

## Peoffesor Kjell Undheim

### A Tribute



Kjell Undheim obtained his B.Sc.Tech.(Honours) in Industrial Biochemistry at UMIST, Manchester, England in 1956, and was awarded a Parke Davis Fellowship for Ph. D. studies in organic chemistry under the supervision of Professor H. N. Rydon at UMIST. When Professor Rydon moved to University of Exeter in 1957, Undheim went with him to complete his Ph.D. studies in Exeter in early 1959. Subsequently, in 1973 he received the D.Sc. degree from the University of Exeter. He also holds the dr.philos degree from the University of Oslo, Norway.

He joined the group of Professor Carl Djerassi at Stanford University, California, for his postdoctoral training in 1959. After one year he was employed as a research chemist at Geigy Pharmaceuticals, New York; in the Astra Laboratories in Södertälje, Sweden, and at Nycomed in Oslo, Norway, before joining the Chemistry Department, University of Oslo in late 1965 as an Associate Professor. In 1970 he was appointed Professor in pharmaceutical organic chemistry at

the Institute of Pharmacy, University of Oslo, but two years later he was appointed Professor in organic chemistry at the Department of Chemistry and returned to the organic chemistry section where he has been working since.

Sabbatical leaves have been spent with Professor Barry Trost, then at the University of Wisconsin, Madison, USA; with Professor Teruaki Mukayama, then at University of Tokyo, Tokyo, Japan; and with Professor Desmond Brown, Australian National University, Australia.

Undheim is a member of The Norwegian Academy of Technical Sciences.

During all his university career Undheim has worked in close contact with pharmaceutical industry and fine chemical companies, frequently on collaborative projects. Besides publications, the collaborative work has resulted in a number of patent applications. On leave from his University, he was for a few years Director of Medicinal Chemistry at Bioreg, a Nycomed company with emphasis on immunology modulators.

More than 300 publications have come out of the Undheim research group. The group has hosted a great number of postdoctorals and many students have received the M.Sc. and Ph.D. degrees under his supervisions. Several of his former students have become professors in Norway. In exchange programs with Universities in Cairo, Egyptian postdoctoral students have since become professors in Egypt. Another collaborative site has been the University in Iasi, Romania, where several of the staff members in organic chemistry have received research training in his group in Oslo.

Undheim is an author of chapters in handbooks and encyclopedia. He authored the Chapter on «*Five-membered Rings (One Oxygen or Sulfur and At least One Nitrogen Atom) Fused with Six-membered Rings (At least one nitrogen Atom).*» in the first edition of *Comprehensive Heterocyclic Chemistry* (A. R: Katritzky, C. W. Rees). In the second edition, his chapter was on «*Pyrimidines and Their Benzo derivatives*». Aspects of organotitanium and -zirconium chemistry were reviewed together with coworkers in the reference work «*Encyclopedia of Reagents for Organic Synthesis*» (L. A: Paquette). The chapter on «*Heteroaromatics via Palladium-Catalyzed Cross Coupling*» in Handbook of «*Organopalladium Chemistry for Organic Synthesis*» (E.-i. Negishi) is about to be published. Reviews also include *Tetrahedron. Symposium-in-Print* articles on the applications of organometallics in synthesis and an early review together with coworker on «*Organometallics in Coupling Reactions in  $\pi$ -Deficient Azaheterocycles*» in *Advances in Heterocyclic Chemistry*.

Undheim has worked in several areas of synthetic organic chemistry starting with his initial training in heterocyclic chemistry during his Ph.D. studies on the synthesis of antifolates. Industrial work was associated with CNS active cyclic amino acid analogues, semisynthetic  $\beta$ -lactams and X-ray contrast agents. Industrial collaborative efforts have been on nucleoside and nucleotide prodrugs as antiHIV agents, metaphase arrestors for synchronization of cell division as adjuvants in treatment with cytotoxic drugs, and on aminoid structures as immune modulators.

Major efforts have been devoted to studies of gas phase structures of ionic and mesoionic molecules in the mass spectrometer, and on syntheses of betaines and mesoionic hetarenes. Early, major efforts were on development of transition metal-catalyzed cross-coupling reactions

in  $\pi$ -deficient heteroarenes. The main emphases in recent years have been on stereoselectivity in the construction of constrained or rigidified amino acid analogues and peptides, and on the stereocontrolled construction of rigidified metallocenes for stereoselective catalytic applications.

### Selected Publications of Kjell Undheim (1989 - date)

1. Efskind, J.; Rømming, C.; Undheim, K. "Stereocontrolled construction of rigid tricyclic bis( $\alpha$ -amino acid) derivatives by Ru(II)-catalyzed cascade and Diels-Alder reactions" *J. Chem. Soc., Perkin Trans. 1* **2001**, 2697.
2. Aburel, P. S.; Rømming, C.; Ma, K.; Undheim, K. "Synthesis of  $\alpha$ -hydroxy and  $\alpha$ -oxospiranes through ruthenium(II)-catalyzed ring-closing metathesis" *J. Chem. Soc., Perkin Trans. 1* **2001**, 1458.
3. Aburel, P. S.; Rømming, C.; Undheim, K. "Rhodium(II)-carbenoid C-H insertion reactions in the synthesis of  $\alpha,\beta$ -dioxospirane systems" *J. Chem. Soc., Perkin Trans. 1* **2001**, 1024.
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5. Wang, J.; Falck-Pedersen, M. L.; Rømming, C.; Undheim, K. "The Pauson-Khand Reaction in the Synthesis of Bicyclic Rigid  $\alpha$ -amino Acids". *Synth. Commun.* **2001**, 31, 1141.
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10. Sirbu, D.; Falck-Pedersen, M. L.; Rømming, C.; Undheim, K. "Palladium Mediated Substitutions and Rearrangements in Spiro[4,4]nonanes" *Tetrahedron* **1999**, 55, 5703-6712.
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12. Hammer, K.; Undheim, K. "Ru(II)-Catalyzed Ring Closing Metathesis in Stereoselective Syntheses of Constrained Homoserine Analogues" *Tetrahedron* **1998**, 54, 10837-10850.
13. Hatlelid, J.; Benneche, T.; Undheim, K. "Synthesis of Prodrugs as Bridged Nucleosides" *Acta Chem. Scand.* **1998**, 52, 1270-1274.
14. Møller, B.; Undheim, K. "Cyclic  $\alpha$ -amino Acids by Pd-Mediated Cycloisomerization and Coupling Reactions" *Tetrahedron* **1998**, 54, 5789-5804.

15. Kremminger, P.; Undheim, K. "Synthesis of orthogonally protected hydroxylated azalkene- $\alpha,\alpha'$ -bridged bis( $\alpha$ -glycine) and dihydroxylysine derivatives" *Tetrahedron Asymmetry* **1998**, *9*, 1183-1189.
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