

NEW WONDERS OF RADIUM

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From the file of Martin A. Eisele.

EXPERIMENTS ON THE UNITED STATES GOVERNMENT RESERVATION AT HOT SPRINGS, ARK.,  
REVEAL THE FACT THAT RADIUM IS THE CURATIVE MYSTERY HIDDEN IN THE SPRINGS' WATER.

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Science has at last discovered the secret of why certain springs cure diseases-- a phenomenon perfectly well established and hitherto impossible to account for. For hundreds of years the Indians have been in the habit of going to the Hot Springs of Arkansas to be cured, and the experience of countless thousands of Americans has established beyond a question that there is some peculiar healing quality in these natural waters.

The Hot Springs are owned by the United States Government, and from time to time Government chemists and individuals have made searching chemical analysis with the hope of finding some tangible explanation of the mystery of the waters. Nothing has ever been found to explain the medicinal qualities, and the official Government report of its investigations frankly confesses this. But a series of most interesting experiments just completed by Dr. J. L. Gebhart, of Hot Springs, Ark., and Professor Larkin, the distinguished St. Louis, Mo., chemist, reveals the mystery at last. It has been found that the waters and the steam and vapors from the hot springs are powerfully charged with radio-activity. It is, in other words, the wonderful new germ-killing metal, radium, which has for centuries been producing the cures which have puzzled physicians and scientists to explain.

At the same moment that these new experiments have been going on in Hot Springs another series of experiments have been conducted in Great Britain and it has been demonstrated that the famous healing waters at Bath, England, contain radium. Professor Dewar, the most distinguished chemist in England, has been experimenting with the famous King's Bath at the expense of the Royal Society. To his surprise he found radium in appreciable quantities, and further analysis revealed traces of the rare element, helium. When investigating at the same place, Bath, Sir William Ramsay discovered that radium emanations slowly changed into helium.

The investigations of Professor Dewar stirred up the Royal Philosophic Society of Glasgow to make experiments with the waters of the Buxton Springs, and a recent report from Blythwood laboratory shows the same radio-activity as was found in the Bath springs.

Prof. H. A. Bumstead and Prof. L. P. Wheeler, of Yale college have just concluded a series of remarkable experiments which confirm the findings of the Hot Springs, Ark., scientists and the British chemists. Tests made in the Yale laboratory revealed several most interesting facts as to the emanations of radium from from the water and the gases as they bubble out of the earth. The conclusion of the Yale professors agrees with the theories of the other investigators, that the radio-activity of these natural springs is due to the presence in the earth near them of deposits of radium.

In the course of the investigations in Arkansas it was discovered that the radio-activity of the hot water was imparted to the bath tubs, wash basins and glass-ware. Further experiments also revealed the astonishing fact that after a bath in the natural springs' water the human body was itself made radio-active and threw off vigorously what are known as N-Rays. The N-Rays are among the latest and least understood of the numerous phenomenon of radio-activity. They

are ~~rays~~ thrown off by the muscular and nervous activity of our own bodies as well as by other substances. If a human being exposes his naked chest to a screen of calcium sulphide, something of the same kind of bombardment of minute particles will be witnessed there as in the case of radium. That is to say, particles of matter are continually being thrown off by the human frame, and these particles ~~of~~, or N-Rays, become visible on a phosphorescent screen.

Just what special medicinal function is going on in this process of discharge of human rays is not yet understood. Nor is it known why the radio-activity of the Hot Springs water stimulates this human radio-activity; nor is it understood why it is beneficial and curative to stimulate special radio-activity of the human system.

Special experiments in the Arlington Hotel, which is on the Government reservation, and has one of the hot springs in its cellar, shows a general radio-activity in the baths and the glassware of the kitchens and dining-rooms and bedrooms. Further investigations are to be made to study and determine what curative effect is produced upon a patient living in this peculiar atmosphere of natural radio-activity.

#### Curious Discoveries at Hot Springs.

The only substance found in the Hot Springs waters to which any healing importance could be attached was hydride of silicon. Why this should have any curative power was difficult to explain, but the explanation is now easy, for it has been proved that radium has a peculiar affinity for silicon which becomes violently radio-active.

Professor Larkin and Dr. Gebhart have concluded that there is a bed of radium at a great depth in the earth, beneath the springs, which communicates a strong radio-activity to the water. At times there are particles of radium in the water.

A curious fact observed at the springs is that a bath of ten minutes in the tub at 98 degree temperature is the limit at which a stimulation effect can be obtained. A longer bath than that has a weakening effect. Yet in some baths in Germany and elsewhere one can remain for hours in the water at a temperature of 105 degrees or more without suffering. This fact is explained by the strong radio-activity of the Arkansas water, which can only be tolerated for a limited period.

The chemists have tested the presence of radio-activity of the waters with the electroscope and the spectroscope.

The electroscope furnishes one of the best and simplest methods of detecting the presence of radium or radio activity. The electroscope is first charged with electricity and then is discharged when radium or any substance having been in contact with radium comes near it.

