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Editorial

Thanks to Mr. Sialic Acid

Dr. Roland Schauer's research activities span about four decades and he is still highly active. For 35 of these years, his research has been dedicated to sialic acids, their special structural properties, their unique metabolic pathways and their diverse biological functions. His seminal contributions to this area in glycobiology have made him well-known as "Mr. Sialic Acid" and not only for "glyco" insiders. Certainly, his significant impact can be deduced from his well over 300 scientific publications (by the end of 2001 and more to come). However, this would not do justice to his efforts to advertise the importance of sialic acids. His more than 70 reviews, many of which are fundamental references in sialobiology and well cited in all areas of life sciences, his monograph on sialic acids and almost 200 lectures document his activities as an advocate for sialo-(and glyco-) biology.

Roland Schauer studied medicine and biochemistry at Tübingen University until 1966. Then as a postdoctoral fellow he moved to Bochum University in the laboratory of Prof. H. Faillard, where he directed his research towards sialic acids. At that time little was known about the structural diversity of these monosaccharides, not to speak of their metabolism or even their functions. All this attracted his scientific interest which has not diminished to the present day. He developed the necessary tools, such as synthetic precursors for metabolic labelling, analytical procedures and the application of surviving slices to tackle the open questions. In addition, he maintained throughout his research, a strong interest in the chemical analysis of the sialic acids which proved to be a vital element in the biochemical approaches to metabolic studies. Within a few years, he demonstrated the existence of several enzyme activities involved in the synthesis of *N*-glycolyl neuraminic acid and several *O*-acetylated sialic acids. These fundamental discoveries formed a solid basis for his future work. After only 3 years in Bochum, he received his *venia legendi* (Habilitation) and became a docent and later an associate professor. In 1976, Roland Schauer was appointed as full professor of biochemistry and director of the Biochemical Institute at the University of Kiel, where he has continued and expanded his productive research on various aspects of sialobiology until today. At that time, he was a well-respected scientist in the developing field of glycoconjugate research. Already in 1977 his work was cited in a textbook (Metzler; "Chemistry of the Living Cell") and scientists from all over the world came to visit him and to work in his laboratory.

His interest in the occurrence and diversity of sialic acids in nature and the enzymes involved has remained strong over all these years. Therefore, it is not surprising that almost all enzymes involved in sialic acid metabolism have been part of Roland Schauer's scientific work. After the initial discoveries of the metabolic pathways, he started the ambitious project of purifying and characterizing the enzymes involved. This has been a very difficult task, since most of these enzymes have a very low abundance, a poor stability or a complex composition. His laboratory developed several novel procedures, often based on affinity chromatography on substrates or inhibitors. Several enzymes, i.e. sialidases, could be purified or at least were sufficiently enriched for further characterization. Worldwide, until today only two enzymes modifying sialic acids, the CMP-Neu5Ac hydroxylase making *N*-glycolyl neuraminic acid and the sialate 8-*O*-methyltransferase, have been purified to apparent homogeneity by conventional protein purification techniques. Both of these enzymes were initially characterized and purified in his laboratory.

Roland Schauer was also one of the pioneers introducing gene cloning into glycobiology. His group cloned several bacterial sialidase genes and was the first to point out characteristic sequence motifs found in these enzymes which have been very helpful in identifying genes coding for sialidases and trans-sialidases. Further examples of enzymes cloned in his laboratory are the sialate lyase and the CMP-Neu5Ac hydroxylase. Already in Bochum, Roland Schauer had started to work on potential biological functions of sialic acids, i.e. he demonstrated that sialic acids also protect cells from phagocytosis by masking galactose recognition sites. In Kiel, he also expanded his research activities in this area and characterized a macrophage receptor responsible for the recognition of desialylated cells. Furthermore, he contributed to our knowledge of sialic acids as attachment sites for pathogens and endogenous receptors.

Roland Schauer's profound knowledge of sialic acids has been the basis of numerous collaborations with scientists from all over the globe seeking his advice and reagents. Therefore, it is not surprising that guests from abroad have always been a constant feature of his laboratory. This was

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strongly supported by his well-known hospitality. As mentioned above, communicating science has been important for Roland Schauer. Besides approximately 500 contributions to conferences, he has been active in organizing meetings himself. Independent of their size, all of these were very well planned providing an excellent atmosphere to communicate science and very good memories of these meetings have remained with the participants. Last but not least, it is important to mention his activities in education. Driven by his strong belief in the importance of good education, he fought for almost 20 years for a diploma course in biochemistry at Kiel University which is now up and running. Almost 100 scientists graduated from his group with a diploma, a PhD, a MD or a ''Habilitation''. Certainly, also this achievement has been beneficial for science.

In summary, without Roland Schauer's work the area of glycobiology would be much poorer and our knowledge of sialic acids would not be anywhere close to where it stands now. We all are indebted to Roland Schauer's achievements and sincerely hope that he will be able to continue his work on the many interesting questions of sialobiology for many more productive years.

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