

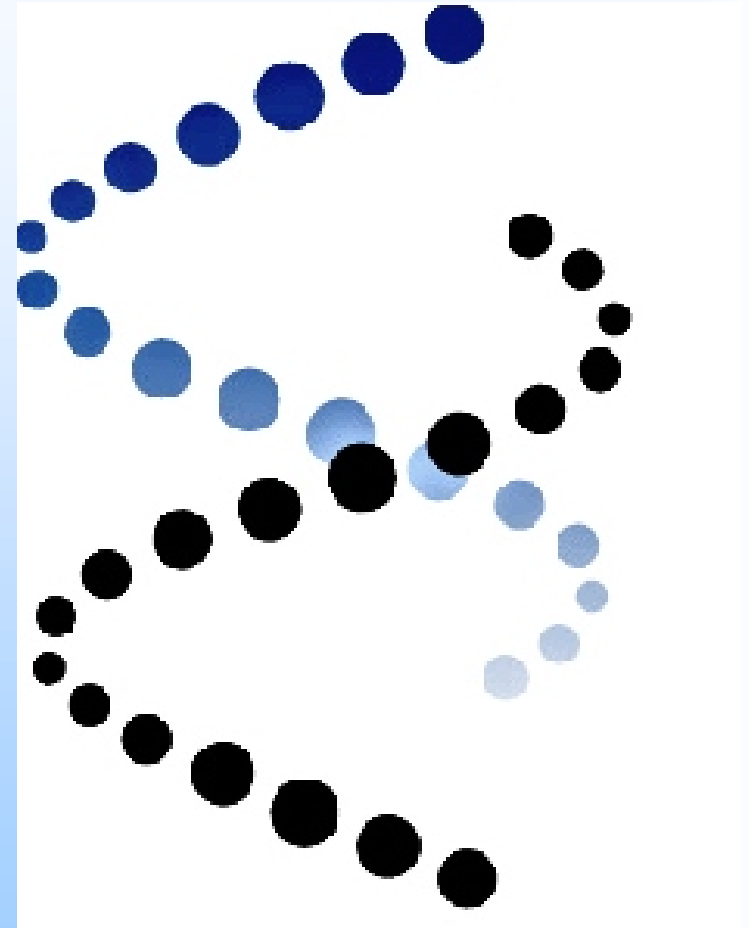
# Victorian Bioinformatics Consortium



*Providing bioinformatics services  
to the Parasitology Network*

# Talk outline

- Introduction to the VBC
- What we do
- Services offered to network members
- Conclusion
- Contact details



# Who are we?

- The VBC brings together researchers from various backgrounds
  - medicine / agriculture / veterinary
  - computer science
  - statistics
  - biotechnology
  - bioinformatics



# Where are we?



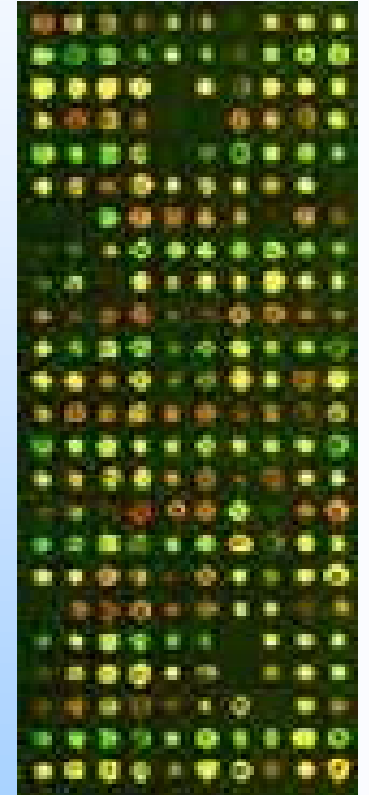
# Services offered



- Microarray analysis/storage
- Sequence analysis/storage
- Comparative genomics
- Custom software development
- Online project collaboration
- Data visualization
- Computer hardware selection

# Microarray analysis

- Consult experts for assistance
- Design oligos/probes
- Analyse data using robust methods
  - normalization of data
  - identify significant genes
- Store microarray data securely
  - can host data on our BASE server



# Microarray storage

- BASE server
- *BioArray Software Environment*
- Web based interface
  - Apache
  - MySQL
  - PHP

The screenshot shows the BASE 1.2.9 - VBC web interface. The main content area displays a table of microarray data points. The table has the following columns: Pos, Reporter, Cluster, Gene, Ch1, Int, Ch2, Int, Ratio, log2, Spot size, Flags, Sp, Reporter name, and NGO Synonym. The data points are as follows:

Pos	Reporter	Cluster	Gene	Ch1	Int	Ch2	Int	Ratio	log2	Spot size	Flags	Sp	Reporter name	NGO Synonym
7585	X1905			17436	15786	1.10	0.14	210	0				hypothetical protein ( NULL )	XNG1905
7586	X1905			18382	17179	1.07	0.10	210	0				hypothetical protein ( NULL )	XNG1905
7587	X1905			20188	18943	1.07	0.09	210	0				hypothetical protein ( NULL )	XNG1905
6399	X1913-3			13829	3408	4.06	2.02	110	0				ubiquinol--cytochrome c reductase, [ ]	XNG1913
5249	X1945-3			17788	18107	0.98	-0.03	210	0				conserved hypothetical protein ( )	XNG1945
5250	X1945-3			16525	17636	0.94	-0.09	210	0				conserved hypothetical protein ( )	XNG1945
7553	X1946			15056	18121	0.83	-0.27	210	0				peptide methionine sulfoxide reductase [ ]	XNG1946
7554	X1946			11630	15055	0.77	-0.37	210	0				peptide methionine sulfoxide reductase [ ]	XNG1946
5251	X2003-3			15711	16404	0.96	-0.06	210	0				hemoglobin-haptoglobin utilization [ ]	XNG2003

# Genomics

- Assembly/scaffolding of reads/contigs
- Developed Wasabi software
- Automatic annotation pipeline
  - genes, RNAs, IS elements, repeat regions etc.
- Precomputed analyses
  - BLAST, HMMER, PSORT, TMHMM etc.
- Store, search, edit, mine all this data!
- Preparation of NCBI submissions

# Wasabi

- In-house web-based system for genome annotation
- View all your annotations and searches together
- Has comparative genomic modules eg. homologs

Wasabi - *Leptospira borgpetersenii* serovar *hardjobovis* strain L550

[Genomes](#) | [Menu](#) | [Search](#) | [Random](#) | [Blast](#) | [Files](#) | [Export](#) | [Query](#) | [Statistics](#) | [SQL](#) | [Pathway](#) | [Homologs](#) | [Validate](#) | [TS](#)

**View L550/1/2141536/ZZ**

[View](#) | [Edit ZZ](#) | [Joint ortholog editing/alignment](#) | [Lepto](#) | [Spiro](#)

**Annotators**

[Ben Adler](#) | [Unknown](#) | [Torsten Seemann](#) | [Merged Annotation](#)

L550/1

1 3.7M

**Neighbourhood of complement(2141536 .. 2142336)**

**Legend:** ← Non-CDS ← CDS P pseudogene   COG colouring LOG (subcellular) location LBL\_xxxx locus\_tag/gene/ftype

**Sequence 1: 2141268 .. 2142604**

```

S E S S H T F * I * * V Y P D R I F Q S H P E V R K L H K I Q D R Q I Q
P S H R I R F E F N K S I R I E F F N R I Q K S E N S I R Y K I V K F N
I R V I A Y V L N L I S L S G S N F S I A S R S P K T P * D T R S S N S
TCGAGTCATCGCATAAGTTTGAATTTAATAAGTCATCGCGATCGAATTTTCAATCGCATCCAGAAGTCGCAAAAATCCCAATAAGATACAAGATCGTCAAATTCAA
|2142078 |2142108 |2142138 |2142168
AGGCTCAGTAGCGTATGCAAAAATTAATTCAGATAGGCCTAGCCTTAAAAAGTTAGCGTAGGTCCTTCAGGCTTTTGAGGTATTCATGTTCTAGCAGTTTAAGTT
S D D C V N Q I * Y T * G S R I K * D C G S T R F S W L I C S R * I * C
R T M A Y T K F K I L R D P D F K E I A D L L G F V G Y S V L D D F E V
F G L * R M R K S N L L D I R I S N K L R M W F D S F E M L Y L I T L N

```

# ESTs

- Chromatogram base calling with Phred
- Filtering of bacterial/vector contamination
- Read assembly -> sequence consensus
- Annotation pipeline
- Data mining and searching of results
- Storage of all data and results
  - developed EST-PAC software

# EST-PAC

Sequences

**Menu**

- Home
- Admin
- Sequences
  - Sequences Groups
  - View Sequences
  - Download Sequences
- Query
- DBS
- ACE
- Logout

Sequence origin:  Sequence type:

Number of rows = 4690

Jump to row: [0](#) [10](#) [20](#) [30](#) [40](#) [50](#) [60](#) [70](#) [80](#) [90](#) [100](#) [200](#) [300](#) [400](#) [500](#) [600](#) [700](#) [800](#) [900](#) [1000](#) [2000](#) [3000](#) [4000](#)

