

December, 2015, from Ardyth,

Dear Friends and Family,

As 2015 races to a close, here's our year in a nutshell: *Plus ça change, plus ça même chose*. Or, in case your high school French is a little rusty, The more things change, the more they stay the same.

Our big changes are all good, and noteworthy. In May, Bob retired as Chairman of Molecular Biophysics and Physiology at Rush, a position he held more than half his life. It took him about five minutes to adjust and he's now doing his science full-time, with a zest and delight that's a pleasure to watch. I think he's traveling more than ever as the Pied Piper of mathematical biophysics. He is a poster boy for happy, productive retirement.

My big change is still a little confounding, considering I'm a nice grandma from River Forest (emphasis on "grandma" – there are a few folks in town who wouldn't call me "nice" at this point). My once part-time law practice is now keeping me busy almost full-time. Last year, I could get most of my pending work done in a day or two. Now, not so much. Afternoon television has taken a backseat to the real world. I'm still not sure how this happened, but I'm getting a LOT of satisfaction from helping some people with some difficult problems and helping others be more successful with their businesses. The best part is, all of my clients are interesting people and it's a privilege to work with them.

As for the "same" in our lives: It's all good and we cherish it. My work has cut into my ability to travel at a whim, but Bob and I have had some good adventures: We started 2015 in Hawaii with Jill and her children, and will be there again in a few days. We've resumed our periodic trips to Utah, and spent a week there in May, hiking in dry (and wet!) river beds and taking pictures like mad. I went to Boise in October for a long-overdue trip home. It included a rare and wonderful road trip to Joseph, Oregon, with two of my best friends who have put up with me for 50 years and are still willing to be stuck with me in a car.

Continuing a couple of family traditions, two of our grandchildren from Hawaii, Henry and Holly, came for long summer visits. Bob took Henry to Washington, DC and I'm sure he'll have much to say about their adventures. I was in my first trial while they were traveling – a fortunate bit of scheduling for all of us. (We lost; I lost five pounds the hard way; it really is a young person's work; and there's a reason they call it a "trial." 'Nuff said.)

Everyone in the family is doing well. Our oldest granddaughter, Chris, is a junior at Columbia College of Chicago, studying video game design. She can hold her

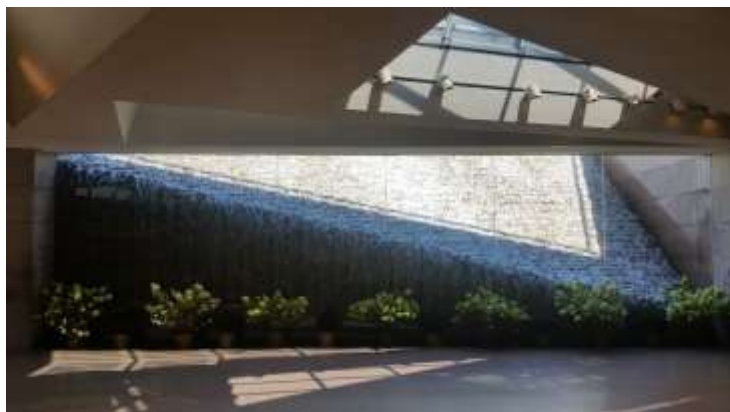
own in technical chats with Bob and occasionally sports blue hair. (Why didn't we think of that in the '60s?) James is spending his first of semester of college in South Africa, studying to be a missionary. Emily recently celebrated the tenth anniversary of her day spa, Spa Soak, a great achievement in these economic times and for any small business. Ben and Sally continue to live their settled lives, Ben just a few floors down from us and Sally in Brooklyn.

As for these times. Have they changed and become worse? Or are all the violence and political blather more of the same? I keep thinking back to words in a folk song from the early '60s, "They're rioting in Africa, they're starving in Spain, there's hurricanes in Florida and Texas needs rain" and wondering. Suffice it to say (unless you want a five-page diatribe), I'm appalled at the blatant lies that go for political discourse and even more appalled at the indifference to the gun violence in our country. It doesn't matter what you call it – terrorism, domestic terrorism, ISIS, bad cops – people are dead and nothing is keeping it from happening again.

And perhaps that real-world backdrop is a big reason for holding close our friends and family and recognizing the blessings in our world. We do.



A favorite spot: guess where?



From Bob:

It is a joy to be dealing only with science and family and not the collapse of basic science departments in Medical Schools throughout the USA, and at Rush (brought on by the **R**adical **R**epublican **w**Reckers, much more than anything else, but what can you expect from pigs except oinks, as my father used to say). Mike Fill, my successor, is doing a fine job handling the realities while doing fine science.

The great change in the family is Ardyth's growth into a superb attorney. She has always been the best legal researcher anyone has ever met (I do not exaggerate; her pleasure and success at burrowing into hundreds of pages of legalese so shocked the lawyer colleagues at Blue Cross that they said she had to go to law school....that was the start of it all), but who knew she would be remarkable negotiator and litigator, and on her way to become an extraordinary entrepreneurial attorney, even entrepreneur herself! What a joy for me to watch and share (a little bit)! *[Note from Ardyth: Since I work at home, he shares my ups and downs every day, with good humor.]*



The grandchildren are too numerous to discuss in detail, and a number, like our children, are embarrassed by publicity in this forum, so I will only mention how proud we are that all are making their way into life, developing *their* skills and ambitions, as *they* want to do it, with a little catalysis from us along the way, and even some added impetus as well. (For those of you who know that catalysts do not provide energy to the reactions they accelerate, a question. How do they work without providing energy? How do you say that in mathspak?).

