

## METEOROLOGY

**Tornadoes Occur When Invisible Wave Breaks**

► **TORNADOES USUALLY** occur when an invisible, but real wave in the atmosphere breaks, somewhat like a single wave of water toppling over as it hits the shore.

The breaking atmospheric wave, known as a pressure jump, is believed to be the trigger that sets off tornadoes and other severe storms. It does so, however, only if there is moisture in the air. If the air is dry, the pressure jump can occur, but no severe storms will follow, Dr. Morris Tepper, Weather Bureau meteorologist in charge of research in this field, states.

Hopes of more accurate tornado and severe storm warning service lie in pressure studies now being made by the Bureau in the Midwest, where tornadoes often hit this time of year. The research is aimed at learning more about the cause of tornadoes, how to predict their beginning and their paths.

The Weather Bureau is now publishing the results of the first pressure jump survey, made in 1951.

Science News Letter, May 1, 1954

## MEDICINE

**Quick, Economical Detection of Cancer**

► **FURTHER EVIDENCE** of the validity of the Penn-Serrofloculation test, a simple blood test to permit quick, economical detection of cancer, has been announced by doctors at the University of California at Los Angeles and the Los Angeles Veterans Administration Center.

The test is named after Dr. Harry Penn, associate clinical professor of radiology at U.C.L.A., who originated it.

Tried on more than 10,000 individuals during six years of research, the test can detect cancer in a majority of cases, help to distinguish between benign and malignant tumors, and indicate the response of cancer to treatment.

A solution of an inexpensive crystalline chemical is added to a blood sample. If the mixture remains murky, the test is considered negative. If small particles form and the solution clears, a positive test is indicated.

Ninety percent of the cancerous individuals tested have shown a positive result. The 10% missed included those in which cancer had not entered vital tissue, but was still in a microscopic stage. A negative result is considered to be a 10,000-to-1 assurance that the subject has no cancer.

Certain conditions such as arthritis and pregnancy give false positives. Further processing of blood samples will tell, in most cases, whether the positive test is the result of cancer or other diseases.

The accuracy of the Penn-Serrofloculation test is considerably higher than X-rays or any other clinical diagnostic approach.

Science News Letter, May 1, 1954



**POWER CHECK-UP**—Inventors of the Bell solar battery, G. L. Pearson, D. M. Chapin and C. S. Fuller, are shown checking sample devices for the amount of electricity derived from sunlight, here simulated by a lamp. The solar battery uses strips of silicon to convert the sun's energy directly and efficiently into electricity.

## PHYSICS

**Sun-Powered Battery**

Razor-sized silicon wafer that converts light directly into electricity was unveiled at the National Academy of Sciences meeting. Its efficiency is six percent.

**See Front Cover**

► **THE SOLAR** battery shown to the National Academy of Sciences meeting in Washington is a quite efficient, simple and direct converter of light into electricity. But it offers no threat to conventional or atomic power plants.

This little device is made of the common chemical element, silicon, in unusual metallic form. It is a cousin of the still novel junction transistor made of related germanium metal.

Just as transistors, replacing electron tubes, are miniaturizing hearing aids, radio sets and other electronic devices, the new silicon solar battery gives promise of first going to work electronically in the nation's telephone system.

The batteries will power mobile equipment such as small radio transmitters. Sun-powered battery chargers will be used at

amplifier stations along rural telephone systems of newer design.

Scientists are elated that the new semiconductor device has six percent efficiency in converting sunlight directly into electricity. Other photoelectric devices, such as selenium cells, do not rate more than one percent. The six percent figure compares favorably with steam and gasoline engine efficiency.

Advantages of the solar battery include: No cost of fuel, because it uses sunshine which is free. Nothing consumed or destroyed in the energy conversion process. No moving parts. No wearing out or obsolescence. The solar battery theoretically should last indefinitely.

The Bell Telephone Laboratories scientists who are credited with the development are G. L. Pearson, C. S. Fuller and D. M. Chapin. This team is part of a group, led by William Shockley, that has worked on

the physics of semiconductors since World War II.

Impurities are responsible for the success of the silicon solar battery. Very pure metallic silicon is grown into single crystals. Then, one ten-thousandth of an inch under the surface of the wafer of silicon, impurities are diffused. This produces positive and negative layers of controlled thickness, and these p-n junctions are the heart of the solar battery.

