

GEOPHYSICS

Three Ionospheric Discoveries Reported

► **THREE IMPORTANT** new discoveries about the ionosphere, the radio-reflecting layers surrounding the earth, have been reported by British scientists.

The discoveries are likely to have a profound effect on the planning of radio communications.

They result from two years' continuous monitoring of the Canadian satellite Alouette at the British Government's Radio Research Station, Slough, Bucks, by Dr. J. W. King, P. A. Smith and D. Eccles.

The findings are:

1. Great arches of highly charged particles exist up to 1,000 miles altitude, stretching to 2,000 miles on either side of the equator.

2. The energy of the charged particles is greater at the poles than at the equator, leading scientists to suggest that an unknown source is feeding additional energy into the earth's magnetic system.

3. There are extremely "peculiar" areas of the ionosphere running in belts around the earth parallel to the equator and containing large numbers of excess particles apparently pushed out of their normal layers.

Dr. King said the equatorial arches are the most important discovery from Alouette. Alouette, which weighs 320 pounds, was launched in September 1962. It orbits at about 700 miles from earth.

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METEOROLOGY

Moon's Changing Faces Linked to Sunshine

► **THE MOON'S** changing faces, already linked to heavy rainfall, are also related to sunshine.

There is more sunshine than usual when the moon is between first quarter and full moon, and between last quarter and new moon.

Below average sunshine occurs between new moon and first quarter, and between full moon and last quarter.

This relationship was reported to the American Meteorological Society meeting in Vancouver, Canada, by Iver A. Lund of the U.S. Air Force Cambridge Research Laboratories, Bedford, Mass.

He studied weather records covering 58 years, from 1905 through 1962, for ten cities, a total of more than 211,000 observations. The link between sunshine and the phases of the moon was strongest for five of the cities—Boston, Columbus, Ohio, Columbia, Mo., Oklahoma City and Bismarck, N. Dak.

However, Mr. Lund found the relationship also existed for Tampa, Fla., Grand Junction, Colo., San Diego, Seattle and Honolulu.

Exactly how the moon affects either the amount of sunshine or of rainfall is not known. However, the findings do not mean that the moon's positions can be used as a reliable way to predict day-to-day weather. The relationship is statistical, not predictable.

Mr. Lund applied many statistical tests to the relationship of lunar phases and sunshine and they showed a positive correlation.

His findings also correlate, in a reverse way, with those concerning rainfall, as would be expected. That is rainfall is much heavier than usual during the week following new moon and full moon, when sunshine is below average. (See SNL, 82:206, Sept. 29, 1962.)

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PHYSICS

Natural Philosophers Returning With Rocketry

► **BECAUSE OF ROCKETS** and space exploration, scientific interest may shift from laboratory research to investigation of larger problems of nature.

The same trend may spur a renewed interest in the origin and history of the solar system and may even "lead to the reappearance of that almost extinct scientist, the natural philosopher," predicts Dr. Gordon J. F. MacDonald who heads the atmospheric research laboratory of the University of California at Los Angeles.

"For the past 50 years, science has been dominated by an obsession with the very small," he said. "For example, the preoccupation of modern physics with the investigation of nuclear particles and the fundamental nature of matter has a curious medieval air."

As the natural scientist, like his 19th century predecessor, focuses again on the large-scale features of the universe, Dr. MacDonald said, he will no longer be satisfied with remote observations of the solar system.

"By its very nature, exploration demands the presence of man himself, and this, in turn, demands huge rockets and complicated instrumentation," Dr. MacDonald said.

He considers one of the most challenging intellectual adventures on the space scientist's agenda to be the exploration of the moon as a guide to the origin and history of the earth.

"It may well be more instructive for man to wander on the surface of the moon than to drill deep into the earth's crust a thousand times," he said.

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ENGINEERING

TV Cameras Keep Eye on Coal Mine

► **TELEVISION CAMERAS** are keeping an eye on a coal conveyor eight and one-half miles long, the longest in the world. The conveyor belt is guided by one man in an underground control center who constantly receives TV pictures from critical locations along the belt.

The TV-conveyor system, located in a mine in California, Pa., was described at the American Mining Congress Coal Show in Cleveland. The belt is expected to carry more than three million tons of coal annually.

