New and Interesting Facts from Science and Life

How Perspiring Plants Promote Your Health

MUCH of the healthful moisture in the air you breathe comes from perspiration of the plants, trees and grass around your home. For example, it has been found that the average suburban lawn gives more than ten barrels of water to the air every summer day.

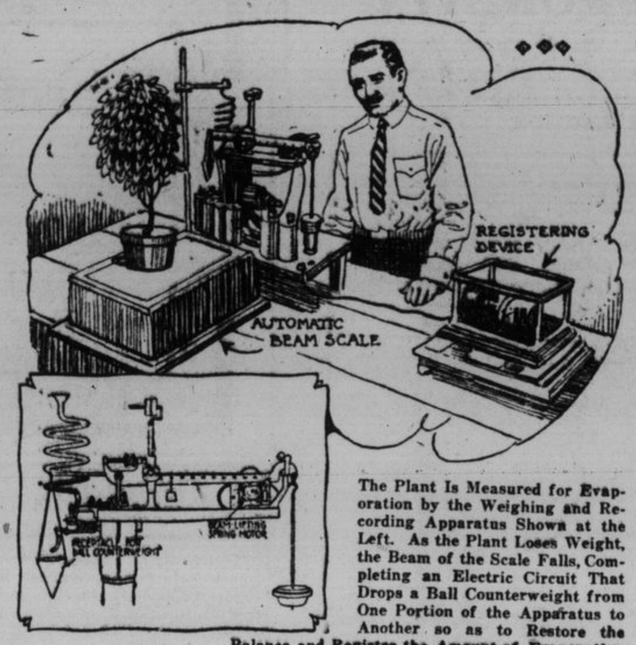
To discover such facts as these, Uncle Sam, master farmer, has recently been conducting interesting experiments with ingenious devices, measuring and recording exactly the amount of water that "transpires" or evaporates from the leaves of plants in 24 hours.

The results have revealed the astonishing rate at which growing things, absorbing water from the soil, pass it off into the air, thus serving as Nature's automatic humidifiers for the atmosphere. One pot of alfalfa lost more than eight quarts of water in a single day, when the atmosphere was dry and the wind strong. The average amount of evaporation for a large plant like a sunflower is between a pint and a quart daily. Findings such as these show why potted plants in your rooms help to restore moisture to the heater-dried air which makes so many American homes unhealthful.

How these experiments were conducted by the United States Bureau of Standards is described by Popular Science Monthly. Special weighing apparatus was devised for these measurements under natural conditions, in the open air. The plant is placed on the platform of a delicate scale, and carefully balanced. Any loss in weight thereafter, of course, is due to loss of water. As the beam of the scale falls, it completes an electric circuit that opens a gate and allows a tiny steel shot to drop from one portion of the apparatus to another, restoring the balance. Each steel ball corresponds to a loss of 20 grams on the part of the plant. The shot are kept in a coiled pipe, and fall into a cone-shaped receiver suspended on knife edges. A spring motor gives a positive lift to the scale beam every time a steel ball is dropped.

The recording device is similar to those used on automatic rain gages. It has a drum 12 inches in circumference that makes a revolution every six hours, and is continually offset by a screw so that four six-hour periods are recorded side by side on the same sheet. In this way, besides determining the total amount of water the plant breathes into the air, the apparatus charts the loss in connection with the time elapsed and the local weather conditions.

The apparatus works perfectly, except when sudden upward gusts of wind lift the plant, causing the recording of a transpiration rate that is abnormally high. Special provision is made to prevent more than one ball being delivered to the cone at a time, however, and no record is made unless a ball is actually deposited on the beam.



The Plant Is Measured for Evaporation by the Weighing and Recording Apparatus Shown at the Left. As the Plant Loses Weight, the Beam of the Scale Falls, Completing an Electric Circuit That Drops a Ball Counterweight from One Portion of the Apparatus to Another so as to Restore the Balance and Register the Amount of Evaporation

A New Bread to Form the Perfect Food of the Future

A LOAF of bread and a bottle of milk—these are the two items that will make up the daily meals of the future. This is not going to be the case because of poverty or a strict diet, but because science has just discovered a new vitamine that will make bread the perfect food and enable the housewife to discard others.

