

The Demise of Radiochemistry

CNS-NSC 2010

Calgary

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Who will teach the next generation?

Globe and Mail:

**Nuclear Safety System
Works Perfectly**

OR

**Deadly Radiation Leak
Shuts Nuclear Power**

Radium Decay Products

Radium A (Radon)

Radium D (Lead-210)

Radium E (Bismuth-210)

Radium F (Polonium-210)

Ionium (Thorium-234)

People involved

**Henri Becquerel
Marie Sklodowska
Pierre Curie
André DeBierne**

Bertha Karlik, Elisabeth Rona, Ellen Gleditsch

People involved

**Kasimir Fajans, Fritz Paneth,
Frederick Soddy, George de Hevesy**

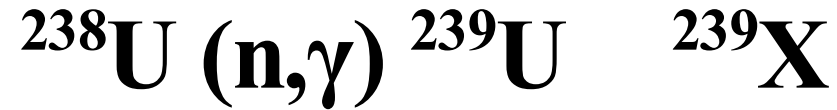
1932-34 was a time of Major Advance

The Neutron was discovered

The Cyclotron invented

Nuclear transformations were started

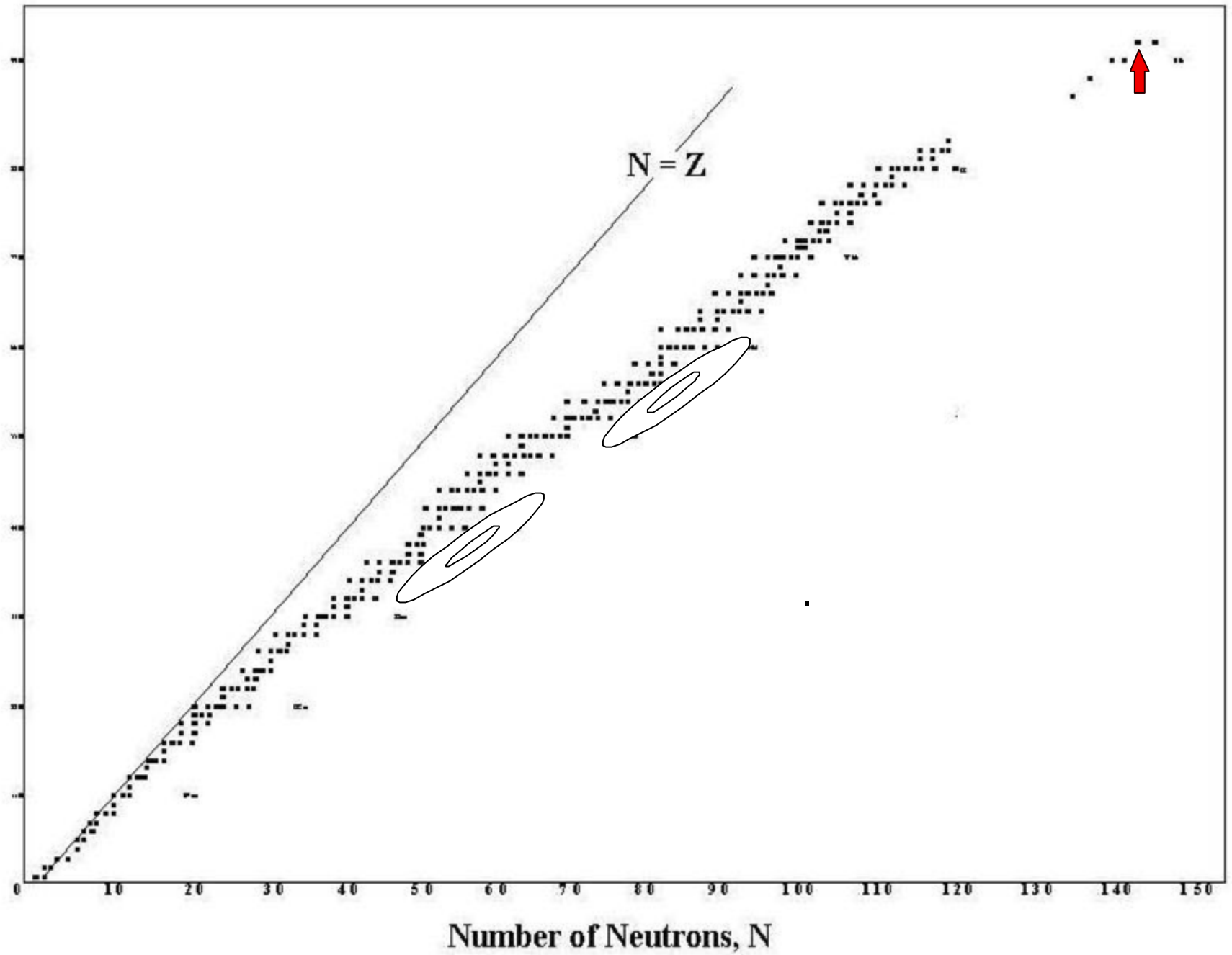
Fission was seen but not recognized



They found many ‘isotopes’

In fact, it was nuclear fission!

