# Biophysical Society NEWSLETTER

August 2011

### 56<sup>th</sup> Annual Meeting

February 25–29, 2012 San Diego, California

Abstract Deadline

October 2, 2011



# Five Society Members Named 2012 Awardees

The Biophysical Society is proud to announce the recipients of five of the 2012 Society Awards. These members will be honored at the Awards Symposium on Tuesday, February 28, 2012, in San Diego, California, where they will each give a presentation.



*Charles R. Sanders*, Vanderbilt University, will receive the Anatrace Membrane Protein Award for his innovative research in the field of membrane protein structure using

NMR spectroscopy and contributions both to the development of model membrane systems and to unraveling the biophysical mechanisms underlying diseases linked to membrane protein misfolding and dysfunction.



*Lucy R. Forrest*, Max Planck Institute of Biophysics, will receive the Margaret Oakley Dayhoff Award for her critical research on conformational changes of membrane proteins related to their function, and her impact on the field of computational structural biology.

# CONTENTS

Biophysicist in Profile	2	Public Affairs 8	
Obituary: Gary K. Ackers	4	Members in the News 9	
New Postdoc Travel Awards	5	Subgroups 10	Biophysical Society
Biophysical Journal	6	Grants and Opportunities 11	
Student Spotlight	7	Upcoming Events 12	





the single-molecule level, and the development of coherent nonlinear vibrational microscopy.



*Vijay Pande*, Stanford University, will be awarded the Michael and Kate Bárány Award for Young Investigators for developing field-defining and field-changing computational

methods to produce leading theoretical models for protein and RNA folding.

defines how drugs and poreforming proteins and peptides interact with lipid bilayers. *Sunney Xie*, Harvard University, will be honored with

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# **Biophysicist in Profile**

#### CRAIG GOUGH

Craig Gough, founder of Reconesis, a biotech and pharmaceutical consulting company based in Tokyo, Japan, knows when to stick with his strengths. "My talent is being able to recognize which combination of previously published methods is appropriate for a problem, rather than developing novel techniques," he says. This talent, whether used for researching real-world applications in the lab or improvising a jazz solo at the piano, earns him his living.

Gough got started in science by way of music. A professional musician right out of high school, he spent a few years playing gigs around Vancouver. He even entered Berklee College of Music in Boston to continue his musical education. However, it only took a year in Boston, with its multitude of universities offering countless opportunities, to realize that there was more to his general childhood interest in science. He reclaimed that interest at McGill University in Montreal, majoring in biochemistry. After completing his undergraduate degree, he modeled himself after chemical physics majors at Cornell University, taking the courses they took, which piqued his interest in areas like quantum mechanics and newer, juicier aspects of biophysics. Exploring this territory, Gough excelled. "Craig is all or none in any endeavor or project," says Andrew Carmen, a fellow student at Cornell and a member of Alpha Chi Sigma, the national chemistry fraternity, of which Gough was also a member. "He can often cut through the theoretical space like a bullet to make profound insights that others casually miss."

Faced with deciding what to do next to take advantage of this ability and his freshly earned masters in biophysical chemistry, Gough transferred to the University of California, San Francisco (UCSF), where he found a plethora

"The most attractive aspect of working in time molecular dynamics of macroindustry is being able to use a variety of approaches to solve a particular problem." into its own and I saw that with more computational power this method -CRAIG GOUGH

of options. "As it turned out, at that molecules was just starting to come could have vast potential to solve biological problems," he says. He hastened

to join Peter Kollman's lab, where he stayed throughout his PhD.

Gough continued at UCSF as a postdoc in Raj Bhatnagar's lab, which proved to be challenging. "This was an experimental lab, with no other computational experts present, in which I was expected to use computational chemistry to tackle problems related to the design of bioactive peptides derived from proteins," he recalls. There was, however, a bright side. "It was worth tackling the challenges inherent in this position," he says, "as some of the projects I worked on involved collaborations with industry, and I could see the advantages of working in industry."

One of his industry partners was Amrit Judd, President and CEO of Synvax, Inc., who enlisted Gough for help on an NIH-funded project developing antivirals for influenza. She couldn't have found a more informed colleague, recalling vividly "his thorough knowledge about almost all the programs and tools available to conduct computational chemistry and design biologically active compounds, especially peptides to make them therapeutically useful," she says.

