SCIENCE NEWS

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PRINCIPLES OF FOG FORMATION AND REMOVAL

ON the thirty-seventh anniversary of the Wright Brothers' first aerial flight at Kitty Hawk, at a meeting of the Institute of the Aeronautical Sciences held at Columbia University, Dr. Sverre Petterssen, professor of meteorology at the Massachusetts Institute of Technology, gave the fourth annual Wright Brothers Lecture, on "Recent Fog Investigations."

Fog may be removed, he said, in two ways. One is by actual physical removal of the fine drops from the air; the other by evaporating them. The latter may be done if enough heat is supplied, not only to evaporate the drops themselves, but also to raise the temperature of the surrounding air. Its relative humidity is lowered, and it can accommodate the extra water vapor produced from the drops. However, heating, over a large area, such as a harbor or airport, is impracticable because the heat must be supplied uniformly over the entire region. Another method which, he stated, has worked successfully has been to spray calcium chloride solution into the fog. This takes moisture out of the air, and reduces the humidity, so that the fog drops may evaporate at the prevailing temperature.

Among possible means for the physical removal of the drops, Dr. Petterssen cited the use of an intense sound, the waves of which would cause the drops to coalesce into larger drops, that would fall to the ground. However, "computations indicate that it yould not be practicable in natural fog." It has been used on a laboratory scale to precipitate smoke.

Hopes that infra-red rays, that is, light waves too long to be visible, could be used effectively to penetrate fog, were dashed. Belief that this was possible was due to the wrong use of a formula for light transmission through suspended particles. This only applies when the particles are about the same size as the wave-lengths of light. Since the fog particles are actually much bigger, about one six-hundredth of an inch in diameter, the light waves would have to be that size, about 500 times longer than they are, in order to produce an effect. However, waves as long as this would be absorbed by the gases in the atmosphere, and no advantage would be attained.

"There is no region of the radiant energy spectrum which will penetrate fog better than visible light. This result has been confirmed by direct measurement."

Dr. Petterssen pointed out that minute particles, each around a twenty-five thousandth of an inch in diameter, must ordinarily be present in the air as nuclei on which the water condenses to form the fog droplets. Ordinary raindrops are from a twenty-fifth to a sixth of an inch in diameter.

CHEMICALS DISSOLVED IN WATER

IDEAS of chemists that when a chemical is dissolved in water, both it and the water are unchanged were challenged at a meeting of the Chemical Society of Washington by Dr. David Harker, associate in chemistry at the Johns Hopkins University, as a result of experiments by him and other chemists. Dr. Harker showed how most inorganic compounds, that is, those which do not contain carbon, actually react chemically with water when dissolved. Aluminum chloride, for example, breaks up into atomic fragments or ions of aluminum and chlorine when in a water solution. The aluminum ions, he has found, unite with six molecules of water, which is hydrogen and oxygen, to form a large molecule of aluminum, hydrogen and oxygen. This is a strong acid. In the case of ordinary salt, sodium chloride, there is also a reaction, when dissolved, though it is less well defined.

When grease is dissolved in petroleum there is no change in either. The grease molecules mingle with the petroleum molecules, but are no different from what they are when separate. Chemists had supposed that solutions in water were of the same sort. Therefore in studying chemical reactions between such solutions the water was almost as much neglected as were the test tubes and beakers in which the reactions took place. This idea is wrong, and it is necessary to include the water in the reaction.

A NEW SYNTHETIC FIBER

GET acquainted with "prolon." It is a new name for what has been called "casein wool." Perhaps soon you will buy clothes, blankets, etc., made of it. This name is the latest addition to the family which now includes nylon, vinyon, rayon, celanese, and the other so-called "synthetic" fibers. It is suggested by F. C. Atwood, of the Atlantic Research Associates, in a paper in the current issue of *Industrial and Engineering Chemistry*.

Prolon is made from casein obtained from milk, soybean or other sources. Mr. Atwood objects to the name "casein wool" on several counts. The fiber itself is not casein, but a combination with other materials. Neither is it wool. "It happens to act like wool in some cases. It resembles silk and fur in other cases. Protein-base fibers are distinct entities by themselves and should be so considered."

Prolon fibers are being made in a number of foreign countries, and their use is increasing. Mr. Atwood expressed the opinion that improvement in quality will come with increased production.

"I know of a few imports of staple fiber within the year from Italy, Holland and Japan," writes Mr. Atwood. "The Italian product, lanital, was of fair quality and showed some improvement over the first imports. The Dutch material appeared to be superior to the Italian product. The Japanese fiber was of good appearance, but very poor in quality.

"The Japanese product is the only foreign material now available and is unsuitable for domestic textile uses, although attempts will probably be made by Japanese interests to import it. These products were all made from milk casein. Some Japanese soybean casein fiber is

expected soon, but the best information available indicates that the quality will be materially below that made from the milk casein.''

