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Seymour "Sy" Meyerson, December 4, 1916–May 28, 2016

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Seymour “Sy” Meyerson, December 4, 1916 - May 28, 2016.



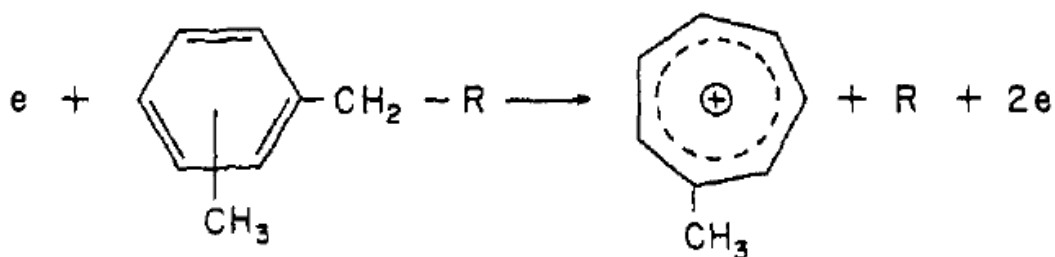
Sadly, we have lost one of the pioneers of our discipline, Seymour Meyerson, recipient of the American Chemical Society’s Frank H. Field and Joe L. Franklin Award for Outstanding Achievement in Mass Spectrometry (1993). Over the past 70 years, mass spectrometry has evolved from an important structural and analytical tool for industrial chemists to become one of the key techniques used to analyze compounds of man-made origin (polymers, pharmaceuticals, etc.) and biological origin. The broad acceptance of mass spectrometry as a tool for structural analysis and as a cornerstone “platform technology” for the myriad “omics” fields stems from the efforts of pioneering organic mass spectrometrists such as Meyerson. Their desired aim was to understand how fragment ions are formed under electron ionization mass spectrometry (EI/MS) conditions, in particular to link fragment ions to the structure of a molecule. Meyerson started working with mass spectrometers upon joining the Standard Oil Co. (Indiana) in 1946 and kept at it for nearly 40 years! As a graduate student in the late 1980s, through Prof. John Bowie’s course on Organic Mass Spectrometry and in my own research, I became aware of Meyerson’s seminal contributions to rearrangement reactions, the use of isotopes to examine reaction mechanisms and his detection of the metaphosphate anion, an important reaction intermediate in phosphate chemistry and biology.

The saying that “everything old is new again” appears to hold true for mass spectrometry at the moment. Metabolomics and lipidomics are driving a renaissance

in “small” molecule analysis, and new EI/MS instruments are appearing on the market. Prof. Herbert Budzikiewicz, another pioneer in organic mass spectrometry, has sounded a warning bell on recent publications where proposed mechanisms of fragmentation are sometimes based on a single example, often not backed up with isotope labelling [1]. Thus it is worth revisiting Meyerson’s (arguably) most important piece of work as a lesson on the value of careful studies involving isotope labelling to experimentally establish the mechanisms of fragmentation reactions. In 1957 Rylander, Meyerson and Grubb published a landmark *JACS* paper on the ion of m/z 91, $C_7H_7^+$ formed in the EI/MS of alkylbenzenes, which had been assumed to be the benzyl cation [2]. As noted in their introduction:

“However, a number of difficulties encountered in this Laboratory and elsewhere have demanded a careful examination of the $C_7H_7^+$ ion. Peculiarities in the spectra of labeled molecules and in correlations of spectra with structures, and inconsistencies in appearance potentials indicate that the origin and nature of this ion may be not quite so simple as has been assumed.”

By synthesizing a series of regiospecifically deuterium-labelled ethyl benzenes and methyl benzenes (and from gifts of samples from colleagues such as the Nobel Laureate H. C. Brown of Purdue University), and carefully measuring the EI/MS spectra including metastable ions, they were able to track where the deuterons ended up in the fragment ions. A statistical analysis of these systems highlighted that all carbons become equivalent in $C_7H_7^+$, consistent with the formation of the symmetrical tropylium ion. The formation of such a species was then used to account for the fact that the EI/MS of *ortho*, *meta* and *para* dialkyl benzenes are identical:



Readers interested in learning more about this important mass spectrometrists and those halcyon days where mass spectrometry was an “art” practiced by a few dedicated practitioners are encouraged to consult his Chemical Heritage Foundation interview [3], and an encyclopaedia entry [4]. Better still, peruse Meyerson’s delightful reminiscence of the early days of Organic Mass Spectrometry [5] and his swansong account of his career in mass spectrometry and musing on life [6].

Having read Meyerson’s local obituary [7] and after corresponding with one of his collaborators, Prof. Maurice Bursey (thank-you!), I wish I had known Meyerson personally. He led a full life. He received an S.B. degree in Chemistry (Phi Beta Kappa) from the University of Chicago in 1938. When war broke out, he volunteered for military service and spent a year in the Signal Corps Enlisted Reserve Corps, training in radio and radar, before entering active duty in 1943. After completing Officer Candidate School, he was commissioned as second lieutenant in the Signal Corps, spent the better part of a year assigned to the Manhattan Project, and then was

stationed in Berlin, Germany, 1945-46. Meyerson was a devoted family man, marrying Lotte Straus, a refugee from Nazi Germany in 1943. Together they were very community minded. For example, they were active members of the Circle Pines Center, a consumer cooperative camp/farm in Lower Michigan; formed a development company in 1994 together with their daughter Elana, that designed and built the Westwood Cohousing Community in West Asheville, one of the most energy-efficient communities in the US; were members of the American Civil Liberties Union; and established the Meyerson Fund for World Federalism at the University of North Carolina at Asheville. Remarkably, shortly after their 73rd wedding anniversary, Sy and Lotte passed away on the same day. Their daughters Sheella and Elana, a granddaughter and other family members, survive them.

Vale Seymour Meyerson.

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