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TEMPERATURES NEAR THE SURFACE OF THE SUN

TEMPERATURES of millions of degrees prevail just above the surface of the sun, instead of the 10,000 degrees that astronomers have previously measured, if the theory proposed by Dr. Donald H. Menzel, of the Harvard College Observatory, is correct.

Speaking before a conference on the sun and solar-terrestrial relationships, he said that his ideas follow from a recent discovery made by Dr. Bengt Edlen, of the University of Upsala in Sweden. This explained the origin of the previously mysterious lines in the spectrum of the sun's corona, its outermost envelope.

They are actually caused, he has found, by elements such as iron, calcium and nickel, from the atoms of which a great many outermost electrons have been torn off. Of the 26 outer electrons in the iron atom, as many as 13 are removed, Dr. Edlen found. He was able to imitate the effects in the laboratory by battering atoms with powerful electric sparks.

Measurements of the surface temperature of the sun, based on the light of the ordinary colors that comes to us, have given a value of about 10,000 degrees Fahrenheit. But, Dr. Menzel said, such an extremely low value would not fit in with the new theory, conditions of excitation must be far greater than this—around several millions of degrees—in the innermost parts of the corona. In spectrum photographs which he made at recent eclipses the outer part of the corona shows lines, but that of the part nearest the sun's surface is a continuous band of color. This indicates that atoms in this region are broken up on account of the high temperatures, and do not show usual lines.

"Perhaps the sun has sprung a leak," he said, "and these hot gases stream out from the sun's interior through holes and pores."

It might seem, Dr. Menzel suggested, that these gases, encountering lower pressures as they emerged, would expand, and the expansion would produce a great cooling. But, he speculated, it might be that great whirlpools inside the sun expand the gases before they are ejected. In that case they would still be as hot as the interior even after they were outside. This theory, he said, is preferable to others which might be offered in explanation.

Apparently the inner corona is the birthplace of the prominences, great flame-like clouds of gas which can be seen and photographed with proper instruments. Dr. Menzel announced that his associate, Walter Roberts, who is in charge of the special Harvard Observatory at Climax, Colo., for studying the sun's corona from an altitude of 11,500 feet, actually saw this happen. A flare in the corona, in which he detected the characteristic green spectrum line, condensed into a prominence, and extended down to the solar surface.

Similar formation of prominences above the sun's surface, apparently out of nothing, have been filmed in astronomical motion pictures taken at the McMath-Hulbert Observatory of the University of Michigan.

Dr. Robert R. McMath, director of the observatory, showed some of these to the meeting. According to Dr. Menzel, this may be due to the atoms recombining. Torn apart, they do not give ordinary light, and are not detected, but as they cool and their parts come together again, they give the familiar spectrum and are then visible.—JAMES STOKLEY.

THE POSSIBLE PREVENTION OF DIABETES

A REQUEST to American physicians to carry on war-interrupted efforts of Canadian scientists to test a promising method of diabetes prevention was made by Dr. C. H. Best, of Toronto, co-discoverer of insulin, and his associate, Dr. H. E. Haist, at the first meeting held in Cleveland of the newly organized American Diabetes Association.

By giving insulin, a diet high in fat content, and also by fasting, the Canadian scientists have succeeded in preventing diabetes in dogs. By any of these procedures the amount of insulin in the dog's pancreas is reduced, indicating that the insulin-producing cells of the pancreas are being given a chance to rest. Overwork of these cells with consequent breakdown of insulin-producing ability results in diabetes.

The hereditary tendency to diabetes has been so well established that Dr. Best and his associate believe the measures which prevented diabetes in dogs should be tried, under carefully controlled conditions, to protect children of diabetic ancestry from developing the disease. They have not been able to make such a trial, Dr. Best explained, because war has called to England for military service the member of the University of Toronto medical faculty who would be able to make arrangements for the trial. Dr. Best's own activities are limited to laboratory research.

A means of diagnosing diabetes in its early stages is badly needed, according to Dr. Best, pointing out that at present doctors do not see diabetic patients until most of the insulin-producing cells in the patient's pancreas are destroyed.

The death rate from diabetes is rising "at an alarming rate" and so is the number of cases, in spite of efforts being made to fight this disease, Dr. Cecil Striker, of Cincinnati, president of the new association, declared in outlining methods by which the association hopes to aid the three quarters of a million diabetics in the nation.—JANE STAFFORD.

NEW METHODS OF DRYING BLOOD PLASMA

TWO new methods of drying the hundred million quarts of blood plasma for treating shock, said to be vitally needed for national defense, were announced at the opening sessions of the American Medical Association meeting in Cleveland.

Cellophane sausage casings, the kind used in preparing "skinless" frankfurters and other sausages, feature the

blood plasma drying method of Dr. Frank Hartman, of the Henry Ford Hospital, Detroit. The blood is collected directly into these casings, which have previously been steam sterilized. After the red blood cells have settled to the bottom, this part of the casing is tied off.