This is the picture drawn by no less an authority than A. B. Hess, graduate chemist of Johns Hopkins University, a professor for 15 years and now educational director for one of the world's greatest milling engineering concerns.

"For the day is not far distant—it is within the span of even the oldest of us—when a loaf of bread will contain all the food values necessary to the most exacting stomach," said Prof. Hess in a recent address to the American Association of Cereal Chemists.

"Within this age bread will become the perfect food—complete in itself. It is only a matter of a few short years—months perhaps—when the American housewife can discard every side dish—can put away her pots and pans, even discarding her oven, and still be able to please the exacting palate of her husband—and all with a loaf of bread."

Prof. Hess's prediction followed the announcement of a discovery by Dr. E. V. McCollum, also of Johns Hopkins University, of a new vitamine—a fourth on the list of these mysterious new food properties.

"The discovery of this new vitamine," said Dr. McCollum, "brings to the world a new message of hope from bodily diseases."

Dr. McCollum classified vitamines "A," "B" and "C" and called the new unknown food force "D."

The new vitamine is concerned in the etiology of bone growth and is the food substance which prevents rickets in children.

The four vitamines, as listed by Dr. McCollum, are:

A—Prevents night blindness and sore eyes among children.

B—Lack of this vitamine lowers the vitality and makes the body subject to infection.

C—Prevents scurvy.

D—Protects bone growth and prevents rickets.

"Heretofore we have known of three vitamines, substances which it is impossible to isolate by chemical means, but which we know are essential to growth," Dr. McCollum explained.

"We know now for a certainty of another one, and I believe we are only on the first road to finding more of these mysterious substances."

Vitamines were first discovered in food when notice was taken of the unusual results animal growers were obtaining by feeding certain rations.

"Every farmer knew young livestock would grow faster on yellow corn than white," the doctor-chemist said. "Chemists did not know why. Investigation has revealed that the yellow color in corn is a vitamine—it is 'Vitamine B.'

"All four vitamines are found in milk and the leafy parts of plants. Their absence from the diet of growing children results in under-nutrition, bad teeth and rickets."

Dr. McCollum emphasizes the importance of foods containing vitamines in the diet of expectant mothers and also in the diet of the growing child.

"The properties of vitamines were made known after laborious tests," he said. "However, what it is, or what a vitamine looks like, is unknown. It does not respond to chemical tests.

"Vitamines are found in these foods:

"Fat, soluble A, in milk, cheese, yolks of eggs.

"Water, soluble B, milk, husks, or grains leaves of plants and spinach.

"Anti-scurvy C, milk, citrus fruits and potato skins, and in combination with foods having the other two.

"Cabbage is the highest food in vitamines; in the raw state it has two counts for A, one for B and three for C. Cooking lowers the first two.

"Carrots have one count each for the three classes. Tomatoes have all three vitamines, and the curative qualities are not lost in cooking. Lettuce has two counts for A, two for B, but none for C.

"The day is coming—and coming soon—when the modern miller will combine the four vitamines in one loaf of bread," Prof. Hess predicts. "Then the American diet can be revived."

How the Height of a Fog Is Measured by a Human Hair

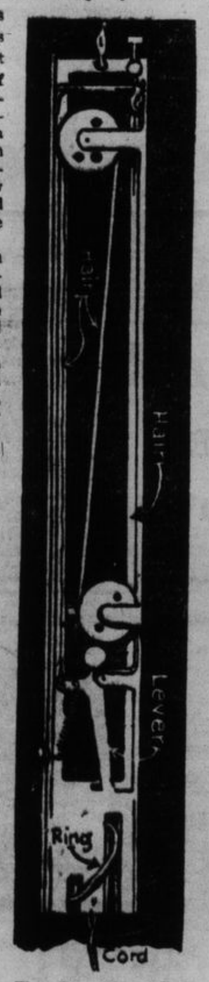
THE contracting effect of dry air upon human hair was the means of suggesting the invention of an ingenious device for measuring the height of fogs in London.