But a wonderful week with Henry (11 years old, from Honolulu, although it might be more precise to say Kahala, Oahu) in Washington must be mentioned. Henry enjoys museums and learning new odd facts (and big ideas too) as much as I do. He also talks as much as I did at that age, when my Mom took Ed and me to Washington, DC. (You might be interested to know that I first heard of Albert Barnes, the art collector, on that trip, while listening to the radio as we drove along the Baltimore-Washington Parkway, as I remember it, on the July 24th anniversary of his sudden death from reckless driving.)

Henry and I managed two and often three museums a day, aided by unseasonable coolness in Washington (thank you, global warming which does more to the variance than the mean temperature and weather). And with judicious naps before dinner, 73-year-old Bob kept up (in enjoyment and even walking) with Henry: only once in the week did we take a taxi.

For me the highlight was seeing the new art form the Smithsonian Museums (note the plural) have developed. Their museums in general are on a different plane from the rest of the museums I have seen. Only Berlin approaches their class. For example, the new American History Museum presents the Civil War in exhibits aimed at high schoolers essentially perfectly (i.e., it agrees with my views, except about Abraham Lincoln as a commander, see the recent William Marvel biography of Edwin Stanton, Secretary of War) but vividly and with considerable subtlety. The exhibits deal with slavery explicitly and frankly. What a welcome change from the patriotic nonsense of my youth (extending even to my middle age)!

Science has been as involving as ever. My two months with Jinn-Liang Liu at Ohio State (Mathematical Biosciences Institute) was very productive and lots of fun. Living and working next to him was just wonderful and we found a new way to deal with the essential problems of ions (like sodium, potassium, and chloride) in water and in and near

channels, and proteins. So far the new approach is working miraculously well, but that will surely change as we test the limits of our ideas. (Scientists are the only professionals who never know what they are doing. As soon as they solve a problem, they move to something they do not understand, at least they move that way if they are intellectually ambitious or reckless, as Jinn-Liang and I like to be.) We exploit an idea used in physics since around 1927, called the (Enrico) Fermi distribution (discovered independently and simultaneously by Llewellyn Thomas) but in a totally different context, building on a crucial new (math) result from Jinn-Liang. Jinn worked out the entropy of mixtures of spheres of any size and concentration. This result lets us easily compute things that the more rigorous methods I have been working on with Chun Liu, et al, since around 2007, do not allow (at least not yet). We have applied the Fermi-Poisson approach to our old friends gramicidin in three dimensional detail, and the EEEE model of the calcium channel of the heart. (EEEE = glutamate side chain- glutamate side chain- glutamate side chain-...), and bulk solutions (like sea water).

Jinn Liang is as reckless and ambitious intellectually as I am, so we are seeking frustration by doing something much harder, that no one has tried so far with physical models, with atomic resolution, but also macroscopic function, all tied together consistently by precise mathematics (not vague simulations): we are trying to study an atomic machine with complexity something like that of a primitive automobile engine, but on an atomic scale. So we are trying our hand on the giant protein molecule (called a transporter, specifically NCX. Type that into google, and look at the structure, and its role in the heart and heart disease) that couples sodium and calcium movements in heart muscle (and probably in the short term memory and learning systems of the hippocampus in the brain). Failures will come for sure as we find the limitations of this new approach, but it is remarkable that we can now take structures of machines with lots of atoms, and water molecules,

and by precise mathematics and well defined physics predict what they will do, so we think.

Lots of travel is involved as I share these approaches with physical, biological, chemical and mathematical scientists. Biologists nowadays are not trained in even the simplest properties of ionic solutions (discovered in the 1920's and found to be crucial to biological function in the 1870's by the English clinical scientist Sydney Ringer, who worked at University College London, where I did my Ph.D.). Without training, it is not reasonable to expect biologists to understand what Chun Liu, Jinn Liang Liu, and I are doing, until we explain,and explain, and explain. But biologists and ultimately physicians are our consumers. Both must use our insights and results to understand experiments and diseases. We must never stop reaching out to them, even if I dislike the travel without Ardyth.

That meant trips to Minneapolis, Ohio State (Columbus), Lancaster UK all within a few months while moving offices and a thousand books or so (with the welcome help of grandchildren Holly and Henry Trowbridge). And much more travel to come. Believe it or not, I do not like travelling (particularly without Ardyth who brings freshness and curiosity to everywhere she goes), but I do like the science, people and interactions that come with the travel. And I seek out a Jersey Mike wherever I can find it, or failing that a PotBelly, or even a Subway.

So that is a short report on what 2015 has brought us. No doubt I left out much that was important but it is what crosses my mind as I struggle with Windows 10, and hurry to watch a Bears game. Those of you who have persevered this far: *thanks and a gentle request:*

Drop me a line at bob.eisenberg@gmail.com or beisenbe@rush.edu and let me know what crosses your mind if you have any energy left after reading this far.