BIOLOGICAL TERRORISM

BIOTERRORISM SYMPOSIUM

SATURDAY, AUGUST 14, 1999
SYDNEY CONVENTION CENTRE, DARLING HARBOUR

BIOLOGICAL AGENTS AS WEAPONS OF TERRORISM

Biological weapons are not new; several infectious diseases have been the subject of intense study by a number of nations as potential agents for germ warfare. Some countries have not stopped this research, nor destroyed their stockpiles. But even more worrying is the potential use of these agents in the hands of terrorists, threatening our cities or entire nations. Major sporting or cultural events may also be targets for bioterrorist attacks. Indeed, an epidemic catastrophe resulting from a terrorist attack using biological weapons is an increasing probability. Many experts say that it is no longer a question of whether a major bioterrorist attack will occur, but when and where. The threat of bioterrorism is not an idle curiosity, but a grim reality and one that emergency services and public health authorities must start planning for now. Only a small quantity of a biological weapon is needed to wipe out a whole city.

The Bioterrorism Symposium will bring together experts in bioterrorism from the US, UK, Russia and Australia to discuss the nature and concepts of bioterrorism, using actual events as examples of possible threats. They will reveal how cities or even nations can be held hostage by terrorists using microbiological weapons of mass destruction, and the types of agents that might be employed by terrorists. Research and contingency plans will be discussed.

The symposium is being presented by the International Union of Microbiological Societies (IUMS) and the Australian Society for Microbiology (ASM) and will be held in the main auditorium of the Sydney Convention Centre on Saturday afternoon, August 14, 1300 – 1830.

Program Outline

Moderator of the symposium will be eminent US scientist Professor D.A. Henderson, who is Director of the Johns Hopkins Center for Biodefense Studies.
Three case studies will be presented at the Bioterrorism symposium:

- **Iraq - Hamish Killip,** Killip & Co, Isle of Man, working with the United Nations Special Commission (UNSCOM), which conducted the UN arms inspection mission to Iraq.

- **Russia**

  (i) Opening Pandora's Box - Biological weapons past, present and future - Dr Christopher Davis OBE, Director, The ORAQ Consultancy Ltd, a biomedical research physician with a PhD in neuropharmacology and former Senior Analyst, Defence Intelligence, Whitehall.
  (ii) The Soviet Bioweapons Program - Dr Ken Alibek, Chief Scientist, Hadron Inc, Virginia, USA and former Deputy Chief of Biopreparations (Soviet Bioweapons Program), USSR. Alibek is co-author, with a US journalist, of a book Biohazard describing Russia's bioweapons program and capability.
- **Aum Shinrikyo - Kyle Olson,** Special Projects Manager, Research Planning Inc. and author of Cult at the End of the World dealing with the Japanese sect Aum Shinrikyo.

Professor Henderson will then present possible scenarios for terrorists' use of microbes, including the types of microbes which might be employed, and the reasons why such microbes make potential weapons.

Two speakers will discuss domestic perspectives and response strategies:

- **United States - Jerome Hauer,** Director, The Mayor's Office of Emergency Management, City of New York, who will discuss New York's contingency plan for responding to the threat of bioterrorism. Mr Hauer whose graduate studies focused on Emergency Medical Services, is co-authoring a rewrite of the World Health Organisation's 1970 monograph on chemical and biological weapons and is a member of the Federal Bureau of Investigation's (FBI) Scientific Advisory Council for Hazardous Response.
- **Australia - Commander Andy Robertson,** Defence Health Services, Canberra, who will present an Australian perspective to bioterrorism.

The panel of speakers will consider the range of microbial agents (e.g. anthrax, cholera, smallpox bubonic plague and mycotoxins produced by fungi) that might be used:

- As weapons of mass destruction in international warfare.
- At the local level, to threaten cities (e.g. by contaminating drinking water or the food supply).
- To disrupt major events (like an Olympic Games).
- To damage a nation's trade by attacking an industry (e.g. the sheep industry with foot and mouth disease).

Current research agendas will be discussed by Dr Steven Morse, Program Manager, Defense Advanced Research Projects Agency, United States Department of Defense.

A dedicated discussion session will occur following presentation of speaker's papers, and a public forum will be held at the conclusion of the major presentations.

This is a not-to-be-missed seminar for those involved in security services, emergency services, health leaders and managers, hospital physicians, public health personnel, police forces, defence force personnel and major event organisers.

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IUMS Sydney Australia 9 – 20 August 1999

The Symposium on Bio-terrorism has been organised as part of, and to be incorporated into, a much wider event.
As the world prepares to bid farewell to the 20th century, 6,000 scientists from around the world - including five Nobel Prize winners and an accompanying elite - are preparing to gather in Sydney in August to consider what the teeming and exceedingly active microscopic world of viruses, bacteria and fungi has in store for us in the next century. Three congresses are being held:

- The Eleventh International Congress of Virology (August 9-13).
- The Ninth International Congress of Bacteriology & Applied Microbiology (August 16-20).
- The Ninth International Congress of Mycology (August 16-20).

The Congresses are being presented by the International Union of Microbiological Societies (IUMS) and the Australian Society for Microbiology (ASM) and will be held at the Sydney Convention Centre, Darling Harbour.
If you have not already registered for the congress and would like to, or you would simply like to find more information on the congresses please visit the congress website at www.tourhosts.com.au/iums or you can contact the congress secretariat:

Telephone: 61 2 9262 2277
Facsimile: 61 2 9262 3135
Email: iums@tourhosts.com.au
Website: www.tourhosts.com.au/iums

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Sponsorship
Demonstrate your commitment to the sciences and industry by participating as a sponsor of the Congress. Several significant sponsorship opportunities are available. Contact Ms Vera Stojanovic at the IUMS Congress Secretariat to discuss your sponsorship of a relevant Workshop or Session that is at the cutting-edge of education and research.
Tel: 61 2 92480820 or email: vstojanovic@tourhosts.com.au

Industry Exhibition
An industry exhibition will be held during the ICV and ICBAMM Congresses. The organising committee commend your company to consider the merits of promoting your products and or services to the delegates in attendance. Every marketer acknowledges the benefits to be achieved by marketing to a targeted and focussed audience. The IUMS Congresses will certainly provide the forum, comprising a wide base of delegates who may be your current and future customers. For details on the ICV or ICBAMM Industry Exhibition, contact Ms Vera Stojanovic NOW. Your participation in the exhibition will add value to your current marketing and promotions.

REGISTRATION FORM BIOTERRORISM SYMPOSIUM 14 AUGUST 1999 (1300 – 1830 HOURS)

Please use block letters to complete this form. A separate form is required for each participant.

Title: [ ] Prof [ ] Dr [ ] Mr [ ] Mrs [ ] Ms [ ] Miss

Family Name .....

Given Name .....

Organisiation/Institute .....

Position .....

Postal Address .....

City: ..... State: .....

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Please Tick

[ ] I have already registered for the IUMS Scientific Congress and wish to be registered for the Bio-terrorism Symposium. I enclose payment of $35.00

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~~D~~ J. Hauer - NYC

- says that w/holding vaccine for people in Washington would not be a total loss

- chemical vs. biological terrorism
  - chemical req's immediate action
  - biological is long term action

How respond to clandestine releases?

① must recognize early
  ② sensitive public health structure
    - real time monitoring EMS calls
    - total ER admissions
    - total # death
    - rate of influenza-like illness in nursing homes
    - sale of diarrheal meds
    - UXD (unexplained death)

  ③ from health care providers
  ④ pharmaceutical distributors

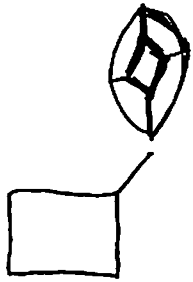
② must deal w/ public

Col. Robertson

Steve Morse - DARPA

Preparation is essential.

1. Sensors
2. External protection
3. Consequence management
4. Adv. diagnostics
5. Medical countermeasures



DARPA

Sensors — Adv Diagnostics — Med Countermeasures

External Protection | Genome Sequencing | Consequence MGMT

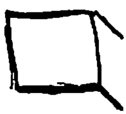
Technology will get better - research not basic security or these things but also necessarily

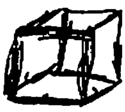
External Protection - thermo catalytic devices, artificial skins
- nanomolecular countermeasures

Consequence MGMT - informatics tools

Biosensors - high density rRNA arrays

Mini mass spec





Bioterrorism

IRAQ weaponry ... must remember that they may not have used as much caution as we would in handling.

Else in Fulk

Christopher Davis - Opening Pandora's Box

Nuclear Blindness - for many years nobody appreciated that Biological weapons could exist or could be a problem b/c of comp to nuclear power

Biological weapons - should be considered things that attack animals + crops too.

Anthrax to kill cattle

US Program

- 1969 7 BW Agent Weapons developed + Stockpiled
- US had much production even though not much used

Russian Program

- v. big program
- v. well supported
- also a civilian program

What are goals?

to improve every step of way
- including Ab resistance

the more we prepare the more deterrence we have

Ken Alibek

- classified Rickettsia separate from bacteria

- measures of effectiveness
  - ~~Spec. expenditure value~~ -
  - amt of weapon req. to infect 50% of people
  - area affected by 1 kg
  - decay rate
  - % aerosolization
  - % that reaches persons

XI ICV
XI International Congress of Virology
9 - 13 August, 1999

IX ICBAM
IX Congress of Bacteriology & Applied Microbiology
16 - 20 August, 1999

IX ICM
IX International Congress of Mycology
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Sarin Attack

- Mission was to kill 3 judges + field test a weapon they had tested in Australia
- plan was to heat gas + release ...
- but they did not find judges in right place -- they improvised + moved to Dorch.
- most of world paid no attention
- another case where sarin released near cult headquarters
- then subway attacks

MULTIPOINT, SIMULTANEOUS ATTACK -- all on trains converging on one station

THIS IS NOT FUNNY, BUT HE KEEPS CRACKING JOKES

Detailed Bacteriology and Applied Microbiology Program

Saturday 14 August 1999

1300-1800	Registration/Information & Tours Desk Open
1400-1730	Inter-Divisional IUMS Symposium

Sunday 15 August 1999

1000-1800	Registration/Information & Tours Desk Open
1830-1900	Opening Ceremony. Werner Arber
1900-2000	KeyNote Lecture - Marine Biotechnology: The Ocean Frontier Rita Colwell
2000-2200	Welcome Reception Exhibition Hall - Sydney Convention Centre

Monday 16 August 1999

0900-1030	BAM PLENARY: Intercellular signalling in bacteria. Chairs: Greenberg P, Davies J Speakers: Greenberg P, Davies J, Kaiser D, Novick R Pete Greenberg "Quorum sensing in Gram-negative bacteria" Staffan Kjelleberg "Marine plants produce AHL antagonists to control bacterial colonisation" Richard Novick: "Peptide signalling in Gram-positive bacteria" Dale Kaiser: "Spatially regulated gene expression by an extracellular signal"
1030-1100	Morning Tea, Posters and Exhibition
1100-1230	BAM PLENARY : Intercellular signalling in bacteria. (Cont'd)
1230-1400	Lunch, Posters and Exhibition
1400-1530	BAM Symposium 1: Escherichia coli infections Chairs: Kaper J, Riley T BAM Symposium 2: The pathogenicity of Helicobacter Infection Chairs: Lee A, Blaser M Speakers: Blaser M,"Helicobacter pylori: the bacterium" Lee A "Helicobacter pylori: the host" Alm R "The tale of two genomes. What does this tell us about H. pylori" Fox J "Beyond H. pylori: the new helicobacters" BAM Symposium 3: Cell cycles and biological clocks Chairs: Rothfield L, March P Speakers: Rothfield L "Regulation of bacterial cell division", Harry Liz "Cell division in B. subtilis" Beech P "Bacterial lessons on chloroplast division" Ishiura M "Cell clocks in cyanobacteria" BAM Symposium 4: Lactic acid bacteria Chairs: Davidson B Dunn N BAM Symposium 5: Ecophysiology of cyanobacteria Chairs: Castenholz R, BAM Symposium 6: New and novel wastewater treatment options Chairs: Millis N Blackall L
1530-1600	Afternoon Tea, Posters and Exhibition
1600-1730	BAM Symposia 1 - 6 cont'd
1600-1730	BAM Mudd Lecture
1400-1530	BAM Symposium 25 MIRCEN Symposium

INTERNATIONAL UNION OF MICROBIOLOGICAL SOCIETIES

IX ICBAM
IXth INTERNATIONAL CONGRESS OF BACTERIOLOGY & APPLIED MICROBIOLOGY

IX ICM
IXth INTERNATIONAL CONGRESS OF MYCOLOGY

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SYDNEY AUSTRALIA

16 - 20 AUGUST 1999

Dr Craig Venter
The Inst for Genomic Research
Rockville
UNITED STATES OF AMERICA
20850-3319

13 February, 1998

Aug. 16-20

Dear Dr Venter,

On behalf of the Organising Committee of the IXth International Congress of Bacteriology and Applied Microbiology to be held in Sydney, Australia in August 1999, we invite you to take part in one of the five important plenary sessions. We would very much like you to chair and help organise the session on **"Microbial genomes"**. Each plenary session will consist of five lectures over half a day and you would be free, along with your co-chairperson, to determine the final shape of the programme and help select the speakers.

