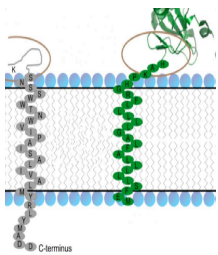


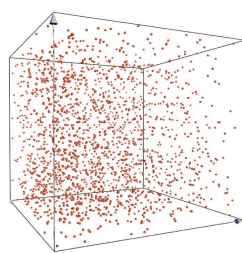


# The 33<sup>rd</sup> Annual Meeting of the Australian Society for Biophysics

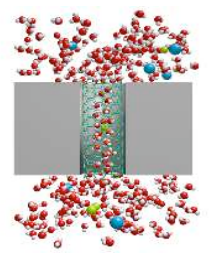
Sovereign Hill, Ballarat  
29 November to 2 December 2009



courtesy A. Ramamoorthy



courtesy G. King



courtesy T. Hilder

Welcome to Sovereign Hill, Ballarat, for a meeting of sublime contrasts, where we will witness the ground-breaking and earth-shattering effects of Australian and International biophysics on a backdrop of the shovels and dynamite of yesteryear.

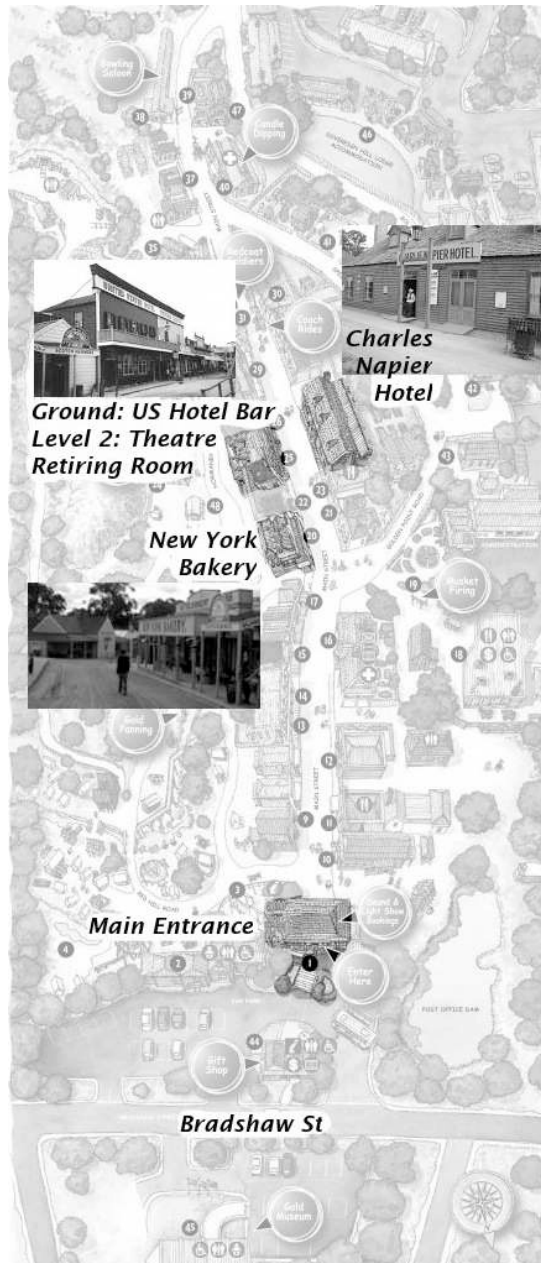
*from the Organising Committee*

	Andrew Clayton	
Jeff Babon	Michelle Gee	Frances Separovic
Glyn Devlin	John Gehman	Irene Yarovsky



**Sovereign Hill** is a recreated 1850s goldfields township set over 25 hectares on a site which forms part of the richest alluvial goldfields known. The Park is an outdoor museum, where guests interact with costumed staff who play the many roles of the times. The town is built on a low hillside, and includes some significant grades; shops, restaurants, mine buildings, and other structures of the times line unsealed roads, so please wear practical shoes.

**Registration:** Upon arrival at Sovereign Hill, let the ticketing desk know that you are attending the ASB/Australian Society for Biophysics Meeting; please proceed to our registration table in the lobby outside the Theatre Retiring Room, level 2 of the U.S. Hotel Bar.



Meeting registration includes a half-priced park entry, good for the duration of the conference.

The keynote and the 2008 Robertson lectures (and all lunches) will be held upstairs in the Theatre Retiring Room, followed by a welcome reception downstairs in the U.S. Hotel Bar.

