

with the vaccine at Hamilton lost their lives and a number have been seriously ill as a result of infection picked up in the course of their work with the spotted fever ticks.

The latest advance has been made by Dr. R. E. Dyer and Ida A. Bengtson, senior bacteriologist of the federal health service. These two have succeeded in growing the Rocky Mountain spotted fever virus on chick embryos. The latter substance is being used increasingly for cultivation of viruses and is now being used for the production of vaccine for smallpox.

Since the Rocky Mountain spotted fever virus can be grown and kept alive apparently indefinitely on chick embryo, it may be possible to prepare the protective vaccine directly from it. This

would eliminate the expense of keeping animals on which to grow the ticks and also the danger of an infected tick's escaping and biting either a laboratory worker or some other unsuspecting person in the neighborhood.

Because of the cost and difficulty of preparing the tick vaccine, the federal health service has never been able to supply all the vaccine wanted by ranchers, hunters and others exposed to the Rocky Mountain spotted fever ticks. The situation has become more acute since the discovery that ticks on the eastern seaboard and in other widely separated parts of the country are infected with the virus of this disease which is thus no longer confined to a small, sparsely populated area of the Far West.

Science News Letter, November 30, 1935

PHYSICS

Cosmic Rays Show Earth's Magnetic Field is Lopsided

DISCOVERY that the magnetic field of the earth is lopsided was announced by Dr. R. A. Millikan of the California Institute of Technology, before the meeting of the National Academy of Sciences. Dr. Millikan's wholly unexpected discovery comes as a result of studies on cosmic rays.

In attempting to discover the nature and distribution of cosmic rays, Dr. Millikan has changed the idea of the still-mysterious aura of magnetism that surrounds the earth.

He finds that the magnetic field extends into space to at least ten thousand miles from the earth's surface—far beyond the limits of the atmosphere.

The magnetic intensity is stronger on the side of the earth opposite to America. This is demonstrated by the fact that there is greater effect on the cosmic ray intensity, from the North Magnetic Pole to the Equator, in the region of India than there is in comparable latitudes in America.

Dr. Millikan's discovery has been discussed with the scientists who have studied magnetism during the past thirty-five years at the Department of Terrestrial Magnetism of the Carnegie Institution of Washington.

A comparison of magnetic variations on the surface of the globe with those high above the earth, as determined by cosmic ray intensities, shows that the variations of magnetism on the earth extend outward many thousands of

miles. Dr. Millikan's results on terrestrial magnetism were obtained on the surface of the earth, and the extension of these results out into space was made by the use of simple laws of magnetism which govern such things as the running of an electric motor.

For the past hundred years, ever since the time of Karl Gauss, it has been assumed that the intensity of the earth's magnetic field was essentially uniform—a conclusion which is now revised by Dr. Millikan.

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ENGINEERING

Giant Salt Container Holds Twenty-Five Tons

THE COVER of this week's SCIENCE NEWS LETTER shows a new 25-ton salt evaporator just completed for one of the largest salt manufacturers. Within it a bronze propeller stirs up wet salt and circulates it through more than 800 tubes where the water is distilled off.

The Lincoln Electric Co., which supplied the picture, states that the apparatus is fifty feet high and twelve feet in diameter at its largest point. Arc weld construction was used throughout.

Science News Letter, November 30, 1935

A new kind of popcorn in Mexico is said to pop to extra-fat limits, and is believed to be the descendant of an old Indian grain variety.

PHYSIOLOGY

Dieting Improves Health Of Over-Fat Children

OVERWEIGHT or obesity is so often associated with "middle-age spread" and "corporation front" that its occurrence in children is apt to be ignored. It is so easy to say, "Oh, my people are all fat like that," and to attribute to the ductless glands the blame for such overweight.

Just as often the family eating habits are at fault. That such is the case is well shown by a report of Drs. Hannah Mulier and Helen Topper of the Pediatric Service of Mt. Sinai Hospital, N. Y., who gave "slimming" treatment to 25 overweight boys and girls not only without harm but with marked improvement in general health as well as in weight.

To do this required careful adaptation of the diet to fill the needs of the child. Not only must the diet furnish enough energy for the internal needs of the body organs and glands, but also for growth and for the child's activities. It must also be low enough to force the body to consume some of its own excess fat.

These doctors therefore gave relatively large amounts of protein foods, such as meat, eggs and cheese, to insure continued normal growth; with but small amounts of sugars and starches, and larger amounts than customary of the bulky foods, such as vegetables and fruits.

Too Much Rich Food

All of the children treated had a history of over-feeding with rich foods, fats, sweets and pastries, and of high water and milk intake. Since some of the overweight of obesity is due to the retention of water by the body tissues, especially when a high carbohydrate diet is eaten, fluids were limited to 15 or 20 ounces daily, and salt not to exceed 15 grains, because it, too, is concerned with water storage in the body.

Increased participation in outdoor sports, swimming, walking, tennis, was gradually encouraged, and the results were well worth the effort taken. Not only did the children lose some of their excess fat, averaging three-quarters of a pound loss per week, but they continued to make more than the normal gain in height for children of their age, 5 to 14 years. They lost their passion for excessive food, became much more interested in work and school study and outside activities, and manifested an increased sense of well-being and alertness. In addition, some of them who

had developed a sense of inferiority because of their excessive fatness which kept them from engaging in the usual activities of their group, lost this attitude and became normal healthy children with an active interest in their surroundings.

