

# THE VORTEX

AMERICAN CHEMICAL SOCIETY  
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CALIFORNIA SECTION  
September 2012



California Section 50/60/70 year members

From left to right: Yulan Tong (50), Fred Baumann (60), Richard Bahme (60), Seymour Lapporte (60), Jim Postma (Chair), Samuel Markowitz (60), Ronald Duetgen (50), Marinda Wu (President-Elect, ACS), Robert Wheaton (70), Roy Wood (50), Howard Mel (60), and Arthur Mendel (60).

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# THE VORTEX

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## Chair's Message

Jim Postma



As I write this in early August, the Olympics are winding down in London and our Councilors are packing for the ACS meeting in Philadelphia.

If you've enjoyed cheering for the home team, please continue because our Section is nominated for 7 different ChemLuminary awards. The list illustrates the wide range of Section programs and highlights our strengths.

Outstanding Project SEED Program

Best New Public Relations Program of a Local Section

Local Section Partnership Award

**Best Activity or Program Stimulating Member Involvement**

**International Year of Chemistry 2011**

**Creative & Innovative Use of the Chemists Celebrate Earth Day Theme**

**Outstanding Performance by a Local Section (Very Large)**

The list also illustrates the wide range of opportunities for member involvement. Because of the strong leadership of these groups, joining the efforts should not entail an overwhelming commitment of time or energy on your part, but represent great opportunities to serve the profession, to observe talented, creative leadership, and to meet great colleagues. If any of these activities pique your interest, please contact me, [jpostma@csuchico.edu](mailto:jpostma@csuchico.edu), or the Section office, [office@calacs.org](mailto:office@calacs.org) or 510-351-9922.



## Editor's Note:

Those categories shown in bold color are the ChemLuminary Awards won by The California Section.

## SAVE THE DATE

The October Dinner Meeting will be held at the new Bioenergy Institute at UC Berkeley on Thursday Oct 25. There will be a tour preceding a catered dinner at the Institute followed by a talk about the research by Dr. Susan Jenkins. The Institute is part of a \$500 million initiative funded by BP petroleum and includes University of Illinois Urbana-Champaign.

## Section September Meeting

**Title:** Vitamin and Mineral Inadequacy Accelerates Aging-Associated Diseases

**Speaker:** Bruce N. Ames Senior Scientist, Nutrition and Metabolism Center, Children's Hospital Oakland Research Institute & Professor Emeritus, University of California, Berkeley

**Date:** Thursday, Sep 20, 2012. Social Hour: 6:00, Dinner: 7:00, Talk: 8:00

**Place:** Solano Grill and Bar; 1133 Solano Ave., Albany, CA 94706; (510) 525-8686.

**Cost:** \$35 (Students \$18). Reservations at office@calacs.org (510-351-9922). Pay at door. **RSVP:** By 10pm Friday, Sep 14, 2012

**Directions:** from I-80 or I-580; Take exit for Albany / Buchanan St., head east on Buchanan St, turn left on San Pablo Ave, turn right on Solano Ave., go 1 block

**Dinner:** Organic Garden Salad (Organic Mixed Greens/ Sun-dried Cranberries/ Cherry Tomatoes/ Julienne of English Cucumber/ Herbed Balsamic Vinaigrette)  
Entree Course (Choose one) 1/2 Braised Chicken (Garlic Mashed Potatoes/ Seasonal Vegetables/ Wild Mushroom Sauce) or Atlantic Salmon (Seasonal Vegetables/ Garlic Mashed Potatoes/ Tomato Caper Salsa) or Grilled New York Steak (Roasted Potatoes/ Seasonal Vegetables/ Bordelaise Sauce) or Vegetarian Dirty Rice (Wild Mushrooms/ Bell Peppers/ Soy Bean Cake/ Jalapeno/Ginger/ Cilantro/ Shiitake Mushroom Glaze)

**Dessert:** Vanilla Creme Brulee with fresh fruit garnish

### Biography:

Dr. Ames is a Professor of Biochemistry and Molecular Biology, Emeritus, University of California, Berkeley, and a Senior Scientist at Children's Hospital Oakland Research Institute. He is a member of the National Academy of Sciences and he was on their Commission on Life Sciences. He was on the board of directors of the National Cancer Institute, the National Cancer Advisory Board, from 1976 to 1982. His awards include: the General Motors Cancer Research Foundation Prize (1983), the Tyler Environmental Prize (1985), the Gold Medal Award of the American Institute of Chemists (1991), the Glenn Foundation Award of the Gerontological Society of America (1992), the Honda Prize of the Honda Foundation, Japan (1996), the Japan Prize, (1997), the Kehoe Award, American College of Occup. and Environ. Med. (1997), the Medal of the City of Paris (1998), the U.S. National Medal of Science (1998), the Linus Pauling Institute Prize for Health Research (2001), the American Society for Microbiology Lifetime Achievement Award (2001), the Thomas Hunt Morgan Medal from the Genetics Society of America (2004), and the