**Monday–Wednesday:** The park does not open to the public until 10 AM. To enter at the main entrance for the first sessions, pass through the main glass doors, and proceed through the solid door immediately to the right. Anybody staying at the Sovereign Hill Lodge will need to make arrangements with Lodge staff for entry before the park opens. Coffee, tea and light breaky will be available at 8:30 AM in the Charles Napier Hotel.

**Blood on the Southern Cross:** Sovereign Hill does a sound a light show around the story of the Eureka Rebellion. The show with optional dinner must be booked directly with Sovereign Hill (advanced bookings +61 3 5337 1199, [bosc@sovereignhill.com.au](mailto:bosc@sovereignhill.com.au)). Showtimes vary:

	dinner	show	dinner	show
Nov	7:30	8:45	8:45	10:00
Dec	8:00	9:15	9:15	10:30

**There is no smoking within Sovereign Hill Park.**

*Many thanks to Angela Corcoran and all the staff at Sovereign Hill for their help with ASB2009!*

## Block Schedule 29 November - 2 December

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<b>Sunday Afternoon</b> <i>Theatre Retiring Room</i>	4
2:00 Registration	
3:50 Welcome Address <i>Andrew Clayton</i>	
4:00 Keynote Lecture <i>Chair Frances Separovic</i> . . . . .	4
<b>4:45 2008 Robertson Prize Lecture</b> <i>Chair: Angela Dulhunty</i>	
<b>5:30 - 7:00 Welcome reception</b> <i>United States Hotel</i>	
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<b>Monday Morning</b> <i>Charles Napier Hotel; coffee, tea and muffins available at 8:30</i>	4
9:00 Computational Biophysics I <i>Chair: Irene Yarovsky</i> . . . . .	4
10:35 Morning Tea	
11:00 Biophysical Characterisation Techniques <i>Chair: Andrew Clayton</i> . . . . .	5
<b>12:30 Lunch</b> <i>Theatre Retiring Room</i>	
<b>Monday Afternoon</b> <i>Charles Napier Hotel</i>	5
1:45 Membrane Biophysics <i>Chair: John Gehman</i> . . . . .	5
3:30 Afternoon Tea	
4:00 Protein Structure, Dynamics, and (Mis)folding I <i>Chair: Glyn Devlin</i> . . . . .	6
<b>5:50 Annual General Meeting</b> <i>Charles Napier Hotel</i>	
<hr/>	
<b>Tuesday Morning</b> <i>Charles Napier Hotel; coffee, tea and muffins available at 8:30</i>	6
9:00 Cellular and Molecular Biophysics and Bioengineering <i>Chair: Michelle Gee</i> . .	6
10:05 Poster Vignettes	
10:30 Morning Tea & Posters preview	
11:00 Biomolecules, Biomimetics, & Biomaterials <i>Chair: Glenn King</i> . . . . .	7
<b>12:30 Lunch</b> <i>Theatre Retiring Room</i> & <b>Posters</b> <i>Charles Napier Hotel</i>	
<b>Tuesday Afternoon</b> <i>Charles Napier Hotel</i>	7
2:30 Protein Interactions and Activity <i>Chair: Marco Casarotto</i> . . . . .	7
3:40 Afternoon Tea & Posters II last chance	
4:00 Computational Biophysics II <i>Chair: Shin-Ho Chung</i> . . . . .	8
<b>5:15 2009 Robertson Prize Lecture</b> <i>Charles Napier Hotel; Chair: Jamie Vandenberg</i>	
<b>7:00 Drinks</b> <i>United States Hotel</i>	
<b>7:30 Conference Dinner</b> <i>New York Bakery</i>	
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<b>Wednesday Morning Charles Napier Hotel; coffee, tea and muffins available at 8:30</b>	<b>8</b>
9:15 Protein Structure, Dynamics, and (Mis)folding II <i>Chair: Jeff Babon</i> . . . . .	8
10:30 Morning Tea & Prize tipping	
11:00 Ion Channels <i>Chair: Derek Laver</i> . . . . .	9

**12:30 Lunch & Prizes Theatre Retiring Room; Chair: Angela Dulhunty**

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Oral Abstracts	
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Wednesday . . . . .	46
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Meeting Participants . . . . .	69



