

# THE VORTEX

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CALIFORNIA SECTION  
JANUARY 2015

## *Holiday Meeting Awards* (See page 8)



Margareta Sequin



Lee Latimer



Alex Madonik



Paul Vartanian

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# Science <sup>café</sup>



Presented by

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## *The Art & Science of Violin Making*

Wednesday, January 28, 2015

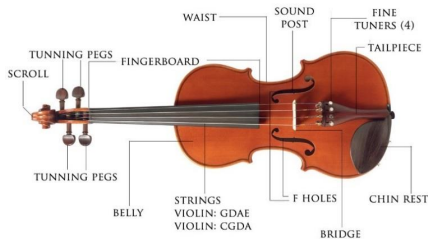
7:00pm to 9:00pm

Lafayette Library, Community Hall – Doors open at 6:30pm

Reserve at: [tinyurl.com/violinmaking](http://tinyurl.com/violinmaking)

Cost \$5.00 at the door

**Guest Speaker: Alan Copeland** - an award winning violin, cello and viola maker. Alan applies his knowledge of mechanical engineering to the 500 year old techniques of hand crafting string instruments. Trained as a mechanical engineer at MIT, Alan worked for over 30 years at the Lawrence Livermore National Laboratory before taking up violinmaking full time. His violinmaking teachers include master violinmakers Edward C. Campbell and Thomas Oliver Croen.



**Science Café** will explore the science of violin making – including the recent carefully designed studies of player preferences among old and new instruments, the use of x-ray CT scanning to understand iconic violins, approaches to material selection, and measurements with modern tools as an aid in the making process. Alan will also address the question – *Why, in today's high tech world, would someone take up violin making, what does this skilled profession look like in the 21<sup>st</sup> century?*

**Alan will conclude the evening with a short performance on a cello.**

To pre-order a boxed meal call the Bookmark Café (925)283-9999 – menu available at [bookmarkcafe.com/events](http://bookmarkcafe.com/events)

Next Science Café: Wednesday, March 4 **The Science of a Manned Mission to Mars** and the Science Fiction of the book *The Martian* with author Andy Weir and Dr. Pascal Lee, Chairman of the Mars Institute.

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# THE VORTEX

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## Chair's Message

Greetings to all!  
I am delighted to be writing my first Chair's message as the 2015 Section Chair. I am a bit nervous

because following the terrific leadership of both our 2014 Chair Mark Frishberg and our 2013 Chair Wally Yokoyama will be a very tall order. However, my nervousness is certainly balanced by my excitement because both Mark and Wally have left our nationally recognized, award winning section in excellent shape. And in addition to both Mark and Wally, we have an exceptional Executive Committee with a wealth of experience to provide support for my relative naiveté. This includes our newly elected Chair-Elect, Lou Rigali, Past Chair, Mark Frishberg, as well as Secretary Michael Cheng and Treasurer Will Kuo. Together with our Directors, Councilors and Board of Trustees, I have an incredible group of colleagues to work with to provide service to our membership and community. And of course we are all supported by our Office Manager, Julie Mason. Whew, I feel less nervous and more excited already!

Just a brief note about my background in the context of this role: I have been a member of the ACS for 36 years - since my

early days as a chemistry graduate student. However, it has only been after a long career doing medicinal chemistry at pharma and biotech companies followed by consulting that I became active in any ACS activities. In addition, my recent participation in ACS outreach activities has also inspired me to get into a classroom to teach (I am a part-time chemistry instructor at Las Positas College in Livermore). Finding time to participate in outreach was hard initially. I am sure that we have a good number of members that fit in that category – life is hectic, finding time to volunteer is tough. Well, I have found it to be tremendously rewarding and part of my mission in 2015 is to bring more of you in to assist in our good works. We need you! We need your energy, ideas and contributions! As such, I am hopeful of expanding our roster of active participants. Our activities span programs including outreach to educate our youth and the general public in our communities about science, to career assistance, and to public advocacy. We are well served by current volunteers but that service can always be enhanced tremendously by new faces and ideas of all ages and backgrounds! Please give it a try – there is much to be gained by active participation and little to lose.

During 2015, one of my goals is to increase our revenue to ensure that our good works, outreach and membership assistance can

*(Continued on page 8)*

## 2015 Section Meeting Schedule

January 21 2015 David Taus with EnCorps STEM (science, technology, engineering and math) Teacher Program, speaking on the topic, *Developing the STEM Teacher Pipeline*, location TBD.

