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Jack Throck Watson, May 2, 1939–September 3, 2016

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Obituary

Jack Throck Watson, May 2, 1939 – September 3, 2016

Jack Throck Watson, Emeritus Professor of Biochemistry and of Chemistry, Michigan State University, passed away on September 3, 2016, after an extended battle with brain cancer. Jack was born May 2, 1939 in Casey, Iowa, a village of 800 people in southwestern Iowa, but grew up in Nora Springs, a town of 1,000 residents in northern Iowa. After graduating from Iowa State University in 1961 with a B.S. in Chemical Technology, he went on to graduate school at the Massachusetts Institute of Technology, earning a Ph.D. in Analytical Chemistry in 1965 in the laboratory of Professor Klaus Biemann. After a tour of duty in the US Air Force, serving as a Research Chemist in the School of Aerospace Medicine at Brooks Air Force base in San Antonio, Jack pursued postdoctoral research from 1968-1969 at the Institut de Chimie, Université de Strasbourg in France. In 1969, he began his academic career as an Assistant Professor in the Department of Pharmacology at Vanderbilt University, and was promoted to Associate Professor with tenure in 1974. In 1980, Jack was appointed Professor of Biochemistry and Chemistry at Michigan State University (MSU), where he was also Director of the MSU Mass Spectrometry Facility. From 1980-1999, he was the Principal Investigator of the *National Institutes of Health* (NIH) P41 Regional Resource in Mass Spectrometry at MSU. In 2006, he retired from MSU to finish the 4th edition of his book on mass spectrometry (with co-author O. David Sparkman), and to give more attention to his lifelong hobbies of hunting, fishing, gardening, wood-working, taxidermy, photography, and (to quote Jack) “my responsibilities as steward to 40 acres of wilderness in the north woods of Michigan”. Despite these distractions, Jack remained active in mass spectrometry until the last few years of his life, as an instructor of short courses on mass spectrometry, and as a reviewer of manuscripts for journals. Jack is survived by his two children Brent and Jennifer, born during his first marriage from 1966-1991 to Judith Sjoberg. He was married for a second time, from 1992-2007, to Shirley Jones.

Throughout his academic research career, Jack mentored 35 Ph.D. and 7 M.S. graduate students, and 19 post-doctoral associates (Table 1) while publishing over 150 scientific papers, 18 book chapters, and authoring 5 books. In recognition of his career achievements, Jack was named an Outstanding Young Alumnus in 1972 and received a Citation of Merit in 1981 from Iowa State University. He received an NIH Career Development Award from 1973-1977, and he was a *Pittsburgh Spectroscopy Society* Awardee in 1990. Jack had a long history of distinguished service to the mass spectrometry community. Over a period of 30 years, he developed and presented a number of short courses on mass spectrometry for the *American Chemical Society* (ACS). As a member of the *American Society for Mass Spectrometry* (ASMS) since its founding, he served as Board Member at Large from 1980-1982, as Chair of the Nominating Committee from 1983-1985, as Program Co-Chair of the Sanibel Conference from 2000-2001, and as a member of the Education Committee from 2004-2006. From 1977-2006, he was the Professor in charge of the ACS Short Courses on Mass Spectrometry, and served as a member of the ACS Awards Committee from 1997-2000. From 1996-1999, he was a member of the Standing Committee on Army Science and Technology to the *National Research Council*, and served throughout his career as a member and *ad hoc* member to several NIH study sections and as a reviewer of funding proposals to the *National Science Foundation*. Finally, he was a member of

the Editorial Boards for *Biological Mass Spectrometry*, *J. Mass Spectrometry*, *J. Chromatography*, *Mass Spectrometry Reviews*, and *Current Analytical Chemistry*.

