

this points the way to solution of the fundamental problem of how life is handed on.

The B vitamins in a grain of wheat were found to be concentrated in a single one of the outer layers.

A single electron such as hits a television picture screen has enough energy to keep a single bacterium moving for about three minutes, it was calculated.

Four generations of fatherless female desert locusts were produced in the laboratory.

A plant absorbs its nutrients from the soil at a point just above the tip of the root, where root hairs are present, a fact revealed when plants were fed radioactive nutrients and then radiograms made of the plants.

Natural plant hybridization produced plants, found in north central Tennessee, that do not resemble either parent after many generations.

Disease-causing fungi were found to have chitin as the material for the skeleton of their cell walls.

Bull frogs were found to show great resistance to sarin, a nerve gas, surviving more than a thousand times the dose that would kill a man.

An international expedition marked whales so that more could be learned about the rate of interchange between whale populations of different regions, the age and rate of growth of whales, and the ratio of number killed to total population.

Two new cattle diseases, an influenza-like ailment and sporadic bovine encephalomyelitis, were reported to present threats to human health.

Carbon of living origin found in Canadian slates of early pre-Cambrian time, or 2,500,000,000 years ago, pushed back the estimated time of life's beginning.

A new plant genus with a green and purple flower, belonging to the family *Umbelliferae*, was discovered in northeastern Mexico.

Rabies vaccine for cattle was made available. New insecticides were developed that can be safely fed to cattle to destroy their parasitic grubs.

Chemical extenders added to present insecticides were found to prolong their effectiveness to an entire season.

DDT-resistant flies developed through survival of the fittest; it was found that the resistant insects are capable of developing an enzyme chemical that serves them as an antidote to the poison.

Infestations of the Khapra beetle, a stored-grain destroyer native to India, Ceylon and Malaya, were reported in 11 counties in California, Arizona and New Mexico; apparently it invaded the United States in 1946, but remained undetected for seven years.

An insect pest, attacking cotton in Texas and known locally as the brown cotton leafworm, was identified as *Acontia dacia* Druce.

America's citrus industry was declared seriously threatened by a nematode called "spreading decline."

The Mexican fruit fly made a new invasion into California.

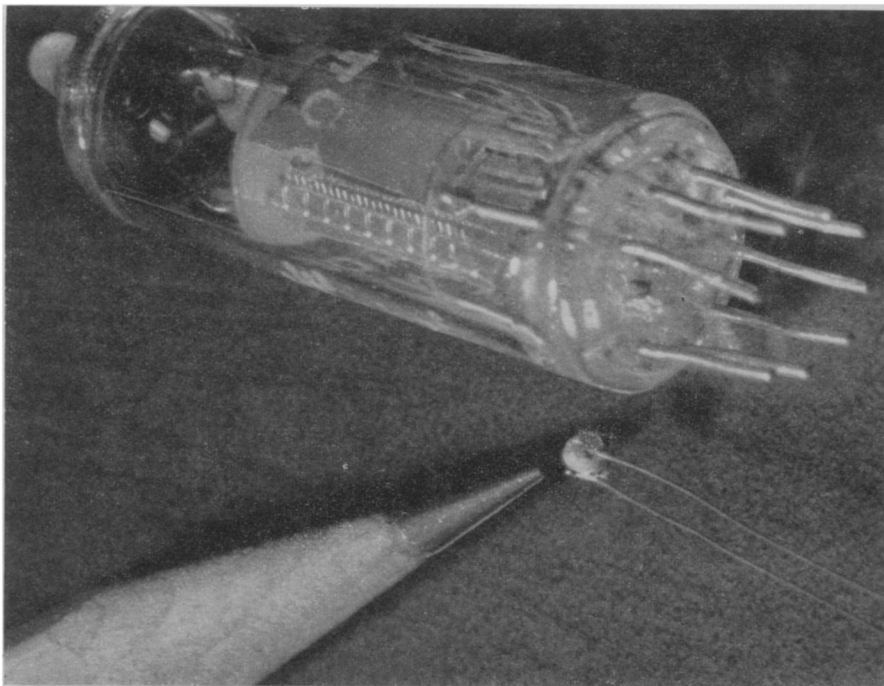
Atomic radiation was found to cause cancer growth in tobacco.

A new virus disease threat to the brain and nervous system of dogs was discovered in Australia.

Research attacks on a sheep disease, blue tongue, included development of a vaccine for immunization and the discovery that mosquitoes spread the virus.

The pink bollworm, pest of cotton, continued to spread throughout the South and was attacked by biological warfare in the form of a virus disease of the insect.

Compressed air was forced to the bottom of



**MIDGET RECTIFIER**—The tiny object under the pencil point is a germanium-germanium junction rectifier made by a disc of indium fused to a rectangular bit of germanium. It has no filament to burn out and no glass tube to break, as does the vacuum tube shown for comparison. It can be used to operate hearing aids and other subminiature devices.

ice-bound lakes, bringing the warmer water at the bottom up to melt the ice and prevent winter-kill of fish.

Three rare birds threatened with extinction were reported increasing in numbers—the whooping cranes, the trumpeter swans and the Hawaiian nene.

#### CHEMISTRY-PHYSICS

### Convert Atomic Energy Directly Into Electricity

Atomic energy was converted directly into electricity by using high-speed electrons emitted by strontium 90 to bombard tiny transistors which, in turn, emit large numbers of slow-moving electrons to give a very small electric current.

An atomic battery was developed that uses thermocouples to convert the heat of its radioactive polonium core into a small voltage electric current.

A semiconductor device made of silicon was successfully used to convert sunlight directly into electricity; another solar battery was produced, using a crystal of cadmium sulfide.

Element 99 was produced by bombarding uranium 238 with stripped nitrogen atoms, and identified.

Different isotopes of element 100 were independently produced in the United States and in Sweden.

Element 43, technetium, was found to become superconductive at the relatively high temperature for this phenomenon of 11.2 on the absolute scale.

Cesium 137 was extracted from plutonium waste products and made into a 1,540 Curie source for gamma ray beam therapy.

New evidence for the atomic ghost particle, the neutrino, which has been postulated for years, was found.

Synthesis was achieved for strychnine and lignin, and a new method for synthesis of morphine used a simpler chemical as the starting point.

Steroids related to those obtained from the adrenal cortex have been synthesized with halogenated substituents and show even greater promise for clinical use than the well-known cortisone and hydrocortisone.

Discovery of part of the molecular structure of ACTH brought nearer the synthesis of this pituitary hormone.

The bevatron, 6,000,000,000 - electron - volt atom smasher, started operation at Berkeley, Calif.

A small atom smasher using the strong focusing principle was under construction at Ithaca, N. Y.

Plans were made by the Atomic Energy Commission for the building of five types of large-scale reactors, and construction was begun on three of them; the types are: the pressurized-water reactor, the sodium-graphite reactor, the boiling-water reactor, the homogeneous reactor and the experimental breeder reactor.

The boiling-water atomic reactor proved to be self-regulating, so that it will not "run away," causing a disaster, experiment showed.

A transistor was successfully made from silicon, promising a cheaper replacement for the costly germanium transistor.

A new family of silicone compounds was produced when carbon was made to join silicon without oxygen as an intermediary.

An axicon, a universal-focus lens, was produced; in the form of a glass cone it is suitable for use in a telescope to bring objects distant from each other into focus simultaneously.

Discoveries were announced of a fourth and fifth type of abnormal adult human hemoglobin that differ from the normal variety in ways similar to those that differentiate the hemoglobins of patients with sickle cell anemia;