

This apparatus has a radioactivity of 500,000, with a centigram of 25% of bromide of radium, incorporated with barium sulphate on a centimetre surface.

It is important to know the force, quality and quantity of the rays which penetrate into the tissues. There are three distinct types of rays. The alpha rays constitute about 90 per cent. of all the rays, and are positively electrified particles. The beta rays, which are the most spectacular and consist of negatively charged particles resembling the cathode rays produced by an electric discharge inside of a highly exhausted vacuum tube, are divided into three classes, the soft, the medium and the hard. These rays are emitted in great preponderance. The gamma rays are few in number. They in many respects resemble very penetrative X-rays, are uninfluenced by magnetism, and pass in straight lines at great speed, and possess remarkable penetrative properties, being able to influence a photographic plate through a foot of iron.

The rays emanating from the apparatus may be modified in strength and character by the interposition of "screens" between the radium and the surface to be acted upon. These may be of aluminum, mica, lead, glass and black paper. Muslin is sometimes used as a protective covering, but what is better is rubber cloth, which satisfactorily protects the varnish surface from moisture and septic secretions. By means of these screens the alpha and beta rays may be cut off.

Using an apparatus such as I now show you, with the interposition of lead, sheets of paper, and tied up in rubber cloth, the surface may be irradiated by the gamma rays exclusively.

As screen² after screen of increasing grades of thickness and density is interposed, first the alpha and soft beta rays will be cut off and absorbed, then the medium beta, then the hard beta. Thus in each case the number of rays having the power to filter through the screens is in decreasing quantity. The rays in proportion to their number will have greater and greater powers of penetration; thus the quality of the radium is changed, because the average of its penetrative power is increased. As the rays diminish in number in proportion as the screens increase in thickness, it is easy to understand that the duration of the application must play a very considerable part, and that this duration must be increased in length in proportion as the rays are diminished in number, and from this fact the following three general rules of treatment can be deduced:

1. Apparatus applied naked. Rays numerous; special action on the surface; duration of application short.

2. Apparatus with interposition of medium filter. Rays less