Over the last few months, we have been canvassing microbiologists around the world on the topics and speakers they would like to see included in this session. On an attached sheet of paper, is a summary of the many suggestions we have had. In making the final choice of topics and speakers, there are two major considerations to be borne in mind.

- We wish to hold a meeting that will be covering the most important, current and exciting issues
- The meeting, being international, we should seek to invite participants from as many countries as possible

We offer return economy airtravel and expenses associated with accommodation during the congress. If however you are able to obtain sponsorship for your travel or for sponsorship of any of the topics of the plenary this would greatly assist the financial organisation of the congress.

We hope you will accept this invitation, and we ask for your decision, in principle, no later than February 28 1998. Please send your decision to Dr D. Groot Obbink at the address shown on the right hand side of this letter. We will need to publish the programme later in 1998 and to ensure that we can send invitations to the chosen speakers, we would need to finalise our lists no later than March, 1998. If you have any suggestions or contacts who might like to help sponsor this plenary session, would you let us know when you reply.

Yours sincerely,

Dick Groot Obbink

Tim Gray
Vice-Chair
Bacteriology & Applied Microbiology
Chair
Congress Organising Programme Committee

Dick Groot Obbink
Chair
National Organising Committee

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16 - 20 AUGUST 1999

SYDNEY AUSTRALIA

Ref: 6645

7 June 1999

Dr Jonathan Eisen
The Institute For Genomic Research
9712 Medical Center Drive
ROCKVILLE MD 20850
USA

Dear Dr Eisen

I am pleased to advise that the Organising Committee has accepted your Abstract(s) for Oral Presentation. Please refer to the details below concerning your Presentation:

Title:	Phylogenomics: the benefit if an evolutionary perspective in genome analysis
Session Name:	BAM Plenary 5: Microbial Genomes
Date:	Friday, 20 August, 1999
Time:	0900 to 1230
Room:	Harbourside Auditorium 2
Your Presentation Time:	0900 to 0930 (1st speaker)
Chairpersons:	Jonathon Eisen (USA) John Mattick (Australia)

As the nominated "presenting author" it is required that you register for the Congress in order for your abstract to be included in the program.

The Speaker Ready Room will be located in the Merino Room, Level 2, the Sydney Convention Centre. Where possible we ask that slides are sorted and registered in the morning before an afternoon presentation, or the afternoon before a morning presentation. A technician will be available to assist you with your presentation materials.

Please ensure you are in your allocated room 15 minutes before your session commences to meet the chairperson.

If you are no longer able to attend the Congress please notify us as soon as possible by fax so we may remove your paper from the Program.

Please find enclosed important information to assist you with the preparation of your presentation. If you have any queries do not hesitate to contact the undersigned on tel: (61) 2 9262-2277, fax: (61) 2 9262-3135 or email: iums@tourhosts.com.au

Yours sincerely
IUMS '99 Secretariat

AMBER WHITTINGTON
Congress Co-ordinator

Encl: Paper Presentation Techniques
Speaker's Requirements Form

MICROBREWERY
SIM + EVOLUTION

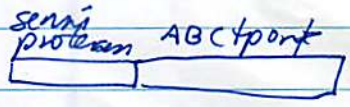
R. Novick. Peptide Signalling in Gram + Bacteria

- Parallels betw. gram − and gram + even though diff molecules used

1. Bacterial signalling systems regulate accessory genes
2. Gram positives use peptides vs. homoserine lactones in gram −
3. Major f(x) of peptides + homoser lactones is as autoinducers
4. Peptide autoinducers generally serve as ligands for transmembrane signal receptors (usually histidine prot. kinase)
5. NOTE - Enterococci use peptides as pheromones BUT these are not Autoinducers

Production of peptides

- all synthesized in cell + then processed
- many processed by two domain proteins



Genetic organization of these systems v. similar

- Genetic organization of gram − systems ~~is~~ not ~~as~~ as conserved

~~Each strain~~ 10 w/in groups - all work on each other
betw groups - block autoinduction

} IF THIS TRUE THEN MIGHT EXPECT VERY HIGH MUTATION RATES

- conserved sequences of proteins + peptides
- Staph. peptides are NOT linear
  - they are peptide thiolactones
- receptor part is variable...

D. Kaiser

Myxobacteria

- localized gene expression in space --
- ~~fp~~ - fruiting bodies are response to starvation
  - sporulation is last step in process
  - how do they know when to sporulate.

- steps in process regulated by series of extracellular signals

rod → group → stalk → spore

A signal → mutants stop here

C signal → mutants stop here

- A signalling - done by amino-acids
  Phe, Tyr, Trp, Pro, Ile, Leu
  } when cells starving for amino-acids they release these a.a.

starvation → sensed by ribosomes → ppGpp (ribosome synthesizes) → stringent response

ppGpp → A signal produced
ppGpp → Pre-aggregation genes

This allows cell to have two things
- are other cells around
- do they sense same thing

A signal produced → A signal taken up

A signal taken up → induces genes
- regulated by ~~A~~ factor (past starvation)
- regulated by ppGpp (current starvation)

This allows cells to check to see if starvation goes away.

C-signalling - 17 kDa protein
- leads to expression of DEV operon in fruiting body

call for new system

classification of proteins — function of proteins

Should we mourn the passing of microbial physiology

- claims we will have enormous amounts of gene data but nobody who can study any of these

Harry Holms - Bioflux - Glasgow, Scotland

Two examples of why we should NOT mourn the death of microbial physiology

① Ecoli growth on glucose

- want to express the physiology of this process in mathematical terms
- quantitative microbial physiology tells you what the biomass is doing
- this knowledge allows you to do things

BIOMASS DOESN'T ALWAYS DO WHAT YOU EXPECT IT TO.

ARROGANCE OF MOLECULAR BIOLOGY

② Industry

What biomass doing
What want to do
Formulate strategy

(look SEE MEASURE FIND KNOW DO)

Fermentation D's
Eliminate unused inputs
Improve sterilization
⋮
Direct genetic engineering

- must not use only one approach ...

DEFINITION OF PHYSIOLOGY — How ORGANISMS WORK

every genome talks I am I and w/ talking about the need for more genes + phys.

- uses mutants
- cloning - gene
- knowledge

DEATH OF A BROAD BASED BIOLOGIST.

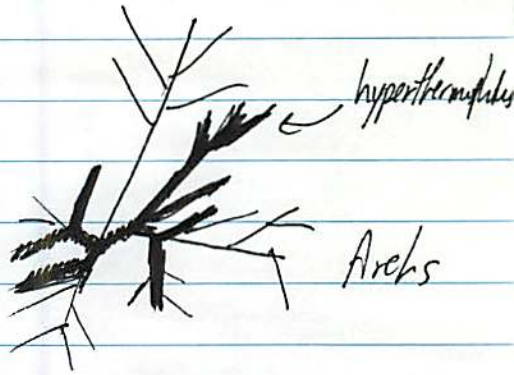
caution - this will make molbio better

the biggest limitation of molbio is

Extremophiles - Karl Stetter

Tuk

Hyperthermophiles - grow fastest at 80°C and above



- all over planet (wherever T° is high)
- most are strict anaerobes
- most do not plate very well
- hyperthermos. have short branches
- growth requirements vary greatly
  (e.g. Solfolobus = pH 1-5, Staphylothermus 4-8)
- most are chemolithoautotrophs
- some are heterotrophs
- can you deduce metabolic properties from 16S tree? - no
  e.g. Pyrobaculum islandicum - strict anaerobe - S user
  , Pyrobaculum aerophilum - O_2 respirer - S inhibits

Archaeoglobus (SO_4) vs Ferroglobus (NO_3)

Energy Metabolism

e⁻ donor	acceptor
H_2	CO_2
	$Fe(OH)_3$
	S, SO_4
	NO_3
	O_2

Aquifex pyrophilus

Thermocrinus ruber - related to Aquifex
- form extended pink filaments w/ a current
- isolated w/ optical tweezers

Thermoprotaleis sp.
- grows fastest at 105°C
- strict heterotroph

KINYA
- spherical
- grows at 100°C
- extrudes mini-cells

-NEED TO GIVE A MULTI-DISCIPLINARY EDUCATION

-TRANSGENIC COW - WANTED LACTOSE FREE MILK
BUT ~~COULD~~ BUT WOULD BE DRY !

How frequently new functions evolve
V. important

Jeff Miller - Repair Systems in Extremophiles

Repair systems in extremophiles

-

Genes in Pyrobaculum

- homology searches don't work very well
- e.g. all these species have Ung activity
- new family of Ung type activity in Pyrobaculum

Two genes in Pyrobaculum like MutY-NH

ORF1 - MutY-like fold

ORF2 - Ung function (G:U, G:T mismatch)

- homologous to the MutH G:T MMR.

two more families discovered - one in Thermotoga, one in human, Xenopus

D. radiodurans

- extremely resistant to everything
- chromosome assembled correctly

- suggests that this is a response to dessication

- is ABSENCE of certain genes indicative of absence of anything?
  - have they found another way?

Ed DeLong

~~Genomics CAN~~
Evol. can show limitations as well

Cultivatable Archaea are limited

Norm Pace - idea to clone genes and get phylogenetic info from sequences and then use probes

Looking for Archaea
- maybe in particulates floating in ocean
- found that there were few Archaea in particles
- instead found many in ocean water

One group is crenarchaea + thus related to extreme thermophiles

- how does one learn more about these organisms?
- Many are still non-cultivated

New Approaches to characterize these species?
① ecological - ~~Santa Barbara channel~~
- monitored rRNA types over time in different depths in Santa Barbara
- monitored in Antarctic ocean - followed rRNA types
- Archaeal signal dropped in spring + increased in winter
- why? sensitive to light, outcompeted, eaten?
~~monterey bay~~
- monterey bay?

② ususual lipids - ether linked lipids - therefore examined lipids from environments. Lipids from cold ocean are very much like Soltolibus lipids

③ genomic - marine sponge filled w/ one kind of crenarchaeote (Cenarchaeum = episymbiont). Found DNA pol → and it is not thermostable.

NEED TO UNDERSTAND NATURAL HISTORY

Psychrophilic Organisms & their Enzymes as Biotech. Tools

Arhenius Law =

Is it possible to adapt structure of an enzyme so that its catalytic efficiency at 0°C is comparable to one homolog at 20°C.

Set of enzymes
- Extracellular
- Intracellular

General features of cold enzymes
- High specific activity at low T°
- High thermolability

Applications
- additives in detergents (proteases)
- additives in food industry (e.g. lactase)
- bioremediation
- biotransformation
- textile
- biosynthesis in low H2O conditions
- tools in molbio
  e.g. alk. phos, ligase

PReeves

www.angis.usyd.au/BacPolGenes/welcome.html
see TIM 4: 495-503

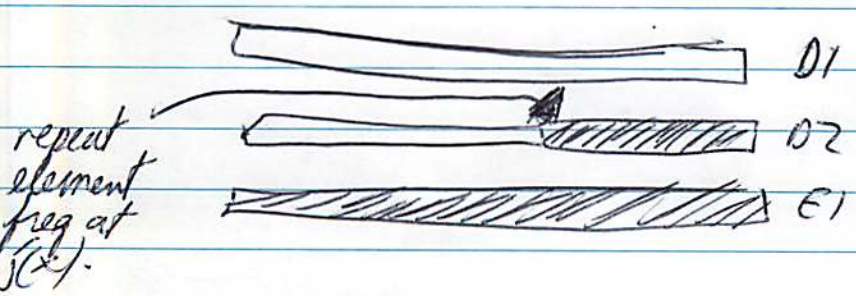
O Antigens
- repeat unit polysac. for outer part of lipopolysac
- v. diverse
- w/gene cluster
  - syn. of NDP sugars
  - transferases
  - processing

} multiple genes/types for each of these

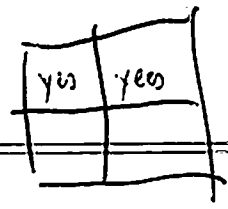
Origins of New O antigen clusters
- Gene addition + recombination
  Salmonella B + E1
- transposons?

