

METEOROLOGY

Ball Lightning Due to Leak in Stroke at Joint

➤ BALL LIGHTNING, a rarely seen form described as a hissing globe, occurs when a lightning stroke springs a leak where it changes direction, allowing a jet of hot gas to escape.

This is the theory suggested by Dr. C. E. R. Bruce of the Electrical Research Association, Leatherhead, in *Nature*, 202:996, 1964.

Ball lightning has been described as a small, glowing globe that moves slowly along in the air, sometimes indoors. Occasionally it touches objects, scorching them, and sometimes they explode.

Dr. Bruce believes that when a flash of lightning sharply changes its direction, the hole in the magnetic field that could be formed at such a bend allows the escape of an electrically charged jet of hot gas under high pressure. Since the escaping and expanding gas is flowing across a magnetic field, it would be rolled into a ball.

Ball lightning is observed to be four to eight inches in diameter, and Dr. Bruce reported that the amount of gas escaping through such a hole would be about that amount.

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COMMUNICATIONS

Cross-Country Duplicator Sends Mail in Seconds

➤ A NEW ELECTRONICS communications system in seconds transmits a letter, drawing, map or printed document over distances ranging from a few thousand feet to more than 4,000 miles.

The high-speed system is expected to lighten the load of the U.S. Post Office, because a large volume of corporation business now carried on through the mail can be sent and received in a few seconds.

Up to eight feet of copy can be sent in one minute, whether it is to another part of a large factory, within the same city or to an office thousands of miles away.

Railroads, trucking lines and airlines can reduce the amount of time vehicles stand idle because of red tape. Factories can refill retail orders immediately because invoices won't bog down in the mail.

The LDX (Long Distance Xerography) system broadens the scope of individual libraries as portions of rare volumes can be transmitted anywhere from a control source.

It is not necessary to translate information into digital codes for transmission over the LDX system. Translations are made directly from the original book or document. Except for feeding material into the scanning machine on the sending end and removing printed copies on the receiving end, human hands do not touch the information sent.

Developed by the Xerox Corporation, Rochester, N. Y., the LDX system consists of a scanner, a transmission link and a printer. The original document is fed into the scanner where a small spot of light,

a few thousandths of an inch in diameter, "reads" the copy and translates it into electronic signals.

Information is transmitted over microwave channels, coaxial cable or special telephone lines. At the receiving end, signals are decoded, reconverted to light images and printed on ordinary paper.

The copy can be reproduced directly on offset master stock at the printer end, so that hundreds of copies can immediately be run on an office duplicator.

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GENERAL SCIENCE

U.S. and Russia Agree On Publishing Space Data

➤ LONG-WITHHELD Russian data on space biology and medicine may soon be available as a result of talks extending back to 1962.

Preliminary agreement has been reached on a series of volumes to contain data from both Russia and the United States, Dr. Hugh L. Dryden, deputy administrator of the National Aeronautics and Space Administration, said in Washington, D. C., on his return from negotiations with Anatoly A. Blagonravov, chairman of the Soviet Commission on the Exploration and Use of Outer Space.

The books to be published in both English and Russian, contain reports side by side by Russian and U.S. authors, each discussing research in his country on the same subject. The material will be subject to several weeks' review by scientists in both countries before publication.

Dr. Dryden said that since there is such a great difference now in the amount of information published by the two countries, the side-by-side project might provide a little "psychological pressure" for both sides to give more complete reports of research.

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CHEMISTRY

Hydrochloric Acid Used To Make Cottage Cheese

➤ A NEW PROCESS for making cottage cheese uses food grade hydrochloric acid to form curd, replacing the bacteria commonly used for that purpose.

The new, mechanized process has been developed at the University of Wisconsin, Madison, and promises a high quality product at lower production costs.

Prof. Carl A. Ernstrom of the university's dairy and food industries department said the use of acid permits curd to be formed, cooked and washed in as little as 20 minutes. The old bacterial process requires six hours or longer to produce enough acid to coagulate milk.

Researchers are studying the possibility of extending the new mechanized process so that it adds cream dressing and puts the finished cottage cheese into packages at the end of the production line.

