J. Rebek, Jr.

The author featured here has published more than 45 papers in Angewandte Chemie, including 15 papers since 2000, most recently: "Selective Guest Exchange in Encapsulation Complexes Using Light of Different Wavelengths": H. Dube, J. Rebek, Jr., *Angew. Chem.* **2012**, *124*, 3261 – 3264; *Angew. Chem. Int. Ed.* **2012**, *51*, 3207 – 3210.

The work of J. Rebek, Jr. has been featured on the cover of Angewandte Chemie: "Self-Assembled Capsules of Unprecedented Shapes": K. Tiefenbacher, D. Ajami, J. Rebek, Jr., *Angew. Chem.* **2011**, *123*, 12209 – 12213; *Angew. Chem. Int. Ed.* **2011**, *50*, 12003 – 12007

Julius Rebek, Jr.

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Education:	1966 BA, University of Kansas 1970 PhD with Professor D. S. Kemp, Massachusetts Institute of Technology
Awards:	**2004** ACS Breslow Award; **2007** University of Oregon Creativity Award in Chemistry, Dance, and Music; **2008** Ta-shue Chou Lectureship Award, Academia Sinica; **2009** Alexander von Humboldt Senior Scientist Award; **2010** Honorary Doctorate, University of Bonn; **2011** Nichols Medal, ACS New York Section; **2012** Prelog Medal, ETH Zürich
Current research interests:	Present pursuits include the sensing and destruction of nerve gases, and devising reactivators for agent-disabled enzymes. I am also intrigued by the behavior of molecules in small spaces, particularly self-assembled capsules and deep cavitands. In chemical biology, I am engaged in developing protein surface mimetics for applications in reducing inflammation in the innate immune system.
Hobbies:	Reading novels and playing tennis

If I won the lottery, I would … keep doing chemistry.

My favorite place on earth is … the VIth district of Paris.

I chose chemistry as a career because … it chose me; the alternative was painting houses in Kansas.

My best investment was … into the company Cubist Pharmaceutical.

I can never resist … a Cuban cigar.

I would have liked to have discovered … the origins of the genetic code.

The downside of my job is … raising research funds.

My favorite author is … David Foster Wallace.

My favorite food is … palacsinta (Hungarian crêpes).

My favorite piece of music is … Akhnaten (an opera by Philip Glass).

If I weren't a chemist, I would be … an architect, I suppose.

What is your opinion on fundamental research in an end-product-driven world?

End-product-driven research can be just as fundamental as any other kind; it only requires the research to solve existing problems. But there is fundamental research beyond that, which involves *creating* new problems.

Who are your heroes in chemistry and why?

I think every young assistant professor starting a career in chemistry deserves my admiration. They are launching careers in exceedingly tough times for science, but are charged with one of the most important of human endeavors.

What advice would you have for a starting academic in chemistry?

Choose a research topic that nobody else is working on and use it to create a research identity.

Why did you choose to investigate peptide coupling as one of your first independent research projects?

I had some excellent training in this area, thanks to Kemp at MIT. His advice, and that of Whitesides, led me to do experiments that tell "this from that".

Which came first, the desire to elucidate peptide synthesis or the idea to investigate reactive intermediates?

Investigating reactive intermediates through the "three-phase test" came to me while listening to Bob Grubbs' lecture on the existence of free cyclobutadiene; I thought I could do a different kind of experiment.

How do you convince PhD students or postdocs to work on projects that start new speculative directions in your research?

I have never had any problems convincing PhD students or postdocs to work on projects. I think they prefer the unconventional to linear extrapolations from existing methods or reagents.

Looking back to your career, what is the "golden thread" that links all the areas that you developed over the years?

If there is a thread, I sure can't see it!

Is the effect of globalization affecting chemical research in a positive or negative way?

For sciences in the US, the impact is negative. Outsourcing has eliminated a large number of jobs for PhD chemists—jobs that won't be coming back.

The interview questions were provided by G. Dan Pantoş (University of Bath, UK).

My 5 top papers:

1. "Mechanistic studies using solid supports: the three-phase test": J. Rebek, *Tetrahedron* **1979**, *35*, 723–731.
   This got me a reputation for swimming outside the mainstream (and made my lifeguards quite nervous at the time). We detected species of current interest then and showed the technique was complementary to kinetic and spectroscopic methods. It is still used today, but only in a desultory way.
2. "Allosteric Effects: Binding Cooperativity in a Subunit Model": J. Rebek, Jr., R. V. Wattley, T. Costello, R. Gadwood, L. Marshall, *Angew. Chem.* **1981**, *93*, 584–585; *Angew. Chem. Int. Ed. Engl.* **1981**, *20*, 605–606.
   In this work, we introduced biaryl rotors as models for allosteric behavior. In these systems, a binding event that occurs at one site transmits information to a remote site through the fulcrum of the biaryl bond. These early molecular machines are present in most of the nanodevices pursued elsewhere today.
3. "Convergent Functional Groups: Synthetic and Structural Studies": J. Rebek, Jr., L. Marshall, R. Wolak, K. Parris, M. Killoran, B. Askew, D. Nemeth, N. Islam, *J. Am. Chem. Soc.* **1985**, *107*, 7476–7481.
   In this work we introduced cleftlike synthetic receptors for recognition of neutral molecular targets. At the time, most people were using macrocycles to bind ions. The clefts allowed complementary functional groups to converge on the smaller targets in a useful way.
4. "A Self-Replicating System": T. Tjivikua, P. Ballester, J. Rebek, Jr., *J. Am. Chem. Soc.* **1990**, *112*, 1249–1250.
   This publication showed that a synthetic molecule can show a primitive sign of life—self-replication. No one doubted the ability of DNA to do this, but this work indicated that many structures could do so; all that is needed is self-complementarity. This key feature has since been incorporated in self-replicating systems synthesized in many other research groups.
5. "A Synthetic Cavity Assembles Through Self-Complementary Hydrogen Bonds": R. Wyler; J. de Mendoza, J. Rebek, Jr., *Angew. Chem.* **1993**, *105*, 1820–1821; J. de Mendoza, J. Rebek, Jr., *Angew. Chem.* **1993**, *105*, 1820–1821; *Angew. Chem. Int. Ed. Engl.* **1993**, *32*, 1699–1701.
   In this publication, a result of collaboration with Javier de Mendoza, we introduced self-assembling capsules. Subsequent work showed that molecular behavior in small spaces is generally quite different from that observed in dilute solution. Reversible encapsulation complexes revealed new phenomena: helically coiled hydrocarbons, amplified intermolecular forces, large rate enhancements for reactions, and new forms of stereochemistry.

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