										Jobs			
id	User	Parsed ID	Length	Creation Time	Blast	EstScan	PFam	Type	Origin	Actions			
1	guest	ASDFS	300	2006-03-25 15:43:51	<a href="#">2</a>	2	--	N	Upload	<a href="#">View Sequence</a>			
5	root	gij1786181 gb AE000111.1 AE000111	10596	2006-04-12 15:38:37	<a href="#">0</a>	1	--	N	Upload	<a href="#">View Sequence</a>			
6	root	gij1786192 gb AE000112.1 AE000112	10179	2006-04-12 15:38:37	<a href="#">0</a>	1	--	N	Upload	<a href="#">View Sequence</a>			
7	root	gij2367095 gb AE000113.1 AE000113	13485	2006-04-12 15:38:37	<a href="#">0</a>	1	--	N	Upload	<a href="#">View Sequence</a>			
8	root	gij1786217 gb AE000114.1 AE000114	13134	2006-04-12 15:38:37	<a href="#">0</a>	1	--	N	Upload	<a href="#">View Sequence</a>			
9	root	gij1786230 gb AE000115.1 AE000115	10102	2006-04-12 15:38:37	<a href="#">0</a>	1	--	N	Upload	<a href="#">View Sequence</a>			
10	root	gij1786240 gb AE000116.1 AE000116	13039	2006-04-12 15:38:37	<a href="#">0</a>	1	--	N	Upload	<a href="#">View Sequence</a>			
11	root	gij1786250 gb AE000117.1 AE000117	13416	2006-04-12 15:38:37	<a href="#">0</a>	1	--	N	Upload	<a href="#">View Sequence</a>			
12	root	gij1786262 gb AE000118.1 AE000118	21757	2006-04-12 15:38:37	<a href="#">0</a>	1	--	N	Upload	<a href="#">View Sequence</a>			
13	root	gij1786283 gb AE000119.1 AE000119	12434	2006-04-12 15:38:37	<a href="#">0</a>	1	--	N	Upload	<a href="#">View Sequence</a>			
14	root	gij1786298 gb AE000120.1 AE000120	10157	2006-04-12 15:38:37	<a href="#">0</a>	1	--	N	Upload	<a href="#">View Sequence</a>			
15	root	gij1786306 gb AE000121.1 AE000121	11043	2006-04-12 15:38:37	<a href="#">0</a>	1	--	N	Upload	<a href="#">View Sequence</a>			
16	root	gij1786315 gb AE000122.1 AE000122	10982	2006-04-12 15:38:37	<a href="#">0</a>	1	--	N	Upload	<a href="#">View Sequence</a>			
17	root	gij1786327 gb AE000123.1 AE000123	11093	2006-04-12 15:38:37	<a href="#">0</a>	1	--	N	Upload	<a href="#">View Sequence</a>			
18	root	gij1786339 gb AE000124.1 AE000124	12888	2006-04-12 15:38:37	<a href="#">0</a>	1	--	N	Upload	<a href="#">View Sequence</a>			

**General Info**

Current DB: 'est-pac-demo'  
Current User: 'guest1'  
Active sessions: 3  
Number of Sequences: 4690  
Jobs Pending: 0/0/0