Pilot models of the machinery needed for the new process already are being used.

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SPACE

Cloth Rocket Engine To Land Men on Moon

➤ THE THRUST CHAMBER in the rocket engine of the first manned vehicle to land on the moon will not be made of any special kind of steel, or even of steel at all. It will be made of cloth.

The lunar excursion model, or LEM, which will carry two astronauts down to the moon's surface from the lunar orbit of the Apollo spacecraft, will blast its power through a chamber made of special quartz cloth. The cloth will be impregnated with a phenolic resin.

The engine's heat will be absorbed by the boiling off of the resin, said Steve Damokas, chief engineer of the space engine department of Rocketdyne Division of North American Aviation, Inc., Canoga Park, Calif., in an interview. This technique is called ablation.

Work was started on the engine, which develops 10,000 pounds of thrust, in May of last year. It is due to receive certification by the National Aeronautics and Space Administration soon.

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ANTHROPOLOGY

Modern Laboratory Set For Ancient Inca Site

➤ DESCENDANTS of the ancient Inca Indians of Peru will be watching a modern laboratory being set up to learn how these hardy Indians can live in the harsh mountain climate, 14,000 feet above sea level.

In the village of Nunoa, near the old Inca summit capital of Cuzco in the high Andes Mountains, an adobe building with a thatched straw roof will house modern physiology equipment for Pennsylvania State University.

Here teams of anthropologists and physiologists will study the resistance of the native Quechua Indians to rigors such as cold, high altitudes and rarefied air of the mountains. The scientists will try to define whether the stamina of these people comes from structural, functional or behavioral factors, which in turn could be traced to genetic and environmental factors.

The Pennsylvania State project, to be started this summer, has been given a grant by the U.S. Army, which is interested in environmental physiology because soldiers must often face inclement rigors.

The Quechuan Indians who thrive in the harsh climate have an intricate complex culture of native and foreign influences. Many are descendants of the once proud Inca Indians who established a powerful civilization in Peru from about 1100 A.D. which was destroyed by the ruthless Spanish Conquest in 1531-35.

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CE FIELDS

BIOCHEMISTRY

How Tranquilizers Work Is Theme of Animal Study

► HOW AND WHY tranquilizers work is the theme of a study being started on animals at DePaul University, Chicago, this summer. It is hoped that the findings can be applied to mentally ill humans.

One theory of mental illness, which states that biochemical change rather than environmental shock causes it, was tried out by a California doctor a few years ago when he had the blood of a patient with schizophrenia, the most common mental illness, transferred to his veins. He proved his point by having to be locked up for three months until his body got rid of the substance in the schizophrenic blood.

Dr. Mary A. McWhinnie, professor of biology at DePaul, who is one of the researchers on tranquilizers, says few scientists are willing to trade blood with a mentally ill person, but that the metabolism of rats sufficiently resembles that of humans to apply conclusions on biochemical changes in the animals to man.

The researchers will compare the biochemistry of neurotic rats before and after they are tranquilized to find out what organic changes go on during the change from abnormal to normal behavior.

Dr. Glen D. Jensen, associate professor of psychology at DePaul, will have the job of turning normal rats into demented ones, probably using difficult tasks and punishment.

Dr. Jensen will then give them tranquilizers and determine when they are behaving normally again.

No date for completion of this research has been set, but the investigators hope to answer some questions as they go along.

Studying the biochemistry of normal, abnormal and tranquilized rats in sufficient detail to permit valid conclusions about the relation between organic changes and mental states could be a life-long project, the researchers believe.

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ENTOMOLOGY

Weevils Resist Poison More at Dawn, Less Later

► AT DAWN, the ugly boll weevils can resist insecticide better than three hours later, entomologists are finding.

The dread snout-nosed insect, which has devastated so many cotton fields, seems to have a daily rhythm that consists of hours when it is more susceptible to insect poisons and other hours when it is able to resist them.

This rhythm of susceptibility appeared to be photoperiodical, or influenced by the light of the day rather than by any set clock time, report Charles L. Cole and Perry L.

Adkisson, both at Texas A. & M. University, College Station, Texas.

