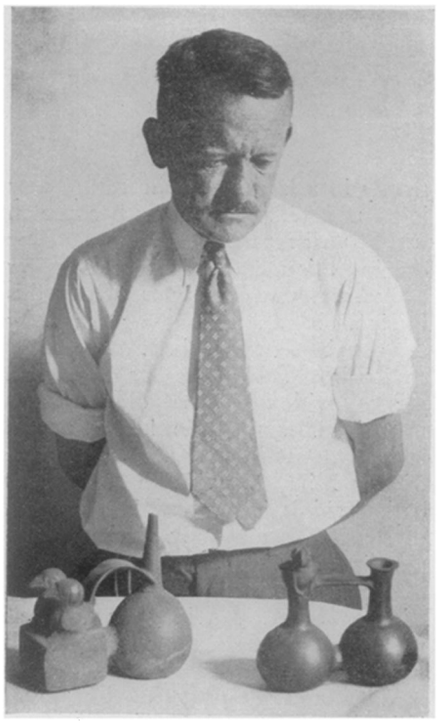

THEY STILL WHISTLE

Despite their age of almost one thousand years, these whistling jugs from ancient Peru still whistle when they are moved about. Change in water level within the jugs forces air through a whistling device. Dr. John Alden Mason, curator of the American division of the University of Pennsylvania Museum, is regarding his recent acquisitions.

most abundant in a layer about eight miles above sea level.

Ozone is a form of molecular oxygen that has three atoms of oxygen to each molecule instead of two as in the common oxygen necessary to support life. It has a peculiar sharp odor and is usually produced by high-voltage electrical discharges. Engineers in high-voltage generating plants often suffer from severe headaches supposed to be due to too great a concentration of ozone in the air.

Estimates of the height of this layer are based upon observations of the spectrum or color of the clear blue sky directly overhead when the sun is either rising or setting. The experimenters state that changes in meteorological conditions affecting the total supply of ozone take place at these great heights and not near the surface of the earth.

Previous estimates of the height of this layer were very unreliable and placed it at about 25 to 30 miles above sea level.

Science News Letter, September 2, 1933

CHEMISTRY

Dead Seas Hoard Minute Amounts of "Heavy" Water

Borax Beds, Dead Sea and Great Salt Lake Are Reservoirs; Excess Weight Proportioned Between Hydrogen and Oxygen

THE NEW "heavy" water, science's latest strange addition to common chemical substances, has been found in detectable quantities in the salt deposits at the bottom of extinct stagnant seas.

Dr. E. B. Washburn, chief chemist of the Bureau of Standards, has announced that the richest natural source of this peculiar type of water is to be found in native borax, a salt that exists in the beds of dead seas. The water of crystallization of this native borax contains seven parts of heavy water in every million parts of ordinary water.

Samples taken from the largest existing bodies of stagnant water, the Dead Sea in Asia Minor and the Great Salt Lake in Utah, when purified showed an increased weight over pure ordinary water. The Dead Sea water was heavier by two parts in a million and the Great Salt Lake sample was three parts in a million in excess of standard light water.

These natural sources of heavy water do not begin to compare in concentration with those prepared in the laboratory by Prof. Gilbert N. Lewis, distinguished chemist at the University of California. Prof. Lewis has succeeded in preparing heavy water that is 35,000 parts per million heavier than ordinary water. Recently he has shown that pure heavy water will prevent the sprouting of tiny tobacco seeds and is determining now whether the seeds subjected to these tests were actually killed or only inhibited.

Dr. Washburn explained the presence of heavy water in stagnant seas as due to the faster evaporation of light water. The strange heavy component lags behind and in the course of thousands of years the remaining water becomes richer and richer in heavy water. The native borax that gave the highest concentration presumably came from a sea that was very old and had very few sources of fresh water.

Heavy water, like all water, has two atoms of hydrogen and one atom of oxygen. But either the hydrogen or the oxygen atoms, or both, in the heavy water have heavier hearts or nuclei than the common hydrogen or oxygen nuclei present in ordinary water. These rare types of hydrogen and oxygen are known as hydrogen isotope of mass two and oxygen isotopes of masses eighteen and seventeen. Part of the increased weight of the heavy water is due to the heavy hydrogen atoms and part is due to the heavy oxygen. The discovery of heavy hydrogen was made only two years ago by Prof. H. C. Urey and Dr. G. M. Murphy of Columbia University and Dr. F. G. Brickwedde of the U. S. Bureau of Standards.

Just how much of the increased weight of heavy water is due to heavy-weight hydrogen and how much to heavy-weight oxygen has been shown by Prof. Gilbert N. Lewis of the University of California in a communication to the *Journal of the American Chemical Society*.

All water molecules are composed of two atoms of hydrogen and one atom of oxygen, H_2O. But there are two kinds of atoms of hydrogen and three kinds of atoms of oxygen. The different atoms of any one element have different weights because (*Turn to Page* 156)

ENGINEERING

Idle Boilers Protected From Rust With Ammonia

RUSTING of idle steam boilers may be overcome by the use of gaseous ammonia, is the statement of the Merseburg ammonia works of the large German dye manufacturing company I. G. Farbenindustrie.

Boilers that are to be shut down are blown dry with air as completely as possible and then filled with ammonia gas from a pressure container. The ammonia reacts with the remaining water in the boiler to form rust-proof surfaces. These compounds can be removed from the surface by flushing the boiler with water.

Science News Letter, September 2, 1933