SCIENCE NEWS

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A NEW DEFINITION FOR TEMPERATURE SCALES

ONE of the most fundamental standards of science and industry, the temperature scale, will have a new definition if suggestions now being put forward are adopted.

Now the essential points on thermometers, whether they be the familiar ones filled with mercury or colored alcohol or the more precise electrical and gas kinds used for greater temperature ranges and more exact measurements, are set by temperature of melting ice (0 degrees Centigrade and 32 degrees Fahrenheit) and the temperature of steam (100 degrees C. and 212 degrees F.).

Under the suggested change only the ice point would be standard and the steam point would be determined experimentally, just as the boiling points of liquids other than water are now determined. Actually the difference between the two systems would be very small indeed, but the change would (1) improve the accuracy of temperature determination, (2) fix by definition the values of the constants for converting ordinary Centigrade and Fahrenheit temperatures to Absolute temperatures, and (3) would eliminate revisions of previously determined temperatures as new determinations are made of fundamental coefficients of thermometric gases.

The possibility of the new standard was foreseen by the famous English physicists, Joule and Thomson, later Lord Kelvin, in 1854 when standards of the present temperature scale were being set. They recognized that when the temperature of the ice point became known sufficiently accurately, it would be desirable to use it alone to fix the scale. This time is believed to have arrived.

In the current issue of *The Journal of Applied Physics*, Dr. F. G. Brickwedde, chairman of the Committee on Low Temperature Scales of the National Research Council, points out that the definition of the temperature scale now in use is the result of an evolution and that it will continue to be changed to meet demands for greater accuracy and precision in the measurement of temperatures. Dr. W. F. Giauque, of the University of California, has proposed that steps be taken to bring about the adoption of the suggested change.—WATSON DAVIS.

CALCIUM IN THE SOIL

DR. WILLIAM A. ALBRECHT, head of the department of soils of the University of Missouri's College of Agriculture, points out that a plant may be growing, yet at the same time instead of taking nutrients from the soil which are needed to build up proteins, it may actually be giving up some of these nutrients to the soil. Speaking recently before the Midwest Regional Meeting of the American Chemical Society, held at Purdue University, he explained how advances in colloid chemistry help in understanding the way in which plants secure these nutrients from the soil.

"Only the finer clay fraction, a small part of ordinary soils, is really active in providing plants with nutrients. Seemingly clay can be so poor in its stock of such plant nutrients as nitrogen, potassium and phosphorus that a plant like the soybean may be running its woody tissue-making factory while the protein-making items like nitrogen and phosphorus are going in the reverse, from the plant to the soil."

Calcium does not move in the reverse direction, though when the clay gives it up, along with potassium and magnesium, for instance, it takes hydrogen in their places. Not a plant nutrient itself, hydrogen makes the soil acid. In reality, more soil acidity means less nutrients in the clay and less fertility for crop production. By adding lime, a calcium compound, to the soil, the effect of the hydrogen is counteracted, and there is less chance for the nutrients originally provided by the seed to be lost by going into the ground.

CONTROL OF THE JAPANESE BEETLE

INVESTIGATORS of the U. S. Department of Agriculture are engaged in spreading a disease in Maryland and parts of New York and Connecticut, to check the Japanese beetle.

Since the beetle entered the United States near Riverton, N. J., in 1916, it has spread over a wide area centering in southeastern Pennsylvania and New Jersey, running north to Connecticut and southeast to Maryland and Virginia. Traveling as a hitch-hiker on shipments of plants and produce, it has established outposts from Illinois to Maine, and from northern New York to Georgia. This year, it is believed, the beetles will be most numerous in the southeastern corner of Pennsylvania, the northern half of Delaware and a small section of southeastern New York.

Many methods of control have been found, but some, while effective, are too expensive for general use. Several parasitic wasps, which prey on the beetle in its native country and prevent it from becoming a pest there, have been introduced, and will probably be more effective when they catch up to the spread of the beetle.

The disease method has also given promising results, and is being extended this year. The most important seems to be the "milky" disease, caused by bacteria, which have been isolated, and made into a virus which is injected into healthy beetle grubs. The grubs die, their bodies are ground, mixed with talc, and spread over the earth, or placed in the soil. Other grubs feed on this, catch the disease, so that they too die. Then they turn milky white, and disintegrate, leaving piles of germs to be eaten by more grubs, so the disease spreads. Fortunately, only the beetles are subject to the ailment, and it is harmless to birds, plant life, domestic animals and human beings.

GROWTH-PROMOTING PRINCIPLES FOR ANIMALS

GOLDFISH grow significantly faster in water in which other goldfish have previously lived for a limited period than they do in other water. Dr. W. C. Allee, Asher J.

