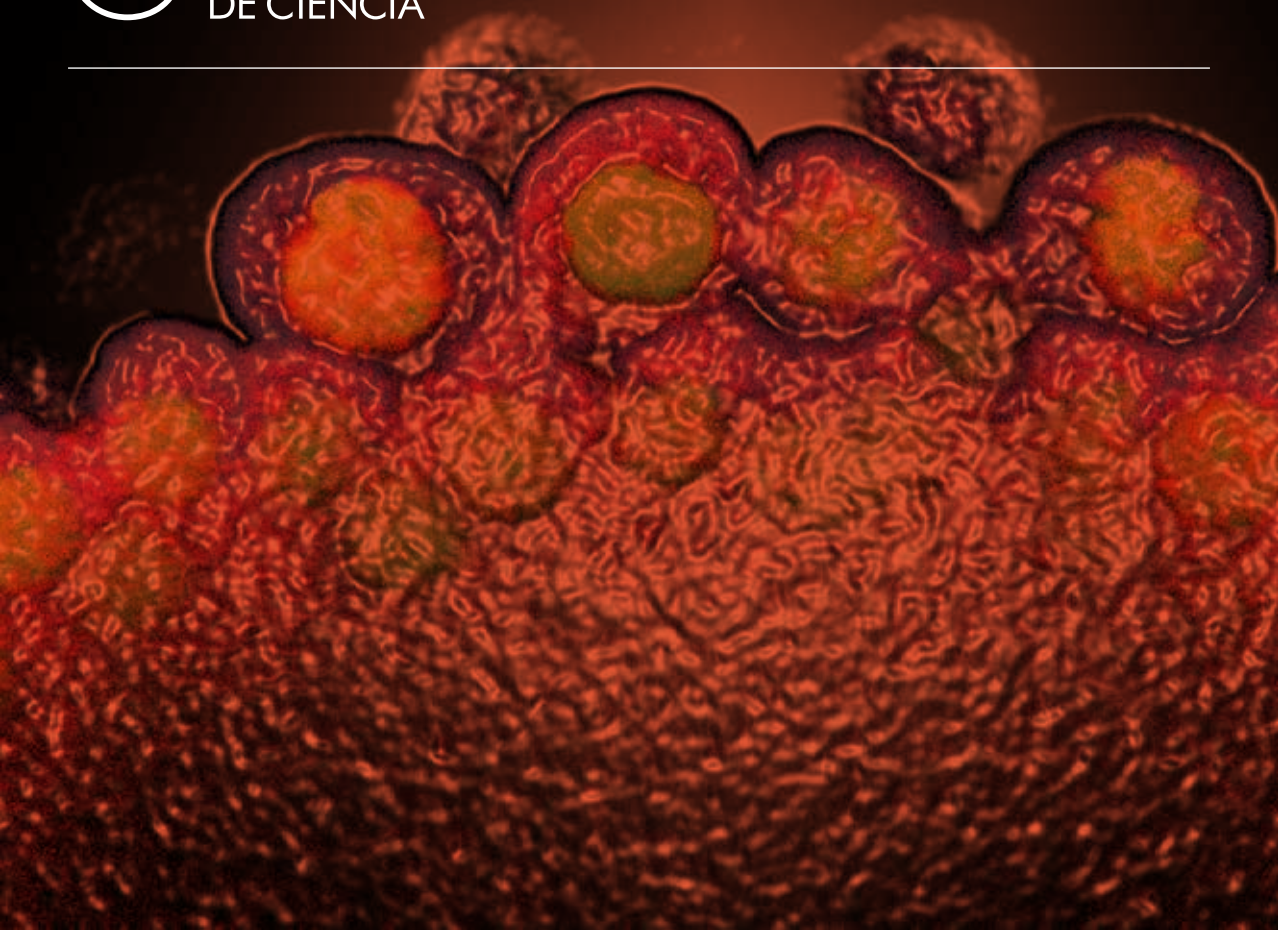
ANNUAL REPORT 2015

INSTITUTO GULBENKIAN DE CIÊNCIA



Cover Image
Embryonic germ cells of *Drosophila melanogaster*. © Leonardo Gastón Guilgur, IGC.

This Annual Report covers the Instituto Gulbenkian de Ciência's financial year from 1st January to 31st December 2015.

CONTENTS

THE DIRECTOR'S INTRODUCTION

— Jonathan Howard

"A sacred grove of olive trees dedicated to Athena, the goddess of wisdom, outside the city walls of ancient Athens"

Out of the city, alone in its beautiful garden, dedicated to wisdom, the Instituto Gulbenkian de Ciência seems to be the very epitome of the Academy, an untroubled space where "this intellectual being, these thoughts that travel through eternity" can live and grow in peace. We are separate from the hurly-burly of the city, yet its pleasures, beauties and excitements are close at hand. On a smaller scale it somehow recalls the relationship between the "dreaming spires" of Oxford or Cambridge and the great metropolis, London, or perhaps between Princeton and New York City, or Caltech and Los Angeles. This almost antithetical relationship between the academy and the city has been around for a long time. It is not an opposition, the contemplative life and the civic life both belong to the make-up of mankind, but rather a complementation.

Is this indeed the IGC, or only what it seems to be? Scientific research in the 21st century is very, very different from the monastic disciplines that generated the modern academy. I remember, it must be more than 40 years ago, as a PhD student working on lymphocyte recirculation, wandering through the beautiful cloisters of the University of Pavia, admiring the memorials to Gaspard Aselius "quis primus incognitas vias chyli deprehendit"[1] and Camillo Golgi. But behind the walls of the cloister, seen through the elegant windows, the rooms of the (at that time) renowned genetics department were filled with giant computers, symbols of modern science. Our peace is only skin deep. Inside the IGC our research teams struggle not only against the difficulties of the science itself, both conceptual and technical, but also against funding constraints, career difficulties and intense competition. Their successes are hard-won and the failures bitter. Our scientists today oscillate between triumph and disaster, with the triumphs made that much more glorious, and the disasters that much more emphatic by amplification from the publicity delivered by the outside world.

The outside world has very much to do with the IGC because, Academy or not, the IGC relies entirely on its ability to persuade the outside world to pay for it. The Calouste Gulbenkian Foundation, our owner and the owner of our legal identity, needs to know and understand what it is that we do, why we do it and how well we do it. Both our individual projects and the IGC as a whole are subjected to constant evaluation by the outside world, whether it is our international Scientific Advisory Board that reports to the Foundation on the whole IGC every year, the review committees of the ERC and other national and international grant agencies who review our research projects and programmes, and the editors and referees of the journals in which our research is published. Most recently the IGC was evaluated in its entirety in the course of the programme to institute the new *Unidades de Investigação e Desenvolvimento* (Units of Research and Development). This evaluation was conducted on behalf of the Portuguese national research funding body, the FCT, during 2014 by a reputable international organisation, the European Science Foundation, using exclusively referees from outside the Portuguese scientific community. The IGC was honoured with the highest commendation of "Exceptional". It is particularly sad for the IGC that the meaning and value of this eminent rating was obscured, overshadowed and possibly even called in question by the politically-charged furore that broke out in Portugal over the local administration of this international review process.

For the IGC, perhaps one of the most important events of 2015 will turn out to have been the general election, and the coming into power of a new socialist government. In the recent political history of science in Portugal three socialist governments in the period from mid 1995 to June 2011 were characterised by a powerful endorsement of science and its integration into large-scale national programmes of infrastructure development in higher education, science and technology. For now, for the IGC, the arrival of a new socialist government in November 2015 stimulates new speculation about future science policy. The rapid strengthening of Portuguese science during the last socialist governments coincided with a visionary Minister of Science, Technology and Higher Education, Mariano Gago and a GDP that grew about 39% from 2000 to 2008, while the collapse of Portugal's economy after 2008 was inherited by the social democratic government that took power in 2011 and despite the best intentions, led to a reduction in the funds available for science. Now we have a socialist government, again publicly dedicated to strengthening the national science programme, but this time with the economy in dire straits. What can we hope for, what can we expect? More resources for competitive research funding would be marvellous, but with a static national budget and many demands on it, this may be hoped for but certainly not expected. In the absence of this, what not only the IGC, but surely all research organisations in Portugal must be begging for is coherence, planning and to the extent possible, stability at the level of the national research funding organisation, the FCT. There is no "right" level of funding for science because there are too many controversial issues to reconcile. It is only inevitable that small, poor countries will invest smaller sums than large rich ones and less science will be done. But it is not at all inevitable that the funds available, however meagre, should be distributed so erratically that research planning is virtually impossible. If the nation is to have an internationally competitive research community, however small or large it may be, an essential precondition is that funds for research be made available according to a disciplined and publicly known timetable, based on well-known and reli-

[1] "who first understood the unknown routes of the lymph"

able funding instruments, and allocated according to widely accepted criteria.
In the last years, with governments of both political colours, there has been extraordinary instability in competitive project grant funding by the FCT, ranging from €0 in 2005, 2007, 2011 and 2015 up to €180M in 2008 and down to €15M in 2013 (Figure 1).

Furthermore the funds have not been transferred promptly even when they are awarded: the last call was in 2014 but the money awarded from that call was not paid in 2015 and is not expected until mid 2016. At the IGC, our core funding from the Gulbenkian Foundation provides some buffering against these extraordinary gyrations in funding level, but the implications for research organisations with no such buffer are extremely grave. It would have been far preferable for science if the sums made available between 2004 and 2015 (about €750M) had been averaged over the years and disbursed regularly in an annual call of a definite amount. On the basis of the funds available for FCT project grants over the last decade, this would work out at something over €60M per year. It is very broadly understood in the northern European economies that science funding should be based on multi-year budget planning with little direct political interference. Portugal has less money, but there is no reason why demanding these underlying principles should not be as helpful to science in Portugal as it is to the rich economies of the North. Disciplined transfer of these sums would have been of enormous help in these difficult times.

So at the beginning of 2016, with a new government, and with the FCT in lock-down, the IGC waits with curiosity but also some anxiety for what is to come. We know that the government is interested in implementing the EU-supported movement towards replacing fellowship contracts with labour contracts carrying social security benefits, an unambiguous benefit to the recipients. Yet it comes with a price tag that, in the absence of new money, will significantly reduce the number of young scientists moving through the system. We also know that the instability of employment in a research career is of concern not only to the new government but also to a very large number of young and indeed not-so-young scientists working outside the established university hierarchy

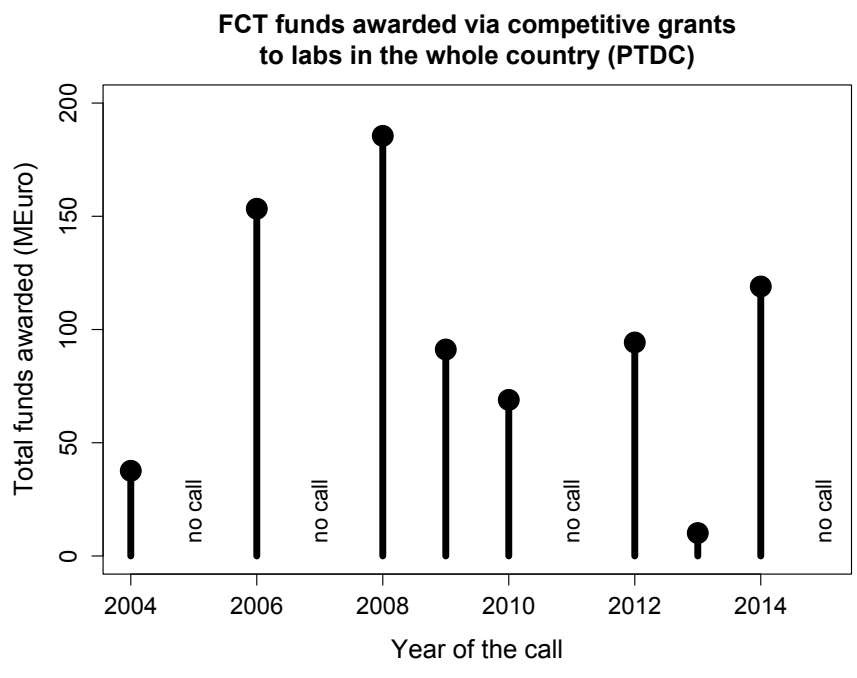


Figure courtesy of Dr. Jorge Carneiro

in Portugal. However, many academic research institutions throughout Europe (eg. EMBL, the Francis Crick Institute, The Max Planck Society and the Royal Society) have settled on 9 or 10 years as the time necessary for excellent young scientists to fulfil themselves properly in their first independent position as a group leader and to declare themselves fit to perform independent scientific research at the highest level in the long term. The IGC too has recently defined this as its preferred approach to the employment of young group leaders, but we do not yet know whether we shall be able to implement it within the new employment regime.

If this is the reality of science now, and perhaps in particular the reality of science in Portugal, should we fear that our academy is nothing more than a myth or an illusion? Perhaps even a dangerous illusion, a distraction from the urgent and earthbound necessities of real life? I say no, the academy of the IGC is also a reality, it contributes enormously to the quality of our scientific lives, it gives us a sense of belonging to a community, as indeed we do, it enables every kind of interaction and stimulates our creativity. For several years now there has been speculation and even discussion about possible radical transformations of the IGC to something more "sensible" and each time I have tried more or less unsuccessfully to articulate what it is that we would lose. I now realise it, what we would lose is the academy.

ORGANISATION

CALOUSTE GULBENKIAN FOUNDATION

The Calouste Gulbenkian Foundation is one of the most important foundations in Europe, carrying out extensive activities both in Portugal and abroad through the development of in-house projects, or in partnership with other institutions, and by awarding scholarships and grants. Headquartered in Lisbon, the Foundation is also home to a scientific investigation centre in Oeiras, and delegations in Paris and London, cities where Calouste Gulbenkian lived.

BOARD OF TRUSTEES

Artur Santos Silva | ***Chairman***

Isabel Mota
Eduardo Marçal Grilo *(Left in 2015)*
Teresa Gouveia
Martin Essayan
José Neves Adelino
Guilherme d'Oliveira Martins *(Started in 2015)*
Emílio Rui Vilar *
Joaquim Gomes Canotilho *
António Guterres *
* *Non-executive Trustees*

INSTITUTO GULBENKIAN DE CIÊNCIA

The IGC was founded by the Calouste Gulbenkian Foundation in 1961. The direct governance of the Institute is made through the Director, a Deputy Director with primary responsibility for financial administration, and a Deputy Director for Science. The Director is in turn answerable to a Management Committee, appointed by the Calouste Gulbenkian Foundation Board of Trustees, which acts on behalf of the Board and reports directly to them. An eminent external Scientific Advisory Board oversees the scientific activity of the IGC, whereas the Ethics Committee assures the ethical conduct of the scientific related to vertebrate animals or human beings. Both the Scientific Advisory Board and the Ethics Committee are appointed by the Management Committee.

Jonathan Howard | ***Director***
José Mário Leite | ***Deputy Director***
Jorge Carneiro | ***Deputy Director for Science***

MANAGEMENT COMMITTEE

Established by the Board of Trustees of the Calouste Gulbenkian Foundation in the context of the decision to provide a higher degree of autonomy to the IGC, facilitating and expediting administrative and financial operations, thus ensuring more flexibility to the Institutes' operation. The Management Committee received ample delegation from the Board over a wide range of areas, meets regularly with the Director and oversees all activities of the Institute.

Sydney Brenner** (The Salk Institute, USA) | ***Chairman***

José Neves Adelino (FCG)
António Coutinho (IGC and Champalimaud Foundation)
Eduardo Marçal Grilo (FCG)
Diogo de Lucena (Universidade Nova de Lisboa)
Guilherme d'Oliveira Martins (FCG) | *Started in 2015*
Jonathan Howard (IGC)

SCIENTIFIC ADVISORY BOARD

The Scientific Advisory Board of the IGC oversees the scientific progress, graduate programmes, recruitment and overall performance of staff and research groups. The Scientific Advisory Board also advises the Director of the IGC and the Board of the Calouste Gulbenkian Foundation on all matters of relevance to the mission of the Institute.

Kai Simons (Max Planck Institute, Dresden, Germany) | ***Chairman***

Martin Raff (University College London, UK)
Ginés Morata (Universidad Autónoma de Madrid, Spain)
David Sabatini (New York University, USA)
Terrence Sejnowsky (The Salk Institute, USA)
Tony Hyman (Max Planck Institute, Dresden, Germany)
Linda Partridge (Max Planck Institute, Cologne, Germany)
Ruslan Medzhitov (Yale University, USA)
Paul Schmid-Hempel (ETH Zurich, Switzerland)

***Resigned from MC at the end of 2015*

ETHICS COMMITTEE

The Ethics Committee of the IGC has as mission to consider all ethical issues that may arise during the course of the research projects developed by the groups or units of the IGC, reviewing the research projects that entail human studies and/or the use of vertebrate animals. The Ethics Committee is an interdisciplinary body made up of nine members, three of whom are laypersons and four are external to the IGC. In 2015, the Ethics Committee approved 8 projects.

Maria Francisca Fontes | ***Chairperson, PhD, MD, External member***

Carlos Penha-Gonçalves (PhD, DVM, IGC)
Tânia Carvalho (PhD, DVM, Instituto de Medicina Molecular)
Manuel Rebelo (PhD, IGC)
Ana Mena (PhD, IGC)
Isabel Ribeiro (MD, External Member)
Ana Runkel (Layperson, External member)
José Athayde Tavares (Layperson, External member)
Greta Martins (Layperson, IGC)

THE IGC AT A GLANCE

The Instituto Gulbenkian de Ciência (IGC) is a private institute devoted to basic biological and biomedical research, and to graduate training. The IGC is free from hierarchical structure, with small independent research groups working in an environment designed to foster interaction and co-operation.
The scientific programme of the IGC is multidisciplinary, including Cell and Developmental Biology, Evolutionary Biology, Inflammation, Immunology, Host-Pathogen Interactions, Disease Genetics, Plant Biology, Neurosciences, Theoretical and Computational Biology.

THE IGC MISSIONS ARE THUS:

1. To promote multidisciplinary science of excellence in basic biological and biomedical research;
2. To identify, educate and incubate new research leaders, providing state-of-the-art facilities and full financial and intellectual autonomy to pursue research projects;
3. To improve the transfer of research expertise into developments that are of potential interest beyond basic science;
4. To provide international graduate teaching and structured training programmes that respond to present-day imperatives;
5. To promote the values of science in society, scientific literacy, and the active participation of citizens in scientific research, through engagement with different communities and stakeholders.

The Institute is part of the Oeiras Campus, home to several other basic and applied research centres in Biology, Biotechnology and Chemistry.

- ***Since 1998, the IGC has hosted 88 research groups**; 46 of these have moved on to other research institutes, 28 to research centres in Portugal.*
- ***29 research groups in Portugal are IGC Associated groups**, with access to IGC facilities and services.*
- ***The IGC pioneered graduate training in Portugal.** Since 1993, 10 PhD Programmes have been set up, with approximately 80 speakers/year/programme.*
- ***By October 2015, over 550 PhD students had started their scientific education at the IGC** in programmes and research groups.*

FACTS & FIGURES IN 2015 *

370
PEOPLE WORK AT THE IGC
including 11 Visitors

153 Males
217 Females

287
RESEARCHERS

Of which 134 are PhD holders

42
GROUP LEADERS

25 Portuguese
17 Rest of the World

19 Female
23 Male

10
CORE FACILITIES

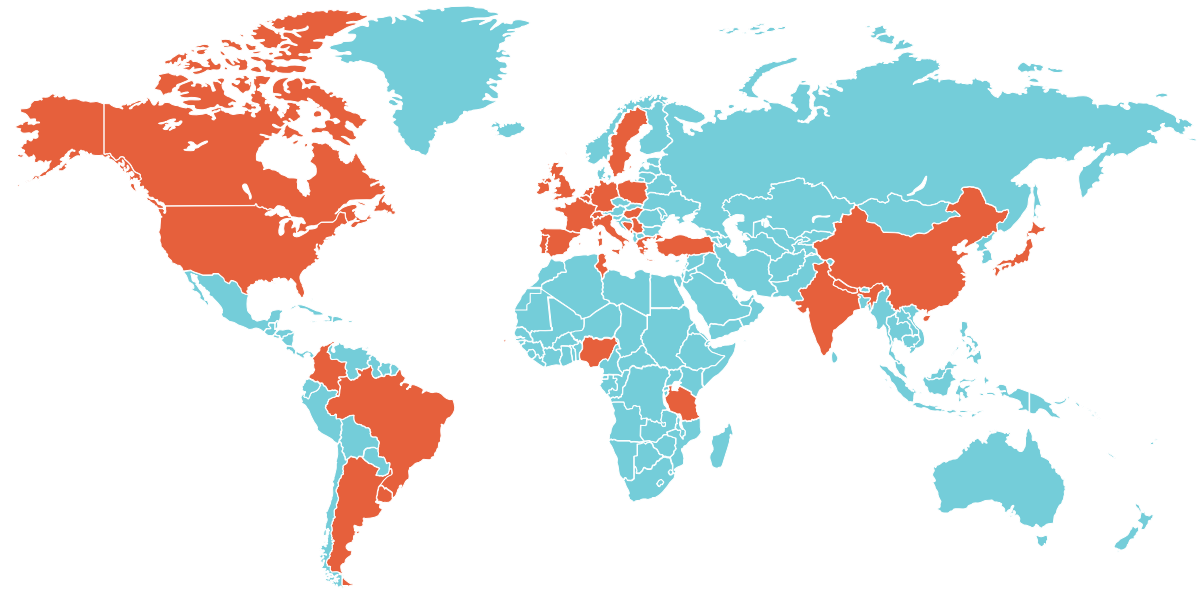
45 Core Facility Staff, of which 14 are PhD holders
(includes 5 Heads that are also Group Leaders)

9
SERVICE UNITS

43 Service Units staff, of which 9 are PhD holders

79 Postdocs
81 PhD Students
31 Research Groups' Technicians
26 Masters Students
17 Trainees
11 Visitors
2 PhD Programmes
2 New Research Groups
1 New Visiting Group

** As of December 31st, 2015*



32
NATIONALITIES

271 Portuguese
99 Rest of the world

Albania	1
Argentina	1
Belgium	1
Brazil	5
Canada	2
Cape Verde	6
China	1
Colombia	2
France	11
Germany	9
Greece	2
Hungary	1
India	5
Ireland	2
Italy	6
Japan	4
Montenegro	1
Nepal	2
Netherlands	2
Nigeria	1
Poland	7
Portugal	271
Serbia	2
Spain	11
Sweden	1
Switzerland	1
Tanzania	1
Tunisia	1
Turkey	2
United Kingdom (UK)	5
United States (USA)	2
Uruguay	1

SCIENTIFIC COMMUNICATION

187
PEER-REVIEWED PUBLICATIONS FROM ASSOCIATED GROUPS

730
PEER-REVIEWED PUBLICATIONS FROM IN-HOUSE GROUPS

917
TOTAL

In the last 5 years

5
BOOK CHAPTERS

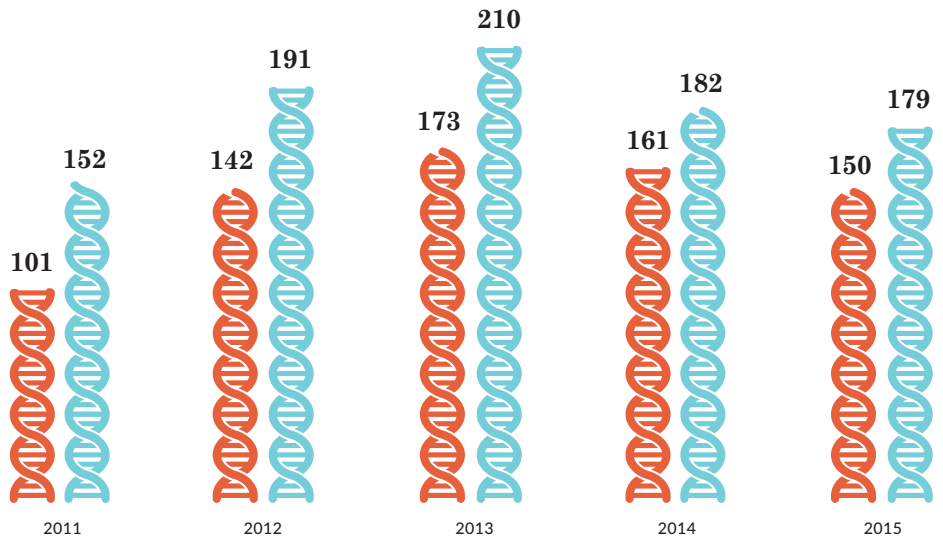
29
PEER-REVIEWED PUBLICATIONS FROM ASSOCIATED GROUPS

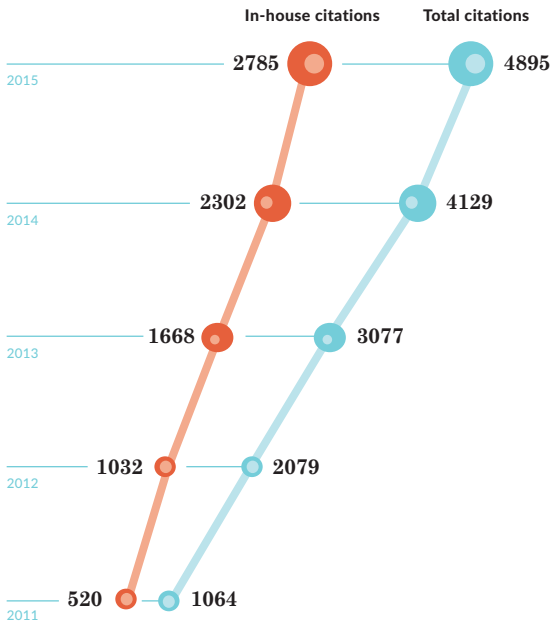
152
PEER-REVIEWED PUBLICATIONS FROM IN HOUSE GROUPS

In 2015

PUBLISHED ITEMS WITH IGC ADDRESS IN EACH YEAR

Source: Web of Science, January 2016





CITATIONS TO IGC PAPERS IN EACH YEAR

Source: Web of Science, January 2016

16
PhD THESES

17
MSc THESES

169
INTERNATIONAL PRESENTATIONS BY IGC RESEARCHERS

53
NATIONAL PRESENTATIONS BY IGC RESEARCHERS

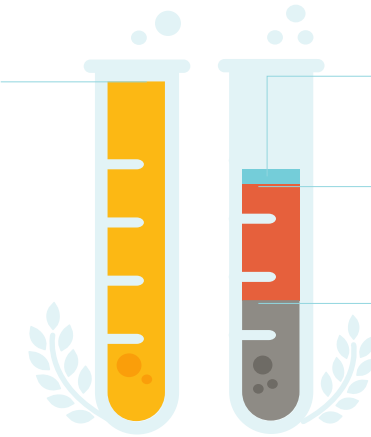
214
SEMINARS AT IGC

122 External speakers

23
CONFERENCES, MEETINGS, WORKSHOPS AT IGC

COMPETITIVE AWARDS SECURED BY IGC RESEARCHERS

40
PRIZES AND HONOURS



2
NEW INSTITUTIONAL GRANTS

14
NEW RESEARCH GRANTS STARTED IN 2015

14
OTHER FUNDING, INCLUDING BILATERAL COLLABORATION, TRAVEL GRANTS AND CONFERENCE ORGANISATION

PRIZES AND HONOURS

2 ERC Consolidator Grants
2 FCT Investigators
1 Pfizer Prize for Basic Science
1 PLoS Genetics Research Prize
1 Laço Breast Cancer Grant
1 Pulido Valente Science Award
1 Grande Oficial da Ordem Militar de Sant'iago da Espada
1 Liga Portuguesa Contra o Cancro/ Pfizer Research Award
1 EMBO Member nomination
1 March of Dimes Research Grant
1 Boehringer Ingelheim PhD fellowship

NEW INSTITUTIONAL GRANTS

1 Unidade de Investigação FCT
1 POR Lisboa/QREN Portugal

NEW RESEARCH GRANTS STARTED IN 2015

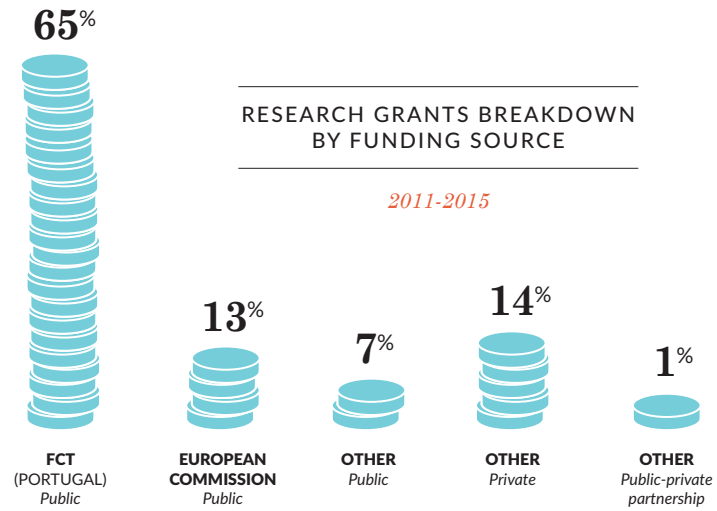
1 European Commission – Horizon 2020
2 ERC Grants
2 European ERA-Net
1 March of Dimes Research Grant
1 FCT – Harvard Medical School
1 EEA grant
1 EMBO Installation Grant
1 Pfizer Investigator-Initiated Research Project
1 Melo e Castro SCML Award
1 BIAL Bursary Programme
1 Laço Breast Cancer Grant
1 FCT Investigator Exploratory Project

OTHER FUNDING, INCLUDING BILATERAL COLLABORATION, TRAVEL GRANTS AND CONFERENCE ORGANISATION

1 Programme Pessoa Bilateral Cooperation Portugal/ France
3 EMBO Practical Course / workshops
1 European Summer School - Volkswagen Foundation
1 FCT-FACC
1 FACC-internationalization travel grant
1 EFIS Short-term fellowship
1 Tebu-Bio's Researchers Travel Grant
1 Bolsa SPP/Menarini
1 SPI Travel Award
1 Youth Travel Fund
1 Christian Boulin Fellowship
1 International Society for Evolution Medicine and Public Health Travel award

RESEARCH GRANTS BREAKDOWN BY FUNDING SOURCE

2011-2015



121
GRANTS

In the last 5 years

Source: IGC Research Funding Affairs

BUDGET OVERVIEW

2015

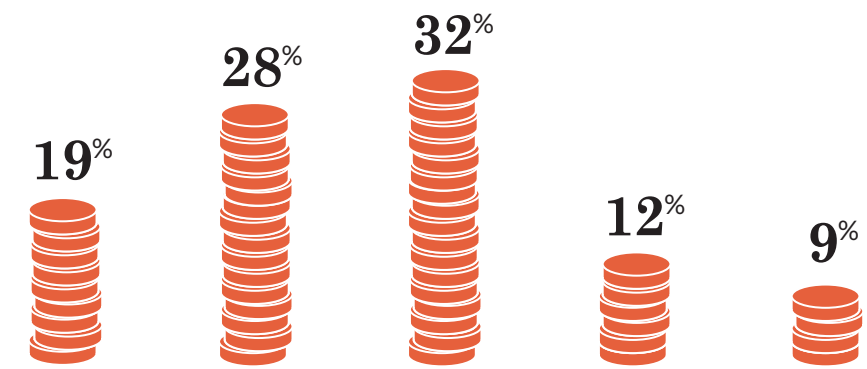
43%
INTERNAL FUNDING
Calouste Gulbenkian Foundation

57%
EXTERNAL FUNDING

TOTAL BUDGET

17.2M €

BREAKDOWN OF IGC EXPENDITURE



19%
PERSONNEL
staff and researchers

28%
FELLOWSHIPS

32%
OPERATIONS
facility costs, others

12%
INFRASTRUCTURE
building maintenance, refurbishments

9%
EQUIPMENT

A WALK THROUGH 2015

JANUARY

IGC launched a new educational resource

"My genes: should or should I not know who I am" is a video that explores concepts related to heredity, questioning the social and ethical implications of accessing genomic information.

FEBRUARY

Luís Moita awarded with an European Research Council (ERC) Consolidator Grant

Moita's research on sepsis was awarded with 2 million Euros.

Call for the 2016 PhD Programme IBB

The IGC PhD Programme in Integrative Biology and Biomedicine (IBB) recruited 10 students for the 2016 class.

Nobel Prize, Christiane Nüsslein-Volhard at the IGC

In the scope of the IBB Course on Developmental Biology, Christiane Nüsslein-Volhard visited the IGC.

MARCH

Workshop "Mouse microbiota: genotype-phenotype control and technological challenges"

Over 50 scientists from all over the world discussed recent findings addressing the interaction of microbiota and mouse genotypes.

Florence Janody awarded with Laço Breast Cancer Grant 2015

Florence Janody will study the alterations of the cell skeleton in the transition from normal to cancer cells.

APRIL

Workshop "Functional neuroanatomy of fish: mapping behaviour and internal states into the brain"

About 50 scientists gathered at the IGC to discuss the behavioural neuro mapping of fish.

António Coutinho awarded with the "Grande Oficial da Ordem Militar de Sant'iago da Espada"

The President of the Portuguese Republic recognized the member of the IGC Management Committee and former IGC Director, António Coutinho, for his work on science and education.

MAY

IGC at Belém Art Fest

For the first time, IGC scientists brought science activities to this music and art festival.

IGC PhD students retreat

The 9th Annual Meeting of Gulbenkian Students (AmeeGuS) was organised by IGC PhD students and involved students from the CF and CEDOC.

President of the Howard Hughes Medical Institute visited the IGC

Robert Tjian visited the IGC as one of the three Portuguese institutions with affiliated HHMI Early Scientists: Miguel Godinho Ferreira and Karina Xavier.

Mónica Bettencourt Dias elected European Molecular Biology Organisation (EMBO) Member

Mónica Bettencourt Dias was recognized by the merit and excellence of the work developed in recent years.

JUNE

Placental malaria research funded by March of Dimes Foundation

Carlos Penha Gonçalves will study factors and mechanisms involved in placental malaria. This was the first time that this American organisation funded research from a Portuguese Institution.

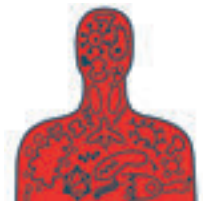
JULY

Conference "Forecasting evolution?"

The Calouste Gulbenkian Foundation hosted over 100 scientists to discuss evolution, in a conference organised by Isabel Gordo.

IGC at NOS Alive Music Festival

IGC scientists took science to this music festival, whose promoter, *Everything is New*, also funds two fellowships every year for young scientists at IGC.



European Summer School "Host-microbe symbioses – old friends and foes"

This Summer School, organised by Karina Xavier and Luís Teixeira, had 30 European PhD students.

EMBO Practical Course "Measuring intra-species diversity using high-throughput sequencing"

Thirty scientists from all over the world attended this EMBO practical course on new sequencing techniques, organised by Daniel Sobral.

AUGUST

European and US consortium coordinated by IGC

The consortium, coordinated by Jörg Becker, received 2.6 million Euros to study the evolution of sexual reproduction in plants.

IGC scientists attracted national funding

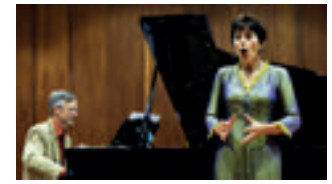
In a competitive call for projects from *Fundação para a Ciência e a Tecnologia* with 13% national success rate, 21 out of 35 IGC groups secured funding.

SEPTEMBER

Workshop Inspirar Ciência: a Matemática para a Vida

In this course, 25 Mathematics high school teachers learnt how to apply mathematical concepts to the analysis of biological systems.

OCTOBER



New artist in residence

Camille van Lunen, a French-Dutch music composer and soprano, joins the IGC as artist in residence for a period of 6 months.

Call for the 2016 PGCD

Applications to the 2016 edition of the Graduate Programme Science for Development (PGCD) were opened.

Symposium "Super-Resolution Microscopy in Infection and Immunity"

Over 65 scientists gathered at the IGC to discuss Super-Resolution Microscopy, in a symposium co-organised by Nuno Moreno.

IGC hosted EURAXESS on Tour

IGC hosted the Lisbon stop of the pan-European initiative EURAXESS - Researchers in Motion.

NOVEMBER

Postdoc Retreat

Over 120 postdoctoral life scientists met in Setubal in the biggest retreat organised by and for the Postdoctoral community in the Lisbon area.

IGC research won the PLOS Genetics Research Prize 2015

A research paper from Isabel Gordo, Karina Xavier and Jocelyne Demengeot's laboratories was recognised as the best article published in the journal *PLOS Genetics* in 2014.

DECEMBER

IGC PhD student received 2015 Fellowship Liga Portuguesa Contra o Cancro/ Pfizer

Sandra Tavares was awarded to study the role of the cytoskeleton in the early phases of breast cancer.

IGC Scientists awarded with the 2015 Pfizer Award in Basic Research

The work developed by Miguel Soares laboratory on how gut bacteria are protective against malaria was selected by SCML and the Pfizer Laboratories.

Mónica Bettencourt Dias awarded with an European Research Council (ERC) Consolidator Grant

Bettencourt Dias' research on the biogenesis of centrioles was awarded with 2 million Euros.

First scientific meeting of African and Timorese Graduate Students in Portugal

Students developing PhD theses in different research fields gathered at the IGC, in an event organised by Joana Gonçalves Sá, Director of PGCD.

