CHEMISTRY

Pre-Living Forms in Space

The first concrete "evidence" that conditions suitable for the development of living forms exist in space is seen in the presence of heterocyclic compounds in some meteorites

MOLECULES FROM SPACE with the earmarks of chemical predecessors of the genetic material that makes life possible on earth have been found. The finding apparently provides the first concrete suggestion that conditions exist in space for development of living forms.

Dr. Melvin Calvin, University of California chemist, said he has found, in stony meteorites, evidence of organic molecules that scientists believe were intermediate in the evolution of chemical forms from inert to living material.

The scientist spoke at a seminar which is a part of Massachusetts Institute of Technology's Compton lectures.

Dr. Calvin's work in part anticipates the day when space vehicles will voyage aloft to bring back samples of planets for analysis in earth laboratories.

"We have found very reasonable evidence of the presence of molecules of the aromatic heterocyclic type resembling the pyrimidines and purines present in terrestrial genetic material," Dr. Calvin said.

The heterocyclic compounds no longer exist as independent molecules on earth. But they are found as fragments of nucleotides, chemicals which in turn are found in chromosomes. And chromosomes are the key genetic materials which carry on life.

According to current scientific theory, Dr. Calvin pointed out, living forms apparently developed on earth through a process of chemical evolution. Atoms like carbon and hydrogen were joined together into progressively more complex molecules by the energy of cosmic rays, ultraviolet light and electrical storms. Heterocyclic compounds were among those formed and eventually these were incorporated into nucleotides and finally chromosomes.

Dr. Calvin said the results suggest the heterocyclic compounds are being formed outside the earth, by pre-biological processes, and that chemical evolution is taking place.

The scientist said that it has been known since the turn of the century that hydrocarbon compounds of the petroleum type exist in stony meteorites. Little effort has been made to use today's advanced analytical techniques to search for more complex organic compounds.

Dr. Calvin said it is reasonable to suppose that the compounds taken from the interiors of meteorites, remain unchanged by the heat generated by entrance into the atmosphere. The heat burns the exterior of a meteorite but by the process of ablation the interior remains cool.

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SOUTH POLE FLAG—Willis Jacobs of the geophysics division, U. S. Coast and Geodetic Survey, is shown raising the Survey's flag at the South Pole on Dec. 21, 1959. During the 1960 research program a permanent marker will indicate the exact location of the South Pole station at latitude 89° 59' 43.6" S and longitude 24.8° W.

PUBLIC HEALTH

Smog Filters Aid Health

TWO DAYS of smog-free filtered air can bring about "significant improvement" in breathing for persons suffering from asthma, emphysema or other respiratory diseases.

As a result of a three and one-half year long study, a team of California researchers recommends that patients use activated carbon filters both at home and in the office in smog-ridden areas such as Los Angeles.

The composition of smog in Los Angeles differs from that found in other cities, such as St. Louis, Pittsburgh or New York. There is no coal smoke, but the major source of smog is the exhaust from 3,000,000 automobiles.

Some 46 volunteers afflicted with emphysema, a disease in which the lung's air passages and air sacs are enlarged and the walls of the air sacs are wasted away, were mong those studied. The severity of the disease is aggravated by the car-exhaust smog found in Los Angeles, report Drs. Hurley L. Motley, Reginald H. Smart and Charles I. Leftwich of the University of Southern California. Normal persons showed no significant lung volume changes from breathing filtered air as compared with smoggy air, they point out in the *Journal of the American Medical Association* (Nov. 14).

This study indicates that breathing smog has direct effects on the respiratory tract in addition to direct effects on the eyes and indirect statistical effects on total mortality, the scientists say. They also report a delayed response of two or more days before the maximum adverse effects of breathing in smoggy air were felt by most persons.

Emphysema patients experienced a beneficial decrease in the volume of residual air when breathing filtered air as well as an increase in their "vital capacity."

Although the Los Angeles area does maintain a smog alert system, the scientists conclude that "the major health problem at present relates to the effects of the pollutants in the atmosphere at lower concentrations than the alert level (0.5 parts per million of ozone in the air) and for prolonged periods of time."

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ASTRONAUTICS

Automatic Guidance in Space Now Possible

TRIPS to other planets, and to the much more distant stars themselves, will not be delayed by lack of navigation systems.

The same kind of mechanisms that have been developed for missile and other guidance, when combined with computers, timing devices and automatic servodrives, could make possible now automatic navigation to Mars and between the planets.

Dr. Charles Stark Draper, inventor of inertial guidance and director of the Instrumentation Laboratory of Massachusetts Institute of Technology, believes that the basic problems in guiding space ships through space have been solved. He was awarded the Magellanic gold medal of the American Philosophical Society in Philadelphia.

Men will not need to steer space ships on interplanetary flights the way automobiles are driven manually. Guiding devices will be automatic and operated by human brains and hands only when directions and objectives are changed. The inertial navigation components of gyroscopes, gimbals and servodrives, that can keep direction without external contacts, would be used to complement automatic trackers for the sun, planets and stars.

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