February 23, 2015 Professor Stanley Prusiner, UCSF, (1997 Nobel Laureate in Medicine for his work and discoveries on Prions.) Topic and location TBD.

March 10, 2015 Daniel Erlanson, Carmot Therapeutics, Topic: Starting a Biotech in the midst of the Great Recession, Time & location TBD.

*Photos from the November 18 meeting at Chabot College with Sandra Sachs of the Oakland PD Crime Lab, speaking on "The Adventures of a Forensic Scientist"*



## *Carbohydrate Diets, Inflammation and Dementia*

Lou Rigali

In 2000 I read “Life without Bread” by Christian Allan, Ph.D. and Wolfgang Lutz, M.D. The cover of the paperback had the sub title, “How A Low Carbohydrate Diet Can Save Your Life”, along with the following bullet phrases:

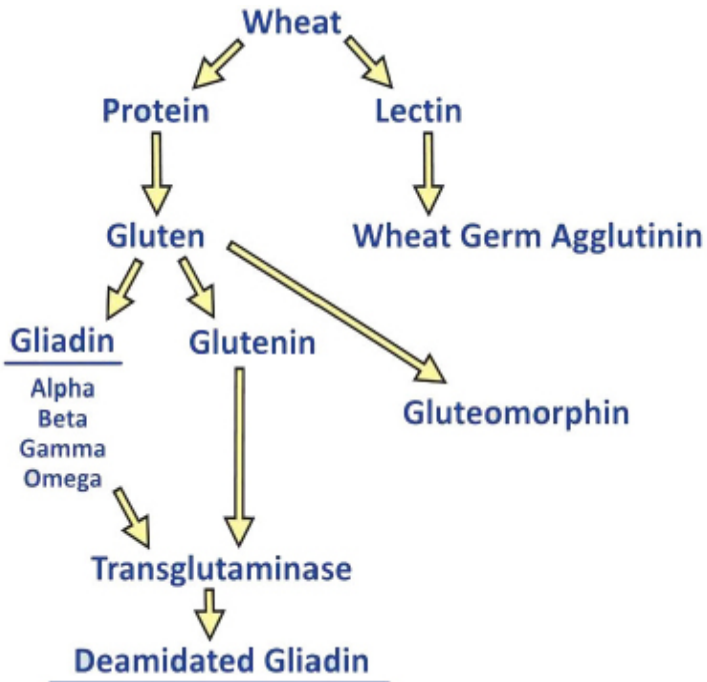
- Discover how a low-carbohydrate, high-protein diet can prevent and even cure heart disease, type 2 diabetes, and gastrointestinal disorders.
- Learn how to feel better and live longer by changing the way you eat.
- Develop strategies to transfer from a high to low carbohydrate nutritional diet.

I thought the authors made a lot of sense but I had no known health problems; I felt well, had high energy, albeit a few extra pounds, and it was just too difficult to remove my favorite carbohydrates: sweet roll with morning coffee, French bread and prosciutto for lunch, and pasta with my Bolognese sauce and bread for dinner. While this

was not my daily diet, I could not see any personal health benefits for the sacrifice of eliminating any of these tasty foods.

Fifteen or so years later, a friend introduced me to the book, “Grain Brain” by David Perlmutter, MD. This book covered a lot of the same issues as the Allan and Lutz book, but emphasized the detrimental role of gluten in wheat and provided information that any sensitivity to gluten along with a high carb diet would increase the risk for dementia. Where weight gain did not get my attention previously, the subject of dementia did. It is those senior moments when you have to retrace your steps to remember why you entered a particular room that shivers your timbers.

Looking further into this subject, I also found similar views in the book “Wheat Bellies” by William Davis, MD. While all three groups confirm that high sugar levels in the blood can cause inflammation in cells leading to various auto-immune diseases and other problems such as heart disease, leaky gut syndrome and type 2 diabetes, Dr. Davis’s main focus is on the gluten



*(continued on page 9)*



*Saluting Stable  
Isotopes  
Part 4:  
Osteochemistry*  
Bill Motzer

So wise so young, they  
say, do never live long:

Richard III

Bloody thou art, bloody will be thy end:

Duchess of York

*The Tragedy of King Richard III:*

a play by William Shakespeare~1592.