Comparing species - E coli vs. Sentenca - v. different genes but clusters are in same place.

Comparing two clusters w/in species - usually some nearly ID components and some v. diverged and some only in 1 species or other



Frequently repeats in these regions are IS elements and many of these are non-functional



Transfer of gene clusters betw species

Suggests based on GC content all E coli O antigen genes were transferred

Evidence?

- O antigen genes from Plesiomonas shigelloides O17 look like exchanged w/ E coli

- this cluster on a plasmid
- not in other Enterobacteria

Movement w/in species

- E coli O157:H7 O55:H7

these strains v. closely related in not things but have v. different O-antigens

- O139 vs O1 in V. cholerae – same type of thing

- Salmonella O antigens - also see similar thing

CROSSWORD PUZZLE

B. subtilis proteomics

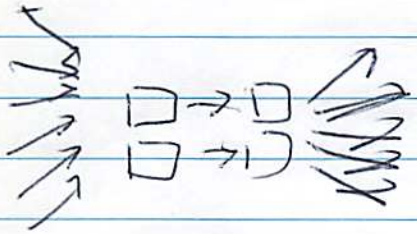
- glucose starvation · TCA enzymes ↓ glycolysis ↑

- thio done CCPA

- stress + starvation are thy RULE not exception
- can use inducton to predict f(x)
- use dual channel system
  - silver-stain
  - ^{35}S
  - red
  - grey

} can use to ID induced, repressed genes

- <u>identifying regulons</u>



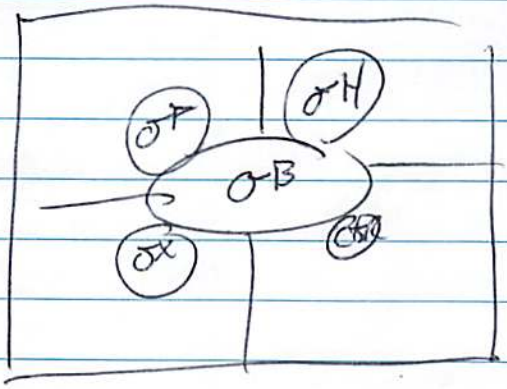
many stresses → regulators → many genes induced

Can study by proteomics, microarrays, and genetics

~120+ genes under sigB regulation

<u>General Stress Proteins</u>
- non spec Or protection
- redox
- non-spec heat, acid, salt stress

} All sigB dep. genes appear to be for non-specific stress resistance



T. Ferenci - Evolving Complexity & Periodic Selection

Examples

- bacterial chemostats (Julian Adams) - discreet set of strains evolve w/ this population (one uses metabolite of another)

- Lenski analysis - differentiation in types

- Stationary Phase Culture (e.g. R. Kolter)

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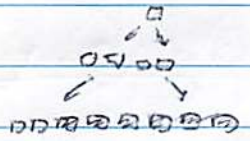
①



eventually end up w/ polymorphism

② add selection to this mix

Glucose limited chemostats

- all experiments - cells accumulate mutations in many genes
- but not all cells have mutation in same genes

- for example - old expts

accumulation of TS mutations shows this fluctuation b/c most adaptive mutations occur in rest of population which will sweep out TS mutants

- in his experiments
  - huge diversity of mutations "sweep" thru population
  - this leads to maintenance of diversity
  - mutations do not look like they are due to mutators
  - How EXPLAIN SYNCHRONIZATION? transient mutable states

DO THEY ELUCIDATE DIVERSITY?

WHAT ABOUT GENETIC EXCHANGE

Jeff Miller - Mutators

- rates of mutations vary w/in many population

Examples of "utility" of variable loci

- contingency loci (MORon) are programmed to have variation

  ∴ a population of cells will have multiple alleles at these loci

- gene duplications - can also be polymorphic w/in species

Mutators

- can be advantageous - ~~as mutators~~ esp. if selection for many mutants over time. Can convert a population to a 100% mutator population by selection over time of multiple ΔΔ's

- w/weaker selection (e.g. Lenski) - get slower accumulation of mutants

Developed single plate mutator selection

- 2 selections on plate (lac + thy)
- plus β-gal mutant so you can tell Δ's in β-gal

NO FREE LIVING ORGANISM HAS BEEN FOUND TO LIVE A MUTATOR LIFESTYLE

suggests that all/most new f(x) due to gene transfer

P Reeves - Niche Adaptation, Gene Exchange...

Species normally consist of specialized clones
Diff betn clones due to +/- of genes
Diff in housekeeping genes indicates relatedness of clones

S. enterica
- seven subspecies by biotyping confirmed by other analyses

∴ HOUSEKEEPING GENES DON'T MOVE MUCH
UNLIKE IN E COLI

- GAIN/LOSS of genes involved in metabolic pathways

V. cholerae
- much higher rate of recombination
- ∴ housekeeping genes don't have a phylogeny

Between species something may be going on.

BUT IF ADD OTHER SPECIES YOU DON'T HAVE AS MANY X-INGS OF TREES

THIS IS WEIGHTS SHIFTING BALANCE IN ACTION!

SOME SPECIES MAY HAVE ALLOWED RECHARGE AT HOUSEKEEPING GENES.

DO WANT TO SEE EVOLUTION ADDING OTHERS

STRAINS

This seems very unusual assessment of V. relatedness

Pathogenicity Islands

- Large regions that contain 1 or more genes for virulence
- present in pathogens but not non-pathogen
- freq diff GC than genome
- near tRNA genes
- freq carry mobility genes
- freq flanked by repeats

Ecoli

EPEC - enteropathogenic Ecoli -
EHEC - enterohemorrhagic Ecoli - produce shiga toxin

- over 200 Ecoli strains have shiga toxin
- some don't have pathogenicity island

LEE - locus of enterocyte effacement
- secretion system - type III - can deliver protein into host cell
- secreted protein
- a few other genes
  - TIR - translocated intimin receptor - Ecoli inserts its own receptor into host cell

compared to EHEC
- both have highly conserved type III system
- much of the rest is not

- mobile elements
  - plasmid p0157
  - pathogen islands

LEE has inserted in many different places

- Extra 1mb of DNA in O157
- scattered throughout genome

Vibrio cholera - VPI
- can be transferred as a bacteriophage
- encodes TCP cluster regd for attachment
- lower GC content
- many genes sim. to Hoge genes
- this section shows up in phage extracts

Salmonella PAI-I
- Salmonella loaded w/ pathogenicity islands

Shigella virulence plasmid pWR100
- appears to be pathog. island inserted in plasmid
- also inserted at SelC (like many other islands)

Black Holes
- large regions that when deleted enhance virulence

- many species have plasmid + chrom. pathogenicity islands
- also in Gram+ species (eg. Listeria monocytogenes)

Emergence & Spread of Ab resistance

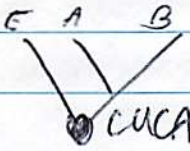
Salmonellas - non-typhoid - in Developed countries
- gastroenteritis
- low mortality
- reservoir in food animals

MDR in Salmonella in UK
- S. Typhimurium = 78% resistant to 4+ Ab
  big increase since 1980s
-

Typhimurium DT104
- # of infections has increased in parallel w/ incr. in Ab^R
- mostly a foodborne pathogen
- common in many animals

David Penny - LUCA Last Universal Common Ancestor

- shows unrooted tree of bacteria
- LUCA = step in later stages of evolution of life
- doesn't believe single gene trees for v. old trees
- simulations suggests it is very difficult to get some trees correct w/ v. old patterns
- suggests H. Phillipe methods are the best current ones



Phillipe rooted tree w/ slowest evolving sites

} BUT THIS DOES NOT SAY ANYTHING ABOUT NATURE OF LUCA

- trying to use RNA world as "outgroup" to work out nature of LUCA

Problems in RNA world

- error cascades (must protect polymerases) (aka mutational meltdown)

- Darwin-Eigen cycle -
  - as genome size increases you can code for more factors to increase accuracy of replication and therefore allowing even larger genome size

Theories -

① suggests that RNA world won't work at v. high T°
∴ early organisms prob not thermophiles

② Forterre thermal reduction hypothesis

BUT WHY TAKE YEAST tRNA? why not thermophile tRNA.

Other examples

- rev. gyrase - must have been later fusion to allow thermophily

JA Fuerst - Cell Compartmentalization

Are there organisms that challenge the prok-euk dichotomy

Ernst Mayr - suggested return to prok - euk dichotomy

Exception to prok-euk
1. Cell size - thiomargarita
2. Planctomycetes w/ membrane bound cell compartments
3. Linear chromosomes in some bacteria
4. Sponge symbionts w/ Archaeal like cell wall + sigh membrane bound compartments

Planctomycetes
Pirella - single membrane bound compartment
Gemmata - double membrane surrounds DNA/RNA

Gemmata genomics - random sequencing

B	E	Euk	A	total
118	13	1	1	133

Anammox Planctomycetes Nature July 29 1999

Sponge Symbionts

- All seq. analysis should be regarded as prediction.

---

heck # of species on TIGR website

e in pathogenicity talk

vel genome scanning
- lat transfer - since we've heard so much about the imp. of lat transfer & will skip it
- duplication

H. pylori CA6

- unrelated people are infected w/ diffs types of H. pylori
- some transmission to next generation or people who are in close contact

- find that H. pylori type MRCA parallel human evolution

Vacuolating Cytotoxin

- receptor binding domain - is only major variable region

type I vs type II

type I = many pathogenic phenotypes in vitro, in vivo, in animal

type II = not pathogenic

type I - has pathogenicity island (CAG1)
- many proteins
- CAG1
  - variable in size
  - f(x) unknown
  - immunodominant
- many genes share similarity to secretion factor operon (type IV secretion system)

Ian Booth

Stress - a definition (Have to avoid anthropocentric definition)

- a change in environment, genome or proteom that if not corrected diminishes survival or growth

① Mackey + Baranyi - adaptive potential

② Few stress responses are simple on off switches
(e.g. rpoS expression slowly increases as growth rate decr.)

