

METEOROLOGY

Upper Atmosphere Probe To Give New Information

► **SATELLITES**, rockets and balloons are being used during August to check on what is happening in the earth's upper atmosphere, especially in the Canadian auroral zone where the "northern lights" are often seen.

The three-pronged probe of the far-out atmosphere is expected to add new information to the mysterious changes that take place more than 20 miles above the earth's surface. There, above most of the protective atmosphere, electrons, protons and other nuclear particles transfer their energy and move in vast patterns that result in auroras, changing magnetic fields and communications blackouts.

One specific aim of the rocket-borne and satellite devices is to detect changes in the numbers and energies of electrons in the very high atmosphere. Researchers from the University of California, supported in part by the National Aeronautics and Space Administration, expect their studies to show how electrons affect earth's magnetism at the surface.

• Science News Letter, 88:104 August 14, 1965

GEOPHYSICS

Rocket Tests Confirm Air's Twinkling Layer

► **ROCKET TESTS** have confirmed the existence of a layer in earth's atmosphere that causes the twinkling of starlight.

The altitude of the layer is about that of the tropopause, or 35,000 to 40,000 feet during the winter. The tropopause is the boundary between the earth's lower atmosphere in which the temperature decreases with increasing altitude, and the stratosphere, where the temperature increases with increasing distance.

About 80% of the total twinkling occurs in this layer, with about 10% each above and below it, Dr. Craig C. Hudson of Sandia Corporation, Sandia Base, Albuquerque, N. Mex., reported in *Nature*, 207: 247, 1965.

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ENTOMOLOGY

Temperature Extremes Exterminate Termites

► **IT IS UNLIKELY** that termites will become a major problem in northern climates because cold and dryness kill off most of the colonies, tests in Wisconsin have indicated.

Three-year studies of the survival of the eastern subterranean termite under conditions of heat, cold and moisture were made by Erland W. Johnson, a Sheboygan, Wis., high school teacher, working with Prof. Harry C. Coppel of the University of Wisconsin entomology department.

A relative humidity of 95% or higher is needed by termites to survive, Mr. Johnson found. The termites survived for a time in drier air, but finally died, and dry

conditions combined with high temperatures killed half of a termite colony within 19 days. Survival was longer when dry conditions were combined with lower temperatures, but half the colony died within 40 days.

Termites are sensitive to both heat and cold extremes, the tests showed. A temperature of 91 degrees F. killed half of a colony within 13 days, and at more than 100 degrees the entire colony was killed in the same period.

To test termite survival in cold temperatures, termite colonies were placed in a freezer at various temperatures and then warmed up to room temperature. After a temperature of 15 degrees, half the termites survived when they were warmed up. A 12-degree temperature left 40% alive, but a temperature of nine degrees was fatal to the entire colony.

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TECHNOLOGY

Tiny Magnetic Rod To Bring Better Radar

► **A NEWLY DEVELOPED** magnetic rod that is only one-half-inch long may lead to simpler, cheaper and more efficient radar systems.

The device, made of a magnetic material called yttrium iron garnet, is the newest and most promising of a class of electronic components known as delay lines, which slow the passage of signals through an electronic circuit.

Delayed signals are used in aircraft Doppler navigation radars for computing airplane speed, and in other radars to provide a more accurate measurement of target range.

The device, developed at Sperry Rand Research Center in Sudbury, Mass., is believed to combine for the first time in one tiny unit both signal delay and amplification at the highest microwave radar frequencies now being widely used.

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AGRICULTURE

Nematode-Resistant Soybean Now Available

► **THE FIRST YELLOW-SEEDED** soybean resistant to the soybean cyst nematode is being released to seed growers.

In field evaluation tests the new variety, named Pickett, showed good resistance to strains of the soybean cyst nematode in Missouri, North Carolina and Tennessee, but not in Virginia.

This indicates that nematodes in Virginia differ physiologically from those in the other test states. Pickett is expected to be nematode resistant in most U.S. areas of known infestation, although the Virginia situation could recur.

