

# EMBL AUSTRALIA Annual Report

March 2013 – February 2014



# **EMBL AUSTRALIA**

In 2008 Australia became an associate member of EMBL, the European Molecular Biology Laboratory, Europe's flagship for the life sciences.

Membership gives Australia the opportunity to internationalise our life science research: introducing our best young researchers to new networks and tools for life sciences. Furthermore, it helps Australia develop highly competitive research teams networked across the nation and with Europe and Asia.

EMBL Australia was created to maximise the benefits of Australia's associate membership of EMBL and does so via research projects, infrastructure and training programs across Australia.

Our secretariat is hosted by the Australian Regenerative Medicine Institute (ARMI) at Monash University.

EMBL Australia has:

- nodes and initiatives in Victoria, South Australia, New South Wales (our NSW group leader is currently based at EMBL in Heidelberg, Germany), Queensland and the ACT
- a nationwide reach through our student and training programs, bioinformatics resources and the Australian Bioinformatics Network
- international linkages through EMBL, the European Bioinformatics Institute and the Systems Biology Institute in Japan.

EMBL Australia is a joint venture between the Group of Eight universities and CSIRO, supported by the Australian Government's science/infrastructure investments.

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# ANNUAL REPORT OF THE CHAIR OF EMBL AUSTRALIA COUNCIL



2013 has been a year of growth and renewal for EMBL Australia.

Our biggest achievement this past year has been the establishment of the South Australian node at the new South Australian Health and Medical Research Institute (SAHMRI). On behalf of the EMBL

Australia Council, I'd like to welcome Ville-Petteri Mäkinen and David Lynn to EMBL Australia, and wish them all the best in their research endeavours.

These two scientists join our existing research teams based at Monash University in Melbourne and in Heidelberg, Germany. We are also in discussion with other Australian research institutions about developing more research nodes, and look forward to building the EMBL Australia network.

At the executive level, the EMBL Australia Council is implementing the recommendations from 2012's mid-term review, to make our organisation stronger and provide clear guidelines for the development and funding of new EMBL Australia group leaders, nodes and initiatives.

Most importantly, EMBL Australia has taken the first steps to ensure its ongoing future with an agreement between the Australian Government and the EMBL Council to renew Australia's associate membership of EMBL. Our challenge in the coming year will be to secure the funding that will allow EMBL Australia to continue the momentum and growth in our programs.

One role I am particularly keen to see EMBL Australia develop in the coming year is in enhancing links between Australia and the European science community. We are exploring the best avenues through which we can leverage our connection with EMBL to play a leading role in assisting the wider Australian science community to better engage with Europe, and through Europe to other nations. Our experiences of active engagement with Europe, through collaboration and networking connections, could help other Australian research organisations engage with Europe too. We've achieved this via exchange of visiting scientists and students, and by arranging high-level meetings between visiting scientists and Australian state and commonwealth Ministers, science leaders and senior public servants.

Stronger international links are fundamental to the EMBL Australia model, and will strengthen Australian science.

Executive Director Silvio Tiziani and Scientific Head Nadia Rosenthal, along with the leadership team and the EMBL Australia Council, have driven EMBL Australia's progress in 2013.

I would like to thank everyone involved for their efforts this year, as well as the Australian Government, the Group of Eight universities, partner medical research institutes, CSIRO and EMBL for their ongoing support of EMBL Australia.

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Prof Richard G. Larkins, AO Chair, EMBL Australia Council

# ANNUAL REPORT OF THE SCIENTIFIC HEAD



I am delighted to report on EMBL Australia's growth over the past year.

It has been a watershed year for EMBL Australia, with new programs introduced and ongoing support from many of our research partners.

I'm very pleased to see the Australian Government and the EMBL Council agree to extend Australia's associate membership of EMBL, with Australia's application being unanimously adopted by the EMBL Council.

This vote of confidence gives us the certainty we need to progress with the development of our South Australian node, growth of SBI (Systems Biology Institute) Australia, and plans for more nodes across the country.

I am delighted to welcome two new group leaders— Finnish bioinformatician Ville-Petteri Mäkinen and Irish computational biologist David Lynn—to our newly established South Australian node at the shiny new South Australian Health and Medical Institute. These two scientists were selected from an outstanding pool of applicants from around the world, and bring unique combinations of bioinformatics and biomedical expertise with them. We are also looking to fill a third position at SAHMRI.

At the Victorian node, our two original group leaders are flourishing, with several papers published in key journals in the last 12 months, as well as successes in the National Health and Medical Research Council (NHMRC) grant rounds, as a result of the hard work they have put into establishing their research programs.

For me, one of the absolute highlights of the last year was the inaugural EMBL Australia PhD Course. Over the two-week course I watched as young researchers were inspired by new scientific ideas, and connected with other students and our international speakers. The speakers also told me how much they enjoyed the experience and the atmosphere. It felt like I was back at EMBL, with the same excitement, buzz and level of excellence that we strive for there.

One of the students asked me how EMBL Australia benefited from holding a course for PhD students. It's a good question, and one I was happy to answer. Quite simply, we are investing in the future of Australian science, growing future leaders and providing them with an international outlook.

I'm quite sure that those 60 students went back to their laboratories with a new enthusiasm and determination to succeed. I'm pleased to say that they have formed into a cohesive group, linked by a Facebook page, and are now organising the inaugural EMBL Australia PhD Symposium, a conference for students, to be held in Sydney later this year.

In the last 12 months we also have sent around 30 PhD students overseas to EMBL for conferences, training courses and lab visits, as well as to the annual EMBL PhD Symposium. It's our way of providing students with valuable opportunities to learn new skills and giving them a connection to EMBL and its networks.

Our various initiatives in bioinformatics and systems biology have also had a productive year, building networks and relationships within Australia, as well as internationally through their links with the European Bioinformatics Institute (EBI) and the Systems Biology Institute in Japan.

The Bioinformatics Resource Australia EMBL (BRAEMBL) reviewed its role in the Australian bioinformatics and life sciences landscape. A survey they conducted clearly showed that Australian life sciences researchers consider bioinformatics to be central to their research and identified a strong demand for access to bioinformatics expertise and training. In response, the Bioinformatics Resource has diversified to include training and to act as a mechanism for sharing uniquely Australian data with the world—through its Sea-quence project, for instance. I'm looking forward to some exciting developments in this area in the coming year.

The Australian Bioinformatics Network, an initiative of EMBL Australia, CSIRO and Bioplatforms Australia, has steadily increased in size and reach over the last year. They are building a community and the Network's website has become a port of call for information about bioinformatics training opportunities, events and jobs. I'm looking forward to progress on their development of a professional society.

SBI Australia, the first international node of Japan's renowned Systems Biology Institute, got off to a flying start in its first year with several collaborations and an impressive outreach program featuring regular symposiums by local and visiting scientists designed to encourage networking and enhance the profile of systems biology in Australia. Later this year, SBI Australia and EMBL Australia will co-host the International Conference on Systems Biology in Melbourne.

In the year ahead, I am looking forward to seeing EMBL Australia continue to consolidate its place in the Australian life sciences research community and to further developing our role as the 'go to' group for European collaboration. I believe our commitment to internationalising Australian science, providing opportunities to talented young researchers and bringing new tools for life sciences research to Australia places us in a unique position to benefit the scientific community as a whole.

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Prof Nadia Rosenthal Scientific Head, EMBL Australia

# **ABOUT EMBL AUSTRALIA**

In the past few decades, molecular biology has transformed the life sciences. New insights into the intricacies of genes, proteins and pathways have revolutionised medical practice—delivering genetically engineered molecules, drugs targeting faulty gene products, and highly specific cancer treatments with reduced side effects. In agriculture, a deeper understanding of genetics has led to better crop varieties and animals. The field of bioinformatics has exploded in response to the complex molecular information now available at every biological level, and systems biology is giving us a whole new set of tools to investigate at a systems level.

Today the application of molecular biology and bioinformatics has the potential to help us:

- master broader scales in biology—from tracking a protein inside a single cell to mapping all of the molecular interactions within a system
- develop regenerative medicine—opening the way to repair organs and tissues using stem cell-based therapies combined with other molecular signals and engineered tissue scaffolds
- understand environmental stresses on plants and animals at a molecular level—leading to hardier varieties of agricultural crops and improved understanding of how the Great Barrier Reef's corals will respond to climate change.

Australian researchers are already making huge contributions to this international revolution. In March 2008, Australia accepted an invitation to become the first associate member of the renowned European Molecular Biology Laboratory (EMBL, see box). Australia was extended this honour in recognition of its strengths in many facets of the life sciences including cell biology, stem cells and regenerative medicine, chemical biology, plant biology, genetic epidemiology and clinical research.

EMBL Australia was launched in 2010 to take full advantage of this unique membership, with the goal of strengthening our global position in life sciences research with a research model that is new to Australia—focusing on nurturing early-career scientists and making the most of Australia's scientific infrastructure.

To implement the research model, EMBL Australia:

- links Australian researchers to international powerhouses of life sciences research
- gives early-career researchers secure, long-term research funding, which enables them to take risks and ask big questions

- gives Australia's best PhD students the chance to develop international networks and alliances and 'calibrate' their work via EMBL's European programs, workshops and conferences
- provides training programs for PhD students in Australia—giving them a head start in their science careers
- creates and shares life science resources with the Australian life sciences community.

## EMBL (the European Molecular Biology Laboratory)

EMBL is Europe's flagship for the life sciences. Its founders had a vision of a supranational research centre to redress the imbalance caused by US domination of molecular biology.

EMBL was founded in 1974 and is funded by contributions from its 20 European member states (as of February 2014). Australia is the first associate member.

With nodes in Hinxton (near Cambridge, UK), Grenoble (France), Heidelberg and Hamburg (Germany), and Monterotondo (near Rome, Italy), EMBL comprises about 85 independent research groups and more than 1,400 people from 60 nations.

Among its many features are:

- nine years of funding security for research leaders (subject to performance), after which they move on
- training for young researchers—over 3,000 per year
- highly sought postdoctoral positions
- internationalising research networks across Europe and around the world
- a culture that focuses on young scientists and builds strong research alliances.

EMBL achieves goals beyond the reach of individual member states.

#### **Membership of EMBL**

Australia joined EMBL as an associate member in 2008. Australia's associate membership runs until the end of 2014, and the Australian Government and EMBL Council have reached in principle agreement to continue, given funding.

Membership is managed by the Australian Government's Department of Education, with some components also managed by the Department of Industry.

EMBL Australia maximises the benefits of Australia's associate membership of EMBL via research support, infrastructure development and training opportunities across Australia.

#### **EMBL Australia's objectives**

EMBL Australia aims to create opportunities for:

- internationalising Australian research
- empowering and training our best early-career researchers and research leaders
- embedding powerful new enabling tools, such as bioinformatics and systems biology, in Australian life sciences.

#### Internationalising Australian research

EMBL Australia links Australian researchers to three international powerhouses of life sciences research:

- EMBL, which jointly supervises Australian PhD candidates (through the International PhD program) and hosts early-career scientists (through the Faculty Development Program). EMBL also invites Australian PhD students to visit for conferences, training or study visits
- EMBL–EBI (the EMBL European Bioinformatics Institute), which shares terabytes of data with the Australian life sciences community through Bioinformatics Resource Australia of EMBL (BRAEMBL)
- Japan's Systems Biology Institute (SBI), which is now closely linked to Australian life sciences through the establishment of an Australian node, SBI Australia.

These connections enable EMBL Australia to create highly competitive research teams that are networked across the nation and with Europe and Asia.

#### **Empowering and training young researchers**

EMBL Australia supports talented early-career scientists with research support, networking and training.

#### **Research groups**

EMBL Australia's flagship program is its research program, which follows the EMBL model in providing talented young scientists with up to nine years of secure funding. The scientists are embedded within existing research institutes and universities.

EMBL Australia plans to work with its members and others to create a total of 18 to 20 research groups around Australia—offering hosting institutions access to the scientific excellence and scientific governance that drives EMBL and EMBL Australia.

### Supporting students with training, grants and internships

EMBL Australia has developed training programs for PhD students and also supports industry internships.

EMBL Australia funds a number of travel grants for PhD students, which allow student travel for conferences and workshops and also make visits to EMBL laboratories in Europe. Australian students also have the opportunity to apply to study for a PhD at EMBL.

SBI Australia also offers training to undergraduate and postgraduate students, and postdoctoral researchers, in a wide range of disciplines.

The Australian Bioinformatics Network provides information, support and advanced training in bioinformatics.

## Embedding new enabling tools into Australian life sciences

EMBL Australia is committed to creating and sharing life science resources with the Australian life sciences community.

EMBL Australia's initiatives include:

- the Bioinformatics Resource which provides access to EMBL–EBI's databases and services
- the Australian Bioinformatics Network , which is developing into a community of bioinformaticians and users of bioinformatics resources across Australia
- SBI Australia, which promotes transnational systems biology research (see box) through the sharing of scientific technology, resources and expertise.

EMBL Australia also supports life science research by undertaking joint activities and sharing resources and expertise with a number of affiliate organisations.

#### What is systems biology?

Systems biology is a new field of science that aims to understand complex biological systems as a system, and to understand the rules and principles that govern, regulate and define the system. This complex task is achieved by integrating life sciences research with the knowledge, skills and technology of all the research disciplines, including mathematics, engineering, computer science, physics, chemistry and even linguistics.



#### Our research nodes, initiatives and activities

EMBL Australia is well under way with its plans to create a total of 18 to 20 research groups around Australia—offering hosting institutions access to the scientific excellence and scientific governance that drives EMBL and EMBL Australia.



# **2013 HIGHLIGHTS**

EMBL Australia's future was ensured, in principle, until at least 2017 when the EMBL Council unanimously adopted Australia's proposal to renew its associate membership of EMBL.

As a leader in the Australian molecular biology field, we seek opportunities to exchange ideas and promote the EMBL model to others in the life sciences. Highlights of our communication efforts include:

- Scientific Head, Prof Nadia Rosenthal, sent wellreceived monthly newsletters to EMBL Australia members and stakeholders, in Australia and overseas, with news and announcements relevant to the life sciences community.
- EMBL alumni who are now based in Australia were invited to events in most Australian capital cities to hear visiting speakers and network with other alumni.
- The number of people following EMBL Australia on both Facebook and Twitter increased by over 200% over the year, and our posts were also shared and liked by EMBL and the European Bioinformatics Institute, who both have very large followings.

We continued to make progress on our goals by implementing our three objectives, as outlined here.

#### Internationalising Australian research

- SBI Australia hosted a series of visits from international scientists including Prof Howard Jacob from the Medical College of Wisconsin, who is at the forefront of personalised medicine; Dr Mike Hucka from Caltech, the founder of several popular exchange formats and developer of open-source software for systems biology; and a delegation of scientists from Japan's RIKEN institute.
- EMBL Australia and SBI Australia hosted the first Nature Café event to be held outside Japan. A distinguished panel and the invited audience explored the topic 'Internationalising your research' in partnership with the scientific journal *Nature*.
- Prof Makoto Asashima, Executive Director at the Japan Society for the Promotion of Science, visited as a guest of Monash University and SBI Australia, giving two talks and participating in high-level meetings in Canberra and Melbourne.
- Planning and promotion continued for the 15th International Conference on Systems Biology (ICSB 2014), to be held in Melbourne, 14–18 September 2014. An outstanding list of keynote speakers has

been announced, including Prof Hiroaki Kitano, from the Systems Biology Institute in Japan and Prof Leroy Hood, from the Institute for Systems Biology, in Washington, US.

- Dr Sarah Boyd, from SBI Australia, and Prof Nadia Rosenthal, EMBL Australia's Scientific Head, took part in the Warwick–Monash Systems Biology Workshop in Venice, Italy, which identified a number of collaborative research and PhD supervision opportunities between systems biology researchers at Monash University and the University of Warwick, UK.
- EMBL Australia Scientific Head Prof Nadia Rosenthal joined the Fondation Leducq Transatlantic Networks of Excellence Program, an international consortium of researchers aiming to understand the role of cardiac stem cells in heart function and repair.
- Twenty-nine students studying in Australian institutions received funding to attend conferences and workshops in Europe.
- International PhD Program student Simone Li continued her studies at EMBL in Heidelberg.
- Dr Marcus Heisler, group leader of the NSW node, continued his posting in Germany, supported by the EMBL Australia Faculty Development Program, the Australian Research Council (ARC) and a European Research Council Starting Grant.

#### Empowering and training our best earlycareer researchers and research leaders

- Victorian node group leader Dr Edwina McGlinn published papers in the *Proceedings of the National Academy of Science (PNAS)* and *Developmental Biology* and was awarded a second NHMRC project grant.
- Dr Nicolas Plachta, also at the Victorian node, published papers in *Nature Cell Biology* and *Nature Communications*, and received a three-year NHMRC project grant.
- Dr James Godwin from the Rosenthal group in Victoria identified an important role for macrophages in limb regeneration in axolotls, which was published in *PNAS*.
- Dr Catherine Boisvert, from Victorian node director Peter Currie's group, co-authored a *Science* paper redefining theories of how jaws evolved in early vertebrates.

- EMBL Australia established a new node at the South Australian Health and Medical Research Institute, recruiting Assoc Prof Ville-Petteri Mäkinen and Assoc Prof David Lynn as group leaders.
- The South Australian Health and Medical Research Institute's new building was opened in November 2013 by the Prime Minister, the Hon Tony Abbott MP.
- Sixty first-year and second-year PhD students from Australian institutions attended the inaugural EMBL Australia PhD Course, a two-week residential program introducing cutting-edge life sciences research, at the Walter and Eliza Hall Institute of Medical Research.
- Prof Nadia Rosenthal and EMBL Council Chair, Prof Richard Larkins, were named High Achievers in Australian Health and Medical Research by the NHMRC in December 2013.

## Embedding powerful new enabling tools in Australian life sciences

- SBI Australia, Monash IVF and the Australian Regenerative Medicine Institute signed a Memorandum of Understanding to use systems biology approaches to improve outcomes for IVF treatment.
- With the support of the Victorian State Government, SBI Australia launched a program of seminars and workshops aimed at enhancing collaboration and networking between systems biology researchers in Victoria and beyond.
- A survey conducted by BRAEMBL clearly showed that Australian life sciences researchers consider bioinformatics to be central to their research and that they want better access to bioinformatics expertise and training.
- The number of visitors to BRAEMBL's website almost doubled in the 12 months from 1 March 2013 to 28 Feb 2014, compared to the same period in the previous year.
- New services, including the GT-Scan service developed by a bioinformatics group at the University of Queensland led by Dr Timothy Bailey, have been added to BRAEMBL's offerings. Existing services, including the BRAEMBL RDA (Research Data Australia) Australian Species Collection and MEME, showed significantly increased usage.

- BRAEMBL is working with a number of collaborative projects and research groups to assist them with collating, analysing and integrating their data into global databases based at the European Bioinformatics Institute and elsewhere. Current projects include the Sea-quence coral reef genome project, the koala genome project and several more.
- The Australian Bioinformatics Network grew to almost 600 members, as registered on the website, an increase of 200% over the year.
- The number of networking, training and education events supported by the Australian Bioinformatics Network increased substantially over the year. The Network supported many events, from local meetings including the Sydney Computational Biologists Meetup to national events such as the UCSC (University of California Santa Cruz) Browser Roadshow, and the Winter School in Mathematical and Computational Biology.
- The Network awarded three Connection Grants to support events and visiting scientists. The grants included support for a visit by US bioinformatician Dr Mike Hucka, training boot camps and a wheat bioinformatics meeting.
- Bioinformatician, and member of the Bioinformatics Advisory Committee, Prof Terry Speed, was awarded the 2013 Prime Minister's Prize for Science.



Terry Speed speaking at the EMBL Australia PhD Course. Credit: EMBL Australia

# **2014 OUTLOOK**

To strengthen our position so that we can continue to support Australian molecular and systems biology and bioinformatics, EMBL Australia will:

- seek continued funding of the EMBL associate membership from member institutions, government and other available funding mechanisms
- continue to strengthen links among the nodes and initiatives, and with stakeholders
- continue to develop new and existing linkages with
  Europe and Asia
- further grow and develop the EMBL alumni group and hold events around Australia.

And we will work towards our three objectives, as follows.

#### Internationalising Australian research

EMBL Australia will:

• strengthen our leading role in creating linkages between Australian and European researchers and research agencies.

