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Tribute to Walther Burchard

On May 15, 2005, Walther Burchard celebrated his 75th anniversary. He is an example of a scientist, teacher, and man who does not seem to have changed a bit since he supervised us during the course of our PhD theses, some 25 years ago. He is as lively a person as ever, optimistic and cheerful. With him being as active in science as at the beginning of his career, this is not the time for us to sum up his oeuvre, but just to make a provisional appraisal! Born on May 15, 1930, in Poznan, Poland, he spent his early childhood in Berlin. From there his family moved to East Prussia, at that time the most eastern province of Germany. Here, he spent most of his youth among five brothers and sisters. The events of 1945 set an abrupt end to this period of his life. Driven by the turbulences of war, his family was swept to Detmold in western Germany. At the center of these events was the flight along the coast of the Baltic Sea on deck of a ship in late winter.

After finishing school, he studied physics in Marburg and Freiburg, where he performed a Diploma Thesis on Nuclear Physics. Attracted by the emerging field of polymer science, he joined the group of Professor Elfriede Husemann (affectionately known as "Husefrau"), who, in turn, had graduated under the supervision of Professor Hermann Staudinger. Continuing this line, he devoted his early research to the dilute solution behavior of water-soluble polymers, applying viscosity and static light scattering experiments. Accordingly, his Habilitation was entitled "Untersuchungen an Polyvinylpyrrolidon in Lösung". As one remarkable result, he succeeded in establishing a procedure to extract unperturbed dimensions from molecular weight dependent viscosity experiments performed under good solvent conditions.[1] The findings inevitably brought him in touch with Walther H. Stockmayer working on the same problem.[2] The result was not only the "Burchard–Stockmayer–Fixman plot" but also a long-lasting deep friendship between both scientists.

In 1961 he got married to his wife Else-Marie. Their two daughters meanwhile have become scientists as well, Almut a professor in mathematics in the US and Angela a physicist in Germany. We are sure that their

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parents are delighted not only by their careers but also by having become grandparents only recently!

The work with polysaccharides and derivatives thereof led him to attack three different aspects of single chain behavior: chain stiffness, excluded volume effects, and branching. A sabbatical leave in 1968−1969 under a Royal Society grant took him to the University of Essex, where he worked with Manfred Gordon. During this stay, he applied the technique of moment-generating functions to predict the scattering behavior of branched macromolecules, among them nonrandomly branched polycondensates[3] and regularly branched "soft spheres"[4] which, a decade later, were reinvented by organic chemists as hyperbranched macromolecules or dendrimers, respectively. As a result, he did not only calculate particle scattering functions but also taught us how to best differentiate between various branched structures. Theoretical calculations were elegantly supplemented by the appropriate experiments conducted in his group.

Working on branched macromolecules inevitably led him to the problem of gelation and related critical phenomena occurring in both synthetic and biological networks. One of us has witnessed the vigorous struggle between Dietrich Stauffer and Walther Burchard on mean-field versus percolation theory, which took a preliminary end by jointly signing an armistice agreement on "the war between chemists and physicists"—battlefield gelation—in Walther's living room. Later, Dietrich Stauffer called this agreement "ein fauler Frieden".

In the late 1970s, Walther Burchard was among the first in Germany to experimentally establish dynamic light scattering in his lab. It was at that time, in 1978−1979, when Walter H. Stockmayer stayed at the Institut für Makromolekulare Chemie in Freiburg as a Humboldt-Price Winner. The resulting cooperation between the two scientists focused on the calculation of the dynamic structure factor of linear and branched polymers. Soon Walther began to realize the power of simultaneously recorded static and dynamic light scattering which resulted in the construction of an instrument capable of providing both types of information from the same experiment. Again, the cooperation between Stockmayer and Burchard propelled further developments in this field. Work was motivated by the benefits of comparing simultaneously measured hydrodynamic radii and radii of gyration. More recently, his interest turned toward the properties of concentrated solutions, testing the predictions of scaling and renormalization group theory and to surfactant solutions.

Given the time, Walther's research could be considered as truly interdisciplinary in combining polymer physics with synthetic chemistry and in dealing with synthetic as well as with biological systems. Above all, these diverging topics are held together strongly by the aim to resolve polymeric structures with scattering experiments.

He not only has been and still is an outstanding scientist but also was equally capable of passing his enthusiasm on to his students. This became evident from his lecture courses in polymer science, which were brilliant in the way he taught fundamental principles as well as in his manner to consider modern aspects. A course on scaling concepts in polymer physics based on de Gennes' book only a few years after its publication was an unforgettable source of new and exciting knowledge to us. Just as important as his teaching skills was him acting as a patient and excellent supervisor: continuously in touch with his students, ready to listen with interest whenever they reported on their latest experiments, and always giving inspiring advice.

We still remember the days during our time in his group. Two coffee breaks, one after 10:00 and a second after 4:00 (frequently at his home with delicious cakes), were a welcome break of our work and offered a chance to talk about the latest developments in politics as on the most recent results from research. Aside from the direct scientific inspiration, he always took care to introduce his students to the scientific community. Whenever possible and appropriate, he offered his students the chance to accompany him to scientific conferences. Whenever he had foreign scientists as his guests, he introduced us and always encouraged exchange of results and ideas. Almost needless to say that he was a host to countless scientists from all over the world, among them many giants in the field. Frequently, lectures from invited speakers were appropriately concluded with a dinner and one or more "Badische Viertele" in one of the many "Landgasthäuser" typical for the area around Freiburg. Lively discussions, not only about science, made those get-togethers extremely entertaining and educational.

Walther Burchard has published about 250 papers and continues to be scientifically very active. Although according to German regulations he had to formally retire 10 years ago, he has successfully ignored this fact in practice. Being recently asked about his daily schedule, the answer was "I have much less time than I used to have before retirement. Because I do not supervise PhD students anymore, I have to do the experiments now by myself". There is little to add, except that we anticipate new and exciting results from him, rely on his advice, and always look forward to meeting him in Freiburg or anywhere at a scientific conference!

We congratulate him on the occasion of his 75th birthday and wish him all the best for his future!

References and Notes

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