BIOLOGY

# "Identical" Cells Differ

➤ CLEAR-CUT evidence supporting the theory that apparently identical cells growing side by side in your body may actually contain important hereditary differences has been provided by human tissue culture experiments in progress at Purdue University, Lafayette, Ind.

Such subtle differences between cells might play a significant role in cancer and other diseases.

Working with tissue cultures of normal human bone marrow cells from a single source, Prof. Merwin Moskowitz, graduate student Don Metzgar and research associate Dorothy Schenk have discovered radically divergent potentialities for growth between cells that look even more alike that the proverbial "two peas in a pod."

Normally, scientists grow their tissue cultures in the presence of 100 micrograms of streptomycin to prevent contamination by bacteria. The tissue culture cells themselves cannot survive much larger doses of the drug.

However, the Purdue scientists added some 200,000 cells to a medium containing 3,000 micrograms of streptomycin and allowed the cultures to stand in an incubator. As they had expected, practically all the cells died within a short time.

But a very small number of cells continued to grow, soon forming 16 thriving little colonies. Transferred to a fresh medium loaded with 3,000 micrograms of streptomycin, all of the cells in these new colonies flourished.

If this abnormal tolerance for streptomycin was an acquired trait, it would be lost when it was no longer needed. On the other hand, it would be retained even when not needed if it was a true genetic difference.

The scientists passed the streptomycin tolerant cells 16 times through normal media containing only 100 micrograms of the antibiotic. Then they placed them again in a medium containing the 30-times-greater drug level. The cells continued to thrive in this medium (which was deadly to the cells from the original culture).

These results suggest that:

1. Two apparently identical cells of the same "parentage" might differ genetically.

2. One of these differences could be that, although cell A and cell B both grow normally under normal circumstances, some environments could inhibit the growth of A and permit, or even stimulate, the growth of B.

3. Cancer-causing agents, including chemical substances such as coal tars, physical irritations, etc., might act by providing an environment which allows apparently normal cells with a hidden potentiality for cancerous growth to multiply at a faster rate than their brothers and sisters which appear to be "identical twins."

Science News Letter, November 30, 1957

PHYSICS

# U.S. Has Biggest Cyclotron

➤ THE ENERGY of the 184-inch cyclotron at the University of California Radiation Laboratory in Berkeley has been doubled so that it now fires protons of 730 million electron volts (Mev).

Although the machine is still dwarfed in energy by the six billion volt bevatron, it has become the world's most powerful cyclotron, exceeding by about 50 Mev a similar machine in Russia.

The Russians announced operation of their machine at the 1955 Geneva Atoms for Peace Conference, two years after the Berkeley remodeling had been planned.

The Berkeley and Russian machines are the only two in the world presently operating in what today is an intermediate energy range of atom smashing. A third instrument in this range is being built at Geneva.

The atom smasher permits the exploration of nuclear reactions that are impractical for the multibillion volt machines and cannot be generated by the lower energy machines in the 350-450 Mev range.

"Operation of the machine at the new energy will enable us to fill in some gaps in our knowledge of the atomic nucleus," said Dr. Ernest O. Lawrence, director of the Radiation Laboratory, who won the Nobel Prize for his invention of the cyclotron. "For a full understanding of nuclear forces, we need to explore nuclear reactions in a broad spectrum of energy ranges."

Remodeling of the cyclotron, under the direction of Dr. Robert Thornton and James Vale, was financed by the Atomic Energy Commission at a cost of $1,500,000. Remodeling has taken two years.

The atom smasher produces a profusion of pi mesons, permitting new and systematic studies of these particles, intimately associated with the energy that binds atomic nuclei together. Also mesic atoms are formed in sufficient quantities for new studies of these strange atomic forms.

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TECHNOLOGY

## Simple Magnetic Memory Uses Twisted Wires

➤ A DEVELOPMENT in electronic memory devices, called the "Twistor," that will greatly simplify memory systems and make them cheaper has been announced by the Bell Telephone Laboratories, New York.

The Twistor is made up of wires woven together much like a window screen, but all the wires running up and down are magnetic wires and the ones running side to side are plain copper wires.

Memory "bits" can be stored at each of the junctions.

To store a "bit" in the electronic memory, a short impulse of current is sent along both the horizontal and vertical wires leading to the junction. This results in a permanent magnetic field being set up in the wire at the junction. This magnetic field is the "bit," and will remain at the junction until the information it represents is needed.

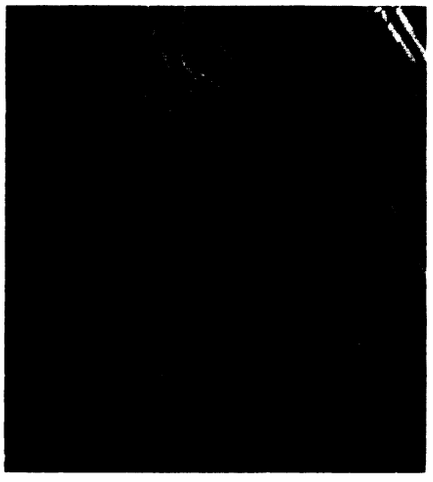
Then, to "readout," or remember, another current pulse is sent along the plain copper wire. The output of the magnetic wire is then measured and will be one value if the magnetic wire is not magnetized, and another one if a "bit" has been stored there before.

The same principle of crossed wires is used in present electronic memories although there must be a tiny ferrite core at each of the junctions to become magnetized. The wires must be threaded through the cores at each junction.

In the Twistors, the core has been eliminated. The wire itself can hold the magnetic field because it has been twisted before being woven into the screen. Because of this twist, the wires are able to build up a magnetic field around themselves in a spiral shape. Without the twist, the magnetic field would not be built up, and the ferrite cores would be needed at each junction.

Magnetic wires as small as one-thousandth of an inch are possible and at least 10 bits per inch can be stored on each wire. Devices using the Twistor concept may be employed in computers and switching systems where rapid-access, high capacity memories are necessary.

Science News Letter, November 30, 1957



*TWISTOR—An experimental magnetic memory array that has been set up at Bell Telephone Laboratories to evaluate the "Twistor" concept. Here, the longitudinal magnetic field for the magnetic wires is provided by small solenoids wound around glass tubes. Such an arrangement facilitates the testing of various magnetic wires.*