

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

**I**T 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

**P**NEUMONIA 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

**I**F 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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