After his postdoc, Gough joined the Integrated Database Team at the Japan Biological Information Research Center (JBIRC) in Tokyo. Five years later, Gough sensed that the project was "winding down," he says. He knew he had to take another path if he wanted to keep pursuing his own work. He also knew he wanted to stay in Japan with his wife, Chie Shinohara, a neurosurgeon with an already prosperous career. After a fruitless search for a position in academia or industry that matched his ideal, Gough opted to blaze his own trail. "I decided to start Reconesis," Gough says, "pursuing the research in which I'm interested and developing aspects of that research which could be valuable in terms of services and consulting to biotech and pharmaceutical companies as well as academic groups."

With Reconesis, Gough created a career that offers the freedom to research what he wants, when he wants, where he wants. "I am predicting sites in the three-dimensional structures of proteins which are dynamically coupled to functional sites such as ligand binding sites and/or catalytic active sites and which could positively or negatively modulate the activity of those sites," he says. Putting his innate talent to work, he takes an existing knowledge base of methods and improvises new uses for them. "I am using these approaches on a large number of proteins of pharmaceutical interest in order to show the potential for developing drugs that could inhibit or activate the proteins in question for the purposes of disease therapy," he says.

With so much independence inside a niche market, Gough faces his own set of difficulties. "The most challenging aspect of my work is choosing problems that are simultaneously soluble, intellectually interesting, and relevant enough to other groups in industry or academia to be a source of income," he says—a formidable task, but one he has honed down to a science. He typically starts with the literature. "The existence of well-tested published methodology suggests that your extension of the method beyond the published test cases to practical cases is likely to result in successful solution of the relevant problems," he explains, "while the fact that this new methodology requires specialized expertise not commonly found in industrial or academic settings means that it's not hard to demonstrate how your own work can be useful to other research groups, for marketing purposes." For Gough, working out new real-world solutions using these tools is heady stuff, with a generous payoff. "The intellectual interest comes from the challenge of applying the methodology to novel situations, which might present more difficulties and complications than the published test cases," he says.

Finding customers is a challenge in itself. One tried-and-true avenue down which he struts his sales pitch is the Biophysical Society Annual Meeting. "The annual meetings provide a broader exposure than more focused meetings such as those in theoretical chemistry or biochemistry," he says. "They have been most useful for meeting academic specialists in other fields who may be possible collaborators and/or users of the services of Reconesis."

Gough's self-made career leaves him ample flexibility for family time. He and his wife often travel together, especially to the mountains for a change of scenery from their urban home. Shinohara is also a musician; listening to classical and jazz music, as well as playing it themselves, supplies a favorite pastime for the couple. "He's taught me ... to improvise on violin in a jazz context, to develop the intuitive freedom to do this," says Shinohara. "However, I think he didn't really teach me in a formal way, he just provided an environment where I could pick it up by myself."

Indeed, Gough fostered his own independent spirit when he embarked on his unique career path. "Consider all of the career options that are open, not just the path leading to a traditional academic faculty position," he advises. "In the past, a faculty position may have been the only option in which to pursue basic research in biophysics; industry positions involved applied research that was less creative and less independent. However, in recent years companies have begun doing the kinds of research once found only in academia." So has Gough, with great success.



Craig Gough and his wife, Chie Shinohara, taking in the Japan wilderness.



Gary Ackers

# Obituary Gary K. Ackers (1939-2011)

Gary Keith Ackers, professor and researcher in molecular biophysics, died on May 20, 2011, at age 71 from early-onset Alzheimer's disease. His research focused on the thermodynamics of macromolecular assemblies, in particular protein-DNA systems and human hemoglobin. He developed an innovative approach to the analysis of cooperative oxygen binding by hemoglobin using linkage thermodynamics, applying lessons learned from DNA binding studies using footprint titration methods. This approach required the development of laboratory techniques such as large-zone analytical gel chromatography, low-temperature isoelectric focusing, and methods for modifying and hybridizing human hemoglobin tetramers.

Ackers' laboratory was known for careful, highprecision measurements. Even as the field of molecular biophysics became more and more reliant on structural rather than functional information, Ackers remained a fervent advocate of the application of thermodynamics to the study of macromolecular systems. His work revealed that hemoglobin operates according to specific codes built into each binding site, rather than into the molecule as a whole.