The new variety was developed cooperatively by the U.S. Department of Agriculture's Agricultural Research Service and the Agricultural Experiment Stations of Arkansas, Missouri, North Carolina, Tennessee and Virginia.

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IN SCIENCE

TECHNOLOGY

Aluminum-Bodied Boat To Be Launched This Fall

► **A NEW** ocean-going cargo ship will have a body of aluminum.

The 226-foot-long vessel will have a hull made from some 600,000 pounds of aluminum, marking the first use of aluminum for hulls in large commercial ships. To be the world's largest self-propelled aluminum hull ship, the vessel will be a "roll-on, roll-off" trailer ship capable of transporting 40 van-type trailers.

The lightweight aluminum is expected to make possible increased speed, improved stability, as well as reduced maintenance in ocean vessels.

United Tanker Corporation and Reynolds Metals Company have been jointly studying the aluminum hull concept for three years.

The ship, which is being built by American Marine Corporation, New Orleans, is scheduled to be launched late this fall.

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TRANSPORTATION

British Hovercar Planned For High Speed Transit

► **PASSENGERS** may someday be able to travel from New York to Washington in an hour, or from Pittsburgh to Cleveland in half an hour without ever getting more than a few feet off the ground.

A hovercar, designed to carry 600 passengers at speeds of 200 to 300 miles per hour between cities up to 500 miles apart, is a new British proposal for future rapid inter-city transit. The hovercar is a land version of the British hovercraft, the air-cushioned vehicle which has shown promise in recent tests on heavy seas. The hovercraft will soon be used in commercial ferry service in Great Britain.

A prototype of the land-based vehicle will probably be built within the next few years, reported A. F. A. Hassall of the British Technical Service Corporation in Great Britain.

Mr. Hassall discussed the hovercar in the *SAE (Society of Automotive Engineers) Journal*, 73:88, 1965.

The proposed vehicle would run on an elevated track and would be powered by an electric motor or pusher air propellers. Looking something like a caterpillar with windows, the vehicle would weigh 140 tons and would be supported as well as guided by air cushions.

Its travel route between the cities would be relatively straight because of its high speed.

Since all of the machinery would be in the rear, the "smooth and quiet operation of this craft should appeal to passengers," Mr. Hassall reported.

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E FIELDS

TECHNOLOGY

Process May Put Scrap Back in Steel Mills

► STEEL SCRAP now cluttering up many of the nation's roadsides may soon find its way back into the steel mills as a result of a new copper-removing process.

Junk, consisting mostly of old autos and major home appliances, has been piling up across the country. Most of it accumulates because the cost of separating and sorting out the various materials too often exceeds the value of the scrap as a reusable raw material.

With the new process, called controlled high-temperature incineration, it may soon be possible to burn off thin coatings and attachments of copper which often "poison" the steel scrap, making it unfit as a raw material.

In a recent experimental study conducted by the Department of the Interior's Bureau of Mines, layers of copper were oxidized entirely in a laboratory-scale furnace. They formed a loose, scaly material that fell off easily, leaving the steel free of surface contamination.

Although the tests made so far have shown the process to be effective, the Bureau cautioned that further study, including commercial scale testing, will be necessary to evaluate the method for efficiency and economy.

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GENERAL SCIENCE

Data Clearing House Curbs Duplicate Research

► A CLEARING HOUSE to provide scientists with up-to-date information on titles and authors of technical articles accepted for publication by various journals has been proposed.

In a letter to Science 149:376, 1965, Russell Eisenman, University of Georgia, Athens, and F.A. Coyle Jr., Milledgeville (Ga.) State Hospital said that the lag between acceptance of an article and its publication can lead to duplicate research. Their system would eliminate "overlapping experimentation," they maintained.

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TECHNOLOGY

Irrigation Accomplished By Automatic Control

► RADIO TRANSMISSIONS beamed from a farmhouse can turn water on and off for irrigating nearby fields at specified times, thus saving labor, time and precious water.

The automatic irrigation system cannot yet be bought on the commercial market, but it has been successfully tested by soil scientists and engineers of the Agricultural

Research Service, part of the U. S. Department of Agriculture.

The system operates with individual inflatable valves made of nylon-reinforced butyl rubber equipped with battery-powered radio receivers.