When fog descends upon England's great metropolis weather observers send up toy balloons attached to long cords at the end of which is fastened an instrument containing strands of hair. The latter is so adjusted that the contraction in dry air releases a little brass ring, which slips to earth. The observers, knowing how much cord they have paid out, can thereupon gauge the height of the fog.

This device is used in the airplane traffic between England and France. So greatly have aviators been hampered by fog, that characteristic feature of British weather, that it often has been impossible to start, or at least altogether risky to venture into the air, from the starting point at Croydon, even though reports from stations five or ten miles along the route showed clear skies, for no adequate information could be had of the extent and particularly of the depth of the fog.

The manner in which this mechanical aid to aviation is worked out is described by a writer in the Scientific American. The rings are held in place on the cord, when the instrument starts its flight by a trigger-like catch. Attached to the butt end of this catch is the hair, which passes over a little pulley-wheel that acts as a fulcrum, and then runs up for some inches through an open cage exposed to the weather.

The hair is damp to begin with when the adjustment is made on starting the flight, and so long as it remains in the damp, foggy air it remains damp and nothing happens. When it reaches the clear, dry air above the top of the fog, however, it contracts, and by virtue of the purchase given it in its passage over the fulcrum, it drags the catch-off to one side and releases the ring. The latter is mounted around the cord on which the apparatus goes up, so that it falls, not freely, but down this cord. When it puts in its appearance at the lower end of this, the observers know that the top of the cord has emerged into clear weather, and, knowing how much cord they have paid out, they know how high the pilot must direct his plane in the search for fair weather.



The Fog-Measuring Apparatus That Uses a Human Hair.

It is contemplated installing this weather-finder at close intervals along the Paris-London route, in conjunction with radio stations. The pilots of the planes will then be advised at all times how high they must go at various parts of their journey to get clear weather, and, among other things, to avoid such accidents as the recent fatal collision in the fog. In addition, the uncertainty surrounding the question of whether a safe start might be made in thick weather would be resolved, and trips that are now lost could be made alike in safety and in comfort.

WHY the FARMER Has to PLOUGH

DURING the present summer the American farmer, it is estimated, will prepare about 40,000,000 acres of land for winter wheat alone. And the cost of ploughing and working this ground will exceed $140,000,000.

Did you ever ask why farmers plough for wheat or why they cultivate for any crop? If you have perhaps your answer was much like the one that L. E. Call, chief agronomist of the Kansas State College of Agriculture, says that his father used to give him.

"As a boy I never ploughed or worked ground for wheat without wondering why," writes Mr. Call in Farm and Fireside. Squirrel hunting and fishing were always good in August. Of course I had a chance to do both, but it always seemed that the neighbor boys could do more because our wheat ground always needed work. I asked my father why many times, but the only answer he could give was that the wheat next year would be better. This I soon observed, for our wheat always turned out better than our neighbors' ever did at threshing time.

"There was no subject that interested me more during my college days than why we cultivate the soil, and my interest in this subject prompted me to start at the Kansas State Agricultural College what is now some of the most extensive and oldest tillage work with winter wheat in the country, from the standpoint of continuity. While climate and soil conditions are not the same in all states, the principles underlying tillage practice are the same everywhere, and I am sure that a number of things that we have learned will be of interest and value to you.

"There seems to be five things accomplished by ploughing and cultivating the soil. They are:

1. The tilth of the soil is improved.
2. The soil is put in the best possible condition to receive the seed or plant.
3. Organic matter is incorporated with the soil.
4. Soil water is controlled and moisture is conserved for the crop.
5. Food is liberated for the use of plants.