1

RESEARCH

42
GROUPS

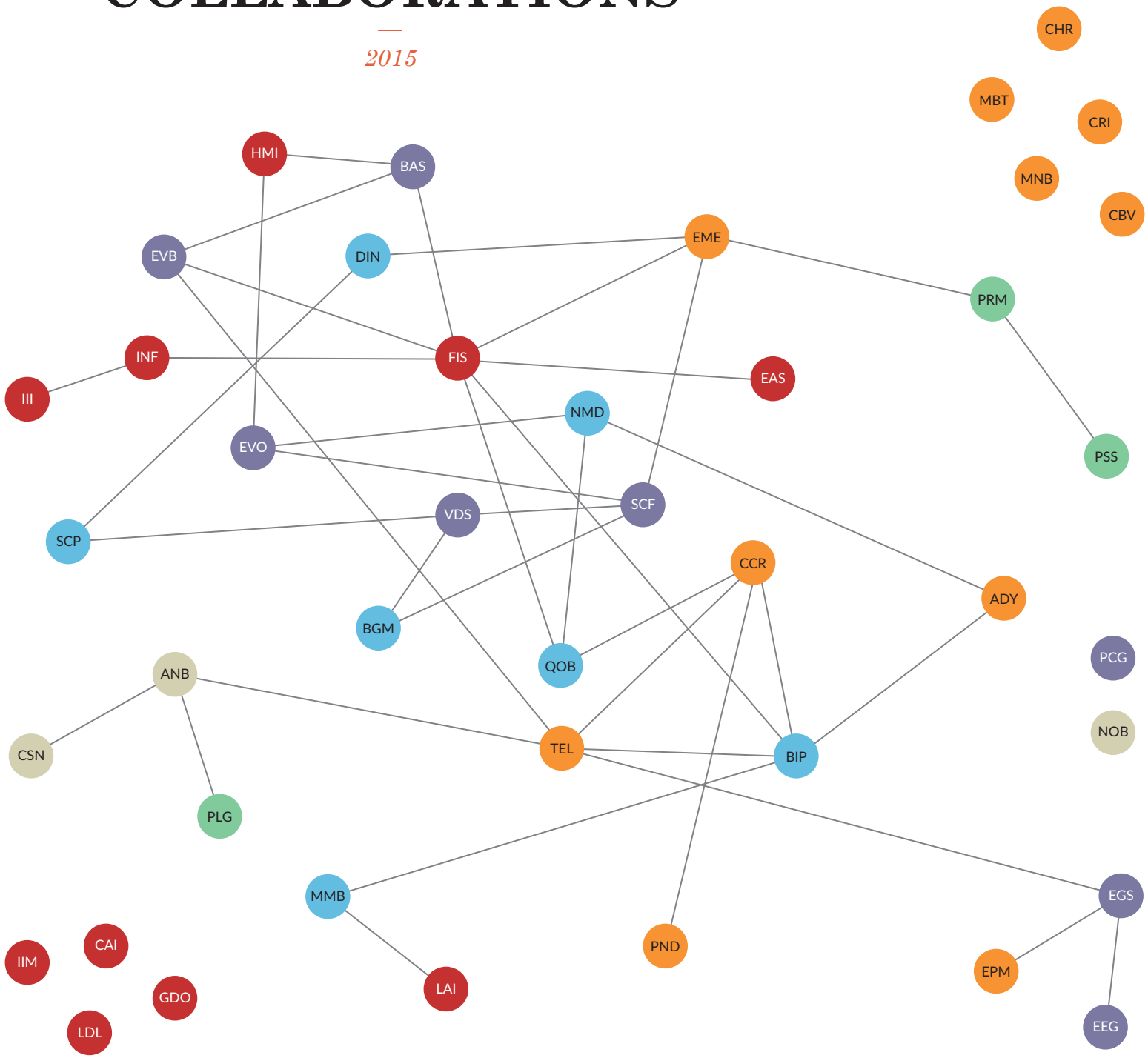
287
RESEARCHERS

69
FUNDED RUNNING PROJECTS

152
PUBLICATIONS

IN-HOUSE COLLABORATIONS

2015



CELL AND DEVELOPMENTAL BIOLOGY

Adrain, Colin • **Membrane Traffic** • MBT
Amorim, Maria João • **Cell Biology of Viral Infection** • CBV
Athanasiadis, Alekos • **Protein - Nucleic Acids Interactions** • EME
Bettencourt Dias, Mónica • **Cell Cycle Regulation** • CCR
Castro, Diogo • **Molecular Neurobiology** • MNB
Godinho Ferreira, Miguel • **Telomeres and Genome Stability** • TEL
Janody, Florence • **Actin Dynamics** • ADY
Jansen, Lars • **Epigenetic Mechanisms** • EPM
Mallo, Moises • **Patterning and Morphogenesis** • CRI
Oliveira, Raquel • **Chromosome Dynamics** • CHR
Telley, Ivo • **Physical Principles of Nuclear Division** • PND

QUANTITATIVE AND COMPUTATIONAL BIOLOGY

Alves, Filipa • **Biophysics and Genetics of Morphogenesis** • BGM
Carneiro, Jorge • **Quantitative Organism Biology** • QOB
Chaouiya, Claudine • **Network Modelling** • NMD
Gjini, Erida • **Mathematical Modelling of Biological Processes** • MMB
Gonçalves-Sá, Joana • **Science and Policy** • SCP
Pereira Leal, José • **Computational Genomics** • BIP
Rocha, Luís • **Complex Adaptive Systems and Computational Biology** • DIN

PLANT BIOLOGY

Baena, Elena • **Plant Stress Signalling** • PSS
Becker, Jorg • **Plant Genomics** • PLG
Duque, Paula • **Plant Molecular Biology** • PRM

IMMUNOBIOLOGY

Barreto, Vasco • **Epigenetics and Soma** • EAS
Demengeot, Jocelyne • **Lymphocyte Physiology** • FIS
Fesel, Constantin • **Lupus and Autoreactive Immune Repertoires** • LAI
Howard, Jonathan • **Host-Pathogen Co-Evolution** • CAI
Martins, Vera • **Lymphocyte Development and Leukemogenesis** • LDL
Moita, Luis • **Innate Immunity and Inflammation** • III
Parkhouse, Michael • **Infections & Immunity** • IIM
Penha Gonçalves, Carlos • **Disease Genetics** • GDO
Soares, Miguel • **Inflammation** • INF
Teixeira, Luís • **Host-Microorganism Interactions** • HMI

EVOLUTIONARY BIOLOGY

Beldade, Patrícia • **Variation: Development and Selection** • VDS
Chelo, Ivo • **Eco-Evolutionary Genetics** • EEG
Chikhi, Lounès • **Population and Conservation Genetics** • PCG
Gordo, Isabel • **Evolutionary Biology** • EVB
Mirth, Christen • **Development, Evolution and the Environment** • SCF
Perfeito, Lilia • **Evolution and Genome Structure** • EGS
Sucena, Elio • **Evolution and Development** • EVO
Xavier, Karina • **Bacterial Signalling** • BAS

NEUROBIOLOGY

Domingos, Ana • **Obesity** • NOB
Fonseca, Rosalina • **Cellular and Systems Neurobiology** • CSN
Oliveira, Rui • **Integrative Behavioural Biology** • ANB

MEMBRANE TRAFFIC

GROUP LEADER
Adrain, Colin

RESEARCH INTERESTS

We are interested in how secretory trafficking coordinates cellular signalling during normal physiology, and its contribution to inflammatory disease and cancer. 60% of all current drugs target membrane proteins, illustrating the medical importance of this pathway. However the complex biogenesis and trafficking of many signalling proteins is poorly understood, providing an incentive to understand the secretory pathway better. In eukaryotes, one third of translated proteins are secretory proteins. These fold in the endoplasmic reticulum (ER) and traffic to the plasma membrane, where signalling occurs. Until recently, it was believed that secretory traffic was accomplished by a default mechanism called 'bulk flow' whereby newly synthesized proteins are packaged into trafficking vesicles at the rate that they are produced. However, it is now clear that trafficking, especially of membrane proteins, is controlled by additional influences, including trafficking partners, post-translational modifications, or regulation of protein stability. We elaborate this theme of trafficking control over signalling in the projects indicated below, using a combination of mouse genetics, disease models, cell biology and biochemistry.

PROJECTS RUNNING IN 2015

- How membrane trafficking regulates signalling controlled by metalloproteases
- Role of quality control in the secretory pathway in vivo in mice, during development and disease
- Genetic screens to identify novel trafficking factors

MAIN ACHIEVEMENTS IN 2015

HOW MEMBRANE TRAFFICKING REGULATES SIGNALLING CONTROLLED BY METALLOPROTEASES

This project builds on my observation that ER-localized membrane proteins called iRhoms are essential for activation of ADAM17, a membrane-tethered metalloprotease, required for the proteolytic release of membrane-tethered signalling molecules including TNF (tumour necrosis factor) and ligands of the EGFR (epidermal growth factor receptor). We now focus on understanding how iRhom itself is regulated by inflammatory and growth-promoting stimuli; hence how these signals activate ADAM17. The major achievements have been the isolation and characterization of iRhom regulatory proteins from immunoprecipitation/mass spectrometry experiments.

This revealed several iRhom interactors that we are studying in cellular/biochemical experiments, including kinases and a cytoskeletal protein associated with the endocytic pathway. We are currently deciphering the effect of these interactors on iRhom (hence, ADAM17) control of growth factor signalling, in cells in which the candidate has been ablated using CRISPR. A second focus is to understand how upstream signals from inflammatory pathways control iRhom behaviour, via triggering post-translational modifications within the iRhom N-terminus. We are delineating how these pathways influence iRhom.

ROLE OF QUALITY CONTROL IN THE SECRETORY PATHWAY *IN VIVO*, DURING DEVELOPMENT AND DISEASE

The goal is to define the role of quality control in the endoplasmic reticulum at the organismal level, during physiology and disease. We have generated mice null in genes implicated (from biochemical studies) in the control of degradation of misfolded proteins in the ER. We have successfully targeted four candidate genes. For one project, we have confirmed ablation of protein expression, and are characterizing the mutant animals. For the others, we have confirmed targeting and are homozygosing the mutants. During this year, we will characterize the mutant mice in disease models, in conjunction with the histopathology facility. We will also assess serum metabolites, to investigate the role of these genes in metabolic regulation.

GENETIC SCREENS TO IDENTIFY NOVEL TRAFFICKING FACTORS

The rationale is to perform genetic screens in mammalian cells to identify novel factors responsible for the trafficking of biologically important molecules, including ADAM metalloproteases, to the cell surface. Our approach exploits mutagenesis of a population of mammalian cells with a CRISPR library, then selecting cells with abnormally low cell surface levels of the protein of interest. Candidates were identified by comparing the parental versus selected populations, in deep sequencing experiments. We have identified several candidate trafficking factors and we are currently dissecting how these control metalloprotease trafficking.

GROUP LEADER

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PhD in Molecular & Cell Biology
Trinity College, Ireland, 2003

Group Leader at IGC since 2013

Previous positions
Postdoctoral Fellow, MRC Laboratory of Molecular Biology, UK

Postdoctoral Fellow, Trinity College, Ireland

GROUP MEMBERS

Marina Badenes, Postdoc | *Started in September*
Emma Burbridge, Postdoc
Laura Carleton, Postdoc | *Left in April*
Miguel Cavadas, Postdoc | *Started in February*
Ioanna Oikonomidi, PhD student, IBB 2014
Tianyi Hu, Masters student
Catarina Martins, Research Assistant | *Left in April*
Ana Dinis Pereira, Research Assistant | *Started in May*

Funding
FP7-Marie Curie Actions, European Commission
Worldwide Cancer Research

Collaborators
Christopher Gerner (University of Vienna, Austria)
Paul Lehner (University of Cambridge, UK)
Seamus Martin (Trinity College, Ireland)
Kvido Strisovsky (Institute of Organic Chemistry & Biochemistry, Czech Republic)

Outreach
IGC stand at NOS Alive'15 - speed dating, Algés, July.

IGC stand at GreenFest - speed dating, Estoril, October.

Hands-on activities for primary school students, Azeitão, December.

BIOPHYSICS & GENETICS OF MORPHOGENESIS

GROUP LEADER
Alves, Filipa

RESEARCH INTERESTS

Our research focuses on the biophysical and genetic bases of pattern formation and morphogenesis. How is gene expression regulation coordinated in space and time during embryo development? How are sharp responses in gene regulation triggered by shallow concentration differences of the signalling molecules? How are gene expression patterns reliably shaped in the presence of molecular fluctuations, genetic variability and environmental perturbations?

We address these questions using a multilevel modelling approach, capturing key quantitative aspects of the interplay between the biophysical mechanisms underlying cell and tissue morphogenesis and the regulation of gene expression. Our theoretical models are developed in close relation with experimental data and are mainly used to formulate organised hypotheses and make testable predictions.

As the models' validation is strongly dependent on quantifying and estimating the biological parameters involved, we also work on the development of quantitative image analysis methods, databases and parameter optimisation algorithms.

PROJECTS RUNNING IN 2015

- Patterned cell fate determination in butterfly wings
- The developmental switch of ovary maturation in *Drosophila*
- Quantifying natural colour patterns

MAIN ACHIEVEMENTS IN 2015

PATTERNED CELL FATE DETERMINATION IN BUTTERFLY WINGS

In butterfly wings, the mechanisms of cell fate determination leading to the biosynthesis of different pigments are strongly constrained by the wing morphology, mainly by the venation system and wing shape.

We are using a theoretical modelling approach to study the interaction between tissue architecture and the gene regulatory networks underlying wing patterning in *Bicyclus anynana*, in collaboration with Patrícia Beldade's lab (IGC). We are especially interested in understanding how this interplay both generates and constrains the phenotypic variation observed within and among species.

We are testing different candidate genes and network topologies that potentially explain the observed patterns. The models predict the temporal evolution of gene expression during key stages in wing development, providing testable hypotheses for how variation may depend on specific biophysical parameters changes.

THE DEVELOPMENTAL SWITCH OF OVARY MATURATION IN *DROSOPHILA*

During ovary development, in both flies and humans, the switch to the mature state is triggered by a threshold concentration of steroid hormones. This critical hormone concentration can assume diferent values depending on the body mass. It has been proposed that the role of body mass in ovary maturation is mediated by the interaction of the insulin and the steroid hormones signalling pathways.

Based on the available experimental evidence, we are developing theoretical models to investigate the regulatory dynamics of ovary maturation in *Drosophila* larvae, in collaboration with Christen Mirth's lab (IGC). This theoretical approach is also contributing to further identify and design key experiments to test the models' predictions.

QUANTIFYING NATURAL COLOUR PATTERNS

In many organisms, relevant phenotypes are described by their specific colour patterns, and these can vary with the genetic background, age or environmental factors.

How can these phenotypes be described by numbers? Can we disentangle different traits from these complex patterns and evaluate them independently? Despite the widespread use of natural colour patterns to characterise phenotypes, there are surprisingly few robust and reproducible methods to quantitatively classify this type of data.

We are developing image analysis methods, together with dedicated (or adapted) image acquisition systems and databases. Our colour and shape analysis algorithms enable the quantitative characterization of phenotypes, according to their morphometric parameters and pigmentation (or gene expression) patterns. These methods are applied to different image types and model systems, from butterfly wings to fly and lizard pigmentation patterns.

SOFTWARE DEVELOPMENT

MathColor

MathColor is a set of Wolfram Mathematica interactive aplications implementing novel methods for the quantitative analysis of colour patterns in natural colour images.

WingPatterns

The WingPatterns knowledge base combines in the same platform the experimental image collections (with the respective associated metadata) and the quantitative analysis results of the gene expression patterns in larvae and pupae, adult pigmentation, vein patterning and wing shape, among other morphometric traits. Associated with the database, we are developing automated image analysis algorithms and data-mining techniques.

wingpatterns.igc.gulbenkian.pt

GROUP LEADER

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PhD in Physics
Universidade Técnica de Lisboa, Portugal, 2006

Group Leader at IGC since 2011

Previous positions
Postdoctoral fellow, Instituto Gulbenkian de Ciência, Portugal

Collaborators
Patricia Beldade (IGC, Portugal)
José Feijó (University of Maryland, USA)
Christen Mirth (IGC, Portugal)
Octávio Paulo (Faculdade de Ciências da Universidade de Lisboa, Portugal)

Outreach
IGC Stand at NOS Alive'15 Festival, Hands-on activities, Algés, July.

Workshop Inspirar Ciência 2015 - Theoretical and practical teaching of high school teachers, IGC, September.

CELL BIOLOGY OF VIRAL INFECTION

GROUP LEADER

Amorim, Maria João

RESEARCH INTERESTS

Influenza A virus is a major human pathogen that causes yearly epidemics and occasional pandemic outbreaks. Despite a tight surveillance and a yearly vaccination scheme, the pathogen is responsible for high mortality, morbidity and economic damage. The elucidation of cellular pathways used by the virus, can contribute to identify novel therapeutic targets. The cell biology of viral infection lab is interested in identifying and characterizing host factors and pathways necessary for viral infection. In particular we focus on the host processes involved in influenza A virus assembly, for which host vesicular trafficking contributes. In this sense, our primary interest is to understand the regulatory mechanisms governing host trafficking and how these are subverted by infection to assist viral assembly while modulating cellular architecture, host immunity and cytoskeleton.

PROJECTS RUNNING IN 2015

- Role of mitofusin 2 during influenza A virus infection
- The role of Rab11 in innate immunity
- Molecular characterization of the cellular machinery involved in genome trafficking of influenza A virus
- Membrane regulators of complement activation modulate immune response to influenza A virus infection
- The role of ADP ribosylation factor 15 in influenza A virus infection

MAIN ACHIEVEMENTS IN 2015

The lab focuses in three main themes related to influenza A virus host interactions, and in all of which we made considerable progress:

ASSEMBLY OF INFLUENZA A SEGMENTED GENOME

One of the most intriguing aspects in the lifecycle of influenza A virus is the selective packaging of its 8-segment genomic core (vRNPs) in a virion. We set out to characterize the involvement of the recycling endosome in the process, substantiated by the formation of vRNP hotspots, promoted by the recycling endosome regulator Rab11. We found that vRNPs competed with Rab11 effectors for Rab11 binding. This competition reduced recycling sorting, giving rise to viral RNA hotspots. We then characterized Rab11-vRNP vesicles at an ultra structural level. To meet our goal, we teamed up with the electron microscopy facility of the IGC to develop correlative light and electron microscopy. We observed vesicular clustering matching RNA hotspots, composed of heterogeneous vesicles of single and double membranes, consistent with a decrease in recycling sorting and are now trying to identify the step affected by vRNP binding. We have also made progress in identifying Rab11 regulators operating during infection.

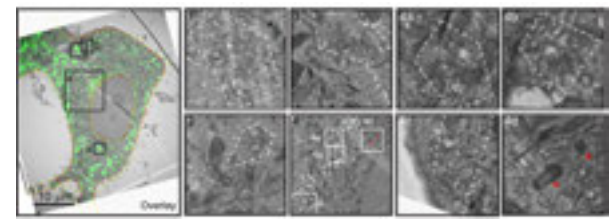
We identified two ARFs and one ARF-GEF required for influenza A virus infection: ARL15, ARL17 and ARNO and are further exploring their role in infection. Finally, we identified KIF13A as a molecular motor involved in the transport of RNA segments, ruling out members of the FIP family in infection, which was explained in the review by Alenquer *et al.*, 2015.

THE ROLE OF CD55 AND CD59 DURING IAV INFECTION

Using the mouse model, we consolidated preliminary data on that the lack of these proteins decreases severity of the infection and are in the process of understanding the underlying mechanism. So far, we found that these proteins are selectively incorporated in virion envelopes and contribute to their resistance to complement attack. As a side project we are developing a novel concept for viral passage to neighboring cells that is substantiated by the finding that infected cells modulate the sialic acid content of host proteins, including secreted peptides.

CHARACTERIZATION OF MITOCHONDRIA ALTERATIONS IN INFECTION

It has been reported that influenza A virus infection leads to mitochondria fragmentation. Our preliminary data showed a positive correlation between mitochondria fragmentation and vRNPs that we are dissecting. Our working hypothesis is that vRNPs attach to mitochondria, leading to its fragmentation, and concomitant transport to sites of assembly, for energy supply.



Correlative light and electron microscopy image showing clustered vesicles by electron microscopy matching the GFP staining of the recycling endosome. This feature was observed in influenza A virus infected cells. In these cells, recycling endosome vesicles harbor protruding viral genomic particles. For infectious particle formation, eight distinct RNA particles are packaged in a virion. It is possible that vesicular clustering places in close proximity the eight segments that constitute a virion, thus aiding virion formation.

PUBLICATIONS

Alenquer, M., **Amorim, M.J.** (2015). *Exosome biogenesis, regulation, and function in viral infection*. **Viruses**. 7(9): 5066-5083.

GROUP LEADER

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PhD in Virology
University of Cambridge, UK, 2007

Group Leader at IGC since 2012

Previous positions
Research Associate in the Digard Lab, University of Cambridge, UK

Research Associate in the Mata Lab, University of Cambridge, UK

Research Associate in the McCauley Lab, National Institute of Medical Research, UK

Institutional Role at IGC
Coordinator of student internships at the IGC

External website
http://sites.igc.gulbenkian.pt/cbv/

GROUP MEMBERS

Marta Alenquer, Postdoc
Sílvia Costa, Postdoc
Zoé Vaz Da Silva, PhD student, IBB 2013
Ana Rita Nascimento, Masters student
Inês Veríssimo, Masters student | *Started in October*
Bárbara Kellen, Research Assistant | *Left in December*

Funding
Fundação para a Ciência e a Tecnologia

Collaborators
Paul Digard (University of Edinburgh, UK)
Luca Scorrano (Venetian Institute of Molecular Medicine, Italy)
Wenchao Song (Institute for Translational Medicine and Therapeutics, University of Pennsylvania, USA)
Graça Raposo (Institute Curie, France)
Stefan Lienenklaus (Hannover Medical School, Germany)

Outreach
Public talk, "Ciência a 4 Tempos", Faro, March.
IGC stand at GreenFest - public talk, Estoril, October.
Media appearance in newspapers, July.

PROTEIN NUCLEIC ACIDS INTERACTIONS

GROUP LEADER

Athanasiadis, Alekos

RESEARCH INTERESTS

Sequence is not fate. Proteins demonstrate an impressive ability not only to recognize and bind to particular pieces of nucleic acids code but also to alter its information content by catalyzing reactions that rearrange its sequence or specifically change one nucleotide for another. Organisms have found in such mechanisms the means for creating sequence diversity as it is gloriously exemplified in the diversification of immunoglobulin genes. The recent realisation that multi-cellular organisms achieve phenotypic complexity without a parallel increase in number of genes has highlighted the importance of posttranscriptional RNA modifications in creating and fine-tuning a much larger repertoire of proteins originating from a small number of genes. I am interested in the study of the molecular mechanisms involved in such diversification of RNA and DNA sequence as well as understanding the consequences of such processes for molecular evolution dynamics. In this direction I am employing the tools of computational, molecular and structural biology in the study of RNA and DNA editing. My work presently focuses on the A to I RNA editing process which alters the sequence of thousands of human pre-mRNAs (Athanasiadis *et al.,* 2004), while it also plays a role in a newly discovered and as yet uncharacterized interferon response antiviral pathway.

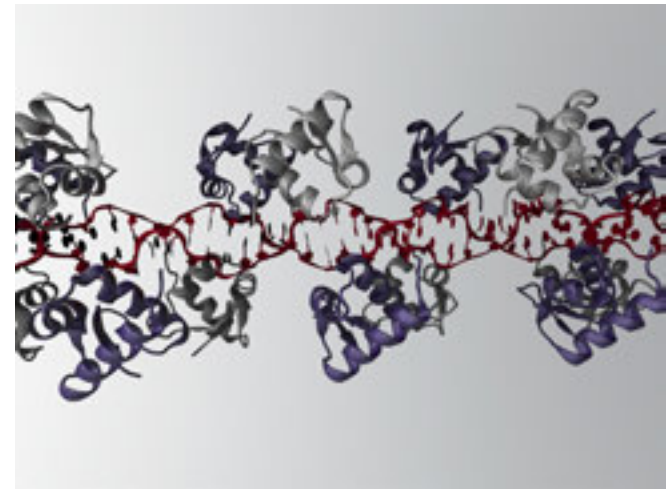
PROJECTS RUNNING IN 2015

- Recognition of nucleic acids by the innate immune system
- Structural studies of A to I RNA editing

MAIN ACHIEVEMENTS IN 2015

In vertebrate species the innate immune system down-regulates protein translation in response to viral infection through the action of the dsRNA activated protein kinase PKR. Not surprisingly viruses have evolved proteins that inhibit such host responses. Pox viruses encode for that purpose E3L a potent inhibitor of PKR and interferon response. In some teleost species another protein kinase, PKZ, plays a similar role but instead of dsRNA binding domains, PKZ has Zα domains. Zα domains recognize the left-handed conformer of dsDNA and dsRNA known as Z-DNA/Z-RNA and two years ago we characterized the interactions of PKZ Zalpha domains with nucleic acids. We also found that Cyprinid herpesvirus 3 (CyHV-3) which infects common and koi carp, that have PKZ, encodes the ORF112 protein which we demonstrated that encodes a Zα domain and suggested that it is a competitive inhibitor of PKZ. This would be the first evidence that Herpes viruses use a similar strategy to inhibit interferon response as Pox viruses through E3L.

Now we completed the crystal structure of ORF112-Zα in complex with an 18 bp CpG DNA repeat, at 1.5 Å. We demonstrated that the bound DNA is in the left-handed conformation and we identified key protein nucleic-acids interactions accounting for the specificity of ORF112. In collaboration with the Veterinary Medicine lab of Alain Vanderplasschen at the University of Liege, we demonstrated that ORF112 protein localises in stress granules of CyHV-3 infected fish cells suggesting a not only structural but also functional behaviour similar to that of host Zα domains. We further designed mutants of ORF112 that abolish DNA binding. Virus with the equivalent mutations resulted in loss of pathogenicity in fish. In the future mutant virus may serve as a live vaccine.



A repetitive CpG DNA bound by the Zalpha domain of the Cyprinid Herpes virus protein ORF112. Like the Pox viral inhibitor of interferon response E3L, ORF112 induces the left-handed helical DNA conformation known as Z-DNA.

PUBLICATIONS

Kus, K., Rakus, K., Boutier, M., Tsigkri, T., Gabriel, L., Vanderplasschen, A., **Athanasiadis, A.** (2015). *The structure of the cyprinid herpesvirus 3 ORF112-Zα/Z-DNA complex reveals a mechanism of nucleic acids recognition conserved with E3L, a poxvirus inhibitor of interferon response.* **J Biol Chem.** 290(52): 30713-25.

GROUP LEADER

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PhD in Structural Biology
University of Crete, Greece, 1995

Group Leader at IGC since 2009

Previous positions
Research Scientist at Massachusetts Institute of Technology, USA

Postdoctoral Fellow, HFSP at Massachusetts Institute of Technology, USA

Postdoctoral Fellow, EMBO at ICGEB/Unido, Italy

GROUP MEMBERS

Luísa Gabriel, Postdoc
Krzysztof Kus, PhD student, PIBS 2010
Daniela Isidoro, Trainee | *Left in September*

Collaborators
Paula Duque (IGC, Portugal)
Angela Gallo (Bambino Gesù Children's Hospital, Italy)
Christen Mirth (IGC, Portugal)
Alain Vanderplasschen (University of Liege, Belgium)

PLANT STRESS SIGNALLING

GROUP LEADER

Baena-González, Elena

RESEARCH INTERESTS

Mounting evidence suggests that in plants, environmental information is partly conveyed through sugar signals. Accordingly, sugars have been linked to stress responses, to the regulation of growth and to specific developmental transitions such as germination and flowering. How the plant nutrient status is integrated with other signals into adequate growth and developmental decisions is poorly understood, but one central component in this process is the SNF1-related Protein Kinase1 (SnRK1). SnRK1 is an evolutionary conserved protein kinase complex that regulates energy homeostasis in plants. In doing so, it promotes tolerance to adverse environmental conditions and influences a large array of growth and developmental processes. Despite the importance of SnRK1 virtually nothing is known about how it operates. Our goal is the dissection of this key pathway as a first step towards understanding how plants cope with adverse conditions and how energy signals influence plant growth and development. We are undertaking a multifaceted strategy that combines biochemical approaches, transient cell-based assays, and genetics with mutant screens and proteomics to address:
i) how is SnRK1 regulated; ii) how does SnRK1 control gene expression; iii) how does SnRK1 interact with the ABA pathway, also central to stress responses and development; iv) what are the cellular processes under SnRK1 control?

PROJECTS RUNNING IN 2015

- Regulation of SnRK1 signalling by SUMOylation
- Cross-talk between the SnRK1 and ABA signalling pathways
- Downstream effectors of SnRK1 signalling
- Screening for mutants altered in energy signalling

MAIN ACHIEVEMENTS IN 2015

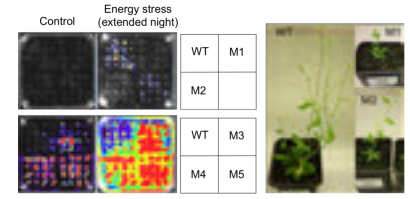
We have found that sustained SnRK1 activation triggers its SUMOylation through the SIZ1 E3 SUMO ligase and its subsequent degradation via the proteasome. This establishes a negative feedback loop between SnRK1 activity and its SUMOylation that prevents a detrimental over activation of the pathway. Our follow-up work suggests that SUMOylation may have additional roles in SnRK1 complex formation, favouring the assembly of specific subunit combinations over others. We are currently investigating the functional relevance of this as well as its connection with the previously observed effect on SnRK1 complex stability.

Our previous work showed that SnRK1 is negatively regulated by the same PP2C phosphatases that repress ABA signalling, a central phytohormone that controls numerous stress and developmental responses. This provided for the first time a molecular connection between SnRK1 and ABA signalling but was not sufficient to explain why manipulation of the SnRK1 pathway results in ABA-related phenotypes. Our work during this year has revealed additional levels of crosstalk between the two pathways, both at the level of the kinases and their surrogate transcription factors.

We have previously shown that part of the transcriptional programme driven by SnRK1 is mediated by miRNAs and by the C/S1-class of bZIP transcription factors, but the mechanistic details of this remained poorly understood. During this year our collaboration with the group of Markus Teige in Vienna has provided insight into how SnRK1 controls bZIP function. Upon activation during stress SnRK1 phosphorylates the C-class bZIP63, thereby changing its dimerization properties and favouring the formation of specific heterodimers with S1-class bZIPs.

Finally, our mutant screen using a transgenic reporter line for the SnRK1 pathway has resulted into the identification of numerous mutants with altered regulation of SnRK1 signalling. Eight of these mutants have now been selected for mapping using next generation sequencing.

Confraria, A., Baena-González, E. (2015) *Using* Arabidopsis *Protoplasts to Study Cellular Responses to Environmental Stress*. ed P. Duque), **Methods in Molecular Biology**, Springer, New York, NY, USA. *In Press*. Springer ISBN 978-1-4939-3356-3.



Identification of mutants with altered SnRK1/energy signalling. Identification of mutants with altered SnRK1/energy signalling. The DIN6::LUC reporter is strongly induced in the original reporter line ("WT") under extended night conditions, but this induction is lost in mutants M1 and M2. On the other hand, mutants M3, M4, and M5 express the DIN6::LUC reporter under normal control conditions and the induction in response to an extended night is aberrantly high. The reduced growth phenotype of plants with deficient induction is similar to that reported for plants with transient systemic SnRK1 silencing.

PUBLICATIONS

Crozet, P., Margalha, L., Butowt, R., Fernandes, N., Elias, A., Orosa, B., Tomanov, K., Teige, M., Bachmair, A., Sadanandom, A., **Baena-González, E.** (2015). *SUMOylation represses SnRK1 signalling in* Arabidopsis. **Plant J. [Epub ahead of print].**

Mair, A., Pedrotti, L., Wurzinger, B., Anrather, D., Simeunovic, A., Weiste, C., Valerio, C., Dietrich, K., Kirchler, T., Nagele, T., Vicente, Carbajosa, J., Hanson, J., **Baena-González, E.**, Chaban, C., Weckwerth, W., Droge-Laser, W., Teige, M. (2015). *SnRK1-triggered switch of bZIP63 dimerization mediates the low-energy response in plants*. **eLife.** 4: e05828.

Martinho, C., Confraria, A., Elias, C.A., Crozet, P., Rubio-Somoza, I., Weigel, D., **Baena-González, E**. (2015). *Dissection of miRNA pathways using* Arabidopsis *mesophyll protoplasts*. **Mol Plant.** 8(2): 261-75.

GROUP LEADER

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PhD in Plant Physiology and Molecular Biology
University of Turku, Finland, 2002

Group Leader at IGC since 2008

Previous positions
Postdoctoral fellow, Massachusetts General Hospital, USA

GROUP MEMBERS

Ana Confraria, Postdoc
Pierre Crozet, Postdoc | *Left in December*
Concetta Valerio, Postdoc
Mattia Adamo, PhD student
Carlos Alexandre Elias, PhD student, PIBS 2013
Leonor Margalha, PhD student, PIBS 2010
Noémia Fernandes, Technician | *Left in July*

Funding
Fundação para a Ciência e a Tecnologia

Collaborators
Andreas Bachmair (Max F. Perutz Laboratories, Austria), **Paula Duque** (IGC, Portugal), **Johannes Hanson** (Umeå University, Sweden), **Américo Rodrigues** (Instituto Politécnico Leiria, Portugal), **Pedro L. Rodriguez Egea** (IBMCP, UPV-CSIC, Spain), **Filip Rolland** (Leuven University, Belgium), **Ari Sadanandom** (University of Durham, UK), **Markus Teige** (University of Vienna, Austria), **Philip Wigge** (The Sainsbury Laboratory, Cambridge University, UK)

Outreach
Hands-on activities for kindergarten students, Outeiro de Polima.

Scientific protocols for high school teachers & students.

PLANT GENOMICS

GROUP LEADER
Becker, Jörg

RESEARCH INTERESTS

Our group is interested in sexual reproduction and early embryogenesis, with a particular focus on (epi) genetic mechanisms acting during male gametogenesis. We and others have shown that male gametes in the plant and animal kingdom carry complex sets of RNA molecules, including not only mRNAs but also small RNAs. Epigenetic reprogramming during male gametogenesis seems to be partially responsible for these distinct transcriptomes.

Using the angiosperm *Arabidopsis thaliana* and the bryophyte *Physcomitrella patens* as our primary experimental models we are addressing the following specific questions:

(1) How has (epi)genetic reprogramming during gametogenesis evolved in the plant lineage? We are employing male gametogenesis in the extant moss *Physcomitrella* as a test case.

(2) Do sperm cells and vegetative nucleus communicate via mRNA transport? This question is being addressed using *Arabidopsis* pollen.

(3) What is the role of the CCR4-NOT1 complex during pollen development in *Arabidopsis*?

(4) Are plant tetraspanin signalling complexes important for gamete cellular interactions and double fertilization?

PROJECTS RUNNING IN 2015

- Evolution of sexual reproduction in plants
- mRNA transport and non-cell-autonomous activity in the male germ unit
- Tetraspanin signalling complexes and their role during gamete cellular interactions and double fertilization

MAIN ACHIEVEMENTS IN 2015

In 2015, we have finalized our *Physcomitrella patens* transcriptome atlas covering 14 stages of the life cycle of the moss, including 3 stages of male gametogenesis. The majority of this data set is easily accessible through the *Physcomitrella* eFP browser at the Bio-Analytical Resource for Plant Biology.

Based on our detailed time-course of sporophyte developmental progression we identified a comprehensive set of sporophyte specific transcription factors. We found that many of these genes have homologs in angiosperms that function in developmental processes such as flowering and shoot branching. Deletion of the PpTCP5 transcription factor resulted in development of supernumerary sporangia attached to a single seta, suggesting that it negatively regulates branching in the moss sporophyte. Given that TCP genes repress branching in angiosperms, we suggest that this activity is ancient.

During spermatogenesis a complex transcriptome was observed, characterized by a high number of enriched and preferentially expressed genes. A phylostratigraphic analysis showed that in antherozoids those transcripts correspond to evolutionarily younger genes, and therefore might act as a source of evolutionary gene innovation. These studies will be continued within the scope of the ERA-CAPS funded project EVOREPRO, which started in July 2015. Here our focus will be on epigenetic mechanisms during male gametogenesis in *Physcomitrella*.

In our search for tetraspanin signalling complexes with potential importance for gamete cellular interactions and double fertilization we identified several potential tetraspanin-interacting binding partners (TBPs). The double mutant of two functionally redundant TBPs (tbp8/9) expressed in sperm cells (SC), showed an altered SC-SC membrane interface and SC connection to the pollen vegetative nucleus. Despite no apparent change in the expression of known sperm adhesion (GEX2) and fusion (GCS1) factors, tbp8/9 presents severe fertility defects, caused by predominant single fertilization events. These results support that TBP8/9 is part of a sperm cell-specific TET signalling complex involved in the regulation of intercellular connections within the male gametophyte and with essential functions in plant gamete fusion.

Boavida, L.C., Hernandez-Coronado, M., Becker, J.D. *Setting the stage for the next generation: Epigenetic reprogramming during sexual plant reproduction*. In Pontes O, Jin H (ed): **Nuclear functions in plant transcription, signalling and development**, pp. 93-118 Springer Science+Business Media, LLC, New York. ***In press.***

PUBLICATIONS

Jiang, H., Boavida, L.C., Chen, Y., **Becker, J.D.**, Kohler, C., McCormick, S. (2015). *Intercellular communication in* Arabidopsis thaliana *pollen discovered via AHG3 transcript movement from the vegetative cell to sperm*. **Proc Natl Acad Sci U S A.** 112(43): 13378-83.

Kappel, C., Trost, G., Czesnick, H., Ramming, A., Kolbe, B., Vi, S.L., Bispo, C., **Becker, J.D.,** de Moor, C., Lenhard, M. (2015). *Genome-wide analysis of PAPS1-Dependent polyadenylation identifies novel roles for functionally specialized Poly(A) polymerases in* Arabidopsis thaliana. **PLoS Genet.** 11(8): e1005474.

