

NEUROLOGY

Brain, Not Air, Makes Vocal Cords Vibrate

► NERVE IMPULSES coming from the brain, rather than air moving in the larynx, make the vocal cords vibrate and produce sound.

Evidence supporting this controversial new theory of human speech has been found by French scientists, Dr. Esti D. Freud, a New York voice teacher, reports in the *Archives of Otolaryngology* (Jan.), published by the American Medical Association.

According to long accepted theory, exhaling air from the windpipe causes the thyroarytenoid muscle to vibrate and thus set up vibrations of the vocal cords.

The French experiments, though, have shown "beyond doubt" that vocal cords vibrate in the absence of an exhaled current of air, and that the vibrations seem to be governed by excitations from a nerve in the larynx or voice box.

This means the exhaled air current cannot be considered the cause of the vibrations of the cords, but only as a sound-carrying medium. The French scientists have also shown that singing and speaking, which produce different vibratory patterns in the vocal cords, originate in different centers of the brain, even though they are both executed by the vocal cords.

This helps explain why persons who stutter or who have lost their ability to speak can still sing without difficulty, Dr. Freud reports.

It also helps explain why a person with a tenor singing voice may speak with a very deep voice.

Dr. Freud is a daughter-in-law of the late Sigmund Freud and is associated with New York Hospital, New York, and a Veterans Administration mental hygiene clinic in Newark, N. J.

Science News Letter, February 15, 1958

ENGINEERING

Phone Calls and TV To Go Simultaneously

► TELEVISION PROGRAMS and private telephone conversations can be transmitted together over long distances by a single radio relay system now being built in Canada, the American Institute of Electrical Engineers meeting in New York learned.

The "stacking" or "double decking" of telephone and television circuits proved to be "entirely feasible and economically attractive" in tests of a limited number of circuits over ranges of 200 to 1,000 miles, a team of engineers reported.

A system based on the test results will span Canada from Halifax to Victoria as an answer to the problem of providing network TV service as well as long-distance telephone communication to a number of widespread cities requiring only a few circuits to meet their demands.

A series of tests started in 1954 was reported by H. E. Curtis, Bell Telephone Laboratories, New York, and U. C.

Strahlendorf and A. J. Wade, Bell Telephone Company of Canada, Montreal. The first successful experiment was conducted over a 1,134-mile TD-2 radio relay route, using standard television and telephone terminal equipment.

In such an operation, the telephone and TV signals are mixed at the transmitter and unmixed and sent their separate ways at the receiver.

Earlier, the first successful use of "over-the-horizon scatter links" for TV transmission between Miami, Fla., and Havana, Cuba, was described to the meeting.

A TD-2 microwave system is also involved in the Miami-Havana operation reported by K. P. Stiles, F. G. Hollins and E. T. Fruhner, American Telephone and Telegraph Co., New York, and W. D. Siddall, Radio Corporation of Cuba, Havana.

Telephone, as well as television, signals are transmitted, the engineers said.

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METEOROLOGY

Urge Establishment of National Weather Lab

► ESTABLISHMENT of a large national weather laboratory to examine such basic problems as how accurately forecasts can be computed with electronic "brains" has been recommended to President Eisenhower.

The Committee on Meteorology of the National Academy of Sciences has prepared a report strongly urging the need for such facilities, estimating their cost at \$50,000,000. Research in meteorology is at present very restricted by the lack of large-scale equipment to find out, for instance, how raindrops form in clouds, the committee concluded.

Although adequate tools for basic weather research are lacking or limited, nature provides many fascinating clues to her weather mysteries. The bigger and better research instruments that would be available at a national weather laboratory are needed because the scale of weather is world-wide.

For instance, aircraft with precise instrumentation are required to explore the properties of hurricanes in the Caribbean and Atlantic, typhoons in the Pacific, and tornadoes in the great land areas. Aircraft are also required to measure the fueling of the atmospheric heat engine in the equatorial regions and the escape of heat near the poles.

Satellites must be put on patrol to observe continuously the earth's heat balance and small local fluctuations in the balance. They can also chart the formation and movements of large cloud systems.

Design and control of such precisely instrumented aircraft and earth satellites, and analysis and interpretation of the data collected by them require a major and continuing effort. Rain towers, wind tunnels and very fast computers are essential to this effort.

