SCIENCE NEWS

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THE EQUIVALENCE OF MASS AND ENERGY

NEW proofs of Einstein's law that mass and energy are the same thing in different forms has been evolved by Professor H. A. Bethe, of the Cornell University department of physics.

The Cornell work removes an obstacle from one of the most important advances now under way in science, the investigation of the atomic nucleus. In the disintegration of the lightest elements, such as deuterium and lithium, the loss of mass was offset by an equivalent amount of energy, thus confirming Einstein's law.

Apparent contradiction to this law had arisen when investigators disintegrated heavier nuclei, such as beryllium and boron. Not enough energy seemed to be given off when these elements were disintegrated. This cast doubt on the validity of the Einstein formula.

Starting from the point that most nuclei disintegrate into helium, Dr. Bethe suggested that the mass of the helium nucleus was greater than previous measurements had indicated.

He was able to compute the atomic weights of all light elements to a greater accuracy than any previous method in chemistry or physics had given. With these more accurate masses Einstein's law was found to hold for every nuclear disintegration thus far investigated.

By a coincidence an independent investigation, conducted by Dr. F. W. Aston, confirmed by direct measurement the most important of the new atomic weights which Dr. Bethe had arrived at by the theoretical method. With confidence again restored in the validity of Einstein's law of the equivalence of mass and energy, the path is now open for probing the remaining secrets of the structure of matter which are bound up in the invisible nucleus of the atom.

OBSERVATION OF THE STRATOSPHERE BALLOON

AN eye more used to watching the remoter heavens will be training an eight-inch telescope on the stratosphere balloon, *Explorer II*, if it drifts within 50 miles or less of Des Moines.

Dr. D. W. Morehouse, astronomer, president of Drake University and director of the Des Moines Municipal Observatory, is preparing to take accurate position observations on the big bag, if it floats within sight, just as though it were a comet or other stranger in outer space. In good "seeing weather," his instrument can pick up an object of that size at a range up to 50 miles, if it floats as high as stratosphere balloons are wont to do, says Dr. Morehouse.

Last summer, Dr. Morehouse kept lone and vain vigil, while the stratosphere balloon met mishap over Nebraska. This year, an elaborate set-up of topographic engineers all over the Midwest, kept posted by radio, will take simultaneous "shots" at the balloon as it drifts within range of their instruments. Dr. Morehouse is tying his much larger telescope into this network of scientific spy-glass men.

Dr. Morehouse first attracted wide popular notice about 25 years ago, when he discovered the brilliantly spectacular naked-eye comet that bears his name. That was at the time of the last visit of Halley's comet; and the two objects, Halley's comet in the early morning hours and the Morehouse comet just after sunset, for months furnished beautiful and awe-inspiring celestial fireworks.

THE EFFECT OF SUNLIGHT ON SEEDLINGS

STRONG sunlight shining on leaves of tree seedlings causes their roots to burrow deep into the soil. Leaves of seedlings in full sun lose from 20 to 250 per cent. more water than do similar seedlings grown in partial shade. Half-shade favors growth of some seedlings, while other species do better on all the light they can get.

These results, which have bearing on young tree cultivation in prairie regions, are among those obtained by Harold H. Biswell, of the University of Nebraska, in experiments on a number of tree species planted in three different soil types near Fayette, Mo. Mr. Biswell's report will be made in detail in the June number of *The Botanical Gazette*.

Mr. Biswell found that seedlings generally have much more of their total length below ground than above it. Honey locust seedlings had roots one and a half times as deep as their tops were high; hickory seedling roots drilled to ten times top height; other species were intermediate.

Tree-root systems were found to be highly plastic, organizing themselves according to the nature of the soil, and especially according to the depth at which they strike permanent water. Thus, cottonwoods are very shallow-rooted on the flat floodplains of streams, but on dry uplands they send down taproots to very considerable depths.

THE IMMUNITY OF SKUNKS TO BEE STINGS

SOME observations on the ill habit of striped skunks in raiding bee colonies are recorded in the new issue of *The Journal of Mammalogy*. The studies were made by Dr. Tracy I. Storer, of the University of California, and Dr. Geo. H. Vansell, of the U. S. Department of Agriculture, both working at the Pacific Coast Bee Culture Laboratory.

