

SPACE

Landing on a Comet Proposed by Scientist

➤ A SPACESHIP landing on a comet to probe its mysteries was suggested as a project for future space scientists.

This suggestion was outlined by Dr. Fred Whipple, director of the Smithsonian Astrophysical Observatory, Cambridge, Mass., at a symposium on unmanned exploration of the solar system, sponsored by the American Astronautical Society in Denver.

Dr. Whipple also outlined two other "way out" proposals at the symposium.

Scientists may film a week-long space movie, with a comet playing a leading role, using the already-existing Baker-Nunn camera tracking system with its installations around the globe. Even though there might be cloud cover at some stations, there are sufficient cameras around the earth to take a photograph every three to five minutes.

Another project would launch a block of dry ice into space to create an artificial comet. Dr. Whipple's theory is that the comets were formed from lumps of "dirty ice" created after a giant snow storm in space billions of years ago.

The artificial comet could give scientists valuable data on the formation of comets and mysterious comet tails.

In addition, if a space vehicle is sent near a comet, Dr. Whipple speculated, scientists could use a low-velocity probe.

The low-velocity probe would be put into an orbit that would keep it in the comet's vicinity for a week or more. Thus it could be used for studying the velocities of gas and dust particles boiled off the comet by solar radiation.

This probe would also be able to take core samples of the comet to give direct measurement of one of the oldest physical processes in the solar system, Dr. Whipple said.

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MEDICINE

Retardation Disease Produced in Monkeys

➤ A DISEASE of faulty metabolism that can bring mental retardation if not caught early enough has been experimentally produced in infant monkeys.

The disease, phenylketonuria, or PKU, develops in infants born without an enzyme necessary to metabolize phenylalanine, a chemical found in all proteins. This chemical accumulates in the blood and finally damages the victim's brain.

By feeding a group of infant monkeys excessive quantities of L-phenylalanine, Drs. Harry A. Waisman and Harry F. Harlow, both of the University of Wisconsin, Madison, were able to produce the same abnormalities that are found in humans with PKU.

Both monkeys and humans with PKU have high levels of phenylalanine in the blood. Epileptic seizures observed in some children with PKU were also noted in some of the experimental monkeys.

Like the infants, monkeys were slow to react to testing procedures and sometimes failed to adapt entirely, which suggests "an intellectual deficit," the physician reported in *Science*, 147:685, 1965.

PKU is the foremost example of the concept that in some cases of mental deficiency a hereditary metabolic error is the basis for brain damage.

Drs. Waisman and Harlow believe that the mentally retarded monkey can serve as a model for further experimentation.

"It will be possible to perform experiments with these animals that cannot be performed with phenylketonuric children," they pointed out.

Although severe retardation from PKU can now be prevented by treatment after a simple diagnostic blood test, no clear explanation for the brain damage in these patients has yet been found. By administering different amino acids, drugs and enzyme inhibitors to experimental monkeys, and performing biopsies to determine the enzyme composition of their brains, the scientists hope to find the reasons for this brain damage.

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OCEANOGRAPHY

Soda Pop Bottles Chart Sea Currents

➤ THOUSANDS of soda pop bottles, thrown purposely into the ocean, have supplied valuable data on surface currents of the Atlantic Ocean.

More than 156,000 corked bottles of the soda pop type were dropped by United States and Canadian research scientists from vessels, ferries, aircraft and "Texas Towers" along the coast from Newfoundland to Florida, reported Dean F. Bumpus of Woods Hole Oceanographic Institution, Woods Hole, Mass., and Louis M. Lauzier of the Fisheries Research Board of Canada.

Each bottle contained a self-addressed return postcard asking the finder to mark the date and location in return for a small reward.

From this data, accumulated for 14 years from 1948 to 1962, oceanographers have constructed minutely detailed charts showing where drift bottles were released, the percentage washed ashore and recovered, and the direction and speed in miles per day of the surface ocean drift.

This detailed study will help scientists solve such problems as where to dispose of atomic waste materials and offshore pollution wastes, as well as learn more about the migration of fish.

Claimed as the most comprehensive study of its kind ever made, the work is published as Folio 7 of the American Geographical Society's "Serial Atlas of the Marine Environment."

