



MEDICINE

**Tumor Detection Aided By Radioactive Chemical**

► THE PRESENCE of bone tumors can be detected in many cases more quickly by use of radioactive fluorine than by X-ray, an American scientist told the ninth International Cancer Congress, Tokyo.

In one out of 10 cases, isotope scanning with fluorine 18 is an effective supplement to the use of X-rays in the early diagnosis of such tumors, which means that in one out of 10 cases, treatment can begin sooner than when X-ray alone is used.

Dr. Monte Blau of Roswell Park Memorial Institute, New York State's cancer research and treatment center in Buffalo, who developed the radioactive isotope for this use, said the recently developed fluorine 18 can be obtained locally from a small university nuclear reactor. It disintegrates rapidly (its half-life is two hours) and is quickly cleared from the blood and soft tissue. Thus, adequate doses can be given to a patient safely.

Studies with more than 150 patients over the past several years showed that fluorine 18 given by mouth goes specifically to diseased portions of the bone. There it reacts chemically with bone crystals, which the disease process has exposed. It thus localizes only in diseased portions of bone, where it gives off radioactivity in the form of gamma rays.

The gamma rays coming from the abnormal portions of bone are detected by a photoscanner that is passed externally over the body. Any portion of bone that gives off gamma rays is considered diseased. X-rays, in contrast, work by showing changes in bone density, which are sometimes difficult to detect until the disease is advanced.

"Bone tumors visible with X-rays have almost invariably shown abnormal uptake of the isotope, thus confirming the reliability of the procedure," Dr. Blau said. "In more than 10 percent of the cases the isotope showed the presence of bone tumors several months before the X-rays did."

Two other radioactive forms of chemical elements, calcium 47 and strontium 85, are also used in bone tumor detection, but both have undesirable characteristics. Calcium 47 has energy levels too high for most hospital scanning equipment, and strontium 85's long half-life (65 days) creates a danger of over-exposures to radiation.

**Optical Pumping Work Wins Nobel Physics Prize**

► For work that has led to lasers, super-accurate atomic clocks and instruments used on many spacecraft to measure magnetic fields in space, the "Father of Optical Pumping" was awarded the 1966 Nobel Prize in Physics.

In the early 1950s, Prof. Alfred Kastler of the University of Paris developed optical pumping, the use of polarized light to redistribute atoms among various possible orientations. From this work came the laser.

But optical pumping used in lasers is only a "brute force" development of Prof. Kastler's work, according to Prof. Carroll Alley, physicist at the University of Maryland. A more "subtle" application is the magnetometer, which uses the spin rate of atoms to indicate the strength of the surrounding magnetic field. Optical pumping made such a device possible by first getting all the atoms oriented in the same direction, so that their collective spin rate could be measured.

While magnetometers measure the spin rate of atoms, atomic clocks, often accurate to within one second in 10,000 years, rely on the rigidly unvarying spin rate of electrons in the magnetic field produced by the atom's nucleus. Again, optical-pumping made them possible by controlling the direction of the electrons' spin.

Prof. Kastler was also noted for his research in spectroscopy.

**Prof. Mulliken Receives Nobel Prize in Chemistry**

► The Nobel Prize in Chemistry this year went to a scientist who paved the way for much of the understanding of why chemical compounds behave as they do.

Dr. Robert Sanderson Mulliken, Ernest DeWitt Burton Distinguished Service Professor Emeritus of Physics and Chemistry at the University of Chicago won the award which carries a \$60,000 prize for "his fundamental work concerning chemical bonds and the electronic structure of molecules by the molecular orbital methods."

Known as "Mr. Molecule" by his colleagues throughout the world, Prof. Mulliken has devoted more than half a century to the study of the molecule and its electrons. He developed the molecular orbital theory which destroyed the stereotyped concept that atoms form molecules as bricks do walls, with each brick retaining its own identity.

Prof. Mulliken showed that when a molecule is formed, the whole balance of particles within the molecule changes to form a new "whole" that is different from a collection of the separate parts. The electrons of the atoms because they are now within a molecule take on a new distribution in space, which he named molecular orbitals.

His theory brought the concept of chemical bonds between molecules into harmony with the general quantum theory and opened the way for more than three decades of physics and chemistry research.

# E FIELDS

POLLUTION

## Air Cleaning Tower Seen for Toronto

➤ **HUGE AIR** purification towers that would suck in polluted air and blow it out clean again were proposed by an engineer who said that Toronto's air is 12 to 15 times dirtier than that of Los Angeles.

A string of air-washing towers could be built with giant fans to push and pull air through water sprays which would carry away most of the pollution, said consulting engineer Ying Hope, in Toronto.

He recommended a survey to determine the areas of worst pollution. A dozen towers, each handling two million cubic feet of air per minute, could then be built atop high buildings at selected points for a total cost of between \$2 million and \$3 million, he said.

About 50 tons per month of dust and pollution settle over each downtown square mile of Toronto, he told a citizens' "clean air" committee.

