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PREFACE

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Scattering techniques in biology—Marking the contributions to the field from Peter Laggner on the occasion of his 68th birthday

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Dear Reader,

This special issue of the *European Biophysics Journal* marks the contributions of Peter Laggner to molecular biophysics and X-ray and neutron scattering techniques on the occasion of his 68th birthday. Actually, Peter Laggner is not a person who likes to dwell in the past, or talk of the good old days. "Why look back, if one can look forward?", is one of his most popular quotes. Well, we hope that he will forgive us on this one occasion. So, let us look back and recall some of the past from a rich life with many things to remember, but, to make it bearable, we will use an element of humor.

Born in Piberbach, Upper Austria, Peter went to Graz to study chemistry and physics. During his PhD, he started with his so successful combination of small-angle X-ray scattering (SAXS), which he learned from the Austrian pioneer in SAXS, Otto Krakty, and biophysics, taught to him by Anton Holasek, then head of the Medical Biochemistry Institute, University of Graz. For his thesis on "Structure of Antigen Antibody Complexes in Solution by SAXS" Peter had an urgent need for blood. Therefore, this part of his career truly was bloody. Using his own car he would go to the slaughterhouse to fetch swine blood in buckets and then drive back to his laboratory. Occasionally blood spilled over. Who cares? In the laboratory the tedious job of precipitation and centrifugation awaited him, accompanied by anxious moments when the rotor lifted and the centrifuge started to move around. By dawn his eyes were blood-shot, but the proteins were prepared and "real science" could start.

Soon afterwards lipoproteins—high-density (HDL) and low-density lipoproteins (LDL)—caught Peter's scientific interest. Again, blood had to be isolated, and trouble started from the beginning. This time the blood had to be of human origin. Thus, healthy normolipidemic volunteers were required. By chance, PhD students were "lucky" to act as donors for Peter's blood pool, but the most fascinating thing was, however, to use one's own blood, as he always told us. Later, lipoprotein subspecies came in from John Chapman in Paris, making life much easier. However, whenever whole blood was harvested in our laboratory, Peter was among the first to put his name on the list of donors, eager to support our common efforts to solve the structure of LDL. One day, early in the morning, Peter arrived at the laboratory with a bottle of warm blood in his hands and laughed, "Hey girls, I have been at the doctor and thought I could bring you some fresh blood!", remembers Ruth Prassl. Peter's pioneering work on lipoproteins has significantly shaped our current understanding of lipoprotein structure and dynamics.

In addition to his research focus on LDL, Peter devoted a large part of his endeavor towards understanding complex biological membranes. Early on, he considered the membrane as a dynamic entity with spatial and temporal fluctuations in its local composition. So, he initiated structural studies on lipid polymorphism and domain formation, long before the term "membrane rafts" became popular. A particularly important study concerns the demonstration of chain interdigitated bilayers in ether-chain lipid membranes. He also pioneered lipid interactions with membrane-active peptides, showing that melittin from bee venom acts on membrane collective properties at concentrations as low as 1/1,000 (peptide/lipid molar ratio).

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Fig. 1 "Die 3 gegenüber im Theatercafé" discussing scientific matters. From *left* to *right*: Peter Laggner, Heinz Amenitsch, and Michael Rappolt

That certainly was not enough. Meeting Gert Rapp at the SAXS beamline at Deutsches Elektronen-Synchrotron (DESY, Hamburg, Germany), Peter began to combine the high photon flux available at synchrotron light sources with membrane structural studies near the melting transition. In the late 1980s and early 1990s, he optimized the experimental setup at the synchrotron source to be able to perform such measurements in the submillisecond time range using either an infrared (IR) laser or a pressure cell to initiate ultrafast temperature or pressure jumps. This way, short-lived intermediates could be resolved. The 1990s also marked the beginning of his efforts to realize the first Austrian synchrotron beamline at the Italian source Elettra (Trieste), just a couple of hours away from Graz, today a success story on its own. Of course, this also suited his passion for sailing, and hence experimental sessions occasionally ended on the Gulf of Trieste, sometimes in the middle of the night. Michael Rappolt remembers: "Peter was always the one pushing us to the experimental limits and usually the last one to get tired!" Curiously enough though, the after-work meetings were often the most productive. Discussing science with a handful of friends and some proper draught beers within reach, including notes scribbled on napkins and rough calculations done in the head, were the starting points of many fruitful projects. Peter would help to bring experts together whenever necessary, as for instance in the joint project combining optical tweezers with μ-focus SAXS. Figure 1 illustrates one of these get-togethers, sketched by an artist sitting on an opposite table.

Additionally, Peter always pursued the idea to market his broad knowledge in X-ray scattering and biophysics. In 1992, he was one of the cofounders and later managing director of the Austrian company Hecus X-Ray Systems, which introduced novel SAXS systems, but he also experienced the risks of such an endeavor: despite just being awarded the prestigious R&D-100 award 2011 for the first combined microcalorimetry/SAXS system, the small enterprise failed through bankruptcy and was taken over by Bruker AXS. The good news was that he became director of nanostructure solutions at the same company. So, he will still be with us in the field for several years to come.

Peter has always been good for surprises. As such, he hit us by announcing his withdrawal as director of the Institute of Biophysics and Nanosystems Research of the Austrian Academy of Sciences at the Christmas party 2011, 1 year earlier than anticipated. Meanwhile, the institute has been divided into three parts, each of which will be transferred to one of the universities of Graz. Even though this has been harsh for us, there is some good news. In Peter's own words: "Remember potatoes: They are chopped and buried

to raise new plants." This is exactly what we will do. So we recite: "Why look back, if one can look forward?"

One of the best ways to demonstrate this is the present special issue, which contains a fine selection of high-quality articles marking the contribution of scattering techniques to biological sciences. Our sincere thanks go to all contributors, as well as to Springer and to Anthony Watts, managing editor of the *European Biophysics Journal*, for making this come true. Though highly different in their individual contents, all the articles included in this issue have one thing in common: They show that scattering techniques and biophysics are fruitful partners with many future prospects.

Enjoy reading!