Dr. Lloyd V. Berkner, president of Associated Universities, Inc., which administers Brookhaven National Laboratory, is chairman of the Academy's meteorology committee.

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IN SCIENCE

GEOPHYSICS

Yeast in Satellite Shows Weightless Reproduction

► THE YEAST to be sent circling the earth in one of the U. S. satellites will show whether weightlessness affects its reproduction rate.

The exact variety of yeast to be used has not been revealed, but it will be much like that found in a local grocery store.

To determine the yeast's reproduction rate when weightless in space, scientists will measure the pressure of gas evolving from it, radioed back by code from instruments in the satellite. This pressure will be compared with that from samples of the same yeast culture kept under controlled conditions in a laboratory.

One of the comparison samples will be allowed to multiply at its usual rate. Another sample will be subjected to the same temperature changes and radiations that the satellite yeast is thought to be receiving as well as these conditions can be simulated in the laboratory.

In this way, scientists will be able to determine if being weightless changes the rate of reproduction. They may also be able to determine the effects of the strong radiations in space on growth.

The yeast experiment is a bonus one, and will be done only in the six-inch test spheres sent orbiting around earth by the Navy, according to the present plans. The experiment was chosen because both the yeast and the equipment for containing and measuring the pressure of the gas evolved could be made very lightweight.

Satellites launched by the U. S. in coming years will also carry biological experiments, although only physical ones are now planned for the International Geophysical Year.

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BIOCHEMISTRY

Coal Analysis Points To First Amino Acids

► ANTHRACITE, one of the oldest fossils known, has been analyzed and found to contain three amino acids. This suggests that these amino acids, aspartic acid, glutamic acid and glycine, may have been the first ones formed and the last to decompose in living organisms.

F. Heijkenskjold and H. Mollerberg, department of clinical biochemistry at Karolinska Sjukhuset, Stockholm, Sweden, report finding a "relative proportion" of 12% aspartic and 40% glutamic acids and 48% glycine. It is highly probable, the scientists report, the acids were the original proteins.

Their analysis, reported in *Nature* (Feb. 1), points to the existence of amino acids in fossils 250,000,000 years old.

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CE FIELDS

AGRICULTURE

Atom Agriculture Extends Fruit-Bearing Time

► THE USE of atomic radiations upon plants, one of the major fields of biological investigation detailed in the 23rd semi-annual Atomic Energy Commission Report to Congress, is bearing fruit, literally.

Peach trees that ripen fruit ten days earlier than the stock from which they came are expected to result from a beneficial mutation that has appeared in trees exposed over a long period to gamma radiation in a field at Brookhaven National Laboratory, Long Island, N. Y.

In experiments begun in 1952, the trees were grown in the radioactive fields for one to three years, then returned to normal growth after which they are inspected for beneficial changes in their genes caused by the atomic radiation bombardment.

One branch on a Fairhaven peach tree tested at Rutgers University bears fruit that ripens approximately ten days earlier than the rest.

The radiation effects can also work in the other direction as a branch on a different tree ripens its fruit some three weeks later than normal.

These mutations were first observed in 1956 and confirmed a year later.

Taken together, the two mutations promise to increase by more than a month the season over which the fruit can be available. Buds from these mutations will be grafted on other trees and when enough of the new types are grown they will be tested to see if they are satisfactory for general commercial use.

In other radiation experiments on plants, disease-resistant strains have been obtained in wheat, oats and flax. Dwarf forms with high yields have been observed which should suffer less wind damage than customary strains. Seeds and pollen as well as entire plants are also being radiation treated.

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VIROLOGY

Tumor Viruses in Humans May Be Masked

► THE FAILURE to isolate viruses from human tumors does not rule out the possibility that the tumors are virus-induced.

This has been shown in studies with chickens and turkeys by Drs. Vincent Groupe and Frank J. Rauscher at Rutgers University, New Brunswick, N. J.

Cancers caused by "Rous sarcoma virus" can be induced in chickens or turkeys when the birds are injected with cell-free minces of chicken tumor tissue. The same virus can then be isolated in the chicken tumors but not in turkey tumors.

