SCIENCE NEWS

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INVISIBLE LIGHT

A LARGE audience of members of the American Chemical Society meeting in Baltimore on April 8 saw and heard Professor R. W. Wood, of Johns Hopkins University, demonstrate some of the strange effects of invisible light. Eyes, teeth, finger nails and shirt buttons of the audience glowed with a pale, phosphorescent light when the illumination of the theater in which the meeting was held was extinguished and a powerful mercury arc light, rich in the invisible ultra-violet rays, but visible only as a faint purple, was directed toward the assemblage.

This phosphorescence of various substances under the ultra-violet rays has already found application on the stage, Dr. Wood said, for by dressing the actors in costumes of material readily affected, they seem to glow. Scenery so treated has also been employed, and by mixing various visible colors with ultra-violet, the same background may be made to appear vastly different.

Dr. Wood said that ultra-violet rays were used secretly during the war for invisible signalling at night. The rays were focussed and directed in the same manner as ordinary light in a searchlight, but the invisible light could only be detected through the use of the proper detecting apparatus.

Ultra-violet rays are like those of ordinary light except that the waves of which they consist are shorter than those of violet light, the shortest that we can see. Red light is the longest of the visible rays, and beyond them are the infra-red, also invisible but with very different properties from the ultra-violet. They do not have the power of inducing phosphorescence, but they do have the peculiar property of passing through mist and water vapor, a property used to advantage last summer in making photographs of Mars when it approached close to the earth.

Photographs were made of Mars with filters which transmitted only the infra-red rays, the chemists were told, and it was found that details on the surface of the planet were brought out which were quite invisible in pictures made with visible and with ultra-violet light. Further, the diameter of the planet in the infra-red pictures is appreciably less than in the others, so that astronomers have concluded that the presence of an atmosphere is indicated. These experiments were similar to some made several years ago by Dr. Wood, when he photographed the moon in a similar way.

RADIUM AND RADON

LESS than a half pound, between 200 and 220 grams, of radium has been produced in the world since Madam Curie discovered this precious element in 1898, Dr. Charles H. Viol told members of the American Chemical Society meeting in Baltimore. Dr. Viol is director of the Radium Research Laboratory of the Standard Chemical Co., of Pittsburgh, which has produced nearly half of the entire supply.

"Small as this quantity of material is," said Dr. Viol, "it represents an almost unbelievable amount of work and expense in the refining of the radium and at the present price represents a total value of $15,000,000. Its commercial production entails the handling of enormous masses of minerals. When carnotite from southwestern Colorado is used as the source, more than 500 tons of ore must be handled to yield one gram of radium. In this process a like tonnage of chemicals, a thousand tons of coal, and upwards of ten thousand tons of treated or distilled water are used—the final product being pure radium bromide, a white powder resembling powdered sugar, having a bulk sufficient to half fill an ordinary thimble."

Dr. Viol demonstrated radon, which is continually being formed from radium, but is 160,000 times more active. While its price per weight is much greater than radium, it has been found that $25 to $50 worth of radon will treat conditions requiring $2,000 to $4,000 worth of radium. However, it loses half of its activity in about four days, he said, so that it can only be used for a limited number of patients, while radium may be used repeatedly. The small bulk of radon, however, is an advantage, for the tiny tubes containing it may be imbedded directly in a tumor mass, so that all the radiations are utilized in the destruction of the growth.

A NEW ANESTHETIC

PROPYLENE, a gas closely related to ethylene, whose usefulness as an anesthetic was one of the sensational medical discoveries of the past year, has been found to possess similar powers, of such high quality that it may rival or even supplant its sister compound. Its properties were described before the American Chemical Society, by Dr. Lloyd K. Riggs and Harold D. Goulden, of the research laboratories of E. R. Squibb and Sons, at New Brunswick, N. J.

In the course of the experiments, in which large numbers of rats were used, it was found that a mixture of 70 per cent. of propylene with 25 per cent. oxygen and 5 per cent. nitrogen rendered the animals insensitive to pain in one minute and caused them to relax into complete unconsciousness in two. Used too long, propylene is poisonous, but there is a wide margin of safety, for about sixteen minutes' time was required before the rats' respiration failed, under the conditions of the experiment.

No long-range ill effects were observed to follow the use of the gas. A number of female rats were experimented with specifically on this point; and although they were used day after day in the tests they remained in good health, gained weight rapidly, and bore litters of normal young. As a consequence of their experiments, the investigators recommend the clinical use of propylene.

Propylene, like ethylene, is an ingredient of common

illuminating gas, and is also obtained as a by-product in petroleum refining.

