SCIENCE NEWS

SLEEPING FLOWERS AND A NEW ANESTHETIC

Science Service

FLOWERS that persisted in "going to sleep," curling up their petals when they should have been gaily blooming, were the clues to a new anesthetic which Dr. A. B. Luckhardt and J. B. Carter tested successfully as a method of putting animals and men to sleep at the University of Chicago. The flowers were carnations and the gas is ethylene, a constituent of ordinary illuminating gas.

As far back as 1908 florists complained that carnations when placed in greenhouses would "go to sleep" and those which had not opened would fail to do so, causing great loss in their business. Investigation proved leaky gas fixtures to be the cause. Gas contains four per cent. of ethylene, and it was shown that one part of this gas in 2,000,000 parts of air caused already open flowers to close. Other investigations showed a similar effect of the gas on other plants.

Dr. Luckhardt and Mr. Carter recently thought it worth while to test the gas as an anesthetic. It was tried first on numerous animals, such as frogs, mice, guinea-pigs, rabbits and kittens, who were all put to sleep by it successfully without any apparent after effects of a disagreeable sort. Before testing it on men, the anesthetic was finally "tried on the dog," who went out completely in less than five minutes on a mixture of 90 per cent. ethylene and 10 per cent. oxygen, and who was up wagging his tail happily three minutes after the gas had been turned off.

The experimenters then tried it on themselves. They describe the effect of the gas mixed with oxygen as exhilarating and giving a sense of well-being. They became unconscious and then subsequently recovered without realization that they had been unconscious. Several students then volunteered. Complete surgical anesthesia with muscular relaxation was produced in a few minutes. Subjects had pins thrust through their arms, were pinched severely enough to leave black and blue areas, and one was beaten on the soles of his feet with a Stillson wrench without any sensation whatever or memory of discomfort.

Recovery was complete in a few minutes. The only after effect was slight weakness and slight nausea. In every case the subject ate a full meal within a few hours after recovery.

It is claimed that the new anesthetic gives loss of sensation long before complete surgical anesthesia is established, that it may be maintained with complete muscular relaxation, yet without any sign of asphyxia, shortness of breath or effect upon the blood pressure; and that there is rapid recovery even after long administration without evidence of after effects.

It is also stated that it would seem to be of value in obstetrical cases as there is a loss of the sensation of pain from a relatively dilute mixture of the gas, and that it may be used in cases in which nitrous oxide or laughing gas would be dangerous.

SPRAYED COTTONWOODS SHED NO COTTON

Science Service

THE cotton of the cottonwood, the popular shade tree of many American cities, need be no longer a drawback to the tree's utility, according to W. H. Long, of the local station of the United States Bureau of Plant Industry, who has developed a spraying treatment which will prevent the growth of the cotton-bearing blossoms without injury to the tree. The same treatment may be given trees of allied species which blossom before the leaves come out.

It consists of spraying the blossoms as soon as they open in the spring with a very dilute solution of sulphuric acid, preferably of a strength of two per cent. This kills the blossoms which later in the season would otherwise produce the tufts of soft downy cotton that strew the streets and fill the air along streets planted with cottonwoods to the annoyance of the property owners.

It is hoped that this is a solution of the problem of what to do with the large cottonwoods which are the only shade trees in so many western cities, but which because of their "moulting" proclivities are in some cases being cut down or trimmed back severely enough to prevent blossoming for several years. The cost of spraying in this city is between 22 and 32 cents a tree. The treatment might also be of value in eastern cities where streets are shaded either with the cottonwood or the related species of Carolina poplar.

Cottonwood trees are of two kinds. One bears the flowers which later produce the pods in which the cotton is formed. The cotton carries the tiny seeds of the tree and enables them to float for long distances through the air. These cotton-bearing trees are known as pistillate or "female" trees. The other kind of tree, called staminate or "male" trees, do not produce cot-

ton. Both bloom before the leaves put out, the blooms being borne in short, finger-like bodies known as "catkins." The staminate blooms are purple in color, while the pistillate, or cotton-bearing ones, are greenish, making it easy to distinguish one from the other, an important point, as only the cotton-bearing trees need to be controlled.

