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(Editors: Here is the story of the secret of the deadly Lewisite gas, revealed for the first time. As the Disarmament Conference is about to consider chemical warfare, this is an important and timely story.)

THE SECRET OF AMERICA'S DEADLY LEWISITE WAR GAS DISCLOSED

(By Science Service)

Rochester, N. Y., November ØØ.- One of the mysteries of the Great War was a rumor which circulated in its later months that the Chemical Warfare Service had discovered a new form of poison gas more deadly than anything the Germans had been able to make. The character and composition of the new gas was kept a close secret and very few even of the chemists of the country knew anything more than that Professor W. Lee Lewis of Northwestern University was confined with his collaborators in a private laboratory in the production of a new compound, so poisonous that a few drops upon the skin would prove fatal. News of this potent weapon of chemical warfare reached Germany and was, undoubtedly, one of the causes of the sudden resolve of the Germans to make peace.

Dr. Lewis for the first time made public the preparation of the mystery gas here in an address before the local Section of the American Chemical Society. The substance is made by the action of two well-known chemicals, acetylene and arsenic tri-chloride. Acetylene gas, familiar to the public from its use in lighting, is bubbled through a solution of the arsenic compound in the presence of aluminum chloride. The gas is absorbed in the course of a couple of hours with the production of much heat. Various compounds are formed, all of them more or less irritating to the lungs and corrosive to the skin. The most effective of these is a product which has the chemical name of chlor-vinyl-di-chlor-arsine. It is a colorless liquid which readily volatilizes to a gas. A mere trace of it in the air will attack the mucous membrane of the nose and cause violent sneezing so that if a soldier has on a gas mask he is forced to take it off. But even if the gas mask is perfectly tight it affords no protection, for Lewisite will soak through the clothing and corrode the skin. It is more than twice as strong an irritant as mustard gas and, what is worse, its injury is not confined to the skin for the arsenic penetrates the body and causes death a few hours later. Three drops upon the skin of a rat will kill it within an hour or two.

This compound had never been prepared previous to our entering the War, but at the time the Armistice came the United States was turning out ten tons of it a day. The first hint of the existence of such a fatal compound came from the Catholic University where J. A. Newlands, working many years ago under the direction of Dr. J. J. Griffin, found that acetylene and arsenic tri-chloride produced an irritating and toxic gas. When the United States entered the War and chemists were called into consultation, Dr. Griffin suggested that this reaction might be investigated and so Dr. Lewis took it up. Since it was found so extremely toxic the United States Government entered upon its manufacture on a large scale and a plant costing $5,000,000 was put up for its production. In order to prevent any knowledge of the process leaking out the thousand men employed were pledged to remain in the plant for the duration of the War. When the Armistice was signed all the Lewisite on hand was dumped into the ocean.

(Editors: This is the second of a series of articles on the Pacific problems that lie behind the Washington Conference. Next week Mr. Allen will tell what the Pacific area is so far as geographical factors are concerned. These articles will give your readers a background to the daily wired reports of the Conference.)

WORLD PROBLEMS OF THE PACIFIC

2. The Races of the Pacific.

By W. E. Allen,
of the Scripps Institute for Biological Research,
University of California.
(Science Service)

All of the five primary races of kankind are represented to some extent in the Pacific area. Particularly is this true if we include in that area the lands tributary to the Indian Ocean. In the area draining directly into the Pacific Ocean proper the Black race is not very conspicuous except in minor locations and the Brown race is also relatively far from prominent though scattered over a considerable area through occupancy of islands.

Of the other three races the Red is least important so far as immediately pressing problems of the Pacific are concerned. It has, however, very valuable possibilities in case a constructive program for Pacific affairs should be developed. As a race it is now confined mainly to areas in the two American continents extending about twelve hundred miles on each side of the equator. It has in times past and does now in some localities show signs of initiative and organizing ability of a high type. But on the whole the main characteristic of this race is passivity, coupled with geographical fixity and localization of interest. Whatever else it may do it is not likely to soon play a part as a distugber in world affairs.

Of the White race the reverse is true. Since the dawn of history it has been notable for a disturbing restlessness. For it, strangeness has held peculiar fascination and the unknown has ever furnished an urge to action, the search for adventure. Its inventive genius has flamed through the centuries. Its organizing ability has surpassed that of all other races and in spite of internal strifes it has shown remarkable cohesive tendencies in times of crisis. Through all of these characters there runs the connecting thread of hatred of unease. Summing up the whole in biological terms we may say that it is pre-eminently the race of high irritability, the one most easily stirred to action by any stimulus. As an offset to its disturbing qualities we may mention its constructive tendencies, its aggressive energy and its capacity for concerted action.