**Selected groups**

test.group  
Ecoli.nt  
Ecoli.aa

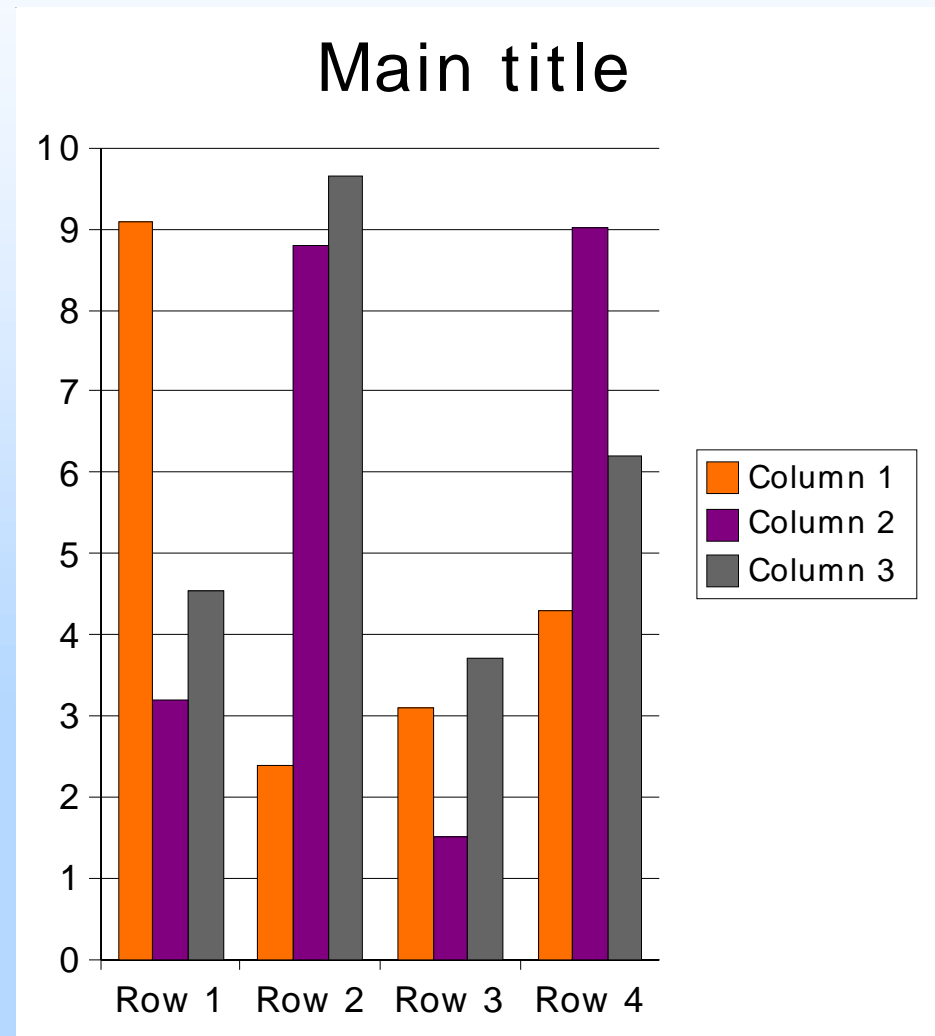
# Software development



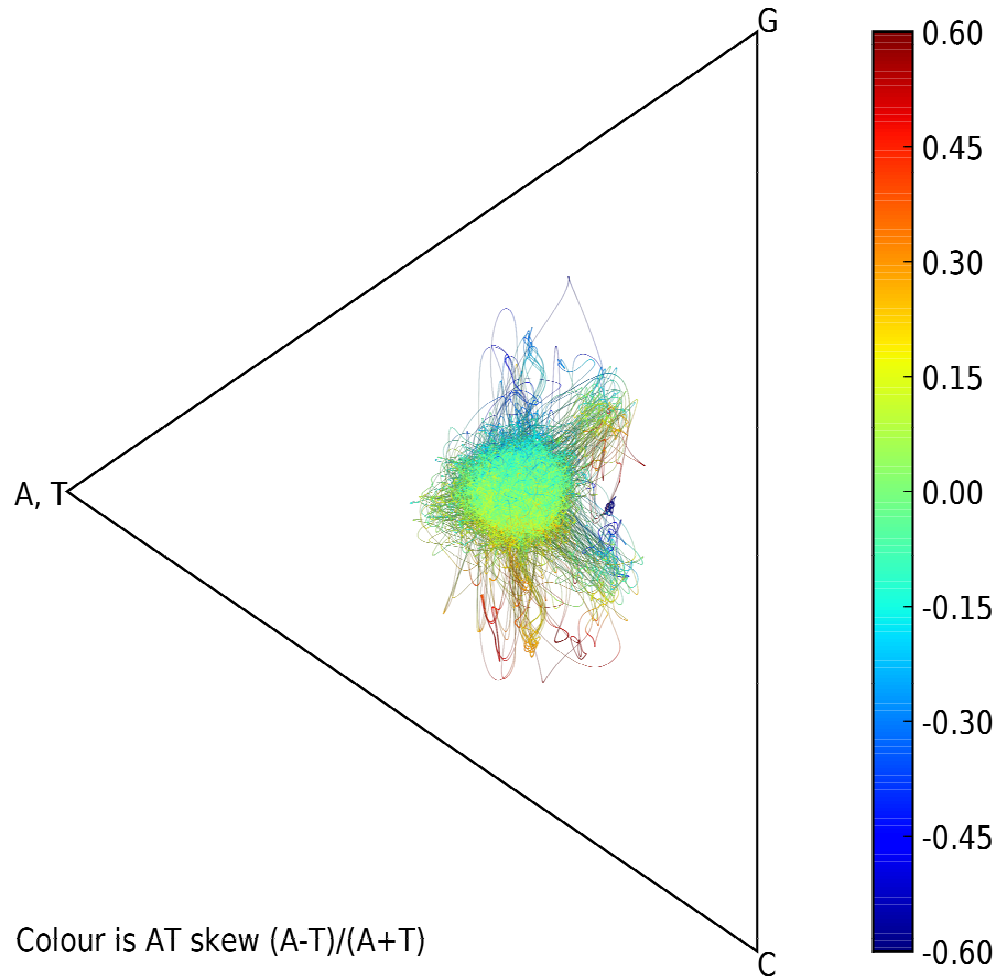
- Experienced software engineers
- Web applications
- SQL databases
- Perl scripts, inc. BioPerl
- Automation of repetitive tasks
- Bulk web form submission
- Run Unix bioinformatics software

