

SPACE

America Launches Heaviest Satellite

► THE UNITED STATES took a long stride on the Soviet Union in the space race with its Jan. 29 launching of what some call "the flying junkpile" and "the world's heaviest and most useless satellite."

The satellite, filled with sand, carried nothing in the way of a working payload. But the launch proved the worthiness of the 16-story Saturn I, forerunner of rockets destined to take U.S. astronauts to the moon.

Spacemen at Cape Kennedy, Fla., succeeded in sending the rocket's entire second stage—84 feet and 37,700 pounds of nose cone, burned out rocket casing and sand ballast—into an orbit of 95 minutes at a distance ranging from 162 to 467 miles.

The heaviest satellite sent up by the Soviets is estimated at about 15,000 pounds.

The 562-ton Saturn I, heavier than six railroad diesel engines, climbed from a massive concrete launching pad atop a furious, thunderous column of smoke and flame generated by eight engines pouring out one and one-half million pounds of thrust.

Television cameras aboard the launching rocket flashed back pictures of the Florida peninsula. They showed the clouds below in brilliant relief.

• Science News Letter, 85:88 Feb. 8, 1964

METEOROLOGY

Artificial Lightning From Beam of Particles

► SHOOTING A BEAM of high-energy atomic particles into the air to create man-made lightning has been proposed.

The artificial lightning flashes would serve as a probe for studying how clouds behave. The atomic particles used to produce them could be either protons or electrons, the American Meteorological Society meeting in Los Angeles was told.

Drs. Harry Moses, Ronald L. Martin and Jacob Kastner of Argonne National Laboratory, Argonne, Ill., developed the proposal and will soon request funds for the required equipment.

The proton beam would come from the Zero Gradient Synchrotron, a large atom smasher that went into operation last year at Argonne. It would be aimed directly overhead by very large magnets, similar to those used to guide the particles inside the accelerator.

The proton beam would trigger the lightning stroke by creating a path of ions, or electrically charged particles, within a cloud. This would give scientists their first chance to study how lightning is formed under relatively well-known conditions.

The beam would act as a probe of the atmosphere from the ground to very high altitudes, Dr. Moses reported. The column of ions would form in less than a millionth of a second, and could be produced every four seconds, if desired.

One problem in beaming high-energy particles into the atmosphere is to make sure there are no airplanes in the path. Another is to protect people near the ground

equipment from radiation damage by the particles.

Even if the beam did not cause a lightning stroke, it would heat the column of air and this heating could be detected by infrared sensors.

Another effect of shooting high-energy particles into the air would be to produce ozone. Since lightning causes "whistlers," these electromagnetic radiations of audible frequency could be detected and charted, giving information about the earth's magnetic field.

Natural lightning causes about 7,500 forest fires each year at a cost of more than \$25 million, and kills some 400 persons in the United States.

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ARCHAEOLOGY

Farming Tools Used 9,000 Years Ago

► DIGGING INTO WHAT may prove to be the earliest cradle of civilization, an American scientist has discovered crude man-made farming tools that are 9,000 years old in a cave in Afghanistan.

A sickle made of flint which he found probably antedates previously discovered farm implements by several thousand years, reported Dr. Louis Dupree, recently returned from studies in Afghanistan, Iran, Iraq and Jordan for the New York Museum of Natural History.

Other diggings he made recently in Jordan, Iraq and Iran may eventually show that man's prehistoric farming activities also extended to India and as far as Central Asia, he said.

There is no reason to believe other crude farming implements and artifacts may not be found beneath the mere 38-foot depth so far explored in the Afghanistan cave, said Dr. Dupree, who will return to the Near East for a two-year study.

Further explorations may prove that the area he studied was the earliest site of the civilization's beginnings, Dr. Dupree, who also is an anthropology professor at Pennsylvania State University, added.

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BOTANY

Snow May Cause Rodents To Eat Tree Bark

► THE HEAVY SNOWS this winter may send wild mice, rabbits and other rodents nibbling at the bark of trees and shrubs in search of food.

This can cause severe damage to plants, explained Clifford W. Collier Jr., landscape architect at West Virginia University, Morgantown. By nibbling too far into the woody part of the tree, the animals can damage the growing region and the tree could die. Wrapping a piece of burlap around the damaged area will help save the trees until they can be treated with a wound compound in the spring.

Best preventive method is to wrap the trunks of trees and shrubs with aluminum foil before the snow falls.

