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Chemistry in Swiss Academia

Spring Meeting 2001 of the New Swiss Chemical Society

March 30, 2001 in Neuchâtel

Reinhard Neier*

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Almost 300 Chemists from All Parts of Switzerland Celebrated the 100th Birthday of Their Society

On March 30th 2001 almost 300 chemists from industry and academia participated in the Spring Meeting 2001 organized in the Aula des Jeunes Rives in Neuchâtel. The meeting marked the 100th birthday of the Swiss Chemical Society. The Society was founded in Zofingen in 1901 and nominated, as its first President, Alfred Werner, Nobel Prize winner for his fundamental work on coordination chemistry. During its 100-year-old history, seven members of our society have won a Nobel Prize: Professors A. Werner, P. Karrer, L. Ruzicka, T. Reichstein, V. Prelog, R. Ernst and Dr. P. Müller. Thus, it was with emotion and respect that the president of the society, Luzius Senti, opened the official part of the symposium.



Dr. Luzius Senti, president of the New Swiss Chemical Society, opens the Symposium.

The organization committee, composed of Alex von Zelewsky from Fribourg, Raffaele Tabacchi and Reinhard Neier from Neuchâtel, had *dedicated the meeting to the memory of Otto Billeter, professor of chemistry in Neuchâtel for 50 years (1875–1925)*. Otto Billeter had been one of the founding fathers of the Swiss Chemical Society together with Alfred Werner (University of Zurich), Eugen Bamberger (ETH-Zurich), and Amé Pictet (University of Geneva) 100 years ago. He had also launched the initiative, as the second president of the Society between 1903 and 1904, to start the series of Spring meetings, dedicated to

important scientific developments. It was a lucky coincidence that the 100th birthday of the Society corresponded to the 125th birthday of the first correct description of an electrocyclic process by Otto Billeter in his Ph.D. thesis. The astonishing story of this important discovery has been beautifully described by Hans-Jürgen Hansen in two recent articles in CHIMIA (*Chimia* **1999**, 53, 163–173 and *Chimia* **2000**, 54, 105–119). In view of these two events, which are intimately connected with the person of the late Otto Billeter, it was an extraordinary event, when the president of the Society was able to greet Jeanne Billeter, the last representative of the Billeter family living in Neuchâtel.

Chemistry from Catalysis to Evolution in the Test Tube

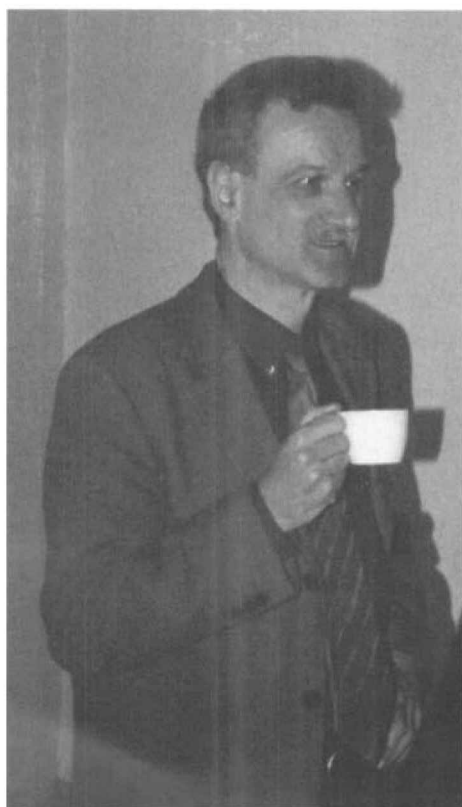
The scientific program of the symposium had been arranged to give a glimpse of the chemistry undertaken in Swiss academia. It was the intention of the organization committee to present the directions of research chosen by professors recently nominated at different universities around Switzerland. The subjects treated spanned the whole breadth of chemistry from artificial evolution in the test tube to laser photochemistry and spectroscopy of isotopomers. As the subjects chosen were widely different so were the methods used for the presentation. The whole selection of possibilities were used: transparencies, slides, projections with or without animation using

*Correspondence: Prof. Dr. R. Neier
Université de Neuchâtel
Institut de Chimie
Avenue Bellevaux 51
Case postale 2
CH-2007 Neuchâtel
Tel.: +41 32 718 24 28
Fax: +41 32 718 25 11
E-Mail: Reinhard.Neier@unine.ch

the computer and a beamer. The chosen method of presentation was always in complete agreement with the subject chosen by the speaker and his personality. During the lunch break two speakers managed even to transfer data and a program from one personal computer to the other, so that the latest technical possibilities could be implemented on the spot. It was certainly an immense satisfaction to Tom Rizzo and Andreas Plückthun to collaborate successfully, despite the stress which is inevitable during such a symposium.

The scientific program was divided into three parts. The first three speakers made a perfect introduction to the fields of catalysis, molecular recognition, bio-organic chemistry and life sciences.