# Data visualization

- Some are easy
- Simple graphs can be done in Excel
- But sometimes need more complex processing



# Data visualization



# Computer hardware



- Advice on hardware purchases for your applications servers
- large RAM or fast CPU?
- large disk storage, RAID
- networking
- NAS, SAN
- Linux, Mac OS X, Windows

# Collaborative Environments and Laboratory Management


- Collaborative online environment
- Password Protected
- Private Web Site for your projects
  - Bulletin Board
  - Text Editing
  - Timelines
  - Calendar
  - Live Chat
  - File Storage

[ARCParasitology] Login

https://arcparasitology.updatelog.com/login

adlines Lab Blog PubMed Journals Blog Comments Connotea C of E

Sale! Me... Drug Lead NMR Collaborative P... [ARCParasitology] Login



Username:

Password:  [I forgot my password/username](#)

Remember me on this computer

[Login with an OpenID](#)

## Research NHMRC Malaria Program

Overview Messages To-Do Milestones Writeboards Chat Files **People** Search Permissions

### People with access to this project

[Add a company to this project](#) | [Change permissions](#)

#### Coppel Laboratory

[Edit](#) this company  
[Add person](#) from this company to the project  
[Remove](#) this company from the project

#### Lina Wang

Dr  
[lina.wang@med.monash.edu.au](mailto:lina.wang@med.monash.edu.au)  
 O: (03) 99051500  
 F: (03) 99054811

[Edit](#) | [Remove](#) from this project

#### NHMRC Malaria Program

Department of Microbiology Wellington Road  
 Clayton, Victoria 3800  
 O: +613 99054822 F: +613 99059773  
[www.malariaresearch.org](http://www.malariaresearch.org)

[Edit](#) this company  
[Add person](#) from this company to the project



#### Brian M Cooke

Administrator  
 Associate Professor  
[brian.cooke@med.monash.edu.au](mailto:brian.cooke@med.monash.edu.au)  
 O: 03 9905 4827  
 M: 0418 142307  
 F: 03 9905 4811

[Edit](#) | [Remove](#) from this project

#### Fiona Hibbert

Administrator  
[fiona.hibbert@med.monash.edu.au](mailto:fiona.hibbert@med.monash.edu.au)  
[Edit](#) | [Remove](#) from this project

#### Magda Plebanski

Administrator  
[mplebans@ari.unimelb.edu.au](mailto:mplebans@ari.unimelb.edu.au)  
[Edit](#) | [Remove](#) from this project



#### Mark von Itzstein

Administrator  
 Professor  
[m.vonitzstein@griffith.edu.au](mailto:m.vonitzstein@griffith.edu.au)  
 O: (07) 55527025  
 M: 0419586391  
 H: 0419586391  
 F: (07) 55529040

[Edit](#) | [Remove](#) from this project

#### Ross Coppel

(Basecamp account owner)  
[ross.coppel@med.monash.edu.au](mailto:ross.coppel@med.monash.edu.au)  
[Edit](#)

**+ Create a new project**

## Your projects

**ARC Centre of Excellence in Microbial Genomics**

[CIs Room](#)

**Centre Personnel**

[Centre Scientists and Associates](#)

[Drug Targets Program](#)

[Host Pathogen Interactions Project](#)

[Pathogen Proteomics](#)

**Pharmacy College**

[Drug Lead NMR Collaborative Project](#)

## **CIs Room** ARC Centre of Excellence in Microbial Genomics

**Overview**

Messages

To-Do

Milestones

Writeboards

Chat

Files



**Dashboard**

To-Dos





Milestones

## Latest activity across your projects

### Pharmacy College — Drug Lead NMR Collaborative Project

Message	<a href="#">Rv1208 and LpgW</a>	Posted by Paul C.	<b>TODAY</b>
File	 <a href="#">akta REPORT Rv120820707.pdf</a>	Uploaded by Ross C.	5 Jul
File	 <a href="#">akta REPORT lpg 280607.pdf</a>	Uploaded by Ross C.	5 Jul
Message	<a href="#">Proteins Available</a>	Posted by Ross C.	5 Jul
Message	<a href="#">Protein Amounts To Be Ordered</a>	Posted by Ross C.	5 Jun

