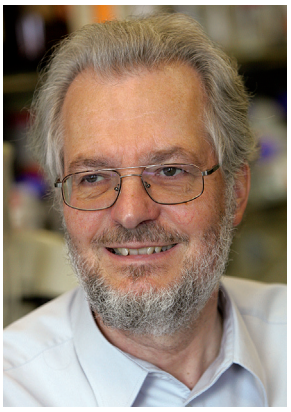

H. Kessler

*Horst Kessler was on the Editorial Board of Angewandte Chemie from 1996–2005, and was its Chairman from 2000–2003. He has published more than **25 articles** in Angewandte Chemie since 2000, most recently:* "Small Cause, Great Impact: Modification of the Guanidine Group in the RGD Motif Controls Integrin Subtype Selectivity": T. G. Kapp, M. Fottner, O. V. Maltsev, H. Kessler, *Angew. Chem. Int. Ed.* **2016**, *55*, 1540; *Angew. Chem.* **2016**, *128*, 1564.

Horst Kessler

Date of birth:	April 5, 1940
Position:	Carl von Linde Senior Fellow at the Institute for Advanced Study, Technische Universität München
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Homepage:	http://www.org.chemie.tu-muenchen.de/akkessler
Education:	1958–1963 Studies at the Universities of Leipzig and Tübingen 1969 PhD supervised by Eugen Müller, University of Tübingen 1966 Habilitation, University of Tübingen
Awards:	**1986** Otto Bayer Prize; **1988** Max Bergmann Medal; **1996** elected to the Bavarian Academy of Sciences; **1997** Emil Fischer Medal; **2001** Max Planck Award; **2002** Vincent Du Vigneaud Award; **2002** elected to the German National Academy of Sciences Leopoldina; **2002** Inhoffen Medal; **2003** Philip Morris Research Prize; **2005** Burckhardt Helferich Award; **2008** Josef Rudinger Award; **2012** Akabori Memorial Award; **2013** Meienhofer Award; **2015** Merrifield Award
Current research interests:	Medicinal chemistry: Rational design and combinatorial development of inhibitors of protein–protein interactions for the development of highly active and subtype selective ligands for medical applications and biophysical studies. Biomaterials: Surface coating of implants with receptor-selective ligands for enhanced cell adhesion is used to stimulate osseointegration. Radiodiagnosis and -therapy: Integrin-subtype-specific radiolabeled ligands are developed for diagnosis and therapy of tumors.
Hobbies:	Hiking, classical music (including modern classics), theater, travelling

My favorite author (fiction) is Philip Roth.

My favorite place on earth is a Japanese garden in Kyoto such as Ginkaku-ji.

If I were not a scientist, I would be a good husband. :-)

My favorite food is Thuringian dumpling with roast goose.

My favorite piece of music is Beethoven's Piano Sonata No. 32, Op. 111.

My favorite quote is "So mancher meint, ein gutes Herz zu haben, und hat nur schwache Nerven" ("Many who think that they have a kind heart have only weak nerves"; Marie von Ebner-Eschenbach).

The most significant scientific advance of the last 100 years has been the development of physical methods for studying molecules.

My favorite type of research is interdisciplinary work.

The biggest problem that scientists face is the modern tendency to estimate quality by a single number (such as h-factors) or to express everything in superlatives.

The downside of my job is that it takes too much time to deal with administration and continuous evaluations.

What I look at first in a publication is the figures and citations (although not necessarily my own).

My greatest achievement has been to have established an institute of creative and excellent scientists who collaborate.

My biggest motivation is to solve scientific questions and apply chemistry to investigate problems in other fields.

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

I changed my main research topic several times: starting from organic synthesis, I investigated intramolecular mobility by NMR spectroscopy in order to determine the energy barriers. Later I began to study the conformation of (cyclic) peptides by NMR spectroscopy. For this purpose we had to use state-of-the-art NMR technology and develop new NMR pulse sequences. The next step was the design of bioactive constrained peptides and peptide mimetics including the use of D-amino acids, sugar amino acids, and N-methylation of peptide bonds to control stereochemistry and biological activity. In all cases, we first started with methodological developments and applied them to our practical problems. Recently, we turned to medicinal applications such as molecular imaging by receptor-subtype-selective ligands for the detection of cancer in animals and humans. Cell-adhesion-stimulating compounds have been used to improve biomaterials and conduct biophysical studies. All this required collaboration with physicians and biophysicists.