For irrigating fields with pipelines, an inflatable valve in the shape of a zero is mounted in the valve of the water pipeline and held in place by a metal sleeve that slides up and down the valve stem. When the rubber valve is deflated, it rides on top of the water flowing from the pipeline. When inflated, it fills the space and seals the opening so the water cannot flow.

For irrigating in open ditches, the inflatable valve is shaped like a tube with sealed ends, and can lie flat in the pipe. When inflated, it blocks the flow of water.

Both systems can be controlled from the farmhouse by preset clock timers and sets of relays. A 12-channel, citizens-band radio transmitter beams signals to the individual inflatable valves, where the receivers pick up the signals and open or close the valves.

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AERONAUTICS

New Winged Helicopter Attains Fastest Speed

► A NEW WINGED research helicopter reached a speed of 272 miles per hour, the world's fastest rotorcraft speed to date.

The helicopter uses a rigid-rotor system where the blades are attached rigidly to the mast, which is fixed to the fuselage. Consequently, the helicopter has inherent stability in flight. Most other helicopters have hinged or flapping blades and many require complicated additional devices for stabilization.

The four-blade XH-51A compound helicopter, developed by the Lockheed-California Company in Burbank, Calif., is 32 feet long, its stub wings have a 17-foot span and the rotor blade diameter is 35 feet. It achieved the high speed in a slight climb during a test program conducted for the U.S. Army.

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GENERAL SCIENCE

Water Temperatures Allow Prediction of Ice

► A WAY OF PREDICTING the ice cover on the Great Lakes that could extend the shipping season is being tested by a University of Michigan scientist.

Dr. Vincent E. Noble believes the amount of winter ice cover can be predicted during the fall by applying knowledge of deep-water temperatures. If successful, the method would reduce shipping costs by permitting the use of fewer ships for longer periods.

Dr. Noble, working with the university's Great Lakes Research Division, made this suggestion after a two-year study of ice growth on Lake Michigan under a grant from the National Science Foundation in Washington, D. C.

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CHEMISTRY

Carbon Dioxide Changed To Breathable Oxygen

► CARBON DIOXIDE exhaled by four persons in a spacecraft test cabin has been successfully broken down into breathable oxygen for reuse, National Aeronautics and Space Administration scientists have announced.

The conversion system is part of a life-support unit that will provide enough air to keep four astronauts alive in space for a year. A supply of fresh oxygen for that length of time would weigh too much. In addition to converting the carbon dioxide into oxygen, the unit must also remove the exhaled air from the cabin before the carbon dioxide level becomes too high.

When the carbon dioxide is drawn into the system it goes through a series of separators in which hydrogen is added. The carbon dioxide combining with hydrogen at high temperature forms water and carbon.

The water, H₂O, is separated into gaseous H₂ and O₂. The oxygen is returned to the cabin for breathing and the hydrogen is recirculated to be used over again.

There are many systems for the collection and removal of carbon dioxide from a cabin atmosphere. But this is the first time that oxygen in carbon dioxide has been reclaimed for reuse.

The tests were conducted in San Diego, Calif., at the Convair division of General Dynamics Corporation.

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GENERAL SCIENCE

Crisis in Library and Information Services

► A CRISIS IN LIBRARY and information services has resulted from Federal emphasis on scientific and industrial research, said the president of the American Library Association in Los Angeles.

"The plain and cruel fact is that research library and information services have been left dependent on local resources," Robert Vosper of the University of California at Los Angeles said, "at a time when immense injections of Federal funds into academic and industrial research have produced a staggering increase in demands for library services."

Federal policy puts libraries in the same category with dormitories and office services and views them as "a kind of static housekeeping service rather than as a vital phenomenon related in kind to the phenomenon of research itself," he suggested.

Libraries are unable at present to respond completely to the needs of research, and Vosper believes the situation will get worse before it gets better if a national policy in support of library service to research is not formulated.

From his other position as librarian at UCLA, where research funds exceeded \$30 million in the period 1963-1964, he observed that the library is a primary research tool that can no longer be treated as a forgotten orphan.

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