SCIENCE NEWS

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THE RATE OF COOLING AT A LUNAR ECLIPSE

IF the surface of the moon were covered with a layer of lava about an inch thick, its rate of cooling at a lunar eclipse would be explained. Reporting on observations made from Mount Wilson Observatory on October 27, 1939, when the moon entered the earth's shadow, Dr. Edison Pettit, of the observatory staff, draws the following conclusion:

The measurements were made by a thermocouple, which changes the heat radiation from the moon into electricity. It was attached to a 20-inch reflecting telescope. These showed that at the beginning of the eclipse the temperature of a point on the lunar surface where the sun was directly overhead was 208 degrees F., just below the boiling point of water on earth. While the moon was entering the shadow, the temperature dropped rapidly, so that when the eclipse was total, the temperature was 98 degrees below zero, F. While the moon was in the shadow, the temperature continued to drop, rapidly at first, then more slowly, until just at the end of the total eclipse, it had reached 144 degrees below zero, F. As the moon left the shadow, the temperature returned to normal.

From these data, Dr. Pettit was able to calculate the ratio between the radiation that the moon receives, from the sun, and that which it sends out again into space. He found that the two were nearly proportional, showing that the moon's surface is able to hold its heat for a very brief period. This is characteristic of materials like volcanic lava, of which the moon's surface is supposed to be made. Knowing how lava does "hold its heat," he found that a layer 2.6 centimeters (about one inch) thick would respond in the way the moon's surface did on this occasion. These results are similar to observations which he made of a lunar eclipse in 1927. Dr. Pettit's report will appear in the *Astrophysical Journal.*

STEREOSCOPIC MOVIES

PRESENTATION in the home of stereoscopic movies that show full relief are made possible with a new invention by Edwin H. Land, of Boston, and Joseph Mahler, of Nemecky Brod, Czecho-Slovakia. For it they have been granted United States Patent No. 2,203,687.

Mr. Land is the inventor of polaroid, the film that causes light passing through it to vibrate in a single plane, instead of in all directions, as it does ordinarily. This has previously been used for stereoscopic motion pictures; for example, at the New York World's Fair, where visitors to one building can see three-dimensional movies of an automobile being assembled.

To do this, the pictures are taken with a two-lens camera, one lens recording the view as it would appear to an observer's right eye, the other as it would look to his left eye. With two projectors, or a single projector using an attachment in which the light is divided into two beams, these pictures are shown together on the same screen. To the naked eye, they are hopelessly blurred. To avoid this, polarizing films are placed over the projecting lenses, so that one image, say that for the right eye, is formed of light vibrating up and down, the other of light vibrating from side to side.

When a member of the audience is provided with special polaroid viewing glasses, these are separated. Over the right eye is placed a film that passes only up and down light, while the one for the left eye admits side to side vibrations exclusively. The pictures are sorted out, and each eye sees only its proper view, as it would at the original scene.

The new invention, however, allows such movies to be shown with an ordinary projector, either of the theater or home type, without any special attachment, other than the viewing glasses used by the audience. For still pictures, special lantern slides can be used in an ordinary magic lantern.

The two pictures are superimposed on a single film. Each image is itself formed in a polarizing layer, by destroying the polarizing properties over a limited area corresponding to the picture. Thus, when projected on a screen, the parts of the picture that both eyes should see are formed of unpolarized light. This, naturally, goes through either viewing lens. The part of the picture that one eye should see is made of polarizing material set to the proper direction of vibration for that eye. For the blacks in the picture, where neither eye sees any light, both layers retain their full polarizing effect. Having their planes of transmission at right angles, no light passes through these parts.

The patent specifications suggest a number of methods by which the polarizing properties of the films may be destroyed to produce the images. Some are with chemicals, others make use of the action of light or other radiations. Gradations of light and shade in the picture may be obtained, it is claimed, by only partially depolarizing the layers. Further, the pictures do not need to be projected, but may be made as prints, still requiring the use of the viewing glasses.—JAMES STOKLEY.

"SUN-BATHING" THE BLOOD

A NEW method of treating blood poisoning and other dangerous infections including childbed fever, claimed to be superior to treatment with sulfanilamide or other chemicals, was announced at the meeting of the American Medical Association by Dr. George Miley, of Philadelphia.

The method consists, essentially, of "sun-bathing" the patient's blood. The sun-bathing is done not by the sun's ultra-violet rays themselves, but by artificially produced ultra-violet rays. A measured amount of blood, the amount depending on the patient's weight and condition, is taken from his veins and after ultra-violet irradiation of from nine to fourteen seconds is put back into his veins. The irradiation is done as the blood is put back. This method of treating infection has been attempted before, but did not succeed until development of a special chamber in which a system of baffles keeps the blood turbulent while

the ultra-violet rays are hitting it. Credit for development of this device, Dr. Miley said, belongs to E. K. Knott, electrophysicist of Seattle, Wash. The demonstration was the first announcement before a large medical group of the results with the new device.