"It is impossible to overestimate the importance of good ploughing on the physical condition of the soil. Land that has been repeatedly hammered down by beating, packing rains can only be put into the best possible seed-bed condition by ploughing. There is a time when every soil contains the proper amount of moisture to plough in the best tilth. If ploughed in a wetter or drier condition, the results accomplished will be less satisfactory.

"The most satisfactory way of disposing of organic matter is with the plough. If we did not have an implement that would turn organic matter under, material such as stubble, cornstalks, and weeds would accumulate in such quantities at the surface that in many cases they would interfere with other tillage tools. It is also important to incorporate organic matter with the soil, so that it will decay properly and, in decaying, release from itself, and from other soil material, plant food for growing crops. If it is ever advisable to plough deep—that is, deeper than six inches—it is probably for the purpose of incorporating organic matter with a greater volume of the mineral soil, and in that way build a larger storehouse in which reserve supplies of plant food can be stored. At Rothamsted, the great English experiment station, 60 years of experimental work has shown that the subsoil is very poor in plant nutrients, and nothing whatever is gained by bringing it to the surface."

POISONS to CURE Deadly DISEASES

IN the reptile houses of some of the country's zoos you can see a rather large and ugly-looking lizard, with a blunt head and a stumpy tail. The inscription on the cage tells you that its name is "Heloderma," and its home Arizona. This unpretentious creature is, in fact, the famous or infamous "Gila monster," which is one of the only two poisonous lizards known to man.

Until recently the best thing to be done with this deadly and uncouth inhabitant of Arizona's blazing wastes seemed to be to destroy it as soon as possible, yet now the advance of science has invested the monster with a sudden value.

It has been found that the poison of the Gila monster is a useful remedy for that form of paralysis known as "motor ataxia," a disease which prevents the proper use of the limbs, and was formerly thought incurable.

The poison is of such amazing strength that it has to be diluted down to the one-hundredth-thousandth part. In other words, the solution used is one drop of the poison to something over a gallon of alcohol.

The poisons of many venomous snakes are now being used in medicine. Both the cobra and the rattlesnake are kept in numbers in captivity, so that their poison may be extracted for the manufacture of a serum for the cure of snakebite.

The work of the Pasteur Institute in this direction is well known, and quantities of their serum go to India.

Near Rio, in Brazil, is a State Institute for the manufacture of sera for the cure of snakebite. Here are snakes of a score of different kinds, including the huge and terrible "bushmaster," and the deadly little "coral snake."

Brazil is full of poisonous snakes, and the government sera are to be obtained in almost any village throughout that country.

Growing MUSHROOMS on TREES

NATURE, by cross fertilization, has produced many freaks and monstrosities. Every now and then you hear of some new prank she has played. As a rule, men don't climb trees to gather mushrooms, though many of the mushroom's near relatives flourish on growing trees.

These fungi, if not edible, are at least very interesting. Their beauty of structure, rapidity of growth, and brilliancy of color readily arrest attention.

However, it might be well to warn mushroom hunters to give these growths on trees a wide berth. The time may be at hand when Nature will eliminate the noxious elements, and these fantastic fairy stools will then be available as food for man.

In anticipation of the "mushroom-tree," the Japanese have adopted a system of tree culture for these delicacies. The Japanese method of securing a crop is unique in many ways, and is characteristic of their mental acuteness. Mushroom growing is one of Japan's many industries, and several million dollars' worth reach the world's markets annually.

In their unique methods of mushroom culture the Japanese fell trees of huge growth which have adorned the forests for many decades. These are left to lie for a year or two. Large holes are then bored into the tree trunks, and spawn inserted therein.

Under such conditions they produce practically a continuous crop, and grow with a "mushroom growth rapidity." To anyone familiar with the somewhat crude methods of producing mushrooms in tunnels and other dark recesses, adopted in this country, this system will readily suggest a better method of culture.

The growth of mushrooms is influenced considerably by changes of the moon. There is an old folk-lore rhyme in Essex with a considerable amount of truth in it:

"When the moon is at the full,
Mushrooms you may freely pull;
When the moon is on the wane,
Wait before you pluck again."