How soon the silicon solar battery can take on greater jobs is problematical. But the wafer-thin strips of silicon, about razor blade size, are extremely sensitive to light. They can be linked together electrically and then deliver power from the sun at 50 watts per square yard of surface.

One of these solar batteries is pictured on the cover of this week's SCIENCE NEWS LETTER. The razor-sized silicon wafer is also shown.

Daily the sun supplies over a thousand trillion kilowatt hours of energy, comparable with all the reserves of coal, oil, natural gas and uranium found on earth. The solar battery taps this stupendous energy from the sun.

Scientists have long sought a practical method of directly converting the almost limitless energy of the sun to electricity. Until now, only the thermocouple and the photoelectric cell have been available, and they are limited to handling minute power quantities.

The thermocouple use small temperature differences in two dissimilar metals to produce a tiny electric current.

Science News Letter, May 1, 1954

## DENTISTRY

## Heredity Affects Caries

**Tooth decay is influenced by heredity, a 17-year study with rats has shown. Findings cannot be applied to man, however, without research on humans.**

➤ TOOTH DECAY is influenced by heredity, a Michigan State College research team reports from a 17-year study of rats.

"Although we have proven the hereditary influence of tooth decay in rats," explained Dr. Harrison R. Hunt, professor emeritus of the department of zoology, "we cannot apply our findings to man without research on man himself."

Dr. Hunt and Dr. Carl A. Hoppert, professor of chemistry, were joined last September in their long-range study by Dr. Samuel Rosen, research assistant in the department of zoology.

Twenty-five generations of rats have been studied by Profs. Hunt and Hoppert since their project began in 1937, and more than 600 of the animals are being studied for further clues of tooth decay. Dr. Hunt foresees another 20 years of observations.

It all began in 1937, Dr. Hunt explained, when Dr. Morris Steggerda, anthropologist for the Carnegie Institution in Washington, suggested that the inheritance factor in tooth decay be studied. Dr. Steggerda's suggestion resulted from his study of primitive peoples who have less tooth decay than "civilized" man.

The two professors placed 119 rats on a "Hoppert diet," which is nutritious but produces tooth decay in rats. The animals were carefully observed, and separated according to the speed with which they developed cavities.

Careful breeding followed, until decay-resistant and decay-susceptible strains were developed. During this process, a detailed history of every rat was recorded. Approximately 10,000 such histories have accumulated thus far, Dr. Hunt said.

Today, after the years of careful breeding and selectivity, the susceptible strain takes 30 to 60 days to develop tooth decay, while the resistant strain does not develop tooth decay for at least 550 days. The normal life of a rat is 700 days. Factors of sex and age made little difference in the tests, the researchers found.

"There is no doubt of inheritance as a significant factor," Dr. Hunt concludes.

Dr. Rosen, the newest member of the team, is interested in the part bacteria play in tooth decay. His investigations in this direction are to be emphasized next year. Sponsor of the research is the Public Health Service, Department of Health, Education and Welfare.

Science News Letter, May 1, 1954



**SOLAR POWER SOURCE**—The sun's rays falling on the solar battery are the only source of power needed to operate a small mobile radio transmitter. Here D. E. Thomas talks to M. B. Prince across the lawn at Bell Telephone Laboratories.

## MEDICINE

## New Anti-TB Drugs May Help in Resistant Cases

➤ A NEW class of chemical remedies against tuberculosis, some of which may be useful when TB germs grow resistant to the currently used isoniazid, has been developed.

Dr. A. E. Wilder Smith of the Ed. Geistlich Sons, Ltd., Chemical Works at Wolhusen, Switzerland, announces the development in *Science* (April 16).

Trials of some of the chemicals in human patients are now under way.

The chemicals are called oxidiazolones. They are made from isoniazid by treating the latter with phosgene, better known as a war-time poison gas.

Although slightly less active against TB germs than isoniazid in the test tube, one of the oxidiazolones was somewhat more active against TB germs in guinea pigs. In mice, it is about one-tenth as toxic and in rabbits, one-third as toxic as isoniazid.

"Chronic dosing" of guinea pigs with this oxidiazolone in four times the remedial dose for two months resulted in favorable weight gains by the animals and no signs of damage to any organs.

Science News Letter, May 1, 1954