

PHYSICS

**Sound Originates
In Breakup of Eddies**

► THE SAME COMPLICATED changes in the air stream produce the gentle singing of the wind in the eaves or the ear-shattering howl of a jet engine.

Both sounds are caused by the creation of eddies in the airflow, or by the breakup of large eddies into smaller ones—not by the mere existence of the eddies themselves, Dr. Alan Powell of the University of California, Los Angeles, believes.

The crux of his theory “is that when a fluid is compressible, the very action that causes the formation of vortices, or eddies, also and at the same time gives rise to the sound radiation.”

The sounds described by Dr. Powell are created without moving mechanical parts, and are one of the two kinds audible to man and animal. Other sounds originate through the action of mechanical systems, such as a loudspeaker or man’s vocal apparatus, on the air.

Sound-producing eddies are formed when the air stream slides over the wall of an airplane or the lip of an organ pipe and is slowed down by the resulting friction.

Dr. Powell, head of the UCLA Aerodynamics Laboratory, notes that the noise from a jet engine would be unbearable if the eddies did not rotate in opposite directions on each side of the jet, and so nearly cancel out each other’s sound.

Even so, the jet-caused eddies are so strong and move so fast that their noise power can be measured in thousands of watts. Rocket engines in the bigger space-launch vehicles produce millions of watts of sonic energy, compared to the one or two watts of a powerful hi-fi set.

Dr. Powell’s theory has the rigorous mathematical support necessary to any theory of aerodynamic noise.

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SURGERY

**Measure Body Radiation
With Hypodermic Needle**

► A SENSITIVE NEW needle, as small as a hypodermic, to measure radiation in the living body has successfully passed its first tests in delicate brain surgery.

Key to the small size and high sensitivity of the medical probe is a “solid-state” device related to the transistors that have so reduced the size of radios and television sets.

The solid-state device has several advantages over the Geiger counters now used to measure internal radioactivity.

1. It can be made in nearly any desired shape, including a pill that can be swallowed.

2. It does not present any hazard of explosion in the operating room.

3. If it breaks by accident while embedded in live tissue, the six volts needed to operate are not harmful, whereas the 900 volts required to operate a Geiger counter would kill a patient.

4. It is smaller than a Geiger counter.

In brain surgery, the device has been

used to pinpoint accurately the location of a tumor. Its measurement of radiation is recorded as audible clicks by an instrument about the size of a lunch box. The radiation rate can also be recorded on a meter or a moving drum.

Between the hypodermic needle and the recorder is a small amplifier to step up the signals generated by the tiny solid-state device.

The new needle is available in two sizes, one millimeter in diameter and five millimeters long or three millimeters in diameter and seven millimeters long. The larger is even more sensitive than the smaller one.

The medical probe was developed by a team of scientists at Solid State Radiations, Inc., Los Angeles, and first used about two months ago. It is now being further tested in several hospitals around the country.

The device will measure beta, gamma or alpha radiation. Its development was an outgrowth of research under a contract with the National Aeronautics and Space Administration to build a radiation dosimeter that astronauts could wear on their space suits.

Dr. Stephen Friedland, one of the scientific team, said the device could be useful in studies of the general circulation and operations in the gastrointestinal tract.

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CRYSTALLOGRAPHY

**Method Found to Grow
Nearly Perfect Crystals**

► A NEW METHOD for growing nearly perfect crystals has been discovered.

It is called the vapor-liquid-solid mechanism, or VLS, because matter in all three states enters into the crystal growth. The method was developed by R. S. Wagner and W. C. Ellis of Bell Telephone Laboratories.

It can be used to grow almost any kind of crystal form at temperatures much lower than those now used for vapor-phase crystal growth. The technique is believed to be particularly valuable for semiconductor, laser, magnetic and piezoelectric devices, which require precisely grown crystals.

VLS growth occurs when a droplet composed of a saturated solution of the desired crystalline material and an impurity receives atoms from a vapor and deposits these atoms at the junction between the droplet and a crystalline substrate.

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CHEMISTRY

**New Fuel Developed for
Rockets More Energetic**

► A NEW FUEL will be used in the rockets that steer spacecraft. A Shell Oil Company team under contract to the National Aeronautics and Space Administration has developed a catalyst that makes possible efficient use of the rocket fuel hydrazine.