Observers of these night growths know that at full moon the crop invariably shows itself, but when on the wane there is a perceptible decline.

SONG of the SIREN

IT is well known that many new inventions in the physics, especially in the field of music, are made by using turn-rails, so-called sirens. The following experiment shows the effect of such a turning disk:

Cut a cog-disk from a piece of cardboard and make about one inch or two inches from the centre two openings. Take a long string through the openings and you will get a little mechanism by which you are able to give your disk a pretty high turning speed.

Making an Experiment in Music with a Cardboard Siren.

Holding the disk against the board or a piece of paper it will give you, according to the speed of the disk, different modulations of sounds which will be reinforced by air blown to the disk by using a paper-screw.

How ELECTRICITY Is MEASURED

THE language of the electrician is Greek to most people. While he talks glibly of volts and amperes and watts, they know only that they have to pay an electric light bill for so many units, and let it go at that!

Though electricity is not a fluid, most of its terms can be compared with water flowing through a pipe. Turn a stream of water onto the paddles of a water-wheel, the work that the wheel will do depends upon two things—the amount of water delivered every second and the pressure of the stream. The first is measured in gallons and the second in pounds.

In the case of electricity, however, the rate at which it flows is measured in amperes and its pressure in volts. The work which it will do is found by multiplying amperes and volts together, which gives the answer in watts, or units of energy.

The unit is 1000 watts, often called a kilowatt, which is the electrical equivalent of one horsepower.

You will find the number of watts they require engraved on most electric lamps, and from this you can discover what they will cost to use. A 25-watt lamp will use one unit of 1000 watts in forty hours' burning.

The ohm is another electrical measurement which can be understood by a comparison with water. Water flows easily through a large pipe, but if the pipe is narrow, only a small quantity can force its way through. What the pipe is to water, the wire is to electricity. The smaller the wire, the more difficult electricity will find it to pass, because the fine wire resists its flow. Wires are measured by their resistance in ohms.

Is LOVE at FIRST SIGHT Due to a PERFUME?

IT has been the experience of practically every one that on first meeting some persons he takes an instant liking to them, and that this liking is almost invariably returned, without there being apparently the slightest reason for it. Scientists explain that this is not a matter of reason at all, but of instinct, and nearly always occurs with highly sensitive persons who have an under-mind that is much nearer the surface than is the case with their more stolid neighbors. This under-mind is perpetually sending out, as it were, flashes of something that can perhaps be compared to wireless telegraphy, trying to pick up another station "in tune" with their own.

When they find another person with an under-mind similarly attuned, the two become friends, without in the least knowing why.

This is not, however, the usual explanation for "falling in love" at first sight, which is quite a different thing, and which as yet is not thoroughly understood.

Some scientists think that the love at first sight business, which they call sex attraction—the indefinable something which suddenly makes the one woman more desirable than anyone else in the world—may be due to a very faint sense of smell, so slight as not to be apparent to the ordinary reasoning working mind at all. It seems an unromantic explanation, but it may be true.

Another thing which very often affects a person without any obvious reason in his choice of friends is that the new person may remind one in some particular of voice, features, or some trick of manner, of someone known before and liked.

The resemblance may be so faint as not to be recognised with the ordinary mind, but it is there just the same, and the under-mind—on which there is an indelible photograph of everything that has ever roused all likes or dislikes—instantly picks up the point.

A NEW EXPLOSIVE

FOR many years mercury fulminate has held its place as a detonating substance superior to all others. Of recent years, however, its place has been threatened by other compounds which bid fair to displace it.

One of the most promising of these is lead azide, a salt of hydronitric acid. This acid forms a great number of salts, as mercury azide, silver azide, and sodium azide. The heavy azides, as lead azide are prepared by treating a solution of sodium azide, with a soluble metallic salt, such as lead acetate, the sodium azide being prepared from nitrous oxide and sodium amide.

Large crystals of lead azide and mercuric azide have been found to be very sensitive to mechanical shock; the sensitiveness increasing with the size of the crystals.