### ARC Centre of Excellence in Microbial Genomics — CIs Room

File	 <a href="#">CE0562063.pdf</a>	Uploaded by Marianne J.	5 Jun
File	 <a href="#">ARC only Funds Allocations 2007 MD.xls</a>	Uploaded by	2 Apr
Message	<a href="#">ARC Funds allocations for 2007</a> 	Posted by Marianne J.	2 Apr
File	 <a href="#">Marketing strategy_Microbial_draft_090207a.pdf</a>	Uploaded by Marianne J.	22 Feb
Message	<a href="#">ARC Centre Genomics CoE Marketing Strategy</a>	Posted by Marianne J.	21 Feb

### Centre Personnel — Centre Scientists and Associates

## Program Grant Timing

[Edit this message](#) | [Delete](#)


by Brian M Cooke in [Management](#) on Mon, 28 May at 11:14am

### 3. More on Program Grant timing

As mentioned in last issue of NHMRC Tracker, NHMRC will change the timing for submission of applications, and for the peer review process, for Program Grants. In brief:

\* Teams wishing to apply for grants to begin on 1 January 2009, may apply either: (a) later this year (closing date of 24 August 2007), for a decision in late 2007 (this will avoid successful applicants needing to write a back up project grant application in early 2008); or (b) by the usual time (8 February 2008). \* Teams wishing to apply for Program Grants beginning on 1 January 2010 will need to apply in the second half of 2008. \* All documentation relating to the second round of applications which close on 24 August 2007, including the Funding Policy, Application Form and the Guide for Applicants, will be available on the NHMRC website by late June 2007. \* Further advice on the specific timelines for the process will be promulgated next week.

2 comments so far

**Ross Coppel** Wed, 20 Jun at 3:52 PM 

SO clearly this means that we will submit in middle of 2008. I suggest we discuss this at the meeting in August. We should download forms when

### Comment notification

The following people will receive email notifications when new comments are posted.

#### NHMRC Malaria Program

You ([remove](#))

Brian M Cooke

Magda Plebanski

Mark von Itzstein

### Who's talking in this thread?

#### Brian M Cooke

03 9905 4827

[brian.cooke@med.monash.edu.au](mailto:brian.cooke@med.monash.edu.au)

#### Mark von Itzstein

(07) 55527025

[m.vonitzstein@griffith.edu.au](mailto:m.vonitzstein@griffith.edu.au)

#### Ross Coppel

[ross.coppel@med.monash.edu.au](mailto:ross.coppel@med.monash.edu.au)

## Milestones (Today is 9 July)

### Upcoming

Monday, **13 August (35 days away)** - Ross Coppel

**CIs Meeting 2** [Edit](#)

### Completed

Monday, **26 June, 2006** - Ross Coppel

**CIs Meeting** [Edit](#)

Tuesday, **4 July, 2006** - Ross Coppel

**Select logo** [Edit](#)

Tuesday, **17 October, 2006** - Ross Coppel

**Mark visiting Monash in AM** [Edit](#)

Tuesday, **31 October, 2006** - Ross Coppel

**Submit Parasitology Today Glycobiology Review** [Edit](#)

▸ [Trends Glycobiology Review](#) (message)

Monday, **18 December, 2006** - Ross Coppel

**CIs Meeting Ross' Office 9:30 AM** [Edit](#)

[+ Add a new milestone](#)

[+ Add ten at a time](#)

 [Subscribe to iCalendar](#)

If you use [The Backpack Calendar](#), [Apple iCal](#), [Mozilla Calendar](#), or any program that supports the iCalendar standard, you can subscribe to your Milestones. [Learn more](#) about iCalendar and Basecamp.

Jul: No milestones

Aug:	S	M	T	W	T	F	S
				1	2	3	4
	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	30	31	

## Writeboards

[Annual Report 2006 for submission March 2007](#) 

Updated 10 months ago by Ross Coppel

[Intended Publications for 2006 and early 2007](#) 

Updated 19 days ago by Ross Coppel

[Potentially interesting Meetings, Grants, Papers](#) 

Updated about 1 year ago by Ross Coppel

## Files for this project

WEDNESDAY, 14 MARCH



### Glycobiology\_Sigma Boifiles.pdf

Glycobiology Biofiles from Sigma — Hi All, I have attached the latest issue of Biofiles f...

by Brian M Cooke 5592K - [Upload a new version](#) / [Edit](#)

MONDAY, 30 OCTOBER



### Malaria\_GPI\_anchor.tif

by Mark von Itzstein 107K - [Upload a new version](#) / [Edit](#)



### EBA-175.ppt

by Mark von Itzstein 2866K - [Upload a new version](#) / [Edit](#)



### EBA-175.jpg

by Mark von Itzstein 993K - [Upload a new version](#) / [Edit](#)

WEDNESDAY, 25 OCTOBER



### glycomalaria Copy.enl

Review Progress — Hi Ross, I have writtne a new section on sexual stages...

by Magda Plebanski 119K - [Upload a new version](#) / [Edit](#)