Examination revealed no evidence of

disturbance of the ductless glands as a cause of obesity, and the steady loss in weight under dietary treatment confirms the belief of the authors, as of other observers on obesity, that overweight is usually due not to gland disturbances but to over-eating plus under-activity.

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PHYSICS

Rotors Whirling at 16,000 Miles an Hour for Atom Study

Scientific Counterpart of the Cream Separator Used To Separate Heavy Isotopes from Lighter Ones

THE CREAM separator, that takes cream out of milk by high-speed whirling, has a smaller but vastly faster scientific counterpart in a 16,000-mile-an-hour centrifuge at the University of Virginia. This device, which develops a centrifugal force equivalent to seven million times gravity, is to be used in an effort to separate chemical isotopes, which are different-weight atoms of the same chemical elements.

Reporting to the National Academy of Sciences meeting, Dr. J. W. Beams, University of Virginia physics professor, told of adapting his high-speed air-driven apparatus to the new highly important atom problem.

Dr. Beams' rotor device can spin in a vacuum and attain velocities as high as 21,000 revolutions a second, or a rim speed of over 16,000 miles an hour. At these speeds the centrifugal forces produced are in excess of seven million times the force of gravity.

The only limit to the speed of rotation, Dr. Beams indicated, is the strength of the rotor. Under the great centrifugal force, the spinning metal may fly apart.

So hazardous is the research with little four-inch diameter rotors that it is carried on behind a barricade consisting of a wall of sand four inches thick held in place by 1½-inch thick wood planks. For larger rotors, still more protection is needed.

Describing the separation of isotopes, Dr. Beams said:

"Because of the new methods recently found by many different experimenters for disintegrating the atoms, it is very important to obtain samples of the various pure isotopes so that the results of the atomic disintegrations can be clearly analyzed. At the present time we are undertaking this problem of separating isotopes, and the method is brief-

ly outlined although no results are as yet ready to be reported.

"Isotopes have the same atomic number but different atomic weights. Therefore in a centrifuge the heavier isotopes settle out under the intense centrifugal force faster than the lighter ones.

"In addition to separation by centrifuging, the rotor is made to select the heavier molecules of a gas or vapor directly. This is easily accomplished because the velocity of a molecule depends upon the square root of its mass. Since the peripheral velocity of the rotor can be made greater than the average molecular speed of most substances, the rotor can easily be set at such a speed that, roughly speaking, only the faster (lighter) molecules can enter a hole on the periphery."

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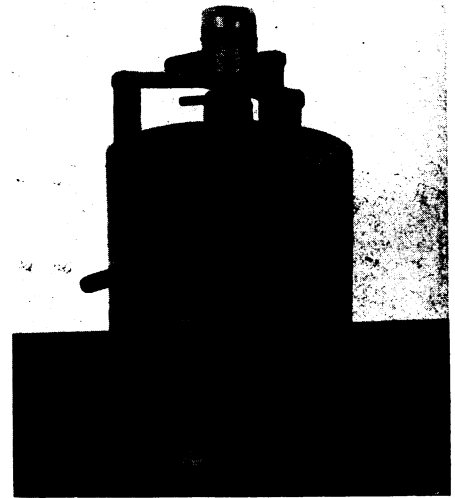
ENTOMOLOGY

New-Found Ant Species Are "Racketeer" Aristocrats

PARASITIC ants of a new species, recently discovered in southern Germany by Dr. Karl Gösswald of the Institute for Applied Zoology, Munich, set a new record for insect racketeering. If Solomon could have seen these insects, he might have hesitated about making a blanket commendation of ants in general as models of industry and thrift.

This ant's career of wickedness begins when a fertile queen intrudes herself into the nest of another species of ant—the normal, hardworking kind that inspired Solomon's praise. Ordinarily the workers in the nest would make short work of any stranger, but she somehow manages to flatter herself into their good graces.

Proceeding thus unmolested to the



LOOKS INNOCENT

But the rotor within this housing, whirling at 16,000 miles an hour, produces such centrifugal force that the metal may fly apart. Scientists working with it "take cover" behind a barricade of sand.

chamber of the rightful queen, the invader springs upon her back and fastens her strong jaws into the body of the much larger insect. The home queen does nothing to defend herself, and the workers still pay no attention.

After the rightful queen is dead, the invading queen is accepted by the duped workers as their own. She proceeds to lay eggs of her own parasitic species, which are cared for by the workers.

These eggs produce "neuters" or undeveloped females, which in a normal ant species constitute the worker caste. But in this parasitic species they are as useless as their mother, living lives of complete idleness, accepting the food the active workers bring them and giving no thanks for it—as typical a lot of alien aristocrats as ever afflicted a community, whether ant or human.

It might be expected that when the last of the workers had died off, the helpless parasites would perish. But here the nature of the "host" ant workers intervenes to play a mean trick on them and perpetuate their slavery.

Normally, when an ant colony loses its queen, some of the usually "sexless" workers lay unfertilized eggs, just as worker bees do under similar circumstances. Such unfathered bee eggs develop only male or drone insects, useless as workers. But with these poor afflicted ants, the eggs laid by the workers produce new workers, so that the "aristocratic" idle parasites always have a full population of exploitable "proletariat" workers to take care of them.

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