## Sunday Afternoon

### 2:00 Registration

*Theatre Retiring Room foyer*

### Keynote Lecture

*Theatre Retiring Room; Chair: Frances Separovic*

- 4:00 **Ayyalusamy Ramamoorthy** *University of Michigan* ..... (p14)  
“Structural Studies of Membrane Proteins Using NMR Experiments on Bicelles”

### 2008 Robertson Prize Lecture

*Theatre Retiring Room; Chair: Angela Dulhunty*

- 4:45 2008 Recipient Ray Norton

### Welcome Reception

5:30 - 7:00 *United States Hotel*

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## Monday Morning

### Computational Biophysics I

*Charles Napier Hotel; Chair: Irene Yarovsky*

- 9:00 **Jill Gready** *Australian National University* ..... (p15)  
“What a difference one or two water molecules make to an enzymic mechanism: the final solution to the mechanism of dihydrofolate reductase?”
- 9:25 **Ashley Buckle** *Monash University* ..... (p16)  
“Understanding the role of dynamics in regulating enzyme activity”
- 9:50 **David Poger** ..... (p16)  
*University of Queensland*  
“Turning the growth hormone receptor on”
- 10:05 **Dan Gordon** *Australian National University* ..... (p17)  
“New directions in Brownian dynamics simulation of ion channels”
- 10:20 **Po-chia Chen** *University of Sydney* ..... (p18)  
“Successful binding energy prediction of ChTX-KcsA complex via umbrella sampling” (p18)

### 10:35 Morning Tea

## Biophysical Characterisation Techniques

*Charles Napier Hotel; Chair: Andrew Clayton*

- 11:00 **Paul Wiseman** *McGill University* ..... (p19)  
"Recent advances in image correlation spectroscopy for mapping protein transport & interactions in living cells"
- 11:25 **Pierre Moens** *University of New England* ..... (p20)  
"Single point FCS and number and brightness analysis on a commercial confocal laser scanning microscope with analog detectors (Nikon C1)"
- 11:50 **Peter Czabotar** *Walter & Eliza Hall Institute* ..... (p21)  
"Biophysical analyses in drug discovery; an academic perspective"
- 12:05 **Andrew Rapson** *University of Melbourne* ..... (p21)  
"Structure and orientation of a novel lytic peptide through synchrotron radiation circular dichroism" (p21)

### 12:30 Lunch

## Monday Afternoon

### Membrane Biophysics

*Charles Napier Hotel; Chair: John Gehman*

- 1:45 **Mibel Aguilar** *Monash University*  
"Real-time profiling of membrane adsorption, destabilisation and lysis of antimicrobial peptides using dual polarisation interferometry"  
(p22)
- 2:10 **Lisa Martin** *Monash University* ..... (p23)  
"Protein organization and assembly on membranes controls steroid production"
- 2:35 **Adam Mechler** *School of Molecular Sciences, La Trobe University* ..... (p24)  
"Formation of biomimetic membranes on carboxylic acid terminated self-assembled monolayers"
- 3:00 **Marc-Antoine Sani** *University of Melbourne* ..... (p25)  
"Molecular mechanism of the antimicrobial activity of maculatin 1.1 towards *Staphylococcus aureus* bacterial membranes"
- 3:15 **Peter Quinn** *King's College London* ..... (p26)  
"The structure of membrane rafts"

### 3:30 Afternoon Tea

## Protein Structure, Dynamics, and (Mis)folding I

*Charles Napier Hotel; Chair: Glyn Devlin*

- 4:00 **Tigran V. Chalikian** *University of Toronto* ..... (p27)  
 “Origins of Pressure-induced Protein Transitions”
- 4:25 **Geoff Howlett** *The University of Melbourne* ..... (p28)  
 “Lipid-induced modulation of protein misfolding and aggregation”
- 4:50 **Martin Scanlon** *Monash University* ..... (p29)  
 “Oxidative protein folding in Gram-negative bacteria”
- 5:15 **Megan O’Mara** *University of Queensland* ..... (p29)  
 “Linking bacterial structures to human multi-drug transporter function” (p29)
- 5:30 **Mark Hinds** *Walter & Eliza Hall Institute* ..... (p30)  
 “Solution structure of Psb27 from cyanobacterial Photosystem II”