MacAlister, C.A., Ortiz-Ramírez, C., **Becker, J.D.**, Feijó, J.A., Lippman, Z.B. (2015). *Hydroxyproline O-arabinosyltransferase mutants oppositely alter tip growth in* Arabidopsis thaliana *and* Physcomitrella patens. **Plant J. [Epub ahead of print].**

Ortiz-Ramírez, C., Hernandez-Coronado, M., Thamm, A., Catarino, B., Wang, M., Dolan, L., Feijó, J.A., **Becker, J.D.** (2015). *A transcriptome atlas of* Physcomitrella patens *provides insights into the evolution and development of land plants*. **Mol Plant. [Epub ahead of print].**

GROUP LEADER

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PhD in Biology
University of Bielefeld, Germany, 2001

Group Leader at IGC since 2008

Previous positions
Postdoctoral Fellow, Instituto Gulbenkian de Ciência, Portugal

Institutional Roles at IGC
Head of Gene Expression Unit

GROUP MEMBERS

Leonor Boavida, Postdoc
Ann-Cathrin Lindner, Postdoc | *Started in September*
Marcela Coronado, External PhD student | *Left in September*
Patrícia Pereira, External PhD student
Sónia Pereira, Masters student | *Left in December*
Mário Santos, Technician | *Started in April*
Joana Caria, Trainee | *Left in March*
Custódio Nunes, Trainee | *Started in January; left in June*

Funding
Fundação para a Ciência e a Tecnologia

Collaborators
Frederik Berger (Gregor Mendel Institute, Austria)
José Gutierrez-Marcos (School of Life Sciences, UK)
Rui Martinho (Universidade do Algarve, Portugal)
Leonilde Moreira (IST, Portugal)
Marek Mutwil (MPI for Molecular Plant Physiology, Germany)
David Twell (University of Leicester, UK)

Outreach
Media appearances in newspapers and other channels, July.

VARIATION: DEVELOPMENT AND SELECTION

GROUP LEADER
Beldade, Patrícia

RESEARCH INTERESTS

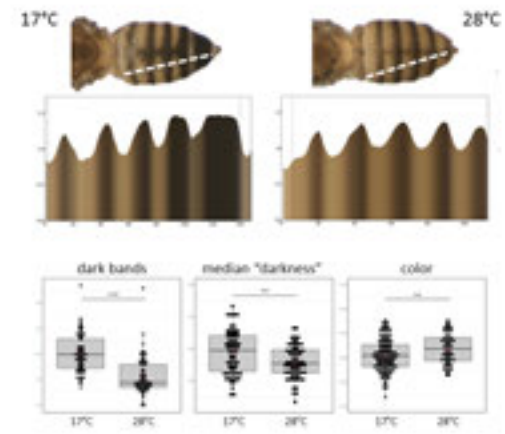
My research in evolutionary developmental biology is focused on the mechanistic basis of phenotypic variation and adaptation. Heritable phenotypic variation is the raw material for natural selection, and a universal property of biological systems. Understanding the mechanisms that generate this variation is a key challenge in biological research. What are the gene types, specific genes, and gene regions that contribute to evolutionarily relevant variation? How do they interact with environmental factors to regulate developmental trajectories and outcomes and account for phenotypic plasticity? For the dissection of variation in complex, diversified and ecologically-relevant phenotypes the lab is currently using three complementary systems: wing colour patterns in butterflies, body architecture in ants, and pigmentation in flies.

PROJECTS RUNNING IN 2015

- Wound response and pigmentation pattern formation: cellular, molecular and evolutionary considerations
- Environmental stress and the generation of new genetic variants: TEs and piRNAs in *Drosophila* oogenesis
- Environmentally-induced phenotypic variation: molecular mechanisms and evolution
- Adaptation to new ecological niches: nutrition and *Drosophila suzukii*
- Genetic basis of variation and diversity: characterization of a hotspot locus for pigmentation evolution
- Morphological and behavioural variation in ants: comparing species, castes, and individuals
- Evolution and regulation of developmental plasticity in butterfly wing colouration

MAIN ACHIEVEMENTS IN 2015

Our group's Eco-Evo-Devo research combines concepts and approaches from different disciplines to characterize genetic and environmental factors (and corresponding mechanisms) that account for intraspecific variation and inter-species divergence in adaptive traits. During 2015, we used different insect models to explore the genetic and environmental factors that account for phenotypic variation and diversity. The bulk of the lab's work focused on the role of the external environment in the generation of novel genetic variants (through the mobilization of transposable elements, TEs) and of novel phenotypic variants (through developmental plasticity). The work of PhD candidate Marta Marialva and MSc candidate Ana Eugénio explored the effect of an external abiotic factor (temperature) and internal biotic factor (*Wolbachia* endosymbiont) factors in TE dynamics during *Drosophila melanogaster* oogenesis and found complex patterns of response that depended on host genotype and TE identity. We also had various projects addressing the impact of the environment on adult phenotype: thermal plasticity in *D. melanogaster* body pigmentation (work of PhD candidate Elvira Lafuente and of student volunteer Jessica King), effect of immune challenge on wing patterns of *Bicyclus anynana* butterflies (work of PhD candidate Maria Adelina Jerónimo which will be followed by PhD candidate Yara Rodrigues), and nutritional plasticity in body architecture in different ant species (work of MSc candidate Andreia Teixeira) and adult performance of *Drosophila* species (work of PhD candidate Nuno Soares). These projects characterized different aspects of the genetic and physiological factors that underpin the environmental-dependence of organismal development: 1) differences in height and slope of thermal reaction norms for body pigmentation between ca. 200 *D. melanogaster* genotypes, 2) similar effects of developmental temperature and immune challenge on ecdysone levels known to affect wing pattern development in *B. anynana*, 3) differences in response to juvenile hormone manipulations between body part, caste and species of ants, 4) differences between closely related species of *Drosophila* in how they respond to macronutrient variation in larval diet. Finally, the lab also completed the work in an FCT-funded project exploring the genetic basis of variation in butterfly wing patterns (work of MSc candidate Carolina Silva and lab manager Pedro Castanheira). We characterized differences between wing pattern mutants in sequence and expression of candidate genes identified by genetic mapping, and started to explore methods of gene editing to study the function of those candidate genes.



Quantifying thermal plasticity in *D. melanogaster* body pigmentation. Example of abdominal pigmentation in two female of the same genotype that differ in terms of what temperature they developed as. The graphs represent the distance to white of every pixel along the transects shown as dashed line on the fly abdomens. Below, we illustrate thermal plasticity for several aspects of abdominal colouration. Image from Elvira Lafuente.

GROUP LEADER

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PhD in Evolution and Development Leiden University, The Netherlands, 2002

Group Leader at IGC since 2009

Previous positions
Associate Professor, Institute of Biology, Leiden University, The Netherlands

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GROUP MEMBERS

Maria Adelina Jerónimo, External PhD student | *Left in November*
Elvira Lafuente, PhD student, PIBS 2013
Marta Marialva, PhD student, PIBS 2011
Yara Rodrigues, PhD student, PGCD 2015 | *Started in September*
Nuno Soares, PhD student, PIBS 2013
Ana Eugénio, Masters student
Carolina Silva, Masters student
Andreia Teixeira, Masters student | *Left in November*
Jessica King, Undergraduate student | *Left in August*
Pedro Castanheira, Technician

Funding
Fundação para a Ciência e a Tecnologia

Collaborators
Filipa Alves (IGC, Portugal)
Manuel Marques Pita (IGC, Portugal)
Arnaud Martin (University of California at Berkeley, USA)
Christen Mirth (IGC, Portugal)
Suzanne Saenko (Natural History Museum of Paris, France)

Outreach
Public talk for general public, Lisbon, April.

Media appearance in newspapers, January, April.

CELL CYCLE REGULATION

GROUP LEADER

Bettencourt-Dias, Mónica

RESEARCH INTERESTS

Our research focuses on cell cycle progression and the cytoskeleton in normal development and disease. We are particularly interested in the role played by microtubule organising structures, such as the centrosome, cilia and flagella. The centrosome is the major microtubule organiser in animal cells, and is very often abnormal in cancer. Cilia and flagella are cellular projections, which are indispensable in a variety of cellular and developmental processes including cell motility, propagation of morphogenic signals and sensory reception. Despite their importance, we know very little about centrosome and cilia biogenesis or how they may go awry in human disease. Our laboratory uses an integrated approach to study those questions: we combine studies in model organisms with studies in human cells, bioinformatics and mathematical modelling to have an integrated view of this process. The fruit fly is an excellent organism to address those questions, since it combines possibilities of screening multiple genes with the ability to perform in-depth regulation studies in the whole organism. As the regulatory mechanisms of the cell cycle and cytoskeleton have been highly conserved throughout evolution, we can extrapolate our findings to humans to test their relevance for human disease. An understanding of the pathways involved in cell cycle and cytoskeleton can generate diagnostic and prognostic markers and hopefully provide novel therapeutic targets in human disease.

PROJECTS RUNNING IN 2015

- Centriole elimination in oogenesis
- Centrosome Evolution
- Centrosome Number Control in Space and Time
- Centriole Structure
- Centrosome changes in Cancer
- Cilia, their diversity and maintenance

MAIN ACHIEVEMENTS IN 2015

CENTROSOME BIOGENESIS AND STABILITY

Focusing on PLK4 regulation in space and time our group has identified mechanisms by which centrosomes form always at the same place (PLK4 trans-autoactivation plays a critical role) and always at the same time (regulated by CDK1 activity).

We have been characterizing new microtubule regulators that regulate centriole elongation and biogenesis. We have discovered that centrioles are not intrinsically stable but need to be stabilized by their matrix. In doing so we have discovered a mechanism by which centrosomes are inactivated and eliminated in oogenesis. We were able to prevent centrosome loss and show that that leads to problems in embryogenesis after fertilization.

CENTROSOMES IN CANCER

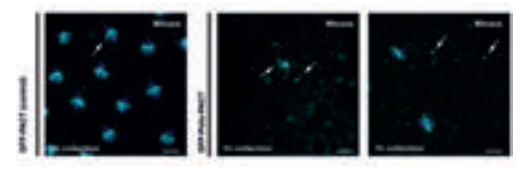
We have found that centrosome amplification and their clustering in mitosis is a hallmark of cancer. Using Barrett´s esophagus as a model system we show that centrosome amplification occurs early during tumorigenesis in dysplasia and is dependent on p53 inactivation.

CENTROSOMES IN EVOLUTION

We have discovered and are characterizing parallels between SPB and centrosome assembly that raise new questions regarding their evolution.

CILIA STRUCTURE AND MAINTENANCE

We have shown that cilia within an organism, such as *Drosophila*, are much more diverse than previously thought and that diversity in basal body and transition zone structure is critical to create diversity in function. We have also uncovered that cilia in *Drosophila* need to be actively maintained for their correct function.



***Drosophila* syncytial embryos expressing Polo tethered to the centrioles show several mitotic defects and arrest development.** Embryos collected 1h after fertilization. GFP-Polo-PACT embryos show supernumerary centrioles and few divisions, often with more than one centrosome at each pole (left panel, arrow) and scattered DNA (right panel, arrows). GFP-Polo-PACT (green), alpha-Tubulin (blue) and DNA (cyan). Scale bars, 10µm.

PUBLICATIONS

Chen, J.V., Kao, L.R., Jana, S.C., Sivan-Loukianova, E., Mendonça, S., Cabrera, O.A., Singh, P., Cabernard, C., Eberl, D.F., **Bettencourt-Dias, M.**, Megraw, T.L. (2015). *Rootletin organizes the ciliary rootlet to achieve neuron sensory function in* Drosophila. **J. Cell Biol.** 211(2): 435-53.

Lopes, C.A., Jana, S.C., Cunha-Ferreira, I., Zitouni, S., Bento, I., Duarte, P., Gilberto, S., Freixo, F., Guerrero, A., Francia, M., Lince-Faria, M., Carneiro, J., **Bettencourt-Dias, M.** (2015). *PLK4 trans-autoactivation controls centriole biogenesis in space.* **Dev Cell.** 35(2): 222-35.

GROUP LEADER

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PhD in Cell Biology
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Group Leader at IGC since 2006

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Research Associate, University of Cambridge, UK

Institutional Roles at IGC
PI mentoring committee

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Daisuke Ito, Postdoc
Swadhin Jana, Postdoc
Carla Lopes, Postdoc
Ana Rita Marques, Postdoc
Gaelle Marteil, Postdoc
Susana Montenegro-Gouveia, Postdoc
Zitouni Sihem, Postdoc
Catarina Nabais, PhD student, IBB 2014
Sascha Werner, PhD student, IBB 2013
Katharina Dores, Masters student
Paulo Duarte, Research Assistant
Susana Mendonça, Research Assistant

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European Research Council

Collaborators
Juliette Azimzadeh (Jacques Monod, Paris), **Tiago Bandeiras** (Instituto de Tecnologia Química e Biológica, Portugal), **Paula Chaves** (Instituto Português de Oncologia, Portugal), **Miguel Godinho Ferreira** (IGC, Portugal), **Eric Karsenti** (EMBL, Germany), **David Pellman** (Harvard Medical School, USA), **José Pereira-Leal** (IGC, Portugal), **Ivo Telley** (IGC, Portugal), **Susana Godinho** (Barts Institute, London), **Thierry Lorca** (Montpellier), **Jadranka Loncarek** (NIH) **Andrew Holland** (John Hopkins), **Joana Paredes & Andre Vieira** (IPATMUP, Porto)

Outreach

Multimedia Resources - video paper, October.

Media appearance in newspapers, TV and other channels, March, May, July, December.

IGC stand at NOS Alive'15 - speed dating, Algés, July.

QUANTITATIVE ORGANISM BIOLOGY

GROUP LEADER
Carneiro, Jorge

RESEARCH INTERESTS

Cells of multicellular organisms cooperate to ensure body development and maintenance throughout life. They do this in a collective distributed manner, without any master or plan.

The *Quantitative Organism Biology* group studies the multilevel mechanisms that give rise to properties of the whole organism, in search for general principles of biological organisation and, eventually, the design of artificial systems.

One of our main research interests is the immune system, in which cells collectively ensure body housekeeping and homeostasis, avoid autoimmune diseases, and fight cancer and infections. We also investigate the morphodynamics of cells and tissues during fertilisation and embryonic development of metazoan.

Our approach is two fold: on the one hand, we create mathematical models of specific exemplary systems aiming to uncover basic principles, and on the other hand, we develop the quantitative methods required to assess the properties and predictions of these models.

PROJECTS RUNNING IN 2015

• Morphodynamic modelling and imaging of sperm chemotaxis in three dimensions
• Regulation of the biosynthesis single product in the cell: from VDJ recombination to centrosome synthesis
• Interplay between immune tolerance and disease tolerance in the vertebrate immune system

MAIN ACHIEVEMENTS IN 2015

A model of membrane potential and ion flux dynamics, featuring the sperm-specific channel Catsper, explains the pH changes and the temporal organisation and envelop of the spike-trains of cytosolic calcium elicited in sea urchin spermatozoa by sperm activation peptides.

A model of polo-like kinase 4 activation, a rate limiting kinase involved in centriole biosynthesis, suggests that supernumerary centrioles can be avoided by concentrating this kinase at the centrosome thus reducing its cytosolic levels below a critical threshold.

A model of the recombination of antigen receptors and its control indicates that allelic exclusion, the quasi-absence of lymphocytes with two functional receptor genes, may be a functionless side-product of reducing the risk of collateral Rag-mediated genome damage.

PUBLICATIONS

González-Cota, A.L., Silva, P. Â, **Carneiro, J.**, Darszon, A. (2015). *Single cell imaging reveals that the motility regulator speract induces a flagellar alkalinization that precedes and is independent of Ca2+ influx in sea urchin spermatozoa*. **FEBS Lett**. 589(16): 2146-54.

Lopes, C.A., Jana, S.C., Cunha-Ferreira, I., Zitouni, S., Bento, I., Duarte, P., Gilberto, S., Freixo, F., Guerrero, A., Francia, M., Lince-Faria, M., **Carneiro, J.,** Bettencourt-Dias, M. (2015). *PLK4 trans-autoactivation controls centriole biogenesis in space*. **Dev Cell.** 35(2): 222-35.

Wood, C.D., Guerrero, A., Priego-Espinosa, D.A., Martinez-Mekler, G., **Carneiro, J.**, Darszon, A. (2015). *Sea Urchin Sperm Chemotaxis*. In **Flagellar Mechanics and Sperm Guidance** (Cosson JJ., Ed.) pp. 135-182.

GROUP LEADER

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PhD in Biomedicine
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Group Leader at IGC since 1998

Previous positions
Postdoctoral Fellow, Theoretical Biology and Bioinformatics, University of Utrecht, The Netherlands

Institutional Roles at IGC
Deputy Director for Science

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GROUP MEMBERS

Tiago Macêdo, PhD student, PGCB 2008
Delphine Pessoa, PhD student, IBB 2013
Pedro Silva, External PhD student
Eleonora Tulumello, PhD student, IBB 2015
Daniel Espinosa, Visiting PhD student

Collaborators
Mónica Bettencourt-Dias (IGC Portugal)
Gabriel Corkidi (Instituto de Biotecnologia, UNAM, Mexico)
Alberto Darszon (Instituto de Biotecnologia, UNAM, Mexico)
Jocelyne Demengeot (IGC Portugal)
Adan Guerrero (Instituto de Biotecnologia, UNAM, Mexico)

Outreach
Workshop Inspirar Ciência 2015 - Theoretical and practical teaching of high school teachers, IGC, September.

MOLECULAR NEUROBIOLOGY

GROUP LEADER
Castro, Diogo

RESEARCH INTERESTS

Our main goal is to understand how global programmes of gene expression are regulated during vertebrate neurogenesis. Along the neuronal lineage, an intrinsic programme that relies on the activity of transcription factors and the epigenetic landscape coordinates the progression of progenitors throughout distinct cellular stages. Such intrinsic programme integrates information from local extracellular signals (e.g. through cell to cell contact) or from long range cues (e.g. secreted factors), resulting in the progression of a coherent programme of cellular differentiation that requires governing the expression of a large number of genes. In order to understand the regulatory logic of neurogenesis, we focus our studies on proneural transcription factors (e.g.Mash1/Ascl1) as these function as master regulators of neurogenesis by coordinating the various components of the differentiation programme. We investigate how Ascl1 interacts with the chromatin landscape and other transcriptional networks, in particular the Notch pathway. In addition, we are also interested in understanding how key transcriptional networks that underlie neural stem cell function are hijacked during tumorigenesis.

In this context we use cancer stem cell models of Glioblastoma Multiform, the most frequent and aggressive of brain tumours. In our research we use a multidisciplinary approach, combining mouse genetics, genomics and stem cell biology techniques.

PROJECTS RUNNING IN 2015

- Transcriptional control of vertebrate neurogenesis by the Proneural and Notch pathways
- Mitotic inheritance of the neural stem/progenitor cell network
- The transcriptional network of the zinc-finger factor Zeb1 and its function in the embryonic nervous system and glioma development

MAIN ACHIEVEMENTS IN 2015

We used a cellular model of neurogenesis to investigate how Ascl1 interacts with the chromatin landscape to regulate gene expression when promoting neuronal differentiation. We found that Ascl1 binding occurs mostly at distal enhancers and is associated with activation of gene transcription. Surprisingly, the accessibility of Ascl1 to its binding sites in neural stem/progenitor cells remains largely unchanged throughout their differentiation, as Ascl1 targets both regions of readily accessible and closed chromatin. Moreover, binding of Ascl1 often precedes an increase in chromatin accessibility and the appearance of new regions of open chromatin, associated with de novo gene expression during differentiation. These observations identified a novel function of Ascl1 in promoting chromatin accessibility during neurogenesis, linking the chromatin landscape at Ascl1 target regions with the temporal progression of its transcriptional programme.

We identified the zinc-finger factor MyT1 as a direct target of Ascl1 at the onset of neuronal differentiation. We found MyT1 functions as a transcriptional repressor genome-wide, acting at multiple levels to antagonize the inhibitory activity of Notch signalling. It targets both Notch pathway components and many of its downstream targets, including known regulators of the neural stem cell programme, such as Sox2, Olig1 or Id3. Our results reveal an intricate gene regulatory network centred on MyT1, through which Ascl1 efficiently suppresses Notch signalling cell-autonomously, thereby coupling neuronal differentiation with repression of the progenitor programme.

PUBLICATIONS

Mateo, J.L., van den Berg, D.L., Haeussler, M., Drechsel, D., Gaber, Z.B., **Castro, D.S.,** Robson, P., Crawford, G.E., Flicek, P., Ettwiller, L., Wittbrodt, J., Guillemot, F., Martynoga, B. (2015). *Characterization of the neural stem cell gene regulatory network identifies OLIG2 as a multi-functional regulator of self-renewal.* **Genome Res.** 25(1): 41-56.

Raposo, A.A., Vasconcelos, F.F., Drechsel, D., Marie, C., Johnston, C., Dolle, D., Bithell, A., Gillotin S., van den Berg, D.L., Ettwiller, L., Flicek, P., Crawford, G.E., Parras, C.M., Berninger, B., Buckley, N.J., Guillemont F., **Castro, D.S.** (2015). *Ascl1 coordinately regulates gene expression and the chromatin landscape during neurogenesis.* **Cell Rep. [Epub ahead of print].**

GROUP LEADER

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PhD in Cell and Molecular Biology
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Previous positions
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Post doctoral fellow, MRC National Institute for Medical Research, UK

GROUP MEMBERS

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Pedro Rosmaninho, External PhD student
Diogo Tomaz, Masters student
Vera Teixeira, Laboratory Manager

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Fundação para a Ciência e a Tecnologia

Collaborators
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Domingos Henrique (IMM Portugal)
Jane E. Johnson (University of Texas Southwestern Medical Center at Dallas, USA)
Deolinda Lima (Faculdade de Medicina da Universidade do Porto, Portugal)
Stefan Momma (Johann Wolfgang Goethe University, Germany)
David J. Solecky (St. Jude Children's Research Hospital, USA)

NETWORK MODELLING

GROUP LEADER

Chaouiya, Claudine

RESEARCH INTERESTS

Thanks to great technological advances, regulatory networks are being uncovered that control cellular processes. Complementary to experimental approaches, mathematical models allow to get further insights into the functioning of these complex networks and to formulate hypotheses, e.g. identify proper strategies to enforce or prevent certain properties.

In this context, considering the dimensions and complexity of the networks at stake, we mainly rely on the logical framework, which can uncover the key characteristics of the dynamics of such large networks, as demonstrated by a growing number of published models. Our activity is mainly organised along three lines:

• Methodological developments to enhance the analysis of large interaction networks (properties in terms of attractors, reachability, etc.);
• Implementation of new methods in the form of software tools;
• Development of models to tackle specific biological questions, in close collaboration with experimentalists.

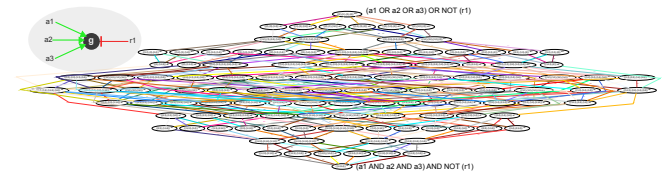
MAIN ACHIEVEMENTS IN 2015

We contributed to two modelling studies that have been recently published, which both show the versatile utility of logical models.

The first aimed to assess patterns of frequent genetic alterations, co-exclusivities or co-occurrences, observed in bladder cancer. To do so, interactions between these genes were organised into an influence network based on literature analysis. Because the sole network topology cannot explain all patterns, a logical model was built, accounting for the dynamics of associated pathways. This model shed light on aberrant activation of some pathways and provided predictions about contexts in which combined alterations would benefit tumorigenesis [Remy *et al.,* Cancer Res. 75(19): 4042-52, 2015].

The second model focuses on the cellular network regulating the differentiation of T-helper cells. Our model-checking tools to analyze reachability properties allowed uncovering observed polarization of naïve cells as well as substantial plasticity of Th subtypes depending on the signalling environment [Abou-Jaoudé *et al.,* 2015].

We also advanced on some methodological aspects. In particular, to better assess the complexity of choosing regulatory functions as well as the impact of this choice on model dynamics, we have fully characterized the Boolean functions compatible with a regulatory structure (i.e. complying with the sign and functionality of each regulatory interaction). We have further devised an efficient SAT-based approach to identify all the stable states of logical models defined as model compositions over 2D grids of cells.



Characterization of Boolean functions compatible with the signs of the regulations (inhibitions or activations) of a component. Here g has 3 activators and 1 inhibitor; there are 144 compatible Boolean functions to describe how g behaves depending on the presence/absence of its regulators. These functions are organised in a Hasse diagram, a convenient representation for a partially ordered set. Our motivation is to provide answers to the following questions: how many functions, how they relate to each other, what is the impact on the model properties if choosing one or another function?

PUBLICATIONS

Abou-Jaoudé, W., Monteiro, P.T., Naldi, A., Grandclaudon, M., Soumelis, V., **Chaouiya, C.**, Thieffry, D. (2015). *Model checking to assess T-helper cell plasticity.* **Front Bioeng Biotechnol.** 2: 86.

Chaouiya C., Keating S. M., Berenguier D., Naldi A., Thieffry D., van Iersel M. P., Le Novere N., Helikar T. (2015) *SBML Level 3 package: Qualitative Models, Version 1, Release 1.* **J Integr Bioinform.** 12(2): 270.

Naldi, A., Monteiro, P.T., Müssel, C.; the Consortium for Logical Models and Tools, Kestler, H.A., Thieffry, D., Xenarios, I., Saez-Rodriguez, J., Helikar, T., **Chaouiya, C.** (2015). *Cooperative development of logical modelling standards and tools with CoLoMoTo.* **Bioinformatics.** 31(7): 1154-1159.

Remy, E., Rebouissou, S., **Chaouiya, C.**, Zinovyev, A., Radvanyi, F., Calzone, L. (2015). *A modelling approach to explain mutually exclusive and co-occurring genetic alterations in bladder tumorigenesis.* **Cancer Res.** 75(19): 4042-52.

SOFTWARE DEVELOPMENT

GINsim

GINsim supports the definition and analysis of logical models of regulatory/signalling networks. This software is in constant development, implementing most of our methodological advances.
http://ginsim.org

EpiLog

EpiLog supports the extension of the logical modelling approach to multi-cellular systems represented as grids of communicating cells. We have recently refactored the code, the graphical interface has been improved and novel updating schemes have been implemented to overcome the unrealistic synchronous behaviours of cellular automata.
http://epilog-tool.org/

GROUP LEADER

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Group Leader at IGC since 2009

Previous positions
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GROUP MEMBERS

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Ricardo Pais, PhD student, PIBS 2013
Pedro Varela, External PhD student
Camila V. Ramos, Technician

Collaborators
Laurence Calzone (Institut Curie, France)
Jorge Carneiro (IGC, Portugal)
Tomas Helikar (University of Nebraska, USA)
Elisabeth Remy (Institut de Mathématiques de Luminy, France)
Julio Saez-Rodriguez (EMBL-EBI, Cambridge UK)
Lucas Sánchez (Centro de Investigaciones Biológicas, CSIC, Spain)
Élio Sucena (IGC, Portugal)
Denis Thieffry (École Normale Supérieure, France)

Outreach
Workshop Inspirar Ciência 2015 - Theoretical and practical teaching of high school teachers, IGC, September.

ECO-EVOLUTIONARY GENETICS

GROUP LEADER
Chelo, Ivo

RESEARCH INTERESTS

We are interested in how adaptation to stressful environments is affected by interactions between organisms. For this purpose we use a multilevel approach that ranges from genes to ecosystems in the context of experimental evolution with *C. elegans* and different bacteria. The focus is on intra-population mechanisms, by which negative feedbacks can lead to the maintenance of genetic variability, or on interactions between species, where strong selective pressures occur between predators and prey or host and parasites. In this context we want to broadly know:

1. If adaptation to a new environment is affected primarily by the type (host/parasite, host/commensal, predator/prey, etc) or by the strength of interactions;
2. If the strength and type of interactions between organisms can change due to co-evolution during adaptation.

PROJECTS RUNNING IN 2015

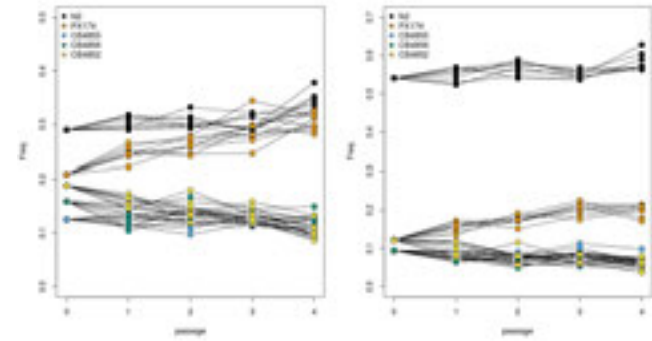
• Diversity and frequency-dependent selection in *Caenorhabditis elegans*

• The genetic basis of consumer/resource interactions and the evolution of aging

• Host-microbe interactions and the evolution of aging

MAIN ACHIEVEMENTS IN 2015

This year, we developed an efficient sequencing-based method to detect changes in frequencies of wild-type *C. elegans* isolates. With this, we show that frequency-dependent fitness effects are prevalent in competitions in the lab, which reveals possible evolutionary consequences of heterogeneity in *C. elegans* behaviour. The next stage of this research will test the adequacy of the worm model to mimic the eco-evolutionary consequences of resource heterogeneity in nature.



Despite large fitness differences between *C. elegans* isolates, frequency-dependent effects prevent absolute loss of genetic diversity thus keeping the adaptive potential of populations.

GROUP LEADER

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PhD in Molecular Biology
Universidade de Lisboa, 2007

Group Leader at IGC since 2014

Previous positions
Postdoctoral Fellow, Instituto Gulbenkian de Ciência, Portugal

GROUP MEMBERS

Ana Laranjeira, Masters student | *Started in October*
Brigite Matos, Undergraduate student | *Left in June*
Ana Paula Marques, Technician
Sara Santos, Technician | *Left in April*

Funding
Fundação para a Ciência e a Tecnologia

Collaborators
Lília Perfeito (IGC, Portugal)
Zofia Prokop (Institute of Environmental Sciences, Poland)
Henrique Teotónio (Institute de Biologie de l'École Normale Supérieure, France)

POPULATION AND CONSERVATION GENETICS

GROUP LEADER
Chikhi, Lounès

RESEARCH INTERESTS

Genetic and genomic data are influenced by the demographic events that have shaped the history of populations. Such events include population collapses, expansions, or admixture processes. Our group is interested in developing new and using/testing existing methods to improve our understanding of these events and of the recent evolutionary history of species. We also, and crucially, want to understand the limits of genetic or genomic data as inferential tools. Applications go from human evolution (e.g. the Neolithic transition in Europe) to conservation genetics of wild (e.g. orang-utans, lemurs, dolphins) and domesticated species (e.g. cattle, sheep).

Work currently done at the *Population and Conservation Genetics* (PCG) group involves field work in Madagascar, Guiné-Bissau and Portugal, and the genetic typing of endangered species (lemurs, endemic and invasive rodents, red colobus, bottlenose dolphins) data analysis and simulation. We are also moving towards the use of genomic data (RAD-seq). We collaborate with the laboratoire *Evolution & Diversité Biologique*, in Toulouse, where Lounès Chikhi is a Senior researcher (Directeur de Recherche) and with colleagues from various institutions, including several in Portugal, the UK (Reading University), France (Institut de Mathématiques de Toulouse), Madagascar (Univ. Mahajanga, Antananarivo, Antsirana), or Malaysia (Danau Girang Field Station).

PROJECTS RUNNING IN 2015

• A vertebrate's eye view on habitat loss and fragmentation across time and space in Madagascar
• Assessing the molecular, toxicological and ecological status of the bottlenose dolphin from the Sado estuary (Portugal), a highly human-impacted environment

MAIN ACHIEVEMENTS IN 2015

With Bárbara Parreira we showed that social groups can maintain high levels of genetic and genotypic diversity. Social groups are common among primates and vertebrates. Population geneticists tend to either ignore them (focusing at the level of the population) or to consider them as small "populations". If they behaved as small populations they should be subject to significant genetic drift and lose diversity rapidly. This is not what we find. We use simulations and find that social groups maintain high levels of genotypic (i.e. individual) and genetic (i.e. at the level of the group) diversity.

With Olivier Mazet, a mathematician from the Institut de Mathématiques de Toulouse, IMT, and Willy Rodriguez, the PhD student that we co-supervise, we showed that it is possible to use genetic data from a single individual to do model selection in population genetics. Population geneticists typically use genetic data from populations to identify which among several alternative models best explains the observed patterns of genetic diversity and differentiation. Here we showed that we can do that with genomic data from a single individual.

In the same study (with Olivier Mazet and Willy Rodriguez) we also showed that if a population or species is structured (organised in a set of S subpopulations) we can estimate the number of subpopulations, S, simply by analysing the genetic data from one individual sampled in any of these populations.

With two additional colleagues (Simona Grusea from the IMT and Simon Boitard from the INRA Toulouse) we also showed that genomic data from a single individual can be wrongly used to identify changes in population size that may never have taken place. This study was published online in Dec. 2015, but will only appear in the Feb. Issue of Heredity.

Propithecus perrieri is one of the rarest primates in the world. It is has been classified as one of the 25 most endangered primates by the IUCN on various occasions. We have carried out the most thorough study of genetic diversity and differentiation of the species. We found that the species is indeed genetically less variable than sister species. This genetic study together with previous work on population size estimates published in 2013 led us to contribute to the IUCN book on the 25 Most endangered primates of the world.

Lemurs in Madagascar.

GROUP LEADER

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PhD in Population Genetics
Université Pierre et Marie Curie, France, 1995

Group Leader at IGC since 2007

Other positions
Directeur de Recherche 2ème classe CNRS (Centre National de la Recherche Scientifique)

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GROUP MEMBERS

Inês Carvalho, Postdoc
Tânia Rodrigues, Postdoc
Reeta Sharma, Postdoc
Jordi Salmona, PhD student, PIBS 2010
Isabel Alves, External PhD student
Bárbara Parreira, External PhD student
Willy Rodríguez, External PhD student
Ana Sousa, External Masters student | *Left in February*
Rúben Oliveira, External Masters student | *Started in October*
Ana Rita Monteiro, Undergraduate student | *Started in May*
Kevin Chapdelaine, Trainee | *Started in June; left in September*
Tiago Maié, Trainee and NOS Alive Research Fellow
Patricia Santos, NOS Alive Research Fellow | *Started in December*
Barbara Le Pors, Technician
Isa Pais, Technician

Funding
Fundação para a Ciência e a Tecnologia
ICNF - TroiaNatura S.A.

Collaborators
Marc Ancrenaz (Kinabatangan Orang-utan Conservation Project, Malaysia)
Mark Beaumont (University of Bristol, UK),
Guillaume Besnard (CNRS/Université de Toulouse, France)
Simon Boitard (Génétique Animale et Biologie Intégrative, France)
Michael Bruford (Cardiff University, UK)
Benoît Goossens (Cardiff University, UK & Danau Girang Field Center, Malaysia)

PUBLICATIONS

Alves, J.M., Lima, A.C., Pais, I.A., Amir, N., Celestino, R., Piras, G., Monne, M., Comas, D., Heutink, P., **Chikhi, L.**, Amorim, A., Lopes, A.M. (2015). *Reassessing the evolutionary history of the 17q21 inversion polymorphism*. **Genome Biol. Evol.** 7(12): 3239-48.

Amir, N., Sahnoune, M., **Chikhi, L.,** Atmani, D. (2015). *STR-based genetic structure of the Berber population of Bejaia (Northern Algeria) and its relationships to various ethnic groups*. **Gene.** 574(1): 140-8.

Banks, M.A., Patel, E.R., **Chikhi, L.**, Salmona, J. (2015) Perrier's sifaka Propithecus perrieri (Lavauden, 1931). In Schwitzer, C., Mittermeier, R.A., Rylands, A.B., Chiozza, F., Williamson, E.A., Wallis, J. and Cotton, A. (eds.). *Primates in Peril: The World's 25 Most Endangered Primates 2014-2016*. pp 38-41. IUCN SSC Primate Specialist Group (PSG), International Primatological Society (IPS), Conservation International (CI), and Bristol Zoological Society, Arlington, VA.

Martinho, F., Pereira, A., Brito, C., Gaspar, R., **Carvalho, I.** (2015) *Structure and abundance of bottlenose dolphins* (Tursiops truncatus) *in coastal Setúbal bay, Portugal*. **Marine Biology Research**, 11(2): 144-156.

Mazet, O., Rodríguez, W., **Chikhi, L.** (2015). *Demographic inference using genetic data from a single individual: Separating population size variation from population structure*. **Theor Popul Biol.** 104: 46-58.

Mazet, O., Rodríguez, W., Grusea, S., Boitard, S., **Chikhi, L.** (2015). *On the importance of being structured: instantaneous coalescence rates and human evolution-lessons for ancestral population size inference?*. **Heredity (Edinb). [Epub ahead of print].**

Miller, A., Ralantoharijaona, T., Misandeau, C., Andriaholinirina Volasoa, N., Mills, H., Bencini, R., **Chikhi, L.**, Salmona, J. (2015) *A biological survey of Antsahanadraitry forest (Alan'Antanetivy corridor, Manompana) reveals the presence of the hairy-eared dwarf lemur* (Allocebus trichotis). **Lemur News** 19, 4-6.

Minhos, T., Sousa, C., Vicente, L.M., Bruford, M.W. (2015). *Kinship and intragroup social dynamics in two sympatric african* Colobus *species*. **Int J Primatol.** 36(4): 871-886.

Parreira, B.R., **Chikhi, L.** (2015). *On some genetic consequences of social structure, mating systems, dispersal, and sampling*. **Proc Natl Acad Sci U S A.** 112(26): E3318-26.