Out of 27 patients with severe infections 22 recovered. These patients had blood poisoning due to various kinds of germs, including staphylococcus and streptococcus. Within 24 to 48 hours their temperature dropped to normal and stayed there. All the women with childbed fever given this treatment recovered. In these cases, the germs had not invaded the blood. Dr. Miley has taken the treatment himself and reported that neither in his case nor in any others were there any bad effects on the blood or on kidney function.—JANE STAFFORD.

SOIL EROSION PROBLEMS IN INDIA

SOIL erosion, that world-ranging dragon that eats the farmer's fields, has its raking teeth deep in the crowded, heavy-burdened land of India. Recent comments on the problem by Dr. R. Maclagan Gorrie, the well-known Indian agronomist, have a familiar ring to American ears:

"The destruction wrought by a modern war heals over quickly compared with the disaster of erosion. Poppies bloom on the old Flanders battle fields, but a leafless desert remains in the wake of our itinerant goat herds. . . . It is a crime for any village to possess land which can be classified as 'waste.' Every piece of land, no matter how poor it may be, can produce at least a good grass crop which can be cut and harvested."

Soil conservation efforts in India are conditioned, as they are everywhere else, by the existing systems of land-holding and land use. In India, most farms are very small, so that the appeal of the soil conservationist must be made to the individual owner or tenant, to make his particular bit of soil a self-contained rain catchment area.

Non-agricultural land, especially grazing land in forests, presents some peculiar problems. Dr. Gorrie calls attention to the fact that erosion can become very serious even under a tree canopy, if trampling herds range through it, stripping the grass and beating the bare earth hard. The recommended remedy is to cut down the number of cattle and better their quality, keep them in stalls and feed them on cut grass instead of letting them out to graze. Despite the innate conservatism of the native cultivators, some success in this program is already reported.—FRANK THONE.

THE ROBOT LOOKOUT FOR FOREST FIRES

A ROBOT lookout, to keep watch for forest fires, is the newest scientific aid designed for forestry. The device is the invention of Serge N. Koulichkov, and is protected by U. S. Patent No. 2,177,493. Its possibilities will be discussed in the forthcoming issue of the *Journal of Forestry*.

The robot fire lookout consists of a combination of a photocell or electric eye, designed to respond to a rising smoke column on the horizon, and a highly sensitive thermocouple, similar to those used by astronomers in measuring the minute quantities of heat radiated by distant stars. The thermocouple will catch the glow from a far-off fire. Only when the photocell and thermocouple report both smoke and fire will the apparatus sound the alarm, notifying a distant operating station by radio or wire connection.

The apparatus has its limitations. As designed at present, it will tell of the presence of a fire within its range of vision, but it lacks the judgment supplied by a human observer in sensing the actual location of fire, and the degree and direction of its spread. It will therefore probably not replace human observers, but may prove useful as a supplement to their vigilance.

Housed in a small rotating turret mounted on the mechanism that keeps it constantly turning to sweep the horizon, the robot lookout would cost about $500 to produce on a quantity basis. Since this is approximately the cost of maintaining a human lookout on a fire tower for approximately three months only, the use of the apparatus seems to promise both economy and increased efficiency in forest fire fighting.

PAPERS READ BEFORE THE AMERICAN SOCIETY OF MAMMALOGISTS

THAT the high crowns of horses' teeth may have been due to constant and rapid wear of their ancestors' dental equipment, was suggested by Dr. R. A. Stirton, of the University of California, at the recent meeting in Denver of the American Society of Mammalogists. He pointed out that "wide-spread sandy deposits, together with appearance of bunch grass, and increasing aridity, may have been important factors" in the development of the unusually long teeth characteristic of modern horses. Primitive horses that lived in America when the climate of the West was more humid, had more generalized, lower-crowned teeth. That horse-tooth development occurred in this way can not be proved, but "the possibility should be given additional consideration."

SHORT is the life-span of the smallest American mammals, the shrews; as short as the natural lives of many of the insects on which these hungry little carnivorous creatures prey. Study of more than 600 specimens of the smoky shrew has convinced Dr. William J. Hamilton, Jr., of Cornell University, that this species normally lives less than a year. The smoky shrews do not breed during the year in which they are born. Following the breeding season in their second summer, when the adult shrews are from 9 to 11 months old, they all die, usually in August or September. The responsibility of keeping the species in existence over winter is thus left to immature animals. This appears to be true of other species in the genus studied by Dr. Hamilton.

THAT wood rats increase immensely in numbers in overgrazed rangeland was reported by Dr. Walter P. Taylor, of the U. S. Biological Survey. When livestock kills off the grass and other desirable forage by eating it too closely, such western weeds as cholla cactus, mesquite and catclaw increase. These are the preferred food of the wood rat, which thrives as the weed population thrives. Dr. Taylor opposes a general wood rat killing campaign on the open range. It would, he declared, do no appreciable good to range forage. "On the other hand, it would distract attention from the real cause of most diffi-

culties encountered in the arid country, namely, too many livestock for the actual carrying capacity of the range.''