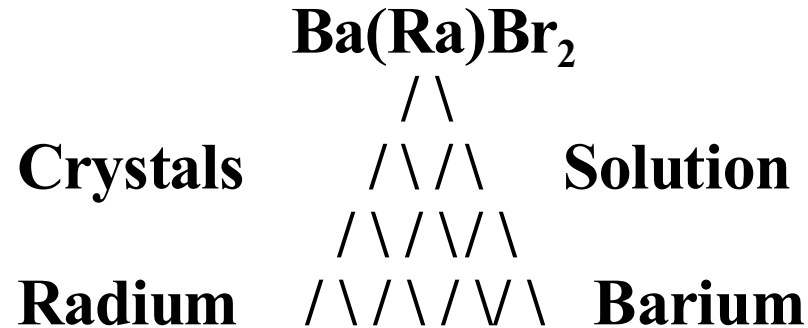
Number of Protons, Z



Number of Neutrons, N

Meanwhile back at Port Hope

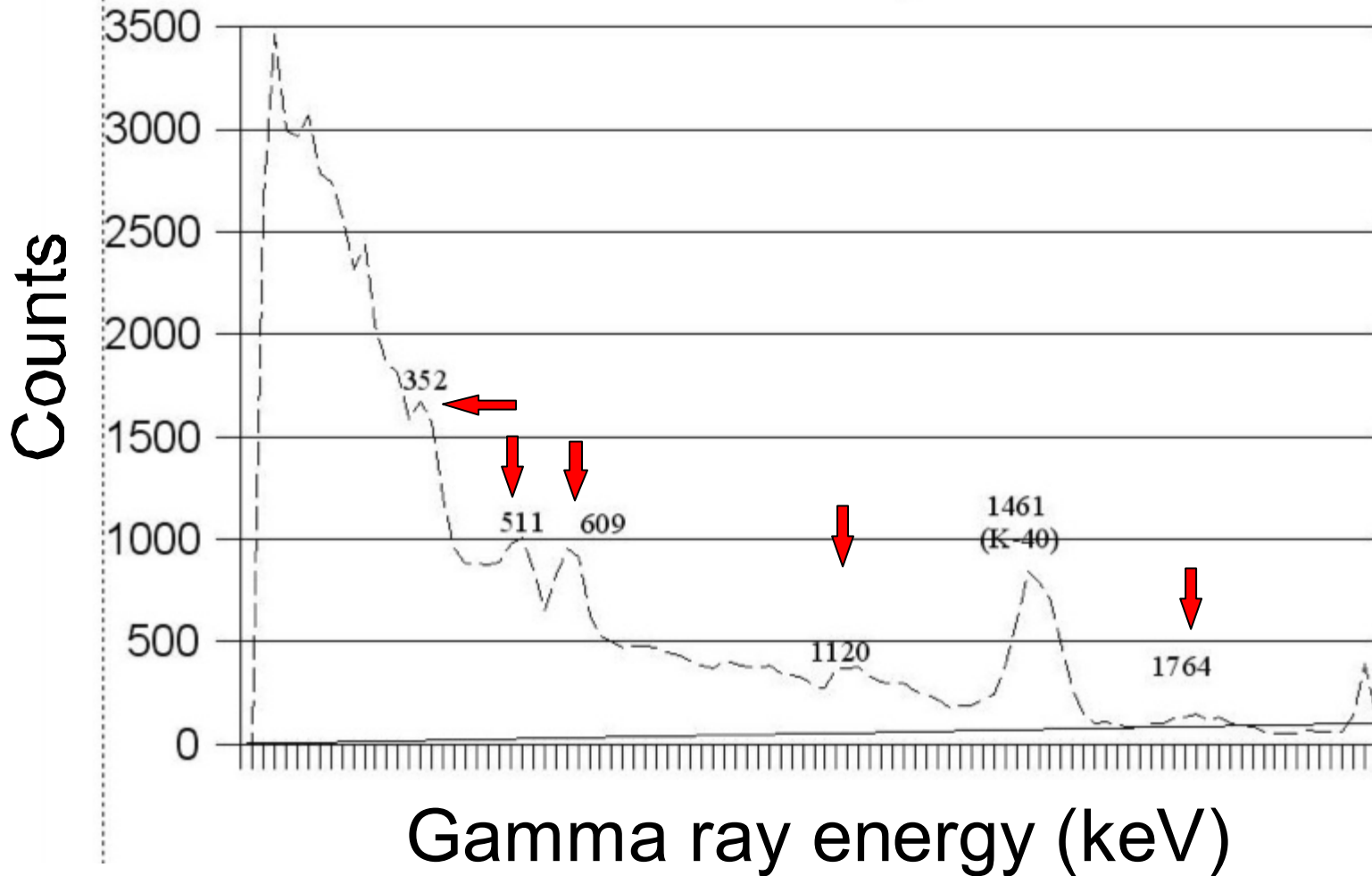