Salmona, J., Banks, M., Ralantoharijaona, T.N., Jan, F., Rasolondraibe, E., Zaranaina, R., Rakotonanahary, A., Wohlhauser, S., Sewall, B.J., **Chikhi, L.** (2015) *The value of the spineless monkey orange tree* (Strychnos madagascariensis) *for conservation of northern sportive lemurs* (Lepilemur milanoii *and* L. ankaranensis). **Madagascar Conservation and Development** 10(2): 53-59.

Salmona, J., Teixeira, H., Rasolondraibe, E., Aleixo-Pais, I., Kun-Rodrigues, C. , Rakotonanahary, A., Jan, F., Rabarivola, C.J., Zaonarivelo, J.R., Andriaholinirina, N.V., **Chikhi, L.** (2015). *Genetic diversity, population size and conservation of the Critically Endangered Perrier's sifaka* (Propithecus perrieri). **Int J Primat**, 36: 1132-1153.

Shafer, A.B., Wolf, J.B., Alves, P.C., Bergström, L., Bruford, M.W., Brännström, I., Colling, G., Dalén, L., De Meester, L., Ekblom, R., Fawcett, K.D., Fior, S., Hajibabaei, M., Hill, J.A., Hoezel, A.R., Höglund, J., Jensen, E.L., Krause, J., Kristensen, T.N., Krützen, M., McKay, J.K., Norman, A.J., Ogden, R., Österling, E.M., Ouborg, N.J., Piccolo, J., Popović, D., Primmer, C.R., Reed, F.A., Roumet, M., **Salmona, J.,** Schenekar, T., Schwartz, M.K., Segelbacher, G., Senn, H., Thaulow, J., Valtonen, M., Veale, A., Vergeer, P., Vijay, N., Vilà, C., Weissensteiner, M., Wennerström, L., Wheat, C.W., Zieliński, P (2015). *Genomics and the challenging translation into conservation practice*. **Trends Ecol Evol. (Amst.).** 30(2): 78-87.

Simona Grusea (Institut Mathématique de Toulouse, France)
Olivier Mazet (Institut Mathématique de Toulouse, France)
Nurzhafarina Othman (Universiti Malaysia Sabah, Malaysia)
Christophe Thébaud (Université de Toulouse, France)

Outreach

Public talk for University students at Aula Aberta, FCSH, Lisbon, March.

Public talk for University students at Darwin's Legacy Tea Party, FCUL, Lisbon, April.

Public talk for general public at Fête de Lutte Ouvrière, France, May.

IGC stand at NOS Alive'15 - speed dating and hands-on activity, Algés, July.

Public talk for general public at Jornada de Reflexão: O que é o Homem? FCSH, Lisbon, October.

Public talk for University students at NEBFCUL conferences, FCUL, Lisbon, November.

LYMPHOCYTE PHYSIOLOGY

GROUP LEADER
Demengeot, Jocelyne

RESEARCH INTERESTS

We are concerned with those properties of the immune system that guarantee tissue integrity as well as tolerance to commensals and food antigens while maintaining the ability to mount efficient responses to infectious agents and some tumours.
We approach the cellular and molecular bases of immune regulation through the analysis of various mouse models, notably of spontaneous or induced autoimmune and immuno-pathological inflammation. Keeping in mind that the vertebrate immune system relies on the production of a very large diversity of antigen receptors through genomic rearrangement by the RAG recombinases, we also maintain a line of research assessing the consequences of deregulated RAG activity on genomic integrity and on lymphocyte homeostasis.
Our interests merge within various collaborative works, notably addressing the efficiency of immunotherapies in the clinic.

PROJECTS RUNNING IN 2015

- Reciprocal interactions between the adaptive immune system and bacterial opportunists
- Precursors of regulatory T cells in cancer immune-surveillance and peptide therapies
- Genetic and environmental factors in the targeting of organ specific autoimmunity
- Clinical relevance of therapeutic Ab immunogenicity
- Off-targets of the lymphocyte recombinase RAG

MAIN ACHIEVEMENTS IN 2015

We evidenced that the adaptive immune system reduces the pace and increases the predictability of *E. coli* adaptation to the mouse gut. We developed experimental algorithms to dissociate the role of lymphocytes and tissues in autoimmune cardiomyopathies and set assays to identify the precursors of Treg impairing tumour immunosurveillance. We revealed physiological conditions under which tolerogenic peptide therapies worsen autoimmune disease outcome. We evidenced that the RAG recombinases exert a selective pressure for genome evolution, demonstrated that the TCRbeta locus undergo intense illegitimate recombination and produced the Recombination Classifier software. Finally, we initiated the systematic monitoring of all patients under anti-TNF inhibitors in a single centre (HGO).

Oruc, Z., Oblet, C., Boumediene, A., Druilhe, A., Pascal, V., Le Rumeur, E., Cuvillier, A., El Hamel, C., Lecardeur, S., Leanderson, T., Morelle, W., **Demengeot, J.**, Aldigier, J.C., Cogné, M. *IgA Structure Variations Associate with Immune Stimulations and IgA Mesangial Deposition.* **J Am Soc Nephrol.** *In press.*

PUBLICATIONS

Barroso-Batista, J., **Demengeot, J.**, Gordo, I. (2015). *Adaptive immunity increases the pace and predictability of evolutionary change in commensal gut bacteria.* **Nat Commun.** *6*: 8945.

Gibson, V.B., Nikolic, T., **Demengeot, J.**, Roep, B.O., Peakman, M. (2015). *Proinsulin multi-peptide immunotherapy induces antigen-specific regulatory T cells and limits autoimmunity in a humanised model.* **Clin Exp Immunol.** 182(3): 251-60.

Meehan, T.F., Chen, C.K., Koscielny, G., **Demengeot, J.** *et. al.* (2015). *INFRAFRONTIER-providing mutant mouse resources as research tools for the international scientific community.* **Nucleic Acids Res.** 43: D1171–D1175.

Roulis, M., Bongers, G., Armaka, M., Salviano, T., He, Z., Singh, A., Seidler, U., Becker, C., **Demengeot, J.**, Furtado, G.C., Lira, S.A., Kollias, G. (2015). *Host and microbiota interactions are critical for development of murine Crohn's-like ileitis.* **Mucosal Immunol. [Epub ahead of print].**

SOFTWARE DEVELOPMENT

REC, a RAG recombinase target Classifier
New bioinformatics tool to map potential recombinase (RAG) targets in all jawed vertebrates. This is the product of a collaboration with the Computational Genomics' group.
http://www.evocell.org/cgl/resources

GROUP LEADER

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PhD in Cellular and Molecular Biology
Université Aix-Marseille II, France, 1989

Group Leader at IGC since 1998

Previous positions
Research Associate, Institut Pasteur, France

HHMI Research Associate, Harvard Medical School, USA

Postdoctoral Fellow, Columbia University, USA

Institutional Roles at IGC
Scientific Coordinator of the Animal facility

GROUP MEMBERS

Marie Louise Bergman, Postdoc
Marie Bonnet, Postdoc
Iris Caramalho, Postdoc | *Started in March*
Elodie Mohr, Postdoc | *Left in March*
Rômulo Braga Areal, PhD student, PIBS 2011
José Guilherme Santos, PhD student, IBB 2014
Vânia Silva, PhD student, PIBS 2013
Margarida Araújo, Masters student | *Left in October*
Ines Cabral, Technician | *Started in March*
Joana Silva, Technician | *Left in February*
Sandra Garcês, Visiting Scientist
Vasco Correia, Visitor

Funding
FP7 programme, European Commission
Fundação para a Ciência e a Tecnologia

Collaborators
Paula Breia (Hospital Garcia de Orta, Portugal)
Michel Cogné (Centre National de la Recherche Scientifique, Limoges University, France)
Decio Eizirik (University Libre Brussels, Belgium)
Stefan Frantz (Universitätsklinikum Halle, Germany)
Isabel Gordo, José Pereira Leal, Vasco Barreto, Alekos Athasianadis, Jorge Carneiro, Miguel Soares (IGC, Portugal)
Luís Graça (IMM, Portugal)
Jorge Kollias (Institute of Immunology, Greece)
Mark Peakman (King's College London School of Medicine, UK)
Salvatore Spicuglia (Technological Advances for Genomics and Clinics, France)

Outreach
IGC stand at NOS Alive'15 - speed dating, Algés, July.

Media appearance in newspapers and other channels, November, December.

OBESITY

GROUP LEADER
Domingos, Ana

RESEARCH INTERESTS

Organisms evolved biological mechanisms that maintain an individual's body weight within a narrow range of variation. For that purpose, different organs such as brain, fat, liver, bone, pancreas, and even the immune system, integrate nutrient-related and hormonal signals to control weight homeostasis. Our laboratory is interested in the function of the nervous system in weight control, aiming at identifying neurons that play a fundamental role in eating behaviour and metabolism. We rely on newly developed targeted mouse strains that enable the application of state-of-the-art neuro-genetic techniques: we use optogenetics to establish the role of molecularly identified populations of neurons, and Translational Ribosome Affinity Purification – TRAP – to identify molecular targets with neuromodulatory activity enriched in those key neurons. We believe that our experimental approach will pave the way for the identification of novel molecular targets with potential in the treatment of obesity.

PROJECTS RUNNING IN 2015

• Sympathetic of the Neuro-Adipose Connection – new mechanisms for new anti-obesity therapies

MAIN ACHIEVEMENTS IN 2015

Neuro-adipose connections are first visualized *in vivo* with two-photon microscopy, in a transgenic mouse expressing red fluorescent protein (dtTomato) in sympathetic neurons. (Cell, 2015).

Optogenetic activation of these neurons drives lipolysis and concordant fat reduction. (Cell, 2015).

Optical projection tomography (OPT) coupled to tissue clearing reveals the hidden anatomy of the adipose organ. (Cell, 2015).

PUBLICATIONS

Huang, W., Thomas, B., Flynn, R.A., Gavzy, S.J., Wu, L., Kim, S.V., Hall, J.A., Miraldi, E.R., Ng, C.P., Rigo, F.W., Meadows, S., Montoya, N.R., Herrera, N.G., **Domingos, A.I.**, Rastinejad, F., Myers, R.M., Fuller-Pace, F.V., Bonneau,R., Chang, H.Y., Acuto, O., Littman, D.R. (2015). *DDX5 and its associated lncRNA Rmrp modulate TH17 cell effector functions.* **Nature**. 528(7583): 517-22.

Kubasova, N., Burdakov, D., **Domingos, A.I.** (2015). *Sweet and low on leptin: hormonal regulation of sweet taste buds.* **Diabetes.** 64(11): 3651-2.

Reis, B.S., Lee, K., Fanok, M.H., Mascaraque, C., Amoury, M., Cohn, L.B., Dallner, O.S., Moraes-Vieira, P.M., **Domingos, A.I.**, Mucida, D. (2015). *Leptin receptor signalling in T Cells is required for Th17 differentiation.* **J Immunol.** 194(11): 5253-60.

Sano, T., Huang, W., Hall, J.A., Yang, Y., Chen, A., Gavzy, S.J., Lee, J.Y., Ziel, J.W., Miraldi, E.R., **Domingos, A.I.**, Bonneau, R., Littman, D.R. (2015). *An IL-23R/IL-22 circuit regulates epithelial serum amyloid A to promote local effector Th17 responses.* **Cell**. 163(2): 381-93.

Zeng, W., Pirzgalska, R.M., Pereira, M.A.M., Kubasova, N., Barateiro, A., Seixas, E., Lu, Y., Kozlova, A., Voss, H., Martins, G.G., Friedman, J.M., **Domingos, A.I.** (2015). *Sympathetic neuro- adipose connections mediate leptin-driven lipolysis.* **Cell.** 163(1): 84-94.

GROUP LEADER

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PhD in Neurobiology
The Rockefeller University, USA, 2005

Group Leader at IGC since 2013

Previous positions
Research associate, The Rockefeller University, USA

Postdoctoral associate, The Rockefeller University, USA

External Website
http://domingoslabobesity.weebly.com

GROUP MEMBERS

Andreia Barateiro, Postdoc
Elsa Seixas, Postdoc
Maria Inês Mahú, PhD student, IBB 2014
Roksana Maria Pirzgalska, External PhD student
Mafalda Pereira, Masters student
Nadiya Kubasova, Research Technician
Imogen Morris, Trainee | *Started in May*

Funding
European Molecular Biology Organisation / Fundação para a Ciência e a Tecnologia

Collaborators
Roger Adan (University of Utrech, The Netherlands)
Denis Burdakov (Medical Research Council, Mill Hill, UK)
Marcelo Dietrich (Yale University, USA)
Chris Glass (UCSD, USA)
Dan Litman (NYU, USA)
Henning Voss (Weill Cornell Medical College, USA)
Allison Xu (UCSF, USA)
Manuel Zimmer (Institute of Molecular Pathology, Austria)

Outreach
Media appearance in newspapers, TV, and other channels, January, March, August, September.

IGC stand at NOS Alive'15 - speed dating, Algés, July.

PLANT MOLECULAR BIOLOGY

GROUP LEADER
Duque, Paula

RESEARCH INTERESTS

As sessile organisms, plants have evolved unique strategies to cope with environmental challenges that affect their growth and development. These range from morphological and physiological changes to alterations at the cellular level, but the basis for adaptation or acclimation lies ultimately at the level of the genome. The *Plant Molecular Biology* group uses *Arabidopsis thaliana* as a model system to investigate how plants perceive and respond to environmental stress at the molecular level. In particular, we are focusing on the role of RNA alternative splicing in the regulation of gene expression. The versatility of this posttranscriptional regulatory mechanism suggests an important contribution in ensuring the developmental plasticity and stress tolerance essential for plant survival. Another major ongoing project in the lab is uncovering a role for membrane transporters of the Major Facilitator Superfamily (MFS) in plant development and responses to abiotic stress. Interestingly, the functional analysis of these membrane proteins is revealing striking examples of the biological impact of alternative splicing in plants.

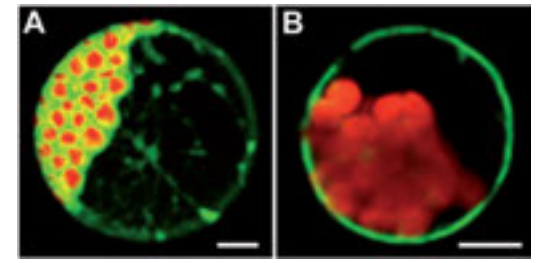
PROJECTS RUNNING IN 2015

• Functional relevance of alternative splicing in plants
• MFS membrane transporters in plant development and stress tolerance

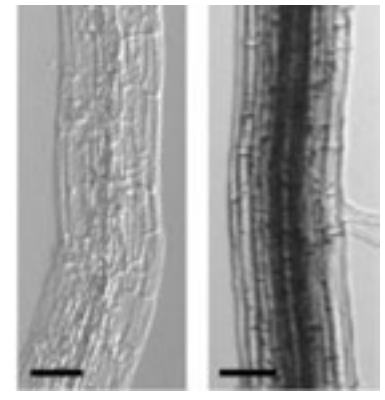
MAIN ACHIEVEMENTS IN 2015

To pursue our general working hypothesis that alternative splicing plays a key role in plant responses to environmental stress, we have been following up on our functional characterization of SR proteins, which constitute a highly conserved family of major regulators of this important posttranscriptional regulatory mechanism. We showed that the *Arabidopsis* SR-like protein SR45 regulates sugar signalling during early seedling development via modulation of the levels of the energy-sensing SNRK1 protein kinase and broadly controls alternative splicing *in vivo* including that of the SR45 gene itself. The endogenous splicing targets of the plant-specific SCL30a SR protein, which we found confers drought and salt stress tolerance during seed germination in *Arabidopsis* via modulation of the abscisic acid (ABA) stress signalling pathway, are being identified by whole transcriptome analysis using next generation sequencing. In 2015, we also reported the functional characterization of a novel *Arabidopsis* membrane transporter of the Major Facilitator Superfamily (MFS). Zinc-Induced Facilitator-Like 2 (ZIFL2) is a plasma membrane root transporter that modulates plant potassium and caesium homeostasis. Our results indicated that ZIFL2 promotes cellular potassium efflux in the root, thereby restricting potassium/caesium xylem loading and subsequent root to shoot translocation under high potassium conditions or in the presence of external caesium.

Remy E., **Duque P.** (2015) *Assessing tolerance to heavy-metal stress in* Arabidopsis thaliana, *in Environmental Responses in Plants* (ed P. Duque), **Methods in Molecular Biology**, Springer, New York, NY, USA. ***In Press.***



The ZIFL2 transporter localizes at the plasma membrane of *Arabidopsis* cells. Confocal laser scanning microscopy images of wild-type *Arabidopsis* mesophyll protoplasts transiently expressing either YFP alone (A) or the ZIFL2.1–YFP fusion (B) under the control of the 35S promoter. The YFP and chloroplast autofluorescence signals are visualized by green and red colouration, respectively. Scale bars = 10 mm. From Remy *et al.* 2015.



The Major Facilitator Superfamily (MFS) ZIFL2 transporter is expressed in the endodermal and pericycle cell layers of the *Arabidopsis* primary root. Differential interference contrast microscopy images of GUS-stained primary roots of a wild-type (left panel) or a transgenic plant carrying a ProZIFL2:GUS reporter construct (right panel). Scale bar = 50 mm. From Remy *et al.* 2015.

PUBLICATIONS

Remy, E., Cabrito, T.R., Batista, R.A., Teixeira, M.C., Sá-Correia, I., **Duque, P.** (2015). *The major facilitator superfamily transporter zifl2 modulates cesium and potassium homeostasis in* Arabidopsis. **Plant Cell Physiol.** 56(1): 148-62.

GROUP LEADER

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PhD in Physiology and Biochemistry
University of Lisbon, Portugal, 1998

Group Leader at IGC since 2006

Previous positions
Postdoctoral Fellow, The Rockefeller University, USA

Postdoctoral Associate, The Rockefeller University, USA

Adjunct Assistant Professor, Queens College, City University of New York, USA

GROUP MEMBERS

Raquel Carvalho, Postdoc | *Left in January*
Estelle Remy, Postdoc | *Left in July*
Dale Richardson, Postdoc
Dora Szakonyi, Postdoc
María Fernanda Niño, PhD student, MolBioS 2015 | *Started in May*
Filipa Lopes, Masters student | *Started in April*
Marius Brechtenkamp, Trainee | *Started in November*
Tiago Cruz, Trainee | *Left in March*

Funding
Fundação para a Ciência e a Tecnologia

Collaborators
Alekos Athanasiadis (IGC, Portugal)
Elena Baena-González (IGC, Portugal)
John Brown (University of Dundee & The James Hutton Institute, UK)
Anthony Kinney (DuPont, USA)
Isabel Sá-Correia (IST, Portugal)
Craig Simpson (The James Hutton Institute, UK)
Mathias Zeidler (University of Giessen, Germany)

Outreach
IGC stand at GreenFest - public talk, Estoril, October.

TELOMERE AND GENOME STABILITY

GROUP LEADER
Ferreira, Miguel Godinho

RESEARCH INTERESTS

It is estimated that one in three people will be diagnosed with cancer during their lifetime (source: CancerStats, CRUK). The strongest risk factor for cancer is age, with 75% of cases diagnosed in people aged 60 and over. Population aging in the developed world represents an ever-increasing burden to our health system. However, emergent therapies have improved ability to fight cancer. This has come substantially from our ever-increasing knowledge of the causes underlying tumorigenesis. Our challenge now lies in understanding the molecular mechanisms responsible for aging in order to identify new ways of reducing the lifetime risk for cancer (and remaining age-associated diseases) leading to a prolonged healthier life. Our goal is to investigate the mechanisms underlying chromosome-end protection and the outcomes of its failure, not only at the cellular level but also at the organism level. Our work will allow the discovery of key regulators guarding cells from genomic instability. Identification of these entities will provide new targets for cancer therapy along with tools for early diagnosis. Ultimately, we aim at preventing the incidence of cancer associated with aging. We plan to achieve this by identifying and manipulating the agents responsible for its increase.

PROJECTS RUNNING IN 2015

- Molecular mechanism of telomere checkpoint
- The role of telomeres in aging and cancer

MAIN ACHIEVEMENTS IN 2015

We finished our comparative prospective study of telomere dynamics, DNA Damage Response (DDR) and aging-related dysfunction and disease in different tissues in wild type zebrafish (from 3 to 42 months), and compared it with the previously published telomerase mutant (Henriques *et al.*, 2013). This work has been recently published (Carneiro *et al.*, 2016). Briefly, short telomeres of specific tissues in naturally aged zebrafish coincide with rise of DNA damage, decline in cell proliferation and lead to age-specific organ decline. Critically short telomeres accumulate in specific organs with age, such as the gut and muscle, leading to cellular and tissue damage that culminated in local disruption of organ homeostasis. Additionally, critically short telomeres are recognized as threatening DNA breaks and accumulate DNA damage (Telomere Induced Foci, TIFs), further contributing to tissue decline.

Carneiro, M.C., Henriques, C.M., Nabais, J., Ferreira, T., Carvalho, T., **Ferreira, M.G.** *Short telomeres in key tissues initiate local and systemic aging in zebrafish*. **PLoS Genet**. *In Press.*

GROUP LEADER

Email mgferreira@igc.gulbenkian.pt

PhD in Cell Biology
University College London, UK, 1999

Group Leader at IGC since 2006

Previous positions
Postdoc, University of Colorado Health Sciences Centre, USA

Postdoc, LRI, Cancer Research UK, UK

External Website
http://sites.igc.gulbenkian.pt/telomere/tgs/Welcome.html

GROUP MEMBERS

Thiago Carvalho, Postdoc | *Left in March*
Maria Inês Castro, Postdoc
Jose Planells, Postdoc
Akila Shridar, Postdoc | *Started in February*
Madalena Carneiro, PhD student, PIBS 2010 | *Left in November*
Edison Carvalho, PhD student, PGCD 2014
Kirsten Lex, PhD student, PIBS 2013
Joana Dias, External PhD student
Tânia Ferreira, Laboratory Manager
Margarida Figueira, Technician
Maria Moita, Technician | *Left in April*
Philip Aguiar, Trainee | *Started in September*
Ana Inês Almeida, Visitor | *Left in December*
Gianluca Selvagio, Visitor | *Started in October*

Funding
FP7 - Marie Curie Actions, European Commission
Fundação para a Ciência e a Tecnologia
Howard Huges Medical Institute
Hubert Curien Programme

Collaborators
Aidan Doherty (Genome Damage and Stability Centre, University of Sussex, UK)
Antonio Jacinto (CEDOC)
Rui Oliveira (IGC, Portugal)
José Pereira Leal (IGC, Portugal)
Paula Soares (IPATIMUP, Portugal)

Outreach
IGC stand at NOS Alive'15 - speed dating, Algés, July.

Public Talk at 'A Coffee with...', Taguspark, Oeiras, November.

LUPUS AND AUTOREACTIVE IMMUNE REPERTOIRES

GROUP LEADER
Fesel, Constantin

RESEARCH INTERESTS

Systemic Lupus Erythematosus (SLE) is a human autoimmune disorder where altered physiologies and self-reactive repertoires of both B- and T-cells are intimately connected. Autoreactive IgG antibodies are the diagnostic hallmark of SLE and diversify over long time periods before disease becomes manifested, however, this depends also on innate-immune and other nonspecific factors. Our current approach is to model, in a stepwise fashion, the ways in which different genetic factors, molecular mechanisms and immune repertoires are interconnected in SLE pathogenesis. In this context, we are particularly interested in the role of T-cell regulation. Since we found particular relations between antibody reactivity and regulatory T-cells (Tregs) in unaffected relatives of SLE patients, who often share elevated titres of SLE-associated auto-antibodies, we follow the hypothesis that these auto-antibody-positive unaffected relatives bear a particular capacity to regulate autoreactive immune repertoires that breaks down in clinically manifest disease. This was principally corroborated for one out of two components contributing to Treg impairment in SLE, which we have recently characterized.
This specific component, measurable as reduced CD25 upregulation in activated Tregs, further turned out to be part of a dynamic instability of Tregs in SLE that we are currently exploring.

MAIN ACHIEVEMENTS IN 2015

In Systemic Lupus Erythematosus (SLE) patients, FOXP3$^+$ T-regulatory cells (Tregs) are functionally deficient, associated to their reduced surface expression of the high-affinity IL-2 receptor CD25.
Studying SLE patients and their unaffected first-degree relatives, we have previously found that while both shared reduced CD25 on early Tregs, only Tregs of manifest SLE patients were characterized by a specific, drastic reduction or absence of the otherwise strong CD25 upregulation upon Treg activation. In a longitudinal study over several months, we have now found that frequencies of activated FOXP3high-CD45RO$^+$ Tregs typically oscillated over time. Most remarkably, individual oscillation amplitudes were strongly correlated with SLEDAI-2K disease activity, as well as (negatively) with blood lymphocyte counts.
This suggests a characteristic dynamic Treg instability, paralleling SLE activity, and relevant for SLE-associated lymphopenia.

Since the observed Treg oscillations were coupled to oscillations of conventional T-helper cell populations, we hypothesized that they reflect an unstable regulation circuit. Such circuits, yielding coupled sinusoidal dynamics, can be described by predator-prey models as the classic Lotka-Volterra equation system. We were able to fit this model to our data of activated Tregs and memory T-helper cells from 15/19 patients with >3 time points. The model parameters estimated this way for each patient turned out biologically meaningful: empirically measured CD25 upregulation upon Treg activation (see above) strongly explained model-estimated Treg turnover (positively) as well as suppression rates (negatively).

We conclude that deficient CD25 upregulation of Tregs likely induces a disease-stimulating dynamic T-cell regulation instability, including Treg dysfunctionality and increased turnover.

PUBLICATIONS

Dalko, E., Das, B., Herbert, F., **Fesel, C.**, Pathak, S., Tripathy, R., Cazenave, P.A., Ravindran, B., Sharma, S., Pied, S. (2015). *Multifaceted roles of heme during severe* Plasmodium falciparum *infections in India.* **Infect Immun. [Epub ahead of print].**

Guiyedi, V., Bécavin, C., Herbert, F., Gray, J., Cazenave, P.A., Kombila, M., Crisanti, A., **Fesel, C.,** Pied, S. (2015). *Asymptomatic* Plasmodium falciparum *infection in children is associated with increased auto-antibody production, high IL-10 plasma levels and antibodies to merozoite surface protein 3.* **Malar J.** 14(1): 162.

Herbert, F., Tchitchek, N., Bansal, D., Jacques, J., Pathak, S., Bécavin, C., **Fesel, C.**, Dalko, E., Cazenave, P.A., Preda, C., Ravindran, B., Sharma, S., Das, B., Pied, S. (2015). *Evidence of IL-17, IP-10, and IL-10 involvement in multiple-organ dysfunction and IL-17 pathway in acute renal failure associated to* Plasmodium falciparum *malaria.* **J Transl Med.** 13(1): 369.

Martins, M., Williams, A.H., Comeau, M., Marion, M., Ziegler, J.T., Freedman, B.I., Merrill, J.T., Glenn, S.B., Kelly, J.A., Sivils, K.M., James, J.A., Guthridge, J.M., Alarcón-Riquelme, M.E., Bae, S.C., Kim, J.H., Kim, D., Anaya, J.M., Boackle, S.A., Criswell, L.A., Kimberly, R.P., Alarcón, G.S., Brown, E.E., Vilá, L.M., Petri, M.A., Ramsey-Goldman, R., Niewold, T.B., Tsao, B.P., Gilkeson, G.S., Kamen, D.L., Jacob, C.O., Stevens, A.M., Gaffney, P.M., Harley, J.B., Langefeld, C.D., **Fesel, C.** (2015). *Genetic association of CD247 (CD3ζ) with SLE in a large-scale multiethnic study.* **Genes Immun.** 16(2): 142-150.

GROUP LEADER

Email cfesel@igc.gulbenkian.pt

PhD in Immunology
Université Paris VI, France, 1998

Group Leader at IGC since 2005

Previous positions
Postdoc, Weizmann Institute of Science, Israel

GROUP MEMBERS

Maria Francisca Moraes-Fontes, Clinical Investigator | *Left in December*
Nuno Costa, External PhD student

Collaborators
Berta Martins (ICBAS, Portugal)
Carlos Vasconcelos (Hospital de Santo António, Portugal)

CELLULAR AND SYSTEMS NEUROBIOLOGY

GROUP LEADER
Fonseca, Rosalina

RESEARCH INTERESTS

Since it is believed that changes in synaptic efficacy underlie memory formation, understanding the cellular mechanisms involved in synaptic plasticity induction and maintenance, can provide new insights into brain function. The induction of synaptic plasticity leads to the input-specific activation of synapses followed by the capture of plasticity-related proteins (PRPs) necessary for the maintenance of plasticity. We have shown that synapses can either cooperate or compete depending on the availability of PRPs. We are interested in understanding how PRPs are captured at activated synapses and the rules that determine whether synapses engage in synaptic cooperation or competition. We have shown that activity-dependent regulation of actin dynamics can capture PRPs in an input-specific manner and we are now addressing the impact of this activity-dependent regulation of actin cytoskeleton in spine morphology, using advanced opto-physiological approaches. What is the contribution of synaptic cooperation and competition to memory formation? To tackle this, we took advantage of a well characterized circuitry, the thalamic and cortical inputs to the amygdala nuclei. We found that thalamic and cortical synapses can cooperate, providing the first evidence that synaptic cooperation is a general mechanism in synaptic plasticity. We aim to take this question further and test, at the behavioural level, whether synaptic cooperation plays a role in auditory discrimination learning.

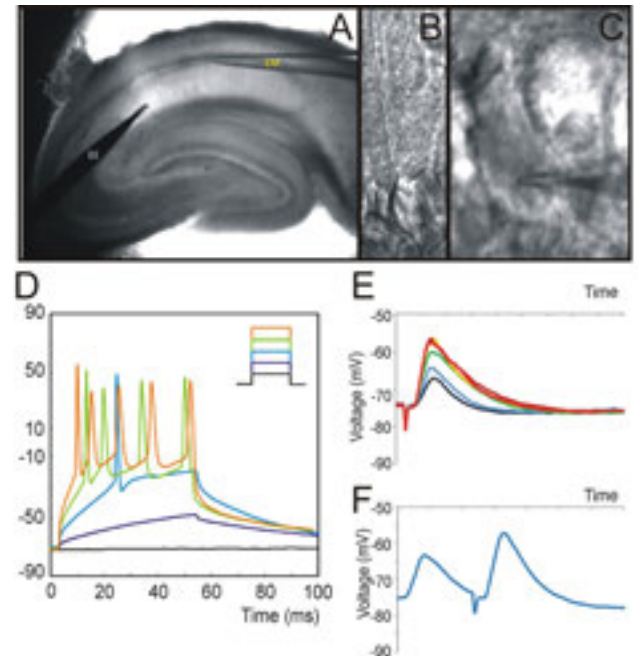
PROJECTS RUNNING IN 2015

- The nature of the synaptic tag: a structural hypothesis
- Synaptic competition in the amygdala: heterosynaptic plasticity between thalamic and cortical projections to the lateral amygdala

MAIN ACHIEVEMENTS IN 2015

The maintenance of synaptic plasticity depends on the interaction between synaptically activated tags and the capture of plasticity –related proteins (PRPs) necessary for plasticity maintenance. We propose that the capture of PRPs at activated synapses is achieved by a local activity dependent modulation of the actin cytoskeleton. We have shown that, similarly to what has been described for long-lasting forms of synaptic potentiation, synaptic depression also requires the modulation of the actin cytoskeleton. Moreover, a dynamic actin is also required for the capture of PRPs. This suggests that the modulation of actin by synaptic plasticity is a general cellular mechanism involved in input-specific plasticity and independent of either synapses are potentiated or depressed.

Following our work at amygdala synapses, we found that thalamic and cortical synapses engage in synaptic competition, similarly to what we have described at hippocampal synapses. This observation has some important implications regarding our current models of memory formation and maintenance. Synaptic cooperation and competition allow synapses to integrated events that are separated by large time-windows, from 30 to 60 minutes. We are currently addressing, using behavioural paradigms, whether events can be associated if separated by large time windows and what are the rules that determine a positive re-enforcement, e.g. cooperation, or a negative re-enforcement, e.g. competition.



Looking at neurons. A. Hippocampal acute slice with stimulating and recordings electrodes. B. Pyramidal neuron from CA1 region. C. Zoom-in looking at patch electrode. D. Input-output response from neuron upon current injection. E. Extracellular recorded evoked potentials. F. Pair-pulse facilitation EPSPs.

PUBLICATIONS

Fonseca, R. (2015) *Synaptic Cooperation and Competition: Two Sides of the Same Coin?* **Synaptic Tagging and Capture**, pp. 29-44, Springer Science+Business Media, New York, NY, USA.

GROUP LEADER

Email rfonseca@igc.gulbenkian.pt

PhD in Neuroscience
Ludwig-Maximilian University of Munich, Germany, 2005

Group Leader at IGC since 2012

Previous positions
Clinical Research Fellow, Champalimaud Neuroscience Programme, Portugal

Postdoctoral fellow, Instituto Gulbenkian de Ciência, Portugal

Postdoctoral Fellow, Julio de Matos Hospital, Portugal

GROUP MEMBERS

Ana Drumond, Masters student | *Started in June*
Rita Manguinhas, Research Technician | *Started in August; left in December*
Eszter Szabó, Research Technician | *Left in July*
Lidia Caley, Trainee | *Started in January; left in March*

Funding
Fundação para a Ciência e a Tecnologia

Collaborators
Rui Costa (Champalimaud Foundation, Portugal)
Valentin Nagerl (University of Bordeaux, France)
Rui Oliveira (IGC, Portugal)
Gal Richter-Levin (University of Haifa, Israel)

MATHEMATICAL MODELLING OF BIOLOGICAL PROCESSES

GROUP LEADER
Gjini, Erida

RESEARCH INTERESTS

My research lies in mathematical biology with a special focus on multi-scale infectious disease dynamics. Adopting mechanistic approaches, I develop a deeper quantitative understanding of how system behaviour emerges from the interaction of its components, and how processes at one biological scale affect patterns we observe at another. At the genetics-ecology-epidemiology interface, we study processes from the individual to the population level. Research interests include antibiotic resistance management, multi-type pathogen ecology, within-host interactions in health and disease, and evolutionary diversification. With interdisciplinary research we aim to impact medical settings and public health policy, besides providing innovative frameworks for the interpretation of biological data.

PROJECTS RUNNING IN 2015

- How classical and adaptive regimes interact with host immunity during antibiotic treatment of resistant infections
- Uncovering the mathematics of direct competition in multi-strain pathogen systems
- Dynamic models for vaccine assessment and applications

MAIN ACHIEVEMENTS IN 2015

Antimicrobial resistance of infectious agents is a growing problem worldwide. To prevent the continuing selection and spread of drug resistance, rational design of antibiotic treatment is needed, and the question of aggressive vs. moderate therapies is currently heatedly debated. Host immunity is an important, but often-overlooked factor in the clearance of drug-resistant infections. In my research, I compared aggressive and moderate antibiotic treatment, accounting for host immunity effects.
I used mathematical modelling of within-host infection dynamics to study the interplay between pathogen-dependent host immune responses and antibiotic treatment. In collaboration with Dr. Patricia Brito, I studied classical (fixed dose and duration) and adaptive (coupled to pathogen load) treatment regimes, exploring systematically infection outcomes such as time to clearance, immunopathology, host immunization, and selection of resistant bacteria. Our analysis and simulations uncover effective treatment strategies that promote synergy between the host immune system and the antimicrobial drug in clearing infection. Our main achievement was to quantify how treatment timing and the strength of the immune response determine the success of moderate therapies. We found key parameters and dimensions, where an adaptive regime differs from classical treatment, bringing new insight into the ongoing debate of resistance management.
In the context of this research topic, I have submitted an FCT project (GATSMATH) as a PI in January 2015, securing collaboration with Prof. Andrew Yates at Glasgow University, Dr. Nick Savill at Edinburgh University and Dr. Jorge Carneiro at IGC. The project was evaluated excellent (8 score), but unfortunately, did not receive funding. An appeal is currently ongoing with FCT.
I also submitted an ESCMID grant to the European Society of Clinical Microbiology and Infectious Diseases, in September, securing collaboration for patient data of bacterial infections from Hospital Santa Maria, in Lisbon and Dr. Luis Caldeira. This collaboration, if supported by suitable funding, will move my research closer to clinical practice and bring an impact to medical settings.
My work on competition in multi-strain systems, initiated within the *Collective Dynamics* group, was concluded with 2 publications in late 2015. Furthermore, during 2015, I developed at least 3 other independent lines of research stemming for these early studies: i) deeper mathematical analysis of competition hierarchies between strains (with dr. Sten Madec); ii) competition and its effect on abundance ratios of co-colonizing strains (with Prof. F. Dionisio and common MSc student Maria Azevedo); iii) serotype competition and vaccine evaluation for pneumococcus across countries.

Gomes, G. **Gjini, E**. Lopes, J.S., Souto-Maior, C., Rebelo, C. *A theoretical framework to identify invariant thresholds in infectious disease epidemiology*, **J Theor Biol**. *Accepted.*

PUBLICATIONS

Gjini, E., Gomes, M.G.M. (2015). *Expanding vaccine efficacy estimation with dynamic models fitted to cross-sectional data post-licensure*. **Epidemics [Epub ahead of print].**

Gjini, E., Valente, C., Sá-Leão, R., Gomes, M.G. (2015). *How direct competition shapes coexistence and vaccine effects in multi-strain pathogen systems.* **J Theor Biol.** 388: 50-60.