Types of stress
- nutritional
- physical
- metabolic imbalance

Stress response
- activation of existing enzymes
- novel enzymes synthesis

Protection systems
- prior exposure to mild stress potentiates survival

Diversity of responses w/in species

Nonspecific responses

- Many genes induced by osmotic stress do not help cells survive this stress (some may be induced simply b/c of physical DNA),

Why are these responses not constitutive?
① energy cost
② impaired growth while repairing
③ permanent repression = loss of diversity

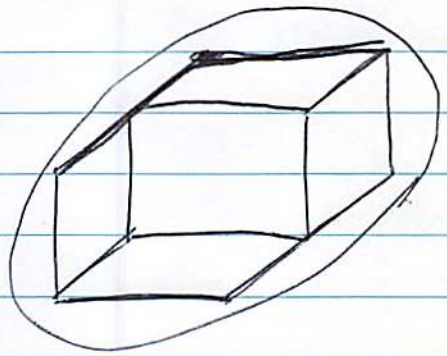
Janelle Bown pH effects

pH Optimum

pH > 9 Alkaliphiles
pH ~ 7 Neutrophiles
pH < 3 Acidophiles

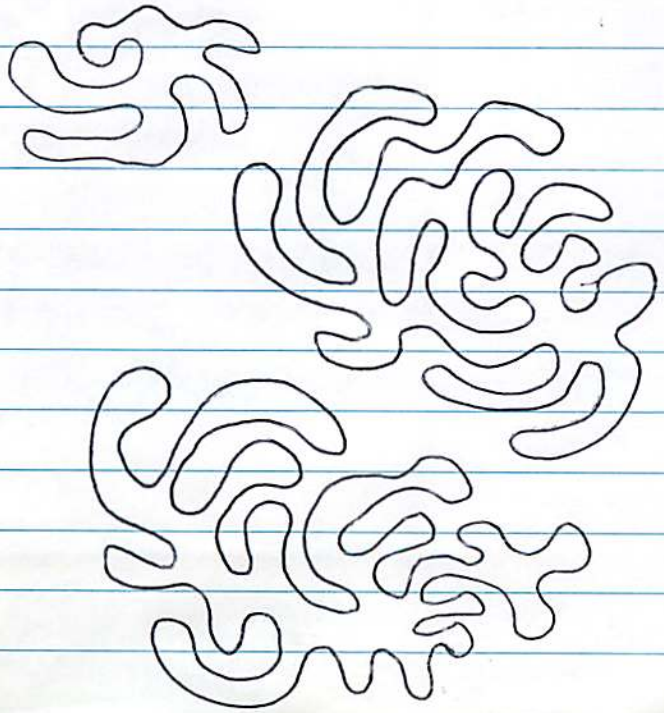
Affects of pH

- cell membrane (e.g. E. coli exposed to acid Δ's its fatty acids)
- cytoplasmic buffering
- active transport
- consumption/production of OH/H
- Δ gene expression



Affects of pH on growth characteristics -

- relatively linear affects



Plenary 1

Adg like green + brown domain of ainS + ainR

Evolution ≠ clustering

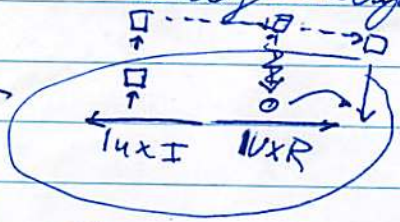
Phylogenomics idea stolen from rRNA

Intercellular Signalling

Quorum Sensing in Gram - Bacteria

- Woody Hastings 1st showed this (1970)
- subsequently found in many species
  - e.g. A tumefaciens controls conjugal transfer by Quorum sensing

- Vibrio fisheri light production
  - energy costly
  - when compared to growth cycle - luciferase produced in late log
  - material from late cultures could induce early log cells
  - Woody realized early on that this was ecologically significa



- when bacteria in packed environment, AI can accumulate to high enough concentrations to allow luxR to activate luminescence genes

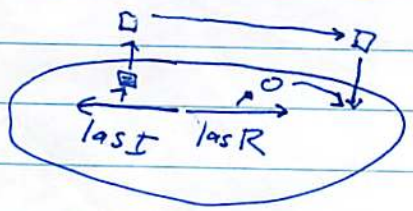
ebo 2nd set
n V. fisheri

ainS ainR

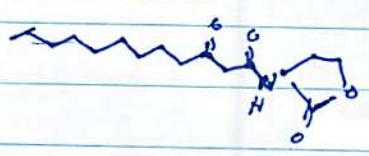
but ainS has
o obvious
milarity to
uxI.

Ps aeruginosa

- ~~colonize space w/in surrounding~~ epithelial cells
- ∴ v. similar to fish light organs
- encodes luxR + luxI homologs

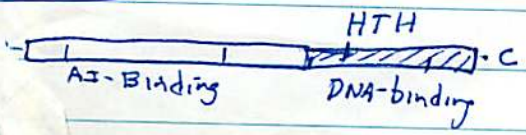


Also is acylated homoserine lactone



- there is a 2nd homoserine-lactone system in Pseudomonas
  RelI, RelR

- formation of biofilms controlled by Quorum sensing



- binds ~ -40 + contacts RNApol

Desiccation - Alisa Hocking

Reduced H_2O activity

Halophilic Archaea
moderately halophilic bacteria
halophilic algae
yeast
fungi

Environments

- salt lakes
- dried seeds, nuts, fruits
- honeys, nectars (concentrated sugars)
- dried meats

All organisms use same strategy
accumulate compatible solutes

Species	Solute
	trehalose
halophilic yeast	K^+
bacteria	prolines, glycine-betaine, glutamate
Halophilic Archaea	K^+

Good correlation between type of solute and level of H_2O activity

Hal archaea
- best @ 20-30% salt
- req 7.5M
- K^+ solute
- K^+/Na^+ ratio high

cell env. sens to low ionic
highly polar, acidic glycoproteins in wall
many proteins in high conc. as well

Julian Davies - Antibiotic Resistance

1946. Alexander Fleming. Suggs. misuse could lead to Antibiotic resistance.

Man vs. Microbe 1950- today

Objectives: control microbes w/ Ab

Subject: Biosphere

Protocol: Add 100 million metric tons of Ab to earth

Results -

- Microbes surviving
- Enormous diversity of resistance mechanisms
- The genes are accessible to all microbes by acquisition + transfer

What wasn't expected?

- mechanisms of acquisition of genes
- MDR resistance
- Resistance is inevitable

- What did this lead to?

- led to better knowledge of bacterial evolution

Mechanisms of resistance

Origin + evolution of Ab^R genes

- Sources of genes: Ab producing species, modification of housekeeping f(x), natural mechanisms

Multi-drug resistance - many mechanisms

- multiple mutations
- single plasmid encoding many genes
- many more

MUPIROCIN seems to come from mammals

- many Ab^R genes are in big multigene families + therefore possibly v. old

Pseudomonas

Pathogenesis Genome Database

Data released onto web as attained

- data released as flat files
  - blastx } matching these is hard
  - Glimmer
- Genome Editor
  - ~5000 genes
  - ½ of genes but Ecoli
- 4 chemotaxis genes

Bordetella

- value of doing 3 related species
- 7 species of gram-
- strict aerobe
- says B. bronchiseptica is most related to ancestor
- strain choice -
  - B. pertussis Tohama I
  - B. bronchiseptica RB50
  - B. parapertussis 12822

Pertussis

- lots of IS's
- high GC
- 40-50 kbp
- no RpoS yet
- dozens ABC transporters

Bronchiseptica

- much bigger
- many of these unique regions prophage
- some unique ABC transporters

- CONSERVED ORDER

Rino Rapuoli - Merk genomic approach to a vaccine

Solve 1 problem - make vaccine

Bacterial meningitis
- H. influenza
- N. meningitidis
- S. pneumoniae

> 5 major serotypes

Genome
↓
10 new genomes

P. gingivalis

Periodontitis -
- 80% of causes of tooth loss
- Mixed gram - picture
  - P. gingivalis - think this is main cause.
  - B. forsythus

Vaccine discovery

Pre-genomics - put seq, antibody - takes long time,
Genomes - shorten time

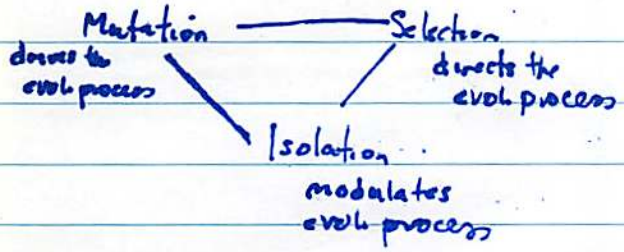
15,000 ORFs → search → candidates → 120 ORFs
↓
PSORT

Screening
- Vaccine candidates P632, P633

W. Arber - Molmech. of gen. diversity + theory of mol. evol.

Try to link evolutionary biology + evol. biology.

Hypothesis - in the genome there are genes who f(x) is an evolutionary f(x).



[redacted]

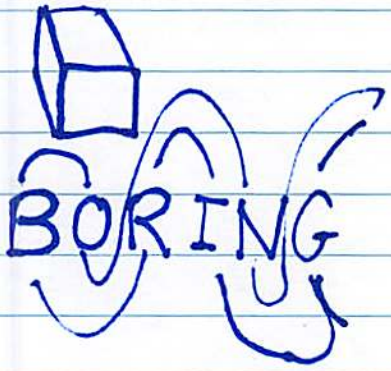
Defines mutation as alteration in nucl. sequence

Strategies of generating variation

Local change

Rearrangement

Acquire



Hypothesizes that some genes are there to drive evolution

2 classes

- generate variation
- limit genetic plasticity

say all people call replication bis an error.

says must be low frequency events

Suggests gene transfer is kept at medium rate

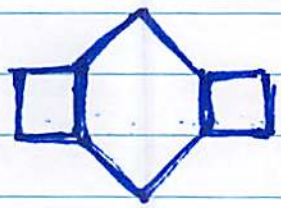
Genomes + Information

3 great mysteries
① origin of life
② why only 3 major branches
③ 3 big for complex life to evolve — say nuclear introns are recent

- what led to microbe-multicellular differences
  - SUGGESTS THIS DUE TO GENETIC "DISCOVERY"
  - suggests this is due to introns

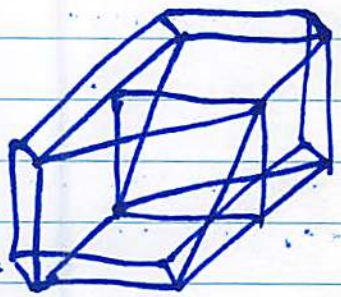
SAYS RNA IS 2nd LEVEL OF COMMUNICATION

GLIMMER



Microbiology Future

3 types of info
① genotype
  - genes
  - plasticity of genomes
② ribotype
③ prototype (proteins)



Future
① not worth studying til sequenced
② if working on species w/o genome - go do genome

says companies should lower cost of reagents

John Taylor

1990's – Last decade of fungi

Yeast mating genes; genomes
Immunodeficiency - AIDS
Immunosuppression
Plant Fungi Interactions

HYBRIDIZATION COMMON IN FUNGI

Universal
Circadian rhythms
Mating Type
Self-nonself (alleles inherited across species)
Intracellular signalling

MMR
Genomy

Fungal Specific
Synthesis of cluster
Sporulation + 2ary metabolites
Virulence + resistance

Evolution
Big picture
Ecological ID
Genomics

FUTURE
EXT. EVOLUTION

JOHN MATTICK - UNIV. OF QUEENSLAND
THE GENOME OF P. AERUGINOSA

DUNKAN MASKELL - CENTER FOR VETERINARY SCIENCE UNIVERSITY OF CAMBRIDGE

COMPARATIVE GENOME SEQUENCING OF BORDETELLA SPECIES.

Ruth Hall - Horizontal Gene Transfer

Gene mobility

Horizontal transfer (movement of DNA from 1 bacteria to another)

Intra-genome transfer (w/in molecule)

Inter-genome transfer

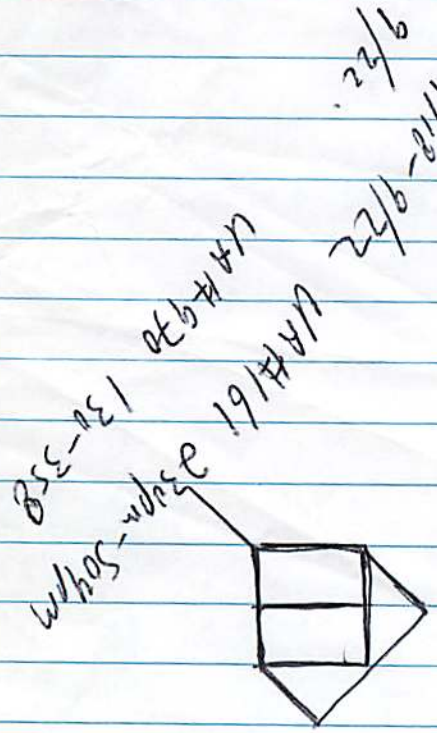
- phage
- plasmids
- conj. tpons
- tpons, IS's, integrons
- gene cassettes

Mobile Genetic Elements - two main mechanisms

- Tposition
- Site spec. recombination

Gene Cassettes

Recomb. system



TAKE HOME LESSONS

- Clinicians and Microbiologists should have a **high suspicion** of cryptococcal disease - albeit rare, it is an important disease.
- Cryptococcal meningitis should be **considered in differential diagnosis** in immunocompetent hosts presenting with unaccustomed persistent (chronic) headache.
- Carefully taken **detailed history**, include epidemiology – e.g. travel, leisure activities etc. can give a clue.
- **Early diagnosis and treatment** is extremely important for better outcome.
- All antifungal drugs have significant toxicity and should be monitored carefully.
- Laboratory findings of CSF (cells, protein) may be near normal; inflammatory markers may be normal.
- Antigen testing may be useful in early diagnosis and in monitoring response to therapy.
- Antifungal sensitivity testing is not standardised and is **not** routinely indicated.

