

ACOUSTICS

Passing Sound Through Gases Helps Study of Molecules

Water Inspires Oxygen Molecules to Pick Up Sound Waves Making Hearing Difficult in Atmosphere of Oxygen

IT IS LUCKY we do not live in an atmosphere of straight oxygen—at least in weather of desert humidity. We would not be able to hear sounds of high pitch at any considerable distance. Recent investigations carried out in the University of California at Los Angeles suggest that the excessive absorption of sound in air of certain humidities is due to collisions between oxygen and water molecules. Prof. Vern O. Knudsen described to the meeting of the Acoustical Society of America at Washington, the Los Angeles experiments, in which Dr. H. O. Kneser, visiting physicist from the University of Marburg, cooperated.

Sound travels freely through chemically dried air, particularly at low temperatures, according to the electrical recording instruments of the California laboratory. Perhaps this accounts for the common opinion that audibility is keen on a clear, cold night. The introduction of small quantities of moisture promptly damps off the sound, especially tones of high pitch. Peculiarly, this phenomenon does not occur when pure nitrogen is substituted for the air, in spite of the fact that air is nearly 80 per cent. nitrogen. A shift to pure oxygen in the experiment reveals this latter gas as the guilty party. But oxygen alone is rather ineffective. Water vapor must also be present to affect the sound waves.

Drs. Knudsen and Kneser find their experimental records in agreement with the theory that the water molecules catalyze, or inspire oxygen molecules to pick up sound waves, convert them into heat or other motion, and thus destroy the sound. The extent to which all this occurs varies greatly with the frequency or pitch of the sound. Peculiar results may thus turn up. For example, the consonants in spoken words, which in general are of high frequency, are damped off more than the vowels of low pitch. Or in the symphony orchestra concert, if the humidity is at a certain value—not too high or too low—

the message from the piccolo gets lost before it gets to the rear of the hall. Thus arises one more good argument for the new art of air-conditioning in public buildings.

More important, possibly, than the acoustic applications, is the possibility of interpreting molecular chemical reactions from the behavior of sound waves. Heretofore the vibrational responses of atoms have been supposed to require the enormous frequency values of light—whence the modern science of spectroscopy. Now it appears that even sound waves, counting but a few score or a few hundred per second, have a definite relation to intramolecular forces. Preliminary experiments by Dr. Knudsen on ammonia, hydrogen sulfide and other gases show decided variations in behavior of the different chemical species. Thus we have a new mode of attack on the age-old mystery of molecular composition and the behavior of objects too small to be seen individually.

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IMMUNOLOGY

Injected Poison From Germ May Prevent Pneumonia

PNEUMONIA attacks may be warded off by hypodermic injections of the poison produced by the pneumonia germ, it appears from studies by Dr. Arthur F. Coca of Cornell University Medical College.

"The pneumococcus (pneumonia germ) produces a substance which is highly poisonous for human beings but much less so for lower animals" he explained.

Apparently this toxin may be the important injurious agent of the pneumococcus, in which case Dr. Coca's experiments indicate that it will be easy to give people resistance or immunity to



ANCESTOR OF AUTO MASCOT

ARCHAEOLOGY

Lucky Fish Found In Abraham's Town

IF YOU HAVE a bird, beast, or fish perched on the radiator cap of your car, take a look at the ancestor of modern sporty mascots in the picture on this page. It is a good-luck fish unearthed at Abraham's home town, Ur of the Chaldees, and it brought luck to somebody in Abraham's day.

The Chaldeans had no roadsters. They used fish mascots around the temples to the God of Running Water. A fish was a symbol of fertility, and they hoped to bring fertility to the fields by special charms. (*Turn Page*)

pneumonia as is now done for smallpox, typhoid fever and diphtheria.

When this poison or toxin is injected into human beings, an antitoxin is formed in the blood which enables the individual to resist the toxin, giving him what physicians call immunity to it. Two injections of toxin produced immunity in two-thirds of the susceptible children within three weeks, Dr. Coca reported.

Patients recovering from pneumonia are almost always immune to the toxin, skin tests showed. Their blood serum has been found to neutralize the toxin.

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This fish from Ur is one to inspire fish stories. It is 4000 years old, and therefore may claim the record to be the world's oldest fish—pending the appearance of a rival for the championship. It is also the biggest of its sort archaeologists have found. It is a carp and made of terra cotta.

The good-luck fish has been brought to the Museum of the University of Pennsylvania from Ur, where the Museum and the British Museum have been excavating. Miss Louise Cross of the University Museum staff is holding the lucky fish.

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MEDICINE

New Disease Caused By Yeast-Like Organism

A CASE of a new and unique disease, caused by a yeast-like organism, was reported by Drs. G. H. Hansmann and J. R. Schenken of Iowa City to the American Association of Pathologists and Bacteriologists meeting in Washington this week.

The patient was a white man, forty-three years old at the time of his death, according to the doctor's records. For the last 16 years of his life he had suffered from a refractory skin ailment. This first appeared on the skin back of his knees in 1916. By 1929 the entire skin was involved. The ailment consisted of a scaly inflammation, underneath which the skin was somewhat thickened and reddened. During 1929 the skin became more reddened and thickened and cracked easily. In June of 1932 hard elevated spots, something like pimples, appeared. Late in July the patient developed a high fever with signs of pleurisy, and died on August 7.

Examination of one of the elevated spots from the skin and of one of the lymph nodes, which had become enlarged, showed that both contained a small organism which appeared as a small yeast. This same organism was also found in the lungs and adrenal glands.

Guinea pigs, rabbits, rats and dogs develop the same sort of skin disease when infected with this organism.

The yeast-like organism causing the disease is smaller than any heretofore described and probably belongs in the *Oidium* group, the Iowa City investigators told fellow-scientists. The character and distribution of the lesions in man are unlike any other disease.

Science News Letter, May 13, 1933

AVIATION

Faster Flying, Slower Landing Airplanes Being Achieved

TOMORROW'S flying machine will fly technical circles around the airplanes of today, just as 1933 models are superior in engineering, speed and economy to airplanes of a few years ago.

Aviation's experts have just been allowed to peer behind the scenes of America's future in the air through the annual inspection trip of the Langley Field, Va., research laboratories of the National Advisory Committee for Aeronautics.

Working with the world's largest wind tunnel, the world's most advanced testing tank and a score of other unique research devices, several hundred engineers and scientists are conducting there for Uncle Sam the world's most effective attack on aeronautical problems.

The major problem confronting airplane designers is, paradoxically, how to make ships that will fly faster and land slower. In the past five years, airplane speeds have been increased by some 30 to 50 per cent., for example, from 120 to 170 miles per hour, by the simple economical procedure of making the airplane easier to shove through the air by reducing its resistance or "drag." A cowling or shield for aircooled engines developed by the National Advisory Committee for Aeronautics a few years ago is now practically standard equipment on all airplanes, and it alone when added to an airplane jumps up its speed some 20 miles per hour. The N.A.C.A. engineers have also found through wind tunnel tests the best place to locate engines on various kinds of multi-engined airplanes and again many miles per hour have been added to speeds.

Now the N.A.C.A. engineers are combating "parasitic drag" still further by streamlining parts of the airplane. Special attention is being given to the junction of the wing and the fuselage. By "fairing" this joint so that air flows over it smoothly instead of creating wasteful turmoil, additional thousands of dollars yearly will be saved to the industry and the public.

Little projections protruding from airplane wings often cause large losses in unnecessary resistance to the air. Years ago the N.A.C.A. showed that a piece of piano wire is as hard to push

through the air as a large strut properly streamlined. Now it has been demonstrated how much of a drag rows of rivets or round-headed tacks on the wings create. Nine rows of rivet heads on a wing of 300 square feet area, use 30 horsepower when the plane is traveling 200 miles per hour.

Because cruising speeds have been increased so markedly through making the drag less, there is now difficulty in obtaining landing speeds sufficiently slow to be safe, that is, not more than 60 to 70 miles per hour. Auxiliary wings and devices of various sorts are being developed in order that the pilot when about to land can convert with the throw of a lever his airplane into a slower craft of higher lift. In a sense, these safety "high-lift" devices are "brakes" in the air, although the problem is complicated by the necessity of arranging them so that control of the airplane is not lost at the lower speeds.

One of the many combinations devised and tested in the N.A.C.A. wind tunnels is a combination of the Handley Page slot and the Fowler wing device. This increases the maximum lift to nearly three times that of the ordinary wing to which these devices are attached.

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PHYSIOLOGY

Study on Catfish Shows How Nerve Dies

THE HUMBLE catfish has served the cause of science by giving neurologists a chance to study at leisure what happens when a nerve is cut. Changes in the injured nerves of warm-blooded animals take place too rapidly to give a good picture, so the cold-blooded fish was called into service by Prof. G. H. Parker and V. L. Paine of Harvard University.

They found that when a nerve is cut, degeneration sets in over the whole part beyond the point of severance, beginning near the cut and proceeding outward. This is contrary to what has hitherto been assumed to be the case with injured nerves.

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