

In 1944, I got the idea that maybe these elements were misplaced in the periodic table. Perhaps the new heavy rare earth series should start back at thorium (Figure 8) with actinium as its prototype--thus dubbing the collection the actinide series. With such an arrangement the position of elements 95 and 96 would suggest that they be chemically similar to europium and gadolinium. When we tried this idea, we found that it was right. We identified elements 95 and 96. A year later, I published the rearrangement of the periodic table in Chemical and Engineering News (12). I remember at the time that when I showed this table to a number of my friends and said that I was contemplating publishing it in Chemical and Engineering News, they said, "Don't do it, you'll ruin your scientific reputation." I had a great advantage--I didn't have any scientific reputation at the time--so I went ahead and published it.

This concept had great predictive value, and its success led to the discovery of the remainder of the actinide elements and its acceptance by the scientific community. The modern periodic table contains not only a full lanthanide series, but a full actinide series and transactinide elements as well.

Americium and curium (95 and 96)

At the wartime Metallurgical Laboratory, after the completion of the most essential part of the chemical investigations involved in the production of plutonium, attention was turned to the synthesis and identification of the next transuranium elements. R. A. James, L. O. Morgan, A. Ghiorso and I were collaborators in this endeavor (Figure 9).

As indicated above, the first attempts to produce these elements ended in failure. Small amounts of $^{239}_{94}\text{Pu}$ were irradiated with neutrons and deuterons but no new α -emitting products were found due to the use of insensitive detection techniques and because the experiments were based upon the premise that these elements should behave chemically like plutonium, i.e., they could be oxidized to the VI oxidation state and chemically isolated. It was not until the summer of 1944, when it was first recognized that these elements were a part of an actinide transition series (with stable +3 oxidation states) that any progress was made. Success in their identification followed quickly.

Once it was realized that these elements could be oxidized above the III state only with difficulty, the use of a proper chemical procedure led quickly to the identification of an isotope of a transplutonium element. Thus, a new α -emitting nuclide, now known to be $^{242}_{96}\text{Cm}$ (half-life 162.9 d), was produced in the summer of 1944 (12) by the bombardment of $^{239}_{94}\text{Pu}$ with 32-MeV helium ions:

