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10 EDITORS: THIS AUTHORITATIVE STORY GIVING A NEW THEORY OF THE DEATH OF THE WORLD HAS BEEN WRITTEN BY DR. MILLIKAN EXCLUSIVELY FOR SCIENCE SERVICE. DR. MILLIKAN IS RECOGNIZED AS ONE OF THE MOST PROMINENT AUTHORITIES ON RADIO-ACTIVITY.

SCIENCE NEWS BULLETIN

For release not
earlier than
June 11.

A NEW THEORY OF THE EARTH'S END

--
The Earth May be Getting Hotter Instead of
Cooling Off

--
By R. A. Millikan,
Professor of Physics in the
University of Chicago.

The amount of heat given off from one gram of radium in disintegrating into lead is 300,000 times as much as the amount of heat given off in the burning of one gram of coal. There is in the radium then a supply of sub-atomic energy which raises the question, does such energy exist locked up in other atoms and if so is there any possible way we can get at it. Do not be too sanguine about it as far as radium is concerned, because if all the radium at present in the world were set to work, although it is 300,000 times as potent as coal in giving off energy it would not suffice to keep the corner popcorn man's outfit going. It does not exist in sufficient quantity.

But what has its discovery done? It has opened our eyes to the fact that certain kinds of matter certainly possess these stores of energy and it is almost a foregone conclusion that similar stores of energy are also possessed by the atoms which we have not yet found to be changing - which are not radio-active. The astronomer has for years been completely puzzled to account for the enormous amount of energy which the sun and stars emit. He has not been able to find its source. It was impossible that the sun was simply a hot body cooling off, because we have evidence that it has lived longer than it could have lived if that were the case. The astronomer, however, has now seized upon the facts of radio-activity and surmises that these sub-atomic energies may be the source of the sun's radiation.

Look again at the significance of these facts of radio-activity for problems of geology. I am thinking particularly of the work of Professor Joly and Lord Rayleigh who have made measurements of the amount of radio-activity of the ordinary surface rocks. Professor Joly has computed that if there are two parts of radio-active material for every million parts of other matter throughout the whole volume of the earth, and this is considerably less than he has found on the average in the earth's crust, then this earth, instead of cooling off, is heating up; so that in a hundred million years the temperature of its core will have risen through 1800 degrees centigrade. That is a temperature which will melt almost all of our ordinary substances. What does it mean? It means that the life history of our planet is perhaps not at all what we have heretofore thought that it was. It means that a planet that looks to be dead like this our earth may, a few eons hence be a luminous body, and that it may go through periods of expansion when it radiates enormously, and then through periods of contraction when it becomes, like our earth now, a body which is a heat insulator and holds in its interior the energy given off by radio-active processes until another period of luminosity ensues.

BEAT EDISON TO IT!

Editors - This is a short daily feature that we believe will attract attention. Six installments arrive in each bulletin, one for each day.

Do you know that-

During the long years Darwin spent on "The Origin of Species" he was constantly an invalid, and never able to work more than an hour and a half at a stretch.

There are tribes of savages who do not recognize the fact that the sun is the source of daylight.

The Pleiades are more distinctly seen as separate stars on a moonlight night than on a moonless night. Moonlight diminishes the irradiation that tends to give them the appearance of a single blur of light.

The "lost art of hardening copper" is a pure myth. Most of the so-called copper tools and knives of ancient origin contain considerable amounts of tin. The ordinary bronze of today can be made as hard as any of prehistoric times merely by hammering.

Dr. Edward A. Spitzka, formerly professor of anatomy at Jefferson Medical College and for many years a student of brain morphology, has presented to the U. S. National Museum his large collection of brains of distinguished persons.

BEAT EDISON TO IT!

Do you know that-

No human being ever died of spontaneous combustion -- Dickens, Zola, Marryat and other novelists to the contrary notwithstanding.

I In the Province of Quebec there are schools for teaching the art of making maple sugar.

The first work in the English language on anthropometry, the science of human measurements, has just been published by Dr. Ales Hrdlicka, of the U. S. National Museum.

A common American mushroom, *Panaeolous papilionaceus*, has remarkable intoxicating properties. Its effects have been compared to those of hashish, opium, and mescal.

Joseph Priestley, the discoverer of oxygen, was a chemist, physiologist, electrician, moral and mental philosopher and political economist -- and made contributions to all these branches of knowledge -- yet he was only an amateur, his profession being the ministry. In languages he mastered Latin, Greek, Hebrew, Chaldee, Syriac, French, German and Italian.

