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THE THERAPEUTIC USES OF THE SALTS OF CESIUM AND RUBIDIUM.

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IN the years 1860 and 1861 Bunsen and Kirchhoff, by means of their memorable four-prism' spectroscope (which, by the way, was on exhibition at [the recent World's Fair in Chicago]), discovered the two alkali-metals, cesium and rubidium, while examining the waters of Duerkheim, Germany. Together with others, they succeeded in finding these alkali-metals in many waters, soils, plants, and in the animal system. Further spectrum observations showed even traces of rubidium and cesium in the blood of man, demonstrating the fact that they are widely diffused in Nature, although in minute quantities.

Lucanus experimented with cesium and rubidium upon the growth of plants and claimed that the latter do not absorb the salts of these metals and that they act inimically upon them, but repeated experiments in recent years have shown the fallacy of his claims. In 1864 Claude Bernard, the celebrated French physiologist, experimented with the salts of rubidium and demonstrated that they are less toxic to the cardiac apparatus than the preparations of potassium.

Cesium is the most electro-positive of the elements. Rubidium, its partner, comes next. Cesium and fluorin should be considered as chemic "ideals," because of their prominent chemic and physical characteristics.



Fluorin, as I have elsewhere pointed out, is the most electro-negative member of the elements, whilst cesium is the most electro-positive. The chemic, physical, and physiologic activities of cesium and rubidium rank higher than those of potassium, sodium, or the other members of the alkali-group. The presence of cesium and rubidium in plants and in the animal organism must certainly serve a purpose. Just as fluorin, in its electro-negative functions and chemic affinities, is an inherently associated member of the halogens, so does cesium behave as a member of the alkali-metals in its chemic functions and electro-positive activity. The researches of physiologic chemistry teach that substances having allied properties must have also analogous actions upon the organism, and the difference of their modes of action can be explained on chemic principles.

My uncle, Dr. Edward Wernigk, once assistant of Prof. Bunsen, experimented as early as 1876 with cesium and rubidium upon his body. He again repeated these experiments on his own person in 1880, using cesium bitartrate. He believed that cesium and its salts acted favorably upon his heart, as he was suffering from a cardiac neurosis. It also acted favorably upon the generative organs. He assured me that the salts of rubidium and cesium possess the same therapeutic effects as the other alkali-salts. In experimenting upon his person he always took the cesium salts in smaller quantities than when he was taking the other alkali-salts internally. Thirteen years ago cesium salts were very expensive chemicals to experiment with, and as his deductions were mostly speculative he was not prepared to publish his results in scientific journals. I have an unpublished manuscript, written in 1881, in which I have noted the following in regard to cesium and rubidium :

"Since cesium appears to possess the most electro-positive character of the elements, one would rationally

suppose that it might play an important function in the animal and vegetable kingdoms. So is it the case with rubidium, the next electro-positive element in rank. It is not difficult to understand that cesium and rubidium, on account of their very high electro-positive nature, probably perform the functional activities of the alkalies in a higher degree. Cesium is reputed to operate toxically upon the nerves of the heart, and the same is stated of rubidium. It is a great question if this be really true. It is more reasonable to suppose that the elements cesium and rubidium, in combination with the halogens, will perform their chemic and physical functions much more conspicuously in the system than the lower electro-positive members of the series."

Dr. Wernigk always used cesium bitartrate in small doses, beginning with $\frac{1}{4}$ of a grain and increasing to 5 grains three times daily. I have used the bromid and bitartrate of rubidium when experimenting on myself in doses of from 3 to 5 grains three times daily. I used rubidium bromid to alleviate nervous palpitation of the heart. I would have used cesium bromid, but was prevented on account of the high price of the salts of cesium.

As soon as the exorbitant market price of the salts of cesium and rubidium is reduced, there is no doubt that they will often be substituted for potassium or sodium salts. Experience will also doubtless teach that they can be given in larger doses.

Cesium is the ideal alkali-metal. It was the first element discovered by means of spectrum analysis. Chemically it is the king of the alkali-metals, being the most electro-positive member of the elements and outstripping them all in electrolytic conductivity. Metaphorically speaking, it stands with rubidium in the same relationship as gold does to silver.

