

## BACTERIOLOGY

# Cancer Chemicals in Smog

► A TECHNIQUE for detecting cancer-producing chemicals will be applied to "smog" compounds that pollute air.

Carcinogenic (cancer-producing) properties of almost infinitesimal quantities of chemical compounds can be determined in a matter of only two days.

The technique was reported at the American Society for Microbiology meeting in Chicago by Dr. William D. Won, assistant research bacteriologist, University of California, Berkeley, who with Dr. Jerome F. Thomas, associate professor of sanitary engineering, found evidence of structural and biochemical changes in bacteria grown in the presence of known carcinogens. No change was seen when the experiments were repeated with non-carcinogens.

The bacterial technique will be applied to the study of atmospheric pollutants. More than 100 organic compounds have been separated in pure form from smog, but less than 20% of these have been classified as to their carcinogenic properties. This is because only millionths of a gram of these compounds are now available.

Present methods of checking for carcinogenic activity by feeding or application to the skin of laboratory animals require at least 20 thousandths of a gram per animal and a minimum of six months before results are obtained. The bacterial method requires only millionths of a gram.

The scientists chose four hydrocarbon compounds present in polluted air to test the new technique. Two of them were known carcinogens, while the other two were known to be non-carcinogenic.

Bacteria grown in the presence of the carcinogens showed the development of giant cells, granular cells, and an increase in fatty acid content. Bacteria grown with the non-carcinogens showed no change in these characteristics.

Other changes apparently resulting from the carcinogens included significant increases in enzyme activity and lactic acid production by the cells. Small increases in these two factors were also noted in those cells exposed to non-carcinogens.

All of the changes found in the bacteria exposed to the carcinogens are characteristic of malignant cells in higher animals.

The bacterium used in the experiments is known as "*Bacillus megatherium*." Several different species were studied before this type was found to be most highly sensitive to the presence of carcinogens.

Bacterial technique can be used to rule out many unidentified compounds as harmless. Those that caused changes in the bacteria could then be obtained in greater amounts for chemical identification and tests with animals.

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## Penicillin Effect

► SCIENTISTS have found one reason why mysterious infections that seem to be

cured by antibiotics flare up again when treatment is stopped, the American Society for Microbiology was told in Chicago.

Herbert Ginoza and Dr. Otto E. Landman of the U. S. Army's Biological Laboratories, Fort Detrick, Frederick, Md., found, as have other investigators, that penicillin often converts rigid, rod-shaped bacteria into soft round bodies rather than killing them. If only a small amount of penicillin is used, the round bodies become bacteria again once the drug is removed, but if a sizable dose is given, the inheritance of all the bacteria is changed and they remain in the round-body stage permanently.

Going a step further, the Fort Detrick scientists offer an explanation for this phenomenon. Penicillin, they believe, damages the bacteria in two ways. First, it prevents them from making the cell wall that holds the soft living mass of the bacteria together. Secondly, penicillin also prevents the bacteria from dividing in the normal fashion.

Under the right conditions, however, the changed bacteria, called "L-forms," can grow well and resist penicillin and other drugs.

This may explain the flare-up of the bacteria, the scientists reported, after termination of treatment.

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## Staph in Gonorrhea

► IN CASES of "penicillin-resistant" gonorrhea, a particularly tough staphylococcus organism, rather than the gonococcus organism itself, is the biggest resistance factor, scientists attending the annual meeting of the American Society for Microbiology learned in Chicago.

Col. Arvey C. Sanders of the Walter Reed Army Institute of Research, Washington, D. C., reported that among U. S. troops on duty in Korea and Japan many with gonorrhea were found to carry large numbers of staphylococci along with the gonococcus. Studies showed, he said, that the gonococcus, when grown with the staph, could thrive in concentrations of penicillin that otherwise would have destroyed it.

The staph species involved is not the same one that has plagued hospitals for years. The one that worries hospital administrators is *Staphylococcus aureus*; the gonorrhea-associated species is *Staphylococcus epidermidis*, which, by itself, causes little or no trouble.

*S. epidermidis*, Col. Sanders reported, produces staphylococcal penicillinase, a substance that breaks down penicillin. This alone makes things easier for the gonococcus. But, in addition, the staph organism is stimulated by penicillin—the more penicillin there is the more the staph breaks it down, because the organism is producing more penicillinase.

The staph organism also produces other substances, as yet unidentified, that help the

gonococcus grow. In some way they "contribute to the continued nutrition" of the disease bacterium.

Working with Col. Sanders were Dr. Michael J. Pelczar of the University of Maryland, College Park, and Dr. Adam F. Hoefling of the 406th Medical General Laboratory in Tokyo, Japan.

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**SURVIVAL SUIT**—Rocket fuel handlers are protected from splash, spray or fumes of high energy rocket propellants with suit developed by the Fireweel Company, Buffalo, N. Y. Similar suits could be used in civil defense.

## HORTICULTURE

## New Kit Grows Plants Without Soil

► EVEN THE RANKEST amateur or a landless apartment dweller can grow plants without soil using a new inexpensive science kit.

The Soilless Gardening unit of THINGS of science just issued by SCIENCE SERVICE, provides seeds, plant food and directions for planting and growing carrots, sweet peppers, snapdragons and petunias. The 16 experiments described in the unit provide an introduction to the science of hydroponics. Following these directions, anyone can have a little "farm" anywhere and anytime regardless of the weather.

The plant food furnished in this kit provides the needed "trace" elements in addition to the usual potash, phosphate, nitrogen, calcium, magnesium and iron. It is in a convenient water-soluble form that makes the feeding of plants simple.

The soilless gardening unit (No. 244) is available for 75¢ each or three for \$1.50 by writing to THINGS of science, SCIENCE SERVICE, 1719 N St., N.W., Washington 6, D. C. Membership in THINGS of science is available at \$5.00 for 12 monthly units.

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