Hydrazine is 50% more energetic than the fuel now used. It can even be used on rocket belts to allow workers to move about in space.

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IN SCIEN

OPTICS

**New Glasses Darken
As Sky Brightens**

► EYEGLASSES THAT automatically darken as the light intensity increases are now being produced. One pair of glasses may soon double as sun-glasses in bright light.

Remarkably, they lighten when in the shade.

Still in an experimental stage, the glass is produced by Corning Glass Works, Corning, N. Y. It contains submicroscopic crystals of silver halide which are light sensitive. They can repeat their darkening and clearing cycle indefinitely.

Possessing all the properties of ordinary glass, these materials are abrasion resistant, smooth, very hard and dimensionally stable. Like other glass, it is impermeable to oxygen and moisture.

Light-sensitive properties are possible in a variety of types of glass, making their use feasible in many different areas.

Such a glass would be ideal for windows and face-plates exposed to the sudden and violent light changes encountered in space. Used in store windows, it would automatically adjust to prevent fading.

The National Aeronautics and Space Administration is studying a similar glass, which they call phototropic glass. It is sensitive to ultraviolet rays and it would protect space travelers from sudden streams of dangerous radiation.

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ZOOLOGY

**Whales Die on Beaches
If Echo Sounding Fails**

► WHEN WHALES founder and are stranded on beaches and die, it is because they have lost use of their built-in echo-sounding systems due to shallow water.

This theory was developed in Holland after study of the records of 133 mass whale strandings in different parts of the world.

Whales cannot screen the echo pings from each other while they mill around close together. Their echo-sounding ability is scrambled or becomes useless also when their heads rise out of the water. Most strandings have occurred on gently sloping beaches, on broad, shallow flats, or in shallow bays or estuaries.

The whale emits a wide variety of sounds, including ultrasonic clicks which he apparently uses in the same way seamen use sonic “pings” to locate fish and determine depths.

These sounds, the scientist believes, enable the whale to avoid collisions, maintain orderly formations, navigate and find prey. Scientists suggest whales use these sounds to communicate with each other over vast distances.

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CE FIELDS

PSYCHOLOGY

'Democracy' in Offices Better Than 'Autocracy'

► "DEMOCRACY" IN A LARGE office may produce more efficient operation than "autocracy."

Dr. Richard P. Barthol, psychologist at the University of California, Los Angeles, surveyed a big office operation that was plagued by a large turnover of personnel and a high absenteeism rate.

He found that the office had a highly autocratic supervisory system. Rigid conformity to rules of behavior during office hours was demanded. For example, no conversation on personal matters was allowed. Decisions affecting personnel, including vacation schedules, were made by supervisors without consulting individuals involved.

As an experiment, rules on personnel behavior were relaxed. Some personal conversation was permitted, and employees were invited to participate in decisions affecting them. For example, they helped formulate their own vacation schedules.

It was found that this trend toward "democracy" in the office reduced personnel turnover by 29%. Absenteeism decreased by 30%.

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PSYCHOLOGY

Nobody Really Thinks, Dr. Gallup Concludes

► AFTER YEARS of polling the thoughts of others, Dr. George Gallup has concluded that nobody is very good at thinking.

In his new book, "The Miracle Ahead" (Harper & Row, \$3.95), the director of the Gallup Poll public opinion service, foresees "a breakthrough for mankind comparable to the extraordinary achievement of the ancient Greeks"—provided people will learn to use their heads.

Not only is there something wrong with the way each of us thinks individually, Dr. Gallup says, but also there are built-in flaws in most of the institutions we have formed for making group decisions.

Each person uses only a tiny part of his mental capacity, Dr. Gallup concludes, after polling anthropologists and brain experts.

To illustrate the shortcomings of our group decision-making system, Dr. Gallup asks the reader to imagine what would have happened had there been no secrecy involved in the project to build an atomic bomb.

He doubts that the bomb would ever have been made. There would have been too much confusion and opposition as officials and congressmen vied for special interests.

Dr. Gallup's solution is to revise the educational system. He would eliminate throwing hodge-podges of facts at children for

memorization. Instead, children would learn problem-solving in fields varying from mathematics to social sciences.

