GENERAL SCIENCE

Unsecret "Secrets"

Previously secret research results reported at Geneva confirm long-held belief that scientists of other nations have done same research. Russia, U.S. vie in "Atoms-for-Peace."

By WATSON AND HELEN DAVIS

➤ IN A half dozen fields, scientists of various nations meeting at the International Conference on the Peaceful Uses of Atomic Energy in Geneva confirmed what most of them suspected—their hard-won secrets, jealously guarded, have been discovered by other nations through the brains and scientific sweat of their scientists.

Specifically, these secrets include:

The ability of the fissionable, or atomic-power producing, elements to capture neutrons. The neutron's cross section, as determined in the United States, Britain, Russia, France and Norway, agrees so closely that differences cannot be detected on a diagram. This fundamental information about plutonium, uranium 235 and 233, was previously closely guarded. Necessary for making bombs and reactors alike, the world has been given this information which each national group was hiding.

The separation of the metals zirconium and hafnium was reported by six processes in about as many nations, all unannounced heretofore. Although the United States is the only country with sizable commercial zirconium production, other localities will be able to produce this metal which is useful in coating the fuel in atomic reactors.

When Russian medical experts compared their radiation safety practices with those of the Western block, the same figures for safe exposure of workers in atomic industry plants appeared, about 50 milliroentgens per day being considered safe. The Russians like to set their controls daily, while the U. S. and United Kingdom prefer to use 300 milliroentgens a week as the figure after which the worker is given an enforced vacation for his own protection. There is no agreement on what lifetime dose is dangerous.

There was agreement there is danger of influencing unborn generations through genetic changes produced by very low levels of radiation, but the extent of such danger is not agreed upon by experts of different nations or even of the same nation.

Atoms-for-Peace Race

➤ THE RACE between the United States and Soviet Russia to provide research reactors to nations within their spheres of influence was pointed up in reports to the conference.

Dr. A. N. Lavrishchev announced Russia's assistance in furnishing peacetime atomic reactors and equipment for physics research to the People's Republics of China, Poland, Czechoslovakia, East Germany, Rumania, Bulgaria and Hungary.

The Soviet Union said it would provide each country, at cost, 2,000-kilowatt nuclear reactors "for the production of isotopes," and cyclotrons capable of speeding up atomic particles to energies of 25,000,000 electron volts.

Russia will also furnish the natural uranium, thorium, uranium 235, uranium 233, plutonium, tritium and heavy water needed to operate the equipment.

The People's Republic of China is an exception. For China, the Russians are designing a 6,500-kilowatt reactor whose capacity "can be increased up to 10,000 kilowatts."

Delegations from countries receiving assistance from the Soviet Union visited Russia from March to June of this year to learn about operation of reactors and cyclotrons.

Dr. Willard F. Libby, U. S. Atomic Energy Commission member, reviewed at the conference previously announced agreements made by the United States with more than 25 nations providing for exchange of information on atomic energy uses.

These agreements also called for the U. S. to furnish some of these countries, at half cost, research reactors, such as the swimming-pool type that proved to be a major attraction at the Geneva conference. The U. S. will also provide fuel to operate the reactors.

The U. S., Dr. Libby said, is prepared to conclude similar agreements with many more countries, although he did not mention any nations specifically.

Both the U. S. and Russian atomic agreements include training scientists from cooperating countries in reactor and cyclotron techniques.

Saving Old Landmarks

➤ ATOMIC RADIATION may save the aged timbers of Westminster Abbey, St. Paul's Cathedral, hundreds of ancient churches and other wooden relics of the past from destruction by gnawing, devouring insects.

Sir John Cockcroft told the conference

MODEL ATOM SMASHER—This one-ton model accelerator is being built at the University of Michigan to test a new principle for a 25-billion-electron-volt giant the Midwestern Universities Research Association hopes to construct in the Midwest. The design is expected to result in a simplified machine 100 times more efficient than existing atom smashers (see SNL, Feb. 5, p. 92). Pictured with the model are, from left to right, Drs. Kent M. Terwilliger and Lawrence W. Jones of the University of Michigan, and Dr. Donald W. Kerst, University of Illinois.

that experiments by the British Forest Products Laboratory indicate low doses of radiation make infertile the eggs of the deathwatch beetle, which has been literally eating away the timbers of age-old landmarks in England.

Previously there has been no effective treatment to rid ancient structures of this pest, although thousands of pounds and years of research have been spent in the effort. Now British scientists feel that exposing infested timbers to radiation doses may rid them of the deathwatch beetle's destruction.

Probably one of the first old relics they will try to save will be Nelson's flagship, the Victory, which is riddled with the pest. In one short test period, more than 7,000 beetles were picked off the lower deck of the wooden ship.

Westminster Abbey, Westminster Hall and St. Paul's Cathedral are other famous structures that need aid from the deathwatch beetle in a hurry. The eerie, tapping sound of the beetle from its cavities cut through ancient oak is a familiar one in countless old churches throughout the island.

The deathwatch beetle is a serious pest in most of Europe, as well as in England. It is found to some extent in this country, in New England. Most of the damage is done by the larva of the beetle.

If the British are successful in a campaign against the deathwatch beetle using atomic radiation, the technique may become widespread in other phases of insect control.

