

able piece of clockwork, which solves in an elegant way the problem of uniform motion in the particular case where there is no work to be done. Its success is so complete that every day I am able to start the mirror at 400 revolutions per second and to watch the two pieces of apparatus go in agreement of about 1/10,000 for whole minutes together.

Yet, in spite of having obtained such certainty on the side of measuring the time, I was surprised to find in my results discrepancies which were not in accord with the precision of the methods of measurement. After quite a long search, I finally found that the source of error was in the micrometer, which did not admit of nearly the degree of precision which we assumed for it. To meet this difficulty, I introduced into the system of observation a modification which finally resulted in a simple change of variable. Instead of measuring the deviation micrometrically, I adopt a value for this defined in advance, it shall be 7/10 of a millimeter or 7 whole divisions of the image, and I find by experiment what distance to establish between the scale and the revolving mirror to produce this deviation; the measurements have thus a length of about 1 meter, the lesser fractions still have a size visible directly and no longer allow room for error.

By this means the apparatus was cleared of the chief cause of uncertainty; since then the results have agreed within the limits of error of observation and the averages have been so constant that I am able to give with confidence the new value which it seems to me ought to represent something very close to the speed of light in space, namely: 298,000 kilometers per second of mean time.

Science News Letter, September 24, 1932

GENETICS

Dingo-Wolf Hybrid In Australian Zoo

SUCCESSFUL crossing between the dingo, wild dog of the Australian bush, and a male European wolf is reported in *Nature*. The litter of six pups, all female, was born in the zoological garden at Adelaide, Australia. One of the animals has been sent to Melbourne for hybridization experiments.

It is well known that dingo and domestic dogs can interbreed, but the present is apparently the first case on record of a cross with a wolf.

Science News Letter, September 24, 1932

GENERAL SCIENCE

Scientist Makes New List Of Extremes in Nature

THE BIGGEST elephant, the smallest germ, the shortest dwarf, the highest mountain, all the things of the universe to which can be applied the superlative "est," stir the human imagination.

Dr. B. S. Hopkins, University of Illinois professor who wrote his name into chemical history a few years ago by discovering the element illinium, has compiled in an article in the *Scientific Monthly* a list of the extremes of nature.

"Our natural curiosity which is stimulated by the use of the superlative degree is reinforced by the needs of our modern civilization," Dr. Hopkins observes. "A study of the extremes of nature soon passes far beyond the realm of mere curiosity and establishes itself as a means by which we can measure our progress in solving the problem of selecting the best material to serve our purpose in a certain specific application."

Some of nature's extremes include:

The heaviest substance known upon our earth is osmium, with a density which varies from 21.3 to 24.

The lightest substance known is hydrogen gas, unless there be considered highly evacuated X-ray tubes which

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more feet deep. Since the discharge of the electroscope in general is due to the cosmic rays and the radioactivity of the earth, the investigators feel that this location in and above non-radioactive water gives the best conditions under which to pursue their investigations.

Up to this time Dr. Millikan has obtained much evidence as to the nature of the cosmic ray by observing its effects through the eye piece on the electroscope. The newer apparatus contains a photographic film for permanently self-recording these effects. These records should render further repetition of these measurements unnecessary since any one interested will henceforth only need to come and measure up the films for himself, for these films will be completely free from the preconceptions as well as the errors of the individual observer.

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contain streams of electrons which are fragments of disrupted hydrogen atoms.

The hardest material is the diamond.

The most ductile and malleable of our metals is gold.

The highest temperatures which have been sustained for a considerable time and measured with reasonable accuracy are in the neighborhood of 3500 to 3800 degrees Centigrade.

The most extreme cold that has ever been reached is the melting point of solid helium, 272.2 degrees Centigrade below zero which is within eight-tenths of a degree of absolute zero, that theoretical point where all heat vanishes.

The most costly substance known to commerce is radium which sells at a price that corresponds to more than two million dollars per troy ounce, making radium worth more than a hundred thousand times its weight in gold.

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PLANT PATHOLOGY

Enzyme Theory of Virus Disease Upheld

EVIDENCE that the so-called "virus diseases" of plants and animals are caused by a non-living chemical substance that can attach itself to living matter, rather than by ultra-tiny living organisms, is claimed as the result of experiments on tobacco plants performed by Dr. Carl G. Vinson of the University of Missouri. Dr. Vinson's work apparently supports the belief, held on theoretical grounds by many physiologists and pathologists during the past thirty years, that the causes of these mysterious diseases of plants and animals are compounds analogous to enzymes, the digestive and respiratory "ferments" of normal organisms, but malefic rather than beneficent in their effects.

Frozen and Squeezed

Dr. Vinson's method of isolating the virus of tobacco mosaic was worked out during four years he spent at the Boyce Thompson Institute for Plant Research at Yonkers, N. Y., prior to coming to the University of Missouri. The first step was to freeze a quantity of