REFERENCES

1. Callejas A et al. First isolation of *Cryptococcus neoformans* var *gattii* from the environment in Columbia. *Med Mycol* 1998; 36; 341-4
2. Chen SC et al. *Cryptococcus neoformans* var *gattii* infection in northern Australia: existence of an environmental source other than known host eucalypts. *Trans R Soc Trop Med Hyg* 1997; 91; 547-50
3. Ellis D & Pfeiffer T. The ecology of Cryptococcus neoformans. *Eur J Epidemiol* 1992; 8 (3); 321-5
4. Espinel-Ingroff A et al. Multicenter comparision of the sensititre YeastOne colorimetric antifungal panel with NCCLS M27-A reference method. J Clin Micro 1999; 37; 591-5
5. Kwon-Chung KJ et al. Improved diagnostic medium for separation of *Cryptococcus neoformans* var *neoformans* and *Cryptococcus neoformans* var *gattii. J Clin Microbiol* 1982; 15; 535-7
6. Laurenson IF et al. *Cryptococcus neoformans* in PNG: a common pathogen but an elusive source. *J Med Vet Mycol* 1997; 35; 437-40
7. Lazera MS et al. *Cryptococcus neoformans* var *gattii* – evidence for a natural habitat related to decaying wood in a pottery tree hollow. *Med Mycol* 1998; 36; 119-22
8. Pfaller MA et al. Antifungal susceptibility testing: technical advances and potential clinical applications. *Clin Infec Dis* 1997; 24; 776\84
9. Seaton RA et al. CMI in HIV seronegative patients recovered from *Cryptococcus neoformans* var *gattii* meningitis. *J Med Vet Mycol* 1997; 35; 7-11
10. Seaton RA et al. Visual loss in immunocompetent patients with *Cryptococcus neoformans* var *gattii* meningitis. *Trans R Soc Trop Med Hyg* 1997; 91; 44-9
11. Sorrell TC et al. Concordance of clinical and environmental isolates of *Cryptococcus neoformans* var *gattii* by RAPD analysis and PCR fingerprinting. *J Clin Microbiol* 1996; 34; 1253-60
12. Sorrell TC et al. Natural environmental sources of *Cryptococcus neoformans* var *gattii. J Clin Microbiol* 1996; 34; 1261-3
13. Speed BR et al. *Cryptococcus neoformans* var *gattii* meningitis in an Australian patient with AIDS. *J Med Vet Mycol* 1993; 31; 395-9

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Cryptococcus neoformans var *gattii*: an emerging pathogen

H. Sheorey*, M.J.Waters, J.R.Daffy, M.O'Reilly, P.Stanley.

Departments of Microbiology and Infectious Diseases,
St Vincent's Hospital, Melbourne, Victoria, Australia

The incidence of cryptococcal disease in the general population is estimated to be <1% annually. However, among AIDS patients, the incidence is ~10%. For reasons unknown, *Cryptococcus neoformans* var *neoformans* usually infects AIDS patients, whereas *Cryptococcus neoformans* var *gattii* usually infects immunocompetent hosts. However, studying the CMI in patients recovered from *Cryptococcus neoformans* var *gattii* meningitis, it has been proposed that there is a transient state of immunosuppression prior to development of the disease (9). A balance between host defences and a number of virulence factors possessed by the fungus, determines the outcome of infection. There have also been few case reports worldwide, including Australia (13), where *Cryptococcus neoformans* var *gattii* has been implicated as a pathogen in patients with AIDS.

The incidence of cryptococcal disease has remained constant over the last few years. Recent experience at St Vincent's Hospital in Melbourne has however shown an apparent increase in cases of cryptococcal diseases. A 'cluster' of three cases presented to this general public hospital within a short period of 5 months in 1998. Although these patients were from different geographical areas, a common epidemiological feature was exposure to "red gum" in different ways. Is there a real increase in infections due to this fungus? There have been no further increase in cases this year, hence, it seems to be a chance occurrence. In addition, due to changes in the public health system in Victoria in the last few years, the distribution of cases has changed, and this apparent increase may be attributed to this.

Study of the ecology of *Cryptococcus neoformans* var *gattii* in recent years has improved our understanding of the epidemiology of this fungus. Ellis and coworkers (3) first reported specific ecological association with 'river red gum' in Australia. Using RAPD and PCR fingerprinting, Sorrell and coworkers (11) have shown a genetic concordance between the majority of clinical and environmental isolates in Australia (same genetic profile). The ecological niche has now increased not only to other varieties of Eucalypts, but also has been reported from almond trees in Colombia (1) and from decaying wood in a pottery tree hollow in Brazil (7). In other places, e.g. in PNG where cryptococcal disease has a relative high incidence, despite extensive environmental sampling, an ecological niche has yet to be identified (6). Also, at the 'top end' of Australia where the two known hosts red gum trees do not occur naturally, Chen et al (2) have found a different genetic profile in the isolates there. This suggests a yet unknown environmental niche for this variety.

Cryptococcus neoformans is widely believed to enter through the respiratory tract, and Cryptococcal pneumonia is a well know entity that is thought to resolve without treatment in immunocompetent hosts. Pulmonary infection is extremely uncommon in patients with AIDS. **Pulmonary cryptococcosis** in Case 1 was a chance finding, not a feature in Case 2 and not a major clinical problem in Case 3. The fungus is known to have a predilection for the CNS (neurotropism) and **cryptococcal meningitis** is the commonest presentation. Acute meningitis is a feature of AIDS whereas immunocompetent hosts usually present with sub-acute or chronic persistent headaches. All three of our cases had involvement of the CNS. Ocular complications leading to visual loss is not uncommon in immunocompetent hosts (10) as also seen in our Case 2. This may be due to immune mediated dysfunction of the optic nerve and pressure, although in our case cryptococci were demonstrated in optic nerve on post-mortem. Ocular involvement is rare in AIDS. Other clinical presentations such as **cutaneous cryptococcosis** have rarely been described.

Treatment has traditionally been with intravenous antifungals such as Amphotericin B ± oral Flucytosine (5-FC) for 6 weeks or longer, followed by an oral Fluconazole tail. Although treatment is lifelong in AIDS, total length of treatment in immunocompetent hosts is not well defined and depends on initial presentation, severity of infection and response to treatment. All these antifungals have significant toxicity (hepatic or renal) and have to be used carefully. Case 2 already had underlying hepatic disease and had to be treated with Liposomal Amphotericin that has significantly lower toxic effects. Clinical failure with Fluconazole is increasingly being reported. Surgical removal of cryptococcoma (esp. pulmonary) may sometimes be necessary. Antifungal sensitivity testing is not standardised for Cryptococcus, and is **not** recommended routinely (8). A broth dilution test (Sensititre YeastOne panel) has been shown to be useful (4).

Effect of a Signal Antagonist on Protease Activity

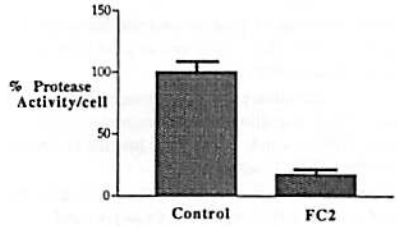


Fig. 3. Cell-free supernatants were prepared from cultures grown in the presence or absence of FC2. Hyde Powder Azure was used as a substrate for determination of protease activity.

Effect of Furanone Compound 2 on SIMC

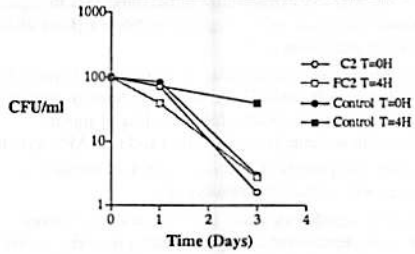


Fig. 4. Control cultures were starved for 0 or 4 hours at room temperature before exposure to 4°C. Experimental cultures were exposed to compound 2 (FC2) and starved for 0 or 4 hours at room temperature before incubation at 4°C.

Southern Hybridization with a *V. harveyi luxR* Probe

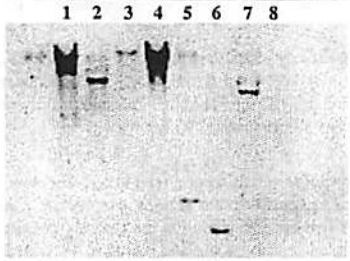
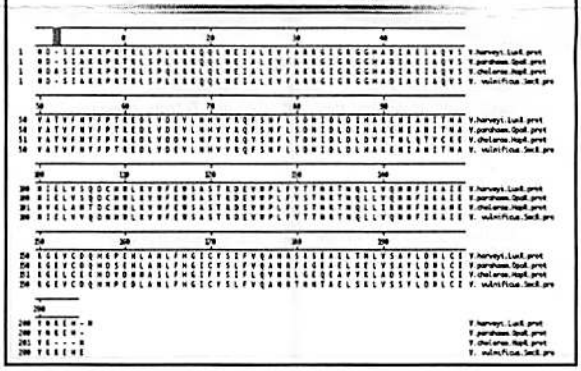


Fig. 5. Lane 1 *V. cholerae*, Lane 2 *V. harveyi* 642, Lane 3 *V. harveyi* 47-666-1, Lane 4 *V. vulnificus*, Lane 5 *Photobacterium angustum*, Lane 6 *V. anguillarum*, Lane 7 *V. alginolyticus*, Lane 8 *E. coli*.

LuxR Protein Alignments



Summary

- *V. vulnificus* produces a signal in the transition to stationary phase that induces the *V. harveyi* non-AHL signaling system.
- The signal produced by *V. vulnificus* occurs simultaneously with the development of starvation adaptation.
- The addition of a signal antagonist inhibits SIMC and protease production but does not inhibit signal production.
- We have cloned and sequenced *smcR* from *V. vulnificus* which shares greater than 90% amino acid identity with the LuxR of *V. harveyi*.

Conclusions

- The LuxR signal response regulator is widespread and highly conserved among marine vibrios, which suggests that these signaling genes were present in their common ancestor.
- Signals produced by *Vibrio vulnificus* are important for starvation adaptation and cross-protection.
- Signals may also regulate virulence factors in *V. vulnificus*.
- Signal antagonists may be used as a unique approach to controlling virulence of this and other marine organisms.

Introduction

- Many bacteria use extracellular signal molecules to regulate virulence factors as well as regulate stationary phase and/or starvation adaptation (1-6).
- There are two well-studied classes of signaling systems in Gram-negative bacteria (2, 7), which act through conserved families of proteins specific for each class of signal; acylated-homoserine lactone (AHL) and non-AHL systems.
- Furanone compounds (FCs) have been demonstrated to interfere with signaling pathways (8).
- Non-AHL signals, originally detected in *Vibrio harveyi*, have been identified in a range of marine bacteria, including *Vibrio cholerae* and *Vibrio parahaemolyticus* (9, 10).
- *V. cholerae* produces an HA metalloprotease, a virulence factor regulated by the *V. harveyi luxR* homologue, *hapR*.

Introduction (Cont.)

- *Vibrio vulnificus* produces a metalloprotease homologous to the HA protease of *V. cholerae* as well as exhibiting a starvation adaptation program.
- In *V. vulnificus*, starvation prior to low temperature incubation induces starvation-induced maintenance of culturability (SIMC) which delays entry into the viable but non-culturable (VBNC) state (11).
- Based on these observations, we tested *V. vulnificus* for the presence of signals, signal-regulated phenotypes and signaling genes as well as the effect of a signal antagonist on signal production and expression of signaling phenotypes.

Materials and Methods

- Cell-free supernatants were prepared by centrifugation and filtration of samples. Cultures were prepared by inoculation of defined medium (2M) or LB from overnight cultures by 1:100 dilution.
- The *V. harveyi* luminescence bioassay was performed by the addition of 10 l of supernatant to 90 l of 1:5000 dilutions of cultures of the non-AHL system reporter strain, BB170 in microtiter plates (12).