The scientists reported that 10% of the bottles released were found on the North Atlantic seaboard, although many more might have drifted ashore without being found. Two percent of the total were swept along by the Gulf Stream and its branches to foreign shores.

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IN SCIENCE

TECHNOLOGY

Space Welding Technique Occurs Only in Vacuum

➤ WHEN UNITED STATES astronauts build their first station on the moon, they may use a strange welding technique that occurs only in the vacuum of space.

Dr. D. V. Keller of Syracuse University, New York, at the request of the National Aeronautics and Space Administration, is trying to learn why certain metal parts of rockets and satellites weld together when brought into contact in space.

This phenomena has been interfering with experiments on some space flights since the first satellite was launched. Moving parts, both inside and outside the satellite, that were exposed to vacuum have locked onto each other and failed to function.

In order for men to conquer space, explore planets and perform other duties outside a space vehicle, it will be necessary to solve this "sticky" problem and use it to man's advantage.

"Once we understand the adhesion mechanism," Dr. Keller said, "we can use it to construct buildings in outer space. On earth, high temperatures and/or pressures are used to weld. In outer space, however, little or no force of any kind is apparently necessary."

The phenomenon should not affect current plans to send two astronauts into orbit, now scheduled for late March or early April. As in previous flights, the astronauts will be sealed into the capsule to protect them from the high vacuum of space.

A metal polished to a bright shine on earth still has four or five invisible layers that serve as a protective coating. The vacuum of outer space, acting in much the same way as a vacuum cleaner, pulls off these layers, stripping the metal surface down to bare atoms.

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EDUCATION

Computer Programming Suited to the Blind

➤ BLINDNESS is no obstacle to a career in computer programming.

Twelve blind students, one a woman, are taking a computer programming course at the University of Cincinnati Medical Center. To allow the students to progress according to their abilities, no time limitations were put on the course. However, in six months most of the students will be ready to begin their careers.

The blind excel at this type of work because of their well developed memories and abilities to orient themselves to an unseen environment. The blind students advanced as rapidly as sighted students.

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CE FIELDS

RADIOLOGY

New Insight Gained Into Origin of Stroke

► NEW INSIGHT into the origin of strokes has been gained as a result of research showing that many begin from blockage of blood vessels in the neck rather than in the brain.

These findings were disclosed by Dr. Elliot O. Lipchik, radiologist at the University of Rochester (N.Y.) School of Medicine and Dentistry, to a New York State Medical Society meeting in New York.

It is especially important to get a good X-ray picture of the network of arteries leading to the brain, Dr. Lipchik said. Radiologists examine these blood supply lines by injecting into the blood a radiopaque substance that will produce a shadow on X-ray films, revealing the shape of the inside of the vessel.

When a person has suffered a stroke, which is due to a severe drop in the blood supply to some part of the brain, it is often hard to tell whether the block is inside or outside the head. The symptoms may resemble those of other disorders, such as a brain tumor, the radiologist explained.

X-ray shows narrowing of the arteries between the heart and brain, fat deposits inside the vessels and other conditions that can cut off blood supply to the brain.

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PHYSICS

Forces in Atom Core Are Weak and Strong

► THE BASIC BUILDING blocks of atomic cores, protons and neutrons, have been discovered to exert weak as well as a strong interacting force.

This fundamental discovery about nuclear forces, reported to the American Physical Society meeting in Berkeley, Calif., by Dr. Felix H. Boehm, professor of physics at California Institute of Technology, Pasadena, opens up new possibilities for research into the atom's nucleus.

Dr. Boehm said he had found "unmistakable evidence" that protons and neutrons are involved in weakly interacting forces, as had been predicted in theory but not previously observed. The evidence was obtained by counting gamma rays from radioactive hafnium 181 at the rate of 500 billion a day with a scintillation counter.

Strong and weak, when used in reference to nuclear forces, apply to rates of reaction. Strong interactions, such as those occurring in a hydrogen bomb explosion, take place in one thousand billion billionth of a second. The weak interaction is a trillion times slower and a trillion times weaker than the strong one.