# Laboratory Blogs

- Accessible by web
- Password Protected
- Hierarchical
- Can show pictures, gels etc
- Can append MS office files including ppt
- Provides running log of progress in the laboratory
- RSS feed
- Beta version at present

The screenshot shows a web interface for a laboratory blog. At the top, there is a navigation bar with a grid of author names: Blog All, M.Rees, D.Sheffield, L.Kats, C.Ma, B.McIntyre, B.Morahan, Elsa.M, A.Rainczuk, Rajini.B, N.Proellocks, H.DeSilva, K.Mitri, V.Dubljevic, G.Spellman, P.Crellin, A.Pelosi, C.Black, L.Wang, P.Anderson, K.Waller, I.Smith, C.Mitchell, R.Coppel, S.Kovacevic, R.Huestis, Y.Strahm, and P.Harrison, K.Martin. Below this is a header for "All Blogs for Coppel Lab" with the subtitle "All the Coppel blogs aggregated".

The main content area displays two blog entries:

- Entry 1:** Dated 09/07/07, posted at 05:42:20 pm by hdesilva (8 words, No views). Categories: Work. Title: "titres". Content: "Ross, hopefully it is attached. Harini". Attachment: "GIAsera2.doc". Actions: "Leave a comment", "Trackback (0)", "Edit...", "Permalink".
- Entry 2:** Dated 10:49:05 am, by Belinda MORAHAN (102 words, 3 views). Categories: Work. Title: "Thesis forms". Content: "Hi Ross. Thank you for getting my thesis comments back to me so promptly. I have finished making the corrections and am ready to print. Upon looking up the guidelines regarding submitting a thesis, there is a supervisor form that you need to fill in and sign in addition to the examiners form before I can submit. How would be the best way to get this form to you? In another matter, I have begun to search for post doc positions both in Australia and overseas. I would like to ask if you would be a referee for those applications. Regards".

On the right side, there is a sidebar with the title "All Blogs for Coppel Lab" and a description: "This is the long description for the blog named 'Blog All'." Below this, it states: "This blog (blog #1) is actually a very special blog! It automatically aggregates all posts from all other blogs. This allows you to easily track everything that is posted on this system. You can hide this blog from the public by unchecking 'Include in public blog list' in the blogs admin." There are links for "Next >", "Recently", and "Last comments". At the bottom of the sidebar is a calendar for July 2007.

July 2007						
Mon	Tue	Wed	Thu	Fri	Sat	Sun
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					
<						

# NHMRC PROGRAM IN MALARIA

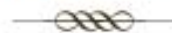
WELCOME COPPEL LAB COOKE LAB PLEBANSKI LAB  
VON ITZSTEIN LAB



*Navigation  
Coppel Laboratory  
Cooke Laboratory  
Plebanski Laboratory  
von Itzstein Laboratory*

*Coppel Lab Blog Site  
Cooke Lab Blog Site*

## Malaria: From Gene to Therapy



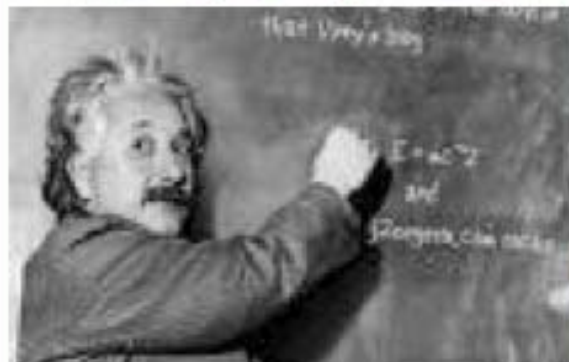
Welcome to the home site of the NHMRC Program in Malaria, a collaborative program among four internationally recognized researchers that focuses on many aspects of the biology of malaria parasites. Our research program, funded by the Australian National Health and Medical

# COPPEL LAB BLOG

WELCOME COPPEL LAB COOKE LAB PLEBANSKI LAB  
VON ITZSTEIN LAB

## Links to Blog

Arek Rainczuk  
Assunta Pelosi  
Belinda Morahan  
Bonnie McIntyre  
Casilda Black  
Charles Ma  
David Sheffield  
Elsa Herdiana Murhandarwati  
Harini da Silva  
Karena Waller  
Khosse Mitri  
Kirstee Martin  
Lev Kats  
Lina Wang  
Megan Rees  
Nick Proellecks  
Paul Crellin  
Peter Anderson  
Rajini Brammanath  
Robert Huestis  
Steven Kovacevic  
Valentina Dubljevic



## Instructions



Your blog is accessed by clicking on your name to the left.

Unfortunately, blog software is pretty primitive, so we will need to just

# b<sub>2</sub>evolution

**Login form** 

You will have to accept cookies in order to log in.