Materials and Methods

- Protease activity was determined by the addition of 1 mg/ml of Hyde Powder Azure to cell-free supernatants and incubation at 37°C for 3-4 hours. Protease activity/cell is reported as absorbance at 595 nm/610nm.
- SIMC response. Cells were grown to mid-log phase and collected by centrifugation at room temperature. Cells were washed once in starvation medium 2M-glucose, resuspended in 2M-glucose and placed at 4°C after 0 or 4 hours starvation as indicated.

Signal Production in *Vibrio vulnificus*

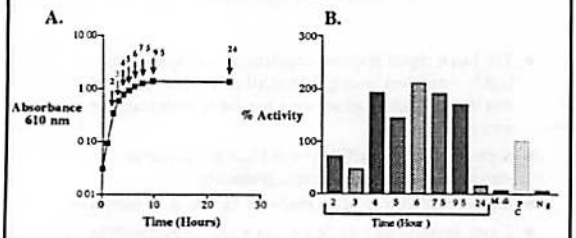


Fig. 1. A. Time of supernatant collection for luminescence bioassay. Cell-free supernatants were prepared at the indicated times for use in the *V. harveyi* biolaminescence bioassay.

B. Induction of *V. harveyi* bioluminescence. Cell-free supernatants were added to the reporter strain to determine % activity.

Factors Effecting Signal Production and Activity

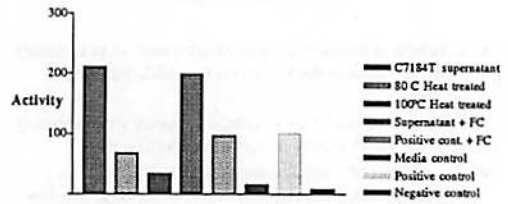


Fig. 2. Effect of heat treatment on signal activity and the signal antagonist, FC2, on signal production. Cell-free supernatants were prepared as described. Heat treated samples were held at the indicated temperature for 10 min. FC2 supernatants were prepared from cultures grown in the presence of 10 g/ml of FC2.

CONSTRUCTION OF A SERIES OF TRANSPOSONS FOR USE IN HALOPHILIC ARCHAEA

D. Wendoloski, C. Ferrer, W. Woods and M. Dyall-Smith
Department of Microbiology, University of Melbourne,
Parkville, Victoria 3052, Australia

Introduction

The study of Domain Archaea is of interest because of the novel evolutionary lineage and close relationship to Domain Eukarya it reveals. The halophilic Archaea are among the most easily studied in this Domain. We are developing a transposon-based mutagenesis and promoter reporter system for use with the extreme halophile *Haloferax volcanii* (isolated from the Dead Sea). Transposons with selectable markers occur naturally in Domain Bacteria (eg Tn*10*); however no such transposons are known in the halophilic Archaea, although they are known to posess very active insertion sequence (IS) elements. Artificial transposons for use in halophilic Archaea have been engineered from individual components such as insertion sequence (IS*H*) elements and selectable halobacterial markers (1, 4).
Transposons constructed in this lab are based on the insertion sequence IS*H28* (3). A resistance marker, *mevR*, which confers resistance to mevinolin (simvastatin) and halobacterial β-galactosidase gene, *bgaH* (a reporter gene) (2) were used in their construction. BgaH is assayable in much the same manner as LacZ of *E. coli*.

Aims

The aims of this work are:
to construct transposons usable in mutagenesis experiments, and perform such experiments; and
to construct transposons to examine halobacterial promoters in vivo, and having found such promoters, to test their activity under differing culture conditions.

Methods

Conventional cloning methods were used in the construction of all transposons.
Site-directed mutagenesis of the *mevM* determinant was carried out by PCR, to create *mevR*. PCR was also used to generate the three-way translational stops in the transposons containing *bgaH*. These transposons also include pOK12, a moderate-copy-number plasmid for use in *E. coli*. Transposons were transformed into *Hf. volcanii* by established methods (1).

Results

Both the mutated *mevR* determinant and the *bgaH* (plus promoter) determinant have been shown to function in non-transposing plasmids capapble of replicating in *Hf. volcanii* (results not shown). Preliminary results indicate that both pMDS106 and pMDS114 are capable of integration into *Hf. volcanii* (results not shown).

Discussion

ISH28 was rearranged so that the transposase gene was located outside of the inverted repeats, while the selectable marker *mevM* and reporter gene *bgaH* (where appropriate) were located inside the inverted repeats. Placing the trasnposase outside the inverted repeats makes the construct "single-use". An up-promoter mutation was introduced into the selectable marker *mevR* to create *mevM*, the aim was to increase its effectiveness in single copy (manuscript in preparation). Two versions of the transposon containing the reporter gene were created: one with its promoter and one without. The version without the promoter is intended for use as a promoter trap, so that β-galactosidase is only synthesised as a transcriptional fusion product. In the plasmids with *bgaH*, an *E. coli* recovery plasmid was also introduced into the transposon to facilitate recovery, cloning and sequencing of the target sites.

Future Work

Southern blotting protocols for locating integrations have yet to be finalised. Once this is done, chromosomal loci into which the transposons have integrated will be sequenced. The effects of different culture conditions (such as growth temperature, salt concentration, medium pH, etc) on expression of *bgaH* will be assayed.

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Sequence of *mevR* (site-directed, up-promoter mutant): 5' ACT TTT AAG AGT

Figure 1: Comparison of sequences of *mevM* and *mevR*

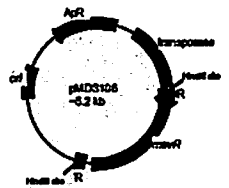

Figure 2: pMDS106
Note that there is no recovery plasmid in this construct

Figure 3: pMDS114
Note the *E.coli* recovery plasmid (based on pOK12) located between *mevR* and *bgaH*.

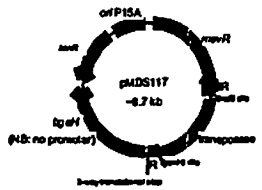

Figure 4: pMDS117
Note that in this construct, *bgaH* lacks its promoter
Note also the *E. coli* recovery plasmid, identical to that of pMDS114

References

1. Dyall-Smith, M.L. and Doolittle, W. F. (1994) Construction of composite transposons for halophilic Archaea, Canadian Journal of Microbiology 40:922 - 929
2. Holmes, M. L., Scopes, R.K., Moritz, R. L., Simpson, R. J., Englart, C., Pfeifer, F. and Dyall-Smith, M. L. (1997) Purification and analysis of an extremely halophilic b-galactosidase from *Haloferax alicantei*, Biochimica et Biophysica Acta 1337: 276 - 286
3. Woods, W.G. and Dyall-Smith, M.L. (1995) Revised nucleotide sequence of an archaeal insertion element (IS*H28*) reveals a putative transposase gene, Gene 162: 219 - 220
4. Woods, W.G. and Dyall-Smith, M.L. (submitted for publication): Improved transposons for halophilic Archaea

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Figure 3: pMDS114
Note the *E.coli* recovery plasmid (based on pOK12) located between *mevR* and *bgaH*.

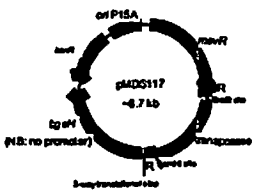

Figure 4: pMDS117
Note that in this construct, *bgaH* lacks its promoter
Note also the *E. coli* recovery plasmid, identical to that of pMDS114

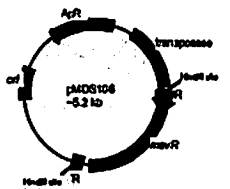

Figure 2: pMDS106
Note that there is no recovery plasmid in this construct.

References

1. Dyall-Smith, M.L. and Doolittle, W. F. (1994) Construction of composite transposons for halophilic Archaea. Canadian Journal of Microbiology 40:922 - 929
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Further Information

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Fax :

Message :

To Jonathan Eisen, Room 211

From :	To : Room 211 Jonathan Eisen

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To Jonathan Eisen, Room 211

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Sex Matters Q&A

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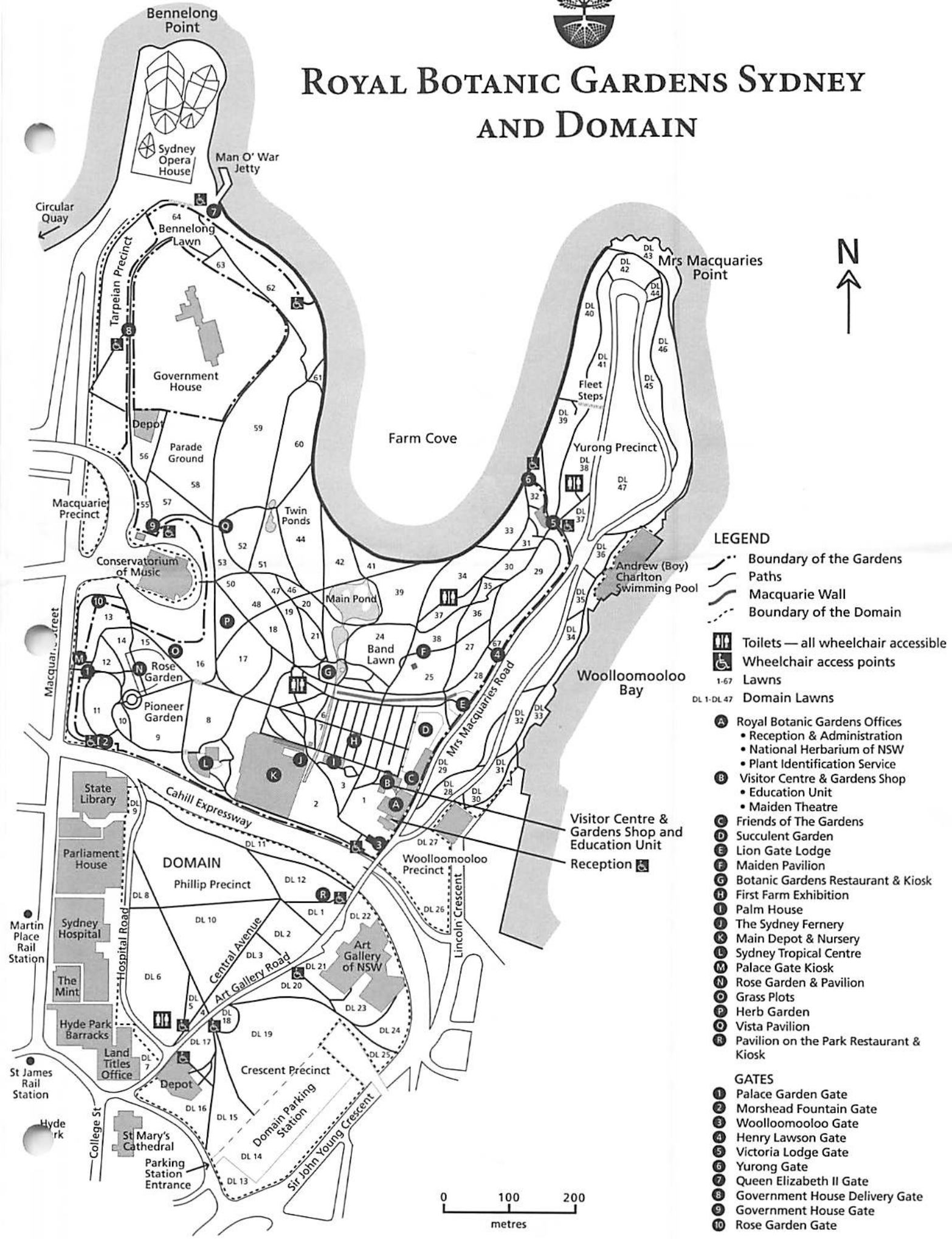
Royal Botanic Gardens Sydney and Domain



LEGEND

- Boundary of the Gardens
- Paths
- Macquarie Wall
- Boundary of the Domain
- Toilets — all wheelchair accessible
- Wheelchair access points
- 1-67 Lawns
- DL 1-DL 47 Domain Lawns