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IN SCIENCE

PUBLIC SAFETY

Do Not Use Tinted Lenses For Night Driving

► **THE AMERICAN** Medical Association says do not use tinted lenses for night driving.

The AMA council on occupational health "condemns the use of tinted lenses and tinted windshields as aids in night driving" for these reasons:

1. The use of any "night-driving" lens or windshield, whether tinted, reflecting, or polarizing, reduces the light transmitted to the eye and renders the task of seeing at night more difficult.

2. The source of glare in night driving is the contrast between the headlights of oncoming cars and the darker surroundings. The use of tinted lenses or windshields does not reduce the contrast but reduces the intensity of illumination from both the headlights and the surroundings, thereby impairing vision.

3. There is no scientific evidence to support any claim that the use of tinted lenses or windshields improves night vision.

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TECHNOLOGY

Iron-Silicon Converts Heat Into Electricity

► **A NOVEL COMPOUND** with exceptional properties for the economic conversion of heat into electricity has been developed by the Plessey Group at its Allen Clark Research Center, Caswell, Northamptonshire, England. Its basis is iron disilicide, a compound of iron and silicon.

The conversion efficiency is somewhat less than that of inter-metallic compounds developed elsewhere, but doped iron disilicide is comparatively cheap, can be constructed into thermoelectric piles simply and is remarkably robust. A direct gas flame can be used on it without noticeable corrosion or loss of efficiency.

The iron disilicide heavily doped with cobalt makes an n-type semiconductor, and with aluminum a p-type semiconductor. These form the two components of a thermojunction.

Since the two components are basically the same compound, there is no difficulty of unequal thermal expansion. The material is highly resistant to oxidation and is stable over a working range of 300 degrees to 1,000 degrees Fahrenheit.

The elements are fabricated together by powder-metallurgy techniques, with thin layers of ceramic material between as insulator except where the metallic contact is required.

Junctions have been tested up to 1,000 hours. The power-to-weight ratio is about three watts per pound.

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CE FIELDS

TECHNOLOGY

Shuttlecocks Designed To Replace Parachutes

See Front Cover

► AN EXPANDABLE cone-shaped device resembling a giant badminton "bird" has been designed to replace the parachute.

Called the Paracone, the device was developed by the Missile and Space Systems Division of Douglas Aircraft Corporation, Santa Monica, Calif. It will provide a quicker, yet safer descent than a parachute, says its designer, R. T. Kendall.

The Paracone, still on the drawing-board, will be gas-inflated. It will fall open-end upwards, with the jumper riding inside on an inflatable mattress, thereby protected against enemy fire. He is insulated from the shock of landing by the compression of gases in the nose of the cone.

In addition to being used as a one-man parachute, the device could be used in larger sizes to drop entire platoons or even personnel vehicles with their motors already running, ready for action as seen on this week's front cover.

The Paracone could be used, in addition, as a lifeboat on water, an igloo in polar regions, or a shield against the sun.

A modification of the Paracone would enable an astronaut using a retrorocket to blast himself out of orbit and let the Paracone take over, acting as a drag brake and floating him safely to earth.

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ASTRONOMY

Lovers on Motorcycle Stop Radio Telescope

► INTERFERENCE caused by a courting couple's motorcycle engine is affecting observations of a star ten light years away.

Sir Bernard Lovell, director of the Nuffield Radio Astronomy Laboratories, Jodrell Bank, is opposing a housing development near the giant 250-foot radio telescope at Jodrell Bank. He said that on the night interference started, it cut into the beam of the telescope and obliterated the signal for ten minutes.

"It is probably a young man taking his girl friend home," Sir Bernard concluded. "It happens every night at about the same time, and I can think of no other case in which he would allow his engine to die out, then rev up again."

Sir Bernard said that one night the interference was later than its customary time of 11 p.m. On that night a star was being photographed by U. S. cameras around the world and was also being observed by a Russian telescope. If the interference had begun 30 minutes earlier, at its usual time, Jodrell Bank would have completely lost the record of observations.

Sir Bernard noted that the radio signals from outer space are so weak that even the slightest electrical disturbance, such as a spark from a lawn mower, interferes with reception.

Similar interference has also been reported by scientists from Cambridge University, England, who are searching for distant galaxies with their radio telescope. On several occasions, mysterious signals were picked up clear and loud. Scientists eventually traced them to a local plant where taxicab two-way radios were being tested.