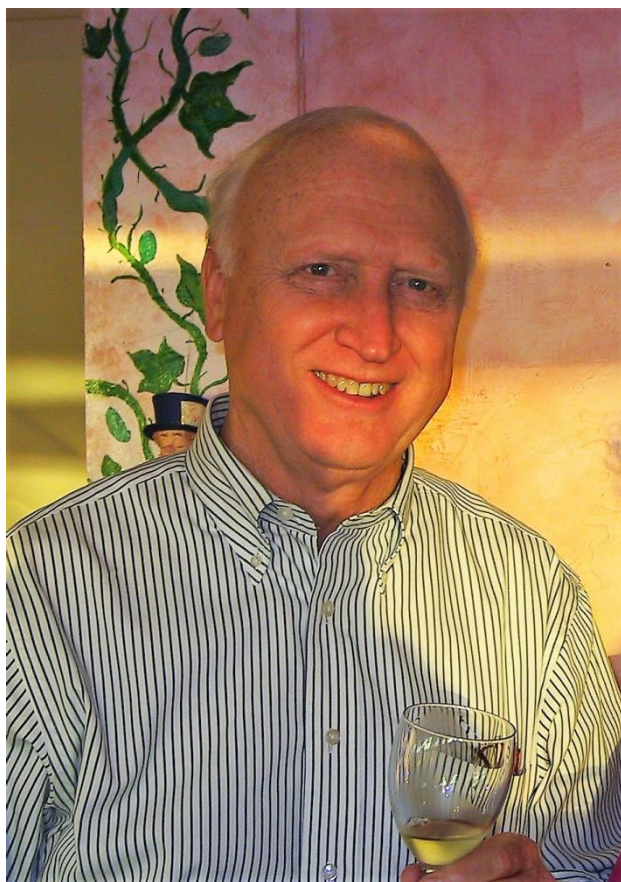
During his time as a graduate student at MIT, Jack developed the Watson-Biemann separator, an interface that could achieve molecular flow conditions to preferentially remove the helium from the effluent of a gas chromatograph (GC) column so that the residual gas stream enriched in the organic components was compatible with on-line mass spectrometry (MS) analysis. This provided a quantum leap in the applicability of GC-MS for the analysis of high-boiling point, polar molecules such as steroids and carboxylic esters [1]. Dominic Desiderio, a fellow graduate student in Biemann's lab at that time, recalled "Jack was a great student and an excellent scientist. It was interesting to watch him develop the Watson-Biemann glass separator for GC-MS. Jack (glass separator) and I (Fortran 2; IBM 7094 computer program to obtain accurate masses and elemental compositions from spectra recorded on a photoplate) gave our first scientific lectures at the 1964 ASTM E14 (the precursor of ASMS) meeting in Montreal, Canada along with Peter Bommer (direct introduction probe) and Klaus (element mapping)." Desiderio also commented on Jack's lifelong interests as an outdoorsman: "After MIT, the Desiderio's and James McClosky, another former member of the Biemann lab, all went camping one summer weekend in Texas. Jay and I had never camped before, so Jack "thoughtfully" procured an Arctic survival tent for us. Although we could have been discouraged to camp again after that sweltering adventure, we camped a lot after that first time. I certainly will never forget Jack. I lost a wonderful friend after more than a half century of friendship".



The major objective of Jack's research career was the extension of mass spectrometry to solve problems in biomedical chemistry. Initially, he gained significant recognition for his development of GC/MS with magnetic sector or quadrupole instrumentation for the proof of structures and analysis of metabolites including prostaglandins [2], and steroids. However,

recognizing the potential of rapidly emerging desorption ionization techniques in the early- to mid-1980s, his interests expanded to include the development of methods for the structure elucidation of peptides and proteins using fast atom bombardment (FAB) and matrix-assisted laser desorption ionization (MALDI) mass spectrometry. Frequently, these research methods involved chemical modification of the compounds of interest to improve their response to ionization, and/or to influence and understand mechanistic aspects of their gas-phase fragmentation behavior [3,4]. Later, he placed significant emphasis on the development of a cyanylation based methodology for determining the connectivity of disulfide bonds in peptides or proteins, including for those involving adjacent cysteines. The utility of this later method was elegantly demonstrated by trapping the cysteine disulfide bond intermediates produced during the refolding of various proteins, including human epidermal growth factor [5].

On his influence as an educator, long term short course co-instructor and co-author, O. David Sparkman, wrote that “J. Throck Watson was a true educator of people using mass spectrometry in the fields of analytical chemistry and biochemistry. More than anywhere else, this is reflected in his involvement in the ACS Short Courses Program. The multiple two-, three-, and five-day hands-on ACS programs that he and I organized and taught since 1978, are considered to be among the most successful and highly-rated ever offered. His legacy remains in the content of these courses, the organization of their presentation, and the experiments and exercises that he developed”. In the Fall of 1976, Watson published *Introduction to Mass Spectrometry: Biomedical, Environmental and Forensic Applications* (Raven Press, 1976). This book was revolutionary in the physical sciences at the time, because of its extensive literature citations including the journal article titles and the range of pages. In 2007, Watson and Sparkman co-authored the fourth edition of this book, retitled *Introduction to Mass Spectrometry: Instrumentation, Applications and Strategies for Data Interpretation* (John Wiley & Sons, 2007). This book received outstanding reviews and has been adopted for many courses around the world. Sparkman also wrote, “Due to the four editions of the book, the hundreds of participants in the short courses taught by Jack and his colleagues, plus his teaching and mentoring at both MSU and Vanderbilt, Jack Throck Watson probably had as significant an impact on people in mass spectrometry as anyone in the field. I know that his impact on me and my career was profound. I shall miss him greatly”.