- A Royal Botanic Gardens Offices
  - Reception & Administration
  - National Herbarium of NSW
  - Plant Identification Service
- B Visitor Centre & Gardens Shop
  - Education Unit
  - Maiden Theatre
- C Friends of The Gardens
- D Succulent Garden
- E Lion Gate Lodge
- F Maiden Pavilion
- G Botanic Gardens Restaurant & Kiosk
- H First Farm Exhibition
- I Palm House
- J The Sydney Fernery
- K Main Depot & Nursery
- L Sydney Tropical Centre
- M Palace Gate Kiosk
- N Rose Garden & Pavilion
- O Grass Plots
- P Herb Garden
- Q Vista Pavilion
- R Pavilion on the Park Restaurant & Kiosk

GATES

1. Palace Garden Gate
2. Morshead Fountain Gate
3. Woolloomooloo Gate
4. Henry Lawson Gate
5. Victoria Lodge Gate
6. Yurong Gate
7. Queen Elizabeth II Gate
8. Government House Delivery Gate
9. Government House Gate
10. Rose Garden Gate

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6. Thomas Cook	173.55	8/14/99
7. Fivanis - dinner		

TUESDAY 17 AUGUST 1999

INTERNATIONAL UNION OF MICROBIOLOGICAL SOCIETIES
9 - 20 AUGUST 1999
SYDNEY AUSTRALIA
IUMS

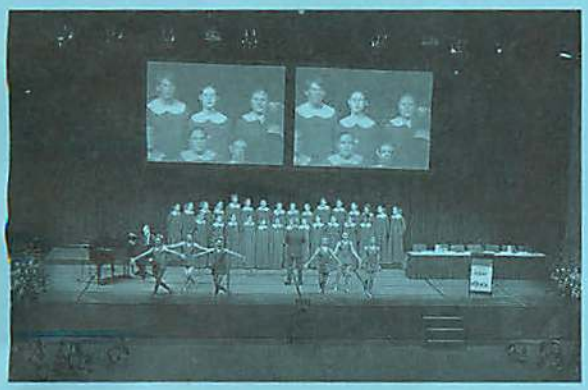
Congress News

IXTH INTERNATIONAL CONGRESS OF BACTERIOLOGY & APPLIED MICROBIOLOGY
IXTH INTERNATIONAL CONGRESS OF MYCOLOGY

An Inspirational Opening

Sydney, sparkling after a night of overnight rain, assured that the IXth International Congresses of Bacteriology and Applied Microbiology and the IXth International Congress of Mycology opened on a high note, and promise to rival the very successful International Congress of Virology that finished last week.

The Australian Youth Choir and the dancers captured the imagery of Australia and provided delegates with the comfortable feel of the Australian lifestye.



Dick Groot Obbink in his welcoming address said the Congresses had excellent scientific programs with many renowned international scientific speakers participating. He thanked the international chairs of the scientific organising committees, Tim Gray and Rob Samson for their contributions in canvassing plenary sessions, symposia and workshops. He paid particular tribute to the untiring efforts of John Mackenzie, overall Chair of the organising committees for his unflagging efforts to make these Congresses a resounding success.

A number of presentations of awards were made. Scientists from around the world were recognised for their outstanding achievements. The Van Neil and the Arima awards were presented by John Mackenzie on behalf of the University of Queensland and Helena Makela, President of IUMS, to Kazuo Tomagata and F.J. Martin respectively.

Ian Gust, President of the Australian Society for Microbiology, presented a number of awards including the award of Honorary Life Membership to Peter Wood for his many years of active service to the Australian Society for Microbiology.

John Mackenzie and Dick Groot Obbink were presented with Distinguished Service Awards for their contributions to the Australian Society for Microbiology and David Ellis was presented the Distinguished Teaching Award.

Richard Strugnell was the recipient of the Fenner Research Award. In addition there were a number of student awards to Australian microbiology students.

Nobel Laureate Werner Arber summarised the enormous advancements made in microbiology since the discovery of restriction enzymes had made him famous. He spoke of the exponential spin offs that had occurred since then. He emphasised the need to scientists to think globally and for there to be free exchange of information and ideas.

Werner Arber will participate in the final symposium on Friday with his vision of the future for Microbiology.

Rita Colwell stole the show in her keynote lecture "Marine Microbiology – the ocean frontier". After being presented with an Honorary Fellowship of the

ASM by ASM President Ian Gust, she kept the audience spellbound for an hour, weaving an intricate picture of biological complexity and how it is now being harnessed to benefit humanity. Her story blended modern molecular science with the diversity of microbiology including microorganisms associated with deep sea vents. This Keynote lecture was a great inspiration to young scientists contemplating a future in microbiology.

Following the Opening Ceremony delegates met new colleagues and renewed old friendships and acquaintances at the opening mixer held in the Exhibition area.

BIOTERRORISM!

The Symposium on Bioterrorism attracted close to 500 delegates. This symposium was particularly pertinent to all three Congresses relating to bacteriology, virology and mycology. DA Henderson from Johns Hopkins University, renowned advisor for the US Government chaired a top rate cast of speakers with first hand knowledge of bioterrorism and included Hamish Killip formerly a member of the British Defence Forces and attached to the United Nations Special Commision (UNSCOM). Hamish detailed the processes the very elaborate investigations UNSCOM carried out to uncover the Iraqi biological war effort. Christopher Davis formerly a Senior Analyst with Defence Intelligence in Whitehall, UK gave an overview of biological weapons past present and future. Ken Alibek was formerly Chief of the Biopreparations for the Soviet Union before defecting to the west in the early 1990s. He gave a chilling account of the very extensive bioweapons program which included Ebola and Marburg viruses.

AUM Shinrikyo was not only concerned with manufacturing seron gas but was a highly organised and dangerous antisocial group well equipped to reek havoc in modern Japanese society. He detailed and provided graphic footage of the gas attack on the Japanese subway system in 1996 which was intended to kill top ranking Japanese police. Possible scenarios were outlined by DA Henderson. Small pox and anthrax are still very much likely agents of BW. Jerome Hauer, Director The Mayor's Office of Emergency Management, New York City explained that New York was far ahead of other American cities in its ability to be able to respond to a biological attack. Much depends on advanced informatics and surveillance systems. New York serves as a model for other world cities. Commander Andy Robertson from the Australian Defence Health Services, Canberra elaborated on Australia's readiness to defend itself from BW. Many Australian personnel have played key roles in international anti-biological terrorist organisations. Finally Stephen Morse spoke of the technologies that are now available for detecting pathogenic organisms including the highly sophisticated PCR array technologies.

Delegates and members of the public concluded the program with a lively panel discussion with the panel of speakers.

Following the symposium speakers from the Bioterrorism Symposium relaxed at Dick Groot Obbink's home to savour fine Australian wines and other elegant Aussie tucker.

MYCOLOGY PROGRAM

At least 350 mycologists have come from all over the world to be here at IUMS! Welcome to you all! We have a great program of 6 concurrent Symposia, all with invited speakers, every morning of the week, with sessions on Systematics and Biodiversity, Medical Mycology, Biotechnology, and many other topics.

This Tuesday morning, look out for "Diagnostic Methods of Clinical Relevance", "Teaching Mycologists", "Wine Microbiology" and "Microbial Resource Centres". The last named is a Joint Symposium with BAM.. These sessions have very broad appeal. Tuesday afternoon's Plenary is entitled "Biodiversity and Biogeography of Australasian Fungi" and is of particular interest to everyone with an interest in fungal ecology.

On Wednesday morning don't miss "Molecular and Immunodiagnosis of Mycotic Infections" "Molecular Analysis and Biology of Candida", "New Industrial Enzymes" and "Mycotoxins 1".

Wednesday afternoon's Plenary will be a highlight, with very broad appeal. "Fungal Resistance in Medicine, Food and Biodeterioration" will draw together experts in diverse fields, seeking common ground in the battle against fungi resistant to the most effective fungal inhibitors man can devise.

MYCOLOGY BARBEQUE

Mycologists! Here is your chance to sort sheep from goats, catch up with old friends, make new ones and talk MYCOLOGY in a convivial atmosphere and wonderful setting, TODAY Tuesday August 17, from 5.30 p.m. to 9.30. p.m., in the Cockle Bay Bar, Level 1, Convention Centre. At the front of the Centre, near the foot of the stairs leading to Registration, the Cockle Bay Bar has great views across Darling Harbour. The cost of $35 includes informal local food and beverages. Tickets are still available from the Cashier's Booth next to Registration.

Posters Show Latest Scientific Discoveries

The poster program for the two congresses are available for viewing until Thursday afternoon in the poster viewing area at the rear of the trade display. These posters outline many of the most recent discoveries in microbiology.
The poster presenters will be at their posters to discuss the poster material and to answer questions at the time indicated in the program.

Congress planning no easy task

Seven years of planning and dediction have culminated in the IXth International Congress of Bacteriology and Applied Microbiology (ICBAM) and the IXth International Congress of Mycology (ICM), bringing together an international cross-section of scientists. The Congress' Organising Committee have been involved since the Australian bid for the Congress was won in 1993.
Innumerable meetings, promotions at other Congresses and communications with the International organsiations worldwide have had impressive results.

MESSAGE CENTRE

Congress participants are invited to use the message centre located in the Exhibition Hall. Messages may be left for friends and collegues. The monitors throughout the Convention Centre will list persons who have messages waiting for collection. Please remember to check the monitors during session breaks.

Media

The International Congress of Microbiological Sciences has attracted a great deal of interest from the media. An extensive media program is being co-ordinated by Ron and Vicki Lord of R. J. Lord Pty. Ltd. Media exposure is occurring through television, radio, newspaper and magazines. More than 40 media outlets - both Australian and International - are covering events at the Congress. A media display board has been set up in the Exhibition and delegates should keep their eyes on all forms of media to see the conference exposure.

Congress Statistics

Total participants - 1378. Comprised of 79 Accompanying persons, 126 exhibitors, 233 students, 140 speakers and chairs, 720 delegates, 61 day delegates, 17 sponsors and 29 media.

Polo Shirts for Sale

Take home a souvenir of the XIth International Congress of Bacteriology and Applied Microbiology or the XIth International Congress of Mycology. A$25 per shirt - purchase from the cashier at Registration. Limited stock available!

Some Congress Trivia!

- There have been 17,648 web site hits
- 34 Registration desk staff & 50 students
- Over 8500 hours expended by Congress Organisers
- 20,000 Registration Brochures printed
- Top 4 delegations - USA , Japan , UK then Germany
- 14 different colour name badges printed to differentiate delegate registration types
- 13,621 delegate enquiries received by the Secretariat - pre-congress.
- Most common enquiry - confirmation and amendment to registration.
- Second most common enquiry - program changes.
- Third accommodation changes

Daily Program Changes will be available for viewing next to the Registration Desk in the Promenade on Level One.

AUSTRALIANA EVENING WEDNESDAY 18th AUGUST 1999

This will be a night to remember.
Come along and enjoy good food, Australian Wine, and "Aussie" entertainment!

XITH INTERNATIONAL CONGRESS OF VIROLOGY

The XIth ICV Congress held 9th to 13th August 1999 was a memorable event for all who attended. The 2500 participants enjoyed a stimulating scientific program as well as a range of fantastic social events where participants had the opportunity to renew past friendships as well as to meet new coleagues

ICV '99 ORGANISING COMMITTEE WITH CONGRESS ORGANISERS

HELICOBACTER AT IUMS

Given *Helicobacter pylori* was born in Australia (i.e. first cultured in 1982 in Perth), it was appropriate on the first day of the ICBAM meeting to have a session on Helicobacter species. Adrian Lee, from the University of New South Wales, introduced *Helicobacter pylori* and reviewed current understanding on pathogenesis. The main message was that this organism is a major global pathogen and is arguably the world's most common bacterial infection with more than 2.5 billion people infected around the globe. Not all go onto symptomatic disease but millions will develop ulcers or gastric cancer. What determines symptomatic disease is a change in the balance of bacterium and hosts. On the bacterial side, acquisition of a pathogenicity island results in a system which facilitates contact with the gastric surface and more aggressive inflammation (gastritis) occurs. Host defences in local acid results in different environments for bacterial growth. Gastritis occurs in different areas of the stomach and so different presentations of disease occur. The different patterns of diseases are therefore explained by differences in bacterial strain and acid secretion.