SBI Australia will:

- further develop its research program and seek to recruit an Academic Director to progress this
- continue to lead planning and promotion for the 15th International Conference on Systems Biology (ICSB 2014), to be held in Melbourne from 14 to 18 September, 2014
- continue the momentum generated by the ICSB 2014 with ongoing systems biology events
- continue to host a wide range of international researchers
- appoint an Advisory Board to oversee the growth, governance and strategic decisions of SBI Australia, and to promote the Institute to external stakeholders and organisations.

BRAEMBL will:

• develop its capacity to share Australian-generated data with the world.

#### Empowering and training our best earlycareer researchers and research leaders

EMBL Australia will:

- recruit an additional group leader to the South
  Australian node at SAHMRI
- appoint a node Head to lead the South Australian node
- continue discussions on the development of new and existing nodes, including expanding the Victorian node, and developing new nodes in Western Australia and New South Wales
- continue to develop and refine the EMBL Australia governance model and guidelines for establishment of new groups and nodes
- run the second PhD Course in Canberra in July 2014
- continue to facilitate student exchange through the student grant programs.

SBI Australia will:

 develop structures for teaching and training opportunities in systems biology for a wide range of participants, from undergraduate students to professional scientists.

# Embedding powerful new enabling tools in Australian life sciences

BRAEMBL will:

- continue to improve and add web services for use by the Australian bioinformatics community, including a new workflow and analysis tool based on the Galaxy user interface. BRAEMBL works closely with EMBL European Bioinformatics Institute's external services group to refine and improve its web services
- work with Australian research groups and consortia to assist with data collation, curation and integration into globally accessible biomolecular databases based at EMBL–EBI and elsewhere
- progress BRAEMBL to provide a range of bioinformatics services in Australia through a coordinated hub and nodes.

The Australian Bioinformatics Network will:

- prepare a proposal for the structure and organisation of a nationally based professional society for bioinformaticians and computational biologists
- support the first annual Australian Bioinformatics Conference, in Melbourne in October 2014
- provide funding for up to four proposals submitted in the 2014 round of Connection Grants
- support bioinformatics events and training programs including Bioinformatics FOAM (March 2014), the Winter School in Mathematics and Computational Biology (July 2014), the International Conference on Bioinformatics (July 2014) and more.

EMBL Australia will:

 sign a Memorandum of Understanding with the Australian Institute of Marine Science to bring systems biology to assist the research, protection and management of the Great Barrier Reef.

SBI Australia will:

- recruit staff and students to expand the scope of the ARC-funded cardiac homeostasis and ageing project, especially to integrate the current research into a more comprehensive modelling of heart function
- seek linkages funding to develop a business plan and case studies on modular 'drop-in' centres, which could provide health, education or social services, for remote communities.





#### **Victorian node**

## Rosenthal group: fundamental mechanisms of regeneration

#### Group leader: Nadia Rosenthal, Scientific Head of EMBL Australia and Director of the Australian Regenerative Medicine Institute

The Rosenthal group focuses on the role of growth factors, stem cells and the immune system in the resolution of tissue injury for applications to regenerative medicine. Studying the remarkable regenerative potential of embryos and many animal species could help us tackle a range of human degenerative diseases.

The very different and unique restorative characteristics of species such as the mouse, zebrafish and axolotl (Mexican salamander) provide important clues to the fundamental mechanisms of regeneration. Salamanders, for example, are unlike mammals in the way their immune system deals with injury. They rapidly orchestrate a series of inflammatory events to promote wound healing and tissue replacement of whole

#### Axolotls out on limb for future human hope

An axolotl's ability to regrow limbs and repair brain and heart tissue could shed light on how humans might one day do the same, after Melbourne scientists discovered the key role played by macrophages, immune system cells, in the animal's regenerative process.

James Godwin, a research fellow in the Rosenthal group, and his colleagues at EMBL Australia, have identified the critical role of macrophages in axolotl tissue regeneration, raising the hope of future treatments for human spinal cord and brain injuries, as well as heart and liver disease.

"We need to find out exactly how the macrophages are contributing to regeneration. Down the road, this could lead to therapies that tweak the human immune system into a more regenerative pathway," James says.

Axolotls, a type of salamander, are known for their ability to regrow limbs and regenerate spinal cord, brain and heart tissue. The healed limb or tissue is completely functional and scar-free.

James and his team discovered that when they removed axolotls' macrophages, the animals lost their ability to regenerate limbs and they formed scar tissue instead. structures or organs. In contrast, humans respond to major injuries with persistent inflammation, fibrosis and scarring, which blocks regenerative programs.

Our approach is to intervene in the mechanisms at work in the mammalian response to damage or disease, focusing on heart and skeletal muscle. Uncovering the molecular events leading to 'scarless' regeneration in these animal models will help us recover the robust regenerative properties of human embryos. At the cellular level, we seek to reduce the impediments to effective regeneration by harnessing blood and tissue stem cell lineages to control inflammation and promote repair.

In 2013–14, Nadia added an NHMRC project grant on congenital heart disease and cardiac stress, and a grant from the UK Regenerative Medicine Platform Immunomodulation Hub to her group's research funding.

The group published seven research papers, including the *PNAS* paper by James Godwin, Alex Pinto and Nadia Rosenthal, on the link between macrophage cells of the immune system and regeneration (see box).

James also believes that studying the animal's regenerative processes could lead to new treatments for several common conditions linked to fibrosis or scarring, such as heart and liver diseases. Promotion of scar-free healing would also dramatically improve patient recovery after surgery.

James is an independent research fellow in Nadia Rosenthal's ARMI laboratory at Monash University, and he has been instrumental in setting up a breeding colony of axolotls to study regeneration further.

"We need to know exactly what salamanders do, and how they do it so well, so we can reverse-engineer that capacity into human therapies."



Axolotls are known for their ability to regrow lost limbs

#### Awards

Nadia Rosenthal was awarded a Sheila and Don Bayne Endowed Lectureship by the University of Ottawa Heart Institute.

#### **Research fellows**

James Godwin Joly Kwek (from Oct 2013)

#### **Postdoctoral researchers**

Mauro Costa: The role of cardiac transcription factors in homeostasis and disease (NHMRC Project Grant)

Milena Furtado: Role of fibroblast cardiogenic genes in heart disease and programming

Alex Pinto: Biology of macrophages in the injured and uninjured mammalian health. (Heart Foundation Grant)

Ekaterina Salimova: Dissecting roles of pro-regenerative factors IGF-1 and Relaxin in promoting cardiac repair and regeneration

Lina Wang: Differentiation of cardiomyocytes and macrophages from embryonic stem cells. (Stem Cells Australia)

#### Affiliates

Nicholas Lam (until Sep 2013)

#### **PhD students**

Ryan Debuque: Mechanisms of Salamander Regeneration. Monash Graduate Scholarship (cosupervised by James Godwin)

Alexei Ilinykh: The role of cardiac tissue macrophages in the ageing heart. (Australian Postgraduate Award, cosupervised by Alex Pinto)

#### **Honours student**

Edward Pranoto: Role of Tbx20 in cardiac fibroblast development (supervised by Milena Furtado)

#### **UROP students**

Lucy Hersey: Development of a genetic system for cardiac specific modulation of macrophages in the mouse (supervised by Alex Pinto)

Suelyn Van Den Helm: Mechanisms of salamander regeneration (supervised by James Godwin)

Emma Rigoni: Regulation of cardiac angiogenesis by IGF-1 isoforms (supervised by Alex Pinto)

#### International visiting students

Alison Perik, College of the Atlantic, Maine, US: The role of T-lymphocytes in mediating the age-related changes in the phenotype of cardiac tissue macrophages

Julia Wilmanns, Medical University of Hannover, Germany: Analysis of human mutations associated with cardiac disease

#### **Research assistants**

Anjana Chandran Joseph Chen (from Oct 2013)

#### **Technical assistant**

Joelle Perera (Casual, until Apr 2013)

### Currie group: how muscle patterns develop in the vertebrate embryo

#### Group leader: Peter Currie, Head of EMBL Australia Victorian node, Deputy Director of the Australian Regenerative Medicine Institute

The Currie group uses the many advantages of zebrafish embryology to dissect molecular mechanisms that act to pattern the vertebrate embryo, and to discover how these different muscle cell types have evolved. In particular, we are interested in how specific muscle cell types are determined within the developing embryo, how they grow and how they regenerate after injury. Zebrafish are excellent study animals because their embryos are transparent, so the development of internal structures can be observed from outside the whole, living embryo.

Research in the Currie laboratory focuses on understanding how early embryonic cells are specified to become individual muscle cells later in development. We concentrate on two different populations of differentiating muscles: those that form the muscles of the head and trunk (axial muscles) and those that generate the muscles of the fins (appendicular muscles).

We use genetic and molecular approaches to dissect the events underlying the specification of axial muscle, and we have defined a genetic hierarchy that specifies these cells in the developing embryo.

The appendicular muscles of the zebrafish fin arise in a completely different process of differentiation, and from different embryonic structures. We study how these fin muscle cells are specified and controlled in the developing embryo. We are also interested in how this process has evolved throughout vertebrate species, and examine the embryos of numerous extant fishes in an attempt to answer this question. Finally, we are intrigued by zebrafish mutations that fail to undergo, or retain, the normal pattern of muscle differentiation within the embryo. We are particularly intrigued by mutations that mirror the onset of human muscular dystrophy and have developed zebrafish models of common muscular dystrophies. We hope this analysis will lead to novel understandings of the cell biological and developmental mechanisms that underlie the pathogenesis of this group of diseases.

In 2013–14, the Currie group published eight papers, including a high-impact factor *Science* paper co-authored by research fellow Catherine Boisvert, which has redefined theories of how jaws evolved in early vertebrates.



Zebrafish are suitable for detailed study of embryonic development. Credit: EMBL Australia

#### **Research fellows**

Silke Berger Yona Goldshmit (Adjunct after Jul)

#### Postdoctoral researchers

Joachim Berger: Modelling myopathies in zebrafish

Catherine Boisvert: Skeletal evolution in early gnathostomes. (Human Frontiers Science Program Fellowship)

David Gurevich: Satellite cell biology in growth and regeneration in zebrafish

Patricia Jusuf: Specification of nerve cell subtypes in the developing central nervous system. (Monash Researcher Accelerator Award)

Ivana Mirkovic: Role of scube gene family during vertebrate muscle development

Ashleigh Siegel: Generating a targeted mutation resource in zebrafish. (ARC Linkage)

Alasdair Wood: Evaluating therapeutic approaches for congenital muscular dystrophy using laminin-a2 deficient zebrafish

#### PhD students

Ophelia Ehrlich: Nanomedicine based therapies for extracellular matrix diseases. (SMART Scholarship)

Zhenhua Li: Investigating muscle regeneration in zebrafish muscular dystrophy mutants. (Monash Graduate Scholarship; Monash International Postgraduate Research Scholarship)

Wouter Masselink: Cellular interplay of pectoral fin myogenic progenitor cells

Jeremy Ng Chi Kei: Role of intrinsic versus extrinsic cues in cell type determination during development and regeneration

Phong Nguyen: Origins and genetic control of progenitor and stem cells from zebrafish. (Australian Postgraduate Award)

#### **UROP** student

Liana Goodings: Characterisation of zebrafish models of human muscle diseases (supervised by Patricia Jusuf)

#### Undergraduate students

Research Placement: Jenna Husckic, Stacey Vranas

Research Placement/Summer Vacation Scholarship: Hakan Tarakci

Winter Vacation Scholarship: Shenpeng Zhang, Alexander Wykes

Summer Vacation Scholarship: Deandra Ferreira

#### International visiting student

Mei Li, Karolinska Institute, Stockholm, Sweden: Using synchrotron radiation to study muscle dynamics in zebrafish larvae

#### **Research assistants**

Fruszina Fenyes Madison Knapp (Casual, until Sep 2013) Wade Moore (Casual, from Jul 2013) Carmen Sonntag

#### Aquarium technician

Gavin Cooke (until Jul 2013)

#### McGlinn group: how does the skeleton grow

#### EMBL Australia group leader: Edwina McGlinn

The McGlinn lab focuses on the importance of microRNA (miRNA) regulation in embryonic development. MicroRNAs are small RNA molecules, found in plants, animals and some viruses, that control the expression of genes—increasing or decreasing the output of gene products such as proteins.

The McGlinn group's particular emphasis is on how miRNAs control the expression of Hox genes, which are critical in the regulation of many aspects of embryonic development. Furthermore, impairment of the regulation of Hox genes underlies many human diseases. The miR-196 family of miRNAs, which are located within a Hox cluster, are predicted to regulate the expression of up to 10 Hox genes.

Over the last three years, the McGlinn lab has built a vast array of genetic tools with which to assess the function of this evolutionarily conserved miRNA family.

Moreover, the fact that a broad sweep of animals from flatworms to primates show the same miRNAs embedded within Hox clusters means that it is an ideal system in which to analyse the evolutionary importance of miRNA acquisition in shaping the morphology of different animal lineages.

In 2013–14, Edwina published papers in *PNAS* and *Developmental Biology* and added a second NHMRC project grant to her existing grant funding. The new three-year grant is to redefine proprioceptive circuitry at a molecular level.

#### **Postdoctoral researchers**

Jesus Casanova: microRNA control of vertebral number and identity

Alysha Heimberg: The evolution of Hox cluster embedded microRNA genes

#### PhD student

Eamon Coughlan: miR-196 in the development of the CNS. (Australian Postgraduate Award)

#### Honours student

Ismath Riyas Elias: The expression and regulatory role of miR-196 in kidney development

#### **Research assistants**

Cristina Massa Gomez Lisa Wong

#### Teaching

Edwina McGlinn taught in two undergraduate units in the Monash University's School of Biomedical Sciences: DEV2011 Early human development from cells to tissues, and DEV3011 Fundamentals of developmental processes.

## Plachta group: watching proteins control development in embryonic cells

#### EMBL Australia group leader: Nicolas Plachta

Revealing the dynamic mechanisms that pattern a mammalian embryo is fundamental to understanding human biology and disease. Yet few experimental systems permit the study of dynamic physical aspects of cells and molecules in living mammalian embryos.

The Plachta group combines single-cell imaging and quantitative methods to discover how the dynamic behaviour of DNA-binding molecules controls the development of the first specialised cells in living mouse embryos. We recently established new experimental assays to visualise the movement of transcription factors, which are key regulatory molecules controlling gene expression, in four dimensions (x, y, z and time).

Our experiments are undertaken at the single-cell level, in real time, in intact embryos. Thus we can probe biochemical events that are typically studied in fixed specimens or homogenised cell preparations that lack the spatiotemporal dynamics of living systems.

We extend these studies by comparing pluripotent cells in the embryo (that is, cells which can give rise to many different tissues) to several stem cell lines cultured *in vitro*—those derived from the actual embryo (embryonic stem cells) or those reprogrammed from somatic cell lineages (known as induced pluripotent stem (iPS) cells). In addition, we have developed live-imaging tools to study the cellular mechanisms governing the formation of the first tissue-like structures in the embryo, with a particular focus on cell movements and formation of the central nervous system.

In 2013–14, Nicolas and his team published papers in *Nature Cell Biology* and *Nature Communications*, and he also received a new NHMRC project grant to further his studies on compaction in the early embryo (see box). Nicolas also has three ongoing grants, one from the NHMRC and two from the ARC. Three research fellows in the Plachta group also received a total of five grants from overseas organisations to support their research.

#### Awards

Dr Jennifer Zenker, a postdoc in the Plachta lab, has been awarded the Prix Amicitia Excellence Prize in recognition of outstanding scientific research in neuroscience. The prize, worth CHF7500, was awarded for her PhD thesis at the University of Lausanne, in collaboration with the Lemanic Neuroscience Doctoral School. The prize, which is awarded once a year at the Lemanic Neuroscience Annual Meeting, supports graduates who are continuing their scientific career at an international academic institution.

Jennifer was also awarded a Swiss National Foundation Fellowship (SNF) and a German Research Foundation Fellowship (DFG).

#### Your first hug

Most people remember their first kiss but Victorian scientists have discovered that your first hug is much further back than you think.

EMBL Australia research leader Nicolas Plachta and his team have discovered that embryos, when only eight cells in size, develop arm-like structures that 'hug' the cells into shape, helping to determine an embryo's ultimate success.

The study, which was published in the journal *Nature Cell Biology* in December 2013, used live imaging and fluorescent markers to capture the action in mouse embryos. The pictures and video show the armlike structures, or filopodia, appearing on the outer membrane of some cells before reaching out and pulling the cells closer together. Only after the filopodia release their grip do the cells continue to divide.

"In a sense, these filopodia are hugging the cells, squeezing them into shape," says Nicolas.

The Plachta group is now hoping to improve the success rates of IVF implantation with this discovery. They are designing non-invasive imaging approaches to see whether IVF human embryos form normal filopodia and undergo normal compaction.

"This could help us choose which embryos should be implanted back in the uterus," says Nicolas.



For the first time, we have been able to watch as filopodia reach out and grab neighbouring cells, pulling them closer and elongating the cell membranes. Credit: EMBL Australia

#### **Research fellow**

Stephanie Bissiere Juan Carlos Fierro-Gonzalez

#### **Postdoctoral researchers**

Gurpreet Kaur: Transcription factor diffusion dynamics in the developing mouse embryo

Melanie White: Imaging the early events patterning in mammalian embryos

Jennifer Zenker: Revealing the mechanisms controlling transcription factor dynamics in single cells

#### Affiliate

Tim Hast (until Sep 2013)

#### **Research assistant**

Juan Silva

#### **New South Wales node**

#### Heisler group: developmental patterning in plants

#### EMBL Australia group leader: Marcus Heisler, EMBL Heidelberg

Marcus Heisler is currently a group leader based at EMBL in Heidelberg, Germany, through the EMBL Australia Faculty Development Program (see box).

Marcus and his team are investigating developmental patterning in plants. They are looking at a fundamental question in plant developmental biology: how specialised tissues and organs become differentiated from embryonic cells and arranged into the stems, leaves and other structures as plants grow.

Leaves and other plant organs have a dorsiventral arrangement of cells and tissues that leads to different types of cell forming on the top (dorsal) and bottom (ventral) sides of the leaf. The arrangement of these cell types also controls the way organs grow. If only one cell type is present, the leaf loses its flat lamina shape and instead develops as a rod-shaped structure.

The Heisler group is investigating the mechanisms by which these cell types are established and how they control growth. So far they have observed the presence of both cell types in precursor tissues, suggesting a role for these tissues in organ initiation. Using confocal-microscope-based imaging methods to examine protein localisation and gene expression in the tissues of growing plants, the team is focusing on three main questions:

- Does the boundary between dorsal and ventral cell types dictate where organs arise and, if so, how?
- How are the expression domains of the dorsiventral patterning genes regulated?
- How do boundaries between dorsal and ventral cell types control leaf morphology?

The Heisler group is also interested in the cellular response to wounding and subsequent tissue reorganisation.

In 2013–14, the Heisler group published three papers, including in *Nature Methods* and *PLOS One.* 



The living shoot apex of *Arabidopsis thaliana*, showing dorsal cell types (labelled with red) and ventral cell types (labelled with green). Credit: Marcus Heisler

#### **Faculty Development Program**

The EMBL Australia Faculty Development Program supports early-career scientists considered to show high potential in molecular biology research with long-term funding that enables them to establish a research career. The program provides research group leaders with generous funding for five years at an EMBL station in Europe, followed by four years at an Australian institution. Groups are funded by external Australian grants (for example, from the NHMRC or the ARC) and/or by Australian research institutions.

Marcus Heisler is the first FDP appointee and has been based at EMBL in Heidelberg, Germany, since 2009. He leads a research team of nine people, including postdoctoral researchers, PhD students and technical staff. His position is supported by the ARC and the University of Sydney. In 2010, Marcus was awarded a European Research Council Starting Grant for his project 'The establishment and function of dorsiventral boundaries in plant organs', and this will extend his stay in Germany by 18 months. After his time in Heidelberg, Marcus will relocate to the University of Sydney for the remaining years of his FDP appointment to underpin the New South Wales node of EMBL Australia.

Under the current associate membership with EMBL, EMBL Australia can place up to two group leaders at EMBL laboratories at any one time.