## 5:50 Annual General Meeting

*Charles Napier Hotel; President: Angela Dulhunty*

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## Tuesday Morning

### 9:00 Cellular and Molecular Biophysics and Bioengineering

*Charles Napier Hotel; Chair: Michelle Gee*

- 9:00 **Amitabha Chattopadhyay** *Centre for Cellular and Molecular Biology Hyderabad* ... (p31)  
 “Organization and Dynamics of the Serotonin<sub>1A</sub> Receptor in Live Cells using  
 Fluorescence Microscopy”
- 9:25 **Philip W. Kuchel** *University of Sydney* ..... (p32)  
 “Quest for bioenergetic understanding of erythrocyte shape changes on the  
 millisecond and minute time scales”
- 9:50 **Huabin Wang** *University of Melbourne* ..... (p33)  
 “Nanoscale study of the mechanical properties of individual *Klebsiella pneumoniae* K54  
 bacteria using atomic force microscopy”

### Poster Vignettes

- 10:05 One slide and one minute by each presenter in Poster session .....(p10)

### 10:30 Morning Tea

## **Biomolecules, Biomimetics, & Biomaterials**

*Charles Napier Hotel; Chair: Glenn King*

- 11:00 **Konstantin I. Momot** *Queensland University of Technology* ..... (p34)  
"Molecular organisation of articular cartilage: MRI results and theoretical analysis"
- 11:15 **Tamsyn Hilder** *Australian National University* ..... (p35)  
"Mimicking biological ion channels using boron nitride nanotubes"
- 11:30 **Scott Fraser** *Melbourne University* ..... (p36)  
"Development of novel biosensors: the influence of ligands and proteins on the structure of cubosome systems"
- 11:45 **Fazel Shabanpoor** *Howard Florey Institute* ..... (p37)  
"Effect of helix-promoting strategies on the biological activity of novel analogues of the B-chain of INSL3"
- 12:00 **Andrew Hung** *RMIT University* ..... (p38)  
"Protein interactions with monolayer-protected nanoparticles"

### **12:30 Lunch and Posters**

## **Tuesday Afternoon**

### **Protein Interactions and Activity**

*Charles Napier Hotel; Chair: Marco Casarotto*

- 2:30 **Jackie Wilce** *Monash University* ..... (p39)  
"Protein-mRNA interactions involved in the regulation of gene expression "
- 2:55 **Katy Wood** *Bragg Institute, ANSTO* ..... (p40)  
"Dynamical coupling between hydration water and proteins"
- 3:10 **Bradley Steel** *University of Oxford* ..... (p41)  
"Observing Rotation of molecular motors"
- 3:25 **Adelle Coster** *University of New South Wales* ..... (p41)  
"Dissecting the movement of glucose transporters"

### **3:40 Afternoon Tea**

## Computational Biophysics II

*Charles Napier Hotel; Chair: Shin-Ho Chung*

- 4:00 **Alan Mark** *Institute of Molecular Bioscience/Univ. of Queensland* ..... (p42)  
“Alternative mechanisms for the interaction of pore-forming and cell-penetrating peptides with lipid bilayers”
- 4:25 **Serdar Kuyucak** *University of Sydney* ..... (p43)  
“Energetics of ion permeation in shaker Kv1.2 and KcsA potassium channels”
- 4:40 **Matthew Wilce** *Monash University* ..... (p44)  
“Interactions of Poly(C)-binding protein KH1 with oligonucleotide – towards understanding specificity”
- 4:55 **Chai Ann Ng** *Victor Chang Cardiac Research Institute* ..... (p45)  
“Structural study of N-terminus PAS domain of hERG K<sup>+</sup> channel: NMR and computer simulations”

## 2009 Robertson Prize Lecture

*Charles Napier Hotel; Chair: Jamie Vandenberg*

5:15 2009 Recipient

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## Wednesday Morning

### Protein Structure, Dynamics, and (Mis)folding II

*Charles Napier Hotel; Chair: Jeff Babon*

- 9:20 **Glenn King** *Institute for Molecular Bioscience, The University of Queensland* ..... (p46)  
“ASAP-NMR: A High-Throughput Pipeline for Rapid Protein Structure Determination”
- 9:45 **Cyril Curtain** *University of Melbourne, & Mental Health Research Institute* ..... (p47)  
“Wraps, Zippers and Dementia”
- 10:00 **Matt Perugini** *University of Melbourne/Bio21 Institute* ..... (p48)  
“Lock, Dock and Four Smoking Barrels: a tale of substrate-mediated stabilisation of oligomerisation and conformational dynamics”

