Roentgen Skiagraphy.*

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When the announcement of Herr Doctor Roentgen's wonderful discovery was made in December last, a new scientific epoch was begun. His first communication was made to the Wurzburg Physical and Medical Society, in a paper entitled "A New Kind of Rays." He had taken time to settle many important questions, and was sure of his ground before making any public announcement. He *first* took his professional colleagues into his confidence, and *did not* rush into the public press as many of his predecessors in *great* discoveries had done — he fully satisfied himself that he had a discovery before making it known. Its importance was too great to be long retained by the savants of Wurzburg, however, and within a few days the whole world knew that a hitherto unknown scientist had made a discovery that will revolutionize many ideas scientific. Ever since that time the press, both public and scientific, has been replete with the wonders of the unknown rays. For some time the discovery was looked upon as something too unreal to be seriously thought of; but as the full details became known, and as other investigators began to report their confirmation of the experiments announced, the incredulous had to abandon their position and admit that there really was something new under the sun. To-day all doubts have vanished, and all are pushing forward to increase the applicability of the new ray.

Fig. 1.

To us, as medical men, it has opened up a great field by perfecting our ability of diagnosis in obscure bone lesions, in the locating of foreign bodies in the limbs, a possibility of making certain of the presence of kidney calculi, in joint lesions, and many other conditions that I cannot mention. We must not expect too much, or we are bound to be disappointed.

The result obtained by the "X" ray is not a sharply defined photograph, but is a shadow picture or skiagraph. We all know that shadows are more clearly defined by the nearness with which the object is placed to the screen on which the shadow is projected. More or less space must intervene between the object and the photographic plate in all of these cases, and that must be at the expense of sharpness of definition. Time of exposure is, at present, a very serious drawback to the use of these rays in medical diagnosis, but this is being materially reduced from day to day. The tube becomes heated so rapidly with the current from a coil giving a sufficient spark to produce good results that a much longer time of rest is required before the current can be again turned on. The tube used to produce the results here presented was heated in ten seconds to such an extent that it required twenty seconds to cool. The time of keeping the part under exposure is really, therefore, three times that of the actual exposure, but this will be overcome by some form of water jacket surrounding the tube, made of celluloid or aluminium. It would be easily done now if a glass cone could be utilized, but it cannot, as the rays will not pass through glass. Edison has announced a celluloid cup, but the results are not yet known.

The method adopted by the workers at the School of Practical Science here of using a bell jar has not proved as useful in medical subjects as it did for other objects, the refraction of the rays dimming the outline of the part. I have found that by surrounding the upper part of the tube with a funnel-shaped piece of tea lead the rays can be concentrated without the dimming effect on the border line.

Though the results attained by these rays are familiar to everyone, the means used are possibly not so well known. An article by Prof. H. Schubert, in *The Monist*, deals very nicely with the previous history of this new physical agent:

In the year 1789 the electric current was discovered by Galvani, of Bologna, but it was not until several years later that its most important properties, at least as distinguished from frictional electricity, were disclosed by Volta. Although galvanic batteries, as a means of producing electric currents, were studied and perfected in the next few decades, three great discoveries had yet to be made in the province of electricity before the new agent could attain the importance in civilized life which it to-day occupies, and before theoretical physics could investigate more closely its nature and character. These three discoveries were as follows:

(1) In 1820 Oersted, of Copenhagen, discovered that an electric current flowing round a magnetic needle deflects the same, and that a magnetic needle rendered insusceptible to the influences of terrestrial magnetism, and free to rotate in any direction, will place itself at right angles to the plane of an electric current surrounding it.

(2) In 1825, Arago, of Paris, discovered that a piece of soft iron, about which a wire connected with a battery has been wound in spirals, is transformed into a magnet and continues in the magnetic condition as long as the circuit remains closed, but is again unmagnetized when the circuit is broken.

(3) In 1831, Faraday, of London, discovered the so-called "induced currents" of electricity. If, he reasoned, the current was a source of magnetizing action, as Arago had discovered, it was possible conversely that a magnet should be the source of a current-producing action. But Faraday found no confirmation of his conjecture. Twenty years later it could

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