BACTERIOLOGY

BacteriophageNowVisible

This foe of disease germs, formerly invisible, has now been seen through an ordinary light microscope as bright yellow pinpoints of light.

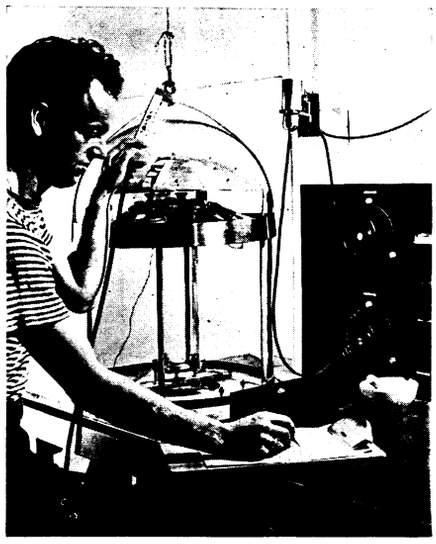
➤ BACTERIOPHAGE, formerly invisible foe of disease germs, has now been seen through an ordinary light microscope, Dr. Alvin W. Hofer, of the New York State Agricultural Experiment Station, and Dr. Oscar W. Richards, of the Spencer Lens Company, Buffalo, report. (*Science,* May 4.)

When the electron microscope made it possible to see bacteriophage particles, scientists found that they were larger than the flagella of bacteria. Since the flagella, tiny whip-like affairs extending from bacteria, can be stained and seen under ordinary light miscroscopes, it seemed reasonable to suppose bacteriophage particles could, too.

This has now been done. First the bacteriophage was treated with auramin, a dye, and radiated with ultraviolet rays. The bacteriophage particles then appeared through the microscope as bright yellow pinpoints of light in an otherwise dark field. With further study, Dr. Hofer and Dr. Richards developed two more methods for making bacteriophage visible. These involved the use of stains, or dyes, one a modification of the acid-fast stain, and ordinary light.

With these methods and use of the new phase difference microscope, the scientists were able to work out the order of events in bacteriophage destruction of bacteria. The sequence agrees with that seen in a dark-field motion picture, made by Dr. A. J. Pijper, of Pretoria, South Africa, showing bacteriophage action on a strain of typhoid fever organisms.

Science News Letter, May 12, 1945



LENSES COATED—Mounted on a rounded panel inside a large bell jar, lenses for naval combat instruments are given a coating of magnesium fluoride in the optical shop at the Mare Island Navy Yard, Vallejo, Calif., to improve their light transmission and field definition characteristics. Jim DeMartini, chemist, is checking the thickness of the coating.

METALLURGY

Airplanes Dissolved

Whole sections of wings and fuselage are placed in a bath of caustic soda to speed up recovering of valuable aluminum from obsolete planes.

➤ RECOVERING valuable aluminum for re-use from crushed war-weary, crashed, or obsolete planes has been speeded up by a new process that literally dissolves the aluminum from whole sections of these planes. This new method, developed by the Aluminum Company of America in cooperation with the Air Technical Service Command, eliminates all need for sorting metals before the aluminum is melted down and gives an end product of pure, high-grade aluminum ready for reprocessing. The aluminum obtained from alloys and other metals coated with aluminum is for all intents and purposes the same as aluminum manufactured from bauxite.

Whole sections of wings and fuselage are placed in a bath of caustic soda. This caustic soda dissolves the aluminum in the planes, while any steel nuts and bolts, rivets, copper piping, bronze bushings, rubber or other non-aluminum parts are not attacked by the caustic and remain in solid form. Aluminum alloying elements are not attacked by the caustic, and as is the case with other non-aluminum parts they can be removed readily from the sludge. Thus scrapped planes are taken apart quickly by chemicals, instead of by tedious hand labor.

After filtering out the solid impurities from the sludge, the aluminum bearing liquor is transformed into pure aluminum oxide by the Bayer process. This is accomplished by pumping the liquor into precipitating towers as high as six-story buildings and allowing it to stand and cool. In time, crystals of aluminum hydroxide begin to settle out. These crystals are removed and washed to free them of caustic soda. Then they are heated white hot in large rotating kilns to drive off any moisture and leave commercially pure aluminum oxide, or alumina. The caustic soda recovered can be re-used.

The aluminum oxide can be processed into any desired form by standard methods, about which there is nothing new. Other parts, such as rivets, rubber, and so on can also be salvaged.