### 10:30 Morning Tea

## Ion Channels

*Charles Napier Hotel; Chair: Derek Laver*

- 11:00 **Livia Hool** *University of Western Australia* .....(p49)  
"Redox regulation of the L-type Ca<sup>2+</sup> channel and relevance to cardiac pathophysiology"
- 11:25 **Peter H Barry** *University of New South Wales* ..... (p50)  
"Permeability measurements in anion channels: effects of divalent cations, liquid junction potentials and offsets"
- 11:40 **Mary Jane Beilby** *University of New South Wales* ..... (p51)  
"Salt tolerance and sensitivity in Charophytes"
- 11:55 **Andrew Battle** *University of Queensland* ..... (p52)  
"The effect of lipid composition on the MscL and MscS channels co-constituted in liposomes"
- 12:10 **Boris Martinac** *Victor Chang Cardiac Research Institute* .....(p53)  
"Significance of the *Corynebacterium glutamicum* YggB protein in fine-tuning of compatible solute accumulation"

## 12:30 Lunch and Prizes

## Posters

- P01 **Divya Mehra** *University of Newcastle* ..... (p54)  
"Flecainide inhibits CPVT induced cardiac arrhythmias by open state block of ryanodine receptor  $\text{Ca}^{2+}$  release channels and reduction of  $\text{Ca}^{2+}$  spark mass"
- P02 **Bansi Sanghvi** *Monash University* ..... (p55)  
"Subtle differences in peptide conformation underlie the amyloid fibril polymorphism exhibited by an 11-Residue fragment of transthyretin"
- P03 **Glyn Devlin** *Monash University* ..... (p55)  
"Probing the stability of amyloid fibrils through control of electrostatic interactions"
- P04 **Iyri L. Salvemini** *University of New England* ..... (p56)  
"Human profilin I and its interaction with membrane polyphosphoinositide lipids"
- P05 **Nevena Todorova** *RMIT University* ..... (p56)  
"Lipid concentration effects on the amyloidogenic apoC-II(60-70) peptide: A computational study"
- P06 **Katy Wood** *Bragg Institute, ANSTO* ..... (p57)  
"Opportunities for structural biology at the Bragg Institute"
- P07 **Nicholas Kurniawan** *National University of Singapore* ..... (p58)  
"Probing heterogeneity of collagen gel using particle tracking microrheology"
- P08 **Marco Cassarotto** *Australian National University* ..... (p58)  
"Multiple binding sites between adamantane drugs and the Influenza A M2 ion channel revealed using surface plasmon resonance"
- P09 **Andrew Battle** *Karlsruhe Institute of Technology* ..... (p59)  
"Clustering and functional interaction of MscL channels"
- P10 **Ian Newman** *University of Tasmania* ..... (p60)  
"Ion flux MIFE measurements in research on human and animal physiology and microbiology"
- P11 **David Szekely** *Victor Chang Cardiac Research Institute* ..... (p60)  
"An improved curvilinear gradient method for parameter estimation in complex model systems"

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- P12 **Cyril Reboul** *Monash University* ..... (p61)  
“DHDPS: Structural and dynamic requirements for optimal activity”
- P13 **Indu Chandrashekar** *Walter & Eliza Hall Institute* ..... (p62)  
“Small molecule inhibitors of Plasmodium falciparum merozoite surface protein 2 fibril formation”
- P14 **Stefan Mann** *Victor Chang Cardiac Research Institute* ..... (p62)  
“Development of a dynamic cardiac action potential clamp system”
- P15 **Grischa Meyer** *Monash University* ..... (p63)  
“The role of dynamics in T-Cell Receptor-MHC interaction”
- P16 **Vinojini Nair** *University of Melbourne* ..... (p64)  
“Solid-state NMR analysis of human apolipoprotein C-II amyloid fibrils”
- P17 **Geoff Burrell** *University of Melbourne* ..... (p64)  
“Distinct  $^1\text{H}$  NMR self diffusion coefficients at high and low field strength indicate ion aggregation in ionic liquids”
- P18 **David Fernandez** *University of Melbourne* ..... (p65)  
“Temperature dependent interactions of the antimicrobial peptide aurein 1.2 with lipid bilayers”
- P19 **Xiaohu Qu** *Monash University* ..... (p66)  
“Amino acids based semi-conducting biomaterial”
- P20 **Jeff Babon** *Walter & Eliza Hall Institute* ..... (p67)  
“Biochemical analysis of the SOCS-JAK-receptor system”
- P21 **Tsz Wai Yau** *University of Sydney* ..... (p68)  
“Engineering red blood cells with  $\alpha$ -haemolysin”
- P22 **Paul Smith** *Australian National University* .....  
“TBA”