"X Rays on the Stars," The Washington Post, March 15, 1896.

X RAYS ON THE STARS

Several Planets Show Quite Different Markings.

CHANGES BY MIND ACTION

Experiments by Prof. Gates, of this City, Show Invisible Chemical Activity in the Brain When One Is Thinking—Air Vibrations May Effect Thought—Valuable Results in Photographing Animal Matter—Producing Rays in a New Kind of Tube.

Prof. Elmer Gates, director of the new Laboratory of Experimental Psychology, now in construction in this city, has accomplished some interesting and original results with non-luminous rays, made differently from those of Roentgen's. Prof. Gates, who, besides being a well-known psychophysicist, is an ingenious chemist and inventor, here describes his experiments for the first time.

His experiments on these lines, he says, date from as far back as 1891. In the place of a Crookes' tube he employs an interesting device, which will soon be on exhibition in his new laboratory. This, he claims, is the first absolute chemical vacuum known to science. From it he has created rays which exhibit strange phenomena never mentioned as being accomplished by the Roentgen rays.

The method of making the absolute vacuum was simple but apparently effective. He took a large, thick test-tube made of the hardest potash glass, whose melting point was at a comparatively low temperature. Allowing the liquid glass to gradually cool, it formed a solid mass with the tube. After attaching a suction piston to the mouth of the test-tube, the whole glass was slowly heated for about thirty hours. At the end of that time the softer glass became liquid again, while the tube still remained solid. By forcing the piston outward the greater part of the moulten glass was expelled. Enough was allowed to remain at the mouth of the tube to seal it by cooling in that position. Back of this stoppage there was left a space where there had never been the least quantity of gas. The Crookes tubes, Prof. Gates says, contain air exhausted to the rarity of only about one-millionth of an atmosphere.

Means of Making Shadowgraphs.

Prof. Gates says that he placed this absolute vacuum in a magnetic field and projected polarized light through it. The light took the form of non-luminous rays and would pass through

objects ordinarily opaque to rays of light such as the eye can discern. In this tube, however, there was no phenomenon of phosphorescence, as appears in the Crookes'. Neither did there take place any rectilinear projections of atoms. These non-luminous rays he found to be lower in pitch than luminous rays, but were otherwise of the same character. When they were reflected upon objects in a dark room he was able to make shadowgraphs thereby.

What the experimenter considers to be the most interesting result which he obtained with these rays is one which has never been mentioned as accomplished by the Roentgen rays. In photographing animal matter he found that the living would cast a shadow, while the dead would not. This he explained by the fact that in the living animal there are constantly going on many chemical and electrical motions. In the dead animal, on the other hand, the protoplasm is congested.

Such a use of these rays, he says, may be of great use some day to physicians for locating dead tissues in the body—especially a dead fetus. Such use might possibly prove a means of determining whether or not a person is actually dead when there is a reasonable doubt.

Still another interesting result which Prof. Gates says he has made by aid of these rays may later prove of great interest to astronomers. With the apparatus described he photographed several planets and found that they showed entirely different markings than when photographed with ordinary non-luminous rays. This discovery, he suggests, may introduce new fields of work in telescopy and microscopy, when better understood. The idea of applying Roentgen rays to either telescopic or microscopic work has not yet been thought of, so far as is known.

Contrivances for Brain Study.

Prof. Gates says that the main object of his development of these contrivances was to use them in brain study, which is his specialty. He will continue to do this on a very extensive scale in his new laboratory. He does not hope to photograph the brain through the skull, however. This he thinks cannot be done. A photograph of the head by the Roentgen process would show nothing more than a silhouette of the skull. Since the brain is more transparent to such rays than bone, it is not probable that the rays will penetrate through the skull and stop at the thinking organ.

For his particular brain study he has employed, in a complicated way, electric heat and light rays passed through the absolute vacuum and modified within by other rays and electrostatic and magnetic fields. By turning these upon the brain he has found that mind-action is invariably accompanied by

chemical changes in the organ. He has also learned in the same way that when we think we cause in our brains vibrations of molecules and atoms. These impinge upon ether and produce wave motions. There are constantly in ether wave motions resulting from similar or different causes. These influence our mind actions or thoughts since they affect the motions of the atoms and molecules of the brain. In other words we cause vibrations in the air when we think, and vibrations already in the air may change our thinking.

Prof. Gates says he intends to continue his researches on these lines, and will submit his results to other scientific men for comment.