As the result of experiment it was found that the following sprays would kill all the blossoms on the trees: crude oil, kerosene, gasoline and dilute sulphuric acid. Saturated common salt solutions killed most of the blossoms and is worthy of further trial because of its cheapness. The kerosene and gasoline sprays were considered efficient but expensive, while the crude oil spray, although effective, was disfiguring to the trees and adjacent property.

The acid spray may be used in a power spray pump, but iron parts in contact with the solution must be replaced by more resistant metal. The solution does not injure paint and is rendered harmless to lawns by watering them immediately before and afterwards. Men operating the pumps should wear old clothes or rubber coats. The solution does not injure the skin if washed off after the job is done.

The trees must in no case be sprayed after the leaves come out, as the acid solution would be fatal to them.

AN ADVANCE IN MUSSEL CULTURE

Science Service

CULTIVATION of the fresh-water mussel during the entire first year of its growth will shortly be undertaken on a large scale for the first time in history by the United States Bureau of Fisheries. This is an important step in making more certain the supply of raw material for the great pearl-button industry of this country.

Heretofore the mussel culturists have largely confined their work to getting the young bivalves well started in life during the brief period when they live a life of ease attached to the gills and fins of fish. For after their first stage of development is passed in the parent shell, they become free-swimming forms with only a tiny shell. Then the little mollusks attach themselves to certain species of fish and for about two weeks live embedded in their foster parents, getting their nourishment from them.

On completion of this stage of the young mussel life, it drops off and settles down to the river bottom to become a regular mussel. There its habits of nearly always eating and having its shell open makes it an easy prey to the hooks of the fishermen.

For some years, the fish experts have engaged in inoculating fish by putting them in a tank with a large number of the free-swimming mussel larvæ. When the proper number had attached themselves the fish were released in the streams. This method, however, did not permit an accurate check upon the effectiveness of the work. Experiments at the Fairport, Iowa, biological experiment station have demonstrated the practicability of holding the fish in large wooden troughs until the parasitic mussels drop off and then keeping the mussels for a year in the wooden tanks of running water where their growth can be observed and more easily controlled. The mussels will then be planted in their natural environment to finish their growth. About 500 species of freshwater mussels grow in the United States, but those of commercial value are practically restricted to flowing waters which drain limestone regions. Most of the streams of the Mississippi Basin and some of the Great Lakes streams are inhabited by these bivalves, from the shells of which are cut many of the buttons on our shirts.

FOOD RESEARCH AND STALE BREAD

Science Service

OLD ideas of how bread stales are overturned by the Food Research Institute, established at the suggestion of Herbert Hoover, in its first publication just issued from its headquarters at Stanford University. The report points out the wholesomeness of the stale loaf, shows the waste produced by present bakery practices and urges further investigation of why some bread keeps better than others.

The assumption that staleness is caused by the loss of moisture from the loaf is not tenable, for the report points out that what probably occurs is that much of the moisture in the bread is held by the starch which has been gelatinized in the baking. As the loaf comes out of the stove, this starch jelly distributed through the bread contains all the moisture it can hold. As the bread cools, the starch gives up some of its moisture, and this moisture is absorbed by the other constituents of the loaf, changing the crust from a brittle material that crunches between the teeth to a soft and pliable one, while the gluten of the crumb is given a toughness and firmness which as fresh bread it did not have. The bread becomes stale at low temperatures and this accounts for the fact that bread when stale, but not dry, can be freshened up by heating. The process is reversed and the starch-jelly reabsorbs the moisture from the other bread constituents.

Losses to wholesale bakers on account of the

arrangement by which they take back the stale unsold loaves from retailers run into millions of dollars a year, the report states. This tends to raise the price of bread to consumers. Before the war the bakeries often lost six to ten per cent. and sometimes twenty-five per cent. from returns of stale loaves, and many a baker has fed his ovens with this wholesome food as a fuel.

