



Tribute

A celebration of the scientific and personal contributions of Jesse (Jack) L. Beauchamp

This volume of the *International Journal of Mass Spectrometry* is dedicated to the achievements and ongoing legacy of Jesse (Jack) L. Beauchamp, on the occasion of his 60th birthday. As friends and students of Jack, it is a pleasure to have assembled this information and to share it with his many colleagues. Jack is a masterful chemist who has touched a wide range of subjects, generally but not exclusively involving ions. We are pleased that so many could join us in celebrating this happy occasion and recognizing his contributions to science.

Jack is presently the Charles and Mary Ferkel Professor of Chemistry at the California Institute of Technology, one of the premier scientific establishments of higher learning in the world. He began his education at this same institution over 40 years ago, graduating with honors in 1964. Accepted to Harvard University for graduate school, he worked with Professor John D. Baldeschwieler in the seminal development of ion cyclotron resonance (ICR) mass spectrometry. Jack likes to say that he got a Stanford education and Harvard degree because his thesis work was conducted primarily at Stanford University, where he completed his thesis, "Ion Cyclotron Resonance Spectroscopy." In 1967, he became an Arthur Amos Noyes Instructor in Chemistry at the California Institute of Technology. He rose through the ranks achieving an Assistant Professorship in 1969, Associate Professor in 1971, and Full Professor in 1974.

Jack rapidly established himself as one of the leaders in the use of ion cyclotron resonance (ICR) mass spectrometry. He was the first to study the acid–base

properties of molecules and ions in the gas phase using ICR. Most recently, his work involves fundamental studies of the acid–base properties of important functional groups in peptides and oligonucleotides. However, Jack's mastery of physical techniques does not end with ICR; he has also made seminal contributions involving several other experimental techniques. These include photoelectron spectroscopy, where he was one of the first to examine the ionization energetics of organic free radicals. He has utilized ion beam tandem mass spectrometry to examine the energetics of the reactions of atomic transition metal ions with hydrocarbons; research that has provided quantitative thermochemistry and mechanistic insight into gas-phase organometallic chemistry for over two decades. At a time when infrared multiphoton dissociation using high-power, pulsed lasers was intensely studied, Jack recognized that an ICR mass spectrometer was an ideal ion storage device that would allow a low-power, continuous-wave infrared laser to be used instead. This permitted studies in which the mechanism of multiphoton excitation could be investigated on a much longer time scale, providing fundamental insight into a process that is now used to activate stored ions and characterize potential energy surfaces. These are but a few examples of the wide-ranging scientific research that Jack has undertaken with his students over the past four decades. Current efforts in his laboratory include adaptation of near field scanning optical microscopy to provide spatially resolved chemical images of surfaces, the development of new instruments and sensors for in situ analysis of organic molecules in

connection with planetary science and space research, and the recent development of a novel “ping-pong” experiment for characterizing the physics and chemistry of droplet evaporation and discharge processes that take place in electrospray ionization. Fortunately, there is no indication that Jack has any plans to retire from scientific research in the foreseeable future.

These achievements have been recognized widely. Notably, in 1978, he was awarded the American Chemical Society Award in Pure Chemistry. In 1981, he was appointed a member of the National Academy of Sciences. In 1999, he was awarded the American Chemical Society Peter Debye Award in Physical Chemistry for his pioneering work involving the gas-phase ion chemistry of organic, organometallic, and biological systems, and his innovative use of ion cyclotron resonance (ICR) mass spectrometry. And just recently, Jack has learned that he will be the 2003 recipient of the American Chemical Society Frank H. Field and Joe L. Franklin Award for Outstanding Achievement in Mass Spectrometry.

Jack and his wife, Patricia, are avid pilots, an interest in part that has led Jack to become involved on a national level with aviation security. He has been a member and chair of the National Research Council Committee on Commercial Aviation Security. He served as a Commissioner on the White House Commission on Aviation Safety and Security, chaired by Vice President Albert Gore. He presently is requested to give talks about aviation security on a regular basis. In addition to his abundant scientific activities, Jack is an enthusiastic runner, backpacker, and skier, pursuits that he shares with his wife and their five children.

Several generations of scientists count themselves lucky to have had Jack as a mentor. I (P.B.A.) remember vividly sitting down and working over my first paper. I was impressed with Jack’s ability to get the issues explained clearly and succinctly, but also to inject some humor and humanity into the process as well. It is a lesson that I have tried to emulate and pass along to my own scientific progeny. Thanks, Jack.

I (M.T.B.) also remember my early encounters with Jack. I was a First Lieutenant in the Army detailed to JPL in Pasadena, CA. A “second front” in the ICR

field was being opened there by Jim King and Don Elleman and they needed a chemist to figure out what to put in the new home built ICR instrument and recruited me. Since I knew absolutely nothing about Mass Spectrometry, Ion Chemistry and especially ICR I was a perfect choice. I remember picking up the latest issue of *J. Chem. Phys.* and flipping through it for ideas. I settled on ethylene after spotting an article by Pierre Ausloos on its radiation-induced chemistry. It was an inspired choice. Dan and I were floundering around trying to make sense out of our data when Jack came for a visit. He had just been appointed an Instructor at Cal Tech and found out we were trying to get started in ICR. It turns out he had looked at ethylene in the ICR during his thesis work and suggested we collaborate, which we gladly did. While I didn’t realize it at the time, this was a seminal event in my career, convincing me to abandon spectroscopy (my Ph.D. work) and pursue ion chemistry. In any case, a first rate paper resulted from the collaboration, my first in ICR and one of Jack’s first at Cal Tech.

Of course ethylene wasn’t the only unfinished business in Jack’s thesis. While at Stanford he had put most of the volatile chemicals in the Aldrich Catalogue into the machine. I remember first meeting Keith Jennings at the ASMS meeting in Atlanta in 1971. We were having lunch and he was sharing some concerns with me. He had just made a major decision to build an ICR and had his first results. He told me about two conversations he’d had. In the first Bud Butrill (a current Baldeschweiler student) had informed him that only people coming through the Baldeschweiler group at Stanford had any chance to be successful in the ICR field (not good news to me either!). Bud always had special communication skills. The second conversation was with Jack. He was telling Jack about some of his early results and plans and Jack indicated he already had two students working in each of Keith’s interest areas (since they dealt with chemicals in the Aldrich Catalogue!). I think at that lunch Keith and I bonded and established a life long friendship. Thanks Jack! In any case, Keith was relieved to find out several years later that it was the same two students

working on each of the projects he'd discussed with Jack.

Over the years Jack and I have continued to collaborate but the real growth has been in our friendship. When I have been at my lowest he has been there and when I've won an award he always celebrated with me. I was most honored when he and Pat asked me to be the godfather of their latest (last Jack?) son Michael and thankful I could attend the ceremony in Wales two summers ago. In my experience you only make a few deep and lasting friends in life. I'm glad Jack is one of mine.

It should be obvious that a 60th birthday is an opportunity to recognize and thank a deserving scientist, mentor, and friend. Jack's infectious enthusiasm for science and life is as high as ever, for which we are thankful. Jack, may your coming years continue to be filled with insight, achievement, and enjoyment.

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