

apparatus be used, or whether the shadow-photograph is to be that of a bone or that of a foreign body. Now, supposing the experimenter is ready to proceed. He takes the plate-holder containing the sensitive plate, the film side of which is turned upward, and fixes the object between the tube and the sensitive plate; everything being in readiness, the apparatus is made to work. The length of time required for the exposure depends upon the following conditions: (1) the penetrating power of the rays; (2) the amount of tissue or substance which the ray will be required to penetrate.

There are now on the market plates wrapped in black paper, and a plate-holder is not required. These plates will keep from four to six months without any deterioration as regards their sensitiveness. The experimenter must always remember that the Röntgen ray will destroy the sensitive plates; consequently these plates must be kept in an iron box or in an adjoining room having a partition made of other than carbonous material. Furthermore, the object to be shadow-photographed must be kept perfectly quiet, otherwise a fogging of the picture will result. You are all familiar with what a photographer will say when you have a photograph taken—namely, keep quiet and do not move a muscle; so, in a shadow-photography, the object must be kept perfectly quiet. If the object be fastened to the sensitive plate it does not matter so much if both move slightly, but one must not move differently than the other. If you wish, for instance, to take a shadow-photograph of the hand, fasten the hand firmly to the plate by three or four bands of adhesive plaster. To the beginner, questions arise, (1) how far should the plate be kept from the tube? That depends upon the apparatus you have and the power of the ray, but, as a rule, very good results are obtained at about two to six inches from the tube. At this distance the picture will be the best as regards accuracy and fine definition. (2) How long must the sensitive plate be exposed? That depends upon two conditions: (a) The density of the tube, whether high or low; if the density be low, much time is required, and at its best the definition is poor and inaccurate; but, if the density be high, a much shorter time is requisite to obtain a perfect impression, a few seconds or even an instant of exposure to a perfect flash is worth more than minutes of the working of the ordinary tubes of low vacuum. (b) The object the ray has to penetrate, as, for example, under like conditions it will take double the time for the elbow than for the hand. There are a few suggestions I shall endeavor to make here in regard to the manipulation of the tube. To the experimenter it is of the utmost importance to have the tube working per-