Bread a day old is quite as nutritious and to some people more digestible than that freshly baked. If consumers realized this, and bakers were not obliged to accept returns, the country would greatly gain by the economy.

FATIGUE AS A PROTECTION AGAINST PNEUMONIA

Science Service

PHYSICAL fatigue protects against pneumonia if the conclusions based on experiments made upon rats at the Johns Hopkins School of Hygiene and Public Health are found to apply to other animals and to man. The protection even with rats is not absolute, but Miss Ella Oppenheimer and Dr. R. A. Spaeth, who conducted the experiments, have found that the resistance of these animals to the pneumonia infection was greatly strengthened in two cases out of three by exercise prolonged nearly to the point of exhaustion shortly before or after the infection.

The result was a complete surprise to the investigators, as they held to the popular belief that people caught diseases more easily when tired out, and naturally supposed the same rule would apply to rats.

The rats experimented on were made to run in wheel cages like a squirrel until thoroughly tired, the wheels being kept slowly turning by an electric motor. That no permanent injury had resulted was shown by their complete recovery of energy after a rest.

They were inoculated with pneumonia germs after three periods of fatiguing exercise and sometimes they were fatigued for three periods after inoculation. Either way the fatigue seemed to act as a protection against the disease. The number that fell ill was compared with another batch of rats which lived under identical conditions, except for the severe exercise. In only 13 per cent. of the cases were the tired animals more susceptible than the ones which had not been exercised, in 20 per cent. there was apparently no difference, while in 67 per cent. the resistance of the fatigued rats was distinctly greater than that of their normal, rested cousins, brothers and sisters.

The experimenters decline to make sweeping deductions from these experiments, at least in so far as they might apply to human pneumonia. The experiments have attracted much attention and are being continued. Similar ones have shown a like increase of resistance to tetanus or lockjaw infection by fatigued animals.

A touch of "human interest" is injected into the story of the experiment by the fact that the rats disliked the enforced exercise extremely and registered temper by all means at their command. Some were clever enough to learn they could avoid running by lying on their backs with their feet and tails in the air, letting the wheel slip along beneath them. Such individuals were useless for the experiments, but were set aside by the investigators with a certain admiration for their genius.

THE PRODUCTION OF GASOLINE

PRODUCTION of gasoline in the United States in January amounted to 623,823,337 gallons, and established a new high monthly record, according to Secretary of Interior Work. The figures, which were compiled by the Bureau of Mines, show an increase of approximately 39,000,000 gallons or 6.6 per cent. over the previous record month's output, that for December, 1922.

Reports from 301 refineries operating during the month indicated that on February 1 the nation's stock of gasoline amounted to 1,002,857,273 gallons, the largest supply ever recorded. Stocks of gasoline were increased during January by 119,000,000 gallons. Gasoline stocks on February 1 were nearly 300,000,000 gallons in excess of stocks on the corresponding date in 1922.

The indicated domestic consumption of gasoline in January was 443,128,456 gallons, excluding imports for which figures are not yet available.

Refineries operating in January had a total daily indicated capacity of 1,927,667 barrels. Based on the crude oil run to stills, these plants operated at 81 per cent. of their capacity.

Exports of gasoline in January, including shipments to insular possessions, amounted to 61,630,469 gallons.

Domestic production of kerosene in January amounted to 212,447,902 gallons. Consumption of kerosene was 123,214,097 gallons; exports were 94,847,333 gallons. Stocks on hand on February 1 were 275,436,804 gallons, a decrease of more than 5,000,000 gallons during the month.

Production of gas and fuel oils in January is given as 989,376,102 gallons. Consumption of these oils amounted to 931,829,391 gallons. Exports were 97,199,839 gallons. Stocks on hand on February 1 were 1,265,074,722 gallons, a decrease for the month of 39,000,000 gallons.