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

Scientists should not stick to their original research topic forever. When he or she has the feeling that most of the principles are already discovered, one should move to another field of interest. Collaboration with the best scientists will help to facilitate such a move.

My 5 top papers:

1. "Detection of Hindered Rotation and Inversion by NMR Spectroscopy": H. Kessler, *Angew. Chem. Int. Ed. Engl.* **1970**, *9*, 219; *Angew. Chem.* **1970**, *82*, 237.
   At that time, barriers between 5 and 25 kcal mol^{-1} for the interconversion of rotamers, invertomers, or ring invertomers had just been discovered by us and others. Substituent effects and stereochemical considerations were used to elucidate mechanistic details of intramolecular mobility and also for ion-recombination reactions and/or intramolecular orbital-controlled rearrangements.
2. "Conformation and Biological Activity of Cyclic Peptides": H. Kessler, *Angew. Chem. Int. Ed. Engl.* **1982**, *21*, 512; *Angew. Chem.* **1982**, *94*, 509.
   Cyclization was introduced as a way to constrain flexible molecules (peptides) and to identify their bioactive conformations. When the 3D structure of the cyclized ligand matches the bioactive conformation, this approach results in superactivity, high receptor-subtype selectivity, and increased metabolic stability. On the other hand, a loss of affinity indicates alterations of the ligand conformation upon cyclization. A systematic use of D-amino acids for conformational control was recommended.
3. "Stereoisomeric Peptide Libraries and Peptidomimetics for Designing Selective Inhibitors of the $\alpha_v\beta_3$ Integrin for a New Cancer Therapy": R. Haubner, D. Finsinger, H. Kessler, *Angew. Chem. Int. Ed. Engl.* **1997**, *36*, 1374; *Angew. Chem.* **1997**, *109*, 1440.
   Application of the "spatial screening" procedure resulted in the first reported highly active ligand for the $\alpha_v\beta_3$ integrin, whose structure has been modified by different peptidomimetic approaches. The structure–activity relationship later allowed the synthesis of Cilengitide (c(RGDfNMeVal)), which was developed by Merck as a drug candidate. This Minireview summarized the state of the art of integrin inhibition at the time.
4. "A Sugar Amino Acid as a Novel Peptidomimetic": E. Graf von Roedern, H. Kessler, *Angew. Chem. Int. Ed. Engl.* **1994**, *33*, 687; *Angew. Chem.* **1994**, *106*, 684.
   Modification of sugar residues by introduction of an amino group and a carboxy group resulted in novel sugar-based amino acids, which were later used as stereochemically controlled scaffolds for bioactive peptide mimetics, in order to improve the hydrophilic character of hydrophobic peptides.
5. "A highly conserved spider silk domain acts as a molecular switch that controls fibre assembly": F. Hagn, L. Eisoldt, J. G. Hardy, C. Vendrely, M. Coles, T. Scheibel, H. Kessler, *Nature* **2010**, *465*, 239.
   This is one of several protein structures solved in my lab by using NMR spectroscopy. A double salt bridge identified here in the C-terminal domain of the long spider silk protein ("spidroin") is conserved in all web spiders and was shown to regulate the switching between the micellar storage form and the aggregating silk thread in response to the altered pH and salt concentration occurring during passage through the spider's silk duct.

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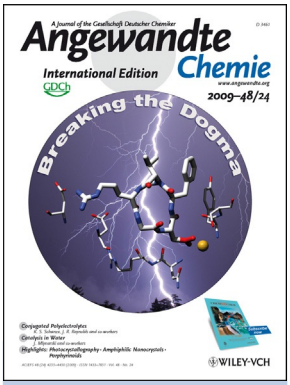

The work of H. Kessler has been featured on the cover of Angewandte Chemie: "Breaking the Dogma of the Metal-Coordinating Carboxylate Group in Integrin Ligands: Introducing Hydroxamic Acids to the MIDAS To Tune Potency and Selectivity": D. Heckmann, B. Laufer, L. Marinelli, V. Limongelli, E. Novellino, G. Zahn, R. Stragies, H. Kessler, *Angew. Chem. Int. Ed.* **2009**, *48*, 4436; *Angew. Chem.* **2009**, *121*, 4501.