SCIENCE NEWS

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ARTIFICIAL RADIUM RAYS

ARTIFICIAL rays of radium, in quantities that could only be obtained from a ton of this valuable element, worth 56 billion dollars at present prices, will soon be produced in the laboratory, according to a statement made by Dr. William D. Coolidge, of the General Electric Company, inventor of the X-ray tube now in general use. He revealed for the first time details of a new form of his cathode ray tube, and which, by a method of cascading, he has already operated at 900,000 volts, three times as many as previously achieved.

Radium gives off three kinds of rays: alpha rays, or rapidly-moving atoms of helium; beta rays, or speeding electrons—the "atoms" of electricity, and gamma rays, similar to X-rays. It has not been possible to successfully imitate radium radiation because sufficient electrical power could not be put into the generating apparatus.

Dr. Coolidge's latest invention will make it possible to increase the voltages applicable to X-ray tubes generating gamma rays, and it will also enhance the power of the cathode-ray tubes and speed up the electrons which correspond to beta rays. In fact, it may be possible in time to surpass the power of radium and provide a new tool for the scientist who now uses radium medically and industrially with telling effect.

Speaking before the American Institute of Electrical Engineers, which conferred upon him the Edison medal, Dr. Coolidge indicated what the apparatus can do.

"This opens a vista of alluring scientific possibilities. It has tantalized us for years to think that we couldn't produce in the laboratory just as high speed electrons as the highest velocity beta rays of radium and just as penetrating radiations as the shortest wave-length gamma rays from radium. According to Sir Ernest Rutherford, we need only a little more than twice the voltage which we have already employed to produce X-rays as penetrating as the most penetrating gamma rays from radium and three million volts to produce as high speed beta-ray.

"The intensity factor would be tremendously in our favor, as with twelve milliamperes of current we would have as many high speed electrons coming from the tube as from a ton of radium. Another factor in our favor would be the control which we would have of the output. This would be quite different from our position with respect to radium, in which case no physical or chemical agency at our command in any way affects either the quality or the quantity of the output.

"What shall we do with the high speed particles obtainable from tubes operating at a potential difference of millions of volts? The lure, of course, lies in the fact that we can't answer the question, beyond saying that we shall experiment with them. They should eventually help us to further knowledge of the atomic nucleus and to further knowledge of radiation laws. It is furthermore not unlikely that therapeutic, chemical bactericidal or other practical uses will develop."

Dr. Coolidge's original cathode ray is an evacuated bulb, with two long extensions. Through one end comes the cathode, which consisted of a small electric lamp filament of tungsten. Such a filament, when lighted, gives off electrons, moving very slowly. Through the other projection from the bulb extends a long copper tube, the anode. When the filament is lighted, a copious stream of electrons is emitted. Then a high voltage, say 250,000, is applied to the tube. This powerful current speeds up the electrons so that they travel through the copper tube, and out to the open air through a thin nickel "window." A "cold cathode effect" prevents the use of more than about 250,000 volts in one tube.

The method now used by Dr. Coolidge to speed up the electrons still more is the very ingenious one of placing several tubes in tandem. The electrons, or cathode rays, in the first tube are furnished by the glowing filament. The end of the first tube takes the place of the cathode of the next, and the electrons from the first tube, already rapidly moving, are still further speeded up by the application of 250,000 volts in the second tube. The speeding stream is fed into a third tube, from which the rays emerge with a speed equivalent to that of the total voltage of the three tubes. With three tubes, Dr. Coolidge has obtained the effect of 900,000 volts, and much more can be used without serious difficulty.

When cathode rays strike a solid metal "target" X-rays are given off. Thus, a similar arrangement could be used to produce the most powerful source of X-rays ever devised. To accomplish this the last bulb of the series would contain such a target, from which the X-rays would be emitted.

BIOLOGICAL EFFECTS OF ELECTRIC WAVES

AN attack on cancer is being made by high frequency electricity, close in wave-length to the short waves that have recently been found so effective in radio communication.

The researches conducted by the U. S. Public Health Service under the direction of Dr. J. W. Schereschewsky, with his laboratory at the Harvard Medical School, have been in progress at intervals during the last five years and have now been informally reported to a congressional committee in connection with a request of an appropriation of $5,000 to provide assistants and material for the work.

Experiments so far have been confined to mice and chickens. Much progress must be made before there can be any possibilities of applying the results to human beings. Mice with tumors artificially acquired in the