The output of lubricants in January amounted

to 87,077,868 gallons. Consumption of lubricating oils is reported at 49,061,520. Exports were 33,061,486 gallons. Stocks on February 1 amounted to 240,689,649 gallons, a decrease of 5,000,000 gallons during the month.

HIGH TEMPERATURE AND HUMIDITY

Carnegie Institute of Technology

FAT men endure high temperature and humidity better than thin men. This fact has been proved in scientific research conducted by the American Society of Heating and Ventilating Engineers, in cooperation with the U. S. Bureau of Mines and Carnegie Institute of Technology, at Pittsburgh. In experiments to determine the relative effect of various temperatures and humidities on the human body, the scientists also found that sweat is the chief factor causing sore eyes, when a person becomes heated.

Another common belief was blasted during the experiments when they found that the drinking of ice water failed to develop cramps in the men after they had been subjected to an hour's exposure to high temperature.

The object of the research work in Pittsburgh is to establish, by scientific study, the exact degree of temperature, and of humidity, or "comfort lines," a person should be subjected to in a room. The problem was first attacked several years ago, and the research work has now reached a point where definite results have been obtained by the society, which has had the cooperation, also, of the United States Public Health Service. The first experiments have been to study the physiological effects of various temperatures and humidities on human subjects at rest in still air, and, for these, a staff of physicians and employees of the society have subjected themselves to great hardships. The laboratories, located in the Pittsburgh Station of the Bureau of Mines, have been partially equipped by Carnegie Institute of Technology.

One of the important results of the experiments was the discovery of the great variations of external temperature which the human being can endure and, at the same time, retain his physiological efficiency. Another fact discovered was that increasing pulse-rate is more the cause of discomfort than is body temperature, when in a heated room.

ITEMS

Science Service

THE old time magic divining rod used in the search for subterranean treasures has been succeeded by a reliable and accurate electrical set of instruments invented in Sweden and used in the recent discoveries of valuable mineral deposits. The discovery of the rich copper deposits in the Bjurfors field in Central Sweden, already announced, and of the huge iron ore deposits at Kristineberg, which has an estimated capacity of 100,000 tons of high-class ore annually, is definite proof of what can be done by this new system. The invention has been definitely adopted by the government research department, whose head, Axel Gavelin, hails it as of extreme importance to the continued development of Sweden's ancient mining industry. The perfected system of detecting ore by the use of electricity, without digging or drilling, has been called the Nathorst-Lundberg method, from the names of the Swedish inventors who have triumphed after years of experimenting. By this system, which makes use of an electric circuit through linear electrodes, it is possible to locate deposits of iron, copper, lead, zinc and even gold, and to determine their position, length, breadth and general richness, though it may not distinguish between the metals. This method which has been used successfully in Norway and Finland, as well as in Sweden, has been introduced in France and Italy, and has been patented in at least 30 countries.

A BOTTLE drift of unusual distance and duration has been reported by the United States Hydrographic Office. The bottle, enclosing a printed paper with directions for its return to the Hydrographic Office, was thrown overboard about 350 miles southeast of New York from the British steamer *Bloomfield* on February 24 of last year. It was picked up on the southeast coast of Ireland on February 14 of this year, having drifted about 3,000 miles. Four other long drifts have been reported on the Atlantic in recent years. These were of bottles thrown into the Bay of Fundy in August, 1919. One was picked up on the coast of the Azores Islands just a year later, another on the Orkney Islands in January, 1921, the third on the coast of North Wales in March, 1921, and the fourth on the coast of Norway in July, 1921. The shortest of these drifts was 2,000 and the longest 3,800 miles; and if it is assumed that they were picked up soon after having been cast ashore, their rates of drift across the ocean varied between 5.1 and 5.8 miles a day. The bottle recently picked up on the Irish coast had travelled about 8.4 miles a day on the same assumption, the difference probably being due to the fact that it was cast over in or near the Gulf Stream.

BRITISH scientists are experimenting with a trailing thermometer for use by fishermen to discover where in the sea to find hake, a fish said to be guided in its movements by the temperature of the water.