**Login:**

**Password:**

[Lost your password ? Bypass login...](#)

**b<sub>2</sub>evolution** 1.8.6 - GPL License - ©2001-2002 by Michel V & others - ©2003-2006 by François PLANQUE & others.

Blog All  
Rajini.B  
L.Wang  
P.Harrison

M.Rees  
N.Proellocks  
P.Anderson  
K.Martin

D.Sheffield  
H.DeSilva  
K.Waller

L.Kats  
K.Mitri  
I.Smith

C.Ma  
V.Dubljevic  
C.Mitchell

B.McIntyre  
G.Spellman  
R.Coppel

B.Morahan  
P.Crellin  
S.Kovacevic

Elsa.M

A.Rainczuk  
A.Pelosi  
R.Huestis

C.Black  
Y.Strahm

# All Blogs for Coppel Lab

All the Coppel blogs aggregated

## 09/07/07

📅 05:42:20 pm, by hdesilva, 8 words, No views   
Categories: [Work](#)

### titres

Ross,  
hopefully it is attached.  
Harini

[GIAsera2.doc](#)

[Leave a comment](#) • [Trackback \(0\)](#) •  [Edit...](#)

 [Permalink](#)

📅 10:49:05 am, by Belinda MORAHAN, 102 words, 3 views   
Categories: [Work](#)

### Thesis forms

Hi Ross

Thank you for getting my thesis comments back to me so promptly. I have finished making the corrections and am ready to print. Upon looking up the guidelines regarding submitting a thesis, there is a supervisor form that you need to fill in and sign in addition to the examiners form before I can submit. How would be the best way to get this form to you?

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Regards

## All Blogs for Coppel Lab

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**This blog (blog #1) is actually a very special blog! It automatically aggregates all posts from all other blogs. This allows you to easily track everything that is posted on this system. You can hide this blog from the public by unchecking 'Include in public blog list' in the blogs admin.**

[| Next >](#)

- [Recently](#)
- [Last comments](#)

July 2007						
Mon	Tue	Wed	Thu	Fri	Sat	Sun
						1
<a href="#">2</a>	<a href="#">3</a>	<a href="#">4</a>	<a href="#">5</a>	<a href="#">6</a>	<a href="#">7</a>	8
<a href="#">9</a>	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					
<						

If in my mix-prep sample that hybridized with pimB probe was such molecule I hypothesized that I could amplify and sequence a bigger fragment of pimB using M13 primer with pimB\_uni primer, to test which pair works I run this PCR:



PCR using M13 primer with pimB\_uni primer.

### XML Feeds

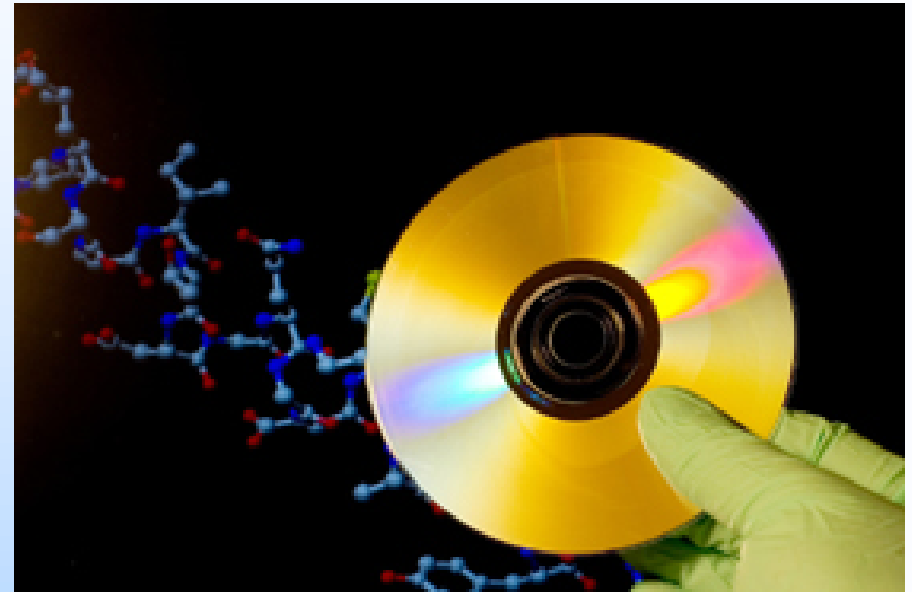
- RSS 0.92: [Posts](#), [Comments](#)
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- RSS 2.0: [Posts](#), [Comments](#)
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pow  
b2ev

# Conclusion

- VBC can *assist* network members
- Project collaboration
- Bioinformatics help
- Software creation
- Hardware advice



# Contact us

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