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Seaborg G T. Elements beyond 100, present status and future prospects.
Annu. Rev. Nucl. Sci. **18**:53-152, 1968.
[US Atomic Energy Commission, Washington, DC]

This paper covered recent research on the nuclear and chemical properties of the heaviest elements and methods for their production. Emphasis was placed on elements beyond atomic number 100, present and future, including methods for their production and identification as well as the ingredients required for their synthesis and identification. [The *SCI*® indicates that this paper has been cited in over 105 publications.]

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This 100-page review paper with 332 references was written in 1968 while I served as chairman of the US Atomic Energy Commission (AEC) on a leave of absence from the University of California, Berkeley. This was 7 years into my 10-year stint in that position. Although my AEC duties were arduous and demanded more than a full contribution of my time, I managed, through much extra effort, to stay abreast of my field (the transuranium elements) by reading the relevant scientific journals regularly, writing articles, and giving numerous lectures in the US and abroad. Thus, when my friend, Emilio Segrè, editor of the *Annual Review of Nuclear Science*, asked me to prepare this review article, I was ready to do so.

I described the status of five elements beyond 100—those with atomic numbers 101, 102, 103, 104, and 105—in this review. Of these, research during the intervening years has shown that the work reported by Soviet investigators on the last two (104 and 105) was in error. Research by other investigators the following year or two (1969 and 1970) led to the positive identification of isotopes of these two elements. In fact, today we can be confident that elements through atomic number 108, and possibly atomic number 109, have been synthesized and identified, the last three in the Gesell Schwerionenforsch (GSI) Laboratory in Germany. A recent review article describes the current status of the field.[1]

My review included a description of systematics for predicting the synthesis and properties of new elements and isotopes. This included radioactive decay properties, indications for nuclear stability (including superheavy elements), and chemical properties and electronic structures for elements as heavy as atomic number 150 and beyond. I coined the name "superactinides" for the predicted 32-member rare earth series of elements beginning at atomic number 122 and ending at atomic number 153, in which the 18-member 5g electron shell and 14-member 6f electron shell are predicted to fill in a commingling fashion. Also included was one of the first thorough descriptions of the concept of an "Island of Stability," centered around nuclei with closed shells of nucleons at Z (atomic number)=114 and N (neutron number)=184. Vigorous attempts have been made during the intervening years to synthesize such nuclei in several laboratories throughout the world; although those efforts have been unsuccessful so far, they have led to an increased understanding of the required nuclear synthesis processes that apparently hold the key to future success.[1] I believe that it is due to the rather complete early coverage of these areas that this review has been so widely read and cited during the intervening years.

About 10 years after the publication of this review, I edited a 488-page book of 121 benchmark papers covering the discovery, first isolation, nuclear synthesis, and nuclear and chemical properties of the transuranium elements,[2] which at that time ended at element 106.

1. **Seaborg G T & Loveland W.** Superheavy elements. *Contemp. Phys.* (In press.)
2. **Seaborg G T,** ed. *Transuranium elements: products of modern alchemy.* Stroudsburg, PA: Dowden, Hutchinson and Ross, 1978. 488 p.

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