But are his cleaning towers practical? "The airplane was a harebrained scheme when it was proposed," Mr. Hope observed.

SPACE

## 'Venus Flytrap' Rocket To Collect Space Dust

➤ **ABOUT** a year and a half after the end of the Civil War, the spectacular Leonid meteor shower hit a peak in its 100-year cycle. Another such peak will occur on Nov. 12, and the U.S. Air Force plans to take full advantage of the rare event by sending up a "Venus flytrap" rocket on that date to gather tiny meteoroids and bring them back to earth.

About 70 seconds after the Aerobee 150 rocket is launched from White Sands Missile Range in New Mexico, four extendable arms will spread outward from the nose, exposing the collecting surfaces. After about five and a half minutes the arms will fold back into the nosecone, hopefully containing hundreds of micrometeoroids held fast for earthbound scientists.

The composition of the meteoroids may provide clues to their origin. The scientists are also interested in just how many enter a given volume of the earth's atmosphere during the intense meteor shower.

The rocket will be aiming for a maximum altitude of 117 miles.

One-by-three-inch squares cut from the collecting surfaces been promised to scientists from six foreign countries. The sections will be sent to Switzerland, Germany, Israel, France, Australia and Japan.

Rocket-borne dust collectors are not new, but they are by no means perfected. The Air Force has been testing variations since 1963. One current idea is a nosecone equipped with a filter paper through which dust particles are pushed by air pressure as the rocket flies. Above 150,000 feet the air is too thin for such a mechanism to work, so a liquid nitrogen pump is automatically turned on to suck air through the filter with greater force.

At the desired altitude, the nosecone jettisons itself and a combination balloon-parachute opens to settle the payload gently to earth. So far this year, nine successful consecutive rocket launches and nosecone recoveries have been conducted at White Sands.

TECHNOLOGY

## Helicopter 'Hearing Aid' Spots Machine Gun Fire

➤ A "HEARING AID" that will enable helicopter and other light aircraft pilots to hear machine gun fire up to 500 yards away is being sent to Viet Nam at the end of this month.

Without such a device, low-flying craft are often at the mercy of weapons that cannot be heard in the cockpit. The hearing aid can be used either defensively, to avoid gunfire, or offensively, to locate and destroy it.

Two microphones in an egg-shaped pod mounted outside the aircraft send a binaural, or stereo, signal to the pilot's earphones, so that he can pinpoint the source of the gun's noise.

Developed at the Air Force's Cambridge Research Laboratories here, the device will be much more at home over the steamy jungles of Viet Nam than in a drier climate. The high humidity of Southeast Asia will act as filter for low-frequency noises such as aircraft engines, letting the high frequency sounds of gunfire stand out more clearly.

Two of the assemblies are being sent to Viet Nam, but the unit getting them is classified, to prevent the enemy from developing countermeasures. After a few weeks of evaluation in combat, the devices will be left in Viet Nam as long as the pilots want them.

Unfortunately, said an Air Force official, the device cannot be used on the C-47 "Goony Bird," the military version of the DC-3. Because of its loud engines, and because it does most of its fighting from above 1,000 feet, the C-47 would need to mount the hearing aid on the end of a long boom for it to be effective.

MEDICINE

## Test Reassures Women Exposed to Rubella

➤ **WHILE** waiting for the new rubella vaccine to be perfected and licensed, women in their first three months of pregnancy will soon have an opportunity to find out if their babies are being endangered by this disease.

The test for detecting immunity to German measles is so simple that a doctor can find out in three hours whether the expectant mother has antibody protection.

She may have been exposed to rubella and want to know if the baby is likely to be deformed. Or she may have forgotten whether or not she had the disease as a child. If her child is exposed to the rubella virus, transmitted during early pregnancy, the infant may be born with such defects as blindness, deafness, congenital heart disease and brain involvement resulting in mental retardation.

Since the new immunity test is so inexpensive and easy to perform it is expected to become routinely available in hospitals, health departments, and other laboratories within the near future.

The test, called hemagglutination-inhibition (H-I), employs the principle of red blood cell clumping, used successfully in studies on influenza and other diseases. Dr. Harry M. Meyer Jr. of the National Institutes of Health Division of Biologics Standards, who with Dr. Paul D. Parkman of the same division has reported development of a live weakened experimental rubella vaccine, said the inhibition of agglutination demonstrates the presence of antibody and immunity.

The H-I test was developed in his laboratory.

None of the previous techniques equal this test. It is capable of detecting immunity years after infection, and it combines reliability with speed.

GENERAL SCIENCE

## India Offers Site For Rice Research Center

➤ **INDIA** has offered to provide a site for an international rice research center, proposed to be set up under the auspices of the Food and Agricultural Organization (FAO).

The proposal was made in a note to the 10th session of the FAO International Rice Commission recently.

The Government of India is proposing to establish a national center for research, training and coordinating of all the engineering aspects of rice at the Calcutta Institute of Technology.

The Indian delegate at the FAO meeting said that it would be an appropriate site for the proposed International Rice Research Center.