Gary was drawn to science at a young age, winning the San Francisco Bay Area Science Fair at age 15. He published his first five scientific papers while majoring in chemistry and mathematics at Harding College. He earned his doctorate in physiological chemistry with *Tom Thompson* at Johns Hopkins University, and then joined the faculty at the University of Virginia, becoming full professor at age 33. He returned to Johns Hopkins University in 1977 as Professor of Biology and the McCollum-Pratt Institute. While at Hopkins, he also served as Professor of Biophysics and Director of the Institute for Biophysical Research on Macromolecular Assemblies, which he founded through the National Science Foundation. He relocated to Washington University School of Medicine in St. Louis, Missouri, in 1989 as the Raymond H. Wittcoff Professor and Head of the Biochemistry department. There, he established the Molecular Biophysics program and expanded the new Department of Biochemistry and Molecular Biophysics. He was a member of the American Society of Biochemistry and Molecular Biology, the American Association for the Advancement of Science, the American Chemical Society, and a Fellow of the Biophysical Society. He was a co-founder of the Gibbs Conference on Biothermodynamics.

Gary was known for his sense of humor and propensity for science puns. He was deeply gratified by the success of the graduate and postdoctoral students who trained in his laboratory. He is survived by his wife, *Jo M. Holt*, who was friend, confidante, and close collaborator in the last decade of his research career, and by her son, *James Hazzard*. He is also survived by his first wife, *Naomi Caldwell*, and their children: *Lisa Ackers*; *Sandra Ackers* and her husband *Bryan Session*; and *Keith Ackers*, his wife *Mimi* and their children, *Anna* and *Owen*.

In the course of his career, Gary gave lectures on thermodynamics across the United States, Europe, the former Soviet Union, and China. A fund for trainees in biophysics at Johns Hopkins University has been established in his name, the Gary K. Ackers Travel Fellowship Fund, for which donors are asked to contact *Richard Hastings* (hastings@jhu.edu).

--Jo M. Holt, Washington University School of Medicine

# New Postdoc Travel Awards

Four Biophysical Society committees will be offering travel awards for postdoctoral fellows presenting abstracts at the 2012 Annual Meeting in San Diego, California.

For the first time, the Minority Affairs Committee and the Education Committee are sponsoring postdoc travel awards to the Annual Meeting. The Minority Affairs Committee will be offering travel grants for minority postdocs, while the Education Committee's postdoc travel awards are open to any postdoctoral fellow presenting an abstract at the 2012 Annual Meeting.

These new postdoc awards are in addition to the travel awards already offered to postdocs by the Committee for Professional Opportunities for Women (CPOW) and the International Relations Committee.

Students, junior investigators, and senior scientists who are presenting abstracts at the 2012 Annual Meeting may also be eligible for specific travel awards. For more information on all travel awards, and to see for which travel awards you qualify, visit www.biophysics.org/2012meeting.



# Biophysical Journal

### **New Submission Site**

*Biophysical Journal* has a new submission site! As of July 5, all authors are required to upload new manuscripts to the submission site supported by eJournal Press. You may recognize the site— *Nature* journals, *Journal of Immunology, JNCI*, *JAMA*, and *Molecular Biology of the Cell* all use eJournal Press for their manuscript submissions. The new submission site offers faster download times, easier navigation, the ability to accept and decline reviews without logging into the site, and more. Check out the new site at http://biophysj.msubmit.net.

### **Editorial Board Members Named**

On July 1, fifteen new members were added to the Biophysical Journal Editorial Board, replacing members whose terms ended on June 30. The following members will serve a three-year term, ending in 2014: Reka Albert, Pennsylvania State University; David Cafiso, University of Virginia; Bert de Groot, Max Planck Institute of Biophysical Chemistry; Jose Faraldo-Gomez, Max Planck Institute of Biophysics; Michael Feig, Michigan State University; Mei Hong, Iowa State University; Chris Lingle, Washington University School of Medicine; Francesca Marassi, Sanford Burnham Institute; Michael Levitt, Stanford University; Davide Odde, University of Minnesota; *Elizabeth Rhoades*, Yale University; Godfrey Smith, University of Glasgow; Ed Stuenkel, University of Michigan; Cecile Sykes, Center for the National Research of Science; and Alissa Weaver, Vanderbilt University Medical Center.

To view the entire Editorial Board along with a listing of areas of expertise, visit the website at www.biophysics.org.



