21st Annual Gibbs Conference on Biothermodynamics

Saturday, September 29 - Tuesday, October 2, 2007

Touch of Nature Environmental Center
Southern Illinois University
Carbondale, Illinois

Organizers
Brian M. Baker and Michael T. Henzl

Sponsors
Aviv Biomedical • Calorimetry Sciences Corp • Cambridge Isotope Laboratories • HORIBA Jobin Yvon • ISS • MicroCal • Micromath • New England Biolabs • Olis • Sigma-Aldrich • Shamrock Structures • TA Instruments
Table of Contents

1. The Gibbs Conference on Biothermodynamics
   Josiah Willard Gibbs 2
   History of the Gibbs Conference on Biothermodynamics 3

2. Meeting Schedule
   Saturday (Check-in and Reception) 5
   Sunday (Sessions I and II) 5
   Monday (Sessions III and IV) 7
   Tuesday (Session V) 9

3. Posters
   Poster Information 10
   Poster Session I: List of Presentations (Ki – Z) 11
   Poster Session II: List of Presentations (A – Kh) 16

4. Abstracts
   Keynote / Session I: Protein Folding and Stability 21
   Session II: Membranes and Receptors 28
   Session III: Enzymes and Dynamics 35
   Session IV: Frontiers in Biophysics 43
   Session V: Assemblies and Interactions 50
   Poster Session I: First Authors Ki - Z 57
   Poster Session II: Authors A – Kh 107

5. List of Participants
   List of Participants 167
   Participants by Laboratory/Organization 177

6. Sponsors
   Sponsor List and Advertisements 180

Cover figure: Global analysis of calorimetric data provides insight into the energetics of conformational changes occurring on recognition of peptidic ligands by αβ T cell receptors
The Gibbs Conference on Biothermodynamics is only possible because of

Josiah Willard Gibbs

1839 – 1903
“The greatest thermodynamicist of them all”
– John Fenn, Nobel Prize in Chemistry, 2002

USNS Josiah Willard Gibbs, 1958-1971

USPS Gibbs Stamp, released May 5, 2005
## History of the Gibbs Conference on Biothermodynamics

**Touch of Nature Environmental Center, Carbondale, Illinois**

1st discussion of the discipline of Thermodynamics in Biological Systems.

**Fall, 1986**  
held in Vail, Colorado: Gary Ackers, Wayne Bolen, Ernesto Freire, Stan Gill, Jim Lee

2nd discussion of the discipline of Thermodynamics in Biological Systems.

**Feb, 1987**  
held in New Orleans: Gary Ackers, Norma Allewell, Wayne Bolen, Ken Breslauer, Ken Dill, Ernesto Freire, Stan Gill, Jim Lee

### Annual Gibbs Conference on Biothermodynamics

<table>
<thead>
<tr>
<th>Year</th>
<th>Organizers</th>
<th>Keynote</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st – 1987</td>
<td>Jim Lee and Wayne Bolen</td>
<td>Ernesto Freire</td>
</tr>
<tr>
<td>2nd – 1988</td>
<td>Gary Ackers and Michael Johnson</td>
<td></td>
</tr>
<tr>
<td>3rd – 1989</td>
<td>Susan G. Frasier and Michael Johnson</td>
<td></td>
</tr>
<tr>
<td>4th – 1990</td>
<td>Michael Johnson &amp; Marty Straume</td>
<td></td>
</tr>
<tr>
<td>5th – 1991</td>
<td>Gary Ackers &amp; Tim Lohman</td>
<td></td>
</tr>
<tr>
<td>Keynote:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6th – 1992</td>
<td>Jim Lee &amp; Tomasz Heyduk</td>
<td>Serge Timasheff &amp; John Schellman</td>
</tr>
<tr>
<td>Keynotes:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7th – 1993</td>
<td>Maurice Eftink and Glen Ramsay</td>
<td>Peter von Hippel and Julian Sturtevant</td>
</tr>
<tr>
<td>Keynotes:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8th – 1994</td>
<td>Enrico Di Cera and Madeline Shea</td>
<td>Gary Ackers and Kathleen S. Matthews</td>
</tr>
<tr>
<td>Keynotes:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9th – 1995</td>
<td>Kenneth P. Murphy and Michael D. Brenowitz</td>
<td>Victor Bloomfield and Mario Amzel</td>
</tr>
<tr>
<td>Keynotes:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Keynotes:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11th – 1997</td>
<td>Dorothy Beckett and Jack Correia</td>
<td>Adrian Parsegian</td>
</tr>
<tr>
<td>Keynote:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12th – 1998</td>
<td>Andy Robertson</td>
<td>David Draper</td>
</tr>
<tr>
<td>Keynote:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13th – 1999</td>
<td>Bertrand Garcia-Moreno and John Shriver</td>
<td>Wayne Bolen and Gary Ackers</td>
</tr>
<tr>
<td>Keynotes:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14th – 2000</td>
<td>George Turner and Kim Sharp</td>
<td>Steve White (replaced Rodney Biltonen)</td>
</tr>
<tr>
<td>Keynotes:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15th – 2001</td>
<td>Margaret A. Daugherty and Luis A. Marky</td>
<td>George Rose</td>
</tr>
</tbody>
</table>