Prof. *Andreas Pfaltz* (University of Basel) started this session presenting a wealth of results on asymmetric catalysis. There is no doubt that asymmetric catalysis is an important field scientifically as well as industrially. The Pfaltz group has been a leader in this field for almost 20 years and the large experience and the knowledge accumulated during this period has become a major factor for the success of the research efforts of the Basel group. It is always impressive how a combination of mechanistic arguments, structural analysis and systematic studies leads to major progress.



Prof. Andreas Pfaltz from Basel, the first speaker of the Symposium.

Prof. *Robert Häner* (University of Bern) presented the challenges of the anti-sense approach. His group has worked systematically towards the goal of obtaining compounds which combine selectivity, with the capacity to cut double-stranded DNA. It became clear that a combination of chemical and biochemical techniques are necessary for success. Structural information has to be adequately introduced in order to rationally achieve progress.



Prof. Robert Häner from the University of Bern during his lecture.

Prof. *Andreas Plückthun* (University of Zurich) was the final speaker of the morning. He gave a very convincing introduction on how to utilize Nature's translation system, the ribosome, for *in vitro* evolution. One of the key features of this approach is the capacity to fool the ribosome in such a way that the genotype (= the coding RNA-molecule) and the phenotype (= the produced protein) are physically joined together on the ribosome. Once this goal has been achieved,



Prof. Andreas Plückthun from the University of Zürich, fully concentrated on his presentation.

techniques like reverse transcription and error-prone PCR allow the genotype to be multiplied and mutations and libraries to be obtained. These sophisticated techniques enable evolution to be carried out in the test tube. Stringent selection conditions can be used to improve properties such as stability, binding, activity or the folding capacity of a protein. At our level of understanding this evolutionary approach, which allows several rounds of evolution to be obtained in the test tube within a few days, is the fastest way to achieve this progress. The long-term goal of this research is clearly to obtain information from this evolutionary approach to develop the theoretical approaches to engineer proteins at will.

Synthetic Methodology and Sophisticated Analytical Methods

The first afternoon session was chaired by Prof. Raffaele Tabacchi, who introduced the three speakers, Prof. Eric Carreira from ETH Zurich, Prof. Philippe Renaud formerly from Fribourg and since the 1st of March at the University of Bern, and Prof. Reto Zenobi from the ETH Zurich.



Prof. Raffaele Tabacchi, Neuchâtel

Prof. *Eric Carreira's* (ETH Zurich) lecture was under the sign of simplicity, which, as he mentioned in the beginning, is difficult to achieve. The goal of his research project is to develop relevant transformations which are simple enough to be easily applied in industry. Many methods have been developed in academia especially to form carbon-carbon bonds, but many of them use either elements which are not compatible with the restrictions of an industrial produc-

tion or the needed reaction conditions are too expensive to be used in large-scale production. The use and catalytic activation of acetylenes by zinc triflate has been developed in Professor Carreira's group so as to obtain important building blocks in an enantiomerically pure or enriched form.



Prof. Eric Carreira from the Laboratory of Organic Chemistry, ETH Zürich, presents his results.

His beautifully structured lecture was followed by the equally impressive presentation of Prof. *Philippe Renaud* (University of Bern) on the use of radical chemistry in synthesis. He presented three beautiful examples of the application of radical chemistry towards synthetic problems. The first example was perfectly ap-



Prof. Philippe Renaud, now at the University of Bern, concentrating on his lecture entirely devoted to radical chemistry and its applications

propriate for this symposium honoring the discovery of the first sigmatropic rearrangement by Billeter. He described a radical pathway which is equivalent to an oxy-Cope rearrangement. The pathway is stepwise and obviously different from the electrocyclic pathway of the Cope rearrangement. The second example was the demonstration of the use of a radical-induced fragmentation process. Finally he presented a radical-induced introduction of amino functions *via* radical methods.

The last lecture from Prof. *Renato Zenobi* (ETH Zurich) demonstrated the importance and the astonishing potential of modern analytical methodologies. Taking the MALDI-TOF MS as an example, a wide variety of problems ranging from the ageing of furnaces of paintings to the analysis of proteins can be analyzed using the appropriate method. The lecture presented an intimate correlation between fundamental research and applied research.



Prof. Renato Zenobi, Laboratory of Organic Chemistry, ETH Zürich, at the beginning of his lecture on recent developments and the use of MALDI-TOF MS in analytical chemistry.

Fundamental Photochemistry and the Application of Lanthanide Complexes in Material Sciences

The last part of the Spring Meeting was chaired by Prof. Alex von Zelewsky, who as past president expressed his greetings to Luzius Senti, the last president of the New Swiss Chemical Society.

Professor von Zelewsky was also able to convince the audience that the name New Swiss Chemical Society had its own merits. He then introduced to two last speakers of the day, both coming from the arc lémanique: Prof. Tom Rizzo from the EPFL and Prof. Claude Piguet from the University of Geneva.