American Society for Nutrition/CRN M.S. Rose Award (2008). His 540+ publications have resulted in his being among the few hundred most-cited scientists (in all fields). [www.bruceames.org](http://www.bruceames.org)

### Abstract:

I posited, and have buttressed, "trriage theory" (1,2): metabolism responds to moderate deficiency of an essential vitamin or mineral (V/M) so that the scarce V/M is preferentially retained by V/M-dependent proteins necessary for short-term survival and reproduction. In contrast, proteins needed for long term health, which I term "longevity proteins" because they defend against the diseases associated with aging, lose the V/M and are disabled. Most of the world's population, including that of the U.S., are moderately deficient in one or more of the ~30 essential V/Ms. Moreover, since the damage from moderate deficiency is insidious, its importance for long-term health is not being appreciated. Strong support for triage theory comes from Joyce McCann's analyses of the literature on proteins dependent on vitamin K (3) and on selenium (4). Both have built into

*(continued on page 9)*

## ACS Fellows

The American Chemical Society announced the selection of 96 members as 2012 ACS Fellows. These distinguished scientists are being recognized and honored for their significant contributions to the science and for providing excellent service to the ACS Community. They represent 23 technical divisions and 52 local sections and reflect a wide range of disciplines and geographic locations. The 2012 Fellows can be found on the ACS website, [www.acs.org](http://www.acs.org).

The California Section is pleased to announce that a member of the Section, Igor Sobolev has been so recognized for his contributions. Congratulations Igor.

Contribution to the science/profession: Serving initially as Kaiser Aluminum's science representative, contributions to international research programs on stratospheric ozone depletion by fluorocarbons ranged from testimony before government committees (1974–1975) to a published study on ozone and Antarctic phytoplankton (2000).

Contribution to the ACS community: Served as Chair of the California Section twice, then as Treasurer (1998 – 2011), and as Trustee (1996 – present).



### *National Chemistry Week 2012: Family Science Night on Thursday October 18, 2012*

This year we will celebrate the 25th anniversary of National Chemistry Week. In the California Section, we have a wonderful 15-year tradition of outreach to local middle schools with Family Science Night. This year we return to Martin Luther King, Jr. Middle School in Berkeley, which hosted us once before in 2001. Award winning science department chair Akemi Hamai is ready to welcome us back:

This will be a night of chemistry excitement, with music by the Scientific Jam, a colorful stage show, liquid nitrogen ice cream, and a dozen hands-on activities for students and their families. So, come

join the fun and be part of our volunteer team.

This year's NCW theme is Nanotechnology, so we will include demonstrations and displays about the different scales of matter and the many uses of nano-particles in technology and medicine. Your suggestions are welcome! We are ready to share NCW publications and souvenirs with the schools in your community -- please contact me or the California Section office for these materials.

Looking forward to hearing from you!

Alex Madonik, NCW Coordinator



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## *Goldilocks and the Three Zones* (Part 1)

Bill Motzer

### **Introduction**

You all know the story, *Goldilocks and The Three Bears*. Once upon a time... “Ahhh, this porridge is just right,” she said happily and she ate it all up. Did you guess that this month’s subject is about the relatively new branch of chemistry known as cosmochemistry or chemical cosmology, a term coined by Harold Urey (1893 to 1981, American physical chemist and 1934 chemistry Nobel Prize winner)?

Cosmochemistry is concerned with the origin and development of the chemical elements (including their isotopes) and substances throughout the universe. To date cosmochemistry’s major focus is on objects within solar system (*e.g.* meteorites, interstellar dust, comets, asteroids, planets, and moons) but the field is also closely related to a branch of astronomy known as astrochemistry in which scientists measure chemical elements and compounds in stars and interstellar dusts in the Milky Way Galaxy and other nearby galaxies. It also involves the search for terrestrial-like life in the universe, based on the elements of carbon, nitrogen, phosphorus, sulfur, oxygen, and hydrogen that compose most life forms and 99% of the human body.