Drs. Storer and Vansell found evidences of dirty work at midnight around some of their beehives. Animals, which proved to be skunks, were coming round, scratching at the outside of the hives to make the bees swarm out to defend their homes, and then beating them down with their paws and eating them. They soon learned which hives held the bees most resentful of intruders, and concentrated their attentions on them, to such an extent that they weakened the colonies almost to extinction. Examination of the stomach contents of trapped animals showed that they were living almost entirely on bees.

Stings seemed to hold no terrors for the marauding skunks. Animals captured had them abundantly in mouth and throat membranes; one skunk yielded no less than sixty-five such stings. It is thought probable that the bees inflicted the stings after they were dead, by reflex muscular action.

Precautions were observed in trapping: "The skunks which we captured were taken in an unbaited, exposed steel trap. . . . The trap chain was fastened to the end of a 12-foot scantling. Each skunk, as captured, was led gently (the operator being on the other end of the scantling) to a near-by garbage can filled with water and drowned without any unpleasant consequences."

Drs. Storer and Vansell believe that drought had something to do with driving the skunks to more-than-ordinary beehive raiding. The season had been very dry, the ground hard, and insects which skunks normally dig up for themselves consequently hard to get. Hence their transfer to a "hotter" diet.

MALNUTRITION AND CATARACTS

LACK of proper food for families hit by the depression may "take a horrible toll" in increased numbers of sightless children, Dr. Emanuel M. Josephson, eye specialist of New York, told a recent meeting of the Eugenics Research Association.

The public should be warned that unbalanced depression diets, lacking in the proper vitamins, may result in eye disease and blindness. Inexpensive foods added to the depression diet may prevent the development of this "hunger blindness." Carrots and other vegetables, and cod-liver oil are among the foods which protect against it.

A family in which almost half the descendants of one grandmother suffered from cataracts, a condition of the eye which gradually veils the sight, was reported by Dr. Josephson as an instance of how the tendency to eye disease may be inherited but brought on by living conditions. Although so many members of this particular family developed cataracts, some of them beginning before the birth of the child, another branch of the family in better financial condition did not have a single case of this disease down to the third and fourth generations.

Dr. Josephson pointed out that cataracts are not the only eye disease which may result from environmental conditions such as malnutrition. Day blindness, a disease common in the poorer countries of the Orient, which causes the patient to see less by daylight than at night, has become wide-spread in the United States for the first time during the depression. This disease, and its later stages, nightblindness and keratomalacia or softening of the cornea, and xerophthalmia (dry eyeball), are due to lack of vitamin A in the diet.

Dr. Josephson concludes that "if America wishes to take no risk of becoming, like China, a country with a high incidence of blindness and eye disease due to prolonged malnutrition, prompt action must be taken."

THE EVOLUTIONARY BASIS FOR ABNORMAL BONE GROWTH IN THE EAR OF MAN

MANKIND may be paying for the rapid evolution of his head, during the past half-million years, with serious ear troubles. This conjectural explanation for the abnormal bony growths in the auditory canal, known as ear exostoses, is offered by Dr. Aleš Hrdlička, physical anthropologist of the U. S. National Museum.

These distressing growths are not the result of disease, but are simply runaway phenomena of ordinary growth. They often impair hearing, and sometimes cause death. They are exceptionally numerous in the skulls of American Indians and South Sea Islanders represented in the Smithsonian Institution collections, but no race can be considered immune. Concluding his explanation, Dr. Hrdlička said:

"Only one thought may here be permissible, but that must not be taken for an assertion. Within some 500,000 years man's progress, especially as concerns his brain and head, has far outstripped that of all the rest of creation. This rapid progress and differentiation, with a spread to all regions and exposure to a multitude of new factors, has prevented in many respects a full adjustment of all parts, a full harmonization and stability in all regions.

"There is a possibility that the central trophic control of the external meatal region in the greatly enlarged, altered and still altering skull, has not regained the full lifelong adequacy that it possessed before. This would mark the abnormality as an incidental condition that might disappear in the natural course of events if further skull changes affecting the part stopped and if direct inheritance of the abnormality did not meanwhile become rooted."