The strongly interacting force is the one

that binds together the particles in an atom's nucleus. The nature of the weakly interacting force remains something of a mystery. It is associated with the radioactive decay and transformation of most of the "new" particles.

The experiments detecting the weak nuclear force took Dr. Boehm and his colleague, Dr. Egbert Kankeleit, a year to complete. The physicists found that a very small part of the nuclear force they were "observing" violated a fundamental principle of physics known as the symmetry of parity.

This principle holds that there is no distinction between left and right "handedness" in certain instances, for example, as the direction in which a subatomic particle spins on its axis.

The strong force conforms to this principle, but the weak force in protons and neutrons violates it three out of 10,000 times.

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PHYSIOLOGY

Tiny Calcium Pump May Be Key to Heartbeat

► KEY TO the rhythmic beat of the heart may be a tiny calcium pump.

Dr. Mary E. Carsten of the University of California at Los Angeles Medical School, department of physiology, has isolated such a cellular pump from rabbit and dog hearts.

The pump is a part of a system of channels known as the sarcotubular system. This system connects the outer cell membrane with the contractile apparatus within the cell.

The system appears to operate as a part of the heart beat in this way:

The heart beat originates in a well-defined area of the heart. This original impulse is conducted by a system of fibers and membranes to other areas of the heart to the level of individual heart cells.

The impulse must then be transmitted to the contractile apparatus within the heart cells.

This consists of filaments of two large protein molecules, actin and myosin, which do the work of contraction.

It is known that calcium is necessary for contraction of the heart muscle.

Dr. Carsten suggests that the tiny pump of the sarcotubular system, activated by the original heart impulse, releases calcium to the contractile apparatus, triggering contraction.

The calcium is then returned to the vesicles of the system, bringing about relaxation of the apparatus.

In the sarcotubular system is an enzyme which radiates the calcium pumping and facilitates utilization of a special fuel by the pump. The fuel is a chemical agent known as ATP (adenosinetriphosphate).

The research is supported by the Los Angeles County Heart and American Heart Associations.

Dr. Carstens is a Research Career Development Awardee under the U.S. Public Health Service career program.

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SPACE

Rocket Troubleshooters Spot Trouble in Advance

► ELECTRONIC THERMOMETERS mounted inside the fiery tails of huge rockets will make space flights safer for U.S. astronauts by spotting trouble before it starts.

Any rocket booster that will carry a manned payload must go through a process called "man-rating," in which everything is made stronger and double-check safety devices are added. Perhaps the most important single safety device is a tiny gadget that can predict rocket trouble in advance, giving valuable seconds to both the astronauts and the technicians on the ground.

One such troubleshooter for solid-propellant rockets uses the exhaust gases themselves to complete an electrical circuit in case a flaw in the insulation lets the gases get too close to the walls of the combustion chamber. The completed circuit can trigger alarms, recording devices, or even automatic emergency procedures.

Inside the combustion chamber are two electricity-conducting liners, sandwiched between layers of thermal insulation. Ordinarily, the insulation prevents a circuit from being completed between the two liners. However, if a "hot spot," or irregular burning of the propellant, burns through the insulation, the ionized exhaust gas bridges the two liners, just like closing a switch.

An important advantage of the device is that it signals trouble even before there is any significant increase in the temperature of the chamber wall. The system has been successfully demonstrated in an actual solid-fuel rocket motor.

Carmon M. Auble of Aerojet-General Corporation, Sacramento, Calif., pointed out that any signals triggered by an alarm system should come before the failure, rather than as an indication of the "resulting emergency."

The troubleshooter was discussed in Washington, D.C., at a conference on solid rocket propellants, sponsored by the American Institute of Aeronautics and Astronautics.

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TECHNOLOGY

Airplane Messages Sent Through Syncom Satellite

► SYNCOM III, the many-voiced communication satellite, has taken on a new task—relaying messages from airplanes to ground stations.

A Pan American Airways Jet Clipper en route from San Francisco to Honolulu on Jan. 27 sent and received messages to and from Camp Roberts, Calif., via Syncom III. The satellite acts as a 20,000-mile-high antenna to communicate with aircraft anywhere in the world without delay or interference. The successful tests proved that a worldwide satellite communication for commercial aircraft may be possible within two years.

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