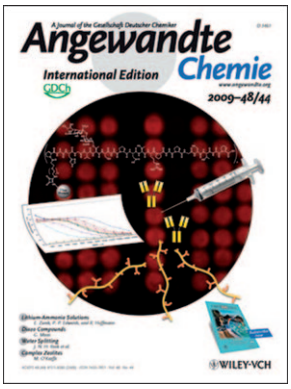
H. Kunz

*The author presented on this page has recently published his **25th** article since 2000 in Angewandte Chemie, which was also featured on the cover:*
"Tumor-Associated MUC1 Tandem-Repeat Glycopeptide Microarrays to Evaluate Serum- and Monoclonal-Antibody Specificity": U. Westerlind, H. Schröder, A. Hobel, N. Gaidzik, A. Kaiser, C. M. Niemeyer, E. Schmitt, H. Waldmann, H. Kunz, *Angew. Chem.* **2009**, *121*, 7688–7692; *Angew. Chem. Int. Ed.* **2009**, *48*, 8263–8267.



Horst Kunz

Date of birth:	December 3, 1940
Position:	Professor of Organic and Bioorganic Chemistry, Johannes Gutenberg-Universität Mainz (Germany)
Education:	1961 Humboldt-Universität Berlin (Germany) 1962–1967 Johannes Gutenberg-Universität Mainz 1969 Dr. rer. nat. with Leopold Horner, "Synthesis of Cyclic Oligophosphonium Salts and Oligophosphine Oxides", Universität Mainz 1977 Habilitation, Mentor Leopold Horner, Universität Mainz
Professional associations:	Professor C2, Johannes Gutenberg-Universität Mainz 1988 Professor C4, Johannes Gutenberg-Universität Mainz
Major awards:	**1992** Max Bergmann Medal, **1998** Corresponding member of Sächsische Akademie der Wissenschaften zu Leipzig, **2000** Emil Fischer Medal, **2001** Adolf Windaus Medal
Current research interests:	Glycopeptide chemistry; Synthetic antitumor vaccines; Synthetic sialyl Lewis X glycopeptide selectin ligands; Carbohydrates as auxiliaries in stereoselective synthesis; Total synthesis of piperidine, quinolizidine, and indolizidine alkaloids; Conjugate addition of organometallic reagents; Total synthesis of natural macrolactone products; C-glycoside synthesis.

My favorite piece of research is … to simulate and elucidate processes of biological regulation through structurally specified models.

The part of my job which I enjoy the most is … that ideas can be proven by experiments.

My favorite subjects at school were … mathematics and sport.

When I was eighteen I wanted to be … a forester.

When I wake up I … look forward to a good breakfast together with my wife.

The biggest problem that scientists face is … to let the truth always triumph over their own theory.

The biggest challenge facing scientists is … to identify an important problem and to have a good idea of how to solve it.

In ten years time I will be … hopefully a contend grandfather of clever grandchildren.

The best advice I have ever been given is … to let impetuous students have their way, as they will grow calm by themselves in the course of time.

The worst advice I have ever been given was … to exchange the diploma studies for the bachelor/master school.

The most groundbreaking discovery in science in the past 100 years has been … the quantization of energy.

My favorite science author is … Emil Fischer.

The most significant advance in chemistry of the last century has been … the elucidation of the covalent chemical bond.

The biggest problem that chemists face is … the distrust of bureaucratic institutions.

The biggest challenge facing chemists is … to remain optimistic in spite of this distrust.

How is chemistry research different now than it was at the beginning of your career?

Today most efficient separation techniques such as HPLC (for identification of products) or flash-chromatography are available for the synthesis of complex organic compounds. These methods were not known fifty years ago. In addition, NMR spectroscopy was not established in preparative laboratories, which nowadays is the most indispensable method of structure assignment and confirmation. For mechanistic interpretation of observed reactions, orbital interactions have become an enormously valuable key to understanding the effects. Orbital considerations also enable scientists to recognize relationships between apparently different reactions and, thus, distinctly facilitate the step from learning to understanding in education.

Has your approach to chemistry research changed since the start of your career?

At first, the reactivity of compounds such as acetylcholine-like esters and their effects on the mechanisms of their conversion had been the focus of interest. Subsequently, the application of the observed effects in the form of synthetic methods received increasing attention. By using newly developed protecting groups, we entered the fields of peptide and carbohydrate chemistry. Glycoconjugates, in particular glycopeptides, of increasing structural complexity became accessible and opened up the field of interdisciplinary investigations of biological recognition phenomena in cooperation with cell biologists and immunologists. On the other hand, new methodical solutions, for example, for stereoselective bond-forming reactions, emerged from the analysis of synthetic problems in demanding glycoconjugate chemistry. These new stereodifferentiating reactions proved to be efficient tools in the total syntheses of natural products such as alkaloids or macrolactones.

Has your approach to publishing your results changed since the start of your career?

About 30–40 years ago, most of our results were published in German, (e.g., in *Chem. Ber.* or *Liebigs Ann. Chem.*). Nowadays most of our research results are reported in English in different international journals. Often, we follow an invitation to publish. This opportunity had not been offered to us at the beginning.

What do you think the future holds for your field of research?

Preparative organic chemistry will remain a central field of scientific activity, and it will probably gain increasing importance. This is not only due to its significance for the productive economy but it is also because preparative chemistry is able to provide structurally exact specified model compounds of increasingly complex nature. Through analysis of their behavior, physical properties of materials or biological effects of drugs, ligands or enzymes not only can be measured, but also can be understood on the basis of their structure. In particular, the wide interdisciplinary field between structural chemistry and medicine and biology will increasingly move into the center of interdisciplinary scientific research

Have you changed the main focus of your research throughout your career and if so why?

My first steps into research were in the field of organophosphorous chemistry. Mechanistic questions soon attracted my attention. These investigations subsequently led to new protecting group methods and their application in peptide and carbohydrate chemistry. With new protecting group chemistry we ventured into (at that time) juvenile glycopeptide chemistry, which led us to the exiting field of synthetic vaccines. Dealing with carbohydrate chemistry resulted in ideas to use carbohydrates as stereodifferentiating tools in stereoselective syntheses (e.g., of alkaloids such as pumiliotoxin C and nupharamine). Our experiences in carbohydrate chemistry also initiated developments of novel reactions of organoaluminum compounds, stereoselective combinatorial syntheses on solid phases, and the use of carbohydrates as multifunctional scaffolds in combinatorial chemistry.

What has been your biggest influence or motivation?

A review by G. F. Springer (*Science* **1984**, *224*, 1198–1206), an American surgeon originally from Germany, probably had the most stimulating effect. From this article one could conclude that an immunological differentiation between healthy cells and malignant cells should be feasible by using structurally exact specified glycopeptide partial structures of cell surface glycoproteins.

What advice would you give to up-and-coming scientists?

If a carefully designed experiment does not furnish the expected, but an undesired result, one should, after the immediate disappointment, consider whether one missed some known aspects or whether this result hints to something completely new, which might be much more interesting than the original concept.

What is the secret to publishing so many high-quality papers?

Publications of high quality from universities always represent the results and efficiency of capable, clever young scientists and, of course, the spirit to enter with them as a team into unknown scientific areas.

My 5 top papers:

1. "Synthesis of *O*-Glycopeptides of the Tumor-Associated T_N and T-Antigen Type and Their Binding to Bovine Serum Albumin": H. Kunz, S. Birnbach, *Angew. Chem.* **1986**, *98*, 354 – 355; *Angew. Chem. Int. Ed. Engl.* **1986**, *25*, 360 – 362.
   This was our first paper describing a synthetic glycopeptide vaccine.
2. "Solid-Phase Synthesis of a Tumor-Associated Sialyl-T_N Antigen-Glycopeptide with a Partial Sequence of the 'Tandem Repeat' of the MUC1 Mucin": B. Liebe, H. Kunz, *Angew. Chem.* **1997**, *109*, 629 – 631; *Angew. Chem. Int. Ed. Engl.* **1997**, *36*, 618 – 621.
   In this work we achieved the synthesis of sialic acid containing O-glycopetides and their complete deprotection (see also the independent work by J. Kihlberg et al., *Tetrahedron* **1997**, *53*, 369—390).
3. "Enantioselective Synthesis of 2-Alkyl-, 2,6-Dialkylpiperidines and Indolizidine-Alkaloids through Diastereoselective Mannich–Michael Reaction Cascades": M. Weymann, W. Pfrengle, D. Schollmeyer, H. Kunz, *Synthesis* **1997**, 1151 – 1160.
   In these syntheses the carbohydrate served as the stereodifferentiating tool in asymmetric Mannich reactions and Michael additions. X-ray analysis of an N-glycosyl piperidinone precursor unequivacally gave evidence of the absolute configuration of coniine.
4. "Sulfated and Non-sulfated Glycopeptide-Recognition Domains of P-Selectin Glycoprotein Ligand 1 and their Binding to P- and E-Selectin": K. Baumann, D. Kowalczyk, T. Gutjahr, M. Pieczyk, C. Jones, M. K. Wild, D. Vestweber, H. Kunz, *Angew. Chem.* **2009**, *121*, 3220 – 3224; *Angew. Chem. Int. Ed.* **2009**, *48*, 3174 – 3178.
   In this paper probably the most difficult among a number of demanding chemical syntheses from our group is described.
5. "A synthetic Vaccine Consisting of a Tumor-Associated Sialyl-T_N-MUC1 Tandem-Repeat-Glycopeptide and Tetanus Toxoid: Induction of a Strong and Highly Selective Immune Response": A. Kaiser, N. Gaidzik, U. Westerlind, D. Kowalczyk, A. Hobel, E. Schmitt, H. Kunz, Angew. Chem. **2009**, *121, 7688–7692; Angew. Chem. Int. Ed.* **2009**, *48*, 7551–7555; *Angew. Chem. Int. Ed.* **2009**, *48*, 7551–7555.
   In this paper the most promising concept for the development of a synthetic antitumor vaccine is described, which potentially can be applied for active immunization in humans.

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