GROUP LEADER

Email egjini@igc.gulbenkian.pt

PhD in Mathematics
University of Glasgow, UK, 2012

Group Leader at IGC since 2015

Previous positions
Postdoctoral fellow, Instituto Gulbenkian de Ciência, Portugal

External website
https://biomathematica.wordpress.com/

GROUP MEMBERS

Maria Azevedo, Masters student | *Left in July*

Funding
Fundação para a Ciência e a Tecnologia

Collaborators
Patricia H. Brito (IGC, Portugal)
Luis Caldeira (Hospital Santa Maria, Lisbon, Portugal)
Francisco Dionisio (FCUL, Portugal)
Constantin Fesel (IGC, Portugal)
Luisa Figueiredo (IMM, Portugal)
Vitaly Ganusov (Theoretical Immunology, University of Tennessee, USA)
Sten Madec (Department of Mathematics University of Tours, France)

Outreach
Workshop Inspirar Ciência 2015 - Theoretical and practical teaching of high school teachers, IGC, September.

SCIENCE & POLICY

GROUP LEADER
Gonçalves-Sá, Joana

RESEARCH INTERESTS

The *Science and Policy* group works under the premise that it is possible to use the scientific method to improve the decision-making process. By gathering large amounts of data and using a broad range of approaches, we ask how political decisions can be more informed and how can scientists and the scientific method help in this process.
Current research includes:
- using internet search engines and social networks to try identify disease outbreaks and group behaviours;
- pooling available (but dispersed) information to study public understanding of science and risk communication;
- generating data (from large scale surveys to text mining techniques) to understand public policies and how to help scientists become effective advisors.
Our ultimate goals are to engage scientists and researchers in the policy-making process and to contribute to a more knowledgeable and critical society.

PROJECTS RUNNING IN 2015

• Different technologies create different risks: an assessment of the risk literacy in natural and social scientists
• Scientific and Technological Risk Regulation in the Social Network Age
• Cultural variation explains worldwide differences in sexual cycles
• Parliament Polarization and Heterogeneity – a computational and transversal approach

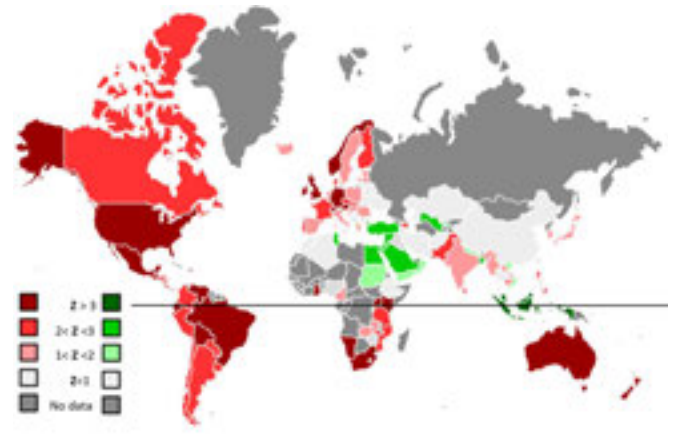
MAIN ACHIEVEMENTS IN 2015

FCT Postdoctoral fellowship to Miguel Won, with the project "Complex systems approach to the political commentary in the Portuguese news media".

FCT Postdoctoral fellowship to João Lopes, with the project "How different schools impact similar students: a transversal comparison of schools' success in student achievement".

The system the S&P group developed to identify the onset of the flu was tested in real-time with INSA and followed by the Portuguese Direcção Geral de Saúde.

Helped solve the long standing question of whether human sexual cycles are more driven by biology or culture. Manuscript in last stages of preparation.



The world map is colour-coded according to each individual country's sex-search profile. Shades of red represent a higher z-score (larger increase in searches) during Christmas week. Shades of green represent a higher z-score (larger increase in searches) during Eid-al-Fitr week. White marks countries with no significant variation above mean in either of these weeks. Dark grey countries are those for which there is no GT data available. Black line represents the equator separating the hemispheres.

GROUP LEADER

Email mjsa@igc.gulbenkian.pt

PhD in Molecular & Cell Biology
Universidade Nova de Lisboa, Portugal, 2010

Group Leader at IGC since 2012

Institutional Roles at IGC
Director of the Graduate Programme Science for Development (PGCD)

GROUP MEMBERS

Manuel Marques Pita, Postdoc | *Started in February*
Miguel Won, Postdoc
João Santos, Undergraduate student | *Started in June; left in October*
Inês Maciel, Trainee | *Started in August*

Funding
Fundação para a Ciência e a Tecnologia
FP7–Welcome II Programme, European Commission

Collaborators
João Baptista (Ministério da Educação e da Ciência, Portugal)
Maria Eduarda Gonçalves (ISCTE, Universidade de Lisboa, Portugal)
Pedro Magalhães (Instituto de Ciências Sociais, Portugal)
Luís Rocha (IGC, Portugal)

Outreach
Science & Art project - Musical Morphogenesis.

Talks for policy makers, European Parliament, December.

EVOLUTIONARY BIOLOGY

GROUP LEADER
Gordo, Isabel

RESEARCH INTERESTS

The area of our research interests is Evolutionary Biology, with a great focus on microbial evolution. We combine both theoretical and empirical work with the aim at a better understanding of the major forces that shape variation in bacterial populations.
Present and future projects of the research team include:
- study the process of adaptation in the context of ecosystems using *Escherichia coli* as a model organism;
- test theoretical models of adaptive evolution against genotypic and phenotypic data obtained in experimentally adapted bacterial populations;
- determine the level of epistatic interactions on fitness between mutations that confer resistance to commonly used antibiotics;
- study the evolution of mutation rates and determine the factors that influence polymorphism for mutation rates in bacterial populations.

PROJECTS RUNNING IN 2015

• Adaption within Ecosystems
• Adaptation of commensal bacteria to the mammalian gut
• Fitness effects of synonymous mutations

MAIN ACHIEVEMENTS IN 2015

We have studied for the first time the evolution of a commensal bacteria when it colonizes the mammalian gut. Using mouse models of *E. coli* colonization we compared the pace and repeatability of evolution in immune-competent and immune compromised mice. We found a higher pace of bacterial evolution and increased predictability in immune-competent than in immune compromised hosts. In the context of the evolution of antibiotic resistance, we have shown that mutations causing resistance show strong epistatic interactions across different environments, and that particular combinations of resistance mutations can lead to increased fitness even in the absence of antibiotics. We have also shown that bacteria with resistance mutations, which cause severe fitness impairments, can be maintained in populations due to their high evolvability, i.e., high rate of emergence of mutations with at high compensatory fitness effect.

PUBLICATIONS

Barroso-Batista, J., Demengeot, J., **Gordo, I.** (2015). *Adaptive immunity increases the pace and predictability of evolutionary change in commensal gut bacteria.* **Nat Commun.** 6: 8945.

Durão, P., Trindade, S., Sousa, A., **Gordo, I.** (2015). *Multiple resistance at no cost: Rifampicin and Streptomycin a dangerous liaison in the spread of antibiotic resistance.* **Mol Biol Evol.** 32(10): 2675-80.

de Sousa, J.M., Sousa, A., Bougard, C., **Gordo, I.** (2015). *Potential for adaptation overrides cost of resistance.* **Future Microbiol.** 10: 1415-31.

GROUP LEADER

Email igordo@igc.gulbenkian.pt

PhD in Evolutionary Biology
University of Edinburgh, UK, 2002

Group Leader at IGC since 2004

Previous positions
Research Associate, University of Oxford, UK

Postdoctoral fellow, Instituto Gulbenkian de Ciência, Portugal

External Website
http://eao.igc.gulbenkian.pt/EVB/index.html

GROUP MEMBERS

João Alpedrinha, Postdoc | *Left in April*
Roberto Balbontin, Postdoc
Paulo Durão, Postdoc
Nélson Frazão, Postdoc
João Proença, Postdoc | *Left in December*
Ricardo Ramiro, Postdoc
Ana Margarida Sousa, Postdoc
João Batista, External PhD student
Luis Cardoso, PhD student, IBB 2015 | *Started in August*
Jorge Sousa, PhD student, PIBS 2010
Hugo Barreto, Research Assistant | *Left in December*
Marta Lourenço, Research Assistant | *Left in July*
Antónia Pinto, Research Assistant | *Left in February*
Catarina Pinto, Research Assistant
Daniela Zwerschke, Laboratory Manager

Funding
Fundação para a Ciência e a Tecnologia
European Research Council

Collaborators
Thomas Bataillon (University of Aarhus, Denmark)
Paulo Campos (Universidade Federal Rural de Pernambuco, Brazil)
Jocelyne Demengeot (IGC, Portugal)
Miguel Godinho Ferreira (IGC, Portugal)
Michael Lässig (Universität zu Köln, Germany)
Karina Xavier (IGC, Portugal)

Outreach
Media appearance in newspapers, TV, and other channels, July, November, December.

HOST-PATHOGEN CO-EVOLUTION

GROUP LEADER
Howard, Jonathan

RESEARCH INTERESTS

Our work focuses on mechanisms of resistance to the ubiquitous intracellular protozoan parasite, *Toxoplasma gondii*, a malaria relative, which infects about 40% of the human race.

We study immunity of mice against *T. gondii* because the primary hosts of the parasite, in which it makes gametes and does meiosis, is cats, so the *T. gondii* life cycle, and its abundance in our environment, is thus driven by an infectious cycle between cat and mouse. Mouse immunity against *T. gondii* is based on a mechanism absent in humans, inducible GTPases (IRG proteins) that cooperatively destroy the vacuole in which the parasite lives.

This mechanism has in turn been targeted by the parasite, via a family of kinases that inactivate IRG proteins. Both the IRG proteins and the kinases are massively polymorphic, consistent with a complex co-evolutionary dynamic.

Our work stretches from ecological studies on wild mice to cell biological, biochemical and structural studies.

PROJECTS RUNNING IN 2015

- Regulatory interactions between IRG GTPases
- Recent co-adaptation in the *Toxoplasma*-mouse parasite-host relationship
- Virulence factors and resistance genes in the ecological relationship between *Toxoplasma gondii* and *Mus musculus*

MAIN ACHIEVEMENTS IN 2015

In mice, avirulent strains (e.g. types II and III) of the protozoan parasite *Toxoplasma gondii* are restricted by the immunity-related GTPase (IRG) resistance system. Loading of IRG proteins onto the parasitophorous vacuolar membrane (PVM) is required for vacuolar rupture resulting in parasite clearance. In virulent strain (e.g. type I) infections, polymorphic effector proteins ROP5 and ROP18 cooperate to phosphorylate and thereby inactivate mouse IRG proteins to preserve PVM integrity. In this study, we confirmed the dense granule protein GRA7 as an additional component of the ROP5/ROP18 kinase complex and identified GRA7 association with the PVM by direct binding to ROP5. The absence of GRA7 results in reduced phosphorylation of Irga6 correlated with increased vacuolar IRG protein amounts and attenuated virulence. Earlier work identified additional IRG proteins as targets of *T. gondii* ROP18 kinase. We show that the only specific target of ROP18 among IRG proteins is in fact Irga6. Similarly, we demonstrate that GRA7 is strictly an Irga6-specific virulence effector. This identifies *T. gondii* GRA7 as a regulator for ROP18-specific inactivation of Irga6. The structural diversity of the IRG proteins implies that certain family members constitute additional specific targets for other yet unknown *T. gondii* virulence effectors.

PUBLICATIONS

Hermanns, T., Muller, U.B., Konen-Waisman, S., **Howard, J.C.**, Steinfeldt, T. (2015). *The* Toxoplasma gondii *rhoptry protein ROP18 is an Irga6-specific kinase and regulated by the dense granule protein GRA7*. **Cell Microbiol. [Epub ahead of print].**

Ohshima, J., Sasai, M., Liu, J., Yamashita, K., Ma, J.S., Lee, Y., Bando, H., **Howard, J.C.**, Ebisu, S., Hayashi, M., Takeda, K., Standley, D.M., Frickel, E.M., Yamamoto, M. (2015). *RabGDIα is a negative regulator of interferon-γ-inducible GTPase-dependent cell-autonomous immunity to* Toxoplasma gondii. **Proc Natl Acad Sci U S A.** 112(33): E4581-90.

GROUP LEADER

Email jhoward@igc.gulbenkian.pt

PhD in Immunology (Medicine) Oxford University, UK, 1969

Group Leader at IGC since 2012

Previous positions
Professor of Cell Genetics, Institute for Genetics, University of Cologne, Germany

Head of Immunology Department, The Babraham Institute, UK

Member of Scientific Staff, MRC Cellular Immunology Unit, Sir William Dunn School of Pathology, University of Oxford, UK

Institutional Roles at IGC
IGC Director

External Website
http://www.genetik.uni-koeln.de/groups/Howard/research.shtml

GROUP MEMBERS

Carolina Alves, Postdoc | *Left in November*
Joana Loureiro, Postdoc
Catalina Alvarez, PhD student, IBB 2014 | *Started in August*
Ana Lina Rodrigues, PhD student, PGCD 2014 | *Started in November*
Ana Cláudia Campos, Laboratory Manager

Funding
Deutsche Forschungsgemeinschaf

Collaborators
John Boothroyd (Stanford University, USA)
Veit Hornung (University of Bonn, Germany)
Eicke Latz (University of Bonn, Germany and University of Massachusetts, USA)
David Sibley (Washington University St Louis, USA)

Outreach
Media appearance in newspapers and radio, January, February, August, September.

ACTIN DYNAMICS

GROUP LEADER
Janody, Florence

RESEARCH INTERESTS

Filamentous (F) actin is assembled from monomeric (G) actin subunits. These semi-flexible polymers exert or resist against forces to drive a large number of cellular processes, including change in cell shape, cell mobility, cytokinesis, vesicle trafficking, signal transduction and gene expression. Divers observations argue that actin deregulation not only promotes malignant-associated features, such as tumour invasion and metastasis, but is also involved in tumour cell proliferation and survival earlier during tumour progression. Our aim is to identify actin-filament-based structures built during tumour progression, investigate how they are regulated by cancer pathways and characterize their function in tumor progression. To tackle these questions, we are using complementary models:

- The *in vivo* model *Drosophila melanogaster*;
- Inducible human cell lines cultured in two- or three-dimension that recapitulate the multistep development of cancer;
- Tumour samples.

Our work will permit to explore the extensive diversity of actin-based structures built within a cell, uncover novel mechanisms by which cancer cells acquire pre-malignant and malignant features and facilitate hypothesis-driven anti-tumour strategies.

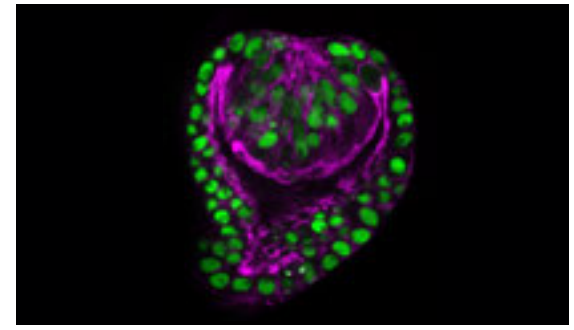
PROJECTS RUNNING IN 2015

- Investigating the role of the actin cytoskeleton in Hippo signalling.
- Cross-talk between the Src proto-oncogene and F-actin during tumoral transformation.
- Loss of the actin-microtubule cross-linkage: A mechanism of pre-malignant breast cancer progression?
- Arp2/3-mediated actin filament branching: Friend or enemy during breast cancer progression?
- Molecular function of the *dachshund/DACH1* tumour suppressor

MAIN ACHIEVEMENTS IN 2015

We had previously reported that the pro-growth function of various oncogenes, including the c-Src non-receptor tyrosine kinase, c-Jun N-terminal kinase (c-JUN) and Yorkie (YAP/TAZ in mammals) is controlled by the actin cytoskeleton in *Drosophila* epithelia. To understand the role of the actin cytoskeleton in controlling the oncogenic activity of Yorkie, we screened for actin regulators involved. In collaboration with the laboratory of Nicolas Tapon, at the Francis Crick Institute (UK), we have identified the actin-associated LIM protein Zyxin.

We found that Zyxin, together with the Ena/VASP family member Enabled, which favours the elongation of actin filaments bundles, promote Yorkie-mediated tissue growth. Our observations argue that the antagonism between Zyxin/Enabled and Capping Protein on actin filaments, links mechanical forces to Yorkie oncogenic activity (Gaspar *et al.,* 2015). We have also identified the nuclear protein related to the Sno/Ski family of co-repressors Dachshund, as an inhibitor of Yorkie-mediated tissue growth. Based on the critical role of the human dachshund homolog DACH1 in tumorigenesis, our work argues that DACH1 prevents cellular transformation by limiting the oncogenic abilities of YAP/TAZ (Bras-Pereira *et al.*, 2015, in collaboration with the laboratory of Fernando Casares at Universidad Pablo de Olavide, Spain). Finally, in collaboration with the laboratory of Raquel Seruca at Instituto de Investigação e Inovação em Saúde (i3S) in Portugal, we have reported that the loss of the cell-cell adhesion component E-Cadherin triggers the accumulation of Laminin in the extracellular matrix that allows E-Cadherin-dysfunctional cells to survive and invade (Caldeira *et al.,* 2015).



dachshund mutant clone extruding from the *Drosophila* eye disc epithelium, marked by nuclear GFP and stained with Phalloidin, which marks actin filaments.

PUBLICATIONS

Brás-Pereira, C., Casares, F., **Janody, F.** (2015). *The retinal determination gene* dachshund *restricts cell proliferation by limiting the activity of the Homothorax-Yorkie complex*. **Development.** 142(8): 1470-9.

Caldeira, J., Figueiredo, J., Brás-Pereira, C., Carneiro, P., Moreira, A.M., Pinto, M.T., Relvas, J.B., Carneiro, F., Barbosa, M., Casares, F, **Janody, F.**, Seruca, R. (2015). *E-cadherin-defective gastric cancer cells depend on laminin to survive and invade*. **Hum Mol Genet.** 24(20): 5891-900.

Gaspar, P., Holder, M.V., Aerne, B.L., **Janody, F.**, Tapon, N. (2015). *Zyxin antagonizes the FERM protein expanded to couple F-Actin and Yorkie-dependent organ growth*. **Curr Biol.** 16(6): 679-689.

GROUP LEADER

Email fjanody@igc.gulbenkian.pt

PhD in Cell Biology, Structural Biology and Microbiology
Université de la Méditerranée, France, 1999

Group Leader at IGC since 2006

Previous positions
Research Associate, Developmental Biology Institute of Marseille Luminy, France

Research Associate, Skirball Institute, USA

GROUP MEMBERS

Catarina Brás-Pereira, Postdoc
Pedro Miguel Gaspar, Postdoc | *Left in March*
Praachi Jain, PhD student, IBB 2014
Sandra Tavares, PhD student, PIBS 2011
Vânia Neves, Masters student | *Left in July*
Filipe Viegas, Masters student | *Started in September*
Margarida Araújo, Trainee | *Started in October*

Funding
Laço Association

Collaborators
Fernando Casares (Universidad Pablo de Olavide, Spain)
Claudine Chaouiya (IGC, Portugal)
Jochen Guck (Biotechnologisches Zentrum, Germany)
Joana Paredes (i3S, Portugal)
José Pereira Leal (IGC, Portugal)
Raquel Seruca (i3S, Portugal)
Nicolas Tapon (London Research Institute, CRUK, UK)
Michael Way (The Francis Crick Institute, UK)

Outreach
Public talk in a patient association's event, Barreiro, April.

Media appearance in newspapers, TV, and other channels, February, April, October.

IGC stand at Belém Art Fest, Belém, May.

IGC stand at NOS Alive'15 - speed dating and hands-on activities, Algés, July.

Interview for high school teachers, IGC, July.

IGC stand at GreenFest - speed dating, Estoril, September.

EPIGENETIC MECHANISMS

GROUP LEADER
Jansen, Lars

RESEARCH INTERESTS

Genomic information is embedded in the primary DNA sequence. In additional epigenetic information is propagated along cell divisions that "memorizes" gene activity states and specific chromatin structures. The laboratory for epigenetic mechanisms has a broad interest in how this works. Epigenetic modes of inheritance impact many aspects of biology that includes development, gene regulation and disease. Several molecular components such as histone proteins and modifications thereof have been implicated in this process but in most cases we don't understand the logic of how something other than DNA can be faithfully duplicated when a cell divides.

We use the mammalian centromere as a model for chromatin-based epigenetic inheritance.

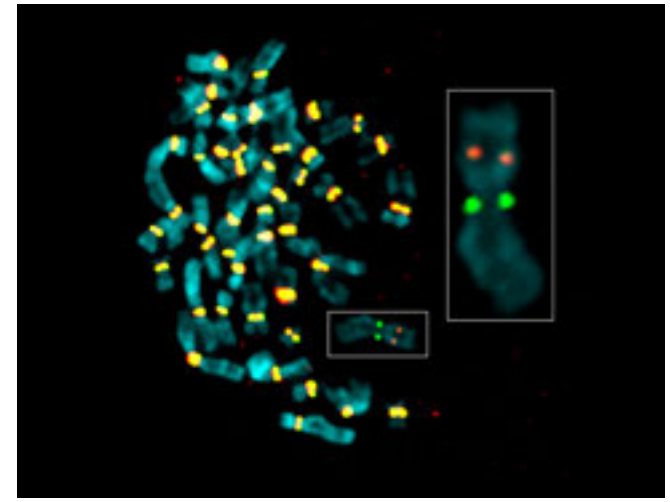
We employ molecular genetic and cell biological tools with a focus on novel fluorescent labelling techniques, high-end microscopy and the latest tricks in genetic engineering of human cells to tackle a wide range of problems in this emerging and fascinating area of biology.

PROJECTS RUNNING IN 2015

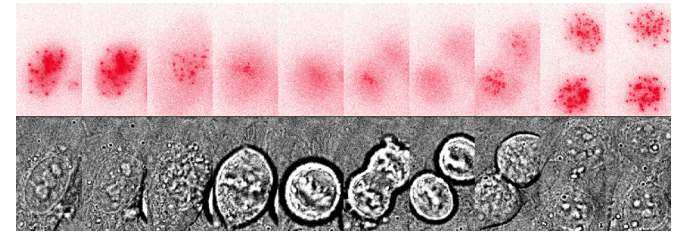
- Epimechanism

MAIN ACHIEVEMENTS IN 2015

Centromeres form the site of chromosome attachment to microtubules during mitosis and is responsible for driving chromosome segregation. Identity of these loci is maintained epigenetically by nucleosomes containing the histone H3 variant CENP-A. In 2015, we focused on understanding how CENP-A itself is inherited. Previously we showed that CENP-A is an unusually stable molecule in chromatin (Bodor *et al.*, 2013). This year we uncovered a centromere protein named CENP-C that appears to be involved in specifically stabilizing CENP-A. In collaboration with Ben Black´s lab at UPenn, Philadelphia, we helped show that loss of CENP-C leads to accelerated turnover of CENP-A from chromatin and loss of centromere identity. This work was published in *Science* in May 2015.



Jumping centromeres. Centromeres can move from one place to another. Mitotic chromosomes (blue) of a human cell are shown. On one of them, the active centromere (green dot) has moved away from its original location (red dot). Once formed these neocentromeres are maintained stably in an epigenetic manner).



Dynamic centromeres. Quantitative fluorescent microscopy helps us understand how chromatin proteins are assembled during the cell cycle. Still frames of a time-lapse movie are shown of a human cell cycling through mitosis (contrast images). The intensity levels of CENP-A, a histone at the human centromere locus, are precisely quantified over time (red scale) to understand how this protein is maintained in place.

PUBLICATIONS

Falk, S.J., Guo, L.Y., Sekulic, N., Smoak, E.M., Mani, T., Logsdon, G.A., Gupta, K., **Jansen, L.E.**, Vand Duyne, G.D., Vinogradov, S.A., Lampson, M.A., Black, B.E. (2015). *CENP-C reshapes and stabilizes CENP-A nucleosomes at the centromere*. **Science**. 348(6235): 699-703.

GROUP LEADER

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PhD in Molecular Genetics
Leiden University, The Netherlands, 2002

Group Leader at IGC since 2008

Previous positions
Postdoc, Ludwig Institute for Cancer Research, USA

External Website
www.epilab.pt

GROUP MEMBERS

Sreyoshi Mitra, Postdoc | *Started in January*
Marina Murillo Pineda, Postdoc | *Started in October*
Wojciech Siwek, Postdoc | *Started in January*
Daniel Bodor, External PhD student | *Left in October*
Dragan Stajic, PhD student, PIBS 2013
Ana Stankovic, PhD student, PIBS 2011
Rúben Abreu, Masters student
João Mata, Research Technician

Funding
European Research Council
Fundação para a Ciência e a Tecnologia

Collaborators
Ben E. Black (University of Pennsylvania, USA)
Ivan Correa (New England BioLabs, USA)
Ben Garcia (University of Pennsylvania, USA)
Robert Kingston (Harvard University, USA)
Lilia Perfeito (IGC, Portugal)

PATTERNING AND MORPHOGENESIS

GROUP LEADER
Mallo, Moisés

RESEARCH INTERESTS

Our group is interested in several aspects of vertebrate embryonic development. The ultimate goal of our research is to understand the molecular mechanisms that translate patterning information into morphogenetic processes during formation of the vertebrate embryo.

Understanding what regulates the behaviour of the axial progenitors responsible for producing the different body elements has become one of the main focuses of our laboratory. More recently, we have also become interested in the role that those processes played in the evolution of the vertebrate body plan.

In general, most of our work uses the mouse as the model system, and our approaches have a main focus on *in vivo* functional analyses complemented with *in vitro* differentiation systems based on stem and progenitor cells.

We are also incorporating other model systems to our approaches, mostly as a consequence of the recent Evo-Devo twist in our research.

PROJECTS RUNNING IN 2015

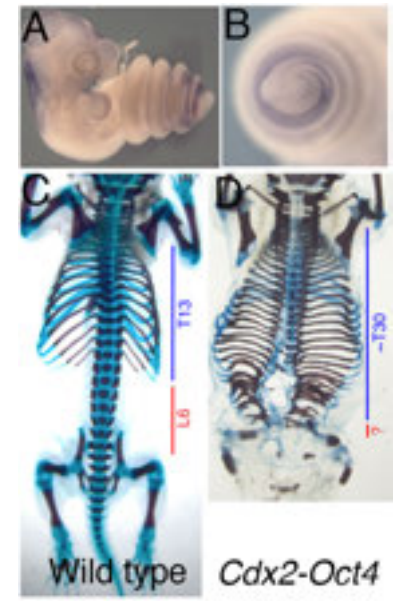
- The role of Oct4 in the evolution of the vertebrate body plan
- The role of Hox genes in patterning the axial skeleton
- Understanding the mechanisms regulating differentiation of axial progenitors

MAIN ACHIEVEMENTS IN 2015

We have identified the pluripotency factor Oct4 as a main regulator of trunk length in vertebrates. In particular, using a transgenic approach we could show that when Oct4 activity is maintained in the axial progenitors it produces a remarkable extension of the trunk at the expense of the lumbar, sacral and caudal areas. We could also show that persistent Oct4 activity is likely to be in the origin of the remarkably long trunks of snakes and that this could have resulted from differential genomic rearrangement at the Oct4 locus in mammals and snakes that affected regulation of Oct4 expression.

We have explored the mechanisms guiding Hoxb6 activity during formation of the axial skeleton. We have identified a new region of the Hoxb6 protein that is essential for its activity. Using a combination of biochemical and transgenic approaches, we have shown that this region is likely to act as a docking surface to recruit additional functional cofactors required for Hoxb6-mediated activation of the rib-promoting programme during formation of the axial skeleton. In the course of these experiments we also found that Hoxb6 can produce vertebral malformations at the lumbar, sacral and caudal levels but not in the thoracic area, indicating that the mechanisms of somitogenesis are not uniform along the anterior posterior body axis.

We have set to identify the conditions to increase the production of axial progenitors specifically fated to produce neural tissues under conditions that allow their expansion. Using the CRISPR/Cas9 technology, we have produced embryonic stem cells carrying a homozygous null mutation for the Tbx6 gene. With these cells we have observed that culture conditions typically inducing mesodermal fates in wild type stem cells promote neural fates in the absence of Tbx6. We are further exploring these observations and the potential to use them in spinal cord replacement therapies.



Oct4 is promotes lengthening of the trunk of vertebrates. A. In snakes, Oct4 expression is detected until very late in development associated with trunk tissues. B. Close up of the snake embryo from a different view. C. Mice have relatively short trunks (represented in the figure by the 13 ribs observed their skeletons). D. Oct4 can extend the trunk in transgenic mice, thus providing an experimental proof of the ability of Oct4 to produce trunk structures.

PUBLICATIONS

Casaca, A., Nóvoa, A., **Mallo, M.** (2015). *Hoxb6 can interfere with somitogenesis in the posterior embryo through a mechanism independent of its rib-promoting activity.* **Development. [Epub ahead of print].**

Mallo, M. (2015). *Revisiting the involvement of signalling gradients in somitogenesis.* **FEBS J. [Epub ahead of print].**

GROUP LEADER

Email mallo@igc.gulbenkian.pt

MD and PhD in Molecular Biology
Universidade de Santiago de Compostela, Spain, 1991

Group Leader at IGC since 2001

Previous positions
Junior Group Leader, Max Planck Institute of Immunobiology, Germany

Postdoctoral Fellow, Roche Institute of Molecular Biology, USA

Institutional Roles at IGC
Head of Transgenics Unit

GROUP MEMBERS

Ana Casaca, Postdoc
Maria Luisa Machado, Postdoc | *Started in May*
Ana Rita Aires, PhD student, PIBS 2011
Ozlem Isik, PhD student, PIBS 2010
Irma Varela Lasheras, PhD student, PIBS 2011
André Dias, Masters student
Ana Nóvoa, Research Technician

Funding
Santa Casa da Misericórdia de Lisboa, Portugal

Collaborators
Nicoletta Bobola (University of Manchester, UK)
Martin J. Cohn (University of Florida, USA)
Denis Duboule (University of Geneva, Switzerland)

Outreach
Media appearance in newspapers and other channels, May, December.

LYMPHOCYTE DEVELOPMENT & LEUKEMOGENESIS

GROUP LEADER

Martins, Vera

RESEARCH INTERESTS

Research in the lab focuses on the development of T lymphocytes and on the processes that lead to leukemia from precursors of T lymphocytes. We use mouse models that enable us to assess small cell populations in the thymus (where T lymphocytes develop) and learn how they interact with each other. One of our major goals is to learn about the genes that regulate these interactions and whether they are involved in the early steps of leukemogenesis.

PROJECTS RUNNING IN 2015

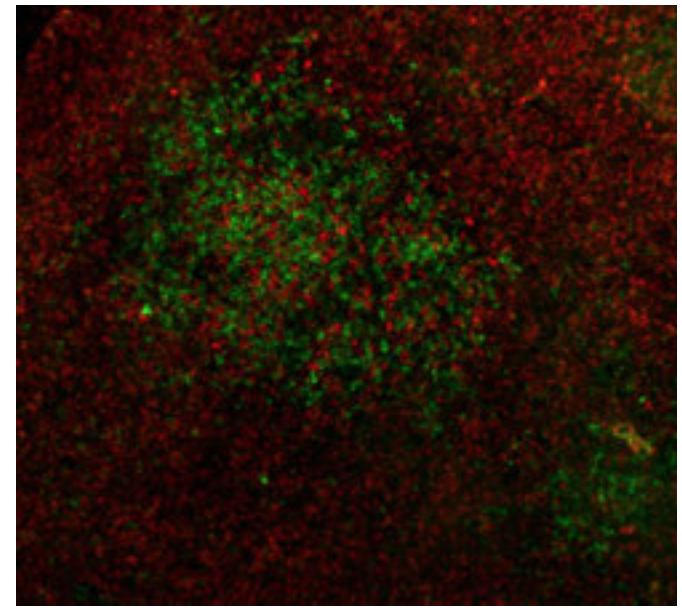
- Cell competition in the thymus

MAIN ACHIEVEMENTS IN 2015

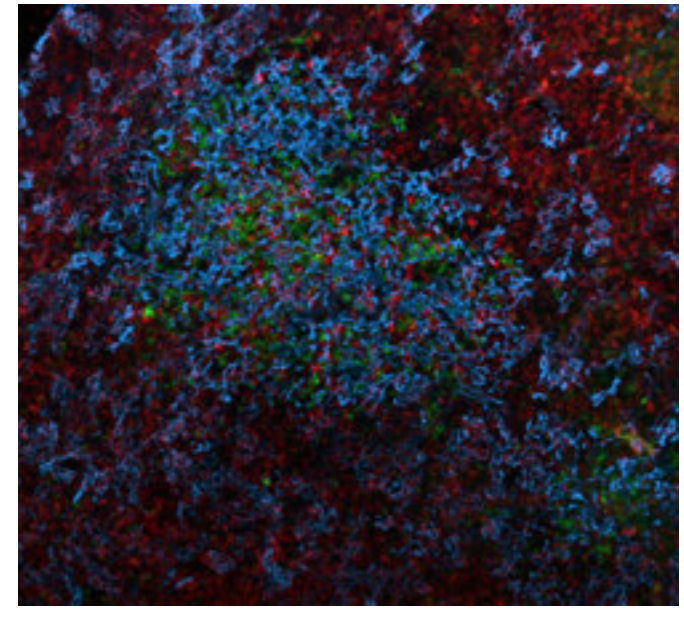
I joined the IGC in September 2015 to establish myself as an independent group leader. Three lab members were recruited in November that now integrate a very motivated team. We started by establishing several of the key techniques and have expanded part of the mouse colony that will enable us to perform most of our *in vivo* experiments.

PUBLICATIONS

Rode, I., **Martins, V.C.**, Küblbeck, G., Maltry, N., Tessmer, C., Rodewald, H.R. (2015). *Foxn1 protein expression in the developing, aging and regenerating thymus*. **J Immunol.** 195(12): 5678-87.



Section of a wild type thymus graft deprived of progenitor import and stained for the T lymphocyte markers CD4 (green) and CD8 (red).



The same section was also stained for cytokeratin 5 (cyan), which identifies medullary epithelial cells and enables the visualisation of medullary areas in this thymus graft.

GROUP LEADER

Email vmartins@igc.gulbenkian.pt

PhD in Biology/Immunology
University of Freiburg, Germany, 2007

Group Leader at IGC since 2015

Previous positions
Postdoc, University of Ulm, Germany

Postdoc, Max Planck Institute of Immunobiology and Epigenetics, Germany

GROUP MEMBERS

Carolina Alves, Laboratory Manager | *Started in November*
Joana Silva, Technician | *Started in November*
Rita Simões, Trainee | *Started in November*

DEVELOPMENT, EVOLUTION AND THE ENVIRONMENT

GROUP LEADER
Mirth, Christen

RESEARCH INTERESTS

Changes in the environment profoundly shape developmental and behavioural responses in all organisms, a process known as phenotypic plasticity. We are, however, only beginning to understand the mechanisms that integrate information from the environment to coordinate this plasticity. In my laboratory, we seek to understand how environmental cues influence development and behaviour and how these interactions evolve to generate species-specific phenotypes. We approach this problem at multiple biological levels with the goal of understanding: 1) the mechanisms that allow the environment to modify the synthesis of hormones necessary for development; 2) how organs interpret hormonal cues to coordinate their development with that of the whole body, and; 3) how the choices animals make while foraging impact their development and life history.

PROJECTS RUNNING IN 2015

- Ontogeny of foraging behaviour in *Drosophila melanogaster*
- Adaptation to new nutritional niches in species of *Drosophila*
- Growth blocking peptides as nutrition-sensitive signals for insulin secretion and body size regulation
- Stage-specific plasticity in ovary size is regulated by insulin/insulin-like growth factor and ecdysone signalling in *Drosophila*
- The role of ecdysone in regulating wing disc size and rate of patterning in *Drosophila melanogaster*

MAIN ACHIEVEMENTS IN 2015

LIFE HISTORY EVOLUTION & FORAGING BEHAVIOUR

We have explored the relationship between the larval nutritional environment and larval and adult life history traits in six different species of fruit flies from the genus *Drosophila*. By manipulating the macronutrient composition of the larval diet across a broad range of protein to carbohydrate conditions, we have found that species differ in how the specific combinations and quantities of both macronutrients affect their life history traits, including body size, development time, and survival. For some species, like *Drosophila melanogaster*, the conditions that optimize developmental time are not the same as those that optimize body size and survival. We have found that these larvae make foraging choices that would optimize development time at the expense of maximum body size.

Further, we find adult females make oviposition decisions that reflect the order in which they colonize rotting fruit. Females that prefer ripe, not rotting, fruit tend to prefer laying their eggs in foods with lower protein concentrations. Taken together, our system provides a tractable way of understanding how foraging decisions affect the life history of animals, and how these traits evolve with new nutritional niches.

BODY SIZE REGULATION

We have continued our work exploring the mechanisms underlying body size regulation in the fruit fly *Drosophila melanogaster*. Our work over the past five years has shown that nutrition regulates body size by altering the synthesis and secretion of two important developmental hormones: the insulin-like peptides and the steroid hormone ecdysone. We have found that a pulse of ecdysone early in the final larval instar changes the sensitivity of the developing wing and ovaries to nutrition. In both tissues, we have found that starving larvae before this ecdysone pulse dramatically suppresses both growth and patterning, whereas starvation after the pulse moderately reduces growth and patterning. In the ovary, we have found that this switch in sensitivity to starvation occurs because ecdysone alters the signalling pathways that regulate the growth and patterning of this organ.

Finally, we have explored how nutritional information is conveyed throughout the body to regulate hormone synthesis and secretion. We have found that two peptides produced in the insect fat body regulate insulin-like peptide secretion in response to dietary protein. This, in turn, regulates both growth rate and the duration of the growth period, ultimately controlling final body size.

PUBLICATIONS

Carvalho, M.J.A., **Mirth, C.K.** (2015). *Coordinating morphology with behaviour during development: an integrative approach from a fly perspective*. **Front Ecol Evol.** 3, 5.