Fractional Crystallization of Radium



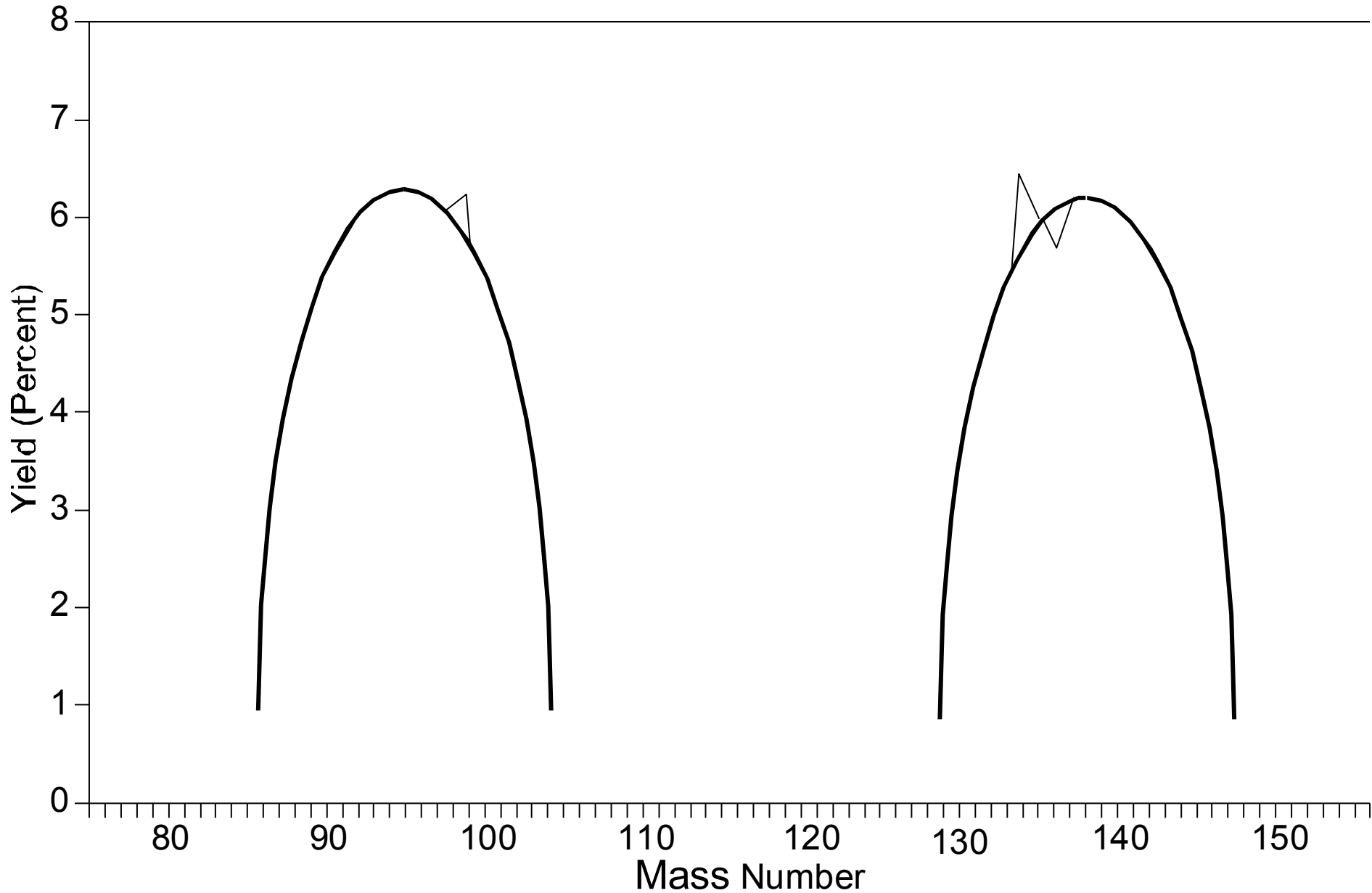


DRW Fingerprints

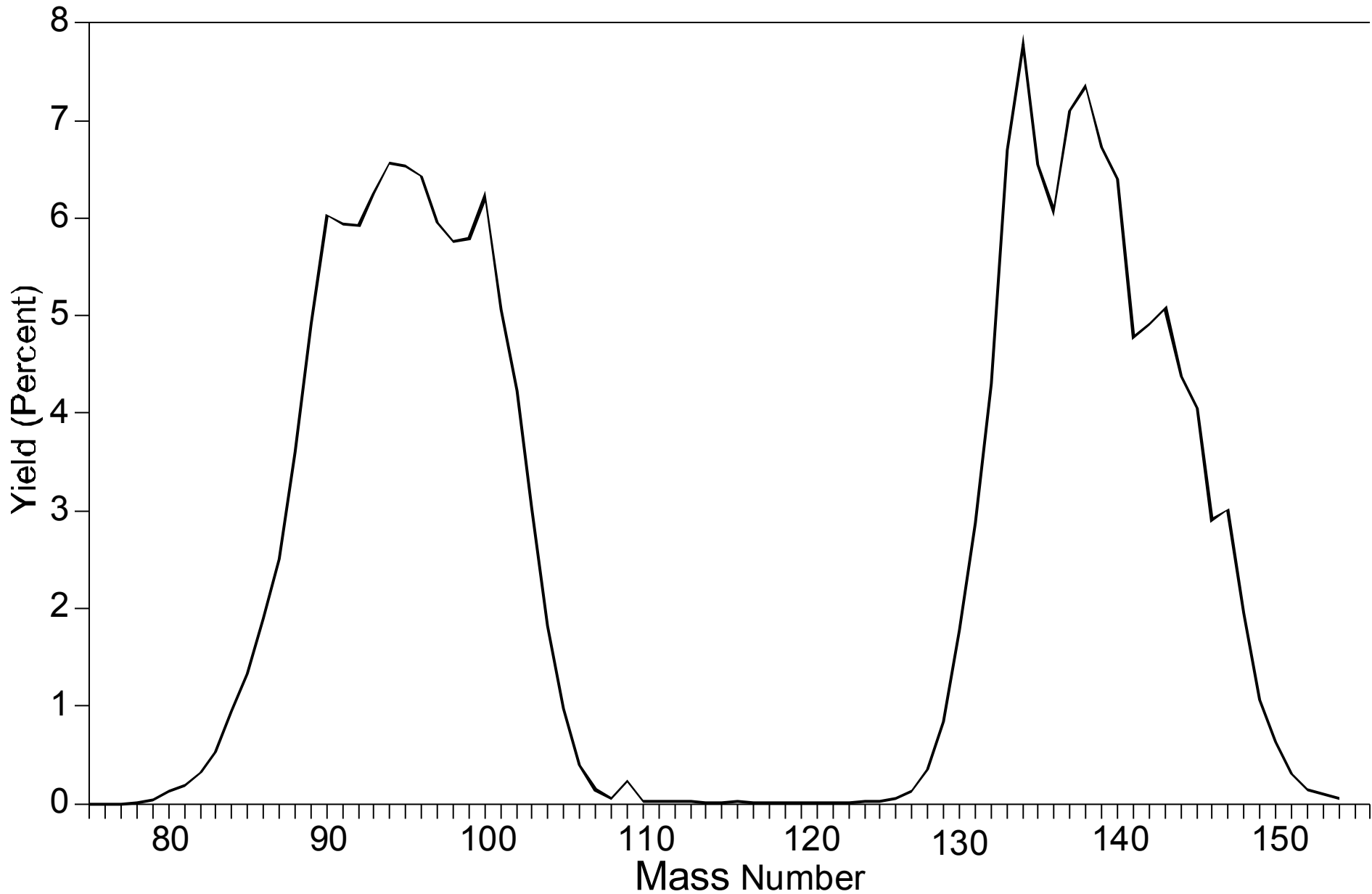
DRW Gamma Spectrum



Fission Yields in U-235



Fission Yields in U-235



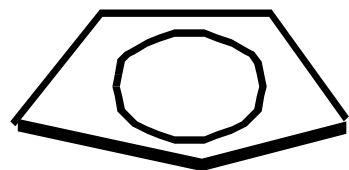
Discovery of the Missing Elements

43 Perrier, Segre - 1937

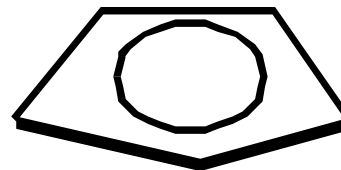
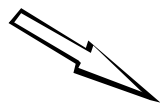
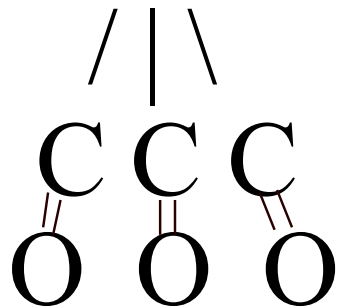
61 Marinski, Glendennin, Coryell - 1945