Biophysica

# Biophysical Journal

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To ensure proper functionality of this site, both <u>JavaScript and Cookies</u> must be enabled in your browser. Welcome to the <i>Biophysical Journal</i> , please log in. <i>Biophysical Journal</i> is in the process of transitioning to a new manuscript submission site. Please use links below to direct you to the correct submission site. We apologize for any inconvenience. <u>Manuscripts submitted to <i>Biophysical Journal</i> prior to July 5,2011 Questions? Contact the <i>Biophysical Journal</i> Editorial Office at bj@biophysics.org or 240-290-5545. If this is your first time using this submission site, but you have submitted or prior to</u>	
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# Student Spotlight

Diana L. Wesch University of La Laguna/Hospital Universitario NS Candelaria, Tenerife, Spain Alvarez de la Rosa & Giraldez Lab

#### What initially attracted you to biophysics?

The fact that our perception, reflexes, and thinking are based greatly on the brain's electricity made me curious about the excitability of organisms. To be able to see electric currents in a living cell gave rise to my interest in membrane physiology and ion channels.

#### What specific areas are you studying?

Regulation of the epithelial sodium channel (ENaC) subunit δ.

#### What is your current research project?

With two-electrode-voltage-clamp and confocal microscopy we characterize isoform specific properties between  $\delta 1$  and  $\delta 2$ , and underlying mechanisms to regulate these channels.

#### What do you hope to do after graduation?

I'd like to be a good scientist and stay in investigation, but at this stage I wouldn't preclude other options. The purpose is to work on something I am interested in.

#### If you could give one piece of advice to someone just starting their undergraduate science career, what would it be?

The one that I was told when I just started: one is not studying alone. Build a group and make teamwork. It is more fun and also more efficient, when you can communicate questions, doubts, and also knowledge with other persons. If you share information you get more different points of view and further insights into a particular topic—and friends.

#### Why did you join the Biophysical Society?

The Biophysical Society offers an excellent platform to exchange ideas and results, with lots of possibilities to get informed and to grow in science.

#### What (or who) inspires you scientifically?

Curiosity to understand things. Sometimes you can predict the result of an experiment and other times it's distinct from the expected one. Then we can argue and find new ways to elaborate ideas. I appreciate work of other groups: While reading it happens a lot that I get new insights and can combine them with our results or get another idea to approach the resolution of a problem. Hopefully, we can contribute with this work to the higher aim to cure or relieve diseases.

#### Teresa Giraldez, Wesch's PI, says:

"If I have to define Diana, I would say she is a hard, thorough, competitive, and strong-minded scientist. She was brave enough to come from Germany to Spain to do her PhD in our small starting-up lab where she is doing a fantastic job, which will be wrapped up with a European Doctorate by the end of this year. During the last three years in our lab, she's been a visiting student at the National Institutes of Health in Bethesda, Maryland and at the Max Plank Institute in Goettingen, Germany. She's a good example that, in search for knowledge, the world (and over the whole scientific world) has no limits!"

#### Suggest a Student to Spotlight

Do you have a spotlight-worthy student in your lab? Send his/her name to society@biophysics.org.

# Public Affairs

### Greenberg Named NIGMS Acting Director

*Judith H. Greenberg* assumed the role of acting director of the National Institutes of Health's (NIH) National Institute of General Medical Sciences (NIGMS) in early July. She will hold the post while the search continues for a permanent director.

Greenberg will oversee the Institute's \$2 billion budget, which primarily funds basic research in the areas of cell biology, biophysics, genetics, developmental biology, pharmacology, physiology, biological chemistry, bioinformatics, and computational biology. NIGMS supports more than 4,500 research grants—about 10% of the grants funded by NIH as a whole—as well as a substantial amount of research training and programs designed to increase the diversity of the biomedical and behavioral research workforce.

"I look forward to continuing our efforts to capitalize on exciting scientific opportunities, get input on and respond to the needs of the research community, and build in other ways on the considerable progress we've made during Dr. Berg's tenure," Greenberg said in a press release.

"In the months ahead, we will also be focusing on implementing our new strategic plan for research training. And we very much look forward to a major milestone in 2012, when NIGMS marks its 50th anniversary," she added.

A developmental biologist by training, Greenberg has directed the NIGMS Division of Genetics and Developmental Biology since 1988. She served as NIGMS acting director from May 2002 to November 2003. Greenberg earned a PhD in developmental biology from Bryn Mawr College in Bryn Mawr, Pennsylvania.

### BPS Suggests NIBIB Not Lose Sight of Basic Research

In May, the National Institute of Biomedical Imaging and Bioengineering (NIBIB) at NIH released a draft strategic plan outlining its priorities for the next five years and asking for input for the community. The Biophysical Society's (BPS) Public Affairs Committee prepared and submitted comments on behalf of the Society's membership.

The plan outlined five major goals for NIBIB through 2016:

- Improve human health through the development of emerging biomedical technologies at the interface of engineering and the physical and life sciences;
- Enable patient-centered health care through development of health informatics and mobile and point-of-care technologies;
- Transform advances in medicine at the molecular and cellular level into therapeutic and diagnostic technologies that target an individual's personal state of health;
- 4. Develop medical technologies that are low-cost, effective, and accessible to everyone; and
- Develop training programs to prepare a new generation of interdisciplinary engineers, scientists, and health care providers.

In its comments, BPS complimented the inclusion of interdisciplinary science as a main goal for NIBIB. The report correctly points out that many of most important advances in basic research and medical care have come from this interface.

However, the Committee challenged NIBIB not to lose sight of basic biomedical research in its quest to do more at the interface of basic and clinical research, pointing out that the interface of the physical sciences and engineering with biomedical researchers studying fundamental issues was a key component of past clinical breakthroughs, such as the development of magnetic resonance imaging and drugs designed based on high-resolution crystal structures determined with synchrotron generated x-rays.

NIBIB will review all of the submitted the comments and issue a final report in the next few months.

To read the strategic plan in its entirety, go to http://www.nibib.nih.gov/About/StrategicPlan.

To read the Society's comments, go to www.biophysics.org/tabid/2243/Default.aspx.

### NSF Releases Strategic Plan

This spring, the National Science Foundation (NSF) released a new five-year strategic plan Empowering the Nation Through Discovery and Innovation: NSF Strategic Plan for Fiscal Years 2011–2016, which will guide the agency's investments for the next five years. The plan outlines three goals that aim to transform scientific frontiers, innovate for society, and achieve operational excellence at the agency. This includes investing in potentially transformative research, emphasizing interdisciplinary approaches to research, and improving the ability of the merit review process to identify this type of research.

The report can be read in its entirety at http://www.nsf.gov/news/strategicplan/ nsfstrategicplan\_2011\_2016.pdf.

# Members in the News





Herbert Levine (top left), José Onuchic (not pictured), and Peter Wolynes (bottom left), members since 2004, 1991, and 1995, respectively, of the University of California, San Diego, are joining the faculty at **Rice University's BioScience Research Collaborative** (BRC). Onuchic and Wolynes joined the faculty at Rice on July 1 and Levine will join the faculty in 2012.







of Brandeis University.

David Deamer of the University of California, Santa Cruz and Society member since 1979 recently published a new book entitled First Life, which presents his longtime research on the beginnings of life on Earth.

Lily Jan (not pictured) of the University of California, San Francisco, and Society member since 1998 was awarded the 2011 Wiley Prize in Biomedical Sciences, along with her husband, Yuh Nung Jan.

# Subgroups

### IDP Pedagogy, Part I

This article is the first in a series of articles illustrating how IDPs are taught across the discipline. Look for subsequent installments in future Newsletters.

Ryan Hoffman, IDP Postdoctoral Representative, interviewed Gary Daughdrill, Associate Professor at the University of South Florida, regarding his approaches to teaching about IDPs.

#### What types of students do you usually teach?

All types, it does not really matter. It is best if they have a good foundation in chemistry.

#### When you introduce students to IDPs, are the students usually already aware of protein structure, or do you get to introduce both subjects?

Now I teach an introductory Cell Biology class, so I start with the sequence-to-structure paradigm. Once the polypeptide is synthesized, we talk about multiple fates, depending on the sequence characteristics of the polypeptide and interactions with water.

If the students are already products of the "traditional" protein structural pedagogy (primary-tertiary structure, heme-globins as paradigmatic globular proteins) does that act as an impediment? What misconceptions about proteins do students most often need to unlearn?

I have not experienced a lot of students that fall into this category. Even the graduate students that I teach have typically had a fairly light introduction to protein structure and function. I think the fundamental impediment for any person to understand this problem is imagination. You have to be able to imagine what the molecule is doing. Simple movies can help in this area but you have to be careful to not present images that are physically unrealistic.