Finkel and Walter H. Hoskins, of the University of Chicago, have demonstrated that in the course of 20- to 30-day periods the average increase in size of goldfish living in "fish-conditioned" water over the increase in size of other fishes is a slight but statistically significant amount. Unfed fishes, experiments show, shrink less in "fish-conditioned" than in pure water.

There seems to be a growth-promoting factor in the mucus secretion from the skin of the "conditioning" fishes. This is indicated by the fact that fish-skin extract added to the water in minute amounts significantly increases growth. Dr. Lester Ingle and Mr. Finkel have gone a step further and shown that fish mucus stimulates the growth of even such very distantly related organisms as water-fleas (Daphnia). They have therefore come to believe that they may be dealing with a general growth-promoting principle of animals which may parallel the already well-known growth-promoting principles of plants.

Further experiments, by Mr. Finkel and Dr. Allee, in which minute quantities of tin chloride were added to the water, showed an increase in length of the fishes living in tin-conditioned water over the increases of other fishes during 20-day periods. Effective amounts of tin are so minute that it can be used practically in aquariums and some lakes.

Several years ago R. S. Young, of Cornell University, demonstrated that the growth of timothy, and also of algae, is stimulated by minute traces of tin. B. B. Cohen, of the University of Chicago, demonstrated last year that tin traces stimulate the growth of sunflower roots. The present work of Dr. Allee and Mr. Finkel shows for the first time that tin stimulates the growth of vertebrates. This discovery shows, also for the first time, a growth-promoting principle which plants and animals have in common.

THE CHINCH BUG SITUATION IN THE WESTERN GRAIN AREA

FARMERS of the prairie grain region expect the next few days to bring developments in the chinch-bug situation in the states of Iowa, Nebraska, Missouri and Kansas.

Much depends on the weather. If it turns hot and dry, the bugs will attack in overwhelming numbers. If a sweeping, pelting rain comes, the situation will be greatly relieved. For the bugs travel mainly over the ground rather than through the air, and they are small so that a raindrop looms large to a chinch-bug. If rain fails to come and the bugs begin their march, they will find their route barred at field-edges by lines of paper. These, however, are formidable to the insect hordes, for they are impregnated with creosote oil.

The Federal Government, in preparations for the chinch-bug invasion, is sending tank cars filled with the creosote oil. Farmers who need it may have it for the taking. Promptness in availing themselves of this help is stimulated by notice that while the government will supply the oil, it definitely will not pay demurrage on cars left over-long on sidings.

In chinch-bug areas, the crisis is usually precipitated by the harvest of oats and wheat, in which the bugs do their early-season feeding and breeding. Suddenly deprived of their pasture, the pests migrate by billions to neighboring cornfields. They move over the ground like a dark, living carpet, and where they hit the corn and sink in their innumerable sharp sucking beaks, the standing grain wilts while you watch.

Unlike many of our worst insect pests, chinch-bugs are native Americans. They have been found all the way from Ohio to the Great Plains, but their principal center of disturbance is in the four-state "corner" mentioned in the first paragraph. They thrive on heat, and their present prevalence is a consequence of the drought cycle of the nineteen-thirties.

They are small insects, no bigger than mosquitoes, but shorter and stockier. They have wings but are weak fliers; wind rather than their own flight is what carries them for long distances when they take to the air at all. Usually, however, they creep in large masses, both the winged adults and the wingless young forms, known technically as nymphs. If you catch a small insect "with a white vest on backwards," and want to make sure of its identity, just squash it and sniff. Nobody who has done that ever forgets what mashed chinch-bug smells like.—FRANK THONE.

ANTI-POISON IVY VANISHING CREAM

A VANISHING cream that gives protection against poison ivy has been developed by Dr. Louis Schwartz, Dr. Leon H. Warren and Frederick H. Goldman, of the U. S. Public Health Service and the National Institute of Health. The formula for the cream, which is made by mixing either sodium perborate or potassium periodate with vanishing cream, will appear in the forthcoming issue of the *Public Health Reports*.

Tests on nine volunteers showed that the cream protects against both the poison ivy extract, which is at least thirty times as powerful as any poison ivy leaf, and against the leaves and stems of the plant itself. Two of the nine volunteers, one the most susceptible and one medium susceptible to poison ivy, after rubbing on the cream went out into the fields near the National Institute of Health at Bethesda, Md., and pulled out poison ivy plants by the roots, plucked the leaves, and rubbed them over their skins. Neither volunteer suffered any ivy poisoning from this. Dr. Schwartz and associates have no doubt the cream will be equally successful in protecting others against poison ivy if it is made and used according to directions.

The cream must be rubbed all over the face, hands, arms or any other part of the body likely to come in contact with poison ivy. After four hours, when the worker stops for lunch, it should be washed off with soap and water. Then after lunch, before going out into the fields or woods again, the cream should again be thoroughly applied all over the exposed skin, and again washed off at the end of the afternoon. The reason for washing it off and reapplying it at the end of four hours is to make sure the skin is all covered and so protected against the poison ivy. Some of the cream

is likely to rub off by the end of four hours and especially during the lunch hour.