A NEW SULFA DRUG

SPECTACULAR results with a new sulfa drug in fighting germs that threaten the lives of patients requiring operations for cancer or other diseases of the lower alimentary tract were announced by Dr. Warfield M. Firor, acting chief surgeon at the Johns Hopkins Hospital and acting professor of surgery at the Johns Hopkins Medical School, at the meeting at Hot Springs, Va., of the Southern Surgical Association.

The new sulfa drug is sulfanilylguanidine. This is the first report of its use on patients. Tests of it on animals, reported in September by Dr. E. K. Marshall of the Johns Hopkins Medical School, showed that it might prove effective in fighting such intestinal tract diseases as bacillary dysentery and typhoid fever. These tests showed that the new drug was fairly soluble in water, but that, unlike other of the sulfa drugs, it is very poorly absorbed from the digestive tract. This means that almost all of it stays in the lower alimentary canal. This lower end of the digestive tract always has germs in it. So long as they remain in the alimentary canal, most of these germs normally present do no harm. When, however, the surgeon must open the canal to remove a cancer or for other reasons, the germs have a chance to get out into other parts of the abdomen and cause serious, frequently fatal infection.

Dr. Firor reported that giving patients the drug before operation frees the alimentary canal of germs. In every case so far the wounds have healed without infection. Every patient has survived the operation, although mortality in operations of this type at the very best hospitals has been as high as 10 per cent. or 15 per cent.

Dr. Firor stated that the fall in number of germs in the alimentary canal when sulfanilylguanidine is used is ''phenomenal.'' In one case the bacterial count dropped from 17,000,000 to 10,000. The reduction in number of bacteria was not so striking in all cases, but has been sufficient to enable the surgeon to perform a successful operation without infection. Further advantage of sulfanilylguanidine is that it is less toxic than any of the other sulfa drugs and it is given by mouth.

Sulfanilylguanidine, under the federal food and drug restrictions, has not yet been released for general sale, but is being distributed to a number of surgeons for further study of its effects. It is made by the Calco Chemical Company.

On the medical side, sulfanilylguanidine has been used with gratifying results in treatment of acute bacillary dysentery. Dr. Marshall expects to report soon on trials of the drug now being made in Puerto Rico, where dysentery occurs the year round. He believes, however, that the number of cases treated so far is too small to make any claim that the new drug is a cure for bacillary dysentery.—JANE STAFFORD.

DRUG ADDICTION

NEW hope for the conquest of drug addiction appears in a report from Dr. Donald Slaughter, Dr. J. Charles Parsons and Dr. H. Deane Munal, of Dallas, Texas, to the *Journal* of the American Medical Association.

The clue to a possible way of conquering drug addiction came from a study of a new method of using morphine to relieve pain in patients suffering severe injuries, heart disease or undergoing surgical operations. Pain could be relieved with one-half the usual dose of morphine in most cases when another drug, prostigmine methylsulfate, was given with the morphine. Use of morphine for relief of pain during serious illness is said to be frequently followed by addiction to the drug. Of a series of 1,276 morphine addicts, 325 attributed their addiction to medical use of the drug.

One man, an ambulance driver, who became addicted to morphine originally through such medical use of it, came to the Robert B. Greene Memorial Hospital in San Antonio for a serious operation. Following the operation he was given morphine in the dosage which he had been taking before the operation. Two days later, he was able to get along on about half this dose when given with prostigmine methylsulfate. The dose of morphine was further reduced in this way to a third of the original size of dose without the patient's knowing that there had been any change. By the sixth week the patient was getting about a quarter the amount of morphine in a single dose and skipping every other dose without ill effects.

''During the time prostigmine methylsulfate was used with the morphine, no withdrawal symptoms were noted.'' It is suggested that this case ''lends encouragement to the use of this drug in similar cases,'' and that they are investigating further the angle of tolerance and addiction.

CUNNINGHAM'S COMET

DR. FLETCHER WATSON, of the Harvard College Observatory, reported to a recent meeting of the American Academy of Arts and Sciences that Cunningham's comet, now coming into view in the western evening sky, may sweep the earth with its tail next month.

He explained it this way: ''On January 13 the comet will very nearly pass between the earth and the sun. Since the tail of a comet extends almost directly away from the sun, the tail of this comet will stream out in the general direction of the earth. Whether or not the earth will pass through the tail is still in dispute; first the comet must develop a tail nearly 60,000,000 miles long. Even then there is no reason for us to become excited for comet tails contain very little material and no effects of a possible collision can be apparent. In 1910 the earth passed through the tail of Halley's comet only a few million miles from the comet and nothing came of it.''

So far, he stated, the tail is much shorter, less than a million miles in length. However, the greatest changes and development of a tail will come as it approaches the sun. On January 16, he said, it will be closest the sun, at a distance of 34,000,000 miles, less than the distance of Mercury.

Harvard astronomers, Dr. Watson told his audience, are making a special effort to obtain a complete sequence of observations of the appearance of the comet, and the character of its light. At the present time the light and other radiations are mostly from molecules of carbon and

nitrogen. "In the middle of December, when the tail may begin to take shape, sodium will probably appear and other radiations may be detected as the comet nears the sun."