In the experiments, adult boll weevils were exposed every three hours to methyl parathion for 15 minutes.

The period of greatest resistance always occurred at "dawn," or when the lights first came on, and recurred at six-hour intervals throughout the 24-hour cycle, the entomologists reported in *Science*, 144:1148, 1964.

The greatest difference of reaction to pesticides occurred during an experiment when the light was on for ten hours during every 24-hour period. At dawn, only about 10% of the weevils died from the dose of insecticide, but 90% died from the poison inflicted three hours later.

The cause for the weevil's rhythm of susceptibility to the poison is not known, report the scientists. Some of the responsible factors may be the daily patterns of activity of the insect, or the differences in the rates by which the poison is penetrated or absorbed into the weevils.

A daily rhythm in the susceptibility of mice to certain toxic agents has been reported by other scientists, but this is the first time such a rhythm has been recorded in insects.

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GENERAL SCIENCE

Russian Research Highly Rated in United States

► RUSSIAN RESEARCH rates high with U.S. physicists.

This is shown by the fact that one out of every five research reports in "The Physical Review" refers to Russian work translated from the "Journal of Experimental and Theoretical Physics." JETP, as the Soviet physics journal is also called, is translated into English under the sponsorship of the American Institute of Physics, New York. Seven other Russian physics journals also are translated.

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AGRICULTURE

New Device Measures Tenderness of Meat

► A NEW DEVICE now does what man has been doing for centuries—judging how tender or tough a piece of meat is.

This research instrument indicates that the most tender part of a beef rib roast is toward the outside, away from the bone. Pork roast, however, is tenderest at the narrow end, near the bone.

No machine yet has been able to match the ability of human senses to gauge the subtle differences in the toughness and tenderness of meat. The new device, however, constructed by scientists at the Agricultural Research Service, Beltsville, Md., is coming close.

Called a slice-tenderness evaluator, the instrument first punctures a circular plug from a slice of cooked meat, then shears it. The force needed to penetrate or shear the piece of meat is recorded on a continuously running instrument.

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BACTERIOLOGY

Microbe Ties Knots In Self When Crowded

► A THREAD-LIKE microbe ties itself up in knots when its surroundings become too crowded. The knots are good ones—something to make a Boy Scout notice.

The living threads twist themselves into simple overhand knots, timber hitches, figure eights and granny knots, reported Dr. Thomas D. Brock at Indiana University, Bloomington.

The knot-tying creature, called *Leucothrix mucor*, is a large colorless bacterium that lives in water and is related to blue-green algae, primitive plants found on damp soil and rocks and in fresh water and saltwater.

When the microbe has enough air and food, it produces many long filaments that continue to grow throughout their length, rather than just at the tips, Dr. Brock reported in *Science*, 144:870, 1964.

Crowded conditions seem to cause the filaments to bend as they grow, and tight loops are formed. The loops may result because the filaments grow faster on the outside of a bend than on the inside.

These knots get tighter and tighter and finally fuse into a bulb. Later, a thread on each side of the bulb separates, and the bulb is released. Each filament then grows into another knot-tying microbe.

Thus, the knot formation is a method of reproduction, Dr. Brock said.

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GENERAL SCIENCE

President Challenges Youth to Excellence

► PRESIDENT LYNDON B. JOHNSON, in awarding medals to 121 leading high school seniors at a presentation ceremony at the White House, said that the destiny of America's younger generation and the nation as a whole "is a rendezvous with excellence."

The students, each of whom received a medallion bearing a profile of the President, had been selected from throughout the nation and Puerto Rico, for their academic excellence. (See SNL, 85:377, June 13, 1964.)

The President stated that the young students had excelled in the scholarship of the class of 1964 and "have the potential to excel even more in the citizenship of their country for future years."

"I want to challenge you. To challenge you to develop and apply that quality of excellence which is within you," the President said.

"Your destiny will not be a faceless and thoughtless existence in a dull and dreary society. I believe the destiny of your generation—and your nation—is a rendezvous with excellence."

Those present at the ceremony which took place in the East Room of the White House included parents of the scholars and celebrities from the worlds of literature, science, education, journalism, music and other fields.

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