The chemical stripping of aluminum from wrecked planes makes possible the conservation of the country's high-grade bauxite reserves and man-hours required to mine bauxite. If this process had been available at the time of the scrap aluminum drive in 1942, when housewives turned in to the government their aluminum pots, pans, and skillets, those cooking utensils could have been processed and used in aircraft construction. As it was, they were of little value, since the large number of different mixtures and alloys of aluminum used in cooking utensils made it impossible to identify and sort the vast quantity turned in. Most of this material was melted down into low-grade metal.

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MEDICINE

Refrigeration Treatment For 89 Days Saves Leg

➤ REFRIGERATION treatment for 89 days continuously saved a woman's leg from the amputation that would ordinarily have been required to save her life, Dr. Isidor Kross, clinical professor

of surgery at New York Medical College, reports. (*Journal, American Medical Association,* May 5.)

The patient had suffered from a chronic osteoarthritis of her right knee for four years. A few days after warming her feet near an oven, a blister opened by itself and discharged a yellow, watery fluid. Shortly thereafter almost the whole leg became involved in a serious infection and gangrene set in.

Sulfadiazine failed to help and had to be stopped because a rash developed on the patient's arms and face. At this time her doctor advised amputating the leg through the middle of the thigh to save her life. Dr. Kross, called as surgical consultant, believed the operation should not be done, as it would involve cutting through infected tissue. Either gangrene of the stump or general poisoning seemed likely to result. Refrigeration treatment was tried, with success.

The 89 days during which the low temperature treatment was carried on is the longest on record for such treatment, Dr. Kross believes. He reports the case for this reason and because he found that when the treatment was stopped after shorter periods, the inflammation and gangrene started up again. The case, he states, shows the necessity for continuing the treatment until the infection is fully overcome.

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AERONAUTICS

Automatic Take-Offs

High-precision gyroscopes may make completely automatic flight, including take-off and landing, a reality within a short time.

➤ HIGH PRECISION gyroscopes can hold a plane on its preset course more accurately than a human pilot, and it is possible that within a short time completely automatic flight, including take-off and landing will be a reality. Flights have already been made with a gyroscopic device that permits automatic control of turns, banks and other aerial maneuvers, reports the General Electric Company.

All this means that one day you may be able to sit down in the cockpit, throw a few switches and set a dial or two, turn over the engines then lean back and let the plane fly itself. The gyroscopes that may make this kind of flying a practical reality are the same as those that are being used on ships and in certain types of aircraft instruments today and in war they direct torpedoes to their targets. Essentially, they all consist of a wheel, or a body, mounted on a shaft and arranged to be spun around at great speed. The first instrument built around a gryoscope was constructed in 1744, the report states.

One of the most recent uses for gyroscopes is in computers for aerial guns on the Boeing B-29 Superfortress and other aircraft. Here they help calculate the factors between the gun and the target, determining how far ahead of the enemy plane the gunner must shoot to have the bullet hit the fast moving target in space.

Regardless of gravity, magnetism or the earth's rotation, the gyroscope maintains a fixed direction of the spin axis. It resists any attempt to change its direction while spinning. When a plane or ship deviates from its course, the gyroscope, mounted horizontally, still points in a pre-set direction, permitting the automatic calculation of how far the craft is off its course. This is the principle of the airplane's directional gyro. Another gyroscopic device tells the pilot whether he is nosing up or down, even when he may be traveling through thick clouds and unable to see the horizon.

Indicating information such as this makes the gyro adaptable to robot devices for completely automatic flying. In such an installation there would have to be several gyros, each designed to do a special job. For example, when a plane gets off its course or is not in straight, level flight, the gyro would sense this and send an electrical message to an amplifier, where the message is converted into greater electrical energy and sent on to a power unit, such as a servo motor, that will move the controls and bring the plane back to its proper flying position and correct course. All this can be accomplished without any attention from a human pilot.

While some types of gyroscopes are spun by air, most of those in use today are electrically driven. Electrically-driven gyros are not limited by extreme altitudes and temperatures, and will operate satisfactorily from plus 160 degrees Fahrenheit (which might be encounterel on a desert) to minus 90 degrees Fahrenheit (a temperature sometimes experienced at high altitudes). These gyros can operate at all altitudes up to 40,000 feet and can run for 1,000 hours without servicing.

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Some *plants* flower only when the daily period of illumination is relatively short—that is, when the days are short and the nights long; when the light periods are long the plants remain vegetative.

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