

In Memory of Dr. Volker Magnus, Plant Biologist

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The world of plant biology lost an outstanding colleague and friend. Dr. Volker Magnus passed away at the end of July, 2009. Volker was born March 22, 1942 in Eckernförde, Germany. He immigrated to Yugoslavia to attend college, receiving his B.S. (1967, in Experimental Biology), M.S. (1971) and Ph.D. (1976, in Plant Biochemistry) formally from the Faculty of Natural Sciences and Mathematics at the University of Zagreb. He began conducting research in the Tracer Laboratory, Department of Organic Chemistry and Biochemistry, Rudjer Bošković Institute as a graduate student, receiving early mentoring from a trio of outstanding scientists all of whom had interests in indole metabolism in biological systems: Drs. Dina Keglević, Sonja Iskrić and Sergije Kveder. His M.S. work concerned indole-3-methanol isolation, resulting in an important paper (Magnus and others 1971) concerning this particular metabolite for which there remains only a few reports in the plant literature. He continued this basic theme during his Ph.D. research when he turned his attention to another indolic alcohol, tryptophol. His isolation and synthesis of a variety of tryptophol glycosides (see Magnus and others 1973; Magnus 1979), and later fatty acid esters (Magnus and others 1989), formed a life-long interest in indole-conjugates.

I first met Volker when he came to Bob Bandurski's laboratory as a postdoctoral in 1977. Volker was a life-long bachelor and always had his own distinct way of handling things. Bob had told me that Volker was coming to the lab, but we all wondered when he would arrive, as he sent ahead no details of his trip except to say he was on the way. At that point he had never been on an airplane and also was interested in saving his funds, so he had booked passage on a Polish freighter and dined with the captain and crew each night for the



Dr. Volker Magnus in 2007 in front of the Rudjer Bošković Institute. Picture taken by Dr. Tatjana Prebeg

days required to cross the Atlantic. He arrived at the lab unannounced and with suitcase in hand, after a long bus trip from New York to Michigan. We were all both surprised by his arrival and pleased he had gotten there. With a combination of Volker's quiet voice, his uncertainty in the new environment and the hum of the laboratory equipment, I am sure I didn't understand a full sentence he said for more than 6 months, but we manage to work together and I both learned from him and helped him at times find his way through campus procedures at Michigan State. Years later when I visited him at the Rudjer Bošković Institute, a much smaller place where everyone seemed to know each other, I understood how his MSU experience took some adjustment.

Jerry D. Cohen

Dr. Volker Magnus came to my laboratory in response to our mutual interest in conjugates of indole-3-acetic acid. He proved to be a wonderful person, a wonderful

chemist and a wonderful colleague and friend. We wanted to know where the hormone (IAA) was, how much of it there was, and its chemical form. We soon found that it was impossible to obtain an accurate analysis of how much hormone there was without an internal standard. Indole-3-acetic acid (IAA) has pi bonding electrons and is easily lost owing to binding to plant constituents or even to binding to glassware and is also subject to oxidative destruction during the assay. Volker provided us with that internal standard as 4,5,6,7-tetra-deutero IAA. This could be added to the plant extract and then losses of IAA could be corrected for by measurement of the endogenous IAA and the d-4 IAA by means of mass spectrometry. This was a difficult synthesis and Volker accomplished it. He was modest and quiet and a highly skilled worker. I found out later that he was also a naturalist, a fine cook, and, of course an excellent chemist. I grieve for the loss of this wonderful human being.

Robert S. Bandurski

Volker's research in the Bandurski lab concerned development of a gas chromatography-mass spectrometry based isotope dilution assay for the plant hormone indole-3-acetic acid (IAA). To this end, he combined his knowledge of plant indoles with his formidable knowledge of synthetic organic chemistry, to produce two deuterated forms of IAA with the labels on the ring (Magnus and others 1980) where they did not exchange during isolation procedures (Caruso and Zeisler 1983). Thus, Volker provided the auxin field with its first quantitative GC-MS isotope dilution based assay. This procedure, although now practiced more often with the ring $^{13}\text{C}_6$ -compound that has become commercially available, remains the *sine qua non* of procedures for quantitative measurement of auxin in plants.

Upon finishing his work on the deuterated IAA, he returned to Rudjer Bošković Institute where he worked for his entire career as a scientific investigator. However, he maintained excellent contacts with the colleagues he met during his time away. He continued to use his visits to both the US and later to Goran Sandberg's laboratory in Umea, Sweden to take on projects that required access to facilities more difficult to obtain at home. He returned, for example, to Michigan State in 1982 and remained there, working with Norman Good and Roger Hangarter on use of IAA-conjugates in tissue cultures (Magnus and others 1992a, b), until 1985.

Volker's knowledge of chemistry as well as plant biology had always allowed him to connect with the physical scientists at his institute. Although he preferred to be referred to as a botanist, his chemical knowledge was excellent. Upon his return from Norm Good's lab he published a number of papers on structure/activity relationships with Dr. Biserka

Kojić-Prodić, an X-ray crystallographer at the Rudjer Bošković Institute. Together they published 3 series of papers, first on IAA amino acid conjugates (Duddeck and others 1989; Kojic-Prodic and others 1991, 1993), then on *n*-alkyl-substituted IAAs (Ilic and others 1991; Kojic-Prodic and others 1991; Nigovic and others 2000) and finally on a series of halogen-substituted IAA compounds (Antolic and others 1996, 1999). These papers represent the most comprehensive study of the 3-dimensional characterization of active and inactive auxin-like molecules in the literature.

