

ASTRONOMY

Sun May be Changing Its Speed of Rotation

FOR MANY YEARS astronomers have known that the sun varies in light over an eleven-year period, as the sun-spots wax and wane. The suggestion that it also varies in the speed of its rotation, but in a period of about thirty years, has been made in a report to the Royal Astronomical Society by John Evershed, following researches made in his private observatory in Surrey.

Dr. Evershed's study is concerned with the sun's equator, where the speed of the surface is about a mile and a quarter, or two kilometers, a second. His observations were made by photographing the edge of the sun with the spectroscope. By measuring the shift of the dark lines which appear in such photographs, the motion towards or away from the earth can be determined.

The mean value of eleven such measures, as made over a period from July to December, 1931, is 2.015 kilometers per second, a value which may be in error as much as .026 kilometers. Previous determinations by other astronomers with similar means have given different values. Those made before 1911 gave values over two kilometers per second, while those made after 1915 gave between 1.90 and 1.94 kilometers per second. A series made by Dr. Charles E. St. John, of the Mt. Wilson Observatory, beginning in 1914, showed close agreement, with a minimum of 1.90, until 1929, when there was a tendency for the value to increase, with 1.95 being obtained. Dr. Evershed's new results, with a value in excess of two kilometers a second, a return to the measures made between 1900 and 1911, indicate that the change in speed actually occurs.

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ARCHAEOLOGY

Clues to Foreign Trade Unearthed in Bible Town

EXCAVATIONS in the ruins of old Beth Shemesh, fifteen miles west of Jerusalem, have yielded objects showing that this Biblical city was for centuries one of the busy commercial centers of Palestine, with a brisk international trade. Beth Shemesh is famous ground because Samson was born in the neighborhood, and it was somewhere nearby that Delilah lived.

Dr. Elihu Grant, who has directed the

Haverford College expedition to Beth Shemesh for four years, announces as discoveries from the site such articles as handsomely made bronze rings with Egyptian scarabs and an Egyptian bowl made of a single block of hard diorite stone. The bowl is very old. It was made a thousand years before the era of the Hebrew kings in Palestine. The history of Beth Shemesh goes back to a settlement of about 2000 B. C.

"We found Beth Shemesh," Dr. Grant explains, "a terraced, tongue-like little plateau with the shadowy stumps of an encircling wall built 3500 years ago. Since Beth Shemesh, which means City of the Sun, was on the border between the hill country and the rich agricultural plains across which the caravan-trading roads ran between Egypt and the north, we expected to find the remains of an important civilization.

"Our newest findings particularly show us that we were right in our conjectures. Beth Shemesh shows up well as a lively commercial town open to the currents of trade, politics, and the arts of all the Mediterranean world. It drew its supplies from Egypt, as is proved by the perfectly-ground Egyptian milk bowl we discovered lately. It also imported pottery from Cyprus and Crete as well as other lands on the Mediterranean.

"I brought back with me several beautifully painted jugs from Crete, as well as imported carnelian beads from Cyprus. Egyptian scarab rings were popular thousands of years ago in Palestine."

Dr. Grant and his party of diggers have uncovered at Beth Shemesh the plans of four cities at different depths. Remnants of city walls, forts, houses, and even a street have been unearthed. They found large cisterns containing valuable treasures, and excavated a Byzantine Arab temple.

"The mound of rock upon which we concentrated," Dr. Grant continued, "was low and covered with not more than twenty feet of soil, rubbish, and ruins. For each layer of rock a yard deep there was likely to be a distinct period of civilization. We found relics that carried us from the late Iron Age back to the Bronze Age.

"We found food jugs that belonged to the Hebrew prophets and from which they ate, back in 600 B. C. Some of these large jugs were full of fat and very delicately made. We found an olive-oil refinery of that time, which proved that they seasoned their food. We found carbonized raisins, wheat, and barley."

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IN SCIENCE

ARCHAEOLOGY

Soviet Divers Explore Lost City Sunk in Black Sea

WITH THE AID of trained divers and telephones connected with motor boats, Soviet scientists have explored the ruins of a submerged Greek city lost for 2,000 years beneath the waters of the Black Sea.

The city is tentatively identified as the famous "Old Chersonesus," described by Strabo, classical geographer of the first century. The ruins are about ten miles south of Sevastopol, in Crimea, and are 100 feet out beyond the present shore line. It appears that the shore line, which is still retreating, was pursued by the advancing sea much more rapidly in antiquity, and the flourishing seaside town was destroyed.

Exploration of the ruins was undertaken by an expedition of the State Academy of Moscow.

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ZOOLOGY

Animal Thought Extinct Has Been Rediscovered

THE AUSTRALIAN rat-kangaroo, lost to science since 1843, has been rediscovered, hale and frisky, in the sandhill country enclosed by the Diamantina and Cooper's rivers at the junction of South Australia and Queensland.

The scientific periodical *Nature* has published a letter from H. H. Finlayson, Adelaide University, saying that since 1843, when Sir George Grey presented three specimens to the British Museum, no one had been able to trace this peculiar animal to its lair, and it was feared that it had become as dead as the dodo. But indications are that the rat-kangaroo has had a long and probably uninterrupted tenure of the semi-desert area where it has been re-discovered. The passing of the drought conditions has probably helped to increase its numbers.