The Cambridge scientists have also had their delicate probings disturbed by shipping on the Thames, 50 miles away, French television, 250 miles away, and a heater in a tennis-racket plant.

Radio astronomers are urging strict control to preserve some areas of "clean air" in the radio spectrum. They point out that when astronauts embark on a moon expedition, interference-free communications will become a matter of life and death.

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MEDICINE

Typhoid Carriers Treated By a New Penicillin

► SUCCESSFUL TREATMENT of typhoid carriers by one of the new penicillins has been reported in London. Such carriers may be healthy themselves, but still can transmit the *Salmonella typhosa* organism to others by handling uncooked food with soiled hands.

Typhoid fever itself can be controlled by the antibiotic chloramphenicol, but carriers have been harder to treat. The surest way to end the carrier state has been removal of the gall bladder.

Now eight carriers—all women—in a Liverpool mental hospital have become "negative" after treatment with ampicillin, a semisynthetic penicillin. Ampicillin has been licensed for use in the United States since December 1963 by Bristol Laboratories, Syracuse, N.Y., under the trade name Polycillin.

Dr. A. B. Christie, physician-superintendent at Fazakerley Hospital, Liverpool, says he "hesitates to claim at this stage that any of the eight carriers has been cured," but he does believe that ampicillin has had a "dramatic and profound effect on their carrier status," even on one of the patients who had a relapse.

Dr. Christie's report in the British Medical Journal, June 20, 1964, is of special interest at this time because of the outbreak of typhoid in Scotland.

At the turn of the century typhoid fever was responsible for an untold number of deaths, but now a patient rarely dies from the disease in the more advanced countries because of the effectiveness of anti-biotics, especially chloramphenicol.

Although seven of the carriers treated at the Fazakerley Hospital have remained negative for a year, plans have been made to continue tests on the seven remaining in the hospital.

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SURGERY

Noses of Boy and Bird Repaired by Non-Doctors

► TWO NON-MEDICAL MEN have been responsible for two astonishing nasal operations. One saved a boy's nose after it had been slashed off by accident. The other succeeded in providing a tropical bird, the toucan, with an artificial beak made of metal and plastics.

The boy, Terence Montague, 15, of Barkings, on the eastern outskirts of London, ran into a barbed wire fence as he was chasing a football on the school playing fields, and cut off his nose.

Sports master Martin Crockett put it back on again and went with Terry to a hospital in an ambulance, still holding the severed nose in place.

Doctors at the East Ham Hospital stitched the nose into position again. Now the stitches have been removed. Terry's salvaged nose is scarred, but the doctors expect that most of the marks will disappear. If not, plastic surgery may be required.

All the hospital surgeons pay tribute to Mr. Crockett's presence of mind, which alone made the stitch-on operation possible. It made sure that the broken tissue did not dry up and die.

The other remarkable nose story—that is, if you can think of a toucan's huge bill as a nasal organ—comes from Kenneth Norris, a Surrey naturalist who has a private aviary containing some 400 exotic birds in his Downland garden.

About two years ago, one of his toucans suffered a damaged beak in an attack by its mate. Norris realized that the bird would die if something was not done quickly to provide it with a means of eating. The toucan uses the tip of its beak to toss fruit into the air and catch it on the way down.

With the help of Wilfred Lawson, a dental specialist, Norris designed an artificial beak made of metal and plastics. Together they fixed it to the damaged beak, and the toucan was able to eat properly again.

After two years, they removed the plastic covering and found that the damaged beak and its metallic accessory have provided the bird with a virtually normal bill.

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PHARMACOLOGY

Antibiotic Lozenges Under Fire From FDA

► THOSE LITTLE TABLETS that millions dissolve in their mouths for temporary relief of minor sore throats are under fire from the Food and Drug Administration.

Certification of 19 types of troches containing antibiotics will be discontinued on the "grounds of lack of substantial evidence of efficacy," if the FDA has its way. Manufacturers, doctors and others have 90 days to submit written comments.

Most of the antibiotic-containing products which are sold without prescription include one or more of: bacitracin, gramicidin, neomycin, polymyxin, chlortetracycline, penicillin, tetracycline and tyrothricin.

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