### **Definitions**

The Goldilocks Zone, also known as the habitable zone (HZ), is commonly defined as the distance from a star that a terrestrial-like planet could maintain liquid water on its surface and consequently sustain terrestrial-like life. Planets in such zones are the likeliest candidates to be “habitable” namely capable of bearing extraterrestrial life similar to our own. The HZ concept generally does not include moons, because there remains insufficient evidence and theory to speculate which moons might be habitable on account of their proximity to a planet. The most familiar HZ is within our own solar system and is commonly referred to as the circumstellar HZ or CHZ. For convenience, this zone is titled

as HZ-1. An HZ could also occur within a galaxy (HZ-2), and there may even be regions of the universe more conducive to the development of life; these are termed as HZ-3.

Planets outside of our solar system have been detected by various methods; these are termed exoplanets. To date, 777 have been positively identified of which five are believed to be within an HZ.

### **HZ-1**

Based on various scientific models, the CHZ for our solar system (Figure 1) is believed to extend from a distance of 0.958 to 1.004 AU to perhaps 0.95 to 1.37 AU (if CO<sub>2</sub> is included as a greenhouse gas). (The Earth is at 1.000 AU or 149,597,870.7. Venus is at ~0.72 AU and Mars is at ~1.52 from the Sun.). Therefore, both Venus and Mars could be considered just outside the CHZ.

We believe that Venus is too hot with no liquid water and Mars is too cold with a sparse atmosphere to sustain complex terrestrial life, although there may be evidence of past bacterial life on Mars. On August 6, 1996, a Martian meteorite designated as ALH 84001 became newsworthy when it was claimed that it might contain trace evidence of life (see D. McKay, et al., *Science*, v. 273, pp. 924-930). An electron microscope study revealed chain-like structures attributed to fossil bacteria-like life forms similar to theoretical nanobacteria, but smaller than any known cellular life at the time of their discovery. If these structures are indeed fossilized life forms, they would be the first evidence of extraterrestrial life. NASA’s new car-sized Mars Science Laboratory (MSL, or Curiosity) is a Mars rover launched by NASA on November 26, 2011. Curiosity successfully landed on August 6, 2012, to begin two years of scientific discovery. The rover contains instruments that may be able to detect the chemical building blocks of either past or present life (*i.e.* biosignatures; see ACS produced video “Chemistry on Mars” at [www.bytesize-science.com](http://www.bytesize-science.com)).

The CHZ also depends on a star’s mass and luminosity. For a star with 0.5 solar

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and luminosity. For a star with 0.5 solar masses, the CHZ would be just inside Mercury's orbit at 0.39 AU and for 2.0 solar masses the CHZ would be just inside of Jupiter's orbit at about 5.20 AU (see an animation at: <http://library.thinkquest.org/C003763/flash/habzone1.htm>).

But, even if a planet is within an HZ, it must have other criteria that would be amenable to the formation of life, particularly for advanced complex life forms similar to those found on Earth. Using Earth as a model, here are some of the important criteria:

(1) a stable metal-rich star

- (2) a metal-rich rocky planet
- (3) a strong constant magnetic field
- (4) a stable almost circular orbit
- (5) a planetary rotation with a stable axis
- (6) a sufficiently dense atmosphere
- (7) a world ocean
- (8) continental platforms and plate tectonics

These will be discussed in more detail in subsequent articles.

[In remembrance of Dr. Sally Ride (1951-2012), physicist, scientist, educator, astronaut, and first American woman in space].

