

## BIOLOGY

# Chemical Brain Control

As man comes closer to solving the mystery of life, he must consider the tremendous problems that would arise with the ability to control life.

➤ BEING ABLE to control the brain cells of a newborn baby could create social upheavals for the world that would make atomic energy explosions seem trivial, Dr. Melvin Calvin, Nobel Prize winner in Chemistry, warns.

Now that science is beginning to tamper with the chemical mechanisms of living organisms, the human race faces momentous problems, he told a colloquium at the National Science Foundation in Washington, D. C.

As scientists probe deeper into the life mechanisms of creatures, whether virus, mouse or man, they are getting closer to manipulating the way in which the creatures express themselves.

Dr. Calvin is director of the laboratory of chemical biodynamics, Lawrence Radiation Laboratory, and professor of chemistry at the University of California, Berkeley.

In a report on the evolution of non-living chemicals into living materials, a process that may have started on earth about four billion years ago, Dr. Calvin described the progress science is making in following the complex steps.

In the evolution from non-life to life, atoms group themselves to form new combinations in a series of steps from the four basic elements, hydrogen, carbon, oxygen and nitrogen. From these, they lead to simple compounds of amino acids, sugars, bases and fatty acids, to the more complex polymers of protein, cellulose, nucleic acids, and finally, to the spiral molecules of life itself, deoxyribonucleic acid (DNA) and ribonucleic acid (RNA).

Suggesting that the report could be called "From Atom to Adam," Dr. Calvin pointed out that little is known about the evolutionary development of chemicals on earth before man appeared.

The borderline between an alive aggregate of molecules and a not-alive aggregate is difficult to recognize, he said. However, the alive molecules have the ability to transfer energy and information to future generations.

Scientists are using two methods of inquiry into the dim dark ages of our earth when life was evolving. One is to dig into the earth and analyze ancient deposits to see what molecular structures can be found in rocks at a geological age before the first fossil remains were made. The oldest chemical structure yet identified, found in northern Minnesota shale, has been dated as being a billion years old.

The other method of building life precursor materials from chemicals can be conducted in the laboratory.

Here the four primeval molecules are subjected to pressures to form combinations of water, carbon dioxide, methane and am-

monia. These are then subjected to ultraviolet and cosmic rays and electrical discharges to generate amino acids, sugars and other substances.

By dehydrating, or pulling out the water molecules, these molecules combine to form nucleic acid, polysaccharides and proteins. The linear peptide molecules twist into coils of definite arrangement, the helix.

The next step of chemical evolution brought molecules of a size visible in the electron microscope, when salt was added and the helixes grouped together in twisted strands.

Thus scientists are coming closer to being able to duplicate the evolution of chemicals and to manipulate the information-transferring mechanisms that lie in complex molecules of living organisms.

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## GEOLOGY

## Map Mile-Wide Crater Gouged by Meteorite

➤ A HUGE CRATER-LIKE depression about 5,000 feet in diameter has been mapped in central Kentucky.

The shape of this depression, which is high in the center and depressed around the rim, leads geologists to believe it may have been caused by a meteorite.

Limestone rock about four hundred million years old has been exposed by the depression, stated a report from the Geological Survey, Department of the Interior, Washington, D. C.

Around the crater, blocks of surrounding rock have slipped downward toward the depression, and on the rim they have been gently bent and twisted into folds.

The structure of this crater seems similar to that of other craters formed by the impact of falling meteorites, stated geologist Douglas Black, who discovered the crater in 1962, along with Earle Cressman, both with the U.S. Geological Survey, Lexington, Ky.

Such a structure could have been caused by volcanic action, some authorities suggested.

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## PSYCHOLOGY

# Man's Approaches to Life

➤ MAN CAN REGARD the mighty Niagara Falls as a misty rainbow, an enormous microcosm of neutrons and protons or an expression of the presence of God.

In his search for thoughtful understanding of the purpose and value of life, man can encounter a physical reality such as the Niagara in three ways—scientifically, artistically and religiously, Dr. Harold K. Schilling, physics professor and dean of the Graduate School, Pennsylvania State University, believes.

The scientific approach is the impression of the powerful force and energy of the Niagara as it pours over the rocks, and of the vast numbers of molecules, atoms, protons and fields of force in the swirling mists.

The artistic approach is the concept of esthetic beauty and grandeur to be expressed with new colors, forms and dimensions.

The religious approach is the awe and fascination expressed at being on holy ground in the presence of unfathomable mystery and purpose.

All three of these approaches—and there are many more—indicate a desire of man to delve deeply below the surface of matter, Dr. Schilling told the 12th annual convention of the National Science Teachers Association in Chicago.

The responses are not inimical or incongruous, as many people have thought throughout history, he said. They are all integral components of man's quest for explaining or interpreting realities of life in a meaningful way.

"Art, like science, is a sublime impatience with the obvious, a living on the verge of something more, and a straining and reach-

ing out for the seemingly unattainable and the invisible," he stated.

Dr. Schilling believes that the more scientists explore and uncover the world of matter, the more they realize that this world is a world of depth, "perhaps even unlimited depth, and a world of genuine mystery."

Formerly, scientists felt that the deeper man penetrated into the reality of matter, the simpler would be the picture of the order of life and the universe. This thinking envisioned a shallow, closed and unmysterious universe, Dr. Schilling said.

Today's scientists are finding the opposite, he added. As they explore the world of matter, the more they find to explore. As soon as they answer some questions, more questions are asked. Increasing the known does not decrease the unknown.

Scientific penetration to a deeper level of reality has added to knowledge and understanding, he said, yet each such penetration reveals a picture of increasing complexity, and of different and unexpected kinds of reality.

Dr. Schilling illustrated this constant unfolding of new mysteries in citing an analysis of Niagara Falls from the waterfall itself to a bucket of the water; to individual drops of water; to molecules, atoms, neutrons, protons, fields of force surrounding the particles; to waves and particles and the quantum theory.

This is an exploration in which science is laying bare an element or dimension of the basic complexity and mystery of nature—the mystery of which science was not formerly aware.

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