#### Postdoctoral researchers

Tufail Bashir: Control of organ orientation in the Arabidopsis flower (from Jun 2013)

Andre Clapson: Modelling the morphogenesis of plant cells (until Dec 2013)

Paz Merelo: Downstream targets of KANADI1

Hathi Ram: Genomic approaches to dorsiventral patterning

Nicol Siegel: Droplet microfluidics for single cell RNA-seq

#### **PhD students**

Neha Bhatia: Mosaic approaches to understand the coordination of plant cell polarity

Philip Brennecke: Accounting for noise in single-cell RNAseq experiments

Monica Pia Caggiano: Dorsiventral patterning and lateral organ positioning in *Arabidopsis thaliana* 

Xiulian Yu: Dorsiventral boundaries and morphogenesis

#### Technician

Carolyn Ohno



The Heisler group (from left to right) Paz Merelo, Carolyn Ohno, Tufail Bashir, Hathi Ram, Marcus Heisler, Neha Bhatia, Xiulian Yu, Svetlana Langenstein (visiting scientist), Pierre Le Gars (student trainee). Credit: EMBL

#### **South Australian node**



The new South Australian Health and Medical Research Institute hosts the EMBL Australia South Australian node. Credit: SAHMRI

### Mäkinen group: systems biology of cardiovascular disease

#### EMBL Australia group leader: Ville-Petteri Mäkinen, Research Group Leader, Molecular Life Course Research Group (Molar), SAHMRI

Ville-Petteri Mäkinen joined EMBL Australia in February 2014 as one of two group leaders recruited to the newly established South Australian node of EMBL Australia at SAHMRI.

Ville develops and uses computational approaches to analyse the huge datasets generated by genomics and transcriptomics studies, looking for patterns linking genetics to the physical characteristics of disease. Ultimately, he'd like to determine molecular patterns of gene and protein expression, and related metabolic characteristics, which are indicative, predictive or causative for chronic and age-related conditions such as obesity, diabetes and cardiovascular disease.

At SAHMRI, Ville plans to investigate some key areas: the connections between the diabetic kidney and vascular disease; the role of lysosomes in the development of atherosclerosis; and the gene regulation networks that underpin the risk for coronary artery disease.

His first step is to combine and analyse large public datasets and databases spanning biomolecular and clinical data, searching for potentially meaningful relationships between the underlying genes and the clinical outcome. The next step is to test these possible relationships, both experimentally, in animal models of disease, and through long-term monitoring of the health of human study cohorts.

Ville is currently establishing his research group in the Heart Health division at SAHMRI.



EMBL Australia's SA node group leader Ville-Petteri Mäkinen. Credit: Ville-Petteri Mäkinen

#### Big data to take on heart disease in Adelaide

Thanks to the complexity and variability of our genes and their expression, no two people are exactly the same. But this diversity also makes our individual responses to disease just as complex and variable.

Finnish scientist Ville-Petteri Mäkinen believes that to fully understand how diseases like diabetes, heart disease, and their associated complications develop, we need to dig right down to the basic variations in our genome and how the genes cooperate to produce observable phenotypes.

A computational engineer by training, Ville has always been drawn to the boundary between biology and engineering. And he's applied this passion to analysing large datasets, establishing connections between our genes and clinical disease.

Now Ville is bringing this systems biology approach to Adelaide, where he's joining the Heart Health research theme at SAHMRI as an EMBL Australia group leader. He plans to continue his studies of the flowon effects from genetic variation to gene regulatory pathways, networks controlling protein expression and metabolism and, finally, to clinical disease.

It's a project, he says, that is suited to the longer timeframe offered by the EMBL Australia funding model, which offers group leaders up to nine years of secure funding.

"Having the security of an EMBL Australia position at SAHMRI will allow me to really do the groundwork thoroughly," Ville says.

Ville's early research focused on the link between complications seen in patients with type 1 diabetes and kidney disease, and their metabolic characteristics.

"People with type 1 diabetes and people with kidney disease have an increased risk of heart disease and stroke," Ville explains. "In Finland, this is a particular problem that affects a significant proportion of diabetic patients, and there is a lot of clinical data available."

In collaboration with several Finnish universities, Ville helped develop high-throughput metabolomics methods (which measure metabolites created by specific cellular processes) for analysing large numbers of blood samples using nuclear magnetic resonance (NMR) spectroscopy. In particular, he looked at the characteristics and composition of lipoprotein particles.

The results of this metabolic profiling could then be compared with patients' clinical profiles, looking for clues linking metabolic characteristics with the observed clinical phenotype.

"It was kind of the reverse of the usual approach, which takes a disease and then looks for the molecular characteristics, for example a specific biomarker, that define it," says Ville. "Here, we were looking at how different metabolic profiles might relate to the risk of developing certain complications."

In 2010, Ville moved to UCLA seeking an even deeper understanding of the connections between genes and clinical disease. There, his work focused on a huge dataset created by the CARDIoGRAM consortium, which brought together all of the European genomewide association studies in cardiovascular disease into one dataset encompassing more than 22,000 patients and 60,000 healthy individuals.

"We looked at DNA variance versus gene expression, versus clinical disease expression, and added gene pathways and networks to see if particular pathways were associated with disease phenotypes," Ville says.

At SAHMRI, Ville plans to continue to study cardiovascular disease using both experimental and computational systems biology.

"The very first thing I need to do is sit down and generate a map of all the public—and perhaps some of the private—genomic, proteomic, metabolomic and clinical resources and datasets out there, so we can begin to work out how best to integrate them and analyse the data," he says. Proteomics is the study of the structure and function of the proteins produced in an organism.

In the longer term, Ville hopes to develop a new animal model that will allow researchers to follow the pathways and networks of genetic regulation underlying metabolic changes, over long periods of time.

"I'd like to develop a model system that allows researchers to look at tissue-specific, time-dependent changes in the animal's gene regulatory machinery, and the associated metabolic changes," Ville says. "This is something that would be so useful to so many researchers that study complex diseases." Although it's only a concept at the moment, Ville has some ideas for some pilot studies to see if such a model is feasible.

"Ideally, the model would need to be a larger animal, to allow us to do serial sampling over long periods of time. Potential challenges include the number of animals required to get a good genetic variance, and the longer life spans of large animals," Ville says.

"But to really get a deep understanding of the cascade of events that starts with genetic variation and ends with observable clinical phenotypes, we need to be able to integrate diverse sources of biomolecular

#### Senior postdoctoral fellows

Kenneth Bryan Miriam Lynn

#### Senior software developer

Manuel Bernal Llinares

#### **Research assistant**

Theodosia Charitou

#### Laboratory technician

Anastasia Sribnaia

## Lynn group: regulatory mechanisms of the human innate immune system

#### EMBL Australia group leader: David Lynn

David Lynn was appointed to join EMBL Australia as one of two group leaders recruited to the newly established South Australian node at SAHMRI starting in March 2014.

David's research focuses on innate immunity, the first line of defence against infectious disease. In the past, he's used computational biology and genomics approaches to investigate how the innate immune system responds to specific human pathogens, and whether the host responses could be modulated using peptide-based drugs. More recently, he has applied these techniques to study innate immune responses to infectious diseases of cattle. At SAHMRI he plans to return to investigating the role of innate immunity in human infectious diseases.

Recently, David has expanded his interest in network biology into the area of cancer signalling. He leads the computational biology aspects of a  $\in$ 12 million European Commission-funded project called PRIMES, which is investigating how to model protein interaction networks in cancer and target them with therapeutic drugs.

data—genetic, proteomic, metabolomics—from multiple tissues across multiple time points."

Ville says the opportunity to join SAHMRI as an EMBL Australia group leader came at the right time for him.

"It was time for me to start up my own group," he says. "SAHMRI is a challenge and also an opportunity for me. I'm not so worried about the science—that will happen—the challenge will be in human resources, finding the right people to work with me."

The following staff will be transferring to SAHMRI in 2014.

David's research group is based within the Infection and Immunity division at SAHMRI and will initially consist of two postdoctoral researchers, a lab technician, a software developer and a bioinformatics research assistant. They will use David's integrative biology approach to investigate the innate immune response of both humans and mouse models to infectious diseases, the interaction between the host microbiome and innate immunity, and the role of microRNAs in regulating innate immunity networks.

David and his group will also develop novel computational analysis tools, including new network analysis and visualisation tools, to facilitate this research. And he will continue to lead the development of InnateDB, a computational analysis platform for studying innate immune networks, which is used by thousands of users worldwide. This project is now hosted in Australia at innatedb.sahmri.com.

#### Senior postdoctoral fellows

Miriam Lynn \* Kenneth Bryan \*

\*transferring to SAHMRI in 2014



EMBL Australia's SA node group leader David Lynn. Credit: SAHMRI

### Unravelling the complexity of our first line of defence

Innate immunity is our body's first line of defence against disease—fighting off foreign invaders by initiating a generic response, such as inflammation.

"Over the last 15 or 20 years, our understanding of innate immunity has become far more sophisticated," says David Lynn.

"We find that the mechanism present in fruit flies is also present in mammals, indicating that these innate immune responses are critical to the initial line of defence in all animals."

Using bioinformatics and systems biology, David has been able to tease out some of the mechanisms that drive the innate immune response.

With the aid of the powerful bioinformatics tools he has developed, he hopes to identify and characterise key regulatory components and gain a better understanding of how the innate immune response responds during infection at a global or systems level.

He wants to know what drives this response, how it works and what happens when it doesn't work—and our bodies attack themselves instead.

David's early research used bioinformatics to identify and characterise previously unknown genes of the innate immune system.

As a postdoctoral researcher in Vancouver, he led a team of researchers to develop InnateDB, an integrated database and analysis platform for the analysis of the innate immune response at the systems level. It's a comprehensive database of human, mouse and bovine molecular interactions and pathways, which David has applied to the study of infectious diseases in humans and, more recently, cows.

Through the Gates Foundation's Grand Challenges in Global Health Initiative, David has used InnateDB and other network biology tools to characterise the innate immune response to a number of human pathogens including typhoid, malaria and dengue virus, both in clinical datasets and in animal models of infection.

He then moved from human to agricultural pathogens, setting up a computational biology team as well as a wet-lab group in the Irish agricultural and food research agency Teagasc in 2009. Here, David and his team used next-generation sequencing approaches coupled with computational analysis tools developed by his group to study bovine infectious diseases such as tuberculosis and mastitis, and the innate immune response generated by these infections.

At SAHMRI, David plans to continue using systems biology approaches to investigate the mechanics of mammalian innate immunity—but refocusing on human disease. In particular he'll be looking for key genes and mechanisms involved in regulating early responses to infection.

"We plan to look at the innate immune response at multiple levels," says David. "For example, at the genetic level, how does individual variation in genes contribute to the innate immune response? What genes are expressed in response to different infections? And what role do microRNAs play in regulating the expression of specific genes in innate immunity pathways?"

Alongside the experimental work, David plans to use his group at SAHMRI to continue the development of InnateDB as well as novel analytical and visualisation tools and resources to support research into the innate immune response.

David says a major attraction for him in moving his research group to Adelaide was the involvement of EMBL Australia.

"EMBL has great prestige and I think that prestige is already paying dividends in the form of prospective collaborations and funding opportunities," says David.

"And the EMBL Australia funding buys space and time to think about how to approach newer aspects of research. The funding model is very attractive as it really allows you to concentrate on the most interesting and potentially high-risk areas of research."

"The other attraction was SAHMRI itself. The stateof-the-art facility is a statement of intent that it is an institute that is aiming to become a global leader. And being able to contribute to the development of a new research environment is a very exciting thing to be a part of, right from an early stage; there are great opportunities for being involved."

#### **Planning for new nodes**

Following the successful establishment of the South Australian node at SAHMRI, EMBL Australia has been in discussion with a number of its participant institutions regarding the development of new nodes.

In July 2013, a letter of intent was submitted by Prof Peter Leedman, Director of the Harry Perkins Institute of Medical Research (formerly the Western Australian Institute of Medical Research), to establish a node in Western Australia at the Institute. The node is envisioned to be a joint effort between the University of Western Australia and other Western Australian research institutions. Discussions regarding potential funding of group leader positions are ongoing.



The new SAHMRI building. Credit: SAHMRI



EMBL Australia's Victorian node at Monash University. Credit: EMBL Australia

# **INITIATIVES TO SUPPORT AUSTRALIAN LIFE SCIENCES**

#### **SBI Australia**



#### **About SBI Australia**

SBI Australia provides specialist expertise in the field of systems biology, facilitating the development of collaborative systems biology research and training across all the scientific disciplines, interlinking national and international partners from research, government and industry, and providing advocacy and advice on the national capacity for systems biology within an international context.

SBI Australia was established in October 2012 as the first international node of Japan's Systems Biology Institute. Its role is to develop and support Australian systems biology capacity through a collaborative program and specialist training, and provide the platform to connect and promote Australian research to the international systems biology community. SBI Australia also facilitates access to Australia's high-performance computing capacity and access to software platforms and resources.

SBI Australia was established through a formal agreement between Monash University and the Systems Biology Institute in Japan. In December 2012, SBI Australia became an EMBL Australia initiative, based at ARMI.

In the short time since its establishment, SBI Australia has attracted national and international attention. SBI Australia has a number of exciting linkages and projects already under way and is actively seeking grants and funding for all of its programs. As host of SBI Australia, Monash University has gained a competitive advantage and reputation in the systems biology space, both nationally and internationally.

In 2013–14, SBI Australia has focused its efforts on outreach activities (particularly bringing international expertise and talent to Australia), and using seed funding to initiate its three research themes (see below). SBI Australia is now in discussion with a number of potential partners to raise additional funding, which will enable the Institute to develop a substantial internationally competitive research and teaching program, in addition to the outreach activities.



Hiroaki Kitano, Director of the Systems Biology Institute, and Sarah Boyd, Developer, Systems Biology Platform, SBI Australia, Credit: EMBL Australia

#### Systems biology research

Currently, SBI Australia has research programs in:

- cardiac homeostasis and ageing, with an ARC Discovery grant to build mathematical models to investigate how cardiac fibroblasts regulate the function of healthy adult hearts
- resilience of coral reefs, with seed funding from the Great Barrier Reef Foundation and philanthropic organisations
- IVF and reproductive systems medicine, with the SBI having signed a major collaborative agreement with Monash IVF and the Australian Regenerative Medicine Insitute to work together on new approaches to improving IVF success rates (see box).

#### A collaboration to improve IVF success rates

Australia boasts some of the best IVF success rates in the world but still some individuals and couples fail to establish an ongoing pregnancy. Success rates fall steeply in a woman's late 30s yet this is now the average age for couples seeking help. Female age, in particular, affects the number and quality of eggs and embryos that can be obtained.

An innovative collaboration between the SBI Australia, ARMI and Monash IVF, on which they signed a Memorandum of Understanding in May 2013, aims to improve the outlook for both infertile individuals and couples. They hope to achieve a dramatic improvement in the ability of doctors to advise potential parents on their chances of success with IVF, and to select the best embryos to implant.

The agreement between these three internationally renowned research organisations with broad international links heralds a completely new approach to research into IVF and early human development. The idea is to apply the latest computing and optic techniques to integrating and analysing a huge range of information, from the lifestyle characteristics of patients to the inner workings of individual embryonic cells.

"Applying maths and engineering methods to biological research allows us to understand complex systems," says Sarah Boyd. "With software and algorithms designed at the SBI in Japan, we hope to trace the development of a whole embryo, which will allow us to make better decisions about IVF treatment. The end goal is reduced risk and better outcomes for families."

Initially, three broad project areas are being considered, all focused on improving outcomes for the infertile individual. The first will focus on embryo selection to further increase the likelihood of a Monash IVF patient achieving a pregnancy in the shortest possible time. This will involve the use of non-harmful, optical microscope techniques invented at ARMI, combined with sophisticated bio-image analysis software invented by SBI, to track in three dimensions the patterns of development of living early embryos and then match them to IVF success.

A second project, using both research and clinical expertise, will explore how closely early mouse development parallels early human development. While we have a quite detailed understanding of how cells interact and orient themselves in early mouse embryos, we do not yet know exactly how that relates to human development.

The third project will address the need to ensure dynamic quality assurance procedures that can also inform clinical and laboratory decision-making, thereby improving IVF outcomes. Algorithms designed at the SBI in conjunction with Monash IVF experience will analyse each of the numerous steps in the IVF process to produce quantitative quality parameters.



#### **Engagement and outreach**

SBI Australia has a comprehensive program of collaboration and training that combines diverse expertise and resources in the emerging field of systems biology, exposing scientists to the big picture of systems across the life sciences, such as human organs, fertility, agriculture and environmental management.

The Enhancing Systems Biology program comprises regular seminars, some with international visitors, that encourage a culture of networking across disciplines, and is supported by the Victorian Government. This program exposes scientists to the big picture of life systems. It comprises regular seminars and workshops that encourage a culture of networking across disciplines and enhance the profile of systems biology in Victoria, including:

- quarterly collaboratives, where three researchers one basic, one clinical and one translational—speak about their research
- visits by international speakers, to showcase international advances in systems biology
- training workshops around specific technical skills for systems biology research.

These activities will build up to the 2014 International Conference on Systems Biology, to be held in Melbourne in September 2014.

In 2013, SBI Australia hosted 23 international visitors from the UK, Japan, Denmark and the US, and four Australian visitors.

Most notably, in October 2013 SBI Australia hosted Prof Makoto Asashima, Executive Director of the Japan Society for the Promotion of Science (and two senior staff), a delegation of four senior scientists from Japan's RIKEN research organisation, and Australia's first Nature Café. The Nature Café, which was also supported by EMBL Australia and Monash University, was on the theme 'internationalising your research' (see box on page 48).

SBI Australia also arranged external activities for many of its visitors, engaging with industry, government and research organisations in Melbourne, Canberra, Adelaide, Sydney, Brisbane and Townsville.

Within Monash University, SBI Australia has developed relationships across multiple faculties and research centres, through visitors, workshops and seminars, including the university-wide Monash Systems Biology Seminar Series. In particular, SBI Australia engaged with:

- researchers at the Australian Regenerative Medicine
  Institute
- the Monash Sustainability Institute
- MAXIMA, the Monash Academy for Cross & Interdisciplinary Mathematical Applications
- Monash schools or departments of Mathematical Sciences, Computer Science, Biological Engineering, Microbiology, and Mechanical & Aerospace Engineering
- Micromon, the commercial services unit of the Department of Microbiology, specialising in highquality DNA and RNA technologies
- the Monash eResearch Centre
- Monash Institutes of Medical Research, and
  Pharmaceutical Sciences.

See the Activities and visitors section (page 43) for more details of SBI Australia activities.

SBI Australia is also playing a role in the planning and organisation of the 15th International Conference on Systems Biology (see box). This has resulted in interest by Sydney University in developing and hosting an annual Australian systems biology conference with SBI Australia and EMBL Australia. Sydney University has also sought SBI Australia's advice and support for developing undergraduate systems biology teaching programs.

#### **Partnerships**

SBI Australia is developing formal partnerships with a number of other external organisations, including:

- RIKEN (Japan)
- Okinawa Institute of Science and Technology (Japan)
  - Sony CSL (Japan)
- University of Warwick (UK)
- the Centre for Structural Systems Biology (EMBL Hamburg)
- the Australian Institute of Marine Science.

## International Conference on Systems Biology 2014

SBI Australia and EMBL Australia are taking a lead role in organising the International Conference on Systems Biology, which will be held in Melbourne, 14–18 September 2014.

Key speakers for the conference include:

- Brenda Andrews (The Banting and Best Department of Medical Research, the University of Toronto)
- Edmund Crampin (University of Melbourne)
- Barbara Fazekas (Centenary Institute of Cancer Medicine and Cell Biology)
- Anne-Claude Gavin (EMBL Heidelberg)
- Leroy Hood (Institute for Systems Biology)
- Huck Hui Ng (Genome Institute)

### Sir Louis Matheson Distinguished Visiting Professor

Hiroaki Kitano

#### **Developer, Systems Biology Platform** Sarah Boyd

Saran Boyd

#### **Executive officer**

Di Lederman (until Aug 2013) Maryanne Borg (Sep–Nov 2013) Allen White (from Feb 2014)

#### **Research fellow**

Hieu Tri Nim

#### Affiliates

Mirana Ramialison (from Feb 2014) Jeannette Hallab (from Feb 2014) Saskia Reibe-Pal

#### Adjunct professor

Madeleine Van Oppen

#### **Visiting PhD student**

Sujay Kumar

- Peter Hunter (Auckland Bioengineering Institute)
- Howard Jacob (Medical College of Wisconsin)
- Hiroaki Kitano (Systems Biology Institute Tokyo)
- Nicholas Le Novere (EMBL)
- John Mattick (The Garvan Institute)
- Dana Pe're (Columbia University)
- David Rand (University of Warwick)
- Ian Small (ARC Centre of Excellence, UWA)
- John Tyson (Virginia Tech)
- Marc Vidal (Harvard Medical School)
- Marian Walhout (Umass Medical School)
- Christine Wells (Australian Institute for Bioengineering and Nanotechnology)
- Hans Westerhoff (University of Amsterdam)
- Marc Wilkins (University of NSW)
- Elizabeth Murchison (University of Cambridge).