BEAT EDISON TO IT!

Do you know that-

A mammoth found embedded in the ice of Siberia, in 1802, was so well preserved that the dogs the Tungusian fishermen ate its flesh.

Calorimetry measures quantity of heat; thermometry measures degree of heat (i.e., temperature); pyrometry is the thermometry of very high temperature.

Fireworks were used in Europe as an accessory of public pageants as early as the 16th century. The European pioneers in the art of making them were the Florentines, and the Italians long retained their supremacy in this field.

An expedition recently sent to Mongolia by the American Museum of Natural History expects to set a new pace in exploration by traveling over the country in motor - trucks.

The pretended possibility of reconstructing an extinct animal from a single bone is a much exaggerated statement of the principle of "coordination of parts." According to this principle, sharp talons go with sharp teeth and a certain kind of stomach, etc.

BEAT EDISON TO IT!

Do you know that-

The bison is generally thought of as an American animal, but the early bisons, of which geology and prehistoric archaeology furnish the record, flourished in Europe and Asia before any specimens existed in the western hemisphere.

The Bible has been printed, in whole or in part, in 32 Indian languages north of Mexico. Complete translations exist in the following languages: Massachuset, Cree, Labrador Eskimo, Santee Dakota, and Tukkuthkutchin.

Dr. Gustav Hellmann, an eminent German meteorologist, has recently published a list of the principal fake weather prophets of the nineteenth and twentieth centuries, with a record of their exploits. Nine Americans are included in the list.

Maps, prepared from telegraphic reports, showing the direction and force of the winds at various levels and containing other information of value to aeronauts are now published daily in England and in Italy.

In the southwestern United States are found remains of elaborate irrigation canals, reservoirs and dams, constructed by the Indians long before the advent of white men.

BEAT EDISON TO IT!

Do you know that-

Photographic plates of paper, superior in many respects to those of glass, are now made in Germany.

The name "Watling Street" used to be applied in England to the Milky Way, as well as to the well-known Roman road from Chester to Dover which still bears this name.

From eighty to ninety-five percent of the gross production of all slate quarries is discarded as waste. Recent experiments indicate that much of this wasted material might be used to advantage in asphalt road mixtures.

One of the largest aluminum-bearing deposits in the world has recently been found near Tapoloza, Hungary. It is believed to be capable of yielding 150,000,000 tons of metal.

An Italian physician has proved the possibility of inoculating successfully and safely against several diseases at the same time. Thus far he has used nine combinations of vaccines on human subjects.

BEAT EDISON TO IT!

Do you know that-

The appearance of fire spouting from a volcano at night is not flame, but the reflection of the molten lava in the crater on rising clouds of vapor and ashes.

The long-talked-of plan commonly referred to as "flooding the Sahara" really contemplates the creation of an inland lake covering only about a thousandth part of the whole area of the desert.

A French savant, Dr. Icard, has made a specialty of the microscopic and chemical examination of ear-wax in connection with legal proceedings. The dust found in the wax frequently reveals the trade or industry in which a person has been engaged.

The balloonist can hear voices on the ground long after his own voice has become inaudible to those below. And that he can hear sounds of high pitch to a greater altitude than those of low pitch, of the same initial loudness. The whistle of a locomotive has been heard as high as 19,000 feet.

Poisonous animals are generally resistant to their own venom. According to Dr. Leo Loeb enough of the venom of the Gila monster to kill forty-five guinea pigs has been injected into the monster itself without effect. On the other hand the Gila monster is susceptible to the toxic action of snake venom and snakes are susceptible to that of poison obtained from the Gila monster.

Editors - This is one of a series
of exclusive and prophetic Science
Service interviews.

THE NEXT GREAT STEP AHEAD

3. In RADIUM

An interview with Dr. Richard B. Moore, Chief Chemist of the U. S.
Bureau of Mines.

(By Science Service)

May man expect to find in the interior of the earth at some future time, when he will be able to penetrate it, a mass of radium-bearing ore millions of times larger than any now known?

Helium, the non-inflammable gas that was first isolated from natural gas in large quantities during the war for use in our balloons and dirigibles, and the facts about radio-activity that have been discovered in the last twenty years are making the scientists ask that question, according to Dr. Richard B. Moore, chief chemist of the Bureau of Mines, who has been instrumental in the development of both the largest radium ore body in the world, the carnotite of Colorado, and the world's only helium plants, erected during the war by the Bureau of Mines and the army and navy at Petrolia and Fort Worth, Texas.