PRAIRIE dogs are far more numerous in the West than they were before white men and cattle replaced Indians and bison, according to Dr. Taylor. The increase in prairie dog population is due at least in part to the reduction in average height of grasses on the range, the result of heavy grazing. Prairie dogs like a wide horizon. They will not live in high-grass formations where their little sentries can not see possible danger approaching from afar. But when over-grazing cleans out the tall and mid grasses, short species come in. Heavy grazing by livestock results in other changes in the wild animal population. Increases occur in numbers of ground squirrels, kangaroo rats, coyotes, bobcats, certain hawks and owls, jackrabbits and plague grasshoppers. Disappearance of the tall grasses causes a decrease in the animal populations that liked the shelter and food they provided, such as cottontail rabbits, meadow mice, harvest mice and cotton rats.

THE toughest bobcat, the ''orneriest'' coyote, the most temperamental skunk, can be carried off alive in a common gunnysack if you only use the right methods, according to Vernon Bailey. First, of course, you must catch your bobcat, coyote or skunk. This must be done with a trap that does not cause the excessive pain that always comes with the savage grip of the old-fashioned steel trap. Mr. Bailey has invented several types of painless traps that nevertheless hold even more securely than the old steel-jawed kind. When you approach a trapped animal to bring it back alive, move slowly, talk softly to it, handle it carefully and gently. Slip an ordinary gunnysack over it, trap and all. Then remove the trap from the captured foot, tie the mouth of the sack shut and hoist it on your shoulder. That's all there is to it. When securely tied up in sacks the animals think they are hidden. They are quiet while being carried over your shoulder or in a car and generally can be transported for short distances more comfortably than in boxes or crates. Clean sacks, free from dust and well ventilated, should be used. If the weather is warm they can be dampened and kept in circulating air for the comfort of the occupants. Dr. Bailey showed two reels of motion pictures illustrating his technique of painless, scareless handling of trapped animals.

PHOTOGRAPHING THE VOCAL CORDS

IN photographing vocal cords of singers at a speed of 4,000 pictures a second, Dr. John C. Steinberg, of the Bell Telephone Laboratories, has discovered that a trained singer's vocal cords are closed much longer during the vibration cycle than is the case with untrained voices. This prolonged closing of the cords develops greater pressure and is probably instrumental in producing the generally greater volume of the trained voice. Dr. Steinberg spoke before the American Association to Promote the Teaching of Speech to the Deaf, meeting in Providence, R. I.

In photographing some voices in action, including his own, the vocal tract was filled with helium, alternating with ordinary air. The lighter gas, helium, which caused Dr. Steinberg's voice to become a childish lisp, is revealed in the pictures as modifying action of the mouth, nose and throat cavities by raising their resonant frequencies. Vocal cord vibrations affecting pitch, however, were little, if any, affected and the vibrations do not seem to be critically dependent on these cavities.

Displaying a recently developed magnetic tape recorder, Dr. Steinberg said that this apparatus records words faithfully as spoken and reproduces them loudly enough for a deaf person who has some residual hearing to listen to the sound of his own voice, thus benefiting by self-criticism.

ITEMS

CALCIUM, bone-building mineral, may be the weapon for defense against lead poisoning, due to contamination of ''practically all common foods'' with traces of lead. ''Increased amounts of calcium in the diet diminish the amount of lead which is stored in the body,'' is announced by Dr. Ludwig G. Lederer and Dr. Franklin C. Bing, of Chicago, in a report to the *Journal* of the American Medical Association. Extra calcium in the diet, they discovered, retarded the deposition of lead in the bones of growing animals. The bones are the chief place where lead is stored in the body. It was pointed out that even minute amounts of lead may be detrimental to health if they accumulate in the body. How calcium acts to keep lead from accumulating in the bones is not definitely known. Apparently it is the result of chemical reactions in the intestinal tract. Presumably the lead is made insoluble so that it can not be carried to the bones.

X-RAY photographs taken with an exposure short enough to show a moving bullet while passing through a block of wood were shown at the Pittsburgh meeting of the American Physical Society. The method was described by Dr. Charles M. Slack, research physicist for the Westinghouse Lamp Division, who developed the new x-ray tube with the collaboration of his associates. A very brief electrical surge of high voltage and amperage is obtained by charging a condenser, in several seconds, and discharging it through the x-ray tube. The voltage is about 100,000, somewhat less than that often used in ordinary tubes. But the current is far greater. The ordinary tube takes about half an ampere; this new tube uses about 2,000 amperes. In use, the bullet golf ball, or other object being studied, is made to break a fine tungsten wire. This is connected to a timing circuit, which releases the energy stored in the condensers.

A BROWNISH-YELLOW beast, with black spots, centuries ago leaped down a yawning cavern on a forested hillside in Tennessee—and because of that, a theory of science is demonstrated. Two boys, Clarence Hicks and Jack Kyker, of Sweetwater, Tenn., in exploring far back in Craighead Caverns, discovered bones and later footprints which were identified by the American Museum of Natural History, New York, as those of an extinct race of jaguars which once roamed North America. Dr. G. G. Simpson, associate curator, went to the caverns to see the footprints and additional bones. He made a cast of the footprints. The animal was closely related to the largest jaguars now found in South America.