The two sheets of gold leaf which are held apart by a charge of electricity in the ordinary electroscope hold their charge indefinitely in dry air. The radium rays ~~dissipate~~ dissipate the charge by what is called ionization of the air. They render the air a conductor of electricity. The same power is possessed by the Roentgen rays and the ultra-violet light.

#### How Radium is Detect@d.

M. and Mme. Curie, the discoverers of radium, have devised an eletroscope specially for the observation of radium. It is illustrated here. In this there

is a single, movable sheet of gold attached to a stationary sheet of copper supported by the insulating piece. The radio-active substance is placed on the lower of two disks. The radiations make the air between them a conductor of electricity. The electroscope is charged by means of a stick of ebony rubbed briskly. This makes the movable gold leaf deviate from the vertical. When a radio-active substance is brought between the disks or near them the gold leaf loses its charge and falls flat against the fixed sheet. The leaking is observed by means of a stationary microscope. The time taken for the discharge is measured by a watch. The hands and clothes of a man who has been handling radium become strongly radio-active and will affect the electroscope.

It is this instrument or one similar to it that has been used in testing the presence of radium and radio-activity at Hot Springs, Ark., and all over the world.

A most interesting observation at the Springs is that a glass left in or near the springs acquires a violet tint in the course of a week. This is one of the best known effects of radium radiations. The color is permanent.

Professor Henry Andrew Bumstead, of the Sheffield Scientific School at Yale, and his assistant, Professor L. P. Wheeler, have succeeded in obtaining radio-active gas from the water. Upon this gas they have been making most interesting experiments, which are still in progress and are likely to show many other interesting facts.

The gas was obtained from the water by boiling and was protected carefully from contact with the air. The gas showed its radio-activity plainly when tested with the electrometer. A number of experiments showed that the activity was not due to the vessels of drying tubes used.

The fact that the water once boiled did not recover to any appreciable extent its power to give off a radio-active gas when left to stand either stoppered or unstoppered for two weeks showed that the presence of the gas was not due to contact with the air nor to a dissolved or suspended radio-active solid.

The activity of the gas as tested by the electrometer lasted about four days. At first there was a rise of activity for 0.1 of a day and then a gradual decay took place.

Professors Bumstead and Wheeler have devised an ingenious electrometer by which the radio-activity of the gas is measured. He found this to be 1,000, meaning that number of times as active as uranium, the basis on which radio-activity is measured.

#### A Strange Yellow Radium Deposit.

At the Hot Springs, Arkansas, as at Bath, England, a soft of soft rock has been found containing radium. It is a yellowish porous substance resembling tufa. It is really a deposit made by the spring water. It is found in wells, in the bottoms of tanks and in bath tubs and in pipes connected with the radio-active springs. Sometimes it is found as a dry powder, but in other places it hardens into a rather porous rock and frequently assumes fantastic shapes.

The discovery of this form of radium at Bath was made after Sir William Ramsay had observed the radium gas arising from the water. He then found that this gas changed after about four days into helium, a metal which Ramsay originally discovered in the sun with the spectroscop. The changing of radium into helium, of one element into another, was a most astounding fact, upsetting all

the existing laws of chemistry.

Professor Dewar then went to work at Bath with more elaborate apparatus in behalf of the Royal Society and has now confirmed the fact that radium is transformed into helium. Professor R. T. Strutt, son of Lord Rayleigh, who discovered argon, has discovered the solid radium deposits in the water. The radium is carried up by the hot water from the depths of the earth and is deposited in the bath. With improved methods of extracting radium the people of Bath expect to be able to get it from their springs in paying quantities.

#### The N-Rays or Human Rays.

While the strange effects caused by radium are being observed in all sorts of different places, a new class of rays is puzzling science. These are the N-rays, discovered by Professor Blondlot, of France. They are as mysterious as the radium rays. They are certainly different from these because they are present in places where there is no radium, but on the other hand they have somewhat similar powers. For instance, they are able to traverse substances opaque to ordinary visible light. They are found in most artificial sources of light and heat, especially in the Welsbach burner and heated steel and silver.

This association with heat is doubtless why the N-rays are found so strongly in the human body, which, as everybody knows, is a combined furnace and oven. They are even spoken of by some observers as human rays. When we are in vigorous health we emit vast quantities of N-rays, and when we grow ill they fade away until we die, when they cease altogether.

A radio-active mineral water bath excites the N-ray activity in a man, and that is principally why it does him good.

The N-rays from the human hand will make an impression on a photographic plate in absolute darkness. These rays will cause a calcium sulphide screen to phosphoresce, just as radium does, but in a far less degree. With a sphinthariscope the bombardment of luminous particles proceeding from the human skin can be observed clearly.

All these interesting discoveries point to the conclusion that we are living in the midst of a system of invisible radiations, which, when they are thoroughly understood, will completely change all our conceptions of physical science and with it the world.

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