As described in my November 2014 Vortex article (*Saluting Stable Isotopes, Part 3: Osteochemistry*), a forensic examination of a skeleton unearthed in Greyfriars Church in Leicester (United Kingdom) in 2012 was the subject of intense scrutiny by the public and scientific community because it was considered to be that of King Richard III, last of the House of Plantagenet line, killed at the Battle of Hastings in 1485 at the age of 32. Richard was the 12<sup>th</sup> child of Richard, 3<sup>rd</sup> Duke of York and Cecily Neville, Duchess of York and he was never expected to become a future monarch. However, through supposed intrigue and murder he was able to obtain the monarchy, which is the theme of Shakespeare's play. In February 2013, University of Leicester archeologists and anthropologists confirmed the skeleton's age by radiocarbon dating (ca 1455-1540).

Based on stable isotope analyses of carbon, oxygen, hydrogen, and strontium, the researchers were also able to construct Richard's early childhood and adulthood environment, e.g., what he drank and ate and what he was exposed to in the environment of the time. Also, a DNA analysis confirmed the skeleton's sex and a follow-up analysis of the complete mitochondrial DNA (mtDNA) was published on December 2, 2014 in *Nature Communications* (DOI: 10.1038/ncomms6631) showing a perfect match with the mtDNA sequence of one living female-line relative of Richard III. However, the Y-chromosome haplotype DNA did not match that of Richard III's male-line relatives, suggesting that there was perhaps at least one false-paternity event that could

have occurred in any of the intervening generations. The DNA analysis also predicted hair (blond at birth that altered to brown at adulthood) and eye color (blue) consistent with Richard's appearance in one early portrait (see figure below).

However, as I indicated in Part 3, what is more intriguing are the additional chemical and stable isotope analyses used to determine Richard's environment during his short life (e.g., lead concentration and lead isotopes) and his lifestyle including diet (i.e., carbon, nitrogen and strontium isotopes).

Richard's tooth enamel had lead (Pb) concentrations of 26 ppm from environmental bioavailable Pb exposure. This value was high when compared to Neolithic pre-metalworking communities that had median Pb concentrations of 0.1 ppm. However, it is within the range of Pb concentrations found in Roman and Medieval tooth enamel because the Roman and Medieval era inhabitants mined and smelted the extensive lead-silver deposits of western England. Additionally, the lead isotope ratios are consistent with typical pre-industrial levels in Britain. The principal causes of lead poisoning in humans during those times were the use of lead pipe in plumbing in soft water areas, the deliberate ingestion of bioavailable lead compounds (such as lead acetate, aka, "sugar of lead" used to sweeten wine), and the ingestion of lead compounds used in medicines. (See also January to March 2008 issues of *The Vortex: Getting the Lead Out.*) The lead isotope ratios that were examined in Richard's bones included  $^{206}\text{Pb}/^{204}\text{Pb}$ ,  $^{207}\text{Pb}/^{204}\text{Pb}$ ,  $^{208}\text{Pb}/^{204}\text{Pb}$ ,  $^{207}\text{Pb}/^{206}\text{Pb}$ , and  $^{208}\text{Pb}/^{206}\text{Pb}$ , and these ratios were consistent with lead isotope ratios from the sources indicated above.

Variations in Richard III's diet can be traced through his life using carbon and nitrogen isotope compositions of his teeth and bones indicating what he consumed from ages ~3 to 14 years. The general trend through Richard's life is one of increasing  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$  values but with slight dips in both isotope values around the age of 4 to 6. When compared with other known isotope data of this era, decreases in  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$

*(continued on page 7)*

*(Motzer continued from page 6)*

coincide with an increase in  $\delta^{18}\text{O}$  values, suggesting that when Richard was a child and was moved from Northamptonshire, a major dietary change occurred to a more

cereal-based diet with considerably less meat and fish. However, as an adult, his diet seems again to have changed again to more meat, fish, and wine. I will discuss those findings in a future article.



Left: earliest surviving portrait of Richard (ca. 1520, after a lost original), formerly belonging to the Paston family (Society of Antiquaries, London). Right: skull of Richard III, photograph by University of Leicester.