The rest, containing the plasma, is attached to the spokes of two wheels and revolved in an air-conditioned cabinet. The water from the plasma seeps through the cellophane casing and evaporates, leaving the light brown, flaky dried plasma, which can be redissolved in five minutes when the doctor is ready to give it to a patient in shock.

This method is said to be only about half as expensive as other methods of collecting and drying blood plasma. Between 45 and 50 liters (48 to 52 quarts) can be dried in 24 hours in any large hospital. For mass production, this amount could be greatly increased by using an air-conditioned room instead of the small cabinets.

With this method, the red blood cells can be saved and used, as the British are now doing, to prepare anemic patients for operation. This, Dr. Hartman estimates, gives double usefulness to every pint of blood collected and cuts the price of the dried plasma in half.

Even simpler and less expensive, and well adapted to small hospitals, is the plasma drying method developed by Dr. Samuel B. Harper and A. E. Osterberg, of the Mayo Clinic. With $20 worth of ordinary laboratory equipment and the part-time services of a technician, their method can be used to produce instantly soluble dried blood plasma. This method consists simply of distilling the plasma in vacuum at a temperature slightly above normal body temperature.

For large-scale production of dried blood plasma, Dr. Harper investigated the process used commercially by manufacturers of dried milk. He found that this method of spraying large quantities of milk into a big room to dry it could be easily and satisfactorily adapted to blood plasma drying.—JANE STAFFORD.

DISEASE CARRIERS

MAN'S nearest zoological kindred, the monkeys and apes, are less dangerous to him as disease carriers than are some of the other, more specialized groups of animals. About the only monkey-borne disease that may be transmitted to man is yellow fever, whereas rodents and hoofed animals bring him a score or more of maladies, was pointed out by William L. Jellison, U. S. Public Health Service bacteriologist, in an address given in Chicago before the meeting of the American Society of Mammalogists.

Man's closest animal friend, the dog, probably the first animal to be domesticated, is carrier for only one disease, although that is a very serious one—rabies. But the placid cow may plague her owner with any of eight kinds of sickness: tuberculosis, anthrax, foot and mouth disease, undulant fever, actinomyces, pox, scarlet fever and streptococcus infection. Other illnesses contractable from hoofed animals include swine erysipelas, trichinosis, glanders and equine encephalitis. Curiously enough, these troubles are all contributed by domesticated hoofed mammals; deer, antelopes and peccaries or wild pigs are not known to carry diseases to human beings.

Rodents and rabbits are bearers of fewer diseases, though some that they do bring us are among the most dangerous of all our ills. The list includes plague, tularemia, spirochaetal jaundice, rat bite fever and one type of food poisoning. Here again it is noticeable that the biggest score is chalked up to the debit of "domestic" rats and mice—although squirrels and rabbits, as carriers of plague and tularemia, can not exactly be rated as innocents.

One striking feature, to which Mr. Jellison attached considerable importance, is the fact that animals with a smaller sum-total of bodily specializations than man and the other primates are of no importance as disease carriers, with the sole exception of the rabies-carrying dog. On the other hand, the more highly specialized animals, including rodents, rabbits and hoofed animals, are also the carriers of the largest number of diseases.

THE ACCURACY OF VEHICLE SCALES

EMPHASIZING the importance of accurate weights and measures in America's defense-time buying, the National Conference on Weights and Measures heard one very cheering report.

Just back from a 48-state tour that has taken over four years is the National Bureau of Standards' 20-ton machine for checking accuracy of vehicle scales. This piece of equipment, technically known as a Vehicle-Scale Testing Unit, has been out inspecting and demonstrating to each state and many large communities how large scales may be inaccurate and what to do about it. Checking the scales that weigh truck loads of bulk commodities has heretofore been too much for most weights and measures officials, who lacked equipment for testing accuracy of such big scales.

State and local officials in all parts of the country enthusiastically received the big scale tester and the two Bureau of Standards scientists in charge, C. F. Horton of the bureau reported to the conference. Fifty thousand questions were asked of scale owners, said Mr. Horton, and they answered more than that in return, about motor-truck weighing and operation of vehicle scales.

Tests with the bureau's equipment showed scale owners that simply because a scale balances perfectly at zero load does not necessarily mean that it will be accurate throughout its weighing range. A surprising number of people had erroneous ideas about this. A wide-spread tendency for wagon scales to be seriously overloaded was discovered. Many scale owners actually believe that a rating "Maximum capacity for motor trucks 12,000 pounds" plainly stamped on the weighbeam means the net, not the gross, load permissible on the scale, when carried in motor trucks. In some scales, erratic performance was traced to construction of the scale. Others proved to be sheltering "livestock" in the scale pits. "We have encountered during pit inspections," said Mr. Horton, "rats, mice, cats, snakes, toads, scorpions, black widow spiders, poultry and in one case a skunk, in scale pits." While easily detected during a test, he pointed out that rats and mice on the lever system might cause considerable error in ordinary weighing. Scales seriously inaccurate because of mud nests that wasps had built inside the main poises were found.