## The Bioinformatics Resource Australia EMBL (BRAEMBL)

The Bioinformatics Resource aims to enable optimal exploitation of the tools and data of bioinformatics by Australian scientists and to contribute to the greater biomolecular information infrastructure in a manner that showcases Australian science.

The Resource provides integrated data services for medical and agricultural sciences, biodiversity and biotechnology. It is not a research facility, although focused research is required to develop unique, customised data services in selected areas. It is managed in accordance with EMBL policies that emphasise open access to data.



#### **About the Bioinformatics Resource Australia**

The Bioinformatics Resource Australia of EMBL Australia (BRAEMBL) was established with the support of the Australian Government's research infrastructure investments to provide access to EMBL–EBI's databases and services. It is hosted by the Institute for Molecular Bioscience at the University of Queensland (UQ).

In 2010, the UQ's Institute of Molecular Bioscience established a mirror of the EMBL–EBI in response to a perception that Australian bioinformatics users were disadvantaged by geographical remoteness and IT connectivity. Within the context of Australia's associate membership of EMBL and EMBL Australia, it envisaged a tight collaboration with the EBI to mirror EBI services from UQ.

Around the same time, the National Computational Infrastructure Specialised Facility in Bioinformatics (NCI–SFB) was established to make computer power available for Australian bioinformaticians, with its hardware hosted by UQ's Research Computing Centre. The two groups have always been co-integrated within the same facility, and provide complementary services.

#### **Bioinformatics resources and services**

The Bioinformatics Resource provides Australian bioinformatics users with an extensive set of data analysis tools and databases and the computer power required to run large-scale analyses.

The data resources include public-domain genome, DNA and protein sequences and protein structures, and novel datasets and related capabilities, including integrated data services, are being added.

In conjunction with high-performance computing resources and scalable storage, and delivered through high-bandwidth national research networks, BRAEMBL enables large-scale integrated analyses that have previously not been feasible. BRAEMBL arose from the EMBL–EBI mirror and NCI–SFB projects. These projects are funded through national infrastructure platforms (including Bioplatforms Australia), partners (CSIRO, UQ) and the Queensland Government.

Current support for the Resource terminates at the end of 2014, and considerable effort has gone into the development of the scientific mission of BRAEMBL beyond this point.

Maturation of the collaborative e-infrastructure created under past funding clearly influences that picture, as BRAEMBL is an obvious customer for it. In these difficult times, it is unlikely that UQ can continue significant cash support to this pan-Australian endeavour.

With this in mind, the EMBL Australia Council is attempting to coordinate Australian scientific enthusiasm to sustain BRAEMBL through a Call for Expressions of Interest. Institutions will be invited to participate in an Australia-wide hub-and-node collaboration as the continuation of BRAEMBL. This itself will not allocate funding, but will develop a shared mission that can coordinate and optimise the benefit of future funding.

In 2013–14, BRAEMBL continued to expand its operations by providing unique or boutique services to researchers directly or via infrastructure mechanisms such as our bioscience data repository resource.

#### **BRAEMBL** web services

BRAEMBL operates an array of cloud research tools and data that allows researchers to run analyses such as sequence search and alignment. These services allow open access to data and performance computing infrastructure that otherwise would be a financial and operational burden for research groups.

# BRAEMBL RESOURCES CONTRIBUTED TO AT LEAST 33 PUBLICATIONS

These services are available to us a result of our collaboration with EMBL–EBI. We continue to expand our suite of tools and services, for example, by hosting high-profile tools such as the MEME Suite for Motif Sequence Search, developed by Dr Tim Bailey at UQ.

The main BRAEMBL website (http://braembl.org.au) continues to host an array of services. BRAEMBL is the provider of both the data and the research tools, allowing researchers to use these tools through a selection of interactive and non-interactive methods and with customer support from the NCI–SFB team in BRAEMBL.

# **26,442 VISITORS USED BRAEMBL'S SITES AND SERVICES**

Visitor numbers increased by 80% over last year, but the number of returning visitors decreased (see figure below).



The reduction in returning visitors may be because:

- visitors may return using different computers or network gateways, which makes the return visit look like a new visit
- search engine optimisation on the BRAEMBL web content has led to a higher ranking in Google and Bing/Yahoo search results, and more visitors in general.

The breakdown of BRAEMBL services is shown in the figure below.



BRAEMBL—BRAEMBL hosts an array of services for sequence similarity searches, multiple sequence alignment, protein functional analysis and motif exploration.

MEME—the MEME suites provides tools for discovery of motifs in groups of related DNA and protein sequences, comparison with other sequences as well as analysis.

NCI–SF—The National Computing Infrastructure– Specialised Facility in Bioinformatics, provides access to the Barrine High-Performance Computing (HPC) cluster, including management of the software and databases, and training and support for users.

RDA—a searchable index of Australian species research data collections accessible via BRAEMBL's services, including nucleotide and protein sequences from Australian plant and animal species.

ENSEMBL—The ENSEMBL project produces genome databases for vertebrates and other eukaryotic species, and makes this information freely available online.

INsPeCT—the Integrative Platform for Cancer Transcriptomics (developed by Mark Ragan) is an innovative analytical framework that provides an easyto-use interface to a comprehensive, integrated suite of tools for rapid in silico analysis of sequence data and/or lists of genes as well as analytical tools.

EBI Mirror —a comprehensive mirror of the European Bioinformatics Institute (EBI) FTP (file transfer protocol). This includes an archive of databases and software in the field of bioinformatics. Use of the BRAEMBL RDA (Research Data Australia) Australian Species Collection increased from 15% in 2012–13 to 34.3% in 2013–14 in the overall usage composite. The number of visitors to the RDA service increased from 1172 to 10280 (777%).

BRAEMBL resources are used by bioinformaticians worldwide, with domestic users accounting for 45% of visitors (down from 51% in 2012–13) (see figure).



#### **Data integration**

The most significant new initiative in the year has been the creation of the BRAEMBL Data Integration Team, charged with helping Australian scientists ensure that their data are represented in global collections rapidly and at high quality.

The BRAEMBL Data Integration Team helps Australian researchers handle and collate experimental metadata; submit data to public repositories; conduct downstream analyses; batch submit large datasets; and use other EBI services.

For example, they are providing expertise to help teams submit data from the following projects to the relevant data repository:

- Sea-quence project—genomes and transcriptomes from 10 Great Barrier Reef coral species, as well as associated algal and other microbial symbionts, to compare to similar data from Red Sea coral (international consortium including Bioplatforms Australia, Rio Tinto and the ReFuGe 2020 consortium)
- Koala Genome Consortium—the full genome and transcriptome of the koala (consortium led by Australian Museum's Australian Centre for Wildlife Genomics and Queensland University of Technology)
- Pogona Genome Project—the central bearded

dragon genome (University of Canberra and BGI, China)

- Bacterial genome projects—comparative analysis of genomes from clinical isolates of bacterial pathogens (Dr Scott Beatson, UQ)
- Spider and toxins project— venom protein and genome sequences from spiders and other venomous arthropod (Prof Glenn King, Institute of Molecular Bioscience, UQ)
- Oncogenomics project—novel cancer genes and their role in cancer predisposition and development (Prof Nick Hayward, Queensland Institute of Medical Research)
- Marine Microbiome project (Dr Justin Seymour, University of Technology Sydney)

One of the main services offered is to create species checklists to community standards. BRAEMBL is also working with the Australian Genome Research Facility to develop an automated pipeline that will upload raw data for each sequencing project to BRAEMBL, ensuring that the metadata for each unique project are captured and that the highest community standards are met before submitting to the European Nucleotide Archive.

#### Computational support and training

The National Computational Infrastructure: Specialised Facility in Bioinformatics (NCI–SFB) was established in 2010 to facilitate data-centric advanced computing services for Australian researchers across the life sciences, bioinformatics and biotechnology.

The project was funded as a joint undertaking among the Australian National University (ANU) as lead agent for NCI), QCIF (the Queensland Cyber Infrastructure Foundation) and CSIRO. An array of training and support services were created, and a turnkey bioinformatics computing environment was established on UQ's Barrine high-performance computing cluster.

The compute infrastructure and services have been actively maintained, and continue to be vital components of BRAEMBL's service portfolio. The facility continues to be accessible via the NCI Merit Allocation Scheme, and via partner share allocation.

#### Director

Graham Cameron (until Feb 2014)

#### **Acting Director**

Sean O'Donoghue (from Feb 2014)

#### **Executive Officer**

Lanna Wong

Senior IT and project manager Gavin Graham

#### Applications manager

Gerald Hartig (until Sep 2013)

#### **HPC** specialists

Dalia Abraham (from Dec 2013) Mr William Hsu Danny Sheehan Kerri Wait

**Outreach, training and communication** Mark Crowe

**Bioinformatics manager** Lien Le (from Nov 2013)

#### **Bioinformaticians**

Elham Gharazi Webber Liao Jeremy Parsons (until Dec 2013) Eric Powell

#### Species specialist

Denis O'Meally (from Nov 2013)

#### Web and informatics developers

Michael Nuhn (from Dec 2013) Alexander Varlakov

#### System administrator

Nick Rhodes

#### **Australia Bioinformatics Network**



#### About the Australian Bioinformatics Network

The Australian Bioinformatics Network was launched in mid-2012 as an independent body jointly funded by EMBL Australia, Bioplatforms Australia and CSIRO, initially for a five-year period. Dr David Lovell, Bioinformatics and Analytics Leader for CSIRO's Transformational Biology Initiative, was appointed Director in July 2012.

The Australian Bioinformatics Network aims to connect people to people, resources and opportunities to increase the benefits of Australian bioinformatics.

The Network is a national information hub and forum for the Australian bioinformatics community. Via its website (www.australianbioinformatics.net), it provides a central resource to share and record information on job opportunities and events important to the community.

The number of registered members of the website has increased steadily since the launch, with close to 600 members at the end of February 2014 compared to around 200 at the end of February 2013.



#### Active memberships on AustralianBioinformatics.net and Yammer

Approximately half of the registered members are also registered users of the Network's Yammer group, a private real-time discussion forum allowing members to converse online.



#### Web traffic to AustralianBioinformatics.net

#### Jobs and events posted to AustralianBioinformatics.net



Visits

Other website initiatives include the sharing of presentations about bioinformatics, from conferences, seminars and other presentations, via SlideShare, which attracts more than 1,000 views per month; and online event management and registrations for bioinformatics meetings and conferences.

The ABN has featured as a sponsor for a range of events, including a CellDesigner workshop and the 2013 Winter School in Mathematical and Computational Biology (see Activities and visitors page 43) and a Jalview workshops, and a livestream presentation from the US to the Computational and Simulation Sciences and eResearch Annual Conference (see Sponsorship page 55).

## A professional society for Australian bioinformaticians

The Australian Bioinformatics Network is working towards the establishment of a professional association for bioinformaticians in Australia.

A discussion paper 'On conferences and professional societies for Australian bioinformatics', presented to the EMBL Australia Bioinformatics Advisory Committee and Network members, has guided the association discussion within the bioinformatics community. These discussions indicate a high level of support for the formation of a professional society representing Australian bioinformaticians and computational biologists.

A committee has been formed with the goal of developing a proposal for the structure and organisation of a nationally based professional society for bioinformaticians and computational biologists during 2014.

#### **Australian Bioinformatics Conference**

The Australian Bioinformatics Network has put its support behind the Australian Bioinformatics Conference, which will be held in Melbourne in October 2014, just prior to the Australian Genomic Technologies Conference.

#### **Connection grants**

The Australian Bioinformatics Network offers Connection Grants designed to fund activities that bring the Australian bioinformatics community together. Eligible activities include travel, support for national and international visitors, and sponsorship of meetings that strengthen professional networks.

The first round of funding, which was held early in 2013, provided funds for three projects in 2013:

- \$12,000 to fund two events bringing wheat bioinformaticians from across Australia to meet and share ideas and discuss the challenges posed by the wheat genome project (lead applicant Ute Baumann, Australian Centre for Plant Functional Genomics)
- \$3,000 to SBI Australia to bring Caltech scientist Dr Mike Hucka to Australia to talk about large-scale, open-sourced initiatives for computational biology and scientific computing (lead applicant Sarah Boyd, SBI Australia/EMBL Australia)
- \$10,000 to support two Software Carpentry boot camps in Adelaide and Brisbane to increase bioinformatics skill sets and provide opportunities for networking between bioinformaticians. Software Carpentry is a volunteer organisation that teaches scientists computer skills with the aim of making them better and more productive scientists (lead applicant Nathan Watson-Haigh, Australian Centre for Plant Functional Genomics and Bioinformatics Interest Group of South Australia).

A second round of funding opened in February 2014.

#### Director

David Lovell

#### **Executive officer**

Benita Vincent

#### Assistant to director

Candace Culyer (from Oct 2013)

#### **Communications officer**

Virginia Tressider (until Mar 2013)

#### Volunteers

Torsten Seemann, Monash University Catherine Shang, Bioplatforms Australia
# **STUDENT TRAINING AND SUPPORT**

EMBL Australia has a number of programs that provide Australian PhD students access to advanced training and networking opportunities in Australia and overseas.

## **EMBL Australia PhD Course**

In July 2013, EMBL Australia launched a new concept in Australian research training—the EMBL Australia PhD Course. Modelled on the compulsory pre-doctoral course attended by all incoming PhD students at EMBL, the two-week long residential program was packed with seminars, workshops and opportunities for networking with students from around the country as well as renowned Australian and international scientists. The course provided a broad exposure to the life sciences, aimed at fostering the creativity of young scientists and providing a flying start to their careers. Sixty first-year and second-year students from around Australia attended the inaugural course, which was held at the Walter and Eliza Hall Institute of Medical Research (WEHI) in Melbourne. The course included symposiumstyle presentations from 62 Australian and international speakers, as well as workshops and site visits to facilities including the Australian Synchrotron, Monash Biomedical Imaging and ARMI's FishCore zebrafish facility.

The 2014 course will be held at the Australian National University in Canberra in July.



## Venue:

Walter and Eliza Hall Institute of Medical Research

### Date:

30 June to 12 July 2013

## **Topics covered:**

Bioinformatics, RNA biology, developmental biology, animal models, genomics, next-generation sequencing, systems biology, bioimaging, neuroscience, science communication, and science in society

## Visited:

Monash University, FishCore at ARMI, Australian Synchrotron, Monash Biomedical Imaging





Students		
STATE	UNIVERSITY/INSTITUTE	
ACT	Australian National University, John Curtin School of Medical Research	
NSW	University of Newcastle, University of Sydney, ANZAC Research Institute, University of New South Wales, Garvan Institute of Medical Research, Brien Holden Vision Institute, Prince of Wales Clinical School, Macquarie University	
QLD	CSIRO, Queensland Facility for Advanced Bioinformatics (QFAB), Bond University, Griffith University, University of Queensland, Institute of Molecular Biosciences, Translational Research Institute, Eskitis Institute, Central Queensland University	
SA	University of South Australia, University of Adelaide, Flinders University	
VIC	St Vincent's Institute of Medical Research, Monash University, University of Melbourne, Murdoch Children's Research Institute, La Trobe University, University of Ballarat, Australian Regenerative Medicine Institute, Peter MacCallum Centre for Cancer Research	
WA	University of Western Australia, Curtin University, Telethon Institute for Child Health Research	
Australian speakers		
STATE	UNIVERSITY/INSTITUTE	
ACT	Australian National University, The John Curtin School of Medical Research	
NSW	University of Sydney, University of New South Wales, Garvan Institute of Medical Research	

- Centenary Institute University of Adelaide SA
- VIC St Vincent's Institute of Medical Research, Monash University, University of Melbourne, La Trobe University, University of Ballarat, Australian Regenerative Medicine Institute, Peter MacCallum Centre for Cancer Research, The Monash Institute of Pharmaceutical Sciences, WEHI, Deakin University, Department of Primary Industries Victoria, Murdoch Childrens Research Institute, VLSCI
- Western Australia Institute for Medical Research WA

#### **Inaugural PhD Course a roaring success**

"This course feels like EMBL. It has the same exciting vibe and the same level of excellence," Nadia Rosenthal told students at the PhD Course reception. "This is all about you and all because of you."

Both students and speakers were enthusiastic about the course.

"The Bioinformatics focus was brilliant, considering the call for molecular biosciences to have those skillsets," said Laura Baker, a PhD student at the Garvan Institute. "The quality of speakers was fantastic. There was a broad range of topics, something for everyone. It really captured what's hot in research."

"We were intrigued with a variety of new questions opening up new corridors of inquiry where we haven't ventured before," said Harsha Padmanabhan, from the University of Adelaide. "I experienced the opportunity to go back to 'class' and consider why I needed to ask the various questions I was asking through my research, and how to improve my current experiments to get better results."

EMBL alumnus Dr Bernard Dichtl, now a researcher and lecturer based at Deakin University, also noted that "it feels like EMBL".

And Dr George Papadatos, who came from EMBL–EBI to take part as a speaker, commented that "There is a good line-up of speakers, high level and good quality—it's great that 60 young, fresh students are exposed to these talks." Many of the students said hearing from researchers about their own pathways in science was valuable too.

"I really enjoyed being able to hear from such a variety of researchers with so many different stories to tell about their careers. It was really reassuring to hear about all the different ways a research career can unfold," said Chloe Warren, who is studying at the University of Newcastle.

Students also appreciated the opportunity to meet other young researchers and future colleagues.

"It was great to meet so many other PhD students and to be able to talk about our research and troubleshoot our problems together," said Chloe Warren.

"I now know a lot of motivated young people from a huge range of fields and I am keen to meet them at conferences, share knowledge and collaborate in the future," said Jasmin Straube, from QFAB at the University of Queensland.

Inspired by their European peers, the students are now organising their own PhD student symposium (see page 40).

## **International PhD Program**

The EMBL Australia International PhD Program enables Australian students to undertake their PhD at an EMBL facility. The PhDs are jointly awarded and co-supervised by EMBL and the student's Australian Group of Eight university.

The program offers Australian students the opportunity to be exposed to the EMBL philosophy and training. EMBL is renowned for the internationality of its students, the interdisciplinary nature of its training, the dedicated mentoring provided by its supervisors and the early independence granted to its researchers. Opportunities to do a PhD at EMBL are awarded competitively based on written applications, panel interviews and one-on-one meetings with the researchers. Entry to the program is extremely competitive. In addition to the stipend and a living allowance, the program provides funding to support travel between Australia and EMBL for both the student and their Australian mentor. Students may also use an Australian Postgraduate Award for the program.

EMBL recruits PhD students twice a year, with positions available for up to three Australian students to commence each year. The 2012 call for applications (announced in late 2011) attracted 914 applications, and 137 applicants were invited for interview in February 2012. One Australian applicant, Simone Li from the University of New South Wales, was successful. She began her PhD September 2012.

### Simone Li-international PhD

Simone is a PhD candidate based at EMBL Heidelberg under the supervision of Dr Peer Bork, a senior scientist at EMBL Heidelberg, Joint Head of EMBL's Structural and Computational Biology Unit and Strategic Head of Bioinformatics.

Her PhD project uses metagenomics—the study of genetic material from environmental samples—to understand how faecal microbiota transplantation therapy can be used as a treatment and potential cure for diseases of the human digestive system. Many of these diseases, such as ulcerative colitis, are believed to arise from imbalances in gut microorganisms.

Simone is collaborating with Prof Thomas Borody at the Centre for Digestive Diseases in Sydney, who is a pioneer of the therapy. She hopes the project will lead to improvements in the efficacy of the treatment, thus reducing the number of sufferers of these diseases.

In 2013, Simone took on a coordinator role for the 15th EMBL PhD Symposium in November 2013.

Speaking in the lead-up to the event, Simone said: "I am excited to be coordinating the EMBL International PhD Symposium this year. It is a conference fully organised by the first-year PhD students—we actually come up with the theme and program, and have to find funding!". She added, "And I'm looking forward to meeting this year's cohort of Australian students and showing them around EMBL too!"