• Science News Letter, 85:88 Feb. 8, 1964

IN SCIEN

ENGINEERING

Historic Diesel 'Pioneer' Presented to Smithsonian

► THE 30-YEAR-OLD diesel engine that changed the pace of locomotion for American and overseas railroads was officially presented to the U.S. National Museum in Washington, D. C.

This first diesel engine to enter rail service powered the Burlington Railroad's famed "Pioneer Zephyr" passenger train on its non-stop dawn-to-dusk run from Denver to Chicago in 1934. The 14-hour trip shaved better than 12 hours off the best steam running time for the 1,026-mile journey.

Since that historic run, more than 50,000 steam locomotives have disappeared from the rails and been replaced by 28,000 diesel-electric locomotives of all types.

Diesel power "is credited with saving U.S. railroads close to a billion dollars annually in reduced fuel and maintenance costs," said Richard L. Terrell, vice president of General Motors and general manager of Electro-Motive Division, in presenting the engine to Dr. Leonard Carmichael, secretary of the Smithsonian Institution.

The famous seven-foot high engine and three locomotive models depicting the growth of diesel motive power stand in the Hall of Railroads in the Smithsonian's new Museum of History and Technology.

• Science News Letter, 85:88 Feb. 8, 1964

MEDICINE

Skin Graft Prolonged By One Drug Injection

► A SINGLE experimental dose of the drug, Cytoxan, or cyclophosphamide, makes skin grafts last longer than they would otherwise, two English researchers reported in London.

It is customary, they point out, to prolong the survival of grafts with a chemical agent by giving frequent doses of the drug over a prolonged period. Because effective drugs are usually toxic, however, death in both animals and man often result.

The experimenters used cyclophosphamide for immunization in an animal laboratory where the skin of a specific type of male mouse was grafted onto the chests of other male mice.

They obtained their best effects when the drug was injected any time from shortly after grafting up to about the fourth day afterwards. If the drug was given before grafting or as late as the sixth day, it had "relatively little effect."

Dr. M. C. Berenbaum of St. Mary's Hospital Medical School, London, and Dr. I. N. Brown of Glaxo Research Ltd, Greenford, Middlesex, England, reported the findings in *Nature*, 200:84, 1963. They said they hoped to make further discoveries from injecting two or more doses of the drug.

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CE FIELDS

OCEANOGRAPHY

New Current Discovered Under Indian Ocean

➤ A CURRENT of water has been found flowing slowly to the east under the Indian Ocean, close to the Equator.

This river under the sea is unsteady and not very strong, Drs. John A. Knauss of the University of Rhode Island, Kingston, and Bruce A. Taft of the University of California, San Diego, reported in *Science*, 143: 354, 1964. The current shows signs of being more strongly developed on the eastern side of the ocean.

The discovery of the undercurrent in this ocean dispels the former theory that no current was there. Oceanographers formerly found no evidence of a current from their surveys of the western side of the Indian Ocean.

As part of the International Indian Ocean Expedition, two three-month cruises were carried out from the research vessel, *Argo*, of the Scripps Institution of Oceanography of the University of California, La Jolla.

Observations of the Indian Ocean undercurrent were made during the two phases of the monsoon, the seasonal heavy rains that sweep over that part of the world.

The Indian Ocean current is similar in many respects to the undercurrents in the Pacific and Atlantic Oceans. But the Indian undercurrent is not so well developed nor as steady as in the two oceans.

It flows only half as fast as the Pacific Ocean—which flows at a maximum speed of about 40 to 60 inches per second at a depth of about 50 to 100 yards.

And even though it does appear to be steady for several weeks, there were times at which the undercurrent was either weakly developed or not present at all.

• *Science News Letter*, 85:89 Feb. 8, 1964

OCEANOGRAPHY

First Two-Man Sub To Study Ancient Wrecks

➤ A TWO-MAN submarine is being built to give scientists a closer look at ancient jars, weapons and other relics lying in shipwrecks at the bottom of the sea.

This unique vessel, scheduled to be finished this summer, will be 16 feet long, nine feet wide, and can go to depths of 600 feet.

With two cameras possibly on the outside, the three-and-a-half ton submarine is designed to hover over wrecks which have been lying under the sea for centuries, stated George Bass, special assistant for underwater archaeology at the University of Pennsylvania.

In their search for historical materials sunken under the sea, archaeologists often encounter difficulties trying to locate and examine the ancient relics of past civilizations.