How is helium, an inert balloon gas, concerned with the penetrating radium that is curing many cancers?

Here is the story:

Uranium, heaviest of the chemical elements, disintegrates into this so-called rare gas, helium, one of the lightest of the elements. It takes some 5,000,000,000 years for this mother metal to use up half of itself in breaking down into helium gas and another uranium that lives only few days. This is what scientists discovered when they investigated the strange radio-active substances that at the beginning of this century wrecked their notions about the immutability of the chemical elements. Not only uranium, which is seemingly the starting point of these constantly decomposing elements that finally end in lead, but uranium 2, ionium, five forms of radium, and polonium all shoot off into space at a velocity of about 18,000 miles per second. alpha rays which are actually helium atoms clothed in positive electricity. And scientists have found that actinium, another heavy metal, and thorium, whose oxide is used in the incandescent gas mantles, also split up into metal of lower scientific order and the sky-rocketing atoms.

Upon the relationship between the helium that occurs in natural gas and that which these heavy metals produce depends the possibility of immense radio-active ore deposits. Small amounts of helium occur in the air and it is generally accepted that its origin is the radio-active changes that are going on in the uranium and thorium minerals in the earth's crust.

Out in Petrolia, Texas, 60,000,000 cubic feet of helium have been thrown out of the earth with the natural gas that has been produced by this small gas field, fifty to sixty square miles in area at the most. A little less than one per cent. of the gas produced there consists of helium. The gas wells of this country, principally those of Oklahoma, Kansas, Ohio, Pennsylvania, New York, and West Virginia, bring forth into the atmosphere probably as much as three to four hundred million cubic feet of helium each year.

"If the helium of natural gas is due to uranium, radium or thorium, extremely large deposits of ores bearing these elements may be discovered inside the earth," says Dr. Moore. "Either that will be the case, or something is going on inside the earth's crust that we do not know about. If these deposits should have the same percentage of radio-active material as the surface ores now known, they must be measured in millions of tons, while the present ore bodies are measured in only thousands of tons."

"Another explanation is that the helium is more or less primordial," added Dr. Moore. "The helium might have been brought from the sun at the time the earth was thrown off from this body whose red hot atmosphere consists of hydrogen and helium."

Some idea of the enormity of the possible subterranean radio-active deposits can be obtained by these facts. Figure them out for yourself. A ton of metallic uranium produces, by radio-active processes, about seven thousandth of a cubic inch of helium per year. Only about 1 to 2 parts of uranium oxide per hundred exist in the ores we know of today. Then remember that each year the natural gas of the United States contains some three or four hundred million cubic feet of helium.

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REVOLUTION IN THE
COCOA INDUSTRY

(By Science Service)

Guayaquil, Ecuador, June - A new enterprise is being investigated in Guayaquil at the present time. Two export representatives of a Chicago syndicate are here experimenting with a new method for handling cacao, the bean from which chocolate is made. Their plan is to receive the bean direct from the pod, and pass it through a drying apparatus, after which the beans are ready to be bagged for the market. Should they be successful, the cacao industry will be revolutionized, for this method eliminates most of the labor of handling the product and standardizes the beans, which will place Ecuadorian cacao above every other grade on the market. The preliminary experiments are all that can be desired and promise complete success of the undertaking.

MAKING OUR RIVERS
HABITABLE TO FISHES

(By Science Service)

Fairport, Iowa, June . - Why has a decline in abundance of fishes and other water resources been parallel with national development, and how can the usefulness of the interior waters to produce food and commodities be improved? These are questions that will be discussed at a conservation conference called by Secretary of Commerce Hoover to meet at the U. S. Fisheries Biological Station here June 8 to 10.

The sportsman, the commercial fisherman, the dealer or manufacturer the biologist, the fish culturist and the sanitary engineer, will discuss together these problems in which they are all interested. They hope to establish a common ground and unite in a general harmonious policy.

"We often treat our rivers as though they belong to an enemy, poisoning them with sewage and industrial wastes or turning them into virtual canals," explains Dr. R. E. Coker, of the Bureau of Fisheries. "Take the Illinois River, for instance. At one point, the catch of fish steadily decreased from 3,000,000 pounds in 1908 to 1,300,000 pounds in 1913. Chicago sewage discharged into the headwaters in enormous quantities and the extensive reclamation of lands along the shore have killed the fish and left them without suitable breeding grounds."

