



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, H₂O. 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

States had clear skies. The number of meteors actually counted does not represent the true number falling into the earth's atmosphere for the moonlight reduced the chances of seeing very faint ones. Astronomers can make allowances for this and arrive at an estimate of the total number of meteors in the shower.

Several local programs for the determination of the heights of the meteors by simultaneous observations from two stations were ruined by clouds but it is the hope of the American Meteor Society that western plans had more success although reports have not yet been received.

The Society believes that many thousands of people observed the Perseid shower this year and points out that popular interest in meteoric astronomy is continually growing.

Science News Letter, September 2, 1933

PALEOBOTANY

Fern Prints Left In Lava That Killed Them

MOLTEN LAVA, so hot as to destroy in a moment any living thing it flows over, has nevertheless become a record book of ferns that once grew on the slopes of the great volcano Kilauea. The story of these "volcano fossils" is told by John E. Doerr, Jr., naturalist of Hawaii National Park.

One hundred and one years ago, a lava flow broke out on Byron's Ledge, a wall-like isthmus separating the craters of Kilauea and Kilauea Iki. The shallow streams of lava running down the wooded slope into Kilauea Iki destroyed all vegetation in their pathway, leaving them covered with black, shiny tongues of the hardened material.

A recently made trail cuts through some of these century-old lava sheets, the thinner ones of which can be pried up in slabs. On the under sides of the slabs there are abundant hollow moulds of the stems and leaves of ferns, showing many fine details of their structure, even to the long narrow sori or fruiting-bodies. The vegetable tissue of course has long since disappeared, except for small charred flakes in a few impressions.

Mr. Doerr raises the question whether it might not be worth while to explore the deeper lavas left by older eruptions, for the print of a plant once impressed in the lava should be good for indefinitely long periods of time.

Science News Letter, September 2, 1933

ENGINEERING

Modern Rooms Redecorated By Flip of Light Switch

Three Scenes Are Painted on Same Wall, But, By Skillful Lighting, Only One Shows Up at a Time

VARIETY being the spice of life, modern scientific ultraviolet lighting and special paints have combined to make possible the complete redecoration of a room with a flip of a switch. The usual room setting may be changed at will to that of a luminous Japanese tea garden or again to a dimly lit winter scene in a Swiss chalet.

This is all possible right in the home by the use of special phosphorescent and fluorescent paints illuminated by ultraviolet light. Ordinary non-luminous paints are used for the formal common finish that forms the standard type of decoration. Over these paints it is possible for skilled artists to paint a scene of entirely different design with fluorescent paints of almost any color that will not show in daylight or with ordinary lighting fixtures. Still a third scene may be applied with phosphorescent paints that will glow in the dark.

When the visible light is extinguished and pure ultraviolet light is shone from concealed fixtures the fluorescent and phosphorescent pigments in the special paints begin to shine and the walls are lighted by a soft gentle light. When all the light, both ordinary and ultraviolet, is extinguished the phosphorescent pattern becomes visible. This new home luxury of changing scenes and relaxing atmosphere will soon be in demand.

As usual it is the advertisers who have gone ahead with these schemes. A visitor to the Century of Progress can see many commercial exhibits featuring this new use of the ultraviolet. Wall paper changes its design from a simple geometric pattern in the day to an aquarium design under artificial illumination. A single poster may have three different scenes painted on it. The surroundings of a group of children playing in sunsuits change from a beach in the middle of summer to a modern nursery equipped with sun lamps in the winter.

The development of the "black bulb" ultraviolet lamp brings these properties of certain pigments, known for more

than 300 years, into commercial use. It is similar to the ultraviolet health lamps but is shielded by a dense purple glass that cuts off all the visible light. These lamps may be wired into the ordinary 110 volt electric light circuits and are small enough to be concealed in a hidden fixture. The invisible light that they generate may be directed upon the painted designs.

The phosphorescent paint stores up energy from the invisible ultraviolet light and glows more feebly than the fluorescent paint, so that it does not interfere with the second design. When all the light, both ordinary and ultraviolet, is turned off the phosphorescent paints will continue to shine in the dark in much the same way as luminous dials of watches.

Science News Letter, September 2, 1933

From Page 149

their atomic hearts are different. The H may be either hydrogen isotope of mass one or hydrogen isotope of mass two and the two common types of oxygen are isotope of mass 16 and isotope of mass 18. Light water or nearly all pure ordinary water is made up of the lightest hydrogen isotope one and the lightest oxygen isotope 16. (See Next Page)

MAINTENANCE OF OUR MENTAL ABILITIES

**R
A
D
I
O**

an address by

Dr. Walter R. Miles

Professor of Psychology at
Yale University

To be given Friday, Sept. 8, at 1:45 p. m. Eastern Standard Time over stations of the Columbia Broadcasting System. Each week a prominent scientist speaks over the Columbia System under the auspices of Science Service.

Heavy water is made up of combinations of the heavy hydrogen and the heavy oxygen with the common lighter constituents. In a given sample of heavy water the amount of increased weight due to the strange hydrogen and the amount due to the heavy oxygen has never been known previously.

Prof. Lewis took a sample of water from a still that concentrated heavy water and weighed it. He found that its density was 0.000182 in excess of light water. He saturated it with ammonia when the water was at 0 degrees Centigrade and then pumped off the ammonia when the water was at room temperature. By repeating this process he was able to remove 99 per cent. of the heavy-weight hydrogen. The remaining heavy water now had an excess density of 0.000085, so that the heaviness of the original sample was due to 0.000097 of heavy-weight hydrogen.

He then started again with another sample of the same heavy water and treated it with sulfur dioxide to remove the isotope of oxygen of mass 18. His measurements showed that of the original excess density at least 0.000073 was due to this oxygen.

Adding up the figures for hydrogen and oxygen Prof. Lewis accounted for 0.000170 of the original 0.000182. He states that an improvement of this simple experiment will provide an exact method for the analysis of water containing isotopes of both elements.

Science News Letter, September 2, 1933

BOTANY

Urn Pattern Existed Long Before Urns Were Made

See Front Cover

URNs, whether for flowers or for funeral ashes, have always had much the same pattern; so much so, that the shape immediately and automatically evokes the name. But that shape existed on the earth long before the earliest neolithic potter smoothed out the walls of the first urn with skillful, muddy fingers. Numerous species of plants, and of animals of the lower orders as well, found that it met the problems of their existence admirably. Here, for example, is a kind of puffball that has been making perfect little urns for nobody knows how many millennia, as caught by the lens of Cornelia Clarke's magnifying camera. And here as elsewhere, the shape evoked the name; for the botanist who christened the genus called it *Urnia*.

Science News Letter, September 2, 1933

PHILOSOPHY

Bishop and Scientist Writes on Scientific Theory and Religion

IT IS SELDOM that bishop and scientist are combined in one mind and body. Peculiar interest therefore attaches to the voluminous book *Scientific Theory and Religion*, written by Dr. Ernest William Barnes, the Bishop of Birmingham, (published by Macmillan). Dr. Barnes is a Sc.D. (Cambridge) and he is a Fellow of the Royal Society of London. As Bishop of Birmingham he is, of course, a leader in the Church of England.

The book is an elaboration of twenty lectures delivered at the University of Aberdeen, and they range over all details of space and time, matter and stars, life and evolution, man and mind.

Dr. Barnes' lucid and comprehensive summaries of the present state of knowledge in physics, astronomy and biology are convenient and useful but not controversial in the same sense that his religio-scientific discussions may be.

Clear Beginning and End

For instance, how did the universe originate? The law of entropy, Dr. Barnes points out, points clearly alike to a beginning and to an end of those processes of material change which make life possible.

"Must we then postulate Divine intervention?" Dr. Barnes writes. "Are we to bring in God to create the first current in Laplace's nebula or to let off the cosmic fire-work of Lemaitre's imagination? I confess to an unwillingness to bring God in this way upon the scene.

The circumstances which thus seem to demand His presence are too remote and obscure to afford me any true satisfaction. Men have thought to find God at the special creator of their own species, or active when mind or life first appeared on the earth. They have made him God of the gaps in human knowledge. To me the God of the trigger is as little satisfying as the God of the gaps. It is because throughout the physical Universe I find thought and plan and power that behind it I see God as creator."

Gloomy on Future

As to man's future on earth, Dr. Barnes takes the gloomy viewpoint. When we reflect upon the evolutionary history of animals upon the earth we cannot, because we are human, easily refuse to regard man as the crown and final end of the process, Dr. Barnes writes. Yet he regards man, like the cereals and the orchids, as an episode in evolution. The supreme species today will have become extinct fifty million years hence, just as the horses that multiplied and developed forty million years ago in North America have become extinct on this continent. But Dr. Barnes believes that absolute values are never destroyed and that therefore those which humanity carries must be preserved elsewhere than on this globe.

In discussing the modernist-traditionalist controversy on the virgin birth of Jesus Christ, Dr. Barnes says, "I

CONVENIENCE COUPON

for New or Renewal Subscription to Science News Letter

Send this coupon to Washington while you are thinking of it.

Science News Letter,
21st and Constitution Avenue,
Washington, D. C.

Please start renew my subscription to SCIENCE NEWS LETTER. I am enclosing remittance as checked: 2 years, \$7 1 year, \$5

Name
Street
Address
City and State

If this subscription is a renewal, check here