Herboso, L., Oliveira, M.M., Talamillo, A., Pérez, C., González, M., Martín, D., Sutherland, J.D., Shingleton, A.W., **Mirth, C.K.**, Barrio, R. (2015). *Ecdysone promotes growth of imaginal discs through the regulation of Thor in* D. melanogaster. **Sci Rep.** 5: 12383.

Matavelli, C., Carvalho, M.J., Martins, N.E., **Mirth, C.K.** (2015). *Differences in larval nutritional requirements and female oviposition preference reflect the order of fruit colonization of* Zaprionus indianus *and* Drosophila simulans. **J Insect Physiol.** 82: 66-74.

Mendes, C.C., **Mirth, C.K.** (2015). *Stage-specific plasticity in ovary size is regulated by insulin/insulin-like growth factor and ecdysone signalling in* Drosophila. **Genetics. [Epub ahead of print].**

Rodrigues, M.A., Martins, B.E., Balancé, L.F., Broom, L.N., Dias, A.J., Fernandes, A.S., Rodrigues, F., Sucena, É., **Mirth, C.K.** (2015). Drosophila melanogaster *larvae make nutritional choices that minimize developmental time*. **J Insect Physiol**. 81: 69-80.

GROUP LEADER

Email christen@igc.gulbenkian.pt

PhD in Zoology
University of Cambridge, UK, 2002

Group Leader at IGC since 2010

Previous positions
Research Specialist, Janelia Farm Research Campus, HHMI, USA

Postdoctoral associate, Department of Zoology, University of Washington, USA

External Website
http://pages.igc.gulbenkian.pt/SCF/lab_page/Welcome.html

GROUP MEMBERS

Maria Carvalho, Postdoc
Takashi Koyama, Postdoc
Cláudia C. Mendes, PhD student, PIBS 2010 | *Left in December*
Marisa Oliveira, PhD student, PIBS 2009 | *Left in March*
Nuno Soares, PhD student, PIBS 2013
Inês Sousa, PhD student, PIBS 2014 | *Left in October*
Ana Sofia Lindeza, Masters student
Marisa Rodrigues, Masters student | *Left in December*
André Alves, Trainee | *Left September*
Andreia Oliveira, Trainee | *Left in September*

Funding
Fundação para a Ciência e a Tecnologia

Collaborators
Rosa Barrio (CIC bioGUNE, Spain)
Patrícia Beldade (IGC, Portugal)
Kristin Branson (Janelia Farm Research Campus, HHMI, USA)
Tony Frankino (University of Houston, USA)
Alisson Gontijo (CEDOC, Portugal)
Alexander Shingleton (Michigan State University, USA)
Élio Sucena (IGC, Portugal)
Yuichiro Suzuki (Wellesley College, USA)

INNATE IMMUNITY AND INFLAMMATION

GROUP LEADER
Moita, Luís Ferreira

RESEARCH INTERESTS

Our laboratory works on two different topics: innate immunity and inflammation. Our focus on innate immunity is centred on the study of antigen cross-presentation mechanisms and the immunobiology of dendritic cells. Effective immune responses against tumour antigens that are not endogenously expressed by dendritic cells (DCs) and against viruses that do not infect antigen presenting cells (APCs) require extracellular antigens to stimulate $CD8^+$ T cells via the MHC I pathway through a process poorly characterized at the molecular level known as antigen cross-presentation. We are using a series of systematic genetic approaches to identify the molecular machinery involved in antigen cross-presentation. In addition, we want to explore antigen cross-presentation as an early immune-regulatory checkpoint in the control of $CD8^+$ T cell priming by dendritic cells, to find drugs that inhibit negative regulators of this process, as they are likely to improve the generation of effective T cells responses against tumours and are good candidates for novel adjuvant therapies for cancer treatment.

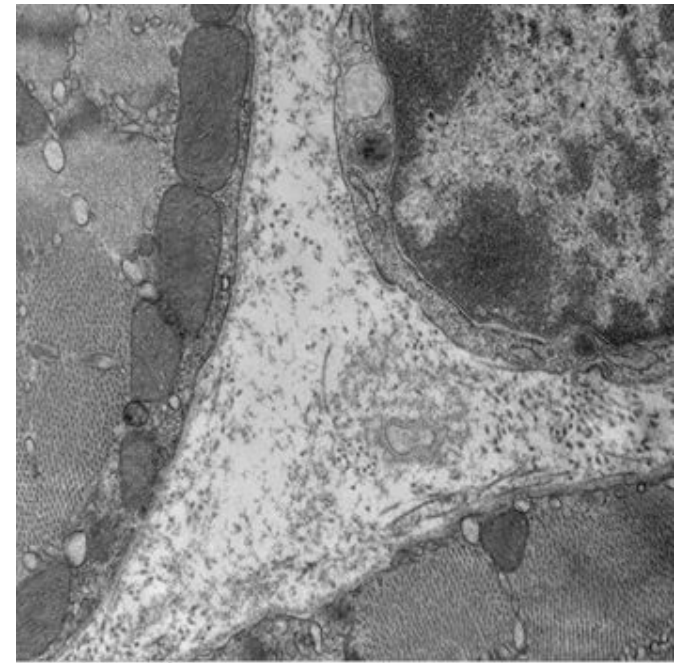
The second theme of the laboratory relates to inflammation. Severe sepsis remains a poorly understood systemic inflammatory condition with high mortality rates and limited therapeutic options outside of infection control and organ support measures. Based on our recent discovery in mice showing that anthracycline drugs prevent organ failure without affecting the bacterial burden in a model of severe sepsis, we propose that strategies aimed at target organ protection have extraordinary potential for the treatment of sepsis and possibly for other inflammation-driven conditions. However, the mechanisms of organ protection and disease tolerance are either unknown or poorly characterized. The central goal of this research programme is to identify and characterize novel cytoprotective mechanisms, with a focus on DNA damage response dependent protection activated by anthracyclines as a window into stress-induced genetic programmes leading to tissue protection.

PROJECTS RUNNING IN 2015

- Molecular Mechanisms of Induced Protection against Sepsis by DNA Damage Responses
- shRNA-based dissection of phagosome-to-cytosol antigen export in dendritic cells

MAIN ACHIEVEMENTS IN 2015

Awarded an ERC Consolidator Grant to the project: Molecular Mechanisms of Induced Protection against Sepsis by DNA Damage Responses - iPROTECTION.



TEM of mouse posterior limb adductor muscle.

PUBLICATIONS

Cascão, R., Vidal, B., Lopes, I.P., Paisana, E., Rino, J., **Moita, L.F.,** Fonseca, J.E. (2015). *Decrease of CD68 synovial macrophages in celastrol treated arthritic rats*. **PLoS ONE.** 10(12): e0142448.

Gerber, P.P., Cabrini, M., Jancic, C., Paoletti, L., Banchio, C., Von Bildderling, C., Sigaut, L., Pietrasanta, L.I., Duette, G., Freed, E.O., de Saint Baisle, G., Moita, C.F., **Moita, L.F.**, Amigorena, S., Benaroch, P., Geffner, J., Ostrowski, M. (2015). *Rab27a controls HIV-1 assembly by regulating plasma membrane levels of phosphatidylinositol 4,5-bisphosphate*. **J Cell Biol.** 209(3): 435-52.

Sarmento, L.M., Póvoa, V., Nascimento, R., Real, G., Antunes, I., Martins, L.R., Moita, C., Alves, P.M., Abecasis, M., **Moita, L.F.**, Parkhouse, R.M.E., Meijerink, J.P.P., Barata. J.T. (2015). *CHK1 overexpression in T-cell acute lymphoblastic leukemia is essential for proliferation and survival by preventing excessive replication stress*. **Oncogene.** 34(23): 2978-2990.

GROUP LEADER

Email lmoita@igc.gulbenkian.pt

PhD in Cell and Molecular Biology
European Molecular Biology Laboratory, Germany, 2003

Group Leader at IGC since 2014

Previous positions
Group Leader at Instituto de Medicina Molecular, Portugal

Postdoctoral Fellow at Massachusetts General Hospital, USA

Postdoctoral Fellow at Whitehead Institute, USA

GROUP MEMBERS

Catarina Moita, Postdoc
Ana Neves-Costa, Postdoc
Raquel Rodrigues, Postdoc | *Left in September*
Henrique Colaço, PhD student, IBB 2015
Lok Pahari, PhD student, IBB 2014 | *Left in May*
Isa Santos, External PhD student
Tiago Velho, External PhD student

Funding
European Research Council
Fundação para a Ciência e a Tecnologia

Collaborators
Sebastian Amigorena (Institut Curie, France)
João Eurico da Fonseca (IMM, Portugal)
Vineet Gupta (Rush University, USA)
Nir Hacohen (Broad Institute, USA)
Darrell Irvine (MIT, USA)
Caetano Reis e Sousa (London Research Institute, UK)

Outreach
Media appearance in newspapers and other channels, February, March, May, October.

CHROMOSOME DYNAMICS

GROUP LEADER
Oliveira, Raquel

RESEARCH INTERESTS

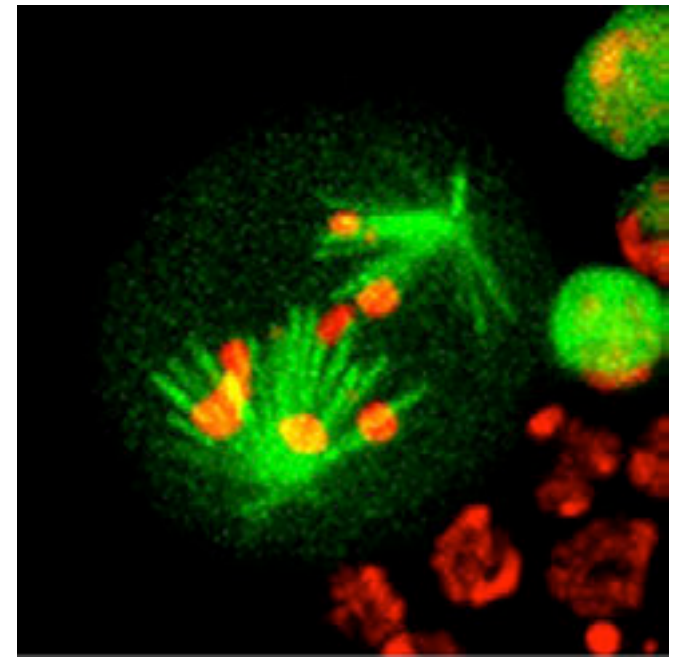
We study how chromosome architecture contributes to faithful genome segregation. Genome stability relies on the fact that at each round of cell division, the genetic information encoded in the DNA molecules is properly segregated into the two daughter cells. Proper completion of this process, in turn, depends on two major changes in chromosome organisation:
1) the two-sister DNA molecules remain tightly associated with each other from the moment of DNA replication until the later stages of the subsequent mitosis;
2) at the onset of nuclear division, chromatin is converted into compact structures with the right mechanical properties (size, flexibility, and rigidity) to facilitate their segregation.
Our laboratory adopts a multidisciplinary approach, combining *Drosophila* genetics, acute protein inactivation, 4D-live cell imaging and biophysical/mathematical modelling to evaluate how dynamic mitotic chromosomes are assembled and how their morphology influences the mechanical aspects of chromosome movement and cell cycle checkpoint signalling. In parallel we aim to dissect how different cells respond to compromised chromosome cohesion and condensation, both at the cellular and organism level. By studying the contribution of chromosome structure in the mechanics of nuclear division we aim to identify novel routes to aneuploidy that underlie several human conditions, including developmental diseases, cancer and infertility.

PROJECTS RUNNING IN 2015

- Analysis of Spindle Assembly Checkpoint response to premature loss of sister chromatid cohesion
- Quantitative analysis of sister chromatid cohesion decay
- Building up mitotic chromosomes: sister chromatid resolution and chromatin compaction
- Role of condensin complexes outside mitosis

MAIN ACHIEVEMENTS IN 2015

Accurate segregation of the genome during mitosis relies on the maintenance of cohesion between identical DNA molecules before their equal distribution into the two daughter cells. Sister chromatid cohesion defects, often found in the context of human disease (e.g. cancer, infertility and developmental disorders), lead to random genome segregation and consequent aneuploidy. Yet, such errors are not efficiently detected by the Spindle Assembly Checkpoint, the principal guardian of mitotic fidelity. Our recent work provided quantitative and mechanistic insights that clarify how this checkpoint fails to sense and prevent aberrant mitotic exit upon premature loss sister chromatid cohesion. Using developing *Drosophila* brains, we show that full sister chromatid separation elicits a weak checkpoint response resulting in abnormal mitotic exit after a short delay. Quantitative live-cell imaging approaches combined with mathematical modelling indicate that weak SAC activation upon cohesion loss is caused by weak signal generation. This is further attenuated by several feedback loops in the mitotic signalling network. We propose that multiple feedback loops involving cyclin-dependent kinase 1 (Cdk1) gradually impair error-correction efficiency and accelerate mitotic exit upon premature loss of cohesion. Our findings explain how cohesion defects may escape SAC surveillance.



Cell undergoing mitosis with Precocious Separated Sister Chromatids. DNA is shown in red and microtubules in green.

PUBLICATIONS

Mirkovic, M., Hutter, L.H., Novák, B., **Oliveira, R.A.** (2015). *Premature sister chromatid separation is poorly detected by the spindle assembly checkpoint as a result of system-level feedback*. **Cell Rep.** 13(3): 469-78.

GROUP LEADER

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PhD in Biochemistry
University of Coimbra, Portugal, 2007

Group Leader at IGC since 2012

Previous positions
Postdoctoral Research Associate, Department of Biochemistry, University of Oxford, UK

External Website
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GROUP MEMBERS

Lina Gellego-Paez, Postdoc | *Left in July*
Gaston Guilgur, Postdoc | *Started in September*
Mihailo Mirkovic, PhD student, IBB 2014
Ewa Piskadlo, PhD student, PIBS 2013
Cintia Ramos, PhD student, PGCD 2014
Mariana Santos, Research Technician | *Left in November*
Alexandra Tavares, Research Technician

Funding
EMBO
European Research Council
FP7 programme, European Commission
Fundação para a Ciência e a Tecnologia

Collaborators
Béla Novák (University of Oxford, UK)

Outreach
Media appearance in newspapers, TV and other channels, January, March, May, October.

Round table "Scientific Research in Portugal", ENEBIOQ, Faro, March.

IGC stand at NOS Alive'15 - speed dating, Algés, July.

INTEGRATIVE BEHAVIOURAL BIOLOGY

GROUP LEADER
Oliveira, Rui

RESEARCH INTERESTS

Our main research interest is the integrative study of social behaviour, which combines the study of proximate causes (gene modules, hormones, neural circuits, cognitive processes) and ultimate effects (evolutionary consequences). In particular we aim to understand how brain and behaviour can be shaped by social environment, and how the cognitive, neural and genetic mechanisms underlying plasticity in the expression of social behaviour have evolved. Current research questions centre on four topics:

1. Evolution of social cognition and of its neuromolecular mechanisms – we aim to understand if social plasticity is as an organismal performance trait that impacts Darwinian fitness and may itself be subject to selection;
2. Genomic and epigenomic mechanisms of social plasticity – we seek to understand how the same genome can produce different social phenotypes in response to key social cues in the environment;
3. Neuroendocrinology of social interactions and of social plasticity – this research aims to understand the role of hormones and neuropeptides as neuromodulators involved in the plasticity of social behaviour;
4. Fish cognition and welfare – we aim to use our knowledge in this field to improve fish husbandry and handling procedures towards better research and animal welfare.

PROJECTS RUNNING IN 2015

- Neural mechanisms of cognitive bias
- Neural mechanisms of social cognition in zebrafish
- Molecular mechanisms and evolutionary implications of social plasticity
- Comparative social cognition: zebrafish as a neurobehavioural model
- COPEWELL: A new integrative framework for the study of fish welfare based on the concepts of allostasis, appraisal and coping styles

MAIN ACHIEVEMENTS IN 2015

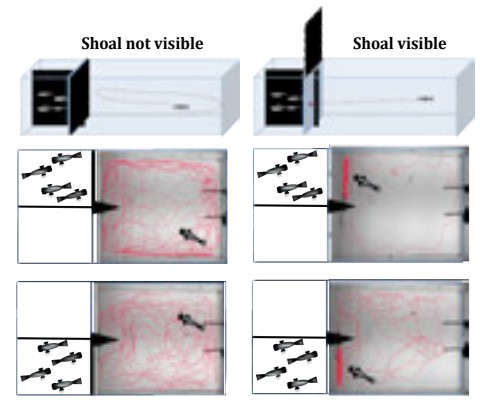
Our lab has been focused on developing zebrafish as a model organism for the study of the mechanisms underlying social cognition. During 2015, three key milestones were achieved in this direction:

1. We have established behavioural paradigms to study social attention and social memory in zebrafish, and we have shown that attention in this species is tuned to social interactions between conspecifics (Abril-de-Abreu *et al.*, 2015). We have also shown that zebrafish can recognize different individuals in its group and that this social memory lasts for at least 24h.

2. We have also shown that social interactions in zebrafish trigger changes in connectivity, rather than localized changes in activity in the neural network known to be involved in social decision-making. Thus, processing of social information seems to occur in a network of forebrain and midbrain structures in a distributed and dynamic fashion, such that the expression of a given social behaviour is better reflected by the overall profile of activation across the different loci rather than by the activity of a single node (Teles *et al.*, 2015).

3. Finally, using a high-throughput gene expression approach to study the response of the brain transcriptome to social interactions, we have shown, for the first time to our knowledge, that what triggers a genomic response to social information is the subjects' assessment of the interaction rather than a fixed response to a releaser cue in the environment. The occurrence of cognitive appraisal in zebrafish suggests that a cognitive ability classically considered complex is also present in a simple-minded vertebrate.

Oliveira, R.F., Simoes, J.M., Teles, M.C., Oliveira, C.R., Becker, J.D., Lopes, J.S. *Assessment of fight outcome is needed to activate socially driven transcriptional changes in the zebrafish brain*. **Proceedings of the National Academy of Sciences**. *In Press.*



Shoal preference as a measure of sociality in zebrafish. When a shoal is not visible, zebrafish explores the whole arena; when a shoal is visible, the focal fish spends the majority of time near the shoal compartment. Real zebrafish tracks represented by red lines.

GROUP LEADER

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PhD in Biology
Universidade de Lisboa, Portugal, 1996

Group Leader at IGC since 2012

Other positions
Full Professor at ISPA

External Website
http://www.oliveiralab.org

GROUP MEMBERS

José Cruz, Research Scientist | *Left in December*
Ana Rita Nunes, Postdoc
Gonçalo Oliveira, Postdoc
João Sollari Lopes, Postdoc | *Left in December*
Magda Teles, Postdoc
Rodrigo Abreu, PhD student, INPD 2007 | *Left in December*
Ibukun Akinrinade, PhD student, IBB 2015 | *Started in September*
Sara Cardoso, External PhD student
Ana Faustino, External PhD student
Ana Sofia Felix, External PhD student | *Started in February*
Júlia Pinho, External PhD student
Leonor Carreira, Masters student | *Started in September*
Natália Madeira, Masters student | *Left in July*
André Monteiro, Masters student | *Left in November*
Diogo Ribeiro, Masters student | *Started in September*
Raquel Martins, Research Assistant

Funding
BIAL
FP7 programme, European Commission
Fundação para a Ciência e a Tecnologia

Collaborators
Gil Levkowitz (Weizmann Institute, Israel), **Koichi Kawakami** (National Institute of Genetics, Japan), **Mike Orger** (Champalimaud Foundation, Portugal), **Gonzalo Polavieja** (Champalimaud Foundation, Portugal), **Svante Winberg** (Uppsala University, Sweden), **Hans Hofmann** (University of Texas at Austin, USA), **Eliane Gonçalves-de-Freitas** (State University of São Paulo, Brazil), **Suzana Herculano-Houzel** (Federal University of Rio Janeiro, Brazil), **Jörg Becker, Miguel Godinho Ferreira** and **Rosalina Fonseca** (IGC, Portugal)

Outreach
IGC stand at Belém Art Fest'15 - hands-on activities, Belém, May.

PUBLICATIONS

Abril-de-Abreu, R., Cruz, J., **Oliveira, R.F.** (2015). *Social eavesdropping in zebrafish: tuning of attention to social interactions*. **Sci Rep.** 5: 12678.

Abril-de-Abreu, R., Cruz, A.S., **Oliveira, R.F.** (2015). *Social dominance modulates eavesdropping in zebrafish*. **R Soc Open Sci.** 2(8): 150220.

Aires, R.F., Oliveira, G.A., Oliveira, T.F., Ros, A.F., **Oliveira, R.F.** (2015). *Dear enemies elicit lower androgen responses to territorial challenges than unfamiliar intruders in a cichlid fish*. **PLoS ONE**. 10(9): e0137705.

Almeida, O., **Oliveira, R.F.** (2015). *Social status and arginine vasotocin neuronal phenotypes in a cichlid fish*. **Brain Behav. Evol**. 85(3): 203-213.

Bshary, R., **Oliveira, R.F.** (2015) *Cooperation in animals: toward a game theory within the framework of social competence*. **Curr Opin Behav Sci.** 3: 31–37.

Cardoso, S.C., Bshary, R., Mazzei, R., Paitio, J.R., **Oliveira, R.F.**, Soares, M.C. (2015). *Arginine vasotocin modulates associative learning in a mutualistic cleaner fish*. **Behav Ecol Sociobiol.** 69: 1173-1181.

Cardoso, S.C., Paitio, J.R., **Oliveira, R.F.**, Bshary, R., Soares, M.C. (2015). *Arginine vasotocin reduces levels of cooperative behaviour in a cleaner fish*. **Physiol Behav.** 139: 314-20.

Cardoso, S.D., Teles, M.C., **Oliveira, R.F.** (2015). *Neurogenomic mechanisms of social plasticity*. **J Exp Biol.** 218(1): 140-149.

Cruz, A.S., **Oliveira, R.F.** (2015). *Audience effects and aggressive priming in agonistic behavior of male zebrafish*, Danio rerio. **Anim Behav.** 107: 269-276.

Fagundes, T., Simões, M.G., Saraiva, J.L., Ros, A.F.H., Gonçalves, D., **Oliveira, R.F.** (2015). *Birth date predicts alternative life history pathways in a fish with sequential reproductive tactics*. **Functional Ecology.** 29: 1533-1542.

Faustino, A.I., Oliveira, G.A., **Oliveira, R.F.** (2015). *Linking appraisal to behavioral flexibility in animals: implications for stress research*. **Front Behav Neurosci.** 9: 104.

Kulczykowska, E., Cardoso, S.C., Gozdowska, M., André, G.I., Paula, J.R., Slebioda, M., **Oliveira, R.F.**, Soares, M.C. (2015). *Brain levels of nonapeptides in four labrid fish species with different levels of mutualistic behavior*. **Gen Comp Endocrinol.** 222: 99-105.

Lopes, J.S., Abril-de-Abreu, R., **Oliveira, R.F.** (2015). *Brain transcriptomic response to social eavesdropping in zebrafish* (Danio rerio). **PLoS ONE**. 10(12): e0145801.

Simoes, J.M., Barata, E.N., Harris, R. M., O'Connell, L.A., Hofmann, H.A., **Oliveira, R.F.** (2015). *Social odors conveying dominance and reproductive information induce rapid physiological and neuromolecular changes in a cichlid fish*. **BMC Genomics**. 16(114).

Teles, M.C., Almeida, O., Lopes, J.S., **Oliveira, R.F.** (2015). *Social interactions elicit rapid shifts in functional connectivity in the social decision-making network of zebrafish*. **Proc Biol Sci.** 282(1816).

SOFTWARE DEVELOPMENT

FishTracker

Custom-made video-tracking system, which determines and extracts into data files the pixel coordinates of the head, centroid and tail of fish for each video-frame, hence allowing to track not only the position but also the orientation of focal fish in relation to a relevant stimulus. This is particularly useful for getting a measure of the attentional engagement of the focal fish, such as in the social attention test developed in our lab. https://github.com/joseaccruz/fishtracker

INFECTION & IMMUNITY

GROUP LEADER
Parkhouse, Michael

RESEARCH INTERESTS

The theme of the group is the reciprocal adaptation between an infectious organism and its host. The necessity to recognise and destroy invading pathogens has played a crucial role in the evolution of the immune system of both vertebrates and invertebrates. At the same time, pathogens, in particular, viruses have evolved strategies to manipulate the immune system. An efficient immune system must select the immune effector mechanism most appropriate to the biology of the pathogen. Thus the study of how pathogens control immune responses will offer novel approaches for the manipulation of the immune responses in health and disease, with novel vaccines and strategies to downregulate the immune system (e.g. inflammation) being the most obvious possibilities. Therefore, we are identifying and characterising virus host evasion genes directed towards subversion of cell biology and innate immunity. We have selected two viruses with very different lifestyles (HCMV and ASFV). We also participate in a collaborative project on the control of human, porcine and bovine cysticercosis (with colleagues in Spain, Mexico, Venezuela, Ecuador, Brazil and Scotland).

PROJECTS RUNNING IN 2015

• Mechanism and consequences of an IL-8 inducing herpesvirus gene

• Inhibition of the Interferon response by African Swine Fever Virus

• Control of Cysticercosis

MAIN ACHIEVEMENTS IN 2015

- Mechanism of an HCMV host modification protein inhibiting cell cycle progression and inducing IL-8 expression through an impact on the DNA damage signalling pathway.

- Mechanism of ASFV host modification proteins inhibiting IFN response.

- Development of a lateral flow assay for the rapid detection and follow up of extraparenchymal neurocysticercosis patients.

PUBLICATIONS

de Paiva e Almeida, S.C., de Oliveira, V.L., **Parkhouse, R.M.E.** (2015). *Impact on antibody responses of B-cell-restricted transgenic expression of a viral gene inhibiting activation of NF-κB and NFAT.* **Arch Virol.** 160(6): 1477-88.

Sarmento, L.M., Póvoa, V., Nascimento, R., Real, G., Antunes, I., Martins, L.R., Moita, C., Alves, P.M., Abecasis, M., Moita, L.F., **Parkhouse, R.M.E.**, Meijerink, J.P.P., Barata. J.T. (2015). *CHK1 overexpression in T-cell acute lymphoblastic leukemia is essential for proliferation and survival by preventing excessive replication stress.* **Oncogene**. 34(23): 2978-2990.

GROUP LEADER

Email parkhous@igc.gulbenkian.pt

PhD in Biochemistry
University of London, UK, 1963

Group Leader at IGC since 2000

Previous positions
Member of the scientific staff, National Institute for Medical Research, UK

Director, Centro Nacional de Biotechnologia, Spain

Head Immunology, Institute Animal Health, UK

GROUP MEMBERS

Sílvia Correia, Postdoc
Rute Nascimento, Postdoc
Diogo Dias, Masters student | *Left in December*
Solange Martins, Masters student | *Left in December*
Pedro Moura, Masters student

Funding
FP7 programme, European Commission

Collaborators
Agnes Fleury (Intituto Nacional de Neurologia y Neurocirugia, Mexico)
Steve Goodbourn (St. George's Hospital, University of London, UK)
John Sinclair (University of Cambridge, UK)

DISEASE GENETICS

GROUP LEADER
Penha Gonçalves, Carlos

RESEARCH INTERESTS

Our previous research in genetics of inflammatory responses to malaria infection drove us to ask how infection/inflammation impacts on cellular metabolism and organ physiology.
One line of research will be focused on how placental inflammation caused by malaria leads to placental dysfunction. We are particularly interested in evaluating the role of foetal-derived trophoblasts, an intriguing cell type that coapts functional roles of endothelial, macrophagic and contractile cells and participates in critical placental functions, namely maternal-fetal exchanges, blood microcirculatory regulation and inflammatory responses. This research will impact our understanding of the involvement of foetal factors in vaso-inflammatory placental disorders and may unveil pharmacological targets to promote foetal viability and protection mechanisms valuable in abortion and stillbirth prevention.
Our malaria research is also looking at the dialogue of brain microvessel endothelial cells with infected erythrocytes and immune cells in the context of the requirement of interferon in the development of cerebral malaria.
The liver is another target organ and the chosen disease models are malaria liver stage infection and NAFLD (non-alcoholic fatty liver disease).
We will focus on the Kupffer cell-hepatocyte dialogue with the twofold goal of (1) investigating hepatocyte metabolic shifts induced by inflammatory responses to *Plasmodium* infection and (2) identifying inflammatory pathways underpinning dysmetabolism in NAFLD. Translation of this research will profit from availability of our human malaria collections from Africa as well as Portuguese cohorts of pre-diabetic individuals.

PROJECTS RUNNING IN 2015

- Foetal factors protecting from placental malaria
- Brain interferon responses in cerebral malaria
- Insulin clearance regulation in diabetes pathogenesis
- CD26/DPP4 in Fatty Liver Disease progression

MAIN ACHIEVEMENTS IN 2015

Identifying vasoactivor pathways activated in trophoblasts upon exposure to erythrocytes infected with the malaria parasite.

Finding that mouse brain endothelial cells produce interferon upon exposure to erythrocyte derived microvesicles, providing a cellular basis for signalling IFNAR1 that is required for the development of Cerebral Malaria.

Finding that CD26 plays a role in activated Kupffer cells in the context of fatty liver disease induced by western diets in mouse models.

Finding that genetic polymorphisms in insulin-degrading enzyme are associated to pre-diabetes in the Portuguese population providing a link for the involvement of insulin clearance in early diabetes pathogenesis.

PUBLICATIONS

Duarte, N., Coelho, I.C., Patarrão, R.S., Almeida, J.I., **Penha-Gonçalves, C.**, Macedo. M.P. (2015). *How Inflammation Impinges on NAFLD: A role for Kupffer Cells*. **Biomed Res Int.** 2015: 984578.

Ferjeni, Z., Bouzid, D., Fourati, H., Stayoussef, M., Abida, O., Kammoun, T., Hachicha, M., **Penha-Gonçalves, C.,** Masmoudi, H. (2015). *Association of TCR/CD3, PTPN22, CD28 and ZAP70 gene polymorphisms with type 1 diabetes risk in Tunisian population: Family based association study*. **Immunol Lett.** 163(1): 1-7.

Lopes-João, A., Costa, I., Mesquita, J.R., Oleastro, M., **Penha-Gonçalves, C.,** Nascimento, M.S. (2015). *Multiple enteropathogenic viruses in a gastroenteritis outbreak in a military exercise of the Portuguese Army*. **J Clin Virol.** 68: 73-5.

Rommelaere, S., Millet, V., Rihet, P., Atwell, S., Helfer, E., Chasson, L., Beaumont, C., Chimini, G., Sambo, M.D., Viallat, A., **Penha-Gonçalves, C.**, Galland, F., Naquet, P. (2015). *Serum pantetheinase/vanin levels regulate erythrocyte homeostasis and severity of malaria*. **Am J Pathol.** 185(11): 3039-52.

Sambo, M.R., **Penha-Gonçalves, C.**, Trovoada, M.J., Costa, J., Lardoeyt, R., Coutinho, A. (2015). *Quantitative trait locus analysis of parasite density reveals that HbS gene carriage protects severe malaria patients against* Plasmodium falciparum *hyperparasitaemia*. **Malar J.** 14(1): 393.

GROUP LEADER

Email cpenha@igc.gulbenkian.pt

PhD in Immunology
University of Umeå, Sweden, 1999

Group Leader at IGC since 2003

Previous positions
Postdoc, Cambridge Institute of Medical Research, UK

Institutional Roles at IGC
Head of Genomics Unit

Member of the Ethics Committee

GROUP MEMBERS

Nádia Duarte, Postdoc
Luciana Moraes, Postdoc
Teresa Pais, Postdoc | *Started in May*
Inês Coelho, PhD student, IBB 2015 | *Started in July*
Yash Pandya, PhD student, IBB 2015 | *Started in July*
Joana Almeida, Masters student | *Left in December*
Sónia Cunha, Technician | *Started in September*

Funding
Fundação para a Ciência e a Tecnologia
March of Dimes Foundation

Collaborators
Taane Clark (London School of Hygiene and Tropical Medicine, UK)
Lars Hviid (University of Copenhagen, Denmark) **Chris Jansen** (Leiden University Medical Centre, The Netherlands)
Paula Macedo (Universidade Nova de Lisboa)
Claúdio Marinho (Universidade de São Paulo, Brazil)
Maria Mota (Instituto de Medicina Molecular, Portugal)
Rosário Sambo (Faculdade de Medicina de Benguela, Angola)
Maria Jesus Trovoada (Centro Nacional de Endemias, S. Tomé e Príncipe)

Outreach
Media appearance in newspapers and other channels, June.

COMPUTATIONAL GENOMICS

GROUP LEADER
Pereira-Leal, José

RESEARCH INTERESTS

We are interested in the evolutionary mechanisms underlying the origins and evolution of cellular life and the complex structures within the cell, the transitions to multi-cellularity, and the medical applications of evolutionary genomics. Our research encompasses themes that are broadly classified as evolutionary cell biology, systems biology, pathogenomics, and translational or medical bioinformatics.

PROJECTS RUNNING IN 2015

- Evolution of protein repertoires involved in intracellular compartmentalisation
- Evolution of endosporulation in Bacteria
- Bioinformatics tools for Evolutionary Cell Biology
- Genomics of marine unicellular Eukaryotes

MAIN ACHIEVEMENTS IN 2015

During 2015, we invested in the analyses of proteins containing coiled-coils domains, that are frequently structural components of many intracellular organelles. We developed a new evolutionary model to study these proteins, and showed that they carry relevant phylogenetic information, in contrast to the widely held belief that they are not usable in homology mapping sand in general sequence analysis approaches. We further showed the beyond sequence coiled coil domains are under a size constraint that equates with a conservation of their physical linear length. These studies have been published. We have further invested in characterising the evolution of Rab proteins and have discovered an evolutionary transitional state in the evolution of their complex membrane association cycle - publication arising.

We have further invested on deepening our collaboration with the group of Dr. Adriano in studying the origins and contains in the endosporulation programme of bacteria, and have focused on characterising naturally occurring diversity and characterising their genomes and genome dynamics it in the context of niche-specific adaptations - publications arising.

We have invested in establishing a new research direction in the group involving a focus on marine micro-organisms, and have participated in sampling exercises in Portuguese and Cabo-Verdian waters, and initiated projects in genome and meta-genome sequencing of both prokaryotic and eukaryotic communities, establishing novel collaborations with the Portuguese State Laboratory for Fisheries (IPMA).

PUBLICATIONS

Diekmann, Y., **Pereira-Leal, J.B.** (2015). *Bioinformatic approaches to identifying and classifying Rab proteins*. **Methods Mol Biol.** 1298: 17-28.

Ramos-Silva, P., Brito, P.H., Serrano, M., Henriques, A.O., **Pereira-Leal, J.B.** (2015). *Rethinking the niche of upper-atmosphere bacteria: draft genome sequences of* Bacillus aryabhattai *C765 and* Bacillus aerophilus *C772, isolated from rice fields*. **Genome Announc.** 3(2): e00094-15.

Reed, P., Atilano, M.L., Alves, R., Hoiczyk, E., Sher, X., Recihmann, N.T., Pereira, P.M., Roemer, T., Filipe, S.R., **Pereira-Leal, J.B.**, Ligoxygakis, P., Pinho, M.G. (2015). Staphylococcus aureus *survives with a minimal peptidoglycan synthesis machine but sacrifices virulence and antibiotic resistance*. **PLoS Pathog.** 11(5): e1004891.

Surkont, J., Diekmann, Y., Ryder, P.V., **Pereira-Leal, J.B.** (2015). *Coiled-coil length: Size does matter*. **Proteins. [Epub ahead of print].**

Surkont, J., **Pereira-Leal, J.B.** (2015). *Evolutionary patterns in coiled-coils*. **Genome Biol Evol.** 7(2): 545-56.

GROUP LEADER

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PhD in Biomedical Sciences Universidade do Porto, Portugal, 2001

Group Leader at IGC since 2006

Previous positions
Postdoc & Career Development Fellow, MRC Laboratory of Molecular Biology, UK

Postdoc, EMBL European Bioinformatics Institute, UK

External Website
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GROUP MEMBERS

Patrícia Brito, Postdoc
Ricardo Leite, Postdoc
Paula Ramos Silva, Postdoc
Ana Paula Aguiar, PhD student, PGCD 2014
Madalena Carneiro, PhD student, PIBS 2010 | *Left in October*
Marc Gouw, PhD student, PIBS 2010 | *Left in July*
Jaroslaw Surkont, PhD student, PIBS 2011

Funding
EEA Grants Iceland, Liechtenstein, Norway

Collaborators
Mónica Bettencourt Dias (IGC, Portugal)
Jocelyne Demengeot (IGC, Portugal)
Miguel Godinho Ferreira (IGC, Portugal)
Adriano Henriques (Instituto de Tecnologia Química e Biológica, Portugal)
Florence Janody (IGC, Portugal)

Outreach
Workshop Inspirar Ciência 2015 - Practical teaching of high school teachers, IGC, September.

EVOLUTION AND GENOME STRUCTURE

GROUP LEADER
Perfeito, Lília

RESEARCH INTERESTS

Can we predict evolution? This is one of the most fundamental questions in biology today. If we can predict evolution, we can control it. Doing so will change the way we understand biology, the way we use living organisms in biotechnology, the way we treat disease and indeed the way we see ourselves.
The *Evolution and Genome Structure* research group aims to create a predictive framework of evolutionary biology by addressing how variations in genetic background in general, and chromosome structure in particular affect the evolutionary path of populations. We use experimental evolution in microorganisms as a method as it allows the precise control of genetic background and of the relative weights of selection and drift. When combined with whole genome sequencing and high-throughput methods to track populations, this approach is very powerful in describing the evolutionary process. For the moment, we use *Schizosaccharomyces pombe* (fission yeast) as a model organism to answer these fundamental questions.