**President:** Jonathan B. Chaires, October, 2006 – October, 2007  
**President Elect:** Tim Lohman, October, 2007 – October, 2008  
**Secretary:** Margaret A. Daugherty, October, 2004 – October, 2008  
**Treasurer:** Michael Johnson, October, 2002 – October, 2008  

**Past Presidents:**  
Gary Ackers, October, 2001 – October, 2002  
Jack Correia, October, 2002 – October, 2003  
Wayne Bolen, October, 2003 – October, 2004  
Madeline Shea, October, 2004 – October, 2005  
Dorothy Beckett, October, 2005 – October, 2006
2. Meeting Schedule

Saturday, September 29, 2007

4:00 – 7:00 pm  Check In
7:00 – 10:00 pm  Reception in Indian Room
                 Light refreshments and beverages

Sunday, September 30, 2007

7:30 – 8:30 pm  Breakfast in Freeberg Hall
8:30 – 8:35 am  Welcome: Jonathan Brad Chaires, Gibbs Society President
8:35 – 8:40 am  Administrative Items: Brian Baker and Mike Henzl

Keynote Address

8:40 – 8:45  Introduction: Brian M. Baker
8:45 – 9:35  Jamie Williamson (The Scripps Research Institute)
             A postproteomic approach to study ribosome assembly
9:45 – 10:05 Refreshment break

Session I:  Protein Folding and Stability

Moderator:  Scott Crick (Washington University; R. Pappu Lab)

10:05 – 10:35  D. Wayne Bolen (University of Texas Medical Branch)
               Anatomy of the energetics of osmolyte-induced protein folding/unfolding
10:40 – 10:55  Krastyu Ugrinov (University of Notre Dame; P. Clark Lab)
               Conformational properties of ribosome-bound GFP
11:00 – 11:30  Marina Ramirez-Alvarado (Mayo Graduate School)
               The folding and misfolding of immunoglobulin light chains - not all dimers
               are equal
11:35-11:50  Matthew Auton (Rice University; J. Moake Lab)
               Unfolding thermodynamics of a three domain fragment of Von Willebrand
               factor
11:55 – 12:25  Neil Zondlo (University of Delaware)
               Stereoelectronic effects and aromatic electronic effects in the control of
               protein structure

