



Bob Eisenberg <bob.eisenberg@gmail.com>

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## RE: Thanks for your invitation

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VCH-Chemistry <chemistry@wiley-vch.de> Mon, Dec 20, 2010 at 5:31 AM  
To: "beisenbe@rush.edu" <beisenbe@rush.edu>

Dear Bob,

Many thanks for your e-mail and for accepting our invitation to write a Review article for *Chemistry - A European Journal*.

We have discussed the different topics that you have suggested and think that the third topic (Life's Electrolytes are Not Ideal) would make an interesting Concept article.

Given the heterogeneous readership of Chemistry we would like to ask you to keep in mind that we usually avoid long mathematical discussions within an article. Would this be ok?

Looking forward to hearing from you.

With our best wishes for the holiday season and the New Year

best regards

Katja

Dr. Katja Glatz

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**Sent:** 15 December 2010 22:34

**To:** VCH-Chemistry; Bob Eisenberg

**Subject:** Thanks for your invitation

Dear Elisabeth and Katja, or Dr. von Roedern and Dr. Glatz, if that is more appropriate,

I just had a chance to review a copy of "Chemistry: A European Journal" and

so can reply more intelligently to your kind letter of November 25.

I would be very interested in writing a review article for your journal.

There are three areas that might work, for me, depending also of course on how you (all) feel about them.

a) Bubbles and Gating, as you suggest. The problem here is that there is an enormous speculative literature with so far no hard biological results. The problem is not whether such a mechanism might exist. It is very clear it might. The problem is to show that it does exist.

b) Ions in Channels. Ion channels are proteins that perform many of their functions with a single structure, using a balance of steric and electrostatic forces to select between ions (at least in the main calcium and sodium channels of the heart and neuron: there are hundreds of channel types and only a fool would presume to think biology/evolution uses the same mechanisms in all of them). They are of enormous biological importance because they are the nanovalves of life controlling most living functions as specifically as transistors control computers. They are also amenable to classical methods of chemical physics, if studied appropriately. I attach an article about them recently for *Accounts of Chemical Physics*. I would not propose to repeat what I wrote there, but the article may serve to show my style.

c) Life's Electrolytes are Not Ideal. I believe that the essential role of electrolytes in life is not widely known (water itself is lethal to almost all cells and to most proteins; ions in water is what supports life). Life's electrolytes are always mixtures and nearly always contain important divalents. They are thus nothing like ideal solutions. Crudely put "everything interacts with everything" in life's solutions; nothing interacts with anything in ideal solutions (of nonelectrolytes) of our education. Only recently has mathematics been developed to deal with such interacting systems. The mathematics of complex fluids, using energy variational methods, can be modified to deal with the simpler components of living solutions and so promises

major advances.

I am eager to discuss these matters further and attach a CV and few papers as an introduction.

As ever  
Bob

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