PROJECTS RUNNING IN 2015

• How does the genetic background affect evolvability?
• Understanding fitness from molecular mechanisms – a step towards predicting evolution
• The impact of genomic instability on the tempo and mode of adaptation

MAIN ACHIEVEMENTS IN 2015

During 2015, we adapted a set of four rearrangements and four controls to the lab environment. We observed they have different adaptation rates. These differences can be explained by the initial fitness, with low fitness strains adapting faster than high fitness ones. Moreover, the strains are converging, indicating that irrespective of the genetic basis of fitness differences, all strains tend to the same phenotypic end point. We sequenced clones from these populations and found a modest number of mutations underlying the fitness increases. We are now in the process of characterizing these mutations.

In parallel, we continued a mutation accumulation experiment with the same set of strains, plus four others. We observed that fitness decreased as expected, but at a different rate, depending on the background of the strain.

We are using both experiments to probe the phenotypes under selection and develop a theoretical framework to predict evolution in a simple laboratory environment.

GROUP LEADER

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PhD in Biology
Universidade Nova de Lisboa, Portugal, 2008

Group Leader at IGC since 2014

Previous positions
Postdoctoral fellow, IGC, Portugal

Postdoctoral fellow, University of Cologne, Germany

GROUP MEMBERS

Diogo Santos, PhD student, IBB 2014
Gustavo Eduardo, Masters student | *Left in December*
Ana Catarina Morais, Masters student | *Left in December*
Ana Paula Marques, Laboratory Manager | *Left in March*
Simone Delgado, Research Technician

Funding
Fundação para a Ciência e a Tecnologia

Collaborators
Ivo Chelo (IGC, Portugal)
Luca Ferretti (Collège de France, Université Pierre et Marie Curie, France)
Miguel Godinho Ferreira (IGC, Portugal)
Lars Jansen (IGC, Portugal)

COMPLEX ADAPTIVE SYSTEMS & COMPUTATIONAL BIOLOGY

GROUP LEADER
Rocha, Luís Mateus

RESEARCH INTERESTS

We are interested in the informational properties of natural and artificial systems which enable them to adapt and evolve. This means both understanding how information is fundamental for controlling the behaviour and evolutionary capabilities of complex systems, as well as abstracting principles from natural systems to produce adaptive information technology. This theoretical and applied research agenda is organised in three main threads: complex networks & systems, Computational & Systems Biology, and Computational Intelligence. Projects in the group range from Biomedical Literature and Social Media Mining to understanding redundancy, robustness, modularity and control in Complex Networks, Collective Intelligence on the Web and in Social Systems, and Agent-based models of Evolutionary Systems such as RNA Editing and Artificial Immune Systems. We are also committed to interdisciplinary research, teaching and graduate training

PROJECTS RUNNING IN 2015

• Collective Computation and Control in Complex Biochemical Systems

MAIN ACHIEVEMENTS IN 2015

The group had a very productive year with research, both with projects and papers involving students. We published 4 papers in very good journals, with 1 more accepted in Nature Scientific Reports for publication in 2016. We also had papers accepted in the best conferences in our field, including some that received special mentions (Conference on Complex Systems). The PI was also invited to speak at top research institutions for complex systems, such as the Santa Fe Institute and the University of Tokyo. The PI also received the Indiana University Trustees Award for Teaching Excellence Award 2015.

One of the group's PhD students, Artemy Kolchinsky finished his PhD and is now a postdoc at the Santa Fe Institute, the leading research institute for complex systems research in the World.

The group also received considerable media coverage, especially with the Computational Fact Checking paper and interviews about Turing.

We are using both experiments to probe the phenotypes under selection and develop a theoretical framework to predict evolution in a simple laboratory environment.

Gates, A., **Rocha, L.M.** Control of complex networks requires both structure and dynamics". Nature Scientific Reports. **arXiv:** 1509.08409. *In Press.*

Correia, R.B., Li, L., **Rocha, L.M.** Monitoring potential drug interactions and reactions via network analysis of Instagram user timeliness. **Pac Symp Biocomp**. *In Press.*

PUBLICATIONS

Ciampaglia, G.L., Shiralkar, P., **Rocha, L.M**., Bollen, J., Menczer, F., Flammini, A. (2015). *Computational fact checking from knowledge networks*. **PLoS ONE.** 10(6): e0128193.

Kolchinsky, A., Lourenço, A., Wu, H.Y., Li., L., **Rocha, L.M.** (2015). *Extraction of pharmacokinetic evidence of drug-drug interactions from the literature*. **PLoS ONE**. 10(5): e0122199.

Kolchinsky, A., Gates, A.J., **Rocha, L.M.** (2015). *Modularity and the spread of perturbations in complex dynamical systems*. **Phys Rev E Stat Nonlin Soft Matter Phys.** 92(6-1):060801.

Simas, T., **Rocha, L.M.** (2015). *Distance closures on complex networks*. **Netw Sci.** 3(2): 227-268.

Correia, R.B., Chan, K.N., **Rocha, L.M.** (2015). *Polarization in the US Congress.* **The 8th Annual Conference of the Comparative Agendas Project (CAP).** Lisbon, Portugal, June 23-24, 2015.

Correia, R.B., Chan, K.N. , **Rocha, L.M.** (2015). *Detecting conflict in social unrest using Instagram*. **In International Conference on Computational Social Science**. Helsinki, Finland.

SOFTWARE DEVELOPMENT

Instagram Drug Explorer

A web application to explore, tag, and visualize Instagram data of interest to drug interactions and public health monitoring. (Correia, R.B., Li, L., Rocha, L.M. [2016]. *Monitoring potential drug interactions and reactions via network analysis of Instagram user timeliness*. **Pac Symp Biocomp.** 21:492-503.)
http://www.informatics.indiana.edu/rocha/publications/IDE/

GROUP LEADER

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PhD in Systems Science
State University of New York, USA, 1997

Group Leader at IGC since 2010

Previous positions
Professor, Indiana University, USA

Postdoctoral Fellow, Los Alamos National Laboratory, USA

External Website
http://www.informatics.indiana.edu/rocha/

GROUP MEMBERS

Manuel Marques-Pita, Postdoc
Rion Brattig Correia, External PhD student
Ian Wood, External PhD student

Funding
Fundação para a Ciência e a Tecnologia

Collaborators
Alekos Athanasiadis (IGC, Portugal)
Johan Bollen (Indiana University, USA)
Marta Cascante (University of Barcelona, Spain)
Rui Costa (Champalimaud Foundation, Portugal)
Jim Crutchfield (University of California, USA)
Joseph Dougherty (Washington University Genetics, USA)
Joana Gonçalves Sá (IGC, Portugal)
Lang Li (Indiana University, USA)
Anália Lourenço (Universidade do Minho, Portugal)
Hagit Shatkay (University of Delaware, Canada)
Olaf Sporns (Indiana University, USA)
Christof Teuscher (Portland State University, USA)

Outreach
Media appearance in newspapers, January, June.

INFLAMMATION

GROUP LEADER
Soares, Miguel

RESEARCH INTERESTS

To understand the biology of inflammation and immunity as it pertains to the maintenance of homeostasis. To identify and develop therapeutic strategies with impact in human diseases associated with major morbidity and/or mortality.

PROJECTS RUNNING IN 2015

• Microbiota control of protective immunity against malaria
• Host microbe interaction at Instituto Gulbenkian
• Treat liver diseases by targeting hepatocyte necroptosis.
• Tissue Damage Control Regulates The Pathogenesis of Immune Mediated Inflammatory Diseases

PUBLICATIONS

Bolisetty, S., Zarjou, A., Hull, T.D., Traylor, A.M., Perianayagam, A., Joseph, R., Kamal, A.I., Arosio, P., **Soares, M.P.**, Jeney, V., Balla, J., George, J.F., Agarwal, A. (2015). *Macrophage and epithelial cell H-ferritin expression regulates renal inflammation*. **Kidney Int.** 88(1): 95-108.

Briquet, S., Lawson-Hogban, N., Boisson, B., **Soares, M.P.**, Péronet, R., Smith, L., Ménard, R., Huerre, M., Mécheri, S., Vaquero, C. (2015). *Disruption of parasite hmgb2 gene attenuates* Plasmodium berghei *ANKA pathogenicity*. **Infect Immun**. 83(7): 2771-84.

Soares, M.P. (2015). *Microbiota's No Wasting Policy*. **Cell.** 163(5): 1057-1058.

Soares, M.P., Ribeiro, A.M. (2015). *Nrf2 as a master regulator of tissue damage control and disease tolerance to infection*. **Biochem Soc Trans.** 43(4): 663-668.

Soares, M.P., Weiss, G. (2015). *The Iron age of host-microbe interactions*. **EMBO Rep.** 16(11): 1482-500.

GROUP LEADER

Email mpsoares@igc.gulbenkian.pt

PhD in Science
University of Louvain, Belgium, 1995

Group Leader at IGC since 2004

Previous positions
Invited Professor at Lisbon Medical School, Universidade de Lisboa, Portugal
Lecturer at Harvard Medical School, USA.
Instructor in Surgery at Harvard Medical School, USA
Research Fellow at Harvard Medical School, USA
Staff PhD at Beth Israel Deaconess Medical Center, USA

Institutional Roles at IGC
Head of Histopathology Unit

GROUP MEMBERS

Patricia Bastos Amador, Postdoc
Birte Blankenhaus, Postdoc
Ana Rita Carlos, Postdoc
Laura Del Barrio, Postdoc
Faouzi Braza, Postdoc | *Started in November*
Raffaella Gozzelino, Postdoc | *Left in March*
Susana Ramos, Postdoc
Sebastian Weiss, Postdoc | *Left in March*
Vital Domingues, PhD student, IBB 2015 | *Started in September*
Zélia Gouveia, External PhD student | *Left in September*
Ana Ribeiro, PhD student, PIBS 2011
Sumnima Singh, PhD student, PIBS 2013
Bahtiyar Yilmaz, PhD student, PIBS 2009 | *Left in June*
Sofia Rebelo, Laboratory Manager
Silvia Cardoso, Research Technician
Inês Cabral, Research Assistant | *Left in March*
Carolina Freitas, Research Assistant | *Left in August*
Balamurugan Sundaram, Research Assistant | *Left in February*

Funding
European Research Council
Fundação para a Ciência e a Tecnologia
Fundação para a Ciência e a Tecnologia/Harvard Medical School Programme

Collaborators
Michael Bauer (Center for Sepsis Control & Care Jena University Hospital Erlanger Allee)**, Guenter Weiss** (Medical University of Innsbruck), **Frederico Aires da Silva** (Technophage, SA, Portugal)**, João Gonçalves** (Faculdade de Farmácia, Universidade de Lisboa, Portugal)**, Smilja Todorovic** (ITQB, Portugal)**, Peter D. Crompton** (Laboratory of Immunogenetics, NIH, USA) **Sílvia Portugal** (Laboratory of Immunogenetics, NIH, USA), **Iqbal Hamza** (Biological Sciences Graduate Program, USA), **Henrique Silveira** (IHMT, Portugal), **Luís Ferreira Moita** (IGC, Portugal), **Cecília M. P. Rodrigues** (Faculdade de Farmácia, Universidade de Lisboa, Portugal)**, Junying Yuan** (Harvard Medical School, USA)

Outreach
Media appearance in newspapers, TV, and other channels, March, May, December.

EVOLUTION & DEVELOPMENT

GROUP LEADER
Sucena, Élio

RESEARCH INTERESTS

The *Evolution and Development* lab aims at exploring the interface between the fields of evolution and developmental biology with the ultimate purpose of contributing to the understanding of the rules by which this interplay shapes organisms across evolutionary time. In particular, research carried out in the lab focuses on evolutionary novelties, that is, new traits (either morphological, physiological or behavioural) that may participate in the emergence of adaptive radiations into novel niches.

We approach this concept experimentally at different levels of biological organisation and through both the comparative method and experimental evolution. Specifically, we look into novelty at: a) the genetic level, studying gene expression evolution upon gene duplication, b) the cellular level, approaching immune cell function diversity and hematopoiesis in *Drosophila*, and c) the organismal level, by studying the evolution of the immune response in arthropods using *Drosophila melanogaster* as a reference model.

PROJECTS RUNNING IN 2015

- Regulatory and functional evolution upon gene duplication
- *Drosophila* hematopoiesis
- Evolution of immune response in *Drosophila*
- Immunity in the spider mite *Tetranychus urticae*

MAIN ACHIEVEMENTS IN 2015

In 2015, we have continued analysing the outcome of the experimental evolution carried out in *D. melanogaster* between 2010 and 2014. We have shown that the increased capacity of evolved populations to survive pathogens does not entail costs in the absence of infection. These populations have adapted to recurrent infection by a mechanism that is only costly when deployed in the presence of pathogens, thus avoiding maintenance costs. Also, we have initiated the NGS characterization of the populations adapted to bacterial infections and we are pursuing functional tests of candidate genes as done previously for the viral infection adapted populations.

We have established the hemocyte larval clusters as true hematopoietic tissues relying on structure-dependent Notch-mediated signalling events to promote the transdifferentiation of plasmatocytes into crystal cells. This novel mechanism of cell type and number control is seemingly central to blood homeostasis in *Drosophila* and may be relevant to our understanding of vertebrate systems. We are presently dissecting this mechanism further both in the clusters and in the main larval hematopoietic organ, the lymph gland.

Concerning our project on transcriptional regulation evolution upon gene duplication, we have focused on one duplication event that produced CG9336 and CG9338 at the base of drosophilids. We generated reporter lines with 25 non-coding regions of these loci in five drosophilid species and observe their activities. With this, we have narrowed down to 200 bp, the regions containing the enhancers with tissue-specific activities of our interest - the most conserved expression domain (glia) and the two novel tissue-specific domains (heart and hemoctyes). Taking advantage of this progress, we have moved on to carry out functional analysis of the minimal enhancers identifying upstream transcriptional factors using mutants and genetic tools as well as bioinformatics analysis of the enhancers. This will help us to elucidate the cis-regulatory mechanism underlying the conservation and evolution of novel tissue-specifies after gene duplication with greater precision than originally expected. For identifying the enhancers of the unduplicated gene, we have generated four reporter lines with two candidate non-coding regions from *Bactrocera curcubitae* and completed the analysis of their tissue-specific activities.

PUBLICATIONS

Faria, V.G., Martins, N.E., Paulo, T., Teixeira, L., **Sucena, E.**, Magalhães, S. (2015). *Evolution of* Drosophila *resistance against different pathogens and infection routes entails no detectable maintenance costs.* **Evolution. [Epub ahead of print].**

Faria, V.G., **Sucena, E.** (2015) *Novel endosymbioses as a catalyst of fast speciation.* **In Reticulate Evolution** 107-120, ed. Nathalie Gontier Springer, SW.

Leitão, A.B., **Sucena, E.** (2015). Drosophila *sessile hemocyte clusters are true hematopoietic tissues that regulate larval blood cell differentiation.* **eLife.** 4: e06166.

Rodrigues, M.A., Martins, B.E., Balancé, L.F., Broom, L.N., Dias, A.J., Fernandes, A.S., Rodrigues, F., **Sucena, E.**, Mirth, C.K. (2015). Drosophila melanogaster *larvae make nutritional choices that minimize developmental time.* **J Insect Physiol.** 81: 69-80.

Tanaka, K., Diekmann, Y., Hazbun, A., Hijazi, A., Vreede, B., Roch, F., **Sucena, E**. (2015). *Multi-species analysis of expression pattern diversification in the recently expanded insect Ly6 gene family.* **Mol Biol Evol.** 32(7): 1730-47.

GROUP LEADER

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PhD in Evolution and Development, Genetics
University of Cambridge, UK, 2001

Group Leader at IGC since 2003

Previous positions
Postdoc, Princeton University, USA

Postdoc, University of Western Ontario, Canada

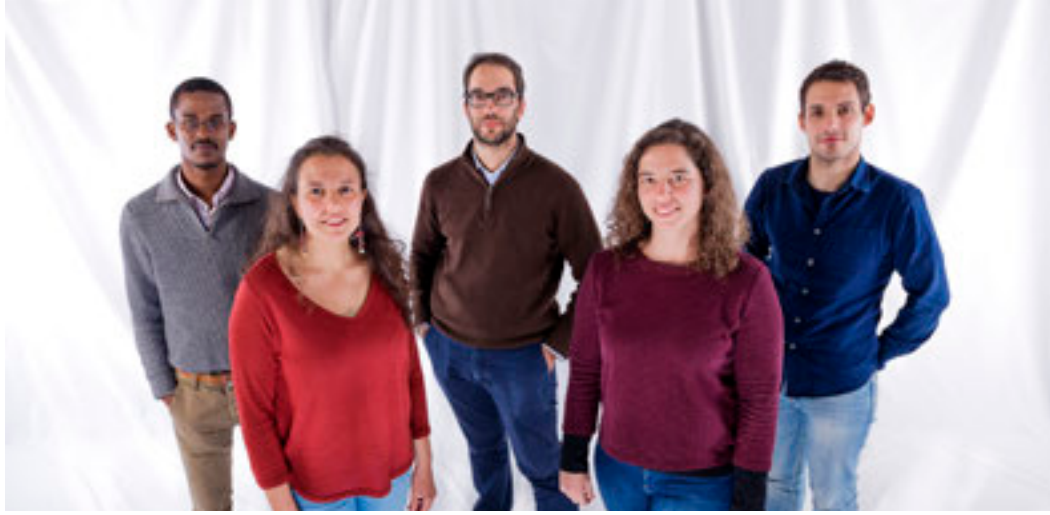
Institutional Roles at IGC
Director of the IGC PhD programme - IBB

GROUP MEMBERS

Diogo Manoel, Postdoc
Kohtaro Tanaka, Postdoc
Rui Castanhinha, PhD student, PIBS 2009 | *Left in November*
Vítor Faria, External PhD student
Alexandre Leitão, PhD student, PIBS 2009 | *Left in July*
Tânia Paulo, Masters student
Gonçalo Matos, NOS Alive Fellow | *Left in November*
Luís Gonzalez, Technician
Julien Marcetteau, Technician

Funding
Fundação para a Ciência e a Tecnologia

Collaborators
Sara Magalhães (Faculdade de Ciências, Universidade de Lisboa, Portugal)
Christen Mirth (IGC, Portugal)
Fernando Roch (Centre de Biologie du Développement, France)
Luís Teixeira (IGC, Portugal)



HOST-MICROORGANISM INTERACTIONS

GROUP LEADER
Teixeira, Luís

RESEARCH INTERESTS

Multicellular organisms and microorganisms are continuously interacting. Many of these interactions are mutually beneficial. However, multicellular organisms have to actively thwart invasion by opportunistic or overtly pathogenic microbes. We are studying the interaction of the model organism *Drosophila melanogaster* with different microorganisms, in particular intracellular ones. *D. melanogaster* has been successfully used as a model system to study innate immunity against many pathogens. Recently it has been shown that there are innate immunity pathways against viruses conserved between insects and mammals. We are investigating mechanisms of resistance to viruses in the fruit fly. Interestingly, we have found that the intracellular bacteria *Wolbachia* confer resistance to RNA viruses in *D. melanogaster*. We want to understand the molecular basis of this induced resistance.
We are also interested in the interplay between *Drosophila* and *Wolbachia* itself. These endosymbionts are one of the most widespread intracellular bacteria in the world but little is known, at the molecular level, on how the hosts control *Wolbachia* or *Wolbachia* manipulate the hosts. Finally, we are studying also what constitutes the gut microbiota of *Drosophila* and their molecular interactions with the host.

PROJECTS RUNNING IN 2015

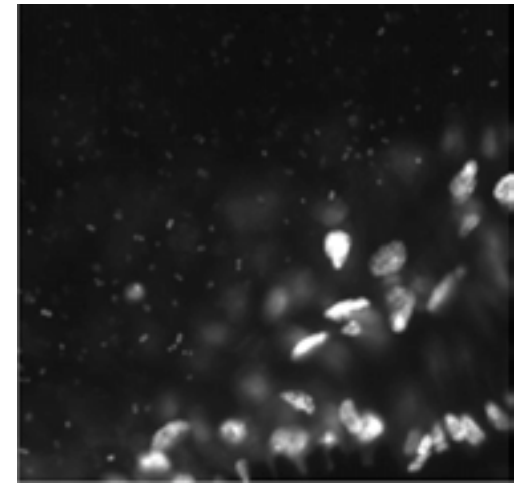
- *Drosophila* antiviral immunity to natural infection
- *Wolbachia* as a defence against RNA viruses in insects

MAIN ACHIEVEMENTS IN 2015

In 2015, we have reported the identification of a genomic region in *Wolbachia*, the Octomom region, responsible for this endosymbiont growth regulation. Genomic amplification of this region leads to overproliferation and a high cost to the host. This was the first genotype-phenotype link shown with this bacteria that currently cannot be genetically manipulated. This work also showed *Wolbachia* can evolve fast and that a single genetic change can break mutualism. Therefore there must be a constant selection at the symbiont level for densities control.

We also collaborated with the group of Casey Bergman (Un. Manchester) in an extensive analysis of *Wolbachia* gene expression throughout the development of its host. We showed that a part of its genes are regulated throughout this development or are host sex-biased.

Together with Karina Xavier (IGC), Margaret McFall-Ngai (Univ. Hawaii) and Martin Blaser (New York University), Luis Teixeira organised a Summer School on host microbe symbioses. This international Summer School brought together a faculty of eighteen leaders in the field with 34 PhD students to discuss current topics and future directions in the field.



Gut bacteria of *Drosophila melanogaster*. DNA stained with SytoxGreen. Large patches are nuclei of *Drosophila* gut cells, small dots are bacteria.

PUBLICATIONS

Chrostek, E., **Teixeira, L.** (2015). *Mutualism breakdown by amplification of* wolbachia *genes*. **PLoS Biol.** 13(2): e1002065.

Faria, V.G., Martins, N.E., Paulo, T., **Teixeira, L.,** Sucena, É., Magalhães, S. (2015). *Evolution of* Drosophila *resistance against different pathogens and infection routes entails no detectable maintenance costs*. **Evolution. [Epub ahead of print].**

Gutzwiller, F., Carmo, C.R., Miller, D.E., Rice, D.W., Newton, I.L., Hawley, R.S., **Teixeira, L.**, Bergman, C.M. (2015). *Dynamics of* Wolbachia pipientis *gene expression across the* Drosophila melanogaster *life cycle*. **G3 (Bethesda).** 5(12): 2843-56.

Serbus, L.R., White, P.M., Silva, J.P., Rabe, A., **Teixeira, L.**, Albertson, R., Sullivan, W. (2015). *The impact of host diet on* Wolbachia *titer in* Drosophila. **PLoS Pathog.** 11(3): e1004777.

Souto-Maior, C., Lopes, J.S., Gjini, E., Struchiner, C.J., **Teixeira, L.**, Gomes, M.G.M. (2015). *Heterogeneity in symbiotic effects facilitates* Wolbachia *establishment in insect populations*. **Theor Ecol**. 8(1): 53-65.

GROUP LEADER

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PhD in Biomedical Sciences
Faculdade de Medicina da Universidade de Lisboa, Portugal, 2005

Group Leader at IGC since 2009

Previous positions
Postdoctoral Fellow, Cambridge University, UK

GROUP MEMBERS

Catarina Carmo, Postdoc
Álvaro Gil Ferreira, Postdoc | *Left in January*
Nelson Martins, Postdoc
Ewa Chrostek, PhD student, PIBS 2010 | *Left in August*
Elves Duarte, PhD student, PGCD 2014
Inês Pais, PhD student, PIBS 2011
Miguel Landum, Research Technician | *Started in May*
Rita Valente, Research Technician | *Started in May*

Funding
Fundação para a Ciência e a Tecnologia
Welcome Trust

Collaborators
Casey Bergman (University of Manchester, UK)
Gabriela Gomes (IGC, Portugal)
Francis Jiggins (University of Cambridge, UK)
Alain Kohl (MRC-University of Glasgow Centre for Virus Research, UK)
Sara Magalhães (FCUL, Portugal)
Laura Serbus (Florida International University, USA)
Élio Sucena (IGC, Portugal)
William Sullivan (University California Santa Cruz, USA)
Karina Xavier (IGC, Portugal)

Outreach
Media appearance in newspapers and other channels, February, June.

Public conference 'How our microbes benefit Human health?', Calouste Gulbenkian Foundation, Lisbon, July.

PHYSICAL PRINCIPLES OF NUCLEAR DIVISION

GROUP LEADER
Telley, Ivo

RESEARCH INTERESTS

We are broadly interested in the physical aspects of nuclear division (mitosis) and nuclear positioning inside large egg cells. We approach this topic by means of micro-mechanical engineering, biochemistry and live imaging rather than phenotypic profiling of genes. An integrative understanding of the chemo-mechanical processes behind mitosis is sought.

Our research focus is two-fold: firstly, we aim to decipher the molecular basis, the kinetics of the molecular machines, and the mechanical scaffold that facilitates movement. Addressing the mechanics of mitosis in embryo cells will help understand early defects in embryo development that have been found by genetic screens. Secondly, we are working towards a systems level understanding of how the mitotic spindle achieves the eccentric movement of segregating chromosomes.

Directed force generation lies at the heart of chromosome segregation. Thus, our lab strives to be able to measure tension generation and the mechanical response of the cytoskeleton.

PROJECTS RUNNING IN 2015

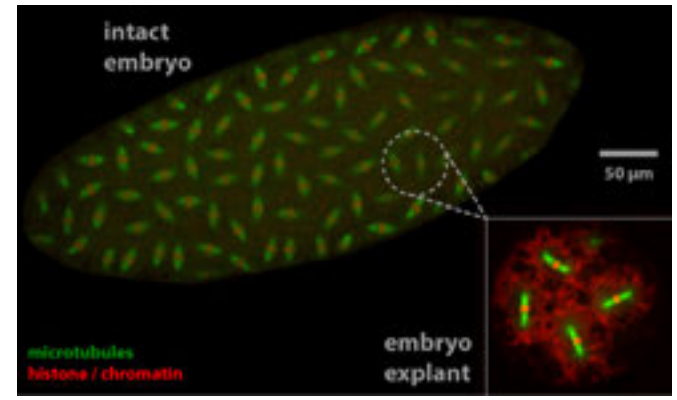
- Physical principles of nuclear migration and positioning in the *Drosophila* syncytial embryo
- Cytoskeletal dynamics during nuclear distribution in the *Drosophila* syncytial embryo
- The mechanics of nuclear division
- Spatial regulation of centriole biogenesis

MAIN ACHIEVEMENTS IN 2015

The intracellular positioning of the nucleus has gained substantial interest among biologists due its relevance in cell cycle, differentiation, migration, and polarity. Abnormal positioning has been related to cell and tissue function deficiency and severe defects in embryogenesis. We study this process in the *Drosophila* early embryo, in which nuclei undergo rapid successive divisions without egg cell division. Hundreds of nuclei share the same cytoplasm and arrange regularly in space. How the regular nuclear distribution during early divisions is achieved and maintained is a peculiar yet unresolved phenomenon. Open questions addressing timing, synchronization and spacing of nuclear separation are studied using a novel *ex vivo* approach. Nuclei and cytoplasm from individual embryos are explanted and made accessible for live imaging and volumetric manipulations.

In 2015, we have finalized the realisation and optimization of a confocal spinning-disk microscope with in-house designed optical extensions enabling high-speed and high-sensitive detection, targeted UV ablation and micromechanical manipulation. We have adopted and refined existing protocols for patterned surface chemistry with which we define the adsorption of embryo cytoplasm to surfaces leading to more accurate shape and volume control. We have collected reliable quantitative data supporting the notion that nuclear distribution is independent of spatial perturbations, suggesting a robust mechanical mechanism of organelle distribution. As one of the first groups at IGC, we introduced CRISPR/Cas9 genetic engineering in *Drosophila melanogaster* to generate a knock-in construct expressing a fluorescent fusion of a gene. Moreover, we started a project in which we test the role of three microtubule associated proteins in maintaining nuclear distance in the syncytium by a microtubule–based repulsion mechanism. In another exciting project we explored the potential of our *ex vivo* single egg assay in order to time-lapse visualize egg fertilization, pronuclear apposition and the first mitotic nuclear division, processes so far inaccessible to live optical microscopy. Finally, we have initiated a collaboration with a laboratory at the Department of Physics, Técnico Lisboa, to characterize the mechanical properties and material failure mechanics of the egg membrane using atomic force microscopy.

In 2015, the group size increased to a total of seven members. One of our PhD students (Catarina Nabais) was awarded a prestigious Boehringer Ingelheim Fonds PhD Fellowship. We received travel grants from the Portuguese Biophysical Society (Jorge Carvalho) and Tebu-Bio (Ojas Deshpande) for conference attendance. Lastly, our Masters student (Júlia Nunes) defended her thesis with excellence and received an MSc in Biomedical Engineering from IST Lisboa.



This scheme illustrates the dimensions of an early fruit fly embryo, which is in syncytial stage and exhibits synchronous mitotic nuclear divisions at the embryo cortex. For our studies of nuclear positioning, the embryo is punctured with a micro-pipette and a small fraction of cytoplasm is extracted to generate an embryo explant (inset). This explant be produced from embryos as early as mitotic division 1, and it enables high temporal and spatial resolution imaging.

GROUP LEADER

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PhD in Mechanical Engineering ETH Zurich, Switzerland, 2006

Group Leader at IGC since 2013

Previous positions
Postdoctoral Fellow, Developmental Biology Unit, EMBL, Germany

Postdoctoral Fellow, Cell Biology and Biophysics Unit, EMBL, Germany

GROUP MEMBERS

Raquel Barros, Postdoc | *Started in January*
Jorge Carvalho, Postdoc
Ojas Deshpande, PhD student, PIBS 2013
Catarina Nabais, PhD student, IBB 2014
Júlia Nunes, Masters student
Raquel Laires, Technician

Funding
Fundação para a Ciência e a Tecnologia
FP7–Marie Curie Actions, European Commission

Collaborators
Mónica Bettencourt Dias (IGC, Portugal)
Thomas Surrey (CRUK London Research Institute, UK)
Luís Viseu Melo (IST, Portugal)

BACTERIAL SIGNALLING

GROUP LEADER
Xavier, Karina

RESEARCH INTERESTS

Bacteria use small chemical molecules called autoinducers to communicate with one another by a process called quorum sensing. This process enables a population of bacteria to regulate behaviours, which are only productive when many bacteria act in concert as a group, similarly to what happens with multi-cellular organisms. Behaviours regulated by quorum sensing are often crucial for successful bacterial-host relationships whether symbiotic or pathogenic. In our laboratory biochemical and genetic approaches are used to study the molecular mechanisms underlying quorum sensing, with an emphasis on systems promoting bacterial inter-species communication. This research includes an integrated study involving elucidation of the chemical molecules that are used as signals, the network components involved in detecting the signals and processing information inside individual cells, and finally characterization of the behaviour of the bacterial community in multi-species bacterial consortia. Our ultimate goal is to understand how bacteria use inter-species cell-cell communication to coordinate population-wide behaviours in consortia and in microbial-host interactions.

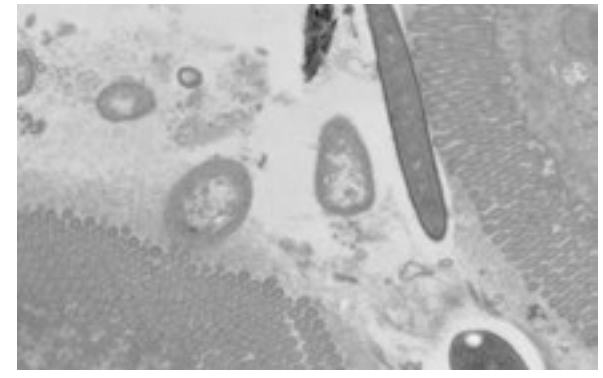
PROJECTS RUNNING IN 2015

- Inter-species cell-cell signalling: its role in bacteria consortia
- Identification of microbiota-derived functions favouring expansion of enteric bacteria in antibiotic-treated mice
- Inhibition of bacterial plant virulence by interference with interspecies cell-cell communication.

MAIN ACHIEVEMENTS IN 2015

Bacteria coordinate group behaviours through production, release, and detection of small chemical signals, autoinducers, via a process called quorum sensing. Because many of these behaviours are important in bacteria-host interactions we are exploiting the natural ability of *Escherichia coli* to manipulate the interspecies quorum sensing in the environment to determine the impact of interfering with cell-cell interspecies signalling during colonization of the gut microbiota.

We successfully showed that mice colonized with *E. coli* producing the quorum sensing signal AI-2 accumulated this signal, while *E. coli* strains that consume AI-2 in vitro can scavenge AI-2 present in the gut. We used these strains to manipulate the levels of AI-2 in the mouse gut and determined if changes in AI-2 levels in the mouse gut could have an impact in the emerging microbial community followed by a strong perturbation induced by a prolonged antibiotic treatment. It is well-known that antibiotic can lead to intestinal dysbiosis (microbial imbalance in the gut) with sever detrimental consequence to host health. We showed that microbiota in mice colonized with the *E. coli* that produced and accumulate high levels of AI-2 was less affected by the antibiotic than in mice colonized with the control strain that does not produce nor destroys the signal (Thompson *et al.*, 2015). This work showed that increasing AI-2 had a positive effect in the antibiotic-treated microbiota. We now want to determine if AI-2 can be used to promote the recovery of microbiota balance after antibiotic-induced dysbiosis. We are currently working with organic chemists to establish new strategies to administrate AI-2 directly to the animals. We will determine the ability AI-2 to accelerate the recovery of bacterial diversity upon stopping antibiotics and determine its consequences in the recovery of microbiota functions such as those that confer host protection against pathogens. Additionally, we are setting up a colonization model with a defined microbiota to identify the mechanisms and functions involved in the microbiota responses to AI-2.



EM photographs of mice intestines with their gut microbiota. These photographs were taken by Ana Rita Oliveira (Bacterial Signalling lab) and Sara Bonucci (from the EM facility).

PUBLICATIONS

Thompson, J.A., Oliveira, R.A., Djukovic, A., Ubeda, C., **Xavier, K.B.** (2015). *Manipulation of the Quorum Sensing signal AI-2 affects the antibiotic-treated gut microbiota*. **Cell Rep.** 10(11): 1861-71.

Valente, R.S., **Xavier, K.B.** (2015). *The Trk potassium transporter is required for RsmB-mediated activation of virulence in the phytopathogen* Pectobacterium wasabiae. **J Bacteriol.** 198(2): 248-55.

GROUP LEADER

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PhD in Biochemistry
Universidade Nova de Lisboa, Portugal, 1999

Group Leader at IGC since 2006

Previous positions
Postdoctoral Fellow/Research Scientist, Princeton University, USA

GROUP MEMBERS

Pol Nadal, Postdoc | *Left in August*
Jessica Thompson, Postdoc
Ana Rita Oliveira, PhD student, IBB 2015
Ozhan Ozkaya, PhD student, PIBS 2011
Ines Torcato, PhD student, ITQB-MolBioS 2015
Rita Valente, PhD student, PIBS 2008 | *Left in June*
Miguel Pedro, External Masters student | *Started in December*
Filipe Vieira, External Masters student
Joana Amaro, Laboratory Manager
André Carvalho, Technician | *Started in October*
Joana Dias, Technician | *Left in December*

Funding
Fundação para a Ciência e a Tecnologia
Howard Hughes Medical Institute

Collaborators
Jocelyne Demengeot
Isabel Gordo (IGC, Portugal)
Stephan Miller (Swarthmore College, USA)
Luís Teixeira (IGC, Portugal)
Carles Ubeda (University of Valencia, Spain)
Rita Ventura (ITQB, Portugal)

Outreach
Public talks for high school students, Turkey, February.

IGC stand at NOS Alive'15 - speed dating, Algés, July.

Participation in the ITQB Open Day, Oeiras, October.

Public talk and hands-on activities for 5th grade school students, Lisboa, November.

EPIGENETICS AND SOMA

VISITING SCIENTIST
Barreto, Vasco

RESEARCH INTERESTS

We study the DNA editing of the immunoglobulin genes to understand random mono-allelic expression and the interplay of DNA repair pathways with Activation-Induced Deaminase (AID), the enzyme that triggers class switch recombination (CSR) and somatic hypermutation (SHM). Random mono-allelic expression is the most striking example of an epigenetic phenomenon, because at the level of each cell only one of two identical molecules (the alleles) is expressed. We are studying the immunoglobulin genes as a model to dissect how a given allele undergoes rearrangement first. In SHM, point mutations are introduced into the variable region of the Ig heavy and light chain genes in germinal centre activated B cells, generating the required diversity to fuel the affinity maturation of antibodies. In CSR, the variable region of the heavy chain gene is combined with gene segments encoding distinct constant regions, each with unique effector functions. AID is essential for SHM and CSR. However, its mutagenic ability has a pernicious side effect and AID has been implicated in B lymphomas and other neoplasias. We use classical molecular approaches and genetically engineered mice to discover AID co-factors for CSR, address the rules governing AID targeting to the immunoglobulin loci and establish murine models to evaluate the ectopic expression of AID.

MAIN ACHIEVEMENTS IN 2015

We have reviewed the role of Activation-induced cytidine deaminase (AID) in active DNA demethylation, detailed the evolution of a domain of AID essential for class recombination and established differences in the way AID and the RAG1/RAG2 complex interact with the NHEJ repair pathway.

PUBLICATIONS

Borges da Silva, H., Fonseca, R., Cassado Ados, A., Machado de Salles, É., de Menezes, M.N., Langhorne, J., Perez, K.R., Cuccovia, I.M., Ryffel, B., **Barreto, V.M.**, Marinho, C.R., Boscardin, S.B., Álvarez, J.M., D'Império-Lima, M.R., Tadokoro, C.E. (2015). In vivo *approaches reveal a key role for DCs in CD4+ T Cell activation and parasite clearance during the acute phase of experimental blood-stage malaria*. **PLoS Pathog.** 11(2): e1004598.

Ramiro, A.R., **Barreto, V.M.** (2015). *Activation-induced cytidine deaminase and active cytidine demethylation*. **Trends Biochem Sci.** 40(3): 172-181.