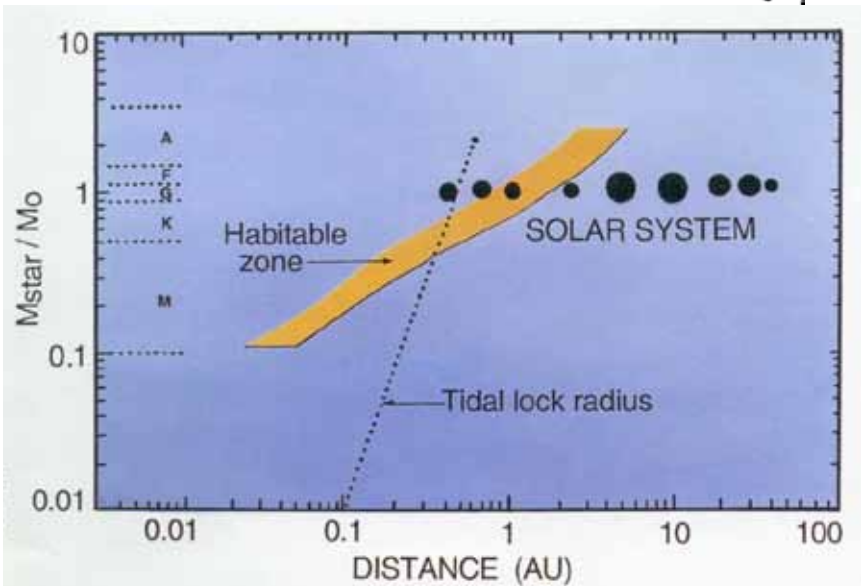


Figure 1: The HZ in relation to a star's mass. The solar system's planets (with the Sun as a G2 star at  $M_{\text{star}}/M_{\odot} = 1.0$  or mass of star divided by mass of Sun) are shown as solid circles beginning with Mercury on the left, proceeding (left to right) to Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, and Pluto (now reclassified as a dwarf planet). Reference: Kasting et al., 1993, *Icarus*, v.101, p.108.

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*Join the Women Chemists Committee for their meeting on  
Saturday, September 8, 2012  
at the Lafayette Library Community Hall*

**Topic:** “Turning Challenges into Opportunities: A Personal and Professional Journey into the 21<sup>st</sup> Century”

**Speaker:** Marinda Li Wu, 2012 President-Elect, American Chemical Society

**Time:** 11:00 – Meet the speaker, 1:30 – Lunch.. 12:00 – 1:00 pm – Presentation

**Cost:** \$16.00 Lunch. \$ 8.00 Students with ID, No charge for presentation only (All are welcome)

Please register (including lunch or for talk only) by email to [office@calacs.org](mailto:office@calacs.org) or by phone (510) 351-9922. If mailing a check in advance, please make payable to “California Section ACS” and send to Cal Section Office, 2950 Merced Street #225, San Leandro, CA 94577, postmarked no later than August 31, 2012.

**Abstract:**

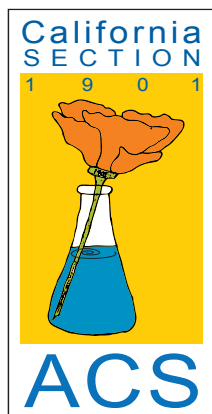
Due to the Korean War, Marinda was born in Pasadena, California, instead of Beijing, China. Growing up in a traditional academic Chinese family influenced her life direction. Marinda was the first in her family to venture into industry by joining Dow Chemical after earning a Ph.D. in chemistry from the University of Illinois at age 25.

In 1994, Marinda became Chair of the local ACS California Section Women Chemists Committee and then served in various leadership roles before being elected to the ACS Board in 2006 and then ACS President-Elect in 2011 — the first Asian and only the eighth woman President of the ACS in its 136 year history. The ACS is the largest scientific society in the world, with over 164,000 members worldwide. As President-Elect, Marinda advocates for science and education.

Marinda will share her story of turning challenges into opportunities and how destiny and determination impacted where she is today. Marinda will also share a few thoughts on leadership as well as her ACS Presidential initiatives for 2013.

*Section Logo Contest*

The Judges are pleased to announce that Sarah Batt Throne submitted the winning entry. Congratulations. The Executive Committee will decide if this or any of the other submissions will be selected as the official Section Logo





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metabolism this trade-off between short-term survival and long-term health and each uses a different mechanism to accomplish this end. Theory and evidence suggest that this metabolic trade-off accelerates aging-associated diseases, such as cancer, cognitive decline, and cardiovascular disease. Importantly, by the official U.S. Institute of Medicine measure of inadequacy, the EAR (Estimated Average Requirement; the RDA is set at 2 SD above the EAR), most of the U.S. population is below the EAR for one or more V/M. Taking these long-term triage effects into account in setting EARs could lead to numerous changes. We have calculated from the NHANES database that the percentages of the U.S. population that are below the EAR are: magnesium 56%; zinc 12%; iron 16% of menstruating women; vitamin B6 49% of elderly women; folate 16% of adult women. The U.S. population also has very low intake of vitamin D, calcium, potassium, omega-3 fatty acids, vitamin K,

and probably others, and this is especially true for children, adolescents, elders, and the obese. Longevity proteins, about half of those studied, indicate a mechanism that could be used for prevention by monitoring for insidious damage and suggest the existence of an undiscovered class of longevity V/Ms, which we are discovering. Our Choribar (V/M-dense, low-calorie, high-fiber, fruit-based) markedly improves metabolism in many human trials (5).