## **Travel grants**

Now in its third year, the EMBL Australia travel grants program continues to attract applications from universities and research institutions around Australia. The grants are extremely competitive, with 18 applications for the most recent round (for travel in the first half of 2014) for up to five grants.

#### **PhD Symposium travel grants**

EMBL Australia also offers 20 PhD Symposium travel grants, which allow students to attend the annual PhD Symposium organised by EMBL's first-year PhD students. Grants to the value of \$3,000 are available to support travel and accommodation expenses and a living allowance for students attending the symposium, which is held at EMBL's headquarters in Heidelberg, Germany, in November each year.

EMBL Australia supported 20 students to join the 15th EMBL PhD Symposium, 21–23 November 2013. The Australian group stood out, winning three out of the six poster prizes as well as one of the two presentation awards given to student speakers.

# **TRAVEL GRANTS TO THE 15TH EMBL PHD SYMPOSIUM**

21-23 November 2013

Competition in Biology: The race for survival, from molecules to systems

**EMBL Advanced Training Centre, EMBL Heidelberg** 



#### Attending the EMBL PhD Symposium

Joanna Kwiatek, a student at the University of New South Wales, attended the 2014 EMBL PhD Symposium on an EMBL Australia travel grant. She went to the conference, and also took the opportunity to present as a Short Talk speaker.

"Being a Short Talk speaker was a challenge! But I am really glad that I rose to that challenge, and I was really pleased with how it went. The great thing was that

#### **PhD travel grants**

EMBL Australia offers PhD travel grants for Australian PhD students to visit the EMBL facilities in Europe. The grants cover travel and accommodation expenses and a living allowance for short-term visits of up to six weeks (up to \$3,500), or long-term residencies of up to six months (up to \$7,500).

This gives Australian PhD students the opportunity to attend:

- conferences, symposiums or one of the many short courses operated by EMBL at the International Centre for Advanced Training (EICAT) in Heidelberg, Germany
- one of EMBL's comprehensive suite of courses, conferences and workshops in the life sciencess
- laboratories of EMBL to undertake training for periods of up to six months.

EMBL Australia awarded travel grants to nine students to attend EMBL for conferences (not including the PhD Symposium, above) and training during 2013, although not all trips were taken before the end of this annual report period.

In late 2013, the first round of grants for 2014 were awarded to four students for travel between 1 January and 30 June 2014.

other students approached me afterwards, and we had interesting discussions about my research work.

"The keynote speakers also presented some interesting talks and were very open for discussion with students, which I personally found useful to open my mind to different kinds of science.

"I hope my adventure with EMBL has just started."

## **EMBL Australia PhD Symposium**

Students with a connection to EMBL, from universities, institutes and hospitals around Australia, have taken up the challenge to organise the inaugural EMBL Australian PhD Symposium, which will be held in Sydney in December 2013.

Entitled 'Research in life sciences: from *in vitro* to *in vivo*', the conference will be an exciting experience for young scientists embarking on careers in medical research, and an excellent networking experience for students, which has begun with an active Facebook page and Twitter account.

## **PhD travel grant**

## **ROUND 2 2013**

For travel between 1 July and 31 December 2013



## 21 APPLICANTS

STATE UNIVERSITY/INSTITUTE

- **NSW** University of Sydney, University of New South Wales, Garvan Institute of Medical Research
- **QLD** University of Newcastle, Victor Chang Cardiac Research Institute, Macquarie University, University of New South Wales, Heart Research Institute
- VIC Monash University, University of Melbourne

## Successful applicants



## **Conferences attended**

- Joint EMBL-EBI/Wellcome Trust Course: Proteomics
  Bioinformatics
- EMBL Advanced Course in Whole Transcriptome Data
   Analysis
- EMBO Practical Course on Analysis of High-Throughput Sequencing Data
- The Non-Coding Genome
- EMBL Conference—Cancer Genomics
- 11th International Conference on Biology and Synchrotron Radiation

## **ROUND 1 2014**

For travel between 1 January and 30 June 2014



## STATE UNIVERSITY/INSTITUTE

JIAIL	
VIC	University of Melbourne, ARMI, Burnett Institute, Walter and Eliza Hall Institute, Deakin University
ACT	Australian National University, University of Canberra
NSW	University of New South Wales, University o

- **VSW** University of New South Wales, University of Western Sydney, University of Technology Sydney, University of Sydney
- NT Menzies Institute
- SA University of Adelaide
- QLD QIMR Berghofer Medical Research Institute, Queensland University of Technology

#### **Successful applicants**



## **Conferences attended**

- EMBO Practical Course on Computational Structural Biology—from data to structure to function
- 10th Annual BioMalPar/EVIMalaR Conference
- Tumour Microenvironment and Signalling Symoposia

## AMSI Intern—industry placements

The AMSI Industry Internship program (AMSI Intern) is an Australian Mathematical Sciences Institute (AMSI) initiative supported by the Australian Bioinformatics Network, EMBL Australia, Bioplatforms Australia and CSIRO. The program places up to three postgraduate students into industry for short-term (four to five month) research projects to obtain valuable experience, with financial contributions from the industry partner.

In 2013 internships were awarded to:

- Milica Ng, a PhD student at the University of Melbourne, who interned at CSL under the mentorship of Dr Matthew Ritchie from the Walter and Eliza Hall Institute of Medical Research
- Sori Kang, also from the University of Melbourne, who worked with the Victorian Life Sciences Computation Initiative (VLSCI) with the support of Prof Bernie Pope at the University of Melbourne.

Both students presented the results of their internship project at the annual BioInfoSummer bioinformatics workshop, held at the University of Adelaide in December 2013.

Due to the success of the program, two more internships will be awarded in mid-2014, again with placements at CSL and VLSCI. The program is seeking another industry partner to host a third intern.



# **ACTIVITIES AND VISITORS**

EMBL AUSTRALIA IS INTERNATIONALISING AUSTRALIAN RESEARCH. IN 2013–14 EMBL AUSTRALIA AND ITS PARTNERS HOSTED 23 INTERNATIONAL VISITORS AND RAN OVER 25 EVENTS AND 115 MEETINGS IN PARTNERSHIP WITH 22 OTHER AUSTRALIAN INSTITUTIONS.

## **International visitors 2013**

Prof Howard Jacob, Director Human and Molecular Genetics Center, Iowa State University, USA Dr Mike Hucka, Scientist, California Institute of Technology, USA

Prof Scooter Morris, Executive Director, Resource on Biocomputing, Visualization and Informatics, University of California, USA

Prof Matthias Hentze, Director EMBL, Germany Dr Matthias Wilmanns, Head of EMBL, Hamburg, Germany

Dr Vladimir Benes, Head of Genomics Core Facility, EMBL Heidelberg , Germany Prof Lars Juhl Jensen, Center for Protein Research,

University of Copenhagen, Denmark

Dr Guy Cochrane, Team Leader, European Nucleotide Archive, EMBL, United Kingdom

Dr George Papadatos, Data Integration and Development Officer, EMBL, United Kingdom

Prof Hiroaki Kitano, Director, Sony Computer Science Laboratories, Japan

Dr Hiroki Ueda, Project Leader, Laboratory for Systems Biology, Japan

Prof Makoto Asashima, Director Research Centre for Stem Cell Engineering, National Institute of Advanced Industrial Science and Technology, Japan Dr Osamu Ohara, Director, Laboratory for Integrative Genomics, Riken Research Center, Japan Dr Hiroshi Ohno, Team Leader, Laboratory for Epithelial Immunobiology, Riken Research Center, Japan Dr Shohei Hori, Unit Leader, Riken Research Center for Allergy and Immunology, Japan

Dr Shuichi Onami, Team Leader Laboratory for Developmental Dynamics, Riken Research Center, Japan Dr Yannick Schwab, Head of Electron Microscopy Core Facility, EMBL Heidelberg, Germany

Dr Aidan Budd, Computational Biologist, EMBL Heidelberg, Germany

Dr Anne Ephrussi, Head of EMBL International Centre for Advanced Training, Heidelberg, Germany

Prof Miguel Andrade, Group Leader, Max Delbrück Center for Molecular Medicine, Berlin, Germany

Dr Holger Dinkel, Software Engineer, EMBL Heidelberg, Germany

Dr Zsuzsanna Dosztanyi, Hungarian Academy of Sciences, Budapest, Hungary

Dr Toby Gibson, Team Leader, EMBL Heidelberg, Germany

## March

Sarah Boyd, from SBI Australia, and Nadia Rosenthal, EMBL Australia's Scientific Head, took part in the Warwick– Monash Systems Biology Workshop in Venice, Italy. The workshop was co-organised by Prof David Rand (Warwick University) and Nadia Rosenthal to identify collaborative opportunities.

Mr John Gunn, CEO of Australian Institute of Marine Science (AIMS), visited Sarah Boyd and Silvio Tiziani at ARMI for discussions on future collaboration opportunities.

### May

Prof Hiroaki Kitano attended a BioMelbourne Network CEO Forum Series luncheon hosted by the Melbourne City Council as guest speaker. The luncheon series is sponsored by the Commonwealth Department of Innovation, Industry, Science, Research and Tertiary Education (now Department of Industry).

SBI Australia ran a workshop at Monash University on CellDesigner, software for modelling and simulation of biochemical and gene regulatory networks, presented by Dr Akira Funahashi and Dr Noriko Hiroi, two of the designers of CellDesigner, from Keio University, Japan.

ARMI, the Systems Biology Institute and Monash IVF signed a Memorandum of Understanding to develop new systems biology approaches for analysis of IVF data.



James Thiedeman, Monash IVF, Nadia Rosenthal, ARMI, and Hiroaki Kitano, SBI, sign the Memorandum of Understanding to collaborate on IVF research. Credit: EMBL Australia

An ARMI delegation toured the Australian Institute of Marine Science in Townsville followed by a workshop discussion to discuss linkages between SBI Australia, ARMI and AIMS.

#### June

EMBL Australia and the Australian Microscopy & Microanalysis Research Facility (AMMRF) ran the Correlative Light Electron Microscopy (CLEM) Masterclass incorporating the 3rd Australian CLEM Workshop, with teachers:

- Dr Paul Verkade, University of Bristol
- Dr Thomas Muller-Reichert, Technische Universität
  Dresden
- Dr Yannick Schwab, EMBL Heidelberg
- Assoc Prof Filip Braet, University of Sydney
- Mr Rick Webb, University of Queensland.

Yannick Schwab also visited EMBL Australia and gave a seminar at Monash University on new tools and techniques in correlative light and electron microscopy that enable high-resolution live imaging and resolution of 3D ultrastructures.

Dr Howard Jacob, Medical College of Wisconsin, US, gave the first Victorian Systems Biology Symposium on 'Personalised medicine: a young life saved through genomics and systems biology', with Kathryn North, Director of the Murdoch Children's Research Institute.

While in Melbourne, he also chatted with research and health leaders and appeared on ABC 24 News Breakfast, as well as in *The Age* and *Sydney Morning Herald*.

Howard Jacob was also the guest of honour at a lunch hosted by EMBL Australia for Melbourne-based EMBL alumni, and students who had attended an EMBL PhD symposium, at University House, University of Melbourne.



The Enhancing Systems Biology program was launched at the first Victorian Systems Biology Collaborative, which was held at the Bio21 Institute on the topic 'Neurodegeneration: from lab to clinic with systems biology', with three speakers:

- Dr Danny Hatters, Bio21 Institute, University of Melbourne
- Prof Nellie Georgiou-Karistianis, Monash University
- Prof Colin Masters, Executive Director of the Mental Health Research Institute and Laureate Professor at the University of Melbourne.

The EMBL Australia PhD School was held in Melbourne from 30 June to 12 July, bringing together 62 speakers and 60 of Australia's best young life sciences PhD students (see Student programs page 35 for more info). Dr Matthias Wilmanns, Dr Vladimir Benes, Dr George Papadatos and Dr Marcus Heisler from EMBL were among the speakers.

#### July

Mathias Wilmanns, George Papadatos and Marcus Heisler, all visiting from EMBL for the PhD course, visited EMBL Australia at Monash University, and Marcus also gave a seminar at ARMI at Monash University on his research into patterning in plant leaves.

Silvio Tiziani, Executive Director of EMBL Australia, was co-organiser of the 2013 Winter School in Mathematical and Computational Biology, held at the Queensland Bioscience Precinct, UQ. The school is part of a series, designed to introduce mathematical and computational biology and bioinformatics to advanced undergraduate and postgraduate students, postdoctoral researchers and others working in the fields of mathematics, statistics, computer science, information technology, complex systems analysis, and biological, chemical and medical sciences and engineering.

## August

Dr Mike Hucka, Caltech, US, the founder of several popular exchange formats and developer of opensource software for systems biology, visited Sydney and Melbourne as a guest of SBI Australia with support from the Australian Bioinformatics Network.

Mike spoke about his experience with open-source collaborations, specifically the systems biology mark-up language (SBML), to researchers at Monash University; held a BioBriefing session for the BioMelbourne Network at St Vincent's Institute of Medical Research; discussed bioinformatics with Gordon Smyth and Terry Speed at the Walter and Eliza Hall Institute as part of the Enhancing Systems Biology program; and addressed the Sydney Computational Biologists Meetup at the Kinghorn Cancer Centre.

In Sydney, Mike Hucka also met up with EMBL Australia personnel and alumni, with a lunch at the University of Sydney, hosted by Dean of Science and EMBL Council member, Prof Trevor Hambley, and visits to alumni at the Victor Chang Institute and the University of New South Wales.



Mike Hucka from Caltech visited in August. Credit: Mike Hucka

#### September

Dr Hiroki Ueda, Head of the Systems Biology Laboratory at the RIKEN Center for Developmental Biology and a visiting professor at the Graduate School of Medicine and Faculty of Medicine, the University of Tokyo, was a guest of SBI Australia and ARMI. He gave two Melbourne talks on his research in systems biology leading towards personalised medicine—one Monash Systems Biology Seminar and the second as part of SBI Australia's Enhancing Systems Biology program, hosted at Baker IDI.

Hiroki also visited the South Australian Medical Research Institute and gave a seminar at the University of Adelaide.

The Bio21 Institute hosted a Victorian Systems Biology Collaborative 'Using big picture science to understand tiny organisms: how the synthesis of information from a huge range of fields is helping us understand the miniature world of pathogens', with three speakers:

- Prof Robin Gasser, Director of the Pathogen Genomics and Genetics Program from the Faculty of Veterinary Science at the University of Melbourne
- Dr Kathryn Holt, Department of Biochemistry and Molecular Biology and Bio21 Institute at the University of Melbourne

 Dr Stuart Ralph, Department of Biochemistry and Molecular Biology and Bio21 Institute at the University of Melbourne.

Mr Gavin Graham visited EMBL–EBI at Hinxton in the UK for EBI Metagenomics and Train the Trainer workshops and for meetings on EBI Strategic Alignment for Technology & Services.

### **October**

Prof Makoto Asashima, Executive Director at the Japan Society for the Promotion of Science (JSPS), Emeritus Professor of University of Tokyo and Fellow and Director at the Research Center for Stem Cell Research, National Institute of Advanced Industrial Science and Technology (AIST), Japan, visited Canberra and Melbourne as a guest of the Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education (now Department of Industry), Monash University and EMBL Australia. Prof Asashima gave talks in Melbourne and Canberra, and participated in meetings with Victorian and national science leaders.



Prof Makoto Asashima from the JSPS gave a presentation at Questacon in Canberra. Credit: Questacon



Dr Guy Cochrane, head of the European Nucleotide Archive (ENA) at EMBL–EBI, United Kingdom, visited Townsville, Brisbane and Melbourne as a guest of BRAEMBL and EMBL Australia. In Queensland, Guy met participants of the Sea-quence project, a collaboration between Bioplatforms Australia, Rio Tinto and the ReFuGe 2020 consortium, to sequence and compare 10 coral species from the Great Barrier Reef and the Red Sea, in order to better understand coral reef genetics, coral resilience, and how these unique marine ecosystems respond to climate change. In Melbourne, Guy gave a seminar at the Australian Regenerative Medicine Institute at Monash University on 'Life sciences data: challenges, approaches and emerging responses'.

Prof Hiroaki Kitano, Systems Biology Institute, Japan and Sony Computer Science Laboratories, gave public talks in Melbourne and Sydney in his role as a Maths of Planet Earth Ambassador.

EMBL Australia and Monash University hosted a delegation of senior Japanese scientists from RIKEN, the Japanese governmental research organisation, who came to Melbourne to engage in a series of meetings aimed at building stronger Melbourne–Japan partnerships and collaborations in systems biology and other fields including metagenomics (intestinal biology), immuno–cancer therapy, iPS, integrative genomics.

RIKEN is Japan's largest and most comprehensive research organisation for basic and applied science in a diverse array of scientific disciplines. It has fostered pioneering, innovative research in fields spanning the entire range of the natural sciences, from developmental biology and neuroscience to quantum physics and computer science. The delegation comprised:

- Dr Osamu Ohara, RIKEN Laboratory for Immunogenetics
- Dr Hiroshi Ohno, RIKEN Laboratory for Epithelial
  Immunobiology
- Dr Shohei Hori, RIKEN Laboratory for Immune Homeostasis
- Dr Shuichi Onami, RIKEN Laboratory for Developmental Dynamics, Quantitative Biology Center.

EMBL Australia and Club Melbourne hosted a reception at the Melbourne Convention Centre for invited research and business leaders to meet the RIKEN delegation, to share ideas and information and to help foster international links and collaborations. EMBL Australia hosted Australia's first Nature Café on 'Internationalising your research' in partnership with the scientific journal *Nature* (see box on page 48).



JSPS meeting with the Australian Academy of Science (left to right) Takanori Suzuki, Sarah Boyd, James Llewelyn, Silvio Tiziani, Makoto Asashima, Chennupati Jagadish, Andrew Holmes, Sayaka Iwamura. Credit: Australian Academy of Science

#### Nature Café: Internationalising your research

The visit of the senior scientists from Japan's RIKEN institute and Sony Computer Science Laboratories offered the perfect opportunity for EMBL Australia and Monash University to partner with Nature Publishing Group to hold the first Australian Nature Café, which was also the first to be held outside its country of origin—Japan.

In his opening remarks, Dr David Swinbanks, Managing Director of Macmillan Science and Education and Regional Managing Director of the Nature Publishing Group, highlighted the growing population of about four million international students worldwide for which universities are competing. "They are an important source of finance," he said. And, at 21%, Australia still ranks number one in the world for the proportion of international students at its universities.

But it's not just the students that the universities are fighting for. "Top quality researchers are now international too. They often hold multiple positions. They are like soccer stars, and you have to create an environment that is attractive to them," he said.

One of the interesting points that emerged from the subsequent discussion of the panel of six prominent players from business, government and academia in Australia and Japan was that, while international research collaboration is now essential for the success of multinational business, research and education, governments often seem ambivalent about it, at least in terms of investing resources.

Because of this, organisations have to use their own initiative. "We have globalised because our members are globalised," said Mr Joe Cucuzza, Managing Director of AMIRA International Ltd, a member-based organisation of minerals companies involved in collaborative research.

Prof Hiroaki Kitano, head of Sony Computer Science Laboratories and the Systems Biology Institute in Tokyo, agreed. "Only 20% of Sony is based in Japan," he said. "Only 35% of its employees are Japanese, and 60% of its investors live outside Japan. It should be similar with universities. They need to be truly international."

Their fellow panel members were: Ms Rosie Hicks, CEO, Australian National Fabrication Facility; Dr Osamu Ohara of the RIKEN Laboratory for Immunogenetics; Prof Jenny Graves, immediate past Foreign Secretary, Australian Academy of Science; and Prof Edwina Cornish, Provost, Monash University. Using Monash as an example, Edwina Cornish outlined some of the advantages of internationalisation. Monash now has six local campuses in Melbourne and Gippsland, as well as campuses in Malaysia and South Africa, and centres in Italy, India and China. From its outset in the early 60s, Monash has always attracted large numbers of international students, she said. And many graduates are now in senior positions in Asia, which as she said was "an effective form of soft diplomacy".

And in particular Monash sees India and China as countries where there is "a huge, highly capable talent pool, particularly in maths and science, areas which are becoming an issue for Australia".

However, Australian universities are now facing challenges in maintaining their international connections.

