

ASTROPHYSICS

Mechanical Device Notes Changes in Sun's Activity

A "BRASS BRAIN," that ferrets out cyclic variations in the amount of heat and light put forth by the sun, was demonstrated by Dr. Charles G. Abbot, secretary of the Smithsonian Institution, at the meeting of his board of regents. It consists of a simple but ingenious arrangement of sliding brass pins on two wheels, which will automatically untangle a curve representing one period of activity from a compound curve in which more than one such period may be indicated.

The device is intended for use in Dr. Abbot's study of the fluctuations in the amount of energy radiated by the sun. Many years of research have led him to the belief that these fluctuations are indirectly reflected in weather changes, and that eventually a reliable method for long-range forecasting may be based on them.

Science News Letter, December 19, 1931

ASTRONOMY

Winter Begins Tuesday; Sun Farthest South

FOR INHABITANTS of countries north of the tropical regions, winter will begin on Tuesday, December 22, at 2:30 P. M., Eastern Standard Time. At that moment the sun will be at the southernmost part of its annual path. Even though the coldest weather of the winter may come in January, the sun by that time will be well on its northward journey to its spring and summer position.

The reaching of the southernmost point by the sun on the twenty-second is called the winter solstice. Because the sun is then so far south in the sky, it rises in the southeast and sets in the southwest. Even at noon, when highest, it is only 26.5 degrees above the southern horizon, scarcely more than a third the height it occupies at noon at the beginning of summer. Because it thus has a very short path to cross in its motion from sunrise to sunset, it does it in a shorter time than on any other day of the year.

The twenty-second will thus be the shortest day, with the sun above the horizon for only 9 hours and 20 minutes. These figures are for latitude 40 degrees and apply with good accuracy to Philadelphia, Pittsburgh, Columbus, Ohio; Springfield, Ill.; Kansas City, St.

Joseph, Mo.; northern Colorado, Salt Lake City, central Nevada and northern California.

Farther south the day is a little longer. For instance, at 35 degrees latitude, near Charleston, S. C.; Dallas and San Diego, the sun rises 14 minutes earlier and sets later by an equal amount, making 28 minutes more of sunlight.

Partly because the sun is now above the horizon for a shorter time than at any other part of the year, but mainly because it shines on the ground at such a low angle that its heat is dissipated over a large area, the earth in the northern hemisphere now receives a relatively small amount of solar radiation. This is the cause of the cold weather.

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ASTROPHYSICS

Moon's Geology Studied By Analysis of Light

STUDYING the minerals on the moon's surface, though no mortal geologist has ever been much nearer to it than a quarter of a million miles, is nevertheless possible, it was explained to visitors at the annual exhibition of the research work done by the Carnegie Institution of Washington.

It is possible to learn something of the nature of the moon's surface by examining the light reflected from it, and comparing it with light reflected from terrestrial rocks and minerals. One line of attack is to make spectral analyses of moonlight, determining the intensities of the various colors of which it is composed. Different types of rock give different proportions of color in their reflection spectra. A second method depends on the fact that moonlight is partly polarized, that is, reflected in such a manner that the light waves vibrate wholly or principally in a single plane. Rocks also differ in the degree to which they polarize the light which they reflect. A third method compares the temperature of the moon's surface when it is illuminated and when it is in eclipse.

By combining these three methods, the Carnegie Institution scientists have eliminated from the moon's surface geology such materials as basalt, granitic rocks and sulphur, leaving as possibilities only pumice, volcanic ash and other rocks of high heat-insulating value. Measurements are now in progress to explore the moon's surface in detail and to identify its surface materials with greater certainty.

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IN SCIENCE

PHYSICS

Cosmic Rays Again Shown Like Radium Gamma Rays

FURTHER SUPPORT of the theory that the mysterious cosmic rays are waves, is offered by Dr. R. A. Millikan and Dr. I. S. Bowen of the California Institute of Technology in a letter to *Nature*.

The long struggle to establish the real nature of these penetrating radiations from outer space has engaged physicists both in America and Germany. Dr. Millikan's faction has favored the theory that the effects are caused by non-material waves like light or radium gamma rays. His critics, led by Dr. Walther Bothe and Dr. Werner Kolhoerster in Germany, believe that the rays are corpuscles, probably electrons.

A doubling of the signal strength was not found by Drs. Millikan and Bowen when the air pressure in the recording electroscopes was doubled, contrary to what might be expected. Radium gamma rays, however, they now find, show just this same behavior when they act on the electroscopes.

Thus changes of pressure in the electroscopes affect the two radiations equally and support Dr. Millikan's idea that the rays are similar in nature. Lack of "saturation" in the currents flowing through the recorders is the cause of the observed absence of proportionality.

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ZOOLOGY

Santa Claus Cavalymen Bstride Strange Steeds

See Front Cover

CAPTAIN JINKS of the Horse Marines bestrode an unfamiliar steed; but the gentleman in the cover picture mounts one more unfamiliar still. He might qualify as a trooper in the Santa Claus Cavalry, for he is mounted on a reindeer. According to the U. S. Biological Survey, reindeer are used occasionally as saddle and pack animals in Siberia, whence the original stock of the great Alaskan herds was imported; but the animals are seldom used for these purposes on this continent.

