

BIOLOGY

Cause Cell Mutations

Radio frequencies in the short wave range have been found to cause chromosomal changes in plant cells, thus giving scientists a new tool for studying mutations.

➤ A NEW, POWERFUL and controlled way to cause chromosomes to mutate, or change, has been discovered. When garlic root-tips growing in water were placed between two insulated electrodes, changes took place in the plant cells.

These changes were similar to those that can be produced by cosmic rays, by X-rays, or other ionizing radiation, such as are emitted by radioisotopes.

Under the action of an electric field set up between the electrodes, the garlic root cells showed a shortening of their chromosomes, irregular cell divisions, and irregularities in the chromosomal envelope, among other changes.

The work is described by Drs. John H. Heller and A. A. Teixeira-Pinto of the New England Institute for Medical Research, Ridgefield, Conn., in *Nature* (March 28).

Electrodes were attached to an electric generator that produced radio frequencies in the megacycle (short wave) range. To minimize heating the specimen, 80 to 180 pulses per second of this radio energy were

"shot" to the electrodes in bursts of one twenty-thousandth of a second for five minutes. The garlic root tips were observed 24 hours later and the cell changes were noted.

Experiments with living protozoa showed these microorganisms could move in a direction only along the lines of force while the electric field was on. As soon as it was switched off, they resumed a random movement.

Heating of the cells was low enough not to hurt the viability of either these organisms or mammalian cells, the scientists reported.

"In a larger immobilized micro-organism we were able to observe intracellular orientation of subcellular particles," they said. "This led us to believe that this force might be used as a powerful and controlled mutagenic agent."

The method may be used to induce cellular changes to a degree depending upon frequency, pulse, power, exposure time, and the way the cell lines up its axis with respect to the electric field.

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TWISTING TOWER—A surveyor's transit aimed at a mirror on top of the 260-foot microwave tower helped determine that the structure twisted only one-half of one degree under loads equal to 85 miles per hour winds. Wires at the right connect strain gauges placed at critical points on the tower with instruments in a laboratory on the ground.

GEOLOGY

Study Earth's Interior

New computations of the temperatures found within the earth, including its solid core and its mantle, indicate the earth's interior is much cooler than had been estimated.

➤ THE EARTH'S interior is much cooler than most scientists have estimated.

New temperatures for the earth's solid core and its molten blanket were presented to the American Physical Society meeting in Cambridge, Mass., by Dr. Herbert M. Strong of General Electric Research Laboratory, Schenectady, N. Y. They are based on the melting point of iron under very high temperature and pressure. Iron is thought to make up both the earth's center and its liquid surrounding.

At the earth's center, some 4,000 miles straight down from Cambridge, the temperature is estimated by Dr. Strong to be 6,300 degrees Fahrenheit. At the boundary where molten iron meets solid iron 900 miles back towards Cambridge, the temperature is approximately 4,700 degrees. Previous theoretical calculations for this liquid-solid boundary ranged from 5,400 to 7,200 degrees Fahrenheit, Dr. Strong said.

The physicist has also calculated the temperature at the boundary where molten iron meets the earth's mantle some 1,800 miles from the earth's surface. He found it to be about 4,260 degrees Fahrenheit.

The farthest man has been able to penetrate the earth's crust, Dr. Strong said, has been about a mile in search of diamonds. Ironically, Dr. Strong bored into the earth's surface on paper using measurements from an instrument that has produced man-made diamonds, GE's super-pressure cooker.

Iron has a higher melting point under greater pressure, which is why, theoretically, the earth's center can be solid iron surrounded by liquid iron. Up to now, most calculations of the earth's inner temperatures have been based on what has been known about the melting point of iron at one atmosphere of pressure, pressure at sea level, which is about 2,786 degrees Fahrenheit. Using the diamond-making instrument capable of pressures up to 150,000 atmospheres, Dr. Strong found that iron's melting point rises to about 3,132 degrees Fahrenheit.

He then extrapolated from these new data and calculated what temperatures of iron would be in the earth's center where the pressure is 4,000,000 atmospheres as well as at the boundary layer where the pressures range from 1,350,000 to 3,000,000 atmospheres.

Science News Letter, April 11, 1959

ASTRONOMY

Nitrogen Tetroxide Found In Jupiter's Atmosphere

➤ NITROGEN tetroxide has been discovered in the atmosphere of Jupiter, three scientists reported to the American Astronomical Society meeting in Rochester, N. Y.

The compound, made up of two atoms of nitrogen and four atoms of oxygen, was found by scanning the rainbow-like spectrum of sunlight reflected by Jupiter's atmosphere. Dr. C. C. Kiess and Mrs. Harriet K. Kiess, with Dr. C. H. Corliss, made the spectographic studies of Jupiter's light at the Slope Observatory of the U. S. Weather Bureau on Mauna Loa, Hawaii. The scientists are affiliated with the National Bureau of Standards and the National Geographic Society.

Besides the nitrogen tetroxide, they also studied the ammonia and methane found in Jupiter's atmosphere.

The structures of the following bands in the red and near infrared were measured: for the 6450 and 7900 bands, attributed to the ammonium molecule, 50 and 135 lines, respectively; for the bands at 6200, 7200, 8400, and 8600, attributed to the methane, 25, 25, 40, and 25 lines respectively. Many of the lines in these bands are not identifiable with published rotational lines of the bands of these molecules, the scientists said.

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