This phenomenon, Drs. Groupe and Rauscher explained, is called "masking." It suggests that the virus, although present in the turkeys, is either non-infectious or obscured.

The same phenomenon may be taking place in humans. If human cancer viruses exist, the scientists point out, they may follow the same patterns as animal cancer viruses, and are being masked.

The problem of isolating tumor viruses in humans is further complicated by the fact that even known tumor viruses cannot now be recovered in a chicken population in which the incidence of this specific cancer is as low as cancer in humans.

Substances that kill viruses are known to exist in various body tissues and fluids, however, and Drs. Groupe and Rauscher are studying their role as possible inhibitors in the phenomenon of masking.

Their work is being supported by the American Cancer Society, the National Institutes of Health and the Rutgers Research and Educational Foundation.

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MEDICINE

New Research Supports Hope for Cancer Vaccine

► EVIDENCE that a vaccine against human cancer may become a reality sometime in the future was reported by the American Cancer Society.

Dr. Alex B. Novikoff, Albert Einstein College of Medicine, Yeshiva University, New York, has made rats resistant to a transplanted cancer with cell material that, by itself, does not cause cancer.

The work has no practical application to human cancer at present, however.

The antigenic material used, which apparently acts like a vaccine, was extracted from a deadly transplanted tumor that tunnels through tissues, spreads rapidly to distant parts of the body and kills the rat in five to seven days following inoculation. The material was spun out of the cancer cells and comprises less than six percent of their mass.

It completely protected seven of eight animals inoculated with live cancer 14 weeks after injection of the cell material. All "unvaccinated" controls died of cancer on schedule.

The effective cell material is known as the "microsome fraction" of the cancer cells. Microsomes are tiny particles believed to manufacture protein and other cell substances.

The exact chemical nature of the active part of the "vaccine" is unknown.

Several other scientists have "vaccinated" animals against specific cancers, but they usually transplanted whole cancer cells, permitting them to grow for a week or two before removing them and nearby tissues surgically. Only in two cases, both with virus-caused cancers, has partially successful vaccination been achieved by other means.

The research was supported by the American Cancer Society, New York, and the National Cancer Institute, Bethesda, Md.

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ENGINEERING

Heat Pumps Now Work Well in Cold Climates

► HEAT PUMPS, machines that extract and circulate heat from the air, water or ground, are now available for use in very cold climates.

Until recently it was thought that the pumps, which use no conventional fuels and operate in a manner similar to the household refrigerator, would be useful only in moderate or warm climates.

A heat pump providing winter heating and summer air conditioning for homes and businesses in cold climates was described to the American Institute of Electrical Engineers meeting in New York by Robert G. Werden, York Corp., subsidiary of Borg-Warner Corp., Chicago.

The pump is capable of drawing heat from the air, or from water in wells, during 20-degree-below-zero Fahrenheit weather, he said.

No matter how cold the weather may be, the air, ground or unfrozen water, such as in wells and moving streams, still contains considerable heat. This heat is extracted and circulated through buildings in much the same manner as the kitchen refrigerator draws heat from foods and pumps it outside the food storage area.

Most heat pumps, including the one described by Mr. Werden, can be reversed to act as air conditioners during warm weather.

Although they burn no coal, oil or gas, heat pumps, like refrigerators, do require electricity to keep the heat-carrying air or gas in circulation.

The new heat pump operates best in extraction of heat from water, Mr. Werden said, but also is available in an air extraction model.

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PHYSICS

Vibration Makes Symmetrical Snow Flakes

► VIBRATION is the secret of how each arm of a snow flake or crystal "knows" what the others are doing and duplicates their pattern.

S. Tolansky of Royal Holloway College, Surrey, England, explains the remarkable symmetry of a six-ray, star-shaped snow flake as the result of each flake's vibrating mechanically as a flat plate.

Water vapor molecules are constantly bombarding a snow flake and are less likely to stick to parts that are in "violent motion." Where the molecules do adhere they exert a damping effect on the vibrations, slowing them down, and more molecules tend to collect in the same spot.

Each arm of the snow flake feels the damping effect at the same time. This means, the scientist reports in *Nature* (Jan. 25), that growth is symmetrical since water molecules collect on each arm in identical places.

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