"Until recently Australia could offer these students an education that was not easy to obtain at home. That's not the case anymore. For many years Australia had little competition. That's also changing. But a highquality education in an English-speaking country is still valued, particularly where there is a safe environment for international students," Edwina said.

However, initiatives like the establishment of EMBL Australia at Monash offer a significant opportunity both for the university and the nation in fostering international collaborations, she said. EMBL was originally set up in Europe to support bold, risky research, at a time when the US was dominating molecular biology. "Europe is now very strong. The fact that Australia has been invited into this model for scientific leadership is an extraordinary coup."



David Swinbanks opening the Nature Café. Credit: EMBL Australia



SBI Australia ran a Melbourne workshop on Cytoscape, an open-source platform for integration and visualisation of biological data, with one of the core development team, Dr John 'Scooter' Morris from the University of California, San Francisco.

EMBL Australia ran a Master Class on Protein Sequence Analysis, at the Garvan Institute of Medical Research in Sydney, with a range of international experts, including:

- Prof Miguel Andrade, Max Delbrück Center for Molecular Medicine, Berlin, Germany
- Dr Aidan Budd, EMBL Heidelberg, Germany
- Dr Holger Dinkel, EMBL Heidelberg, Germany
- Dr Sean O'Donoghue, CSIRO and Garvan Institute, Sydney, Australia
- Dr Zsuzsanna Dosztanyi, Hungarian Academy of Sciences, Budapest, Hungary
- Dr Toby Gibson, EMBL Heidelberg, Germany
- Prof Lars Juhl Jensen, University of Copenhagen, Denmark
- Dr Scooter Morris, University of California, San Francisco, US.

## November

Prof Lars Juhl Jensen, University of Copenhagen, Denmark, gave talks at Monash University and the University of Melbourne on how to use information system approaches to link molecular-level data to their phenotypic consequences at the cellular level such as diseases.

Dr Scott Braxton, Thomson Reuters, US, visited SBI Australia and gave a Monash Systems Biology Seminar on how pathway and network approaches to systems biology are advancing biomarker identification where current statistical-only methods are failing. Mr Silvio Tiziani, Executive Director of EMBL Australia, gave a presentation on the EMBL model to the Bio21 cluster, as part of their external seminar series.

The South Australian Health and Medical Research Institute, from February 2014 the host of the South Australian node of EMBL Australia, was officially opened by the Prime Minister, the Hon Tony Abbott MP, and South Australian Premier, the Hon Jay Weatherill MP. SAHMRI is the first stage of a \$3 billion-plus health and biomedical precinct on Adelaide's North Terrace.



Prime Minister Tony Abbott at the SAHMRI opening. Credit: SAHMRI/Peter Clarke Photography

### December

Dr Ville-Petteri Mäkinen gave a seminar at ARMI at Monash University on 'Figuring out biology from complex data', following his appointment to the South Australian node of EMBL Australia.

### January

Mr Gavin Graham, BRAEMBL, visited EMBL–EBI at Hinxton in the UK for meetings on the EBI Data Integration technology transfer.

### **February**

Dr Anne Ephrussi, from EMBL Heidelberg, visited EMBL Australia and gave a seminar at Monash University titled 'Assembly and transport of RNPs in the Drosophila oocyte'.

Dr Mathias Wilmanns, Head of EMBL Hamburg, visited EMBL Australia and gave a seminar at Monash University titled 'Regulation of protein kinases by calcium/ calmodulin and its impact in muscle biology'.

To deliver these events we partnered with scientific and other organisations including:

- The Bio21 Institute (Melbourne)
- The Walter and Eliza Hall Institute (Melbourne)
- Club Melbourne (Melbourne)
- Bio Melbourne Network (Melbourne)
- The Bio21 Cluster (now Biomedical Research Victoria) (Melbourne)
- The University of Melbourne (Melbourne)
- Monash Univeristy (Melbourne)
- NICTA (Melbourne)
- Victorian Government (Melbourne)
- St Vincent's Institute of Medical Research (Melbourne)
- South Australian Health and Medical Research Institute (SAHMRI) (Adelaide)
- The University of Adelaide (Adelaide)
- The Garvan Institute (Sydney)
- The University of Sydney (Sydney)
- The University of NSW (Sydney)
- The Victor Chang Institute (Sydney)
- Bioplatforms Australia (Sydney)
- CSIRO (Canberra)
- Questacon (Canberra)
- Australian Academy of Science (Canberra)
- The University of Queensland (Brisbane)
- Australian Institute of Marine Science (Townsville).

# **OUTREACH AND COMMUNICATION**

EMBL Australia undertakes a range of activities to communicate across the nodes and initiatives and with member organisations.

We also reach beyond the organisation to engage with: other scientists and science organisations in Australia and internationally, including our partner organisations; government departments and funding organisations; business leaders; science journalists and the general public.

Our key message is the value that EMBL Australia brings to its members and potential future members, as well as to life sciences in Australia generally.

## Keeping in touch with our stakeholders

Nadia Rosenthal, Scientific Head of EMBL Australia, sends a well-received monthly newsletter to stakeholders with information on EMBL Australia activities and other useful life sciences information. Open rates for our newsletter are consistently over 30%, which is higher than the average for similar bulletins.

# March 2013 newsletter 967 NEWSLETTER RECIPIENTS



Clicked Opened a link the email

## Average of March 2013 to February 2014 newsletters

## **1152 NEWSLETTER RECIPIENTS**

**6%** 36%

Clicked Opened a link the email

## February 2014 newsletter

## **1273 NEWSLETTER RECIPIENTS**

9%	42%
Clicked	Opened
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## Statistics from March 2013 to February 2014

On average 36% of recipients open EMBL Australia's newsletter each month. Around 20% of those who open the newsletter click on a link—mainly those relating to travel grants, the student programs and other funding opportunities.

## Where are our readers?

## **NEWSLETTER OPENS**



## **Social media**

Social media can exponentially expand the reach of information.

#### Facebook

Fans are from the following locations:

## FACEBOOK PAGE "LIKES"



The students who attended the PhD Course in July 2013 also set up their own Facebook group (www.facebook. com/groups/EMBL2013PhDcourse), which they use to keep in contact and connect with future participants.

They've also set up a Facebook, Twitter (twitter.com/ EMBLAuSymposium) and website (emblphdsymposium. org.au) to promote and organise their own EMBL Australia PhD Symposium, which will be held later in 2014.

The EMBL Australia Facebook account is still growing but, more importantly, our posts are shared and liked by other organisations, such as EMBL and EBI, which assists us in reaching their larger followings.

For example, this Facebook post about the Understanding Pathogens Collaborative (see image) was been seen by over 4,000 people and was shared 21 times by accounts such as EMBL–EBI (2,000 likes) and Bioinformatics (19,000 likes).



EMBL Australia 29 August 2013 sår Like Page

Understanding pathogens is a problem ideally suited to systems biology. Researchers Kat Holt, Robin Gasser and Stuart Ralph talk about their experiences at the next Victorian systems biology collaborative

Monday 9 September 3:15pm At the Bio21 Institute. University of Melb



Understanding pathogens: a systems biology approach Systems biology is helping us synthesise information from a huge range of fields to understand the miniature world of pathogens. It's using big picture science to understand tiny organisms. Victor...

Like Comment Share

🖒 3 people like this

A 21 shares

## **Twitter**

Partners, including EMBL, EMBL–EBI, Monash University, SAHMRI and others, are sharing our news via social media, helping us reach a wider audience. We are now connected with similar organisations, peak medical research bodies, our European partner organisations, research and business leaders, science journalists, and many other researchers.

Some important organisations following us on Twitter and sharing our content are:

- EMBL
- EMBL-EBI
- EMBO (the European Molecular Biology Organization)
- Association of Australian Medical Research Institutes
- Bioplatforms Australia
- Life Sciences Queensland
- Biomedical Research Victoria
- South Australian Health and Medical Research
  Institute
- Garvan Medical Research Institute
- Sarah Robertson, Director, Robinson Institute
- Doug Hilton, Director, Walter and Eliza Hall Institute of Medical Research
- Leonie Walsh, Victorian Lead Scientist
- Bridie Smith, science journalist, The Age
- Cosmos Magazine.

#### **EMBL** Australia in the news

EMBL Australia research featured in the news and popular science press several times.





## First past the postdoc

Postdoc research jobs in Australia can be intellectually and financially rewarding, but competition is fierce. Sarah-Jane Collins has five tips for landing the post of your dreams

1 Choose wisely

It's all very well to pick a subject you love, but it's important to establish yourself in an up-and-coming field." Tyou specialise in something that has a demand you can really build yourself a career path." says lason Price a chemical crystallographer at the Australian

stron. followed his undergraduate degree in rry with a graduate diploma, and then the University of Sydney. He found toral fellowships in New Zealand and land without too much trouble, but on

returning to Sydney, he struggled to find work.
Sarah Boyd's decision to build her career
"I door knocked the University of Sydney,
bascally", sags Price. When he found work with the university in
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Edwina McGlinn appeared in The (Melbourne) Magazine's The Lab Report.

Visiting American geneticist, Howard Jacob, foresees a future of personalised medicine based on genome sequencing, reported across Australia in the Fairfax press.



Catherine Boisvert pieced together the evolutionary transition from a simple fish hip to the weight-bearing pelvis that terrestrial animals need in a piece for The Conversation.

## **Sponsorship of events**

EMBL Australia and its initiatives were proud to sponsor a range of external activities, including:

- BioInfoSummer 2013, the annual summer school in bioinformatics held by the Australian Mathematical Sciences Institute, which was held at the University of Adelaide in December
- the UCSC Genome Browser Roadshow, with Dr Robert Kuhn, Associate Director of the UCSC Genome Browser, which held workshops in Brisbane, Sydney, Canberra and Melbourne with the support of the Australian Bioinformatics Network
- the 2013 Winter School in Mathematical and Computational Biology at the University of Queensland, for which EMBL Australia, the Australian Bioinformatics Network and Bioplatforms Australia offered a number of competitive travel bursaries to undergraduate and postgraduate students
- a two-day course, Introduction to Metagenomics, which featured BRAEMBL/EBI resources, was held in both Melbourne and Sydney, supported by Bioplatforms Australia, CSIRO and EMBL
- the Young Investigator award at the Lorne Proteomics conference
- live streaming of a keynote speaker from VIZBI 2013 (the 4th meeting on Visualizing Biological Data) from Cambridge MA, US, to the Computational and Simulation Sciences and eResearch Annual Conference in Melbourne, March 2013
- a hands-on workshop at the Garvan Institute, Sydney, on Jalview workshop, a program for visualising DNA, RNA and protein sequences and structures and analysing their capabilities, April 2013
- BRAEMBL supported the following workshops that provided informatics support to Australian researchers:
  - RNA-Seq, March 2013 (UQ St Lucia)
  - Variant Detection, April 2013 (UQ St Lucia)
  - RNA-Seq, June 2013 (Griffith University Nathan)
  - RNA-Seq, July 2013 (QUT Kelvin Grove)
  - Statistics with R, August 2013 (TRI)
  - AMATA ECR workshop, October 2013 (Griffith University Gold Coast)
  - Statistics with R, November 2013 (UQ St Lucia)
  - Variant detection, November 2013 (UQ St Lucia)
  - RNA-Seq, November 2013 (UQ St Lucia)
  - Variant detection, November 2013 (CMRI, Westmead NSW)
  - RNA-Seq, November 2013 (CMRI, Westmead NSW)
  - Genome assembly, November 2013 (UQ St Lucia).

# **PROFESSIONAL ACTIVITIES**

## **Active grants**

Name	Grant
Nadia Rosenthal	British Heart Foundation: Research Excellence Award (2008–14)
	EU FP7 ENDOSTEM: Vasculature associated stem cells and muscle stem cells (2010–14)
	EU FP7 EUCOMMTOOLS: Tools for functional annotation of the mouse genome (2010–15)
	NHMRC Australian Fellowship: Enhancing human regeneration: a systems approach (2010–16)
	ARC Special Research Initiative: Stem Cells Australia (University of Melbourne): Internal share (2011–18)
	Cardionet (FP7 EU Marie Curie Initial Training Network) (2012–15)
	National Heart Foundation: Macrophage-mediated therapy of myocardial injury (2013–14)
	NHMRC: Equipment grant (2013–14)
	Mesoblast: Novel mechanisms of MPC action through physical organelle transfer (2013–16)
	British Heart Foundation Cardiovascular Regenerative Medicine Centre (2013–17)
	Fondation Leducq Transatlantic Networks of Excellence (2013–18)
	NHMRC Project Grant: Congenital heart disease and cardiac stress (2014–17)
	UK Regenerative Medicine Platform Immunomodulation Hub (2014–19)
Peter Currie	ARC Discovery Early Career Researcher Award (to Patricia Jusuf): Role of intrinsic versus extrinsic cues in cell type determination during development and regeneration (2012–14)
	ARC Discovery Project: Genetic and molecular basis of appendicular muscle formation (2011–13)
	Muscular Dystrophy Association US: Small molecule screening in a zebrafish model of Duchenne muscular dystrophy (2011–14)
	NHMRC Principal Research Fellowship: Genetic basis for skeletal muscle formation in development and disease (2013–16)
	NHMRC Project Grant: Evaluation and design of therapeutic strategies utilising zebrafish genetic models of Duchenne Muscular Dystrophy (2013–14)
	NHMRC Project Grant: Modelling laminin mediated adhesion and congenital muscular dystrophy in zebrafish (2013–15)
	NHMRC Project Grant: Molecular mechanisms that generate and activate muscle stem cells during growth and disease (2013–15)
	NHMRC Project Grant: The role of scube gene function in hedgehog signal transduction (2012–14)
	Sigma-Aldrich Pty Limited: Generating a targeted mutation resource in zebrafish (2012-15)
	The Jain Foundation—ARC Linkage Partner: Generating a targeted mutation resource in zebrafish (2012–13)
	ARC Linkage Project: Generating a targeted mutation resource in zebrafish (2012–13)

Name	Grant
Edwina McGlinn	NHMRC Project Grant: Elucidating the role of miR-196 in formation of the axial skeleton (2013–16)
	NHMRC Project Grant: Redefining proprioceptive circuitry at a molecular level (2014–17)
Nicolas Plachta	ARC Discovery Project: Imaging transcription factors in living mammalian embryo's to reveal cell- to-cell variability (2012–14)
	ARC Discovery Early Career Researcher Award: Revealing dynamic mechanisms controlling pluripotency in mammalian stem cells and embryos (2012–14)
	NHMRC Project Grant: Revealing how transcription factors search the DNA to control preimplantation development in mammals (2013–15)
	NHMRC Project Grant: Revealing how the mammalian preimplantation embryo undergoes compaction (2014–16)
	NARSAD Brain & Behavior Research Foundation (US) (awarded to postdoctoral researcher Stephanie Bissiere)
	Deutsche Forschungsgemeinschaft Postdoctoral Fellowship (awarded to postdoctoral researcher Jennifer Zenker)
	Swiss National Foundation Postdoctoral Fellowship (awarded to postdoctoral researcher Jennifer Zenker)
	Wenner–Gren Foundations Postdoctoral Fellowship (awarded to postdoctoral researcher Juan Carlos Fierro-Gonzalez)
	Swedish Research Medical Council Postdoctoral Fellowship (awarded to postdoctoral researcher Juan Carlos Fierro-Gonzalez)
Marcus Heisler	European Research Council Starting Grant: The establishment and function of dorsiventral boundaries in plant organs (2011–15)
David Lynn	National Centre for the Replacement, Refinement and Reduction of Animals in Research (NC3Rs), UK, CRACK IT Challenge 16. Virtual Infectious Disease Research. Phase I award: Modelling of the molecular interactions between host and pathogen (2013)
	European Commission FP7-HEALTH grant: PRIMES—Protein interaction machines in oncogenic EGF receptor signalling (2011–16)
	Teagasc, Ireland, Internal Funding Competition: MicroRNA regulation of the host response to bovine TB (2011–14)
	Teagasc, Ireland, Walsh Fellowship Scheme (2010–14)
	Science Foundation Ireland award: Bovine Genetic Variation and Disease Susceptibility (2010–13)
	Teagasc, Ireland, Internal Funding Competition: Systems Biology Cluster (2010–13)
	Teagasc, Ireland, Walsh Fellowship Scheme (2009–13)
Sarah Boyd	ARC Discovery Project: Systems modelling of the cardiac fibroblast (2013–15)
	Victorian Department of State Development, Business and Innovation: Systems Biology Institute Victoria (2013–15)
	Great Barrier Reef Foundation: The resilient reefs successfully adapting to climate change program (2013–14)

### **Publications**

Allen, J.M., **E. McGlinn**, A. Hill and M.L. Warman, *Autopodial development is selectively impaired by misexpression of chordin-like 1 in the chick limb.* Dev Biol, 2013. **381**(1): p. 159–169. Category: Development Biology **Impact Factor: 3.868** Ranking: 11/41

**Berger, J.** and **P.D. Currie**, *TECHNOLOGY REPORT: 503unc, a small and muscle-specific zebrafish promoter.* Genesis, 2013. **51**(6): p. 443–447. Category: Genetics & Heredity **Impact Factor: 2.584** Ranking: 80/161

Biasoli, D., S.A. Kahn, T.A. Cornelio, **M. Furtado**, L. Campanati, H. Chneiweiss, V. Moura-Neto and H.L. Borges, *Retinoblastoma protein regulates the crosstalk between autophagy and apoptosis, and favors glioblastoma resistance to etoposide*. Cell Death Dis, 2013. **4**: p. e767.1– 11. Category: Cell Biology **Impact Factor: 6.044** Ranking: 35/185

Brennecke, P., S. Anders, J.K. Kim, A.A. Kołodziejczyk, X. Zhang, V. Proserpio, B. Baying, V. Benes, S.A. Teichmann, J.C. Marioni and **M.G. Heisler**, *Accounting for technical noise in single-cell RNA-seq experiments*. Nature Methods, 2013. Nov;**10**(11): p. 1093–1095. Erratum in: Nature Methods, 2014 Feb;**11**(2):210.

Cervelli, M., G. Bellavia, M. D'Amelio, V. Cavallucci, S. Moreno, J. Berger, R. Nardacci, M. Marcoli, G. Maura, M. Piacentini, R. Amendola, F. Cecconi and P. Mariottini, *A New Transgenic Mouse Model for Studying the Neurotoxicity of Spermine Oxidase Dosage in the Response to Excitotoxic Injury*. PLoS One, 2013. **8**(6): p. e64810.1–16. Category: Multidisciplinary Sciences **Impact Factor: 3.730** Ranking: 7/56

Costa, M.W., G. Guo, O. Wolstein, M. Vale, M.L. Castro, L. Wang, R. Otway, P. Riek, N. Cochrane, **M. Furtado**, C. Semsarian, R.G. Weintraub, T. Yeoh, C. Hayward, A. Keogh, P. Macdonald, M. Feneley, R.M. Graham, J.G. Seidman, C.E. Seidman, **N. Rosenthal**, D. Fatkin and R.P. Harvey, *Functional Characterization of a Novel Mutation in NKX2-5 Associated With Congenital Heart Disease and Adult-Onset Cardiomyopathy*. Circ Cardiovasc Genet, 2013. **6**(3): p. 238–247. Category: Genetics & Heredity **Impact Factor: 6.728** Ranking: 17/181

Dooley, C.M., C. Scahill, **F. Fenyes**, R.N. Kettleborough, D.L. Stemple and E.M. Busch-Nentwich, *Multi-allelic phenotyping - A systematic approach for the simultaneous analysis of multiple induced mutations*. Methods, 2013. **62**(3): p. 197–206. Category: Biochemistry & Molecular Biology **Impact Factor: 3.641** Ranking: 94/290

#### Fierro-Gonzalez, J.C., M.D. White, J.C. Silva and

N. Plachta, Cadherin-dependent filopodia control preimplantation embryo compaction. Nature Cell Biology, 2013. **15**(12): p. 1424–1433. Category: Cell Biology Impact Factor: **20.761** Ranking: 6/185

Foroushani, A., F.S.L. Brinkman and **D.J. Lynn**, *Pathway-GPS and SIGORA: Identifying relevant pathways based on the over-representation of their gene-pair signatures*. PeerJ, 2013. **1**: p. e229.