#### Do you look at IDPs as a kind of scientific revolution (in the Kuhnsian sense)? Do you emphasize that to your students?

Not really, and I think it is important for progress in the field that we move beyond this notion. IDPs are just proteins that have evolved a particular set of characteristics. I do think that the human brain has more difficulty processing the notion of disorder than it does order and this combined with how much 3-D structures of ordered proteins were able to impact understanding of function was part of the reason for the lag in focusing attention on these proteins. I also think that the lack of a consensus description of the equilibrium ensembles of IDPs is inhibiting progress in the field. I am not sure how much longer it is going to take to get to this point, but it does not help when some groups claim to have already solved the problem.

# There are multiple devices for describing the protein universe. Do you have more success with a particular approach?

I do like the energy landscape and actually have a standard figure that I use in my conference talks to compare energy landscapes for ordered and disordered proteins. For the students I teach now, we are not getting into the problem this deeply.

Structure-activity relationships are almost always described in ordered systems. What are your favorite—putative or accepted structure-activity relationships for disordered proteins?

The two that I think are the simplest to conceptually display and that we have the most data on are coupled folding and binding, and flexible linkers.

-Jianhan Chen, IDP Secretary/Treasurer

### BIV

We are excited to announce the Biopolymers in vivo (BIV) subgroup plans for the next Biophysical Society Meeting in San Diego in 2012.

The theme of the Biopolymers in Vivo Symposium will be "Bridging *in vivo* and *in vitro* studies."

We are pleased to have secured a stellar list of speakers, including experimentalists and theorists at the forefront of this emerging field. The keynote talk will be delivered by *Tom Record*, University of Wisconsin. Other invited talks will be given by *Christine D. Keating*, Pennsylvania State University; *Sarah Woodson*, Johns Hopkins University; *Huan-Xiang Zhou*, Florida State University, *Gary J. Pielak*, University of North Carolina; and *Jeffrey Skolnick*, Georgia Institute of Technology. To give young researchers an opportunity to present exciting new research, two slots will be reserved for postdoctoral or graduate student presentations. Look for more information about these in subsequent Newsletters.

We are again planning a group dinner, taking place on Saturday, February 26, 2012, to conclude the Symposium. Please plan to attend!

We look forward to seeing all of you in San Diego in 2012!

*—Joan-Emma Shea*, Biopolymers in vivo Member at Large



# Grants and Opportunities

Name: NSF International Science & Engineering Visualization Challenge

Objective: The National Science Foundation (NSF) and the journal Science, published by the American Association for the Advancement of Science, invite you to participate in this year's Challenge. The competition recognizes scientists, engineers, visualization specialists, and artists who produce innovative work in visual communication.

Submission Deadline: September 30, 2011

Website: http://www.nsf.gov/news/ special\_reports/scivis/challenge.jsp Name: ABRCMS Judges' Travel Subsidy

Objective: To provide an opportunity for faculty and postdocs who are active researchers and first-time attendees willing to serve as judges for all poster and oral presentations at the Annual Biomedical Research Conference for Minority Students.

Application Deadline: September 30, 2011

Website: http://www.abrcms.org/TravelSubsidy.html



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# **UPCOMING EVENTS**

#### October

October 22–27, 2011

Cell Signaling Networks Conference Mérida, Yucatán, México http://www.csn2011.com/

October 30-November 3, 2011

The 17th International Biophysics Congress Beijing, China http://www.17ibc.org/

#### November

November 17-19, 2011

10th Short Course of the Portuguese Biophysical Society: Nanosciences for Life Casa do Brasil, Santarém http://www.spbf.pt/article.php?sid=18

November 27–December 1, 2011

ANZMAG 2011: Biennial meeting of the Australian & New Zealand Magnetic Resonance Society Torquay, Australia http://anzmag2011.org.au/ ANZMAG2011/Welcome.html

#### December

December 3-7, 2011

51st American Society for Cell Biology Annual Meeting Denver, Colorado http://www.ascb.org/meetings/

#### January

January 7–8, 2012

Protein Folding Dynamics: Topics in Protein Folding and Aggregation Ventura, California http://grc.org/programs. aspx?year=2012&program=grs\_protf

January 22-27, 2012

Membranes in Motion: From Molecules to Disease Tahoe City, California http://www.keystonesymposia. org/Meetings/ViewMeetings. cfm?MeetingID=1143