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Foreword

Prof. Volker Schurig's 70th birthday

On February 16th this year, Prof. Volker Schurig, one of the pioneers of enantiomeric separation has celebrated his 70th birthday. As former student, it is my pleasure to extend my heartfelt congratulations. As so many things in scientific research, Volker Schurig's involvement in chromatography started in 1969 by mere coincidence. After completing his entirely inorganic Ph.D. thesis at the University of Tübingen, in the group of Ernst Bayer, working on 'Nitrogen-Fixation and Reduction to Ammonia with Organometallic Catalysts' in 1968 he was offered a postdoctoral position by Emanuel Gil-Av from the Weizmann Institute of Science in Rehovot, Israel. Intrigued by the topic of enantiomeric separation, he immediately accepted. After all, the first example of a fully reproducible enantioseparation of derivatized amino acids was only published two years earlier by Gil-Av et al. At that time many scientist doubted the use of separating 'identical compounds such as optical isomers'. Undoubtedly, this changed no later than the thalidomide tragedy in the 1970s. Volker Schurig started to try to separate chiral olefins on optically active metal coordination compounds, a technique which he coined with the name enantioselective complexation gas chromatography. Unfortunately these early attempts remained unsuccessful. Still, unwilling to give up, he followed an invitation by Albert Zlatkis to continue his investigations on enantiomeric separation in Houston, Texas, in 1971. After returning to the University of Tübingen in 1972 it took another three years of research until the first enantiomeric separation by complexation gas chromatography could be achieved [1]. The smallest chiral olefin 3-methyl-cyclopentene was separated on a chiral rhodium(I) coordination complex (dicarbonyl-rhodium(I)-3-TFA-(1*R*)-camphorate) dissolved in squalane [2]. An interesting side-product of this first investigation, relevant to solid-state stereochemistry, was the finding of the chiral rhodium(I) complex exhibits chirodichroism. While the racemic dicarbonyl-rhodium(I)-TFA-(1*R*,1*S*)-camphorate was a red–green dichroic solid, the enantiomers of the same complex were yellow. When the yellow crystals of the *R* and *S* enantiomers were mixed, the red color of the *R*,*S* racemate was gradually formed in a solid state reaction. At this time he also developed chiral lanthanide shift reagents for chiral differentiation of olefin metal π-complexes [3–5] and together with E. Bayer novel polymer-supported metal complexes for homogeneous catalysis and membrane techniques [6].

In the following years the scope of enantioselective complexation gas chromatography was gradually extended to chiral oxygen-, nitrogen-, and sulfur-containing racemic compounds using various 1,3-diketonate *bis*-chelates of manganese(II), cobalt(II), and nickel(II) derived from perfluoroacylated terpene ketones [7–9]. As analytes he chose the smallest class of chiral compounds, such as aliphatic aziridines, oxiranes and thiiranes. This technique also allowed to study enzymatic and metal-catalyzed asymmetric epoxidations [10,11] and to further discover the main principles of enantioselective chromatography [12–19]. The discovery of processes such as enantiomerization, enthalpy/entropy compensation or various peak coalesence phenomena [20,21] are owed the intensive investigation of the system chiral oxirane/chiral metal coordination compound [22]. Another breakthrough for enantioselective chromatography was the development of immobilized polymeric stationary phases (Chirasil-Metal) [23,24]. These allowed for a greater thermal stability and wider applicability, e.g. in SFC or OTLC.

Later other polysiloxane-mediated chiral selectors such as Chirasil-Dex [24–26] and mixed phases comprising of amino acids and modified cyclodextrins [27–29] were developed by Schurig and other groups [30,31] which lead to the great success of chiral chromatography and electrophoresis [32] including a unified enantioselective approach [33].

The discovered dynamic behavior of interconverting enantiomers, which gives rise to characteristic peak profiles exhibiting peak distortion and plateau formation (enantioselective dynamic chromatography [34]), was one of Volker Schurig's earlier discoveries during the enantiomeric separation of aziridines [35]. Volker Schurig felt, that this phenomenon should be used not only to detect stereolabile molecules but also to determine kinetic acti-

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vation data. With the fast improvement of computation capacity, this challenge became within reach, and eventually the programs SIMUL [36] and later ChromWin [37] were developed in his group. At this point Volker Schurig became mentor for my Ph.D. thesis. Working for him was challenging, while having the freedom of being able to work independently in a creative and relaxed atmosphere. He constantly developed new ideas and concepts which should be incorporated in the project. Eventually, this lead to a great success and a broad applicability of the developed computer programs which are widely used, even today. This project, as well as the development of stopped-flow multi-dimensional gas chromatography [38], was also stimulated by the new legislative demands of the drug registration offices, such as the American FDA, who now, after the experiences with thalidomide, require the assessment of the stereochemical integrity of the drug substance. In recent years these techniques were extended to SFC, OTLC and CE and the interconversion barriers of various drugs and other substances [39–41] could be determined (thalidomide [42], benzodiazepines, polychlorinated biphenyls [43], aziridines [44]. . .).

Volker Schurig also fostered many international cooperations within the 'chiral community' which led to innovative approaches in many fields. He was for many years member of the international scientific committee of the highly successful Chirality conferences (International Symposia on Chiral Discrimination) and also organized the 3rd International Symposium on Chirality in Tübingen in 1992.

Volker Schurig's contributions have been recognized by many awards, the latest and most prominent being the Chirality Medal and the M.J.E. Golay Award and Medal of Chromatography both in 2004. He also served as founding editor of Enantiomer – a Journal of Stereochemistry and coeditor of Journal of Chromatography A as well member of the editorial boards of Chirality, Microcolumn Separations, and Electrophoresis.

I want to renew my very best birthday wishes for good health, happiness and success. I am sure that his former students and readers of this journal join me in this proposition.

Happy birthday to Volker.

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Heidelberg, Germany Oliver Trapp