GROUP LEADER

Email vbarreto@igc.gulbenkian.pt

PhD in Immunology
Université Paris VI, France, 2001

Visiting Scientist at IGC since
2015

Previous positions
Research Associate, The Rockefeller University, USA

GROUP MEMBERS

Inês Trancoso, PhD student, PIBS 2009
Rute Amaro, Trainee
Mafalda Ferreira, Trainee
José Vicente, Trainee
Manuel Vicente, Trainee

Funding
Fundação para a Ciência e a Tecnologia

Collaborators
Jocelyne Demengeot (IGC, Portugal)
P. Hammarström (Karolinska Institute, Sweden)
Paulo Vieira (Institut Pasteur, France)
Y. Zhao (China Agricultural University, China)

EXTERNAL ASSOCIATED GROUPS

2015

GASTRULATION

GROUP LEADER *Belo, José António*
CEDOC – Chronic Diseases Research Center, Faculdade de Ciências Médicas, Universidade Nova de Lisboa, Portugal

NEURAL CIRCUITS & BEHAVIOUR

GROUP LEADER *Carey, Megan*
Champalimaud Neuroscience Programme, Portugal

NEUROBIOLOGY OF ACTION

GROUP LEADER *Costa, Rui M.*
Champalimaud Neuroscience Programme, Portugal

NEO-VASCULARIZATION

GROUP LEADER *Dias, Sérgio*
Instituto de Medicina Molecular, Portugal

EVOLUTIONARY ECOLOGY OF MICROORGANISMS

GROUP LEADER *Dionísio, Francisco*
Faculdade de Ciências da Universidade de Lisboa, Portugal

VASCULAR DEVELOPMENT

GROUP LEADER *Duarte, António*
Faculdade de Medicina Veterinária, Universidade Técnica de Lisboa, Portugal

SYSTEMS IMMUNOLOGY

GROUP LEADER *Faro, José*
Universidad de Vigo, Spain

YEAST STRESS

GROUP LEADER *Fernandes, Lisete*
Biosystems and Integrative Sciences Institute (BioISI), and Escola Superior de Tecnologia da Saúde de Lisboa, Portugal

CELLULAR IMMUNOLOGY

GROUP LEADER *Graça, Luís*
Instituto de Medicina Molecular, Portugal

DEVELOPMENTAL BIOLOGY

GROUP LEADER *Henrique, Domingos*
Instituto de Medicina Molecular, Portugal

NEURONAL STRUCTURE & FUNCTION

GROUP LEADER *Israely, Inbal*
Champalimaud Neuroscience Programme, Portugal

TISSUE MORPHOGENESIS & REPAIR

GROUP LEADER *Jacinto, António*
CEDOC – Chronic Diseases Research Center, Faculdade de Ciências Médicas, Universidade Nova de Lisboa, Portugal

NEUROETHOLOGY

GROUP LEADER *Lima, Susana*
Champalimaud Neuroscience Programme, Portugal

SYSTEMS NEUROSCIENCE

GROUP LEADER *Mainen, Zachary*
Champalimaud Neuroscience Programme, Portugal

EARLY FLY DEVELOPMENT

GROUP LEADER *Martinho, Rui*
Universidade do Algarve, Portugal

BEHAVIOURAL NEUROSCIENCE

GROUP LEADER *Moita, Marta*
Champalimaud Neuroscience Programme, Portugal

MALARIA

GROUP LEADER *Mota, Maria*
Instituto de Medicina Molecular, Portugal

AZORES GENETICS

GROUP LEADER *Mota Vieira, Luísa*
Divino Espírito Santo Hospital, Universidade dos Açores, Portugal

GENOMICS OF COMPLEX DISEASES

GROUP LEADER *Oliveira, Sofia*
Instituto de Medicina Molecular, Portugal

VISION TO ACTION

GROUP LEADER *Orger, Michael*
Champalimaud Neuroscience Programme, Portugal

DOPAMINE IN ACTION LEARNING

GROUP LEADER *Paton, Joseph*
Champalimaud Neuroscience Programme, Portugal

BEHAVIOUR AND METABOLISM

GROUP LEADER *Ribeiro, Carlos*
Champalimaud Neuroscience Programme, Portugal

EMBRYONIC DEVELOPMENT OF VERTEBRATES

GROUP LEADER *Saúde, Leonor*
Instituto de Medicina Molecular, Portugal

MOLECULAR IMMUNOLOGY

GROUP LEADER *Silva Santos, Bruno*
Instituto de Medicina Molecular, Portugal

VIRAL PATHOGENESIS

GROUP LEADER *Simas, Pedro*
Instituto de Medicina Molecular, Portugal

STRESS AND CYTOSKELETON

GROUP LEADER *Soares, Helena*
Faculdade de Ciências da Universidade de Lisboa, Portugal

DEVELOPMENT & EVOLUTIONARY MORPHOGENESIS

GROUP LEADER *Thorsteinsdóttir, Solveig*
Faculdade de Ciências da Universidade de Lisboa, Portugal

INNATE BEHAVIOUR

GROUP LEADER *Vasconcelos, Maria Luísa*
Champalimaud Neuroscience Programme, Portugal

HUMAN MOLECULAR GENETICS & FUNCTIONAL ANALYSIS UNIT

GROUP LEADER *Vicente, Astrid*
Instituto Nacional de Saúde Dr. Ricardo Jorge, Portugal

2

SUPPORT TO RESEARCH

10
CORE FACILITIES

9
SERVICES

88
STAFF

28
PUBLICATIONS

41
EXTERNAL INSTITUTIONS THAT USED THE CORE FACILITIES

ANIMAL HOUSE FACILITY

HEAD OF FACILITY
Rebelo, Manuel

DESCRIPTION OF FACILITY

The Animal House Facility is organised in several areas, specifically prepared for each model organism hosted at the IGC.

RODENT FACILITY

Composed of 1 SPF Production Unit, 4 Experimental Areas, 1 Quarantine. *Services offered:* common strains production, rederivation, mouse germline cryopreservation, revitalization, germ-free, gnotobiology and bsl-2. It is part of the Infrafrontier-I3/European Mouse Mutant Archive (EMMA) consortium (www.infrafrontier.eu) and the European Consortium for Gnotobiology (www.ecgnoto.eu).

AQUATICS FACILITY

• **Zebrafish Facility:** composed of 1 Production + Experimental area, 1 Experimental area for behaviour studies, 1 Quarantine and 1 Procedure room. *Services offered:* husbandry, common strains production, embryo production. *Technological setup/development:* husbandry, germline cryopreservation, assisted reproduction and health monitoring protocols.
• **Frog Facility:** 2 aquatic habitat systems and benches for experimental work. *Services offered:* husbandry.

FLY FACILITY

Hosts thousands of mutant lines. It is composed of 2 controlled-temperature walk-in chambers, 2 controlled-temperature small rooms, 1 food preparation room, 4 procedure labs and 1 Quarantine. Services offered: central food production and fly stock surveillance.

PROJECTS AND MAIN ACHIEVEMENTS IN 2015

EU-FP7 European Mouse Mutant Archive (EMMA)
www.infrafrontier.eu
EMMA is a not-for-profit repository for the collection, archiving (via cryopreservation) and distribution of mutant mouse strains used in basic biomedical research. EMMA plays a crucial role in exploiting the tremendous potential benefits of current research in mammalian genetics to human health. This grant maintains a state-of-the-art Mouse Germ-Free Facility, used by European and IGC researchers. EMMA is nowadays integrated in the FP7 Infrastructure Infrafrontier-I3.

Host microbe interaction
This FCT funded project (RECI/IMI-IMU/0038/2012) aims at enhancing the capacity of the Instituto Gulbenkian de Ciência to study evolutionary conserved mechanisms regulating host-microbial interactions under homeostasis as well as in the context of infection in mice. In this frame, the Animal House Facility implemented, tested and adapted to experimentation the Gnotobiology and the BSL2 facilities.

European Consortium for Gnotobiology
www.ecgnoto.eu
This consortium aims at developing new tools and technologies in the field of Gnotobiotic and Germ-free mice. It also aims at harmonizing procedures across facilities in Europe.

CONGENTO
CONGENTO was selected to be part of the National Roadmap of Research Infrastructures (RI) that FCT launched in 2013. The goal of CONGENTO is to provide services, making available state of the art technologies in the 3 most commonly used genetically tractable organisms worldwide (mouse, zebrafish and *Drosophila*). It is a completely innovative infrastructure at the National and International level. The IGC is part of this RI, together with Champalimaud Foundation, Instituto de Medicina Molecular (IMM) and CEDOC-Chronic Diseases Research Center.

Collaborative project with University of São Paulo - USP (Brazil)
Since 2008 the IGC has a collaborative project with USP (Brazil) in the field of cryopreservation of mouse germline, sharing knowledge and human resources to implement the latest developments in our common routines. In 2014 the project was extended to the zebrafish model, in which the IGC is helping on the implementation of the new Fish Facility in USP.

PUBLICATIONS

Meehan, T.F., Chen, C.K., Koscielny, G., **Demengeot, J.** *et al.* (2015). *INFRAFRONTIER-providing mutant mouse resources as research tools for the international scientific community.* **Nucleic Acids Res.** 43: D1171–D1175.

HEAD OF FACILITY

Email mrebelo@igc.gulbenkian.pt

PhD in Immunology
Universidade de Lisboa, Portugal, 2005

Head of Facility since 2014

Other Roles at IGC
Member of the Ethics Committee

STAFF

Ana Cristina Borges, Manager of Fish Facility
Joana Bom, Manager of Germ-Free/ Gnotobiology Facility
Liliana Vieira, Manager of Fly Facility
Sandra Crisóstomo, Technician
Maysa Franco, Technician
Ana Sofia Leocádio, Technician
Marília Pereira, Technician
Ana Ribeiro, Technician
Liliana Vale, Technician
Adérito Vieira, Technician
Carla Almada, Caretaker
Cláudia Gafaniz, Caretaker
Jelskey Gomes, Caretaker | *Left in June*
João Lopes, Caretaker
Carina Monteiro, Technician
Margarida Pereira, Caretaker | *Started in July*
Pedro Pinto, Caretaker
Lévi Pires, Caretaker
Graça Ramalho, Caretaker
Marco Rocha, Caretaker
Cátia Silva, Caretaker

Funding
Rodent Facility
Calouste Gulbenkian Foundation
EU-Framework Programme 7 EMMA
EU-Framework Programme 7 ERC (ERC-2011)
Howard Hughes Medical Institute
Fundação para a Ciência e a Tecnologia

Aquatics Facility
- Zebrafish Facility
Calouste Gulbenkian Foundation
Howard Hughes Medical Institute
Centro de Estudos de Doenças Crónicas
Fundação para a Ciência e a Tecnologia
- Frog Facility

EQUIPMENT

RODENT FACILITY

- 7 autoclaves
- 17 IVCs (Individually Ventilated Cages) rack systems
- 9 AHU Smart Flow model, with touch screen for all IVC racks
- 4 cage washers
- 1 bedding disposal station
- 7 conventional biosafety cabinets
- 1 movable biosafety cabinet CS5
- 1 movable biosafety cabinet Aria
- 9 isolators for Germ-free• 2 ISOcage isolator rack system (72 cages each)
- 1 biosafety Cabinet for ISOcage rack system
- 1 ISOTEC transfer chamber with souflet connector for 270 DPTE Isolators door
- 10 stainless steel cylinders for 350 DPTE Isolators door
- 3 stainless steel cylinders for 270 DPTE Isolators door
- 5 transport cars for cylinders
- 1 plastic emergency cylinder for 350 DPTE Isolators door
- 1 paracetic acid sterilizer and compressed air pump
- 1 osmosis reverse system
- 1 vapour-phase hydrogen peroxide decontamination system
- 1 transfer and decontamination chamber
- 1 animal transfer chamber

AQUATICS FACILITY - ZEBRAFISH FACILITY

- 1 multi-linking WTU system (Tecniplast®) with 6 racks, total capacity of 300 aquariums (3.5L)
- 1 multi-linking WTU system (Tecniplast®) with 2 racks, total capacity of 100 aquariums (3.5L) + 60 aquariums (1.1L)
- 5 Stand-Alone ZebTec™ systems (Tecniplast®) , total capacity of 200 aquariums (3.5L) + 100 aquariums (1.1L)
- 1 Marine Biotech Z-Mod® Aquaria Rack System, total capacity of 126 aquariums (3.5L), for Quarantine
- 20 glass aquariums (6L) for fish isolation
- 3 reverse osmosis systems
- 2 microinjectors
- 4 stereoscopes
- 2 fluorescent stereoscopes
- 1 microscope

AQUATICS FACILITY - FROG FACILITY

- 1 Xenopus stand-alone with chiller, total capacity of 9 aquariums (27L each)
- 1 aquatic habitat system with 9 tanks
- 1 cooler/heater system for the aquatic habitat system
- 1 incubator

FLY FACILITY

- 2 controlled-temperature walk-in chambers
- 2 controlled-temperature rooms
- 11 incubators
- 17 working stations with CO_2 output pedal system
- 6 working stations with CO_2 output flow buddy system
- 1 microinjector
- 1 boiling pan for food preparation, 80L capacity
- 3 food dispensers
- 2 heat shock baths

Calouste Gulbenkian Foundation
Fundação para a Ciência e a Tecnologia

Fly Facility
Calouste Gulbenkian Foundation

Outreach
Public talk for high school students, Oeiras, September

TRANSGENICS UNIT

HEAD OF FACILITY
Mallo, Moisés

DESCRIPTION OF FACILITY

The goal of the *Transgenics Unit* is to help research groups at the IGC by generating genetically modified mouse strains required for their research activities. Our technical competence covers a wide spectrum of approaches to introduce genetic modifications into the mouse genome. These include:

- The production of transgenic animals by pronuclear DNA injection using both conventional expression constructs and Bacterial Artificial Chromosomes (BACs). We generate transgenic mice in various genetic backgrounds, including C57BL/6.
- Introduction of targeted modifications into endogenous genomic loci both following conventional embryonic stem cell-mediated approaches and, more recently, with the CRISPR/Cas9 technology.

Our main goal is to cover the needs of the research groups at the IGC but under specific circumstances we can also produce mice for external users.

PROJECTS AND MAIN ACHIEVEMENTS IN 2015

As usual, production of transgenic mice was one of the main tasks of the unit, although this year the genesis of genetically modified mice using the CRISPR/Cas9 technology has grown to levels matching our activities involving the production of transgenic mice.

In what concerns transgenic mice, during 2015 we injected a total of 24 different constructs that produced 10 transgenic lines and 271 transgenic embryos that were analysed at the embryonic and fetal stages. Our efficiency remained high (around 30%). In addition to the production of transgenic mice using regular DNA constructs, we also produced transgenics with BACs using 3 different constructs to generate a total of 23 transgenic embryos and 3 new lines. As for regular transgenics, our efficiency in the production of BAC transgenics remained high, ranging the 26%.

One of the highlights of the Transgenics Unit activity during 2015 was the remarkable increase in the production of mutant mice using the CRISPR/Cas9 technology. We have successfully used this technique to inactivate genes (both through the indel and the insertion approaches), to remove exons from gene loci, to produce mouse models for specific syndromes by altering the coding region of the relevant genes, to introduce a small tag into the coding region, and to modify target sites for transcription factors and microRNAs, including point mutations. We produced 6 new mouse lines and 50 mutant embryos in both the FVB and C57Bl/6 backgrounds with ~15% efficiency.

EQUIPMENT

- 1 Microinjection setup with Nikon inverted microscope equipped with DIC optics, and three-dimensional Narishige micromanipulators
- 1 Microinjection setup with Leica inverted microscope equipped with DIC optics, and three-dimensional, power assisted, Narishige micromanipulators
- 2 FemtoJet pump
- 1 Sutter P-87 Flaming/Brown micropipette puller
- 1 Zeiss SV6 Stereomicroscope with training head
- 2 Standard Zeiss SV6 Stereomicroscopes
- 1 CO_2 incubator
- 1 Ultrasonic Cleaning Device

HEAD OF FACILITY

Email mallo@igc.gulbenkian.pt

MD and PhD in Molecular Biology
Universidade de Santiago de Compostela, Spain, 1991

Head of Facility since 2001

Other Roles at IGC
Group Leader of the Patterning and Morphogenesis group

STAFF

Ana Nóvoa, Technician

Funding
Calouste Gulbenkian Foundation
Fundação para a Ciência e a Tecnologia

PLANT FACILITY

USERS

Baena-González, Elena
Becker, Jörg
Duque, Paula

DESCRIPTION OF FACILITY

The *Plant Facility* at the IGC ensures the growth and maintenance of *Arabidopsis thaliana* and *Physcomitrella patens* plants, the model organisms used by the plant research groups hosted by the Institute. The facility consists of a custom-built greenhouse with lighting control and temperature regulation and three custom-made fully controlled growth chambers with short-day, long-day and continuous light settings, as well as a walk-in plant growth room and five small reach-in chambers that allow the performance of cell-based assays and more precise phenotypical analyses. Three research groups (P*lant Molecular Biology*, *Plant Stress Signalling* and *Plant Genomics*) make use of the IGC *Plant Facility*.

PROJECTS AND MAIN ACHIEVEMENTS IN 2015

Boavida, L.C., Hernandez-Coronado, M., Becker, J.D. S*etting the stage for the next generation: Epigenetic reprogramming during sexual plant reproduction***. In Pontes O, Jin H (ed): Nuclear functions in plant transcription, signaling and development, pp. 93-118 Springer Science+Business Media, LLC, New York.** ***In Press.***

Confraria, A., Baena-González, E. *Using* Arabidopsis *protoplasts to study cellular responses to environmental stress*. (ed P. Duque), **Methods in Molecular Biology**, Springer, New York, NY, USA. ***In Press.***

Remy, E., Duque, P. *Assessing tolerance to heavy-metal stress in* Arabidopsis thaliana, *in Environmental Responses in Plants* (ed P. Duque), **Methods in Molecular Biology**, Springer, New York, NY, USA. ***In Press.***

PUBLICATIONS

Crozet, P., Margalha, L., Butowt, R., Fernandes, N., Elias, A., Orosa, B., Tomanov, K., Teige, M., Bachmair, A., Sadanandom, A., Baena-González, E. (2015). *SUMOylation represses SnRK1 signaling in* Arabidopsis. **Plant J. [Epub ahead of print].**

Kappel, C., Trost, G., Czesnick, H., Ramming, A., Kolbe, B., Vi, S.L., Bispo, C., Becker, J.D., de Moor, C., Lenhard, M. (2015). *Genome-wide analysis of PAPS1-Dependent polyadenylation identifies novel roles for functionally specialized Poly(A) polymerases in* Arabidopsis thaliana. **PLoS Genet.** 11(8): e1005474.

Mair, A., Pedrotti, L., Wurzinger, B., Anrather, D., Simeunovic, A., Weiste, C., Valerio, C., Dietrich, K., Kirchler, T., Nagele, T., Vicente, Carbajosa, J., Hanson, J., Baena-González, E., Chaban, C., Weckwerth, W., Droge-Laser, W., Teige, M. (2015). *SnRK1-triggered switch of bZIP63 dimerization mediates the low-energy response in plants*. **eLife.** 4: e05828.

Martinho, C., Confraria, A., Elias, C.A., Crozet, P., Rubio-Somoza, I., Weigel, D., Baena-González, E. (2015). *Dissection of miRNA pathways using* Arabidopsis *mesophyll protoplasts*. **Mol Plant.** 8(2): 261-75.

Ortiz-Ramírez, C., Hernandez-Coronado, M., Thamm, A., Catarino, B., Wang, M., Dolan, L., Feijó, J.A., Becker, J.D. (2015). *A transcriptome atlas of* Physcomitrella patens *provides insights into the evolution and development of land plants*. **Mol Plant. [Epub ahead of print].**

Remy, E., Cabrito, T.R., Batista, R.A., Teixeira, M.C., Sá-Correia, I., Duque, P. (2015). *The major facilitator superfamily transporter zifl2 modulates cesium and potassium homeostasis in* Arabidopsis. **Plant Cell Physiol.** 56(1): 148-62.

EQUIPMENT

- 1 Walk-in Chamber (Aralab 10.000 EH 2009)
- 3 Regular Reach-in Chambers (Aralab S600PLH)
- 2 Double Reach-in Chambers (Aralab D1200PL)
- 3 Custom-made fully controlled plant growth rooms
- 1 Custom-built greenhouse with lighting control and temperature regulation
- 1 Temperature-controlled room for plant drying and seed production
- “Soil house” for planting, seed harvesting, plant crossing, etc.

STAFF

Vera Nunes, Technician

Funding
Calouste Gulbenkian Foundation
European Molecular Biology Organisation (EMBO)

BIOINFORMATICS & COMPUTATIONAL BIOLOGY UNIT

HEAD OF FACILITY
Sobral, Daniel

DESCRIPTION OF FACILITY

The mission of the Bioinformatics and Computational Biology Unit is to:
1) Promote the use of computational methods in biological research, through training and development of resources and materials;
2) Provide direct user support in biological data analysis using computational methods;
3) Conduct research and development in bioinformatics, in particular in data-flow, data warehousing and data analysis;
4) Maintain a computing infrastructure suited for biocomputing.

PROJECTS AND MAIN ACHIEVEMENTS IN 2015

The Bioinformatics Unit has provided more than 800 hours of direct bioinformatics support to IGC research groups. This work has led to 3 publications, with others in preparation. We have also provided 30 hours of support to external users.
We continue colaborating with the sequencing facility to optimize their sequence data quality assessment and in the development of new services such as high throughput sequencing of 16S. In this context, a new master student has joined the unit to compare and optimize pipelines for 16S metagenomic analysis.
The IGC (represented by the Bioinformatics Unit) received 180.000€ from an European Project (Elixir-Excelerate) to be applied in four years to help build an European infrastructure for the integrated management of biological data. In this context, we are collaborating in the development of best practices in data representation and data analysis. We are also developing technology in the area of ontology-mapping.
We have been maintaining a set of services, the most relevant of which is a costumized galaxy web-based service enabling IGC users easy access to bioinformatics tools. We have customized this service with tools and data meeting IGC needs, such as tools for the analysis of bacterial genomic resequencing data, and detection of structural variants. We have also developed tools for functional enrichment analysis, making them accessible to researchers.
In 2015, the Bioinformatics Unit, in collaboration with Pedro Fernandes, organised the EMBO practical course on Measuring intra-specific diversity using high-throughput sequencing. This course allowed us to expand our know-how in an area of strategic importance for the research at IGC.
The Bioinformatics Unit has continued empowering IGC researchers in their ability to perform bioinformatics analysis, by providing several short practical tutorials based on the galaxy service we provide IGC users. We have also continued our mission of promoting the use of bioinformatics by giving lectures in courses at the master and doctoral level.

PUBLICATIONS

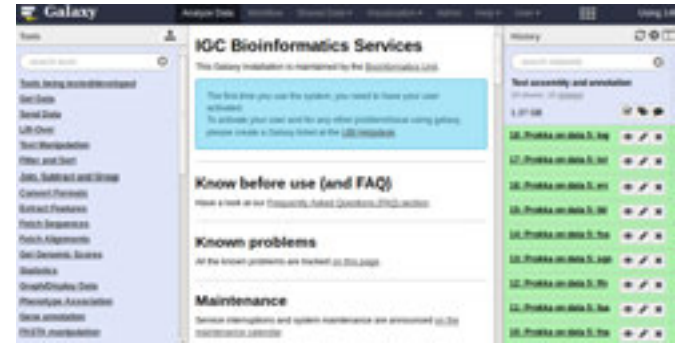
Duarte, M., Carvalho, C., Bernardo, S., Barros, S.V., Benevides, S., Flor, L., Monteiro, M., **Marques, I.**, Henriques, M., Barros, S.C., Fagulha, T., Ramos, F., Luís, T., Fevereiro, M. (2015). *Rabbit haemorrhagic disease virus 2 (RHDV2) outbreak in Azores: Disclosure of common genetic markers and phylogenetic segregation within the European strains*. **Infect Genet Evol.** 35: 163-71.

Gilchrist, M.J., **Sobral, D.,** Khoueiry, P., Daian, F., Laporte, B., Patrushev, I., Matsumoto, J., Dewar, K., Hastings, K.E.M., Satou, Y., Lemaire, P., Rothbächera, U. (2015). *A pipeline for the systematic identification of non-redundant full-ORF cDNAs for polymorphic and evolutionary divergent genomes: Application to the ascidian Ciona intestinalis*. **Dev Biol.** 404(2): 149-63

Raposo, A.A., Vasconcelos, F.F., Drechsel, D., Marie, C., Johnston, C., Dolle, D., Bithell, A., Gillotin S., van den Berg, D.L., Ettwiller, L., Flicek, P., Crawford, G.E., Parras, C.M., Berninger, B., Buckley, N.J., Guillemont F., Castro, D.S. (2015). *Ascl1 coordinately regulates gene expression and the chromatin landscape during neurogenesis*. **Cell Rep. [Epub ahead of print].** *(Bioinformatics Unit in acknowledgments)*

EQUIPMENT

- One heavy calculation server used for support and hosted projects
- Two virtualization servers dedicated to hosting web services and other computational resources
- Six workstations of which two have analysis software for user access
- Four smaller servers to support virtualization services



GALAXY. The Bioinformatics Unit has developed customized bioinformatics tools and workflows available for IGC researchers through an easy to use Galaxy-based web interface. We also organised several short training sessions to help users with this new resource.

HEAD OF FACILITY

Email dsobral@igc.gulbenkian.pt

PhD in Bioinformatics
Université Aix-Marseille II, France, 2009

Head of Facility since 2014

External Website
http://bioinformatics.igc.gulbenkian.pt

STAFF

Isabel Marques, Senior Bioinformatics Specialist
Daniel Faria, Researcher | *Started in June*
Tiago Macêdo, Systems Administrator & Programmer | *Started in November*
Paulo Almeida, Systems Administrator & Programmer | *Left in December*
Renato Alves, Systems Administrator & Programmer | *Left in September*
Patrícia Santos, Trainee | *Started in March; left in December*

Funding
Calouste Gulbenkian Foundation
Fundação para a Ciência e a Tecnologia

Outreach
IGC stand at NOS Alive'15 - speed dating, Algés, July.

GENE EXPRESSION UNIT

HEAD OF FACILITY
Becker, Jörg

DESCRIPTION OF FACILITY

The Gene Expression Unit provides three types of services:

NEXT GENERATION SEQUENCING

The unit runs NGS services on an Illumina MiSeq system (in close collaboration with the Genomics Unit). These include *de novo* and re-sequencing of small to mid-sized genomes as well as amplicon sequencing, for example 16S metagenomics.

MICROARRAYS

We are an Affymetrix Core Lab with reference status for GeneChip technology in Portugal since 2002. Our microarray services focus on gene expression profiling (mRNA and miRNA), starting from experimental design over complete sample processing to expert advice on data analysis.

BIOANALYZER

Our Bioanalyzer is used for RNA and DNA quality analyses.

PROJECTS AND MAIN ACHIEVEMENTS IN 2015

In 2015, the unit has produced 380 Gigabases of sequencing data with its MiSeq. These derived from 427 samples of re-sequencing, 13 RAD-Seq runs of RAD-Seq, 388 samples of 16S metagenomics, and 59 samples processed for custom experiments.
In the end of 2015 we have implemented a new 16S protocol (Earth Microbiome Project), which allows us to multiplex 288 samples into one run and we have already processed 440 samples.
In addition we have run 81 microarrays for 8 different research projects and analysed 1283 RNA/DNA samples on our Bioanalyer.

For 2016 new NGS services and improvement of existing ones are planned. We will implement protocols for RNAseq, so that we can produce sequencing libraries in-house and have them shipped to service providers abroad for high-volume sequencing. Existing protocols will be optimized to reduce costs.

PUBLICATIONS

Costa, A., Sanchez-Guardado, L., Juniat, S., Gale, J.E., Daudet, N., Henrique, D. (2015). *Generation of sensory hair cells by genetic programming with a combination of transcription factors.* **Development.** 142: 1948–59.

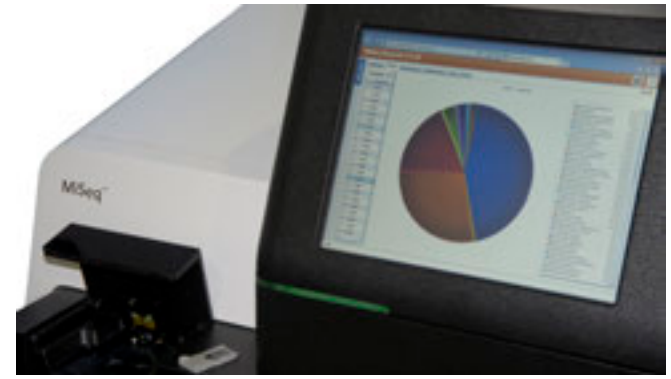
Lopes, J.S., Abril-de-Abreu, R., Oliveira, R.F. (2015). *Brain transcriptomic response to social eavesdropping in zebrafish* (Danio rerio). **PLoS ONE.** 10(12): e0145801.

MacAlister, C.A., Ortiz-Ramírez, C., **Becker, J.D.**, Feijó, J.A., Lippman, Z.B. (2015). *Hydroxyproline O-arabinosyltransferase mutants oppositely alter tip growth in* Arabidopsis thaliana *and* Physcomitrella patens. **Plant J. [Epub ahead of print].**

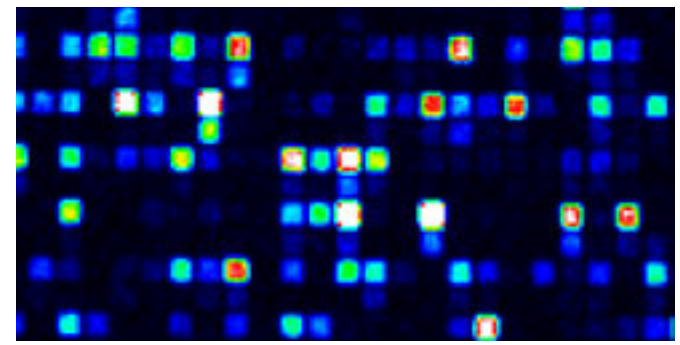
Ortiz-Ramírez, C., Hernandez-Coronado, M., Thamm, A., Catarino, B., Wang, M., Dolan, L., Feijó, J.A., **Becker, J.D.** (2015). *A transcriptome atlas of* Physcomitrella patens *provides insights into the evolution and development of land plants.* **Mol Plant. [Epub ahead of print].**

EQUIPMENT

- GeneAtlas System
- Scanner 3000 7G with Autoloader
- Fluidics Station 450
- Hybridization Oven 645
- Bioanalyzer 2100
- MiSeq System



MiSeq Desktop Sequencer used for deep sequencing applications like re-sequencing of bacterial genomes or 16S rRNA metagenomics.



Pseudo-coloured image of a GeneChip array after scanning, showing different signal intensities depending on the expression level of the correspondent transcripts.

HEAD OF SERVICE

Email jbecker@igc.gulbenkian.pt

PhD in Biology
University of Bielefeld, Germany, 2001

Head of Facility since 2008

Other Roles at IGC
Group Leader of the Plant Genomics group

External Website
http://pages.igc.gulbenkian.pt/GEU/

STAFF

João Sobral, Technician

Funding
Fundação para a Ciência e a Tecnologia

Outreach
Facility tour for high school and University students, Oeiras, March and September

GENOMICS UNIT

HEAD OF FACILITY
Penha Gonçalves, Carlos

DESCRIPTION OF FACILITY

The Unit provides technological support and expertise for research at the genome scale and is composed by Genotyping and Sequencing Services:
The Genotyping Service offers the Sequenom iPLEX technology, allowing rapid SNP genotyping assays with up to forty SNPs assayed simultaneously. The facility collaborates with investigators on: SNP choice and SNP Assay Design, Sequenom Procedure and Data Management for Genetic Studies, providing access to the BC/GENE interface software. Genotyping Service also offers a backcrossing service for users of genetically modified mice and mouse breeders.
The Sequencing Service offers DNA sequencing and fragment analysis using multicapillary with automatic sequencer ABI 3130XL. SNP genotyping and gene expression are also available with QS7 (ABI) and CFX384 (BioRad) Real-Time PCR systems.
The *Genomics Unit* collaborates with the *Gene Expression Unit* for Next Generation Sequencing (NGS).

PROJECTS AND MAIN ACHIEVEMENTS IN 2015

GROUPS USING GENOTYPING SERVICE

Three In-house, one IGC associated and four non IGC groups have used the Genotyping Service in a total number of 33 chips, and 506 880 SNP genotypes have been produced since January 2015 until January 2016. Groups that have used the Genotyping service:
IGC In-house: Host-Microorganisms interactions, PI: L. Teixeira (Project: *D. melanogaster* backcrossing); Integrative Behavioural Biology, PI: Rui Oliveira (Project: Comparative social cognition: zebrafish as a neurobehavioural model); Eco-Evolution Genetics, PI: Ivo Chelo/Henrique Teotónio (Project: Population genetics of adaptation in *C. elegans*).
IGC associated: Genetic Epidemiology, PI: Astrid Vicente, INSA Lisboa (Project: Genetic Epidemiology).
Non IGC: CIBIO - Vairão CONGEN, PI: Paulo Alves (Wolf Project); CIBIO - Vairão, POPGEN, PI: Nuno Ferrand (Rabbit Project); IPO/Porto, Molecular Oncology Group, PI: Rui Medeiros (Human cancer project); ICBAS/Porto, Dep.Patologia & Imunologia Molecular, PI: Carlos Lopes (Human cancer project).

GROUPS USING SEQUENCING SERVICE

- DNA Sequencing: nineteen In-house and one IGC associated groups have used the ABI 3130XL Sequencing Service, with a total of 10204 samples sequenced during the period of January 2015 until December 2015.

Groups that have used the Sequencing Service: Bacterial signalling; Cell biology of viral infection; Chromosome Dynamics; Early Fly Development; Evolution and Development; Evolutionary Biology; Host-Microorganism Interactions; Infections & Immunity; Inflammation; Integrative Behavioural Biology; Lymphocyte Physiology; Patterning and Morphogenesis; Plant Genomics; Plant Molecular Biology; Plant Stress Signalling; Population and Conservation Genetics; Telomeres and Genome Stability; Variation: Development and Selection.
- Real-time PCR systems: thirty In-house groups have used the RT-PCR equipment on a regular basis (a total of 5176 hours), to detect gene expression of several genes in different projects.

PUBLICATIONS

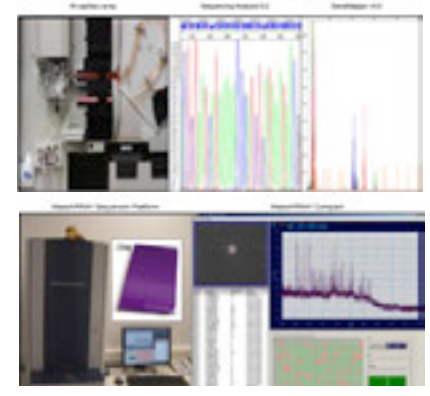
Alves, J.M., Lima, A.C., Pais, I.A., Amir, N., Celestino, R., Piras, G., Monne, M., Comas, D., Heutink, P., Chikhi, L., Amorim, A., Lopes, A.M. (2015). *Reassessing the evolutionary history of the 17q21 inversion polymorphism*. **Genome Biol Evol.** 7(12): 3239-48.

Sambo, M.R., Penha-Gonçalves, C., Trovoada, M.J., **Costa, J.**, Lardoeyt, R., Coutinho, A. (2015). *Quantitative trait locus analysis of parasite density reveals that HbS gene carriage protects severe malaria patients against Plasmodium falciparum hyperparasitaemia*. **Malar J.** 14(1): 393.

Santos, M., Carvalho, S., Lima, L., Mota-Pereira, J., Pimentel, P., Maia, D., Correia, D., Gomes, S., Cruz, A., Medeiros, R. (2015). *FAS -670A>G genetic polymorphism Is associated with Treatment Resistant Depression*. **J Affect Disord.** 185: 164–169.

EQUIPMENT

- Two robotic pipetting devices, robot PlateMate 2x2 (Matrix)
- Five thermocycling machines - ABI 9700 equipped with 2x384 blocks
- Chip spotting robot (MassARRAY, Nanodispenser)
- SNP detection, MALDI-TOF technology - MassARRAY Compact (Sequenom)
- ABI 3130XL
- QS7 (ABI) Fast Real-Time PCR
- CFX384 (BioRad) Real-Time System



Genotyping Service, equipment and software (upper panel); Sequencing Service, equipment and software (lower panel).

HEAD OF FACILITY

Email cpenha@igc.gulbenkian.pt

PhD in Immunology
University of Umeå, Sweden, 1999

Head of Facility since 2003

Other Roles at IGC
Group Leader of the Disease Genetics group

Member of the Ethics Committee

STAFF

Isabel Marques, Senior Laboratory Manager
João Costa, Genotyping and NGS Research Assistant
Susana Ladeiro, Sequencing and NGS Research Assistant

Funding
Fundação para a Ciência e a Tecnologia

Outreach
Facility tour for high school and University students, Oeiras, February, March and April.

HISTOPATHOLOGY

HEAD OF FACILITY
Soares, Miguel

DESCRIPTION OF FACILITY

The *Histopathology Unit* provides a wide range of services related to tissue preparation. These include collection, fixation, processing, embedding, sectioning and staining of animal tissue samples. The unit also provides microscopy assistance as well as training to new users in sample preparation and sectioning.

EQUIPMENT

- Tissue processor
- Paraffin embedding station and water bath
- Microtome
- Cryostat
- Vibratome

HEAD OF FACILITY

Email mpsoares@igc.gulbenkian.pt

PhD in Science
University of Louvain, Belgium, 1995

Head of Facility since 2011

Other Roles at IGC
Group Leader of the Inflammation group

STAFF