RADIO MOVIES

MOTION pictures have already been successfully sent and received by radio, C. Francis Jenkins, Washington inventor, declared before the American Chemical Society. Describing the laboratory experiments in which this seeming marvel is daily performed, he predicted that stay-at-homes throughout the country will see the next presidential inaugural ceremonies and the Olympic games without leaving their own firesides.

Distant baseball games, boat races and baby parades will be visible to radio fans operating receiving sets at home, he said.

Still pictures are now excellently done both by radio and wire, he explained, and the only difference between stills and movies is a matter of speeding up the apparatus. The process is very simple and much like that with which our mothers used to entertain the youngsters when they laid a piece of white paper over a penny and rubbed over it with a dull pencil until the Indian's picture appeared on the paper.

By means of turning glass disks with prismatic edges a tiny pencil or point of light is made to travel across a photographic plate in a succession of parallel adjacent lines. The picture is formed by constant changes in the strength of the light which is controlled by the varying strength of the incoming radio signals.

By speeding up the disks and other apparatus, the inventor declared he had succeeded in sending motion pictures from one room of his laboratory to another and the practicability of sending at great distances has been demonstrated.

FALLACIES ABOUT WOOD

"SEVENTEEN fallacies about wood" were discussed by Dr. L. F. Hawley, of the U. S. Forest Service, before the American Chemical Society, who took occasion to deny a number of popularly accepted but erroneous ideas.

After disposing of what he characterized as the complimentary but untrue notion that a chemist can tell all about what a given kind of wood is good for, merely by analyzing it, Dr. Hawley took up a few of his "seventeen fallacies" in detail.

"It is not true," he stated, "that wood from trees cut in summer is much less resistent to decay than that cut in the winter. The apparent difference in durability is due to the conditions for decay being more favorable during the summer than during the winter, and not to any seasonal difference in the chemical composition of the wood.

"Neither is it true that blue-stained wood is weaker than similar unstained wood. The fungus that causes the stain feeds on the starches and sugars in the wood, and not on the wood itself.

"The idea that wood can be so modified by treatment that it no longer absorbs moisture and therefore no longer shrinks or swells is wrong. The attraction of wood for moisture is so great that there are very few coatings which are able to do more than retard the process of absorption.

"There are several erroneous ideas about pines that have been tapped for turpentine. Some people think that pine trees which have been turpentined furnish a less resinous and a weaker wood than unturpentined trees, that the sapwood of long-leaf pine contains more resin than the heartwood, and that resin is produced in longleaf pine wood after the tree is cut. These ideas have all been shown to be erroneous.

"Finally, there is no easy way to get rid of stumps, such as boring holes and filling them with kerosene or saltpeter and setting them on fire, or by pouring a corrosive chemical into the hole. The first method sounds well in theory, but doesn't work when it is tried. And as for the chemical, we don't know of one that will do the work."

GOLD FROM MERCURY

THE artificial production of gold from mercury by the application of strong electrical forces is announced by Professor Hantara Nagaoka, of the Institute of Physical and Chemical Research, Tokyo.

Such a transmutation was recently reported by Professor A. Miethe, of Berlin, but the Japanese chemist used a different method. Miethe worked with an electric field as small as 170 volts per centimeter, but Nagaoka employed many million volts and by a special device concentrated it upon a narrow space in the immediate neighborhood of the surface of the mercury.

In a statement made to Science Service, Professor Nagaoka says:

"Although the yield is small, and can only be examined with a microscope of low magnifying power, mercury is transmuted into gold. After a few more experiments as to the best laboratory arrangement, the method will be made public. So far as the experiment goes, gold comes out in colloidal state and forms beautiful ruby glass. On evaporating the treated mercury, gold is deposited on the bottom of the vacuum distilling apparatus in a very thin film, which viewed with nearly normal reflected light shows the characteristic yellow color, and seen with transmitted light the complementary greenish tint. It stands the usual Cassius purple test for gold.

"It was only in an extremely intense electric field that the experiment succeeded. In order to be sure of transmutation, repeated purification of mercury by distilling in vacuum at temperatures below 200 degrees Centigrade is essential.

"Finally, I wish to state that there are many Tokyo papers and journals giving mistaken notions of the experiment, so that translations of different statements are not in the least to be trusted."

The object of these researches is not the production of gold in commercial quantities but the study of the internal structure of atoms. From an investigation of the fine structure of the lines of the mercury spectrum, published in No. 13 of the Scientific Papers of the Institute, Dr. Nagaoka came to the conclusion that the

nucleus of the mercury atom consisted of compact central mass with a proton particle elastically connected with it. If this proton could be detached from the mercury atom by some sufficiently powerful force the remaining nucleus would have the same positive charge as that of gold, and a similar arrangement of electrons. The spectroscope verified this surmise and the next step was to construct apparatus that would expel the proton from the mercury nucleus and thus effect the transmutation of the element into gold which he now reports accomplished. Since proton is the nucleus of a hydrogen atom the result may be roughly expressed by saying that by knocking out a hydrogen atom some of the mercury atoms are reduced to gold atoms.