#### References:

- (1)Ames, B (2006) Proc. Natl. Acad. Sciences, U.S.A., 103:17589-94.
- (2)Ames, BN (2010) J Nucleic Acids. doi:10.4061/2010/725071.
- (3)McCann JC and Ames BN (2009) Am J Clin Nutr. 90: 889-907. doi: 10.3945/ajcn.2009.27930.
- (4)McCann JC and Ames BN (2011) FASEB J. doi:10.1096/fj.11-180885.
- (5)Mietus-Snyder, et al. (2012) FASEB J. published online ahead of print doi:10.1096/fj.11-201558.



## **Do you need Scientific Information to Advance your Work?**

By Michael P. Filosa, CCAS Member 2011-13

Since 1907 Chemical Abstracts Service (CAS) <http://www.cas.org/> has been abstracting and indexing the chemical literature. Coverage includes journals and patents worldwide. The CAS Registry file currently contains over 68 million compounds. Through its software products, such as SciFinder, chemical professionals in both industry and academia can easily and quickly search CAS databases for structures and references critical to their work.

Chemical Abstracts is the largest operating division within the American Chemical Society (ACS). It plays an important role both in fulfilling one of the Society's key objectives – the dissemination of chemical information – as well as providing a financial surplus to fund society programs. CAS employs more than 600 chemists in Ohio and others around the globe to support its mission. The CAS website has a FAQ page that can quickly answer a number of basic questions about CAS and access to its products. <http://www.cas.org/about-cas/faqs>

## *April 28, 2012 24<sup>th</sup> Annual Northern California Undergraduate Research Symposium*

Mills College hosted the undergraduate research symposium this year and a tremendous amount of chemical research was presented. The research topics ranged from biochemistry, material science, organic and inorganic synthesis, to atmospheric science. More than 160 people attended this year's event which had 23 oral research presentations and 60 student research posters.

The student poster session and presentations were held in LEED Platinum Moore Hall at Mills College. Students and faculty from 16 different educational institutions throughout Northern California were participating in the symposium. The students and faculty enjoyed Tori Hoehler's keynote lecture on the Fundamental Chemistry in the Search for Life Beyond Earth after the morning oral presentations and poster session.

Photos of the Undergraduate Research Symposium are posted at the following link:  
<http://westernspectroscopy.org/2012MillsACS/>

Thanks to all the Mills College faculty who coordinated and organized the symposium!!  
The student research was terrific and inspiring.

Steve Bachofer

## *Formation, Function, and Future of EBMUD*

Presented at 6/9/12 WCC Meeting by Linnea Hoover, EBMUD Laboratory Supervisor  
E.S. Yamaguchi and S.W. Yeh, ACS Women Chemists Committee

Thanks to the welcoming spirit of Professor John Brabson of Mills College, the Women Chemists Committee (WCC) held its recent meeting in the relatively new Moore Natural Sciences Building. Ms Linnea Hoover, a veteran (27 years) employee of the East Bay Municipal Utility District (EBMUD) and Supervisor of the Inorganic Chemistry Section shared her knowledge about the formation, function and future of EBMUD.

The EBMUD Laboratory is located at the EBMUD Main Wastewater Treatment Plant in Oakland, California. The facility has approximately 18,000 square feet of analytical workspace and a staff of more than 30 analysts. The Laboratory is a full-service environmental laboratory providing analysis of water, wastewater, and hazardous materials in support of the Clean Water Act (CWA), Safe Drinking Water Act (SDWA), National Pollutant Discharge Elimination System (NPDES) and Resource Conservation and Recovery Act (RCRA). Approximately 50,000 samples are processed annually by the Laboratory to comply with these regulations and to monitor District processes. The data generated by the Laboratory must be of known quality that meets customer needs, is legally defensible, and meets requirements of reference methods and the California Department of Health, Environmental Laboratory Accreditation Program (ELAP).

An issue to consider for the future...should water suppliers continue to treat drinking water to SDW Act standards when only the smallest fraction of water provided is consumed by customers? Is there a better use for the ~ 60 million gallons of treated wastewater that is currently discharged into the Bay? Discussion followed, and whether we lived in the EBMUD district or not, we marveled at the system and quality of water available to us in the Bay Area.



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