For many centuries the main body of the Yellow race showed qualities similar to those already mentioned for the Red. More than the Red, perhaps, has it shown in its passivity a willingness to endure for the sake of some end to be attained, i.e., more of what may be called patience. Generally it has shown less initiative and less power of concerted action than the Red. But there have been notable exceptions. Many times great migrations westward by Yellow hordes have shown that the restless quality may be only dormant in the main population. These migrations have also revealed destructive qualities of a more distinct type than those of other races. In modern times the Japanese branch of the race has shown that when aroused by sufficiently powerful stimuli this race may show characteristics very similar to those of the White race. Aggressive energy, constructive ability and organizing capacity of a high order are being constantly shown. Apparently when once aroused there is ample sensitivity. Such things may be disturbing enough to those who wish to see racial strife debarred in the Pacific area, but they are not so seriously disturbing as the fact that the Yellow race has over-populated its territories and is developing and showing an endurance of adverse conditions of life which the White race is ill prepared to meet. Such powers of endurance must be reckoned with in considering future possibilities not only for the Pacific area but for the world.

THOUGH OLD INDIANS DIE,
THEIR SONGS WILL LIVE FOREVER.

(By Science Service)

Washington, November 00.- The old-fashioned Indian, with his war dances and war feathers, his native songs and his tribal customs is disappearing from the West year by year as the younger generations embrace civilization.

But when the tribes of old Indians have all gone to the happy hunting ground of oblivion, it will be possible to stop into a museum and see specimens, photographs, and life-like groups of figures that will resurrect Indian scenes of the past. We may even hear again the beat of Indian drums and the peculiar rhythm of ancient songs.

For on plains and deserts, miles from white men, on moonlight nights and under hot summer suns, Miss Frances Densmore, of Red Wing, Minnesota, has listened to the songs and music of tribal gatherings and ceremonies. Then she has selected the best and most typical musicians and has persuaded them to sing into her phonograph. The results of her latest work among the Ute Indians of Utah will soon be published in bulletins of the Bureau of American Ethnology of the Smithsonian Institution.

Her phonograph has recorded on wax cylinders the songs of war and dance of seven tribes of Indians now living on Uncle Sam's reservations. Songs on all phases of their everyday life and those used in treating the sick have also been preserved in this way.

"The Indians, unlike most white people, sing in their throats with their lips practically motionless," Miss Densmore observed. "The morache or a notched stick rattle, and small and large drums are the musical instruments used to accompany some vocal efforts, while certain songs are enhanced by beating on a horizontal pole."

In ancient times Indians said they received their songs in trances or long fasts in the wilderness. Several modern Indian singers declared that they "heard a song in their sleep", sang it, and either awoke to find themselves singing it aloud or remembered it and were able to sing it. In old times this was the principal way in which the songs were produced. In only one case has Miss Densmore been able to find a song of joint authorship and that one was a modern song composed by several Indians working together.

Going further than the mere recording of songs, Miss Densmore has transcribed the Indian music in notes. The tempo of the music transcribed by ear has been checked by analysis on the phonodeik, an instrument invented by Dr. Dayton C. Miller, head of the department of physics, Case School of Applied Science, Cleveland, Ohio. This instrument transforms the sound waves of music into wavy lines on photographic films. Dr. Miller found that there were no essential differences between the time in the musical transcriptions written by Miss Densmore by ear and those obtained by his scientific method.

BATTERIES REVERSE VOLTAGE
AT LOW TEMPERATURE

(By Science Service)

Washington, November 00.- If the air were liquid and had a temperature of minus 274 degrees Fahrenheit the storage battery on your automobile would reverse its voltage. Two physicists, G. W. Vinal and F. W. Altrup, of the Bureau of Standards, have discovered this startling fact.

A miniature storage battery that they subjected to such cold treatment not only registered voltage in the wrong direction but on their delicate instruments showed ten volts "charging", which is about six times the normal discharge potential. A dry cell of an electric flashlight was given a similar cooling treatment and it reversed voltage also at the sub-arctic temperature. Down to about minus 100 degrees the voltages of both storage cells and dry cells remain very nearly normal, and the voltage reversals occurred after the electrolyte and dry cells were frozen.

