



Preface

Preface IJMS honour issue Michael Gross

It is with great pleasure that the three Special Editors express our deep respect and gratitude in the preface of this special issue in honour of Professor Michael L. Gross. Each of us has had the pleasure of knowing and working with Michael for many years, dating back to 1974 (for DR and NN) and 1997 (for YW). For two of us (DR and YW), these first interactions were as graduate students, but very quickly the professor–student relationship transitioned to that of a colleague, friend, and lifelong mentor. Michael is a tireless mentor for his students, and we can remember spending many hours sitting in his office, in the very late hours of the day...meaning between midnight and sunrise...for some reason Michael could seldom be found around his office or laboratory during the day, and when you did find him you could seldom grab his attention long enough to have meaningful discussions! On the other hand, late in the day Michael comes to life, and once you get his attention you can spend hours discussing results from experiments, recently published papers dealing with the full range of mass spectrometry and ion chemistry issues, or simply gossiping about the scientists that comprise the field of mass spectrometry. Incidentally, these characteristics have remained unchanged; when Michael visited Texas A&M University as a “Frontiers in Chemical Research Lecturer” a few years back, he stayed in my (DR) home, and for four nights straight the sun was rising by the time we called it a day.

I (NN) met Michael for the first time during the ASMS Conference at Philadelphia in 1974 when I spent a few months as a visiting scientist in the laboratory of Professor Fred McLafferty at Cornell University in Ithaca, NY, to perform collisional activation studies with the aim to show among others that the $[M-Br]^+$ ion of 2-phenyl ethyl bromide had the phenonium ion structure when generated at low electron energies. From the beginning, Michael and I did understand each other very well and became very close friends. Over all the years we have discussed many aspects of mass spectrometry both at conferences—sometimes at unusual hours such as around three o’ clock after midnight at a square in Florence, Italy, during the 7th International Mass Spectrometry Conference—and frequently until sunrise at our homes. These discussions led to a number of scientific cooperative works and joint publications, including three with DR and NN. Notable examples are the structure of the $[M-ethylene]^+$ ions from 2-phenoxyethyl chloride, a subject that gave rise to a lively debate whether they were phenol and/or 1,5-cyclohexadienone radical cations, the latter eventually being shown to be present by use of photodissociation, the origin of hydrogen and carbon atom scrambling in the radical cation of 1,3-butadiene, and the amount of kinetic energy released upon loss of carbon monoxide from the molecular ion of phenol as a function of its lifetime.

Another joint project concerned a collisional activation study of synthetic beta-endorphins and ACTH peptides of molecular weight to 2000 Da, obtained from the pharmaceutical company Organon in Oss, The Netherlands, to compare the performance of the Kratos MS-50 triple analyzer mass spectrometer, the first commercial triple analyser mass spectrometer, in his laboratory with the VG Micromass ZAB-2HF double focusing instrument in my laboratory. It was with this instrument that Michael and coworkers sequenced one of the first unknown peptides (a tetrameric cyclic peptide from a corn toxin) using MS/MS with ionization by fast atom bombardment.

At the 1974 NATO conference held in Biarritz, France, I remember that Michael (with Gerry Meisels and Charles Wilkins) was preparing a major grant application for setting up a Midwest Center for Mass Spectrometry at the University of Nebraska in Lincoln, Nebraska. That application was successful, and I could note during my subsequent visits that Michael enjoyed leading such a center in “the middle of nowhere”, enabling him and his group to perform exciting research and instrumental developments in addition to highly sophisticated analytical work. In that center, the concept of charge-remote fragmentation was born, which has become a widely applied tool to determine the location of double bonds in the aliphatic chain of fatty acids and a new class of gas-phase reactions. Moreover, together with his colleague Professor Charles Wilkins, he designed and constructed a broad-band Fourier transform ion cyclotron resonance mass spectrometer and was the first to couple it to GC, to adapt it to laser desorption for analysis of non-volatile compounds, and to develop the mass calibration (with D. Rempel) that is still used today. This was the second FT-ICR instrument built in academics.

During the late 1970s and 80s, he also used high resolving power sector MS to validate, along with US EPA colleagues, the method for ultratrace analysis of the highly toxic 2,3,7,8-tetrachlorodibenzodioxin (TCDD) and use the methodology to assist the EPA in environmental monitoring and to discover TCDD in humans (veterans of the Vietnam conflict who were heavily exposed to Agent Orange). The analytical procedure continues to be used worldwide for dioxin monitoring.

After 26 years at the University of Nebraska, Michael took up in 1994 the position of Professor of chemistry and medicine at the Washington University in St. Louis, Missouri. There also he set up an excellent centre for mass spectrometry, being heavily supported by the NSF and NIH over all the years. He continued his basic research, instrumental developments and analytical application and studied for many years the fragmentation of DNA and used this as background for studying DNA damage with both his former Nebraska

colleague, E. Cavalieri and his WU colleague, J. S. Taylor. I (NN) visited him several times in St. Louis and worked for 3 months in his laboratory on the preparation of Volume 4 of the Elsevier Encyclopedia of Mass Spectrometry, in which he gave very helpful suggestions. The encyclopedia is co-edited by Richard Caprioli and Michael. During that stay I could attend and participate in his group meetings both in the chemistry department and in the faculty of medicine, which were very exciting and stimulating indeed!

Michael's research interests remain in ion chemistry and instrumentation, but a new and major focus in recent history is protein biophysics and biochemistry. In this area, he and his students have developed protein footprinting approaches including hydrogen–deuterium exchange for affinity, a method they termed PLIMSTEX, and fast photochemical oxidation of proteins (FPOP). Just recently, his long-time co-worker, Don Rempel, and he showed that FPOP is suitable as the “probe” method for a two-laser “pump-probe” experiment to follow protein folding and unfolding.

Michael and I (NN) have spent together with our wives, (the late) Judy and Tini, very enjoyable holidays in the Cotswolds and Salisbury area in England, in the Eifel for roots hunting, along the Romatische Strasse, in the Schwäbische Alb and in the Schwarzwald, Germany (he will certainly remember the nice dessert we had after dinner in Freudenstadt in the Schwarzwald) and in France during our memorable trip via Chartres, Amboise along the Loire river where Michael did a very good bargain (he miscalculated the price by a factor of 10 in favour of the shop owner) to buy a beautiful tapestry, showing “The Lady and the Unicorn”, and Limoges where we stayed in a Fawlty Towers type of hotel along the Vienne river and where we were awakened around five o'clock

in the morning by crowing cocks, and then to Bordeaux for the 11th International Mass Spectrometry Conference.

In this special issue we have 30 manuscripts contributed by colleagues, collaborators and friends of Michael Gross. These manuscripts cover a range of topics including instrumentation, biological mass spectrometry/chemistry and environmental applications of mass spectrometry, which reflects Michael's diverse interest in the fundamentals and applications of mass spectrometry. Michael, we would like to thank you for all your scientific and editorial contributions to our field and for your support and long-standing friendship, and we wish you a happy birthday and good health for both your wife Paula and you for many years to come!

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