Frisca, F., D.E. Crombie, M. Dottori, **Y. Goldshmit** and A. Pebay, *Rho/ROCK pathway is essential to the expansion, differentiation, and morphological rearrangements of human neural stem/progenitor cells induced by lysophosphatidic acid.* J Lipid Res, 2013. **54**(5): p. 1192– 1206. Category: Biochemistry & Molecular Biology **Impact Factor: 4.386** Ranking: 69/290

**Godwin, J.W.** and **N. Rosenthal**, *Scar-free wound healing* and regeneration in amphibians: Immunological influences on regenerative success. Differentiation, 2014. **87**(1–2): p. 66–75. **Impact factor** 2.855 Ranking : Cell Biology 102/185: Developmental Biology 20/41

#### Godwin, J.W., A.R. Pinto and N.A. Rosenthal,

Macrophages are required for adult salamander limb regeneration. Proc Natl Acad Sci U S A, 2013. **110**(23): p. 9415–9420. Category: Multidisciplinary Sciences **Impact Factor: 9.737** Ranking: 4/56

Harvey, S.A., I. Sealy, R. Kettleborough, **F. Fenyes**, R. White, D. Stemple and J.C. Smith, *Identification of the zebrafish maternal and paternal transcriptomes*. Development, 2013. **140**(13): p. 2703–2710. Category: Developmental Biology **Impact Factor: 6.208** Ranking: 5/41

**Heisler, M.G.** and C. Ohno, *Live-imaging of the Arabidopsis inflorescence meristem*, Methods Mol Biol, 2014. **1110**: p. 431–440.

Kaur, G., M.W. Costa, C.M. Nefzger, J. Silva, J.C. Fierro-Gonzalez, J.M. Polo, T.D. Bell and N. Plachta, *Probing transcription factor diffusion dynamics in the living mammalian embryo with photoactivatable fluorescence correlation spectroscopy*. Nature Commun, 2013. 4(Article #1637). Category: Multidisciplinary Sciences Impact Factor: 10.015 Ranking: 3/56

Lawless, N., A.K. Foroushani, M. McCabe, C. O'Farrelly and **D.J. Lynn**, *Next generation sequencing reveals the expression of a unique miRNA profile in response to a Gram-positive bacterial infection*, PLOS ONE, 2013. **8**(3): p. e57543. Lawless, N., T.A. Reinhardt, K. Bryan, M. Baker, B. Pesch, D. Zimmerman, K. Zuelke, T. Sonstegard, C. O'Farrelly, J.D. Lippolis and **D.J. Lynn**, *MicroRNA regulation of bovine monocyte inflammatory and metabolic networks in an in vivo infection model*, G3: Genes, Genomes, Genetics, 2014. (Epub Jan 2014).

Lexow, J., T. Poggioli, P. Sarathchandra, M.P. Santini and **N. Rosenthal**, *Cardiac fibrosis in mice expressing an inducible myocardial-specific Cre driver*, Dis Model Mech, 2013 **B**(6): p. 1470–1476

**Mäkinen V-P.,** A.J. Kangas, P. Soininen, P. Würtz, P-H. Groop and M. Ala-Korpela, *Metabolic phenotyping of diabetic nephropathy*, Clin Pharmacol Ther, 2013. **94**: p. 566–569.

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R.A. Harrison, T.A. Castoe, A.P. de Koning, D.D. Pollock, M.
Yandell, D. Calderon, C. Renjifo, R.B. Currier, D. Salgado, D.
Pla, L. Sanz, A.S. Hyder, J.M. Ribeiro, J.W Arntzen, G.E. van
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Zelikowsky, M., **S. Bissiere**, T.A. Hast, R.Z. Bennett, A. Abdipranoto, B. Vissel and M.S. Fanselow, *Prefrontal microcircuit underlies contextual learning after hippocampal loss*. Proc Natl Acad Sci U S A, 2013. **110**(24): p. 9938–9943. Category: Multidisciplinary Sciences **Impact Factor: 9.737** Ranking: 4/56

## Invited conference and seminar presentations

Name	Presentation
Nadia Rosenthal	Monash–Warwick Systems Biology workshop, Venice, Plenary speaker
	RECOMB 2013, 7–10 April, Beijing, Keynote speaker
	Human Genome Meeting/International Congress of Genetics, 13–18 April 2013, Singapore, Plenary speaker
	Centre for Cell Therapy and Regenerative Medicine Research Symposium, Perth, Plenary speaker
	EMBO/EMBL Conference Cardiac Biology—From Development to Regenerative Medicine, 7–10 June 2013, Heidelberg, Germany, Plenary speaker
	Gordon Research Centre Conference on Regeneration, 16–21 June 2013, New London, New Hampshire, US, Plenary speaker
	Australian American Leadership Dialogue, Sydney, Delegate
	Mouse Molecular Genetics, 18–21 September 2013, Wellcome Trust Genome Campus, Hinxton, Cambridge, UK, Plenary speaker
	BHF Symposium, Oxford, Plenary speaker
	World President Organisation, Melbourne, Keynote speaker
Peter Currie	Asian Society for Pigment Cell Research (ASPCR) and the Australasian Society for Dermatology Research, 17–19 May 2013, Sydney, Plenary speaker
	Brisbane Developmental Biology Society Meeting, Brisbane, Invited speaker
	Dysferlin Meeting, 3–6 April 2013, Arlington, Virginia, US, Invited speaker
	Gordon Conference on Myogenesis, 7–12 July 2013, Lucca, Italy, Conference convenor
	Indian Ocean Rim Muscle Meeting, 12–13 December 2013, Singapore, Keynote speaker
	Department of Molecular Biology & Genetics, John Hopkin's School of Medicine, US, Invited seminar speaker
Edwina McGlinn	CSIRO Australian Animal Health Laboratory, Geelong, Victoria, Invited speaker
Nicolas Plachta	Combio2013, 29 September – 3 October 2013, Perth, Invited speaker
	23rd Australian Conference on Microscope and Microanalysis (ACMM23) & 2014 International Conference on Nanoscience and Nanotechnology (ICONN 2014), 2–6 February 2014, Adelaide, Invited speaker
	13th Asian Conference on Transcription, 19–22 February 2014, Melbourne, Invited speaker
Marcus Heisler	10th NIBB (National Institute for Basic Biology)–EMBL Symposium, 17–19 March 2013, Okazaki, Japan, Invited speaker
	24th International Conference on Arabidopsis Research (ICAR), 24–28 June 2013, Sydney, Invited speaker
	13th FASEB Plant Biology Conference: Mechanisms in Plant Development, 11–16 August 2013, Saxtons River, Vermont, US, Invited speaker
	German Botanical Congress, 30 September – 4 October 2013, Tubingen, Germany, Invited speaker
Graham Cameron	Winter School in Bioinformatics and Computational Biology, June, University of Queensland, St Lucia, Invited speaker
	Hepatology Research Workshop, June, Gold Coast, Invited speaker
	Presentation to EMBL–EBI on Bioinformatics Initiatives in Australia, October, Hinxton, UK, Invited speaker

## Advisory boards and committees

Name	Organisation	Board/Committee	Role	Since
Nadia Rosenthal	International Mouse Mutagenesis Consortium	Consortium	Member	2002
	Institute of Advanced Studies, University of Western Australia	Scientific Advisory Board	Member	2005
	Descartes Prize	Grand Jury	Member	2005
	Keystone Symposia	Scientific Advisory Board	Member	2005
	Koeber Prize	Grand Jury	Member	2006
	Center for Molecular Medicine, Vienna	Scientific Advisory Board	Member	2007
	Institute of Molecular Biology and Biotechnology, Heraklion, Crete	Scientific Advisory Board	Member	2008
	European Research Council	Grant Review Committee	Chair	2010
	College of the Atlantic, US	Board of Trustees	Member	2011
	SENS Foundation	Research Advisory Board	Member	2011
	Max Planck Institute, Bad Neuheim	Scientific Advisory Board	Member	2012
	The Jackson Laboratory, US	Scientific Research Council	Member	2013
	Mount Desert Island Biological Laboratories, US	Scientific Advisory Board	Member	2013
	Monash–Warwick Systems Biology Workshop, Venice	Organising Panel	Co-organiser	2013
Peter Currie	Global Facioscapulohumeral Muscular Dystrophy Association	Scientific Advisory Board	Member	2008
	Human Frontiers Science	Fellowship Review Panel	Member	2005
	International Steering committee on zebrafish research	Committee	Member	2007
	Australian Academy of Science	National Committee of Cell Developmental Biology	Committee member	2013
	International zebrafish society		Committee member	2014

## Journal editorial roles

Name	Publication	Role	Since
Nadia Rosenthal	Developmental Biology	Editorial Board	1995
	BioMedNet (mouse models of diseases reviews)	Guest Editor	2001
	Developmental Dynamics	Editorial Board	2003
	Rejuvenation Research	Editorial Board	2004
	Disease Models and Mechanisms	Founding Editor	2007
	Stem Cell Research and Therapy	Editorial Board	2010
	Differentiation	Editor-in-Chief	2012
	Regenerative Medicine Research	Editorial Board	2012
	Regeneration	Founding Editor	2013
Peter Currie	Development	Editorial Board	2006
	Developmental Biology	Editorial Board	2011

## **Conference organising committees**

Name	Conference	Role
Nadia Rosenthal	International Conference on Systems Biology (ICSB 2014) (14–18 September 2014, Melbourne)	Co-organiser
Sarah Boyd	International Conference on Systems Biology (ICSB 2014) (14–18 September 2014, Melbourne)	Co-organiser
Peter Currie	2013 Gordon Myogenesis Conference, Ventura, California, US	Co-organiser
Silvio Tiziani	International Conference on Systems Biology (ICSB 2014) (14–18 September 2014, Melbourne)	Co-organiser

## Memberships of professional societies

Name	Society	Since
Nadia Rosenthal	American Society for Biochemistry and Molecular Biology	1988
	American Society for Cell Biology	1992
	Society for Developmental Biology	1994
	Australia and New Zealand Society for Cell and Developmental Biology	2001
	International Society of Differentiation	2002
	European Molecular Biology Organization	2002
Peter Currie	Society for Muscle Biology	2002
	Australia and New Zealand Society for Cell and Developmental Biology	2003
	Health Research Council of New Zealand College of Experts	2012
Edwina McGlinn	Australia and New Zealand Society for Cell and Developmental Biology	2012

# **OUR RESEARCH PARTNERS**

EMBL Australia signed agreements with a variety of research organisations to support Australian life sciences research through joint activities including collaboration and sharing of resources and expertise via workshops, training and other opportunities.

Joint activities carried out with these organisations over the year include:

## Australian Genome Research Facility (AGRF)

• AGRF is Australia's largest provider of genomics services and solutions with a national network of state-of-the-art facilities, technology and expertise.

## Australian Microscopy and Microanalysis Research Facility (AMMRF)

- EMBL Australia and AMMRF jointly sponsored the Correlative Light Electron Microscopy Masterclass, incorporating the 3rd Australian Workshop on Correlative Light Electron Microscopy, 3–6 June 2013, at the Australian Centre for Microscopy and Microanalysis, the University of Sydney, NSW, Australia.
- The linkage agreement terminated on 30 June 2013.

## Australian Nuclear Science and Technology Organisation (ANSTO)

• Dr Adi Paterson, the CEO of ANSTO, chaired the Panel for the Mid-term Review of EMBL Australia.

## Australian Phenomics Facility (APF), Australian National University

- EMBL Australia entered into agreement and subsequent arrangements for ANU to conduct the 2014 EMBL Australia PhD Course in July 2014.
- Discussions are progressing regarding arrangements for EMBL Australia to become a member of the International Mouse Phenotyping Consortium (IMPC). The IMPC is dedicated to making available a collection of mouse strains in which the function of every gene in the genome is known.

## **BioGrid Australia**

- BioGrid Australia is a secure research platform and infrastructure providing access to real-time clinical, imaging and bio specimen data.
- SBI Australia and BioGrid Australia are exploring ways for BioGrid expertise and infrastructure to support collaborative activities.

## **Bioplatforms Australia**

- Bioplatforms Australia offers subsidised services to EMBL Australia group leaders.
- Bioplatforms Australia, CSIRO and EMBL Australia have jointly established the Australian Bioinformatics Network.
- EMBL Australia and Bioplatforms Australia are jointly funding the AMSI Intern program.
- BRAEMBL is working with Bioplatforms Australia to build systems to manage and share coral reef genome data generated by the Sea-quence project, which is also supported by Rio Tinto and the ReFuGe 2020 consortium (which includes The Great Barrier Reef Foundation, James Cook University, AIMS, UQ, the Great Barrier Reef Marine Park Authority, the King Abdullah University of Science and Technology (Saudi Arabia) and the ANU).

## Systems Biology Institute (Japan)

- SBI has established its first international node, SBI Australia, in collaboration with EMBL Australia.
- Additional collaborations with SBI include the Monash IVF project and the collaboration with the Australian Institute of Marine Science (see SBI Australia, page 25).

# GOVERNANCE

## **EMBL Australia participants**

EMBL Australia is an unincorporated joint venture between the Group of Eight universities (Australian National University, Monash University, the University of Adelaide, the University of Melbourne, the University of New South Wales, the University of Queensland, the University of Sydney, the University of Western Australia) and CSIRO, with the support of the Department of Education and the Department of Industry.

## **Ensuring EMBL Australia's future**

Late in 2013, Australia's Minister for Education, the Hon Chris Pyne, wrote to the chairperson of the EMBL Council seeking a two-year renewal of Australia's associate membership of EMBL. The current membership term expires at the end of 2014.

Australia's application was unanimously adopted by the EMBL Council, which also agreed that the renewal would be automatically prolonged after 2017 unless otherwise decided by the Australian Government or EMBL Council.

The renewal was guided by the senior leadership team, which was established early in 2013 to oversee the further growth of EMBL Australia and provide mentorship to the group leaders.

## Implementing the mid-term review

The recommendations from 2012's mid-term review of EMBL Australia were tabled with the EMBL Australia Executive Committee of Council in 2013, and progress is being made on implementing key recommendations. Among these are:

- the development of a charter agreement between EMBL Australia and EMBL to ensure that EMBL Australia and its nodes and affiliates adhere to the EMBL standards of research excellence
- the development of hub-and-node agreements between EMBL Australia and its nodes at Monash University, SAHMRI and elsewhere to ensure alignment with EMBL Australia and EMBL goals and philosophy. This has already been implemented for the SAHMRI node
- implementation of the Senior Leadership Team, comprising node heads and program managers, with regular meetings to ensure that EMBL Australia programs remain on track
- the development of the Scientific Advisory Committee is under way, to provide increased guidance and scientific oversight of EMBL Australia's research programs

 a strategic review and plans for the future direction and governance of the Bioinformatics Resource has been submitted by its director Graham Cameron, and recommendations subsequently endorsed by EMBL Australia Council. Current plans for the facility include assessment of its location, and improved alignment with EMBL Australia and EMBL goals and philosophy through a specific charter agreement.

## **EMBL Australia Council**

The EMBL Australia Council has continued to review and develop the EMBL Australia governance model and guidelines for establishment of new groups and nodes.

The Council includes up to two representatives from each participating institution as well as a number of independent scientist members.

### Chair

Prof Richard Larkins, AO

## Australian National University

Prof Andrew Cockburn, Director of the ANU College of Medicine, Biology & Environment

Prof Chris Goodnow, Head of the Department of Immunology

## CSIRO

Dr Graeme Woodrow, Health Adviser, Preventative Health Flagship (until Jul 2013)

Dr Sean O'Donoghue, OCE Science Leader, Mathematics, Informatics and Statistics, and Garvan Institute for Medical Research

#### EMBL

Prof Iain Mattaj, Director General

Dr Silke Schumacher, Director of International Relations

#### **Monash University**

Prof Edwina Cornish, Provost and Senior Vice-President

Prof Ross Coppel, Deputy Dean and Director of Research of the Faculty of Medicine, Nursing and Health Sciences

## The University of Adelaide

Prof Mike Brooks, Deputy Vice-Chancellor and Vice-President (Research)

Assoc Prof Paul Thomas, School of Molecular and Biomedical Sciences

#### The University of Melbourne

Prof Paul Gleeson, Head of the Department of Biochemistry and Molecular Biology

### The University of New South Wales

Prof Merlin Crossley, Dean of Science

Prof Warwick Dawson, Director of Research Partnerships

#### The University of Queensland

Prof Deborah Terry, Senior Deputy Vice-Chancellor (until Feb 2014)

Prof Anton Middelberg, Acting Deputy Vice-Chancellor (Research) (from Feb 2014)

Prof Brandon Wainwright, Director of the Institute for Molecular Bioscience

#### The University of Sydney

Prof Trevor Hambley, Dean of Science

Prof Jill Trewhella, Deputy Vice-Chancellor (Research)

#### The University of Western Australia

Prof Peter Leedman, Head of the Laboratory for Cancer Medicine, Deputy Director of the West Australian Institute for Medical Research, and Director of Research at Royal Perth Hospital

Prof Robyn Owens, Deputy Vice-Chancellor (Research)

#### **EMBL** Australia

Prof Nadia Rosenthal, Scientific Head of EMBL Australia

Mr Silvio Tiziani, Executive Director of EMBL Australia

#### Independent members

Prof David Day, Deputy Vice-Chancellor and Vice-President (Research), Flinders University

Prof Simon Foote, Dean of the Australian School of Advanced Medicine, Macquarie University

Prof Steve Wesselingh, Executive Director of the South Australian Health and Medical Research Institute

Prof Doug Hilton, Director of the Walter and Eliza Hall Institute of Medical Research

#### **Observers:**

Tony Rothnie, Science and Infrastructure Division, Department of Industry

Claire McLaughlin, Science and Infrastructure Division, Department of Industry (until Jul 2013)

#### **Meeting dates:**

Tuesday 9 July 2013 (Adelaide) Tuesday 10 December 2013 (Melbourne)

## Committees

### **Executive Committee of Council**

Prof Richard Larkins AO, Chair of the EMBL Australia Council

Prof Nadia Rosenthal, Scientific Head of EMBL Australia

Prof Edwina Cornish, Provost and Senior Vice-President, Monash University

Prof David Day, Deputy Vice-Chancellor and Vice-President (Research), Flinders University of South Australia

Prof Brandon Wainwright, Director of the Institute for Molecular Bioscience, University of Queensland

Prof Trevor Hambley, Dean of Science, University of Sydney

Dr Silke Schumacher, Director of International Relations, EMBL

Dr Graeme Woodrow, Health Adviser, Preventative Health Flagship, CSIRO (until Jul 2013)

Mr Silvio Tiziani, Executive Director of EMBL Australia

#### **Meeting dates:**

Monday 22 April 2013 (Brisbane) Tuesday 12 November 2013 (Melbourne)

## Leadership Team Committee

#### **Prof Nadia Rosenthal**

Scientific Head

Nadia has exceptional scientific credentials, including 16 years working at Harvard Medical School. She is the Scientific Director of ARMI at Monash University and Director of the EMBL Outstation in Monterotondo, Italy. She also serves as Scientific Director of the Heart Science Centre at Imperial College London.

#### Mr Silvio Tiziani

**Executive Director** 

Silvio is a member of the Australian Institute of Company Directors (AICD) and the Australian Institute of Management (AIM). He has extensive experience in financial analysis and budget management, business development, strategic planning, leadership and corporate governance.

## **Prof Peter Currie**

Head, Victorian node

Peter is a developmental geneticist, using the powerful zebrafish model to look at the development and regeneration of skeletal muscle in the context of diseases like muscular dystrophy. He is the Deputy Director of ARMI and was appointed Head of EMBL Australia's Victorian node in September 2012. Before he came to ARMI, Peter worked at the Medical Research Council's Human Genetics Unit in Edinburgh.

## Mr Graham Cameron (until February 2014)

Director, EMBL Australia Bioinformatics Resource, University of Queensland

Graham joined EMBL in 1982 to work on the world's first public DNA database. In 1986 he took over the leadership of that project, and developed the concept for the EMBL–EBI and oversaw its launch. Until April 2012 he was responsible for the EBI's databases and services. In October 2012 he joined the University of Queensland to direct the Bioinformatics Resource Australia of EMBL.

#### **Dr David Lovell**

Director, Australian Bioinformatics Network

David has worked in research management within the quantitative biosciences domain since 2004. He's been the Bioinformatics and Analytics Leader for CSIRO's Transformational Biology initiative since 2008, and was

appointed Director of the Australian Bioinformatics Network in July 2012.

An electrical engineer by training, David completed postdoctoral research in perinatal risk prediction at Cambridge University before joining CSIRO in 1998. Since then, he has been involved in a wide range of research and consulting in the analysis of large and complex datasets. David worked as Executive Officer to the CEO from 2001–2002 and was a member of CSIRO's Corporate IT Management team from 2002–2004.