"Deforestation and drainage operations aim to lead the surface waters into the rivers as quickly as possible and consequently to produce extreme high and low stages with rapid fluctuations. Along the Mississippi fish go out into the overflowed lands to deposit eggs that hatch into fry that are stranded as the river quickly recedes. But for the rescue operations of the federal and state governments a large part of an entire generation would be wiped out. Last year the federal rescue crews restored more than 120 million fish to the rivers."

How to conduct proper agricultural and navigational improvements with the least harm to aquatic resources will be discussed at the conference.

Stephen A. Forbes, of the Illinois State Natural History Survey will be chairman of the conference.

SEARCH CANYON RUINS FOR
ABORIGINAL AMERICAN HISTORY (By Science Service)

Washington, June. - To hunt for buried traces of pre-Columbian history among the communal "apartment house" ruins of Chaco Canyon, in northwestern New Mexico, the National Geographic Society has sent out an expedition this summer.

At a time no later than the century of William the Conqueror, and perhaps hundreds of years earlier, some 10,000 persons lived in the earth gash now known as Chaco Canyon. And the ceramic remains, indices of cultural progress, which already have been found show this people to have had marked artistic attainments. Their dwellings indicate their engineering skill and their complex social organization.

The sending of the expedition this summer follows the report of a reconnaissance party sent by the society last season. Neil M. Judd, curator of American Archeology, U. S. National Museum, who conducted the party last summer heads the expedition.

One ruin selected for study is the Pueblo Bonito, which was a great D-shaped structure, with 800 rooms which once housed from 1,000 to 1,200 souls, and the other is Pueblo del Arroyo, shaped after the familiar "E" design of the modern office building.

An announcement concerning the scope of the studies contemplated by the expedition says:

"Geographically the Chaco Canyon ruins have a special interest. They denote

admirably the exceptional characteristics that result from an exceptional environment. Being a people hemmed in by natural barriers, their area of activity was restricted.

"They were able to meet their material needs by expending only a fraction of their energy. Hence the surplus found expression in religious ritual, attested by the great ceremonial chambers; in architectural monuments, as did that of the European cathedral builders of the Middle Ages; and in ceramics, which flourished there as never before or since, for the black and white ware of the Chaco Canyon has been cited as marking the high point of this art in the Southwest.

"Other departments of science may be expected to profit by results of the Chaco Canyon investigations. The architecture and masonry of the great communal dwellings are of keen interest. Where the builders came from, how long they stay in the canyon, and where they went are questions yet to be solved.

"The Chaco Canyon is a desert today, unwatered except by floods in the rainy season. The investigators must be relied upon to describe conditions of water supply and crops when the great houses were occupied. Specialists in desert flora must cooperate with the geographers in an effort to picture the economic life of these ancients. Only by the combined findings of these various experts can it be determined whether the inhabitants left because natural changes threatened their food supply, or whether falling cliff masses impressed their superstitious minds as being omens of evil."

BOSTON MEDICAL CENTER WHEN SOCIETIES MEET

(By Science Service)

Boston, June -- For this week Boston is the medical center of the country and can boast of more doctors per 1000 inhabitants than any other city. The American Medical Association, and ten other medical societies that group around it, are holding conventions here June 7 to 10. It is estimated that a peak of 8,000 to 9,000 visitors will be reached.

SCIENTISTS TO EXPLORE UNKNOWN AMAZON REGIONS

(By Science Service)

New York, June -- To penetrate into regions of South America untrodden as yet by the scientists, to discover and collect plants, insects, fishes, and reptiles, and to study health conditions of the Amazon region, are the objects of a party of eight men who are now sailing toward Antofagasta, Chile, to begin an tropical exploration trip that will last until the middle of 1922.

This expedition, backed by the H.K. Mulford Co., is headed by Dr. H. H. Rusby, dean of the College of Pharmacy at Columbia University who expects to bring back at least 5000 species of plants, many of them new. Especial attention will be paid to medicinal plants which he will obtain in quantity so that they may be studied in this country. Dr. William M. Mann of the Bureau of Entomology of the U. S. Department of Agriculture and the National Museum, will collect insects and conduct extensive experiments with different insecticides and repellents in an attempt to find an effective method of protecting travelers and natives from attack. Fishes of the Amazon will be collected and studied by Dr. E. N. Pearson. Dr. O. E. White, a representative of the Brooklyn Botanic Garden and Harvard University, will accompany the party to collect rare orchids that have made that region famous.