PATAGONIA YIELDS HITHERTO UNKNOWN FOSSILS

BONES of an extinct flesh-eating animal related to the kangaroo but much bigger than a grizzly bear, fossil frogs, remains of a totally new kind of fossil browsing animal five feet high, are among the scientific trophies brought back from South America to the American Museum of Natural History by Dr. George Gaylord Simpson, associate curator of vertebrate paleontology.

Dr. Simpson and his associates made actual a semi-legendary "place of bones" deep in the interior of Argentina's "Wild South," Patagonia, as the result of a chance sight of a fossil jawbone in a bank in Buenos Aires. They went through adventures of an almost Marco Polo type, including a brief sojourn at the ranch of a veritable ogre of a bushy-eyebrowed killer known as the Terrible Turk, and passage through a land where the natives valued money at nothing, but would sell you anything you wanted for an empty tin can.

Finally, after disappointing searchings in the region to which they had been directed, they found, in a fissure-sided hill, a tremendous deposit of bones, believed to be one of the richest "fossil mines" ever discovered. The deposit appears to be the silted-up bottom of an ancient lake that formed in the crater of an extinct volcano. Apparently animals coming down to drink were overcome and killed by poisonous fumes from cracks in the earth, which were the dying gasps of the old volcano itself. The bones were so thick, where they had been weathered out in the course of ages, that they cluttered the ground, and the explorers stumbled over them. The big, hitherto unknown herbivorous animal they found has been named

Scarrittia, in compliment to H. S. Scarritt, sponsor of the expedition.

ITEMS

NORTHERN INDIA, stricken by disastrous earthquake on May 31, is one of the "most seismic regions in the world," Frank Neumann, seismologist of the U. S. Coast and Geodetic Survey, told Science Service. In prehistoric, possibly pre-human, times the most tremendous earthquakes the world has ever known rocked the region, as is evidenced by geological structures still existing. The mountains are still growing, so that earthquakes are still to be expected fairly frequently. A violent earthquake there on August 26, 1931, killed several hundred people. There was another sharp shock, though not fatal in its effects, on June 14, 1934. The location of the epicenter of this earthquake was an unusually difficult matter, because of its remoteness from the reporting seismograph stations. However, the Jesuit Seismological Association, St. Louis, Mo., has calculated a tentative location in latitude 27.3 degrees north, longitude 65.7 degrees west. This is in the mountainous region of eastern Baluchistan, approximately 220 miles in a southeasterly direction from the ruined city of Quetta.

PROFESSOR G. H. PARKER, Harvard University zoologist, held a watch on three different hippopotamuses, in the zoological gardens at Hamburg, Germany, Philadelphia and Washington, respectively, as the huge creatures, immersed in their tanks, came bubbling up at intervals to breathe. He found that the longest time that any of them stayed under was 4 minutes 40 seconds, the shortest time 5 seconds, and the average time 2 minutes 14 seconds. This, he comments, does not come anywhere near the long breath-holding performances of submerged whales, which are truly aquatic mammals. The hippo is to be classified as an amphibious rather than an aquatic animal. Professor Parker's observations are recorded in detail in the current issue of *The Journal of Mammalogy*.

THE heavy mortality among infants under one year of age is due in large part to inferior quality of the eggs from which these infants started life, Dr. George L. Streeter, of the Carnegie Institution of Washington, stated in a lecture delivered under the auspices of the Harvey Society. Experiments with frogs' eggs and pigs' eggs were cited by Dr. Streeter to show how poor quality prevents survival. A baby starting from a poor egg is badly handicapped in the struggle for survival, he pointed out. Many of them can not withstand the hardships of the first year of life and particularly the change in living conditions met at birth. These infant deaths, he said, represent Nature's first sorting of the fit from the unfit.

MAN-EATING sharks have been claiming increasing numbers of victims, recently, along the Australian coast, especially on the beaches of New South Wales, according to Gilbert Whitley in a report to *The Victorian Naturalist*. The number of authentic shark-attack records in the decade 1912–21 was 13; in the decade 1922–31 it jumped to 45, and in the three-year period 1932–34 there were sixteen recorded cases of shark onslaughts. It is believed that the increasing use of bathing beaches is responsible for the rising count of tragedies. Enclosing beaches in netting or "shark fences" is strongly advised, with patrolling from airplanes or "shark towers" where such complete protection is not practicable.