In making the cream, and any druggist can do so, 10 per cent. sodium perborate is used, or 2 per cent. potassium periodate. These two substances come in crystals which should be ground into powder first because the crystals will not mix well with the cream. The vanishing cream should be made first and then the chemical added, otherwise the chemical will react with other ingredients of the vanishing cream and the result will not be satisfactory. The cream should be freshly prepared at least once in two weeks to avoid deterioration. It acts by filling the pores of the skin and forming a protective covering which prevents much of the ivy poison from penetrating the skin. As perspiration comes in contact with the vanishing cream, a soap is formed and the alkalinity of the soap tends to neutralize the poison ivy, in addition to washing it off and out of the skin.—JANE STAFFORD.

THE RADIO RANGE BEACON

BY means of a radio beam which sweeps around the horizon 60 times a second, airplane pilots can now find their course to a fixed beacon at all times. A dial on the instrument board displays a circle of light, around which an indicating mark moves to show the direction of the plane from the beacon.

Dr. David G. C. Luck described to members of the Institute of Radio Engineers the new device, developed under his supervision in four years of research at the RCA Laboratory at Central Airport, Camden, N. J. It is known as the "omnidirectional radio range beacon," and operates on ultra-high-frequency, minimizing the effect of static.

Previous radio beacons confine the pilot to a definite course. As long as he is following the course he knows it. If he goes off, he is also informed. But, though he can tell which way he is off, he can not tell how far he has left the course, nor what direction his destination may be. To provide this information, some air lines have used direction finders on the plane, which show the direction to the beam-transmitting station from the plane, but these are not satisfactory in the ultra-high-frequencies.

Dr. Luck described the operation of the new system as follows: "If the pilot must fly around bad weather on his regular course, he can always 'see' his direction from the radio station at a glance. If he wants to fly straight into or out from the beacon, he has only to hold the mark steady at that course against a scale on the instrument face.

"All this works like a lighthouse that sends out two kinds of light, one a beam which sweeps around steadily and the other a flash sent out in all directions just as the beam points north. Time the interval from the flash until the beam sweeps over you, and you know your exact direction from the lighthouse.

"In this new radio range, the radio lighthouse is on the ground and on the plane the indicating instrument automatically times the flash and beam. All this is done electrically, and our lighthouse beam sweeps clear around 60 times each second."

ITEMS

ON July 4 the sun was farther away than at any other time of year, according to the Nautical Almanac Office of the U. S. Naval Observatory. Its distance was 94,239,000 miles. This was 2,896,000 miles farther than it was when closest, on January 2. The fact that we have warm weather now, with the sun so far, is explained by the fact that for people in the northern hemisphere it is higher in the sky, and its rays of heat fall more directly, and are therefore more concentrated.

A LAW recently passed by the Congress and approved by the President protects our national bird, the bald eagle, imposes fines up to $500 for taking, possessing or dealing in these birds, except in Alaska. It has been threatened with extinction.

THE day when participants in a telephone conversation will be able to see each other may be brought nearer with the invention of Dr. Vladimir K. Zworykin, of Philadelphia, granted patent 2,206,654, by which two-way television may be accomplished over a single pair of wires. Essentially this consists in sending both ways over the wires at once. A blurred image, like a photographic double exposure, would normally be obtained at each end. "Blanking out" amplifiers are provided at each end of the line, which permits the transmitting tube to send and the viewing tube to show only alternate pictures in the series that is constantly coming over the line. These automatically switch back and forth so that first a picture is sent in one direction, then one goes in the opposite direction. All this is so fast that the persons at each end see a continuous picture, though not with as good quality as if the transmission were continually in the same direction.

THE world's largest projection screen, 200 feet long, was put into use on July 2 in the Hall of Aviation at the New York World's Fair. A battery of 20 projectors, placed in a central revolving tower, flashed a group of pictures on a wide expanse of curving wall. Reproduced in color from paintings and photographs made especially for the display, the pictorial pageant depicts the far-flung activities of present-day aviation. A voice narration accompanies the pictorial presentation. Sponsored by the aviation industry and the New York Museum of Science and Industry, experts on the museum staff developed the technique by which the individual pictures, each 24 feet long and 16 feet high, are projected so accurately that they flow into each other and the audience has no feeling of separate units.

AN electrical micrometer is the latest form of vacuum tube. About the size of those used in radio receivers, the tube has a rod projecting from its end, which forms the sensitive element of the micrometer used for measuring minute displacements. When connected with the proper electrical circuit and meter, a movement of the rod produces a movement of the indicating hand of the meter 10,000 times as great. With the hand moving a tenth of an inch, a motion of the rod of one one-hundred-thousandth of an inch will be shown.