In remembering his attributes as a mentor, former graduate student Nalini Sadagopan (Ph.D 1999) wrote, “I remember the first time I met him (Fall 1996) as I stood outside of his office, he was standing near his desk and searching for something and as he looked up he commented “I am trying to find the surface of my desk” which put me at a real ease as a coy graduate student trying to talk to one of the prestigious mass spectrometrists in the world.”, and “The last I saw Jack, in Santa Rosa in Feb. 2015, his passion for science still showed when we talked about the mechanism of action for Avastin (part of the treatment he was receiving due to reoccurrence of his glioma) and his love for nature as he pointed out the hill tops and where the geysers would spring from”. Brad Ackermann (Ph.D. 1986) similarly wrote “As the lab expanded into new areas of research Jack’s unique style and calming demeanor made him the ideal point person to bring together a diverse collection of motivated professors and students. Above all, I will remember Jack for being a truly approachable mentor who found value in all people and loved to approach science through constructive partnerships”. Perhaps the defining words to describe Jack’s approach on science can be found in the comments made by Brian Musselman (Ph.D. 1987), who recalled, “J Throck was always looking for the perfect word, the perfect tense, that string of words that became sentences telling the story of the experiment as clearly as it could be stated, so that others might succeed. We learned more than just how to work, we learned how to be scientists and to understand what it was to be a member of that community.”

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Table 1. List of J. Throck Watson laboratory doctoral and master students, and post-doctoral associates.

Brian Sweetman	1969-1972	(post doc)
Fred Falkner	1972-1974	(post doc)
Jai Khandelwal	1972-1974	(post doc)
Eugene Heath	1974-1975	(post doc)
Walter Hubbard	1975-1977	(post doc)
Donald Pelster	1980	(Ph.D.)
Ching-Bore Wang	1981-1982	(post doc)
Gregory G. Dolnikowski	1983	(M.S.)
Guor-Rong Her	1985	(Ph.D.)
J. David Pinkston	1985	(Ph.D.)
John T. Stults	1985	(Ph.D.)
Brian A. Eckenrode	1985	(M.S.)
David Guido	1985	(M.S.)
John T. Stults	1985-1987	(post doc)
Bradley L. Ackermann	1986	(Ph.D.)
John J. Leary	1986	(Ph.D.)
Vivek Bedi	1986	(M.S.)
Douglas Gage	1986-1988	(post doc)
Holly Fortnum Adamsons	1987	(M.S.)
Gregory Dolnikowski	1987	(Ph.D.)
Brian D. Musselman	1987	(Ph.D.)
Linda (McCarragher) Doherty	1987	(Ph.D.)
Steven Mullen	1987-1988	(post doc)
Susan Erhardt-Zabik	1988	(Ph.D.)
Brian A. Eckenrode	1988	(Ph.D.)
Kathleen Kayganich	1989	(Ph.D.)
Amid Salari	1989-1990	(post doc)
George E. Yefchak	1990	(Ph.D.)
Eric Erickson	1990	(Ph.D.)

Curt Heine	1990	(Ph.D.)
Timothy G. Heath	1990	(Ph.D.)
Yoon-Seok Chang	1990-1992	(post doc)
Helen Mayer	199	(Ph.D.)
Gary A. Schultz	1991	(Ph.D.)
David S. Wagner	1992	(Ph.D.)
Jong-Shin Yoo	1992	(Ph.D.)
Tim Nieuwenhuis	1992	(M.S.)
Eugene Zaluzec	1992-1994	(post doc)
Kuruppu Dharmasiri	1994	(Ph.D.)
Jian Wang	1994	(Ph.D.)
Marina Yu. Ksenzenko	1994-1994	(post doc)
Ronald F. Lopshire	1995	(Ph.D.)
Jennifer Johnson	1995	(Ph.D.)
John Strahler	1995-1996	(post doc)
Jiang Wu	1997	(Ph.D.)
Naxing Xu	1997	(Ph.D.)
Ben Gardner	1997	(Ph.D.)
Ying Yang	1998	(Ph.D.)
Qing (Susan) Li	1998	(M.S.)
Kenneth Roth	1999	(Ph.D.)
Nalini Sadagopan	1999	(Ph.D.)
Jianfeng (Frank) Qi	2001	(Ph.D.)
Brett Phinney	2000-2001	(post doc)
Chad R. Borges	2001-2003	(post doc)
Yi-Te (Robert) Chou	2002-2004	(post doc)
Wei Wu	2003	(Ph.D.)
Charles Ngowe	2003-2005	(post doc)
Robin J. Hood	2003-2006	(post doc)
Yingda Xu	2004	(Ph.D.)
Xue Li	2005	(Ph.D.)
Jose-Luis Gallegos-Perez	2005	(Ph.D.)

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