A scale outfitted with a bullet shield of quarter-inch steel plate was encountered in a midwestern state. The state highway patrol, which used the scale to check highway loads, devised this armor for the scale when not in use, because the expensive automatic-indicating mechanism had been a frequent target for rifle or pistol shots fired by persons riding on the highway.

THE USE OF PLASTICS IN AUTOMOBILES

"THE 'plastic car' will be seriously considered if national defense or war priorities should deprive the automobile of its supply of body steel," was stated by George W. Walker, industrial designer of Detroit, speaking before the Society of Automotive Engineers. In fact, such use might have come normally, for, he said, "Plastics have already completely demonstrated that they are logical materials to incorporate to a far greater degree in automobiles."

However, he explained, a "plastic car" at present does not mean one with a body completely of plastic materials. "More than half the body's weight," he stated, "will be due to the steel used as super-structure. However, the plastic panels fastened to the steel framework will cause the body to be far lighter than the all-metal motor car body in use to-day." He also predicated use of windows and windshields of transparent plastic, even more transparent than glass, as well as lighter and less breakable.

"The industrial designer," he said, "especially the one who works closely with the automobile industry—looks forward to the day of the plastic car with genuine anticipation. For in its styling he will have such opportunity to express his art as he has never had before. His opportunities for original expression will be as numerous as the fascinating materials with which it will be his privilege to work. And the plastic combinations which lend themselves to automotive uses are numbered in the thousands.

"After the industry's chemists and engineers have discovered the best means of adapting plastic materials to automobile manufacture and the designer has done his bit, many benefits, I'm sure, will accrue to the maker of the motor car and also to the man who is going to own and operate it.

"For one thing, the plastic car can be lighter than the steel-bodied car—and hence it will cost its owner less to operate it. This, of course, is a decided sales advantage for the manufacturer.

"Then, the car will be quieter. A plastic substance, being an inert material, will insulate against noise far better than steel does. This is another excellent sales point for the manufacturer to use.

"Also, the car can be made more comfortable, for plastics have heat-insulating properties. These substances will keep heat either in or out of a car's interior. And this leads one's imagination to picture truly air-conditioned automobile interiors, automatically cooled in summer and heated in winter. So here's still another possible 'reason to buy' which the manufacturer can stress to his public."

ITEMS

DR. HARLOW SHAPLEY, director of the Harvard College Observatory, has announced that for the third time this year, a new comet has just appeared in the sky. It was discovered on May 27 by H. van Gent, of the Bosscha Observatory at Lembang, Java, according to a cable message received from Dr. W. H. van den Bos, director of the observatory. When found, it was of the eleventh magnitude, too faint to be seen except with a fairly large telescope. It was then in the constellation of the Southern Crown, which can now be seen from the United States very low in the south about 1: 00 A.M., to the left of the hook-shaped figure of Scorpius. Slowly moving in a northwesterly direction, it may come into better view for northern countries, but whether it will brighten or get fainter can not be told until more observations are made. Earlier this year astronomers found two other new comets, as well as Encke's periodic comet. All three departed without being visible to the naked eye in the United States, though one was conspicuous in southern countries.

WET, cool weather in the West is holding back grasshopper outbreaks by delaying their hatching, C. M. Packard, of the U. S. Bureau of Entomology and Plant Quarantine, informed Science Service. Wetness does not do material harm to the egg masses in the soil, but it does prevent them from hatching. If the dampness persists after the young 'hoppers emerge, high mortality can be expected. The grasshopper situation this spring is not as bad as in former years. There are only two extensive areas of severe infestation. The principal one is in the Dakotas, and there is a smaller area extending from southern Nebraska across Kansas and into the Panhandle country of Texas.

FLAXEN cords are strengthening the bonds of good neighborship between the Americas. Peru is the newest South American country to join the ranks of fiber flax raisers, with a crop of about 500 tons now being harvested, according to the U. S. Department of Agriculture. Seed from the United States and Canada has been purchased for next year's sowing. Although considerable flax is now being grown in this country, the domestic crop comes nowhere near supplying the demand, which amounts to as much as 7,000 tons a year. Since most of this came from Europe, there is a wide market for South American replacements in this commodity.

HEREDITY proved stronger than environment, when screw-worm flies whose ancestors had been artifically reared for 100 generations were given a chance to display the behavior normal to their species. When they were removed from the laboratory and released near living animals they buzzed around them at once, seeking an opportunity to lay their eggs. In nature, the flies lay eggs in cuts and scratches in animals' bodies. These hatch into the larvae known as screw-worms, which cause great discomfort to farm animals, as well as considerable money losses to their owners. In the course of a search for chemicals that will drive off the troublesome pests, the Government entomologists reared their hundred generations artificially on a synthetic diet compounded of milk, calf blood, beef and formaldehyde.