He also would replace many decision-making institutions with junior versions of the Peace Corps. Dedicated citizen volunteers, he believes, often can come up with wiser solutions than can groups of specialists having vested interests.

For everyone's thinking, Dr. Gallup advocates a "new methodology" in which mass surveys, statistics and computers are the chief tools.

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BIOLOGY

Mars Pollution Unlikely With Sterilized Probes

► IF A STERILIZED spaceship would smash on Mars, there is only a one-to-10,000 chance that a microorganism would be found in the debris.

It is so important that earth microbes do not contaminate the Martian planet that microbial contamination on U.S. spaceships is being reduced to the lowest possible level, stated Dr. Carl W. Bruch, bioscience division of the National Aeronautics and Space Administration.

Earth microbes could seriously contaminate Mars, or be picked up by our instruments for detecting life there and thus confuse the whole issue, perhaps permanently, Dr. Bruch told the American Institute of the City of New York in New York.

A special quarantine officer has been assigned to NASA to study the problem of sterilizing and decontaminating our space vehicles. Sterilization of spacecraft is not an easy matter. They can be sterilized only if attention is given at all stages of design and construction.

By the same token, any spacecraft returning to earth after a planetary landing may carry microbes or spores of a dangerous character to earth.

"Probably the microbes would find the terrestrial environment too hostile," he said, "but if by chance this was a heaven awaiting them, they might utilize all earthly life as a medium for Martian growth."

The chance is unlikely, he believes, but it cannot be ignored.

Dr. Bruch stated that the search for life outside the planet earth is the most challenging and profound issue to come from the scientific movement characterizing the history of Western thought for the past 300 years.

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SPACE

Satellite Gets Bird's Eye View of Sun

► A SATELLITE to study the sun will have unprecedented pointing accuracy with a new sun sensor which controls pitch, roll, and yaw. The advanced orbiting solar observatory (AOSO) satellite will orbit over the poles for a full year, giving scientists the most accurate view ever obtained of the sun's surface.

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METEOROLOGY

Lightning Strokes Found To Come in Two Sizes

► LIGHTNING FLASHES come in two sizes, one about one-tenth of an inch in diameter and the other about an inch in diameter, an experiment in Arizona has shown.

The lightning striking two television towers atop Mount Bigelow near Tucson, Ariz., left the two classes of holes, one ten times the size of the other.

The diameter of lightning was found by measuring the size of the hole melted in a Fiberglas screen placed around the six lightning rods on the two TV towers. When the screens were removed for observation, 12 strokes were found to have melted holes in the screens between July and September, 1963.

Diameters of the holes formed were either from eight-hundredths to two-tenths of an inch, or from eight-tenths of an inch to 1.3 inches.

Martin A. Uman of the University of Arizona, who made the measurements, praised stations KVOA-TV and KGUN-TV for their cooperation.

Details of the experiment were reported in the Journal of Geophysical Research, 69:583, 1964.

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MEDICINE

New Cystic Fibrosis Center in Los Angeles

► A NEW Cystic Fibrosis Regional Care, Research and Teaching Center has been established at the University of California at Los Angeles Center for the Health Sciences.

The new Center, under the direction of Dr. Arthur J. Moss, UCLA pediatrician, was made possible by a grant from the National Cystic Fibrosis Research Foundation.

Cystic fibrosis is an inherited disease affecting the glands of external secretion, including the sweat, saliva and mucous glands, Dr. Moss pointed out. Thick, gluey mucus clogs the lungs and sometimes the digestive tract and other parts of the body.

Without early diagnosis and intensive medical and home treatment, half the children born with cystic fibrosis die before they are five years old. But when the disease is caught and treated in its initial stages, patients survive into their teens and beyond.

Dr. Moss said that, in addition to increased patient care, the new facility would provide a broad research program aimed at improved treatment for the disease.

A special heart laboratory will provide electrocardiograms, vectorcardiograms (a sort of three-dimensional ECG) and heart catheterization studies, in which a tiny tube is pushed through veins to the heart to measure pressure in the chambers and large vessels emanating from the heart.

Another laboratory will provide a battery of tests of lung function. A third laboratory will analyze the gas content (oxygen and carbon dioxide) of the blood of patients.

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