Cunningham's comet has been steadily brightening since its discovery in September. It can now be seen with the aid of binoculars near the star Albireo, in the constellation of Cygnus. The brilliant moon now offers some interference with the view, but by Christmas eve the moon will be out of the way. Then the comet, it is expected, will be seen easily with the naked eye near the star Altair, in the constellation of Aquila, the eagle, which is observed in the western sky soon after sunset.

PREPARATIONS IN SOVIET RUSSIA FOR THE OBSERVATION OF THE ECLIPSE NEXT SEPTEMBER

WHEN the tip of the moon's shadow next strokes the earth, along a path crossing Siberia and China on September 21, 1941, some two hundred investigators in thirty groups at sixteen different points in Russian territory, will be making observations of the total eclipse of the sun, according to a dispatch received from Tass, the Soviet news agency.

The Soviet Academy of Sciences has set up a commission under the chairmanship of V. Fesenko, to take charge of preparations. A book in Russian and English is shortly to be published giving details of the planned observations, and a discussion of the weather probabilities in the various locations.

"The zone from which the total eclipse will be observable," Dr. Fesenko is quoted as saying, "stretches from the shores of the Caspian Sea across that sea and the Aral Sea, through the cities of Kzyl-Orda and Alma-Ata, and then on to Chinese territory. The maximum duration of the total phase of the eclipse will be about 2½ minutes.

"The mountains of Kazakhstan through which the zone of total eclipse passes offer excellent points of observation."

Among the subjects which will be studied are the Einstein theory of relativity, the sun's corona, its innermost atmospheric layer, the chromosphere, the sudden explosions in the sun that seem to cause electrical and magnetic disturbances on earth, and the zodiacal light, a glowing band sometimes observed near the sun.

To supplement the ground observations some astronomers will ascend high above the earth in airplanes and stratosphere balloons. These should be especially useful if clouds hamper the work of the ground parties.

ITEMS

U. S. LYONS, astronomer of the United States Naval Observatory, has reported to Science Service that a new group of spots on the sun passed across the exact center of the sun's face on Sunday, December 8. Radio disturbances and displays of the northern lights are sometimes associated with them. These spots, which included ten separate condensations, were on the solar equator. This is a rare position for spots at any time, especially so long after the maximum of the 11-year spot cycle in early 1937. At the time this group crossed the center of the disc, there were five others visible. A total number of 36 spots could be seen, which covered an area of 17.5 square degrees.

A MASS of special electrical equipment occupying the space of a two-story house, including transformers, rectifiers, capacitators, etc., will form the unique "finishing school" to prepare the electricity needed to run the new 4900-ton cyclotron of the University of California. This huge "atom-smasher" is now under construction as a result of a grant of $1,150,000 from the Rockefeller Foundation, supplemented with $250,000 from other sources. Its electrical apparatus, which will take more than a year to construct, was designed by Dr. Edwin McMillan, of the Radiation Laboratory. It has been ordered from the General Electric Company. Dr. E. O. Lawrence, inventor of the cyclotron, in charge of the laboratory, said that 2,500,000 watts of electrical power will be needed to run the machine. Power supplied from the lines is three-phase, alternating current, but it will be changed to single-phase direct current before it is fed into the cyclotron. The new equipment will be finished in three years. It will be capable of accelerating charged atoms to 100,000,000 electron volts energy.

A YARD-LONG, black creature recently sent to the Smithsonian Institution as a fossil snake turns out to be neither fossil nor snake, but something more interesting still. It is an Amphiuma, an almost limbless amphibian related to the salamanders, but so rare that years may go by without so much as a single one being added to museum collections. Amphiuma is commonly mistaken for a snake, despite its lack of scales, because its legs have become so degenerate that they are practically invisible. Its eyes also are extremely small, and probably do the animal very little good. It commonly lives in muddy water, coming to the surface to breathe at intervals, and feeding on fish eggs and aquatic larvae. The females come ashore to lay their eggs, around which they remain coiled until they are hatched. The present specimen was found under about 15 feet of mud in the Everglades. It probably was trapped by a slide of muck during the dredging work, and thus killed.

A NEW blood test which will aid in the diagnosis of jaundice and also will predict the course of the disorder has been devised by Dr. J. L. Irvin and Dr. C. G. Johnston, of the College of Medicine of Wayne University, and Dr. E. A. Sharp, of Parke, Davis and Company and the Harper Hospital, Detroit. The test might tell, for example, whether the jaundice is due to liver disease or to one, and which one, of several kinds of anemia. The test, reported to the Central Society for Clinical Research, is said to give for the first time a method of making dependable quantitative determinations of the bile acids in the blood. The amount of these, the test shows, is about one tenth to one twentieth greater in anemias characterized by destruction of red blood cells than the amount needed to destroy normal red blood cells in the test tube. Whether this concentration of bile acids in the blood is the cause of the red-cell destruction is the next point to be determined.