The submarine is the latest idea to surmount these problems, Mr. Bass explained in a lecture for the Smithsonian Institution and the Archaeological Institute of America in Washington, D. C.

Driven by electric batteries, the sub will be able to stay underwater for about ten hours searching for archaeological treasures, he said.

The two scientists sitting inside can look out of the port holes to see where they are going, and manipulate an extended mechanical arm for some rough work of probing and lifting what they find.

Underwater archaeologists often obtain general, but rather vague, directions to sunken wrecks from looking through the hauls of fishermen's nets. Mr. Bass intends to explore the ocean floor off the coast of Turkey and other parts of the Mediterranean Sea with this submarine which is being constructed by the Electric Boat Division of General Dynamics.

Never before have undersea archaeologists had a proper plan to survey submerged treasures, Mr. Bass said.

Pottery pieces 1,000 years old were found in an ancient sunken Byzantine sailing vessel in 1960, and the largest collection of pre-classical bronzes in the Aegean Sea was found off the southwest coast of Turkey.

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AUTOMATION

Automation May Rescue Library From Data Flood

➤ WITH CARD CATALOG cabinets beginning to line the corridors in the 43-million-volume Library of Congress, with catalogers at least one year and 150,000 items behind in cataloging and with new items coming in at 40 a minute, library officials are hopefully looking toward more automation as a solution.

A survey team headed by Dr. Gilbert W. King of Itek Corporation, Lexington, Mass., made a two-and-a-half year study of the complex problem of making a large research library more effective for the user.

While automation in three areas of library work—bibliographic processing, catalog searching and document retrieval—is now technically feasible in libraries of one million books or more, getting an evaluative service through the machine is a dream that still must wait for new ideas in automatic equipment.

With future sophisticated equipment, such as trillion-bit memories and individual search consoles guiding the researcher in the manner of teaching machines, the high cost of a functioning national automatic system for research libraries could be balanced and outweighed by greater value of services.

Individual books are not going to be replaced by electronic systems, and there will still be miles of them on library shelves.

The report, "Automation and the Library of Congress," financed by the Council on Library Resources with a \$100,000 grant is available from the Government Printing Office, Washington, D. C. 20402, at \$2 per copy.

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ENGINEERING

Deep Sea 'Power' From Decaying Isotopes

➤ A PROPOSED thermoelectric generator fueled by radioisotopes is expected to help solve the problem of supplying power for deep sea oceanographic research equipment and for underwater navigational aids for ships and submarines.

Electricity is created as the heat from decaying isotopes flows through the generator. The proposed generator is the project of the 3M Company in St. Paul, Minn., and has been selected by the U.S. Atomic Energy Commission to be included in the Government's SNAP (Systems for Nuclear Auxiliary Power) program.

• *Science News Letter*, 85:89 Feb. 8, 1964

BIOCHEMISTRY

Body 'Assembly Lines' Synthesize Proteins

➤ "ASSEMBLY LINES" inside body cells are believed to synthesize all types of proteins, the American Chemical Society meeting in Denver was told.

Studying the synthesis of hemoglobin, the red coloring matter that carries oxygen in the circulation, Dr. Boyd Hardesty of the University of Kentucky College of Medicine, Lexington, found evidence supporting the assembly line theory for all proteins.

The assembly lines themselves are composed of material known as messenger RNA (for ribonucleic acid), which carries from the cells' genes the directions necessary for making hemoglobin, Dr. Hardesty explained.

Working with anemic rabbits, Dr. Hardesty, with his co-workers, Drs. Richard Schweet and Ralph Arlinghaus, found evidence that subcellular particles called ribosomes move onto molecular assembly lines inside body cells as synthesis of hemoglobin molecules begins.

The ribosomes move along the line during synthesis and move off again when synthesis has been completed.

"The objective of this work," Dr. Hardesty said, "was to gain an understanding of the way in which the genetic information transcribed from DNA (deoxyribonucleic acid) into messenger RNA is utilized in the assembly of hemoglobin."

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GENERAL SCIENCE

Danger From Shipyard 'Spaghetti' Reduced

➤ THE TANGLED MASS of cables and hoses known as shipyard "spaghetti" is no longer a safety problem for Boland Machine and Manufacturing Co. in New Orleans.

Time lost in untangling and repairing the lines that carry water, steam, fuel, oxygen, lubricants, air and electricity to a ship from the dock has been eliminated by installing the maze eight feet above the deck, thus also cutting accident rate.

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