12:30  GROUP PICTURE followed by LUNCH
## Session II: Membranes and Receptors

**Moderator:** Robert J. Hoey (Northern Illinois University, J. Horn Lab)

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>3:15 – 3:45</td>
<td>Adrian Parsegian (National Institutes of Health)</td>
<td><em>Confined Polymers: in the cell, in the test tube, or in polymer brushes</em></td>
</tr>
<tr>
<td>3:50 – 4:05</td>
<td>Emily R. Lamberson (Purdue University; J. Hovis Lab)</td>
<td><em>Controlling the charge and organization of anionic lipid bilayers: effect of monovalent and divalent ions</em></td>
</tr>
<tr>
<td>4:10 – 4:25</td>
<td>Michelle M. Gomes (University of Cincinnati; A. Herr Lab)</td>
<td><em>Biophysical analyses of the role of glycosylation on IgA1-FcαRI interactions</em></td>
</tr>
<tr>
<td>4:30 – 4:50</td>
<td>Refreshment break</td>
<td></td>
</tr>
<tr>
<td>4:50 – 5:20</td>
<td>Karen Fleming (Johns Hopkins University)</td>
<td><em>Folding of outer membrane phospholipase A, a unique membrane embedded enzyme</em></td>
</tr>
<tr>
<td>5:25 – 5:40</td>
<td>Kathryn M. Armstrong (University of Notre Dame; B. Baker Lab)</td>
<td><em>Calorimetric studies of a T cell receptor – ligand interaction and the implications for CDR loop dynamics</em></td>
</tr>
<tr>
<td>5:45 – 6:15</td>
<td>Eric J. Sundberg (Boston Biomedical Research Institute)</td>
<td><em>Energetic cooperativity and conformational flexibility in protein-protein interactions</em></td>
</tr>
<tr>
<td>6:30</td>
<td>Dinner in Freeberg Hall</td>
<td></td>
</tr>
<tr>
<td>8:00</td>
<td>Posters and Beer/Wine I in Sledgefoot Hall</td>
<td><em>First author last names L – Z</em></td>
</tr>
</tbody>
</table>
Monday, October 1, 2007

7:30 – 8:30  Breakfast in Freebird Hall

Session III:  Enzymes and Dynamics

Moderator:  Rebecca L. Davis-Harrison (University of Illinois-UC; J. Morrissey Lab)

8:30 – 9:00  David A. Johnson (University of California Riverside)
*Time-resolved fluorescence anisotropy and the measurement of protein conformational flexibility*

9:05 – 9:35  Anne-Frances Miller (University of Kentucky)
*Nitroreductase, a plastic explosive degrading protein*

9:40 – 9:55  Andrew Bigley (Texas A&M University; G. Reinhart Lab)
*A new tail in allostery: a reexamination of the role of the N-terminus of glycogen phosphorylase b in activation by AMP*

10:00 – 10:20  Refreshment Break

10:20 – 10:50  Greg Reinhart (Texas A&M University)
*Allosteric communication in a homo-tetramer: the inside story*

10:55 – 11:10  Rebecca Strawn (Princeton University; J. Carey Lab)
*Allosteric activation of arginine repressor*

11:15 – 11:30  Michael J. Harms (Johns Hopkins University; B. Garcia-Moreno Lab)
*Contribution of water penetration and conformational fluctuations to pKa values of internal ionizable groups*

11:35 – 12:05  Jeffrey W. Peng (University of Notre Dame)
*Functional motions of modular proteins - glimpses from NMR*

12:15  Lunch

12:15  Gibbs business meeting:  *all previous organizers please attend*
**Session IV: Frontiers in Biophysics**

**Moderator:** Francis Insaidoo (University of Notre Dame; B. Baker lab)

3:30 – 4:00 Carlos Bustamante (University of California Berkeley)
*Recent advances in single molecule manipulation in biophysics*

4:05 – 4:20 Katrina L. Schweiker (Pennsylvania State University; G. Makhatadze Lab)
*Computational design of the Fyn SH3 domain with increased stability through optimization of surface charge-charge interactions*

4:25 – 4:55 Ishita Mukerji (Wesleyan University)
*Spectroscopic and molecular dynamics evidence for a sequential mechanism for the A to B transition in DNA*

5:00 – 5:20 Refreshment break

5:20 – 5:50 Yuri Lyubchenko (University of Nebraska)
*Dynamics, mechanics and stability of synaptic SfiI-DNA complex: single molecule studies*

5:55 – 6:10 Ellen Kloss (Johns Hopkins University; D. Barrick Lab)
*Mapping of interfacial and intrinsic stabilities of leucine-rich repeat units in YopM*

6:15 – 6:30 Nichola C. Garbett (University of Louisville; B. Chaires Lab)
*Calorimetry outside the box: a new window into the plasma proteome*

6:45 Dinner in Freebird Hall

8:00 Posters and Beer/Wine II in Sledgefoot Hall

First author last names A – K