### *Gifts & Donations*

You can help support the Section's outreach programs through your donations. Information will be provided in the coming months that will specify programs and events and how your thoughtful contribution would be used. For additional information, please email Lou Rigali [LR101898@aol.com](mailto:LR101898@aol.com)

*Chair, continued from page 3)*

continue. We are actively seeking corporate and other sponsors for our activities. As part of this plan, I will be reaching out to our membership to provide contacts within their employers or business partners/collaborators to contribute to our programs. We have over 3400 members in our section which represents a significant contribution to the local economy – collectively, we should be able to influence local and national businesses to support our local programs. In addition, for those of our members who may not have paid your ACS membership dues, I hope that when you do, you include a contribution to support the California Section. It is greatly appreciated!

Finally, we have a fine slate of activities that will hopefully have broad appeal to our members and our community during the first half of 2015. Details are still being worked out but confirmed activities for

section meetings include presentations by Dr. Stanley Prusiner, UCSF (1997 Nobel Laureate in Medicine) on Feb. 23, and Dr. Dan Erlanson, Carmot Therapeutics on Mar. 10. We will also have a presentation by Dr. Marinda Wu, former President of the ACS! In addition, we are planning a very special Wine, Cheese and Chocolate Extravaganza during April (in collaboration with the Sacramento and Santa Clara Valley Sections) that is not to be missed! Check out future updates in the Vortex and on our website at [www.calacs.org](http://www.calacs.org).

I look forward to working with you and hopefully meeting many of you during 2015. Certainly contact me any time at [charles.gluchowski@gmail.com](mailto:charles.gluchowski@gmail.com) with any feedback and suggestions regarding current and future ACS activities and programs. It will be a great year, especially with your active participation!



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### *Holiday Meeting Awards*

Mark Frishberg, Section Chair presented the CAL-ACS Public Outreach Volunteer of the Year award to Margareta Sequin and CAL-ACS Salutes to Excellence awards to Lee Latimer, Alex Madonik and Paul Vartanian.

Mark Frishberg and Eileen Nottoli, Chair of the High School Teacher Committee congratulated Jenelle Ball from Chico High School as the recipient of The ACS 2015 National Teacher of The Year award, as well as a recipient of the Section's 2010 Ryland Award for Teachers.



Jenelle Ball, Mark Frishberg, Eileen Nottoli



*(Carbs continued from page 5)*

protein, gliadin. There is a twofold effect of gliadin: the first is that it binds to opiate receptors in the brain...that makes the grain addictive. The addictive property of gluten is interesting. Dr. Davis shows that products as diverse as Campbell's soup, Twizzlers, and hundreds of other processed foods contain wheat or wheat products. The second effect is that the protein, gliadin, unlocks the natural barriers present in the intestines and allows molecules like gluten, its metabolites, and other foreign agents to enter the blood stream causing inflammation and auto-immune reactions and diseases. In Dr. Davis' opinion, this has nothing to do with gluten sensitivity. The action of gliadin takes place in everyone's gut. Davis also cites studies that show type 2 diabetes appears to be a precondition or marker for heart diseases and mental disorders.

Dr. Perlmutter, the author of "Grain Brain" describes and discusses the various studies that correlate diseases like heart disease, strokes, cancer, diabetes, and Alzheimers with low level chronic inflammation. In his opinion one of the major causes is due to sensitivity to proteins in the gluten present in wheat and many cereal grains. He differentiates between celiac disease which is an extreme manifestation of gluten sensitivity and results in damage to the small intestine. Dr. Perlmutter feels that 40% of the population are sensitive to gluten and may be at risk for all of the diseases mentioned previously.

While his focus is on gluten in wheat, he does not neglect the problem of the large amount of sugar in our diet that greatly contributes to the problem.... from migraines to dementia. When blood sugar is high there is increased glycation (this is also known as glycosylation and is a normal process that can be overdone) ... the reaction of a sugar with a protein that modifies the function of the protein. One consequence is an immobilized protein and the sterically misshapen molecule that causes skin to show aging and may clog the brain.

The Allan & Luntz's book, *Life after Bread*, approaches the situation as a hormone imbalance. Carbohydrates are large polymers of glucose. Carbs are digested into smaller

sugars and glucose is absorbed into the blood stream where it triggers the release of the hormone, insulin. Insulin in turn directs glucose to the cells to be used for energy. The second function for insulin is to convert excess glucose to glycogen and store it in the liver and as fat as triglycerides. Glucagon, also a hormone, is released when insulin in the blood is low. Glucagon sends a signal to fat cells to start burning triglycerides in cells to release glucose from glucagon until the glucose level is back in balance. The problem comes when there is too much sugar present and the body loses its ability to use glucose properly. This leads to insulin resistance which starts a hormone imbalance. Drs. Luntz and Allan proceed to show how these imbalances are reflective in various diseases. They go on to discuss and reference studies that show that diets with high fats are not a cause for heart disease and correlating high cholesterol with disease states or heart disease is incorrect.