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E FIELDS

EVOLUTION

Living Diatoms Identical With Ancient Ancestors

EVOLUTION has meant nothing to certain species of diatoms, one-celled plants shown in photomicrographic enlargement at the annual exhibition of research work of the Carnegie Institution of Washington.

Their finely marked fossil shells, left behind when they died over a hundred thousand years ago, are practically identical in every detail with the shells of the same species living today in Chesapeake Bay and other waters of the Atlantic coast. Yet other diatoms have not been immune to the forces that make for evolutionary change. The vast majority of the 8,000 known diatom species have changed greatly; most living species are unrepresented in fossil deposits, and many fossil species have no living kindred. The exhibit of diatoms was arranged by Dr. Albert Mann.

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DIETETICS

Milk and Bread First On Depression Menus

MILK and its products; fruit or vegetables or both; and bread and other cheap sources of calories, such as cereals, are the three groups of foods which Dr. Henry C. Sherman of Columbia University declares are essential to save the child-victims of the depression from lasting injury to their health.

The advice of this eminent authority on nutrition was obtained by the American Child Health Association for the guidance of the many mothers faced this winter with the problem of what to feed their children when the family purse is low and the ordinary standards of diet must consequently be sacrificed.

"When shortage of money forces expenditure for food to an abnormally low level, more than one-fifth, perhaps one-third should be spent for milk in some form," Dr. Sherman advised.

One-fifth of the money should go for fruit and vegetables if possible, but the selection should be limited to the

cheaper sorts so as to get the most food value for the money.

At least one-fifth of the reduced expenditure may well go for breadstuffs and cheap forms of cereal, since a penny spent here will go farthest to meet the actual pangs of hunger.

The remainder may be divided one-fifth for meats, fish, eggs, and one-fifth for fats, sugar and other groceries, but these foods can be omitted altogether if one gets enough milk in some form and of fruits and vegetables to provide the absolutely essential minerals and vitamins, and enough breadstuff to prevent actual weakness from hunger.

Science News Letter, December 19, 1931

EVOLUTION

Individual's Life Affected By Darwinian Evolution

DARWINIAN evolution was extended to apply to the movements and reactions of individual animals and plants by Dr. Edwin G. Conklin, Princeton biologist, addressing the Washington Academy of Sciences.

In nature, he explained, there is a great overproduction of movements and reactions. Adaptations occur by the elimination of unfit reactions during the life of the individual that do not cause its death but do modify its course of life. Immunities to certain diseases acquired during life were cited as examples by Dr. Conklin.

Darwin's famous principle of the elimination of the unfit is thus applied to reactions of animals and plants as well as the existence of whole kinds and species of living things.

All fitness for life displayed by the living world can be explained mechanistically, Dr. Conklin contended, if to begin with life is endowed with sensitivity to distinguish between good and evil situations, reproduction to perpetuate the organism, and metabolism to convert non-living materials to the use of the living thing. Biologists generally recognize these three fundamentals of life.

"Something other than mere chance and accident permeates the entire universe," Dr. Conklin said in protesting against undiluted mechanistic evolution.

With "vitalism" or "psychism" that "no one can define or study I have no sympathy," Dr. Conklin explained. But he contended that something which may be called "differential sensitivity psychism" is necessary after which all of evolution can be explained on the basis of the operation of mechanistic principles.

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BIOGRAPHY

Noted Editor To Head Southwest Museum

A NNOUNCEMENT that the Southwest Museum is to have as its director Frederick W. Hodge, well known ethnologist and editor of many important scientific publications, has been made by M. R. Harrington, curator of the Museum, at Los Angeles. Mr. Hodge's appointment will take effect January first, Mr. Harrington stated.

Among scientists Mr. Hodge is best known as editor of the "Handbook of American Indians," a monumental two-volume work, arranged in encyclopedia form and giving facts about Indian tribes north of Mexico. Material for these two bulky volumes was gathered and published by the Bureau of American Ethnology, more than twenty years ago. It is still one of the outstanding reference works on the Indians.

Mr. Hodge has conducted a number of expeditions to the Southwest. In 1897, he successfully scaled the precipitous "Enchanted Mesa." His latest excavations have been at the pueblo of Hawikuh, in New Mexico, where the Hendricks-Hodge Expedition worked for six seasons, finding evidence that Indians of different periods had occupied the old town.

For nineteen years, Mr. Hodge acted as editor of the *American Anthropologist*, and in 1916 he was honored by being made President of the American Anthropological Association.

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ENGINEERING

Vertical Recording Used With New Disc Records

THE KIND of phonograph recording used by Edison in his original work promises to return to practical use and effect the most faithful reproductions of music. Halsey A. Frederick of the Bell Telephone Laboratories demonstrated to the Society of Motion Picture Engineers and the Institute of Radio Engineers new disc records cut by the vertical method instead of the lateral method used in ordinary phonographs. The new system of music reproduction is claimed to eliminate needle scratch. The material of the new disc records is cellulose acetate, the same substance that is used in making cellophane, rayon and other new products of synthetic chemistry.

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