Richard Alm from the Astra- Zeneca Research and Development, Boston then dissected the genome of this gastric pathogen. *H.pylori* was the first bacterium for which two whole genomes are available. Alm compared the sequences and laid to rest the myth of extensive genetic diversity about the organism and provided important new insights as to its biology.

The bacteria were remarkably similar with only 6% strain specific genes the majority of which are clustered into a sing!e hypervariable locus. The final presentation in this symposium by Jim Fox from MIT Boston introduced a whole new world of helicobacter and exciting possibilities for the future. The genus is exploding with 19 new species identified. In animals these bacteria cause a range of diseases - hepatitis, liver cancer and inflammatory bowel disease. The first human data starting to appear. Watch out the 'new Helicobacter species - H. hepaticus, H. bilis, H. canis etc - the wonderful world of Helicobacteriology has just begun!

Be a Winner

Exhibitor and Delegate Word Search Competition

We invite delegates to visit the Exhibition in Hall 5 and see the great product stands.
Join in the Competition -
visit each Exhibitor Display and match the word with the corresponding Company Name listed on the Competition Form found in your delegate satchel.,
The winner will receive a 24 issue subscription to FEMS Microbiology Letters, kindly donated by Elsevier Science.

THURSDAY 19 AUGUST 1999

INTERNATIONAL UNION OF MICROBIOLOGICAL SOCIETIES
9 - 20 AUGUST 1999
SYDNEY AUSTRALIA
iums

Congress News

IXTH INTERNATIONAL CONGRESS OF BACTERIOLOGY & APPLIED MICROBIOLOGY
IXTH INTERNATIONAL CONGRESS OF MYCOLOGY

The Next IUMS Congresses

The next IUMS Congresses will be held from 27 July to 01 August 2002 at the Palais des Congres, Paris, France. This promises to be a gala spectacular of microbiology as it will be the first tijme that all three IUMS Congresses, Bacteriology and Applied Microbiology, Mycology and Virology will be held in the same week at the same venue.

If you wish to receive the forms and information on the 2002 congresses please complete the cards available at the reception desk or spread throughout the exhibition.

Emerging Foodborne Diseases: A feast of Science for Microbiologists.

The ICBAM plenary yesterday provided a feast of microbiology for IUMS registrants. Chaired by Roy Robins Browne and Trish Desmarchelier the symposium provided an outstanding program associated with Emerging Foodborne diseases. The first half of the program outlined the contribution of pathogenicity islands to the evolution of bacterial virulence in food borne pathogens; the role of bacteriophages in bacterial virulence and how selected antibiotics may enhance rather than suppress pathogenicity; and the emergence and spread of antibiotic resistance in food borne bacteria in the UK, including how the use of antibiotics in food animals influences the spread of antibiotic resistance bacteria. The second half of the program focused on food as an ecosystem and how food borne diseases can be assessed and monitored.

The symposium provided much food for thought. It built a strong bridge between food mircobiologists, scientists involved in veterinary medicine and those in clinical practice and emphasised the importance of wide collaboration in microbiology.

The program illustrated the importance of meetings such as IUMS in bringing together scientists from various specialties and many countries to present and share their data.

EXTREMOPHILES!

Six OVERSEAS EXTREMISTS held the audience captive during the Tuesday morning plenary session. Aided by a junior extremist from Australia, the extraordinary group delivered their message about the existence of life in the depths of the ocean at temperatures above 110C, of survival mechanisms for life forms existing in the water cores of nuclear reactors, of life in the freezing Antarctic, and of thriving in saturated salty seas. Not content to amaze the audience with these extreme views, they eluded to life on Mars and a link to the origins of life on Earth. Is this possible? Well yes it is. The extremists of course were the speakers in the Plenary Symposium on Extremophiles; microorganisms likened to the bungy jumpers of the microbial world. While this is a flippant description of a fascinating new field, it does under pin the fun and excitement that is inherent in the science of Extremophiles.

Rick Cavicchioli from the University of New South Wales and Karl Stetter from the University of Regensberg, Germany, chaired the session. The first presentation, by Karl Stetter, highlighted the diversity of microbial life existing at a broad range of geothermally heated environments, describing some hypertheromphiles being able to survive autoclaving and growing up to 113C. The chemolithoautotrophic nature of some of these hyperthermophiles provided the provocative concept of organic life evolving in these superheated environments. Jeffrey Miller from UCLA described the DNA repair mechanisms that are being identified in a number of hyperthermophiles. His coverage extended a the amazing radiation resistant bacterium, Deinococcus radiodurans, which is able to completely repair denatured chromosomal DNA following exposure to enormous doses of radiation. Ed De Long from the Monteray Bay Aquarium Research Institute in California provided convincing evidence that archaea are not only prevalent in extreme environments but are also numerically abundant throughout the bulk of the ocean. This should once and for all put to rest the question about the significance of archaea to the world's production of prokaryotic biomass.

After the break Mike Danson from the University of Bath, UK, described a comprehensive structural biology analysis of citrate synthases from organisms surviving from over 100C to 0C. The comparative analysis revealed important biochemical constraints for proteins functioning at the thermal limits of life. As a result of their work Mike predicted that proteins themselves were not the limiting factor for the upper limit of life and that instead, the stability of cellular metabolites was likely to be critical. Charles Gerday from the University of Leige demonstrated the importance of structural biology studies of cold adapted proteins for Biotechnological application. He provided a broad list of present and future applications of enzyme to industry (eg. lipases and proteases in cold water detergents) and highlighted the importance of mutagenesis studies for engineering designer proteins. Torsten Thomas, a PhD student in Rick Cavicchioli's laboratory, described biochemical properties of archaeal cold adapted proteins. The work provides an important link to work on cold active proteins from bacteria and eucaryotes. Oren Aharon from the Hebrew University of Jerusalem, Israel, gave a perspective of life in extremely saline environments. He provided insight into methods for the cultivation of Halobacteria (an archaeal genus) from salterns and demonstrated the ability to isolate the genus even when molecular studies indicated their absence.

The field is expanding and exciting new extremophiles with unheard of properties continue to appear – to remain abreast ensure you mark your calendar for the 3rd International Congress on Extremophiles, Hamburg, Germany, September 2000 – the extremists will be there!

Don't Miss the Gala Dinner !

Tickets are still available from the Cashiers Desk in the Registration area for the gala end of conference dinner to be held at Dockside on Friday 20 August, 1999 at 1930 – 2200 hours.

This is an opportunity for registrants to share good food and wine in a beautiful venue overlooking Darling Harbour.

Cost $100 - Dress – cocktail.

You don't need to organise your own table – just come along!
Note – this dinner is for both microbiologists and mycologists.

Community's interest in science alive and well!

The international congresses on Virology, Bacteriology and Applied Microbiology, and Mycology, together with the special symposium on BioTerrorism have attracted a wealth of media interest in the contribution of the microbiological sciences to everyday life and wellbeing.

The fact that these events are in Sydney has provided a rare opportunity to bring that information and the scientists presenting it to the attention of the community via a wide range of general and specialist journalists and writers in the print, radio and media.

Many of the subjects being discussed at the congresses regularly make international headlines, so presentations of research findings and updates can be expected to arouse considerable community interest.

To disseminate that information, the Conference Organising Committee retained the services of a company knowledgeable about organising events and working with journalists, and an experienced health writer to help compile background information about the scientific programs.

It adds up to a Sydney-based husband and wife team: the company is Victoria Lord Pty Ltd and the health writer is Ron Lord. Although they work in unrelated fields, their respective services dovetailed for what they knew would, because of its sheer magnitude, be an extremely challenging project.

Vikki is a former editor and fashion and beauty editor of a number of national women's magazines. Her press relations and advertising company specialises in the promotion of prestige companies and events – work that requires her to be in constant touch with an extraordinary range of media outlets.

Ron is a specialist health writer and journalist and is one of the founders of the Australian Medical Writers Association. In 1991 he launched a national subscription journal on health policy called healthcover which provided Australia, for the first time, with a forum for objective debate on the funding and delivery of health services (a project with has hitherto occupied all of his time).

Between them, Vikki and Ron set about the task of what amounts to presenting a parallel congress program: firstly, to let writers and journalists know the congresses were on and invite their interest, and secondly to service that interest by arranging a daily series of media conferences and otherwise facilitate communication with microbiologists.

In developing an extensive backgrounder on the congresses, Ron received considerable assistance from:

• In Virology and the symposium on Bio-Terrorism, Professor John Mackenzie, head of the Department of Microbiology and Parasitology, University of Queensland and Vice-Chair of the Program Committee and Chair of the 1999 Congress Organising Committee, Virology.

• In Bacteriology and Applied Microbiology, Dr Dick Groot Obbink, Chair of the National Advisory and Organising Committee, Bacteriology and Applied Microbiology

• In Mycology, Dr John Pitt, Chief Research Scientist at Food Science Australia and Chair of the National Advisory Committee, Mycology.

In the lead-up to the congresses, the background document was distributed to some 360 media outlets around Australia (including specialist and trade publications and representatives of international news agencies). To encourage international interest and provide regular updates about the media, information was listed on the internet at the congress website.

At the same time, invitations were issued to some 160 presenters and session chairs in different time zones around the world to participate in a daily series of up to five media conferences throughout the congresses (40 media conferences in total).

The invitations met with nearly 100% acceptance. The presenters and session chairs also contributed greatly by providing information required by journalists, such as summaries of their work and their professional background.

News and current affairs journalists in the major print, radio and television media have been notified daily of the program of media conferences. The conferences are presented in a Media Centre established adjacent to the main congress auditorium.

Just days from the start of the congresses, there was evidence that considerable media interest was building. Some 42 journalists from across the media spectrum had registered to attend, including representatives of outlets servicing audiences globally, in North America and South East Asia.

At the conclusion of the Virology congress and at the start of the Bacteriology and Mycology congresses, media coverage had included:

• A spectacularly illustrated six-page cover story (The Real Millenium Bug) in the Colour Magazine that accompanies the nationally distributed The Weekend Australian.

• A session on ABC's Lateline featuring interviews by Dr Norman Swan with four scientists attending the congresses (three of them Nobel Laureates).

• A segment on Kerry O'Brien's 7.30 Report dealing with the resistance to antibiotics.

• A superb series of current issues in virology written by Sydney Morning Herald correspondent Deborah Smith.

• A visit by the Korean Broadcasting system to film for a "60 minutes" style documentary to be shown later this year. In the course of the crew's three-day visit the producer conducted 20 interviews.

• Inquiries from the United States (Reuters, USA Today) and Europe arising from a front page article in the Sydney Morning Herald by Deborah Smith about the discovery of a virus strongly suspected of being the cause of breast cancer. The scientist who presented the paper had to be equipped with a mobile phone to enable him to respond to the local and international inquiries.

• Extensive coverage on radio, mainly via interviews nationally via the ABC.

• Articles in rural and interstate newspapers resulting from syndication arrangements through the Sydney Morning Herald and the national newsagency Australian Associated Press.

• Daily interviews of visiting scientists on SKY TV News.

• Coverage in Sydney's three major metropolitan newspapers on Monday April 16 arising from Saturday's special symposium on Bioterrorism.

Coverage known to be in the pipeline are segments being prepared for the ABC's television series Quantum and a program devoted to Bioterrorism about to be recorded for Geoffrey Robertson's Hypothetical (Channel 7).

Among specialist publications covering aspects of the congresses are Nature, The Medical Journal of Australia, Modern Medicine, New Scientist, Today's Life Science, ECOS (CSIRO Publishing) The Economist, Australian Doctor, Medical Observer, Australian Medicine (the newsmagazine of the Australian Medical Association), Australasian Pollution & Waste Management, Clean Air Journal, The Australian Grapegrower & Winemaker and National Liquor News.

Journalists working off site have been seeking telephone interviews or relevant documentation. They include the New York based Mycology Observer.

An interview in progress –
L to R: Steven Morse, Kyle Olson, Jerome Hauer, Donald Henderson, Ken Alibek, Christopher Davis, OBE & Hamish Killip

AUSTRALIANA EVENING

Partticipants at the ICBAM & Mycology Congresses enjoyed a fabulous social evening on Wednesday night !

Thank you to Our Sponsors

We are extremely grateful to all our sponsors who, via their various contributions, have contributed in a very large way to making this Congress both a possibility and the huge success that has resulted! Thank You!

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