All three authors address the hereditary background reasons for a low carb/high fat diet. Prior to about 10,000 years ago, the human diet consisted of predominantly animal sources, high in protein, high in fat, low in carbs. Carbs came mainly from fruits and nuts in season. The digestive system of our ancestors of that time period did not need to process high carbs, and even 10,000 years is not a very long time for our system to adjust to today's high carb diet.

One interesting concept related to evolutionary adaptation to changes in the diet: are that GMOs are accepted (by some) in our food supply that have undergone maybe 90 days to 2 years of critical health studies. Is this long enough to understand if modification in our food supply affects humans?

Dr. Davis, the "Wheat Bellies" author, goes into a little more detail with the description of wheat over our history. These early grains were very different from what we are now eating; wheat back 8000-10000 years ago had only 14 chromosomes. Even the wheat of biblical times was different, having 28 chromosomes and the wheat of the Middle Ages had 42 chromosomes as it does now. As a chemist who never had a

*(continued on page 10)*

### *Carbs Continued from page 9*

course in biochemistry or plant biology, I am not sure what the effects of more or less chromosomes would be. But Dr. Davis' next revelation caught my attention.

In the 1960-1970s it became increasingly evident that the world's population was potentially outgrowing its capacity to adequately feed future populations. Research was started on high-yield hybrid wheat. Indeed, such a hybrid was developed that increased the yield by about 80 times. By about 1985 that hybrid became the prime crop. It was in 1985 that we started to see increases in Type 2 diabetes and weight gain throughout the US. The wheat that we eat today contains proteins which our bodies do not have the ability to digest without health consequences.

It is worthwhile to summarize the separate views because it provides perspective. Even though there are questions about why and how something is happening, the resulting observations seem to confirm that changing a diet from high carbs/low fats to low carbs and high fats has health enhancing results. All three groups indicate that protein is important in the diet and provide either recommendations or recipes for a healthy diet.

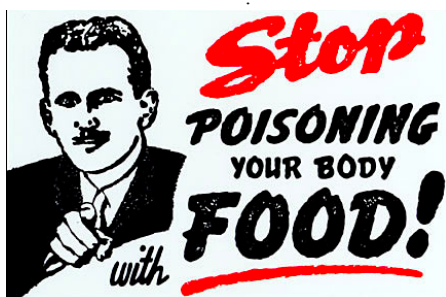
All three groups observed that their patients and own health issues were significantly improved when the amount of food with low carbs but high in fats and protein were introduced into the diet. Good science starts with observations and testing followed, by theories and assumptions that look to find correlation between observations and results. Again this is good science. The views and conclusions of these groups directly contradict the established dietary

recommendation from, government and private health groups for a low fat/high carb diet. As best as I could find from current websites, as of Nov 17, 2014, the American Heart Association recommends a low fat diet, The American Diabetes Association as of August 2014, recommends a whole grain, low caloric diet and lean meats, the FDA offers no recommendations. The USDS, as of 2012, recommends a low fat, low cholesterol diet, and the American Medical Association says to Eat Healthy, Lose Weight, Exercise and Eat Nutritional Foods and Avoid Unhealthy Foods

It is not always easy to tell good science from bad science. In reviewing studies sometimes one can develop prejudices and preferentially, knowingly or unknowingly, select those studies and data that do not contradict a favored hypothesis. This is bad science. Good people can do bad science. Sometimes either financial or other personal gain can influence selection of data.

With regards to this diet topic, which position reflects good science? High fats/low carbs or low fats/whole wheat grains? The wheat industry and agribusiness has a large economic stake in this debate that could lead to bad science. The Pharma industry also has financial interests that have often led to bad science and harm to the public.

With regard to the opinions and theories of the authors, all three views were consistent with observations ... Overweight population and type 2 diabetes is an epidemic; a change of diet provided improved health. There is no membership fee to join this low carb/high fat club. There are no exotic and proprietary elixirs to purchase, maybe there is a book or two to purchase, but information and lectures are also free on the Web.



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