The years 1991–1995 were traumatic times in Yugoslavia and Croatia and science was secondary to the other events of the time. Volker, although resident in Zagreb since starting college, was never-the-less a German in the middle of another land's civil war. He used this time productively (and likely was safer for it) by taking a scientific leave to work in the Sandberg lab in Sweden from 1991 to 1993 (Jakas and others 1993; Ilic and others 1997) and then moving to Mark Brenner's laboratory at the University of Minnesota in 1993 to work on studies of 4-Cl-IAA in pea with Dennis Reinecke and Jocelyn Ozga (Reinecke and others 1995; Magnus and others 1997) until things had quieted down at home in 1996. He also sent his graduate student, Nebojša 'Neb' Ilić, to his long-term collaborator in the United States, Jerry Cohen, and Neb earned his Ph.D. at the University of Maryland during that period. Upon returning to the Ruđer Bošković Institute, Volker established the Laboratory of Chemical Biology at the Department of Molecular Biology.

Volker introduced me to the science, from the first step on how to wash the lab dishes to the multi-step synthesis of isotopically labeled compounds and how to interpret NMR data. The best chemist I knew, even he always corrected me that he is a biologist. My scientific father and dear friend. I will miss him so much. A shot of plum brandy and Brahms' 'Ein Deutsches Requiem' for you my friend. Salute.

Neb Ilić

More recently Volker's interests had become focused on using advanced methods for auxin localization, from the production of a new novel class of antibodies based on linking ring-aminoalkyl substituted IAA to proteins (Ilic and others 2005; Šoškic and Magnus 2007; Tomašic and others 2007), to the use of carbon nanotube microelectrodes to record auxin flux (Mancuso and others 2005).

As a plant biologist, Volker was also interested in plant physiology and hormonal regulation of plant growth and developmental processes. During the last decade, for example, he became actively involved in research on the potential role of plant hormones in the regulation of post-anthesis development of the Christmas rose (*Helleborus niger* L.) flower (Salopek-Sondi and others 2000, 2002; Tarkowski and others 2006; Salopek-Sondi and Magnus

2007), an excellent model for understanding cellular control of plastid development.

I had the honor to work with Volker later during his career, when I spent some time in Zagreb, even though I met him in the 1990's in Jerry Cohen's lab. The collaboration started with another group of conjugates, namely with my favorite auxin, indole-3-butyric acid (Campanella and others 2004; Savic and others 2009). It was a great pleasure science wise but also with respect to his ability to be a wonderful host. My memories range from wonderful dinners to walks in one of Zagreb's many parks, which he as a nature loving person knew quite well. He must not have told anybody that he felt sick because it came as a shock for all of us when we heard that he was in hospital and died about one month later.

Jutta Ludwig-Müller

I didn't have the opportunity and the pleasure to work with Volker but I also met him in the 1990s during one of my visits in Jerry Cohen's lab. At that time, I already knew him by reputation and I still remember when I first met him during a party in Neb Ilić's house in Beltsville, how shy and, at the same time, excited I was, since compared to him, I felt scientifically very "young". Although he was a very quiet man, he made me feel comfortable talking with me very friendly, showing interest in my work and especially encouraging me to continue my research. I was very pleased and honored to know him personally since his interesting research and discoveries already cited by other friends, have been important milestones in my scientific career on IAA physiology and biochemistry.

Rita Baraldi

I met Volker in 1993 when I started my career at the Ruđer Bošković Institute as a PhD student under Volker's supervision. Since then we were working together on several topics. One of our favorite projects was research on an unusual plant, Christmas rose (*Helleborus niger* L.) whose beautiful white flowers became green and photosynthetically active only upon fruit development. The most enjoyable moments of our collaboration were field trips in the forests of Gorski kotar where we were collecting plants, and at the same time, observing many other plant species. Volker was a passionate naturalist, a very good botanist and a real plant lover. We have assumed that plant hormones synthesized in the fruits may be signaling molecules that regulate post-anthesis flower development, and through years, in collaboration with colleagues from abroad, published several papers on that topic. One of those papers was just accepted for publication (Ayele

and others 2009) and I am tremendously sorry that Volker did not have the chance to celebrate it. Volker was dedicated to science until the end of his life. Although retired in 2008, he was coming to the laboratory every day; doing research, writing, and discussing problems with young colleagues. Even in the hospital, he told me: "I miss the lab. Bring me something to work," and he corrected one of our last manuscripts. He was my mentor, teacher, and in the last years, my big support and dear friend. I miss him.

Branka Salopek-Sondi

Volker was a unique scientist who made important contributions, both at home and on his many trips abroad, which have shaped the field of plant hormone research in the 21st century. He was a model collaborator and a wonderful mentor to students who worked under his guidance. His thoughtful approach and dedication to science, his friendship and collaborations with many colleagues, as well as his truly unique personality made him a very special person who will be missed.

Robert S. Bandurski

Rita Baraldi

Jerry D. Cohen

Nebojša Ilić

Jutta Ludwig-Müller

Lech Michalczuk

Branka Salopek-Sondi

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