened

Even Among Steels of Similar Chemical Composition, Larger Grains Are Found To Give Harder Metal

NEW studies of the factors which affect the degree to which steel can be hardened, important in preparing steel for armor and munitions, as well as for many industrial uses, were described to the American Society for Metals, meeting in connection with the National Metal Congress and Exposition in Cleveland. These researches were made by Dr. M. A. Grossman, director of research, and R. L. Stephenson, metallurgist, of the Carnegie-Illinois Steel Corporation.

The chemical composition of a steel has a lot to do with the extent to which it can be hardened, but it has been found that even those of similar composition may have different hardenabilities. This is determined by the size of the grains of which it is formed.

In their researches, Dr. Grossman and Mr. Stephenson found that larger grains gave a harder steel. They stated also "that the greater the hardenability of the steel, due to its chemical composition, the more was the hardenability affected by a change in grain size." The hardenability can be increased as much as 50% by changing grain size.

They presented to the meeting tables showing these relations in various kinds of steel. This information, it is expected, will prove useful in making possible a more accurately controlled degree of hardening of steel in various uses.

Science News Letter, November 2, 1940

RESPONSIBLE

These three men were responsible for the design and erection of the new Durez synthetic phenol plant. They are G. M. Loomis, R. M. Crawford and Dr. W. Prahl. The latter, while connected with the Raschig company in Germany, was one of the original inventors of the process.

Stronger Stainless Steels

ABILITY of stainless steel used in airplanes to absorb vibrations, such as those from the engines, is less the stronger it is. This was reported by R. M. Brick and Arthur Phillips, of the Hammond Laboratory of Yale University, to the meeting.

However, both aluminum and stainless steel have their respective advantages, and the experimenters drew no conclusions as to whether or not one might supplant the other. They were concerned both with the fatigue of a metal, that is, the number of times it can be bent; and the damping, or vibration-absorbing power. The latter is very important in an airplane, because, unlike machinery on the ground, there is no foundation to absorb the vibration. This must be done by the structure of the airplane itself.

Surface effect, they find, is a considerable factor. Some types of aluminum alloy develop surface cracks under heavy vibration. Stainless steel, also, may have its fatigue strength impaired by surface effects. They point out that a finely polished surface, free from any channels made by the acid used in the final stages of manufacture, is important.

Science News Letter, November 2, 1940

Chafing Affects Strength

CHAFING between metal machinery parts, often neglected in past tests of metal parts, is an important factor in constructing airplanes and other kinds of machinery, Dr. George Sachs, assistant professor of metallurgy, and Peter Stefan, research assistant, at the Case School of Applied Science told the American Society for Metals.

The rubbing action between two closely fitted machine parts, they said, adds greatly to the total stress to which they are subjected. Examples are found in press fits, axle seats, propellor hubs and other important machine assemblies. If chafing is not considered, a simple test under static conditions of the material used may give a false idea of its strength. Even if a part's normal strength under continued stress seems ample, the