Prof. Alex von Zelewsky, University of Fribourg, during the presentation of the last two lectures.

Prof. *Tom Rizzo* (EPF Lausanne) introduced the notions of highly advanced photochemistry and photophysics in a very convincing way. Using all the modern techniques to illustrate complex physical behaviors he focused the attention of the audience to the central points of his complex studies and he could show how order could be created from chaos.



Prof. Tom Rizzo, EPFL, continues his discussion during the aperitif.

The final scientific highpoint of the day was the presentation of Prof. *Claude Piguet* (University of Geneva), who demonstrated convincingly that the adequate choice of ligand structure allows the photochemical and electrochemical proper-

ties of the lanthanide complexes to be influenced that he and his group had synthesized. The goal of these studies is to obtain intelligent materials for applications such as switches.



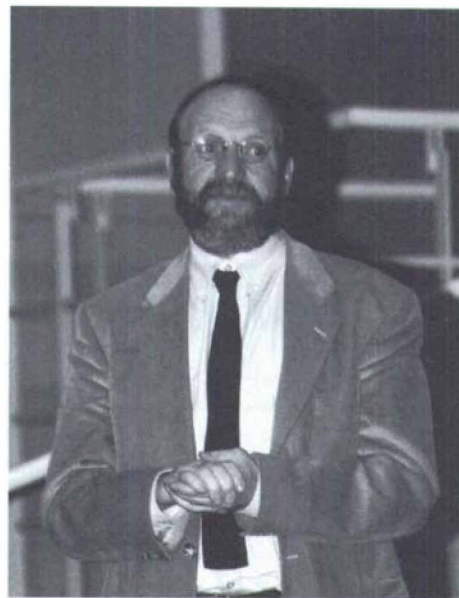
Prof. Claude Piguet, University of Geneva, demonstrates the use of lanthanide complexes in material sciences.

Closing Remarks

It was obvious to everyone at the symposium that there was a lot more to the science presented than can be covered in any one lecture. But as the goal of this symposium had been to present a cross-section of chemistry in Swiss academia there was not the time to go more into the details. However it was impressive to see during this one-day meeting how knowledge in one field was used and applied in a completely different context by another speaker. Lanthanide complexes *e.g.* appeared twice, once as the cutting 'head' in the lecture of Prof. Häner and then in the lecture of Prof. Piguet in their applications for material science. The goal of this symposium to show the breadth and the interconnectivity of today's research in chemistry was certainly achieved.

The day ended with a warm welcome pronounced by Mr. *Jean-Daniel Perret*, representing the University in the Canton of Neuchâtel, who described the importance of the University for the Canton and who then invited all the participants to profit from the *apéritif* offered by the Canton to the participants. The day

hopefully convinced the participants that chemistry in Swiss academia is healthy, but also that the Society is full of life, so that it is worthwhile for chemists to be or to become members of our Society.



Jean-Daniel Perret, the representative of the University of Neuchâtel, welcomes all the speakers and participants to Neuchâtel.

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4th Lausanne Conference on Bioorganic Chemistry, March 8/9, 2001

Institute of Organic Chemistry, University of Lausanne

For the fourth time, the Lausanne scientific core community, augmented by a considerable number of regular scientific guests, focused interest onto topics in bioorganic chemistry. Highly ranked speakers from Europe and overseas accepted invitations, and allowed younger scientists to participate and communicate interactively. And again *Manfred Mutter*, who together with *Pierre Vogel* and *Gabriele Tuchscherer* organized the meeting, welcomed a particularly large and eager audience of well over 200 scientists in an auditorium generously decorated with forsythia.

'Molecular Recognition' is the keyword for a long-standing endeavor of

Prof. *François Diederich*, ETH Zürich, to understand host-guest interactions at a high level of molecular perception. This endeavor is by no means confined uniquely to the ivory tower of purely academic research, but perfectly well suited to shape up pharmaceutical research programs. By means of two examples of a fruitful collaboration with F. Hoffmann-La Roche Ltd., the design of thrombin inhibitors as well as bisubstrate inhibitors of the (*S*)-adenosylmethionine (SAM)-dependent enzyme catechol O-methyltransferase (COMT), he convincingly demonstrated the power of rational drug design. This process is, of course, the more promising, the more structural in-

formation on a particular receptor is available, preferably at the resolution of an X-ray structure. By thoughtful computer-assisted design, the extent of structural information can be complemented, and the convergence of a lead-finding process further enhanced when taking into consideration first-order determinants of intermolecular interactions such as multiple hydrogen-bonding, aromatic stacking, edge-to-face interactions or fluorophobic/fluorophilic effects.

As Prof. *Franz P. Schmidtchen* of the TU München explained in the following lecture, co- or posttranslational decoration of peptides and proteins with non-proteinogenic moieties like saccharides,