Health, longevity, acclimitization, and sanitary progress, particularly as regards the American residents, will be studied by Dr. Frederick L. Hoffman, third vice-president and statistician of the Prudential Life Insurance Co. who has joined the expedition. G. S. McCarty, an expert rifleman and two expert camera and motion picture men will complete the party.

About July 1 they will reach La Paz, Bolivia, and plunge into the forests and jungles on the eastern slopes of the Andes. The City of Manaus, Brazil will be reached about November of this year, when collections will be sent in. Early in 1922, they will set out, ascending the Rigo Negro and Rio Uaupes, and crossing at one point the trail of the famous Roosevelt Expedition to the "River of Doubt."

Perhaps no other Expedition with possible exception of Roosevelt's party, has ever entered the South American tropics so well protected medically against fevers, skin diseases and the numerous tropical affections. Every member of the party has been vaccinated against smallpox, typhoid fever and pneumonia, and in addition they carry among other supplies, large quantities of serums and medicines of all kinds. The most important among these is anti-snake venom to counteract the poison of snake-bites, quantities of antidyenteric serum important in combatting dysentery, which is so prevalent in the tropics, and quinine to ward off everywhere present malaria.

Other supplies include large quantities of food stuffs, including canned goods purchased from surplus Army stores and quantities of evaporated vegetables. The scientific apparatus, collecting equipment and containers of various kinds are important items in their supplies. Their total equipment will weigh nearly three tons.

EXPLODING AN OLD STORY

(By Science Service)

Dr. Dionysius Lardner, professor natural philosophy at the University of London, never made the assertion, so often attributed to him, that it would be impossible for a steamship to carry enough coal to propel her across the Atlantic Ocean. This alleged declaration is generally quoted to show that scientific men don't know much, after all, and hence that their adverse opinions of Keely motors, etc., need not be taken seriously. What Lardner really said was that, in the state of steam engineering when the statement was made, it would not pay to run a line of freight steamers between Liverpool and New York.

ONLY THREE PLANTS LOCO HORSES

(By Science Service)

Loco poisoning, which causes great destruction among horses, sheep and cattle in the western United States, is due to more than one species of plant, but not to so many different species as was formerly supposed. Recent critical investigations indicate that there are only three unquestionably dangerous loco plants; viz, *Aragallus Lambertii*, *Astragalus mollissimus*, and *Cystium diphysum*. All these were originally included in the genus *Astragalus*. What substance in these plants causes the poisonous effects has not yet been determined. One suggestion is that some obscure fungoid or animal parasite on the plants may be responsible.

TRAILING THE WIRELESS STRAYS

(By Science Service)

The strange disturbances known as "strays" or "static", which interfere with the operation of radiotelegraphy, probably originate in powerful electric discharge in the upper atmosphere. Since the introduction of radio direction-finders it has been known that these disturbances come from more or less definite directions. On the Atlantic coast of the United States they generally come from directions between west and south.

BEFORE THE TRENCH PERISCOPE

(By Science Service)

The late Sir Francis Galton anticipated the invention of the trench periscope, used during the world war. He devised for his own use an instrument which he called a "hyperscope" -- a tube with two reflecting mirrors set at an angle of 45 degrees -- for seeing over people's heads at a theatre or in a crowd. Galton was famous for his versatile accomplishments. It was said of him that "if one wanted to put a saddle on a camel's back without chafing it, to manage the women of a treacherous African tribe, to measure a snail's shell, or to work a theodolite in the midst of London traffic, Galton would tell you how it might be done."

GILA MONSTER'S LOOKS WORSE THAN HIS BITE

(By Science Service)

According to Dr. Frederic Lucas, no case is known to science in which a man has died from the bite of a Gila monster. The bad reputation of this curious animal dates back to the seventeenth century, when the Spaniards brought from Mexico accounts of a reptile so venomous that even its breath caused death. The so-called "monster" possesses a venom that is deadly to small animals, but the apparatus for injecting the venom is extremely imperfect. Dr. Lucas tells of one specimen that was kept as a pet by a five-year-old girl and never offered to bite. Another one inflicted a severe bite on an attendant at a Brooklyn museum, but the man recovered.