Perpetual Batteries

➤ SOME KINDS of electrical batteries of the future will be powered by by-product atomic radiation converted directly into electricity, Dr. E. G. Linder of the Radio Corporation of America, Princeton, N. J., told the conference.

Some atomic batteries giving small but constant amounts of power are ready for practical use. Future developments will determine whether there can be commercial developments at high power levels.

About a dozen research organizations are working on this problem, Dr. Linder reported.

Radioisotopes from the debris of U. S. atomic power reactors a decade hence might furnish the radiation that could be converted into electrical energy equivalent to 2,000,000 watts from the annual production of batteries. This possible substitution of atomic batteries for present conventional chemical ones is foreseen by Dr. Linder.

Radioactive wastes from reactors most desirable for atomic batteries include radioactive strontium 90 and yttrium 90, and tritium, or triple-weight hydrogen, probably an H-bomb element. These are cheap enough for such battery use. They also have a long enough life.

As other radioactive substances do, they require shielding to prevent radiation danger to people and damage to materials. When nickel 63 becomes cheaper than at present, it will become a favorite for use in atomic batteries, because of its long life and the tameness of its radiation.

Four main methods of converting radiation into electricity are being tried:

1. Simple collection of charged radiation by an electrode to create a voltage.
2. Using contact potential fields to separate charges and produce currents.
3. Generation of heat by radiation upon thermocouples that produced current.
4. Radiating semiconductor junctions to produce and separate out currents.

Science News Letter, September 3, 1955

TECHNOLOGY

Pave Dirt Roads With Peanut Husks

➤ INDIAN SCIENTISTS have found a way to pave dirt roads with peanut husks.

A dark liquid from peanut shells is the key material in the process that can turn rutted, muddy roads to hard, sturdy surfaces. The soil is first treated with the dark liquid and dried. Adding calcium chloride then causes formation of a gelatinous mass in the soil that holds the tiny earth particles together.

Earths with high sand content harden best in the process, L. R. Chadda and S. R. Mehra of the Laboratory at Karnal, India, report in *Highway Research Abstracts* (June).

The treatment increases the soil's resistance to friction and lowers its tendency to form mud when wet.

Chemically hardening dirt roads is a widespread practice in the United States to improve secondary arteries of travel. Furfural, a chemical from oat hulls, is one of today's most important stabilizing agents.

The Indian scientists said their process may not prove economical for large-scale road paving because of the cost of obtaining the husk liquid.

Science News Letter, September 3, 1955

MEDICINE

Doctors Should Look Warts in the Eye

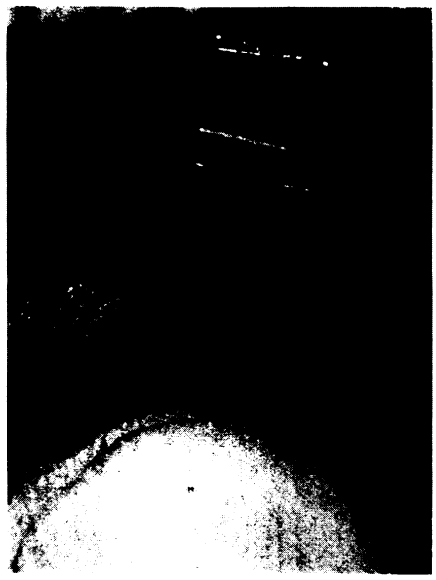
➤ IN TREATING WARTS, "look them straight in the eye, telling them they must go." This advice to doctors from a physician and skin specialist, Dr. David I. Williams, King's College Hospital, London, is given in the *British Medical Journal* (Aug. 20).

"Remember always that you must be firm and confident with warts," Dr. Williams states.

"Without such certainty of success, any treatment must fail. Even with it, failure may sometimes occur," he says, "but this fact must be kept from the wart and from the patient."

For the medical part of the treatment he uses mostly a three percent formaldehyde lotion or a lotion containing mercury biniodide and salicylic acid.

Science News Letter, September 3, 1955



HIGH - FREQUENCY TRANSISTOR — Bridged between the two center "posts" is an experimental transistor, the junction tetrode, developed by Bell Telephone Laboratories that has produced more than a billion oscillations per second.

TECHNOLOGY

Transistor Sets Record For High Frequencies

➤ NEARLY ALL the vacuum tubes in a television set can now be replaced with tiny transistors, modern offspring of the crystals in the old "cat whisker" radio sets.

The transistor took this leap into vacuum tube territory with the announcement in New York by Bell Telephone Laboratories that its latest experimental transistor has set a new high frequency record. It flipped current from positive to negative more than a billion times a second. This transistor can handle frequencies well into the UHF, or ultra-high frequency, television range.

Such high frequency would also permit transistors to take over the job of tubes in installations that pack hundreds of telephone conversations into a single set of wires. The billion-cycle transistor is called a junction tetrode transistor.

Earlier junction transistors, limited to lower frequency ranges, are composed of sandwiched layers of p-type, or positive, and n-type, or negative, germanium.

Frequency was raised in the new experimental unit by reducing the width of the germanium bar and the central p-layer, and by adding a fourth electrode. The central layer is less than five-thousandths of an inch wide.

Advantages of the transistor over the vacuum tube are that it is more rugged, does not get as hot, takes up less space and is far less wasteful of power.

Production of the new transistors is scheduled to begin this year.

Science News Letter, September 3, 1955