The Australian rat-kangaroo is one of the marsupials, animals possessing a pouch in which they carry the young for a considerable time after birth.

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E FIELDS

PHYSICS

Diamonds Yield Electricity When Bathed With Light

SCIENTISTS are puzzled by the behavior of certain rare types of diamond, which are transparent not only to ordinary light but also to ultraviolet down to a wavelength of 2300 Angstrom units, and to infra-red heat rays of 8000 Angstrom units (an Angstrom unit is about four billionths of an inch.) These diamonds, of which very few are known, give an electric current when illuminated by certain kinds of light.

"Out of some 250 diamonds which I have tested," declared Sir Robert Robertson, Chief Chemist to the British Government, "only five have shown this power to generate an electric current. I think that I can now recognize such diamonds in a simpler manner from their behavior in polarized light."

Sir Robert showed a photosensitive diamond at a recent experimental evening of the Royal Society of London. The precious stone was clamped between two carbons. Brass or lead can also be used to make electrical contact. When illuminated by ultraviolet or by extreme red light it gave an electric current that produced a deflection in a galvanometer, so long as the light shone on the diamond. This photoelectric effect is different from that which occurs in the "electric eye" instruments, where electrons are dislodged and thrown out into vacuum by the impact of light rays or quanta upon certain sensitive metals.

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GENETICS

One Type of Deafness Found to be Sex-Linked

TWICE as many women as men are affected with the type of deafness known to physicians as otosclerosis. This and other facts point to an hereditary origin for this physical defect, Dr. Charles B. Davenport, of the department of genetics, Carnegie Institution of Washington, Cold Spring Harbor, Long Island, told a meeting of the Eugenics Research Association.

The hereditary mechanism by which

this particular type of deafness is handed on from father to son, or more accurately from father to daughter, consists of two defective genes, one of which is in the sex-controlling chromosome. The sex-linked gene, it is thought, acts in some way to upset the body's use of the bone-forming food calcium, while the other works directly to produce the deafness. The disease may also be associated with a disturbance of the pituitary gland, a gland which in youth and middle life exercises considerable control over bony changes.

Although otosclerosis is thought to affect only about two or three per thousand of the white population of the United States, a much higher proportion is observed among the members of the family of any individual who is affected with it, Dr. Davenport reported. Often from one-quarter to one-half of such a family group are troubled with hardness of hearing. This strengthens the view that otosclerosis has a genetic basis.

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PHYSICS

Cosmic Ray Tracks Occur In Groups of Two or Three

THE TRACKS of the intensely penetrating cosmic rays, recently photographed for the first time, occur in groups of two or three, apparently radiating from one point, more often than can be accounted for by chance, Dr. Gordon L. Locher of the Rice Institute at Houston, Texas, has found. His discovery has been reported to the American Physical Society through its *Physical Review*.

Dr. Locher concludes from this that these tracks are not actually the paths along which the cosmic rays travel on their way in from the depths of space. The incoming cosmic rays are, he believes, probably photons or wave-light rays which strike an atom to produce two or three speeding electrons simultaneously. The paths of these secondary electrons produce the tracks that can be photographed.

If Dr. Locher is right in his interpretation, his experiments help settle the much-disputed question as to whether the cosmic rays are moving particles or wave-like rays much shorter than X-rays.

Electrically charged particles produced in the air by the cosmic rays are much less numerous per inch along the tracks than had formerly been believed, according to Dr. Locher's new findings.

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BOTANY

Sprouting of Drunken Seeds First Speeded, Then Delayed

GIVING seeds a "shot" of alcohol seems to have much the same effect on them that it has on human beings: it peeps them up for a little while, then brings about a depressed state. A second dose restores vigor temporarily, but the following depression is even deeper.

These are, in brief, the results of observations on the seeds of red pine immersed in absolute alcohol for the purpose of floating off the dead and empty ones, reported in the *American Journal of Botany* by Dr. Henry I. Baldwin of Saranac Lake. Dr. Baldwin found that seeds immersed for a short time had their rate of germination appreciably increased when planted immediately. But if they were stored for several months the germination rate fell off, as compared with "teetotaler" seeds. Given a second soaking in alcohol, these inebriated seeds underwent a short-lived regeneration of their sprouting capacity, then lost it again.

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MINING

Gold Mine Accumulates World Surplus of Arsenic

THE BOLIDEN mine in northern Sweden is expected to bring that country to the position of the largest producer of gold in Europe, among the first ten in the world, with an annual output of about 320,000 ounces. To achieve this position, however, the company, in operating the mine, must also produce copper and silver, selling at low prices, and a large amount of arsenic. The oxide is the form in which the metal is obtained during roasting operations.

The entire world consumption of arsenical poison could be supplied from this mine. The problem of disposing of this by-product surplus after commercial demands had been met proved difficult. At first the white arsenic, as it is called, was mixed with the ingredients for concrete, and the shapes were sunk in deep water in the Gulf of Bosnia, on whose shore the smelter is situated. Storage has now been provided for 120,000 tons—a stock that will prove a menace to producers in other countries, for the Boliden arsenic can be sold to the company's advantage at any nominal price.

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