## Dr Sarah Boyd

Developer, Systems Biology Research Platform, ARMI, Monash University

Sarah has a background in computer science, biochemistry and molecular biology, and has undertaken a variety of research projects at the interface of computer science, mathematics and the life sciences. She has worked in a variety of departments and faculties at Monash and La Trobe Universities, and has been a visiting researcher at the Sanford–Burnham Medical Research Institute (San Diego, US), the Monash Institute of Medical Research (Melbourne, Australia), and the Walter and Eliza Hall Institute of Medical Research (Melbourne, Australia).

Sarah combines the research practices, cultural differences and methodologies of these diverse fields to develop new approaches to research questions in the life sciences. She has also published national and international collaborative research in journals for computer science, bioinformatics, biochemistry and molecular biology, microbiology, allergies and biotechnology. She is now spearheading the establishment of SBI Australia, and also sits on the organising committee for the International Conference on Systems Biology in Melbourne in 2014.

## Dr Sean O'Donoghue (from Feb 2014)

OCE Science Leader, Mathematics, Informatics and Statistics, and Garvan Institute for Medical Research

Sean's research interests are in bioinformatics, with a particular focus on the use of data visualisation principles to address emerging challenges in the life sciences. In addition, he also works on improving how knowledge is obtained from life scientific literature, and his work has received international recognition, winning first prize in the recent Elsevier Grand Challenge. He maintains a broad international network of collaborators, and he is leading an international initiative, with funding from both

Europe and the US, to improve how data visualisation is used to obtain knowledge from complex biological datasets.

Dr O'Donoghue received his BSc (Hons) and PhD in biophysics from the University of Sydney. He then spent 20 years working in Germany, most of that time in the Structural and Computational Biology program at the main EMBL laboratory in Heidelberg. He also worked at EMBL's first spin-off company, Lion Bioscience AG, where he was Director of Scientific Visualisation. Lion was at that stage the world's largest bioinformatics company, and collaborated in the analysis of the first human genome in partnership with Celera.

#### Observer

Mr Niall Byrne, Science in Public

#### **Meeting dates**

Wednesday 13 March 2013 Wednesday 10 April 2013 Wednesday 12 June 2013 Wednesday 10 July 2013 Wednesday 14 Aug 2013 Wednesday 9 Oct 2013 Wednesday 13 Nov 2013 Wednesday 11 Dec 2013 Wednesday 12 Feb 2014

#### **Bioinformatics Advisory Committee**

The role of the Bioinformatics Advisory Committee of EMBL Australia Council is to assist and advise the Council in all matters relating to the provision of bioinformatics and related services to the EMBL Australia research nodes and the Australian life sciences research community.

Dr Sean O'Donoghue (Chair), OCE Science Leader, CSIRO Mathematics, Informatics and Statistics, and Garvan Institute for Medical Research

Prof Nadia Rosenthal, Scientific Head of EMBL Australia

Prof Dave Adelson, Head, School of Molecular & Biomedical Science, University of Adelaide

Dr Graham Cameron, Director, BRAEMBL (until Feb 2014)

Dr Ewan Birney, Associate Director of the EMBL–EBI (until May 2013)

Dr Vivien Bonazzi, Program Director, Genome Informatics and Computational Biology, National Human Genome Research Institute

Prof Paul Bonnington, Director of e-Research at Monash University

Dr Alvis Brazma, Senior Team Leader, Functional Genomics, EMBL–EBI (from May 2013)

Dr David Lovell, Director, Australian Bioinformatics Network, and Transformational Biology Bioinformatics & Analytics Leader, CSIRO

Prof Grant Morahan, Director, Centre for Diabetes Research, Western Australian Institute for Medical Research

Prof Mark Ragan, Head of Genomics and Computational Biology, Institute for Molecular Bioscience, University of Queensland

Prof Stuart Ralph, ARC Future Fellow, Dept of Biochemistry and Molecular Biology, Bio21 Institute, the University of Melbourne

Prof Terry Speed, Head of Bioinformatics Division at the Walter and Eliza Hall Institute of Medical Research

Mr Silvio Tiziani, Executive Director of EMBL Australia

Prof Marc Wilkins, Director of the New South Wales Systems Biology Initiative, and Director of the Ramaciotti Centre for Gene Function Analysis, University of New South Wales

Dr Jean Yee Hwa Yang, Senior Lecturer in the School of Mathematics and Statistics, University of Sydney

#### **Observers:**

Mr Andrew Gilbert, Bioplatforms Australia Dr Catherine Shang, Bioplatforms Australia

#### Meeting dates:

18 April 2013 (Brisbane) 26 June 2013 (teleconference) 25 November 2013 (Sydney)

# **STAFF AT EMBL AUSTRALIA AND OUR INITIATIVES**



From left to right: David Lynn, Laura Crilley, Sarah Boyd, Nicolas Plachta, Nadia Rosenthal, Silvio Tiziani, Edwina McGlinn, Peter Currie, Ville-Petteri Mäkinen. Credit: EMBL Australia

## **Research group leaders**

#### **Dr Marcus Heisler**

Group leader, New South Wales node (currently based at EMBL Heidelberg, Germany)

Marcus joined EMBL's Heidelberg laboratory as a group leader in 2009, through EMBL Australia's Faculty Development Program. His research investigates developmental patterning in plants. Prior to joining EMBL he was a postdoctoral researcher in Elliot Meyerowitz's lab at California Institute of Technology. He completed his PhD at Monash University in 2000.

## **Dr Edwina McGlinn**

#### Group leader, Victorian node

Edwina joined EMBL Australia as a group leader in January 2011. She completed her PhD at the University of Queensland in 2002. More recently, she was a researcher at Harvard University where she started looking at the role of microRNAs in development processes.

## **Dr Nicolas Plachta**

Group leader, Victorian node

Nicolas joined EMBL Australia as a group leader in July 2011. He completed his PhD at the University of Basel, Switzerland, before undertaking his postdoctoral studies at California Institute of Technology.

## Assoc Prof Ville-Petteri Mäkinen

Group leader, South Australian node

Ville joined EMBL Australia as a group leader in the South Australian node in February 2014. He received his Doctor of Science degree in 2010 from Aalto University in Helsinki, Finland, where he developed computational techniques to investigate the link between complications affecting type 1 diabetes patients and their underlying genetic and metabolic characteristics. Recently, Ville completed postdoctoral studies at the University of California, Los Angeles, with special focus on the causal genetic perturbations of gene regulatory networks in coronary artery disease. He is also an honorary research associate of Imperial College London and a past postdoctoral fellow of the American Heart Association. Ville holds a joint appointment as Associate Professor in the School of Molecular and Biomedical Science at the University of Adelaide.

## **Assoc Prof David Lynn**

Group leader, South Australian node

David joined EMBL Australia as a group leader in medical informatics in the new South Australian node in February 2014. He completed his PhD in Ireland at University College Dublin in 2004, and followed with postdoctoral training at Trinity College Dublin. He held a joint research associate position at Simon Fraser University and the University of British Columbia in Vancouver, before returning to Ireland in 2009 to lead a group at the Irish agriculture and food agency Teagasc. David currently holds a joint appointment as Associate Professor at Flinders University School of Medicine in South Australia.

## **Research staff**

### **Rosenthal Group**

Prof Nadia Rosenthal, Group Leader Ms Anjana Chandran, Research Assistant Mr Joseph Chen, Research Assistant (from Oct 2013) Dr Mauro Costa, Research Fellow Mr Ryan Debuque, PhD Student Dr Milena Furtado, Research Fellow Dr James Godwin, Research Fellow Ms Lucy Hersey, UROP Student Mr Alexei Ilinykh, PhD Student Dr Joly Kwek, Research Fellow (from Oct 2013) Mr Nicholas Lam, Affiliate (until Sep 2013) Ms Joelle Perera, Casual Technical Assistant (until April 2013) Ms Alison Pierik, Visiting Student Dr Alex Pinto, Research Fellow Mr Edward Pranoto, Honours Student Ms Emma Rigoni, UROP Student Dr Ekaterina Salimona, Research Fellow Ms Suelyn Van Den Helm, UROP Student Dr Lina Wang, Research Fellow Ms Julia Wilmanns, Visiting Student (from Oct 2013)

## **Currie Group**

Prof Peter Currie, Group Leader Dr Joachim Berger, Research Fellow Ms Silke Berger, Research Fellow Dr Catherine Boisvert, Research Fellow Mr Gavin Cooke, Aquarium Technician (Mar–Jul 2013) Ms Ophelia Erhlich, PhD Student Ms Fruszina Fenyes, Research Assistant Dr Yona Goldshmit, Research Fellow (Adjunct after Jul 2013) Ms Liana Goodings, UROP Student (until Dec 2013) Mr David Gurevich, PhD Student (Research Fellow after Mar 2013) Dr Patricia Jusuf, Research Fellow Ms Madison Knapp, Research Assistant – Casual (until Sep 2013) Mr Zhenhua Li, PhD Student Ms Mei Li, visiting PhD Student (from Jul 2013) Mr Wouter Masselink, PhD Student Dr Ivana Mirkovic, Research Fellow Mr Wade Moore, Research Assistant – Casual (from Jul 2013) Mr Jeremy Ng Chi Kei, PhD Student Mr Phong Nguyen, PhD Student Dr Ashley Siegel, Research Fellow Ms Carmen Sonntag, Research Assistant Dr Alisdair Wood, Research Fellow

## **McGlinn Group**

Dr Edwina McGlinn, Group Leader Dr Jesus Casanova, Research Fellow Mr Eamon Coughlin, PhD Student Dr Alysha Heimberg, Research Fellow Ms Cristina Massa Gomez, Research Assistant Mr Ismath Riyas Elias, Honours Student Ms Lisa Wong, Research Assistant

## **Plachta Group**

Dr Nicolas Plachta, Group Leader Dr Stephanie Bissiere, Research Fellow Dr Juan Carlos Fierro-Gonzalez, Research Fellow Mr Tim Hast, Affiliate (until Sep 2013) Dr Gurpreet Kaur, Research Fellow Mr Juan Silva, Research Assistant Dr Melanie White, Research Fellow Dr Jennifer Zenker, Research Fellow

## **Heisler Group**

Dr Marcus Heisler, Group Leader Dr Tufail Bashir, Postdoctoral Researcher (from Jun 2013) Ms Neha Bhatia, ERC-funded PhD Student Mr Philip Brennecke, PhD Student (until Jan 2014) Dr Andre Clapson, EIPOD Postdoctoral Researcher (until Dec 2013) Dr Paz Merelo, ERC-funded Postdoctoral Researcher Ms Carolyn Ohno, Technician Ms Monica Pia Caggiano, PhD Student (until Sep 2013) Dr Hathi Ram, ERC-funded Postdoctoral Researcher Dr Nicol Siegel, EIPOD Postdoctoral Researcher (until Dec 2013) Ms Xiulian Yu, ERC-funded PhD Student

## Mäkinen Group

Assoc Prof Ville-Petteri Mäkinen, Group Leader

## Lynn Group

Assoc Prof David Lynn, Group Leader Dr Kenneth Bryan, PRIMES Senior Postdoctoral Fellow\* Ms Theodosia Charitou, PRIMES Bioinformatics Research Assistant\*

Mr Manuel Bernal Llinares, PRIMES Senior Software Developer\*

Dr Miriam Lynn, EMBL Senior Postdoctoral Fellow\* Ms Anastasia Sribnaia, EMBL Laboratory Technician\* \*transferring to SAHMRI in 2014

## **EMBL** Australia secretariat

Prof Nadia Rosenthal, Scientific Head Ms Laura Crilley, Executive Officer Ms Jane McCausland, Student Program Coordinator Ms Penny Rowlett, Finance Officer Mr Silvio Tiziani, Executive Director

## **SBI** Australia

Prof Hiroaki Kitano, Sir Louis Matheson Distinguished Visiting Professor Dr Sarah Boyd, Developer, Systems Biology Platform Ms Maryanne Borg, Executive Officer (from Sep 2013) Ms Jeannette Hallab, Affiliate (from Feb 2014) Mr Sujay Kumar, Visiting PhD Student Ms Di Lederman, Executive Officer (until Aug 2013) Dr Mirana Ramialison, Affiliate (from Feb 2014) Dr Saskia Reibe-Pal, Affiliate Research Fellow

Dr Hieu Tri Nim, Research Fellow

Dr Madeleine Van Oppen, Adjunct Professor Mr Allen White, Executive Officer (from Feb 2014)



From left to right: Nadia Rosenthal, Penny Rowlett, Jane McCausland, Silvio Tiziani, Laura Crilley. Credit: EMBL Australia
## BRAEMBL (the Bioinformatics Resources Australia – EMBL)

Mr Graham Cameron, Director (until Feb 2014) Dr Sean O'Donoghue, Acting Director Mrs Dalia Abraham, HPC Specialist (from Dec 2013) Mr Mark Crowe, Outreach, Training and Communication Ms Elham Gharazi, Bioinformatician Mr Gavin Graham, Senior IT and Project Manager Dr Gerald Hartig, Applications Manager (until Sep 2013) Mr William Hsu, HPC Specialist Mrs Lien Le, Bioinformatics Manager (from Nov 2013) Mr Webber Liao, Bioinformatician Dr Denis O'Meally, Species Specialist (from Nov 2013) Mr Michael Nuhn, Web and Informatics Developer (from Dec 2013) Dr Jeremy Parsons, Bioinformatician (until Dec 2013) Mr Eric Powell, Bioinformatician Mr Nick Rhodes, System Admin Mr Danny Sheehan, HPC Specialist Mr Alexander Varlakov, Web and Informatics Developer Ms Kerri Wait, HPC Specialist (from Nov 2013) Ms Lanna Wong, Executive Officer

#### Australian Bioinformatics Network (ABN)

Dr David Lovell, Director, AustralianBioinformatics.net site owner

Ms Candace Culyer, Assistant to David Lovell and

AustralianBioinformatics.net site editor (from Oct 2013)

Ms Benita Vincent, Executive Officer and

AustralianBioinformatics.net site editor

Ms Virginia Tressider, Communications Officer (until Mar 2013)

Dr Torsten Seemann, Volunteer, Monash University

Dr Catherine Shang, Volunteer, Bioplatforms Australia

# **FUNDING AND STAKEHOLDERS**

#### **Financial report**

## Statement of Income and Expenditure for the year ended 31 December 2013

Income	
Other Revenue	123,634
Interest earned on invested income	139,797
Total Income	263,431
Expenditure	
Salary Expenses	857,163
Central and Faculty Support Charges	795,225
Lab & Operating	289,940
Travel	251,749
Consultants	205,270
Other expenses	121,546
Student Prizes/Awards	92,572
Building Expenses	75,446
Sponsorships (Grants/Donations)	53,346
IT Equipment & related	24,430
Printing & Stationery	24,250
Vehicle Expenses	14,442
Audit fees	1,500
Total Expenses	2,806,879
Net Balance for the year	(2,543,448)
Opening Balance as at 1 January 2013	5,040,358
Closing Balance as at 31 December 2013	2,496,910

I certify that the above financial statement correctly reflects income and expenditure as recorded in the Monash University Accounting and Financial Reporting System against the grant monies received from Department of Industry.

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May Cheng Manager, Research and Revenue Accounting Services Date: 7/7/2014

#### Auditor's report



This audit opinion is prepared for the purpose of the Grant Agreement dated 11th December 2009 for the EMBL Australia Partner Laboratory Network ("the Project") between the Commonwealth of Australia as represented by the Department of Innovation, Industry, Science and Research and Monash University.

#### Scope

We have conducted an independent audit in accordance with Australian Auditing Standards of the attached Statement of Income and Expenditure ("the Statement") for the period 1 January 2013 to 31 December 2013. The Statement specifies an amount of \$2,806,880 of expenditure on the Project and an amount of \$263,431 of contributions towards the Project.

Our audit involved an examination, on a test basis, of evidence supporting the amount of the grant funds incurred, and the amount of the income received on the Project. This included an examination of the University's financial records, and receipts, and an evaluation of the policies and procedures used to calculate the expenditure on the Project. These procedures have been undertaken to form an opinion as to whether the methodology used to calculate the expenditure is in accordance with the Agreement, and that the figures stated are true and fair.

This audit opinion expressed in this report has been formed on the above basis.

#### Audit Opinion

We confirm that:

- the Statement of Income and Expenditure is true and fair;
- the funding was expended for the project in accordance with the Agreement; and
- the balance of funds as at 31 December 2013 is \$2,496,910.

RSM Bird Cameron Chartered Accountants

NBS

WARWICK SPARGO Director 8 July 2014 Melbourne, Victoria

Liability limited by a scheme approved under Professional Standards Legislation Birdanco Nominees Pty Ltd ABN 33 009 321 377 Practising as RSM Bird Cameron ABN 65 319 382 479 Major Offices in: Perth, Sydney, Melbourne, Adelaide, Canberra and Brisbane RSM Bird Cameron is a member of the RSM network. Each member of the RSM network is an independent accounting and advisory firm which practises in its own right. The RSM network is not itself a separate legal entity in any jurisdiction.

#### **Participants**

- Australian National University
- CSIRO
- Monash University
- The University of Adelaide
- The University of Melbourne
- The University of New South Wales
- The University of Queensland
- The University of Sydney
- The University of Western Australia

### Funding and in-kind support

The following in-kind and financial contributions to the EMBL Australia initiative are acknowledged.

#### **Commonwealth Department of Industry**

- Super Science Funding—for support of the EMBL Australia research groups and the Australian Bioinformatics Network
- International Science Linkages Grant—to support
  development of the EMBL Australia secretariat

#### **Australian National Data Service**

• Financial support to establish BRAEMBL via a separate agreement with the University of Queensland

#### **Australian Research Council**

• Financial support for Faculty Development Program (Dr Marcus Heisler)

#### **Bioplatforms Australia**

- Access to core research facilities and services
- Financial support to establish the EMBL Australia Mirror of the EMBL–EBI Facility at the University of Queensland via a separate agreement with the University of Queensland

#### **Systems Biology Institute**

• Financial support to establish Systems Biology Institute Australia

#### **CSIRO**

- Financial contribution to the associate membership subscription
- Accommodation for the Australian Bioinformatics
  Network

#### **Flinders University**

Financial support for the South Australian node

#### **Group of Eight universities**

Support for International PhD Program and preparation of Framework Agreement

#### **Monash University**

- Financial contribution to the associate membership subscription
- Accommodation for the partner laboratory groups and access to research facilities
- Accommodation for SBI Australia and access to research facilities
- Office accommodation and corporate support services (including legal and payroll) for EMBL Australia secretariat and research staff

#### NCRIS (National Collaborative Research Infrastructure Strategy)

• Financial contribution to the associate membership subscription

#### South Australian Health and Medical Research Institute (SAHMRI)

Accommodation for EMBL Australia research groups
 (from Feb 2014)

#### **The University of Queensland**

- Financial contribution to the associate membership subscription
- Accommodation for the Bioinformatics Resource (BRAEMBL)

#### **The University of Sydney**

- Financial contribution to the associate membership subscription
- Financial support for Faculty Development Program (Dr Marcus Heisler)

#### The University of Western Australia

• Financial contribution to the associate membership subscription

#### **University of South Australia**

• Financial support for the South Australian node

#### Victorian Department of State Development, Business and Innovation

- Financial support for the establishment of the secretariat
- Financial support for the establishment of SBI Australia
- Financial support for the Enhancing Systems Biology in Victoria program

#### Affiliations

EMBL Australia has affiliations with the following organisations:

- Australian Genome Research Facility
  (www.agrf.org.au)
- Australian Microscopy and Microanalysis Research Facility (www.ammrf.org.au)
- Australian Nuclear Science and Technology
  Organisation (www.ansto.gov.au)
- Australian Phenomics Facility, Australian National University (apf.anu.edu.au)
- BioGrid Australia (www.biogrid.org.au)
- Bioplatforms Australia (www.bioplatforms.com.au)
- Systems Biology Institute, Japan (www.sbi.jp)

# **CONTACT US**

EMBL Australia c/o Australian Regenerative Medicine Institute Level 1, Building 75 Monash University Wellington Road Clayton, VIC 3800 Phone: +61 3 9902 9600 Fax: +61 3 9902 9729

Web: www.emblaustralia.org Email: info@emblaustralia.org



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### **Acknowledgments**

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