VITAMIN X

VITAMIN X, the newly discovered vitamin whose presence in foods is necessary for the production of offspring, has been shown to be present in a large variety of vegetable and animal substances by Drs. Herbert M. Evans and George O. Burr, of the University of California, who told of their results before the American Association of Anatomists meeting at Cleveland on April 11.

They have found it to be present in small concentrations in many kinds of animal tissue, when the animals had been fed on vegetable foods containing it, but not in parts of animals fed upon a ration lacking in vitamin X. It is present also in milk fat and egg yolk. Cod liver oil, an important source of the vitamin that prevents rickets, is almost totally lacking in the fertility vitamin.

In vegetable tissues, the investigators state, vitamin X is low or absent in potato tubers, but abundant in leaves and is not injured by careful drying of such leaves as lettuce, alfalfa, pea and tea. It is present in some fruits, the banana for instance, and particularly abundant in seeds, such as those of wheat, corn, oats, cotton, lettuce and alfalfa.

"Since X is fat soluble, we have studied vegetable oils," the investigators state. "Most of them contain the vitamin, but few in high concentration; crude cottonseed oil, corn, olive, coconut, walnut, peanut and flaxseed oils can all be fed daily in quantities five times the required minimum of wheat germ oil without restoring fertility. Yet butter, walnut oil and a certain lard substitute have been proved to do this immediately when fed at high levels.

"The vitamin is thus seen to have a wide distribution if we disregard percentage abundance. In no other instances have we been able to encounter it in as concentrated form as in the ether extract of wheat embryo flakes and in desiccated leaves of lettuce."

THE CANADIAN WOOD BUFFALO

A PLEA for the maintenance of the racial integrity of the Canadian wood buffalo was presented before the meeting of the American Society of Mammalogists in session at Washington on April 8, by Dr. Francis Harper, of Cornell University. Dr. Harper is much opposed to the transfer of surplus animals from the Wainwright herd of plains buffalo to the range of the only surviving group of wood buffalo, now preserved in a special range in northern Alberta.

"The latter are practically the only representatives of the genus Bison left anywhere in a perfectly wild and unconfined state," said Dr. Harper. "They have been described as a distinct subspecies, being notably larger and darker than the plains buffalo. They are much better fitted than the latter to cope with two of the chief problems of existence in their own particular environment—deep winter snows and the depredations of timber wolves. In recent years they have been specially protected by the Canadian government, and have shown a gratifying increase in numbers. There is every reason to believe that this increase would continue naturally and steadily to the point where their range could support no more buffaloes.

"The Wainwright herd has lived for generations in enclosures, its vitality has been weakened, and it is said to be largely infected with tuberculosis. If placed together on the same range, the two races would inevitably interbreed. The mixture of the smaller, weakened and diseased plains buffaloes with the huge and vigorous wood buffaloes would be disastrous. In a few generations the wood buffalo, probably the noblest big-game animal of North America, would absolutely cease to exist as such. The mixed descendants of the two races might be quite unfitted to cope with the conditions of their environment, and the whole wood buffalo range might be eventually depopulated.

"Zoologists and conservationists in general have expressed the utmost concern over the critical situation thus confronting the wood buffalo," Dr. Harper concluded. "From every point of view, both biological and economic, the introduction of plains buffaloes into the range of the wood buffaloes is alike unnecessary and unjustifiable. Some other solution should be found for the difficult problem of disposing of the annual surplus of the Wainwright herd. It is essential that the wood buffalo stock should be kept pure and absolutely free from contamination with any other race of buffaloes."

ITEMS

Two stone axes which may prove to be among the earliest antiquities thus far found within the limits of the United States have been brought to the Smithsonian Institution by H. L. Straight, a brick manufacturer of Adel, Iowa. These ancient implements are crudely shaped and were discovered under 25 feet of apparently undisturbed clay, according to the information given to Neil M. Judd, archeologist of the U. S. National Museum, who is investigating the find. The digging of a trench for the laying of a narrow-gauge railway in the clay pits used by Mr. Straight led to the unearthing of the tools. On account of the possible importance of the discovery, the Smithsonian Institution is planning to send a geologist to make a carful study of the site to determine whether the axes are as antique as the depth of burial indicates. Mr. Judd pointed out that before the extreme antiquity of the axes could be determined, the report of the geologist showing geologic age of the strata in which they were buried must be received.