85 Corson ... Segre - 1940

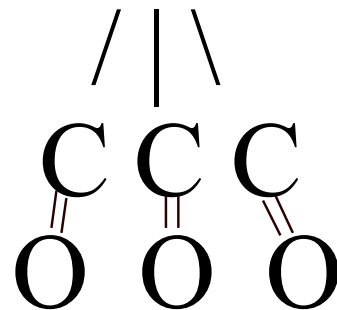
87 Perey - 1939



Mn



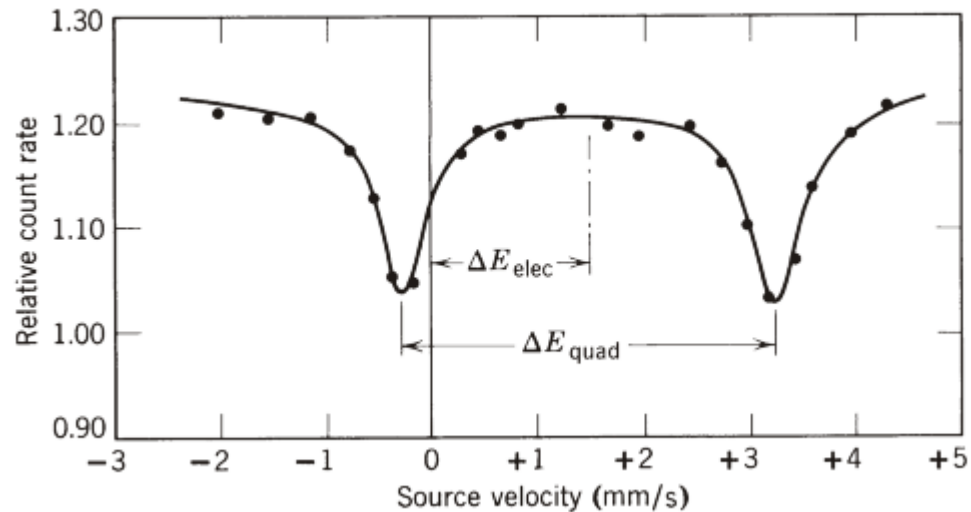
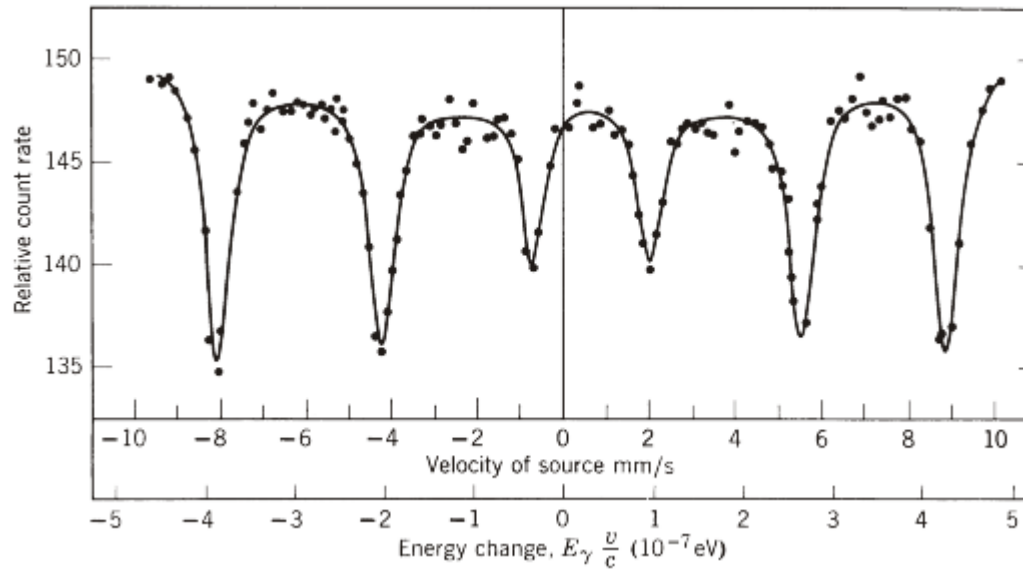
Mn



$\text{Mn}_2(\text{CO})_{10}$

$\text{Mn}(\text{CO})_5$

Mössbauer Spectroscopy



But we had a better idea!

Nitrogen in proteins



Reactor neutrons have too high energy:



Use a photoneutron source



Using ${}^{124}\text{Sb}$,

the maximum neutron energy is about 25 KeV.

largest photo-neutron source in the world

Not strong enough

Radiochemistry

Radioactivity

Measurement of radiation

Detection, Statistics

Applied Radiochemistry

Tracers, Fission, Waste Disposal

Theories of the Nucleus

Liquid Drop, Shell theory, Beta theory

Radiochemistry has Changed

**Radiochemistry has now become
a servant to other fields of study:**

Pharmaceutical and Medicinal Radiochemistry

Environmental Radiochemistry

Two Recent Books

