

CHEMISTRY

Lightest Water Made, and New Record for Heaviest Set

Concentrations of Light and Heavy Hydrogen Isotopes Account for Liquids Slightly Unlike Ordinary Water

THE WORLD'S lightest weight water, containing the lightest sort of hydrogen and the lightest variety of oxygen, has been manufactured in the chemical laboratories of the U. S. Bureau of Standards at Washington.

Last year Dr. E. W. Washburn, chief of the chemistry division of Uncle Sam's great scientific establishment, the Bureau of Standards, made what was then the world's heaviest water. Prof. Harold C. Urey of Columbia University checked the heavy water's composition with the spectrograph. They reported their achievement in the Proceedings of the National Academy of Sciences and exhibited the water at the American Association for the Advancement of Science meeting at Atlantic City last Christmas week. Now Dr. Washburn has made the lightest water known.

The Bureau of Standards heavy water contains increased amounts of hydrogen isotope two and oxygen isotope eighteen. The lightest water contains increased amounts of hydrogen isotope one and oxygen isotope sixteen. Both, of course, consist of one atom of oxygen and two atoms of hydrogen.

Until a few years ago it was not known that there are two kinds of hydrogen, one with just twice the atomic weight of the other. In 1931, Prof. Urey and Dr. G. M. Murphy of Columbia University and Dr. F. G. Brickwedde of the U. S. Bureau of Standards discovered the heavy weight hydrogen. It is also known that there are three weights or isotopes of oxygen atoms, 16, 17 and 18.

Dr. Washburn has just determined several physical constants of his heavy water. The heavy water freezes even when surrounded by ordinary melting ice. Its freezing point is five-hundredths of a degree Centigrade higher than that of ordinary water. Its boiling point is higher and its refractive index is lower.

The new lightest water must have physical constants differing from ordinary water in the opposite direction, but since ordinary water consists almost

entirely of light-weight hydrogen and oxygen the difference between ordinary and light water is much smaller.

Drs. E. R. Smith and Mikkel Frandsen of the Bureau of Standards staff have worked with Dr. Washburn in his current tests on the light and heavy waters.

Ordinary water was the starting point in making both the heaviest and lightest waters. It was discovered that water in the electrolytic cells of oxygen and hydrogen gas plants had larger concentrations of the heavy hydrogen and oxygen. The light hydrogen and oxygen atoms go off as gas first when the electric current breaks down the water. Thus heavier water is left in the electrolytic cells. Dr. Washburn and his associates therefore decomposed water electrically over a long period and thus obtained heavy water. They burned the light hydrogen and oxygen gases to obtain the champion light (*Turn to Page 158*)

MEDICINE

Successful Treatment For Strychnine Poisoning Found

STRYCHNINE poisoning may be cured by two modern sleeping poisons, it appears from a report to the American Medical Association in Chicago, Ill. Successful use of these two medicines in eleven cases is described by Drs. G. F. Kempf, J. T. C. McCallum and L. G. Zerfas of the Lilly Laboratory for Clinical Research, the Indianapolis City Hospital and the Indiana University School of Medicine.

The two modern medicines are isoamylethylbarbiturate, sometimes called sodium amytal for short, and sodium pentobarbitol. They are known to induce sleep in restless, suffering patients. Directions for their use in strychnine poisoning are given by the Indianapolis doctors in *The Journal of the American Medical Association*.



DEIFYING A SCOTSMAN

These two canes are adorned with features of Dr. William Patterson, who is god of medicine to Tule Indians of Panama. The Scottish doctor spent two years in Panama in a seventeenth century colonial venture. Now, the Indians think of him as a god who once lived in their midst and worked great wonders of healing. Dr. Walter Hough, of the U. S. National Museum is holding the canes.

Ordinarily, poisoning of any kind is treated by emptying the stomach and preventing the absorption of the poison into the system. Because strychnine is very quickly absorbed, these measures are usually unsuccessful, and treatment must be directed at counteracting the effects of the poison on the system.

Many drugs have been used for this purpose, but have not been satisfactory. Doctors have been searching for an antidote that would control the convulsions, get the poison out of the body, and supply oxygen so that the patient does not suffocate. Death in strychnine poisoning is due either to exhaustion or to suffocation, the Indianapolis physicians explained. The difficulty with most of the older antidotes for strychnine is that if much strychnine has been

MEDICINE

High Voltage Tubes Declared Of Little Value Against Cancer

THE OLD ADAGE, "Shoemaker, stick to your last!" was told, in effect, to the world's physicists in an editorial in the *American Journal of Cancer*. Dr. Francis Carter Wood of Columbia University is editor of the *Journal*.

Very high voltages in X-rays are probably of little or no use in treating cancer, stated the editorial.

"The physicists who have suggested that a million volt X-ray will do wonders in the curing of cancer had better return to their own problem of fracturing the atom," the editorial declared.

"The real question in the treatment of cancer today is the adjustment of the dosage administered to the biological

rhythms in the cancer cell and the surrounding healthy tissues.

"Of all the variables entering into the problem, the wavelength of the radiation as determined by the voltage is probably the least important."

Radium and moderate voltage X-ray have been found equally effective for treating cancer, when used under the same conditions. Radium is not considered any better than X-ray except when it is possible to obtain intense local action by inserting radium into the tissues.

"It is therefore very doubtful that unusual curative possibilities lie in a million volt X-ray, for six million volt X-ray is available in radium," the editorial concluded.

The expense and difficulty of handling the apparatus furnishing greater voltages than the present commercial limit of 300 kilovolts must not be forgotten. It is preferable to place the money which the high-voltage apparatus would require in radium because of the greater convenience and ease with which that substance can be handled, the editorial suggested.

"Cost is of immense importance, for the vital fact is that radiation should be available for the many rather than limited to the few victims of cancer who have large means."

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ARCHAEOLOGY

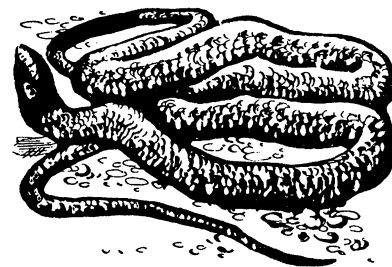
35-Century Old Egyptian Quarries Found

EGYPTIAN quarries, lost 35 centuries, have been discovered by a Cairo museum official in the desert west of the Nile, near Abu-Simbel.

The quarries contain diorite, a gray colored rock. Amethystine quartz is present in the rock, indicating that the ancient Egyptians may have used these quarries as a source of their amethyst.

Discovery of the quarries follows an earlier, accidental discovery made by Sir Charles Spinks, inspector general of the Egyptian army. While on western desert patrol he found cairns containing stone tablets and tables of offerings. Museum officials became interested and investigated the region.

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No Snakes for St. Patrick

OLD LEGENDS to the contrary notwithstanding, St. Patrick never drove any snakes out of Ireland.

Even if the great bishop of Erin had had any time to spare for herpetological pursuits, he would have been hard put to it for raw material, for there hasn't been a snake in Ireland for at least a hundred thousand years.

If there ever were any snakes in Ireland at all, they were driven out by a mightier than Patrick, wielding a greater weapon than a bishop's crozier.

They were driven out by Patrick's master, the Lord God himself. And He used the cold breath of the great glaciers, that lay over the earth in pre-human days, to rid the Green Island of its serpents.

It is not certain that the ice of the Pleistocene ever covered all of Ireland. It would not be necessary for it to do so, however, in order to do away with snakes and other reptiles. Snakes are creatures of the sun. No snake could live within hundreds of miles of the front of the continental glaciers.

But when the ice retreated, leaving Ireland warm again, what was there to prevent the snakes from coming back?

Salt water. Ireland has been separate from England, in a geographic sense at least, ever since the Ice Age closed. And no snake can cross the Irish Sea, or any other body of salt water. There is only one genus of snakes in the world that habitually lives in salt water, and they are tropical serpents that never lived anywhere near Ireland. Land snakes can swim in fresh water all right, but they dread salt water almost as much as they do fire. So Ireland has sat, securely seagirt against all serpents, through all human times.

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weight among waters. The light water is about 13 parts per million lighter than normal water.

Prof. Gilbert N. Lewis, University of California chemist, has obtained heavy water which now holds the world's record, by use of the Bureau of Standards method.

This extraordinary water has a specific gravity of 1.035, whereas normal water is the liquid upon which specific gravity measurements are based and therefore its specific gravity has a value of one. More than one-third of the hydrogen in the heavy water consists of the hydrogen isotope of atomic weight approximately two.

The heavy water obtained at the University of California is 35,000 parts per million heavier than ordinary water, whereas the U. S. Bureau of Standards water is 1,400 parts per million heavier than normal. Experiments showed that the University of California heavy water has a refractive index one tenth per cent. below that of ordinary water.

The unusual waters are no mere curiosities but steps to a more precise knowledge of the properties of matter. From such slight differences that might seem insignificant at first glance, some of the most important industrial developments in our modern world have arisen.

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