But there is no chance of a new kind of storage battery station advertising "Storage Batteries Recharged by Freezing". While the Bureau of Standards tests showed marvellously large reversed voltages, the current, or the amount of electricity, was vanishingly small. It practically did not exist.

After the dry cells were thawed out they were found to be about as good as unfrozen batteries. This result will reassure arctic explorers and high-altitude flyers who have to carry batteries into the low temperature regions of the earth.

NEWS OF THE STARS.

What You Can See On the Moon.

By Isabel M. Lewis,
of the U. S. Naval Observatory.
(Science Service)

At the full of the moon one may easily see without telescopic aid the famous crater Tycho as a small white spot in the southeast quadrant of the moon's disk and radiating from it in all directions like the spokes of a wheel its mysterious system of rays that reach nearly across the entire disk in certain directions. With field glasses or even opera glasses the details are still more distinct.

Tycho lies in the midst of the most rugged portion of the moon's surface. In this brilliantly luminated region are craters crowded upon craters, newly formed groups frequently encroaching upon older formations. Of the thirty thousand lunar craters that have been mapped the majority are to be found in the vicinity of Tycho and in the south western quadrant of the moon, which is the most elevated portion of the moon's surface. Some believe that the dazzling brilliancy of these regions is due to the fact that they are covered with deposits of snow and hoar-frost.

Along the southern edge of the lunar disk lie the Leibnitz and Doerfel Mountains, ranging between 25,000 and 30,000 feet in height. A few of the loftiest peaks in these ranges are fully as high as Mt. Everest. In proportion to the size of the moon lunar mountains are much higher than terrestrial mountains. Our highest mountains would range from fifteen to twenty miles in height if they were in the same proportion to the size of the earth that the lunar mountains are to the size of the moon. The greater relative height of lunar mountains is supposed to be due to the fact that gravity on the moon is only one-sixth of gravity on the earth so that volcanic eruptions and internal upheavals were correspondingly greater in the past.

Tycho is a typical lunar crater about fifty-five miles in diameter with elaborately terraced encircling walls about 16,000 feet high and a central peak about one mile high rising from the floor of the crater. Its ray system is its most mysterious feature. Though a number of other craters have ray systems none of them are as extensive and symmetrical in form as that of Tycho. These streaks or rays look to us like great cracks that have filled up with material from below or, less probably, the splashings from some great meteorite that hit the surface of the moon with terrific force. No theory of their origin has proved to be entirely satisfactory.

The extensive dark patches so conspicuous at time of full moon called "seas", though they contain no water, are depressions on the lunar surface and some go so far as to believe that some form of vegetation may thrive in these regions since they appear variously colored. Others attribute the color effect to rocks of various shades and tints and so the question of the origin of the color that is so plainly observable remains unsettled.

Some observers of the moon now claim that changes are taking place within a number of lunar craters and that the moon is not as dead a world as we have generally been led to believe. In fact it appears as if we may have as great a controversy over certain lunar markings as has been going on for a number of years concerning the world-famous "canals" of Mars.

WHAT A METEORITE CONTAINS.

Washington, November 00.- (Science Service).- The masses of solid matter that fall from the skies to the earth have as their principal constituents iron, nickel and cobalt, with smaller amounts of sulphur, carbon, and phosphorus, and traces of platinum and the allied metals. Dr. George P. Merrill of the National Museum will soon publish in the Proceedings of the National Academy of Sciences, an account of his investigations of a 425-pound mass of meteoric iron found some years ago in Owens Valley, California. No gold, silver, lead, copper, zinc, rare earths or metals other than those mentioned could be detected in this meteorite by the chemical methods employed in detailed analyses made by Prof. S. F. Brinkley of Yale University. The findings in this case sustain Dr. Merrill's previous investigations of reported occurrence of certain minor constituents of these earthly visitors.

NOW WE HAVE THE LOW-VOLTAGE, SELF-STARTING, NEON-TUNGSTEN-ARC-INCANDESCENT LAMP.

(By Science Service)

The low-voltage, self-starting, neon-tungsten-arc-incandescent electric lamp has been perfected, McFarland Moore has declared in a paper before the Illuminating Engineering Society. This new and very simple efficient lamp looks much like the ordinary incandescent lamp in general use except that there is a gap in the filament wire of tungsten and that a gas is the light-giving material. The bulb is filled with neon, an inert rare gas, and when the current is switched on there first appears around the wires or electrodes at the gap a close fitting electric glow or corona discharge of light with the characteristic reddish color of neon. As the current rises this corona becomes more intense and finally a very intense white arc appears in the gap between the electrodes. It is declared that this type of lamp can be made for outputs ranging from very low to very high candlepowers and that it can be used for many purposes ranging from general illumination to projection lantern service.

IS AN ATOM CONSTRUCTED LIKE A CLOCK?

London, November 00. (Science Service).- Sir Joseph Larmor has suggested that an atom may be analogous to a clock. The outer electron system of the atom, on which its chemical and spectroscopic properties depend, and which has certain definite rates of oscillation, would correspond to the pendulum, or better, to a compound pendular system of a clock, he says. The inner core of the atom is similar to the spring of a clock, which, by means of the escapement, slowly imparts its energy to the pendulum in a jerky fashion.

MEXICO AERIAL MAIL.

Washington, November 00 (Science Service).- An aerial mail and passenger transportation service will shortly be inaugurated between Mexico City and Tampico, Mexico, according to reports received here. There was recently inaugurated between Peking and Tsinan, China, an aerial postal service with planes leaving each city every other day.

CEDAR CHESTS KILL MOTH WORMS.

Washington, November 00 (Science Service).- It is the pleasant aroma that does the trick of protecting wool clothing from moths. Young moth worms simply cannot stand the smell of red cedar. They die and do not get a chance to feed on your best suit. Grandmother knew cedar chests were moth preventers, but it took Department of Agriculture experts to prove just how the red cedar moth defense operates. The adult or moth miller, its eggs, and the pupae do not mind cedar.

The worms or larvae, which do the wool eating, and which develop into pupae after a satisfying wool feed, are killed shortly after hatching by the odor of cedar that fills a tightly closed cedar chest. But, say the moth fighting experts, two or three pounds of unpleasant-smelling naphthalene, or moth balls, placed in just an ordinary chest protect clothing just as well.

UNIQUE CASE OF INSECT PEST ERADICATION.

(By Science Service)

A few years ago citrus canker threatened to destroy the orange and other citrus industries of Florida and adjoining states. A vigorous campaign of eradication was begun, however, during which time all orchards found infected were destroyed. As a result the Florida Plant Board was able to announce that no infections had been found since August, 1919, and that the disease was to be considered as eradicated. This is practically the only instance where a virulent plant disease, once thoroughly established, has been thoroughly eradicated over any considerable area.

WARD IS CENTENARY GIFT.

Tegucigalpa, Honduras, November 00 (Science Service).- Medical students here celebrated the centenary of the country by presenting a tuberculosis ward to the general hospital here.

DAY'S SALARY FOR AVIATION.

Tegucigalpa, Honduras, November 00 (Science Service).- Officers and men connected with the Department of War and Navy have given a day's salary toward the purchase of flying machines for the use of the aviation branch that is being established here. Two young Honduranians have been sent to the United States by the government to study aviation.

MAKE DIAMOND SUBSTITUTE.

Washington, November 00 (Science Service).- The Germans have prepared a compound of tungsten carbide, called "Volomit", that has a hardness of 9.8, while the hardness of the diamond is 10 on the geologist's scale of hardness. The compound is prepared at the temperature of 3000 degrees, Centigrade, and is not used as a jewel, but as an abrasive and cutting agent.

THIRD OF GREAT BRITAIN'S REFUSE IS FUEL.

London, November 00 (Science Service).- The annual production of Great Britain's house refuse, which amounts to some ten million tons, could be made to yield three million tons of fuel without touching its three to four million tons fertilizer content, J. A. Priestly, president of the conference of the Institute of Cleaning Superintendents, declares. He also states the fuel content represents approximately one-tenth of the annual domestic coal consumption of the country and even taking into full consideration its comparatively small calorific value, the saving to the nation from its utilization would be enormous. This system of recovery of fuel in domestic refuse is no longer an experiment, he says, and is practical for universal adoption except for conflict with vested interests.

DO YOU KNOW THAT --

In California, where the rice fields are damaged by vast numbers of ducks, aeroplanes have been used to frighten away the birds by flying over the fields. As a great many ducks have been killed by the aircraft in this process, efforts to have it discontinued have been made by the American Game Protection Association.

The gold bearing gravel of the famous "Rand", in South Africa, contains only a few grains of gold to the ton.

It is estimated that there are at least 2,000,000 species of insects, of which only about 250,000 are known to science.

When steam replaced horses for hoisting and pumping in British mines, the need arose of stating how many horses were replaced by an engine. Experiments by Boulton and Watt showed that a powerful dray-horse could lift 330 pounds out of a mine shaft at a rate of 100 feet per minute. Hence the unit known as a "horse-power".

DO YOU KNOW THAT --

Pearl essence, used in making artificial pearls, is a silvery pigment obtained from the surface of fish scales. In the manufacture of such pearls, the inner wall of the thin glass spheres is coated with this essence and the cavity filled with hard wax.

It takes 10 months to build a 14-inch gun, the life of which is 150 shots before relining. As each shot is executed in from one-fiftieth to one-thirtieth of a second, the actual life of the gun in use aggregates only about 3 seconds.

To illustrate the utility of birds in preventing the increase of injurious insects, it is stated that there are about 13 generations of the hop aphis in a year, and if all survived the twelfth brood alone would number 10 sextillion individuals. If this brood were arranged in a line, 10 insects to the inch, it would extend, not merely to the sun or the nearest star, but a distance of 2,500 light-years!

Horseshoeing was once regarded as a particularly aristocratic art and was practiced by noblemen, bishops, and even kings. This fact explains why the horseshoe figures in the arms of many ancient European families.

DO YOU KNOW THAT --

A rare specimen of squid, five feet long, was recently washed on board the S. S. "Caronia" during a storm. Only two other specimens of this creature have been recorded, and the last previous capture was in 1876.

According to Dr. W. T. Hornaday, furs will be unobtainable if the destruction of fur-bearing animals for their skins continues at the present rate. No less than 80 skins are required to make a mink wrap, 200 for a squirrel coat, 280 to 300 for a black mole coat.

Within the proposed superpower zone, only about 19,000 miles of the 36,000 miles of main line, yard, and siding railroad track could be profitably electrified.

There has been engraved on an area of glass only 1/11,000 of a square inch the complete Lord's Prayer. This was accomplished by an English clergyman, who later placed the whole prayer on 1/110,000 square inch. On the first scale one and a half complete bibles could be placed on a square inch of area, while fifteen complete bibles could be engraved on a square inch of glass if the smaller scale were used.

DO YOU KNOW THAT --

There is no truth in the frequently published statement that wheat taken from the wrapping of Egyptian mummies has germinated. Unger and other Egyptologists have repeatedly tried without success to germinate ancient grains of wheat and other seeds. The extreme limit of vitality of seeds is from twenty to thirty years.

The available water-power of the world is estimated at about 200,000,000 horse-power, of which approximately 25,000,000 is now developed or in course of development.

When gas-lighting was first proposed, Sir Walter Scott ridiculed the idea of "lighting London by smoke," and "carrying the light below the streets in pipes," but he lived to see his own home, Abbotsford, lighted by gas.

According to an official report issued in New Jersey, the mosquito pest could be eliminated from that state for all time by a five-year campaign costing less than a million dollars. It is claimed that this would, in 20 years, add $500,000,000 to the industrial value of the state.

DO YOU KNOW THAT --

Fruit and vegetable growers of the State of Washington have imported South American ant bears to help combat insect pests. The ant bear is a queer-looking long-nosed animal as large as a good-sized dog.

The application of the term "bug" to insects in general is a particularly offensive Americanism. This name belongs only to the bedbug and his near relatives

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A Norwegian meteorological station has been established on the hitherto uninhabited island of Jan Mayen in the Arctic Ocean and is sending weather reports by wireless to Europe.

The exact quota of representatives in Congress to which each state is theoretically entitled on the basis of population usually involves a fraction. The problem of replacing these exact quotas by whole numbers in such a way that the resulting injustice, due to the adjustment of the fractions, shall be as small as possible has been a subject of violent debate in Congress for a hundred years, besides engaging the attention of able mathematicians and economists.

DO YOU KNOW THAT --

Duralumin, an alloy of aluminum and copper with a little manganese and magnesium, has about the same strength as cold-rolled steel but is only one-third as heavy. It was first used commercially in building Zeppelin airchips, and is now used in building both airships and aeroplanes.

The French Ministry of Public Works is planning to erect on the coast of Brittany an experimental station for generating electricity from the power of the tides.

The process of gathering cochineal insects from the cactus branches on which they live is exceedingly tedious, a day's picking amounting to only about two ounces. The insects are very small, about 70,000 of them, when dried, weighing a pound.

The salt mines at Wieliczka, in Galicia, constitute a veritable underground city, containing chapels, altars, ballrooms, thrones and staircases all cut out of rock salt. Chandeliers of salt hang from the roof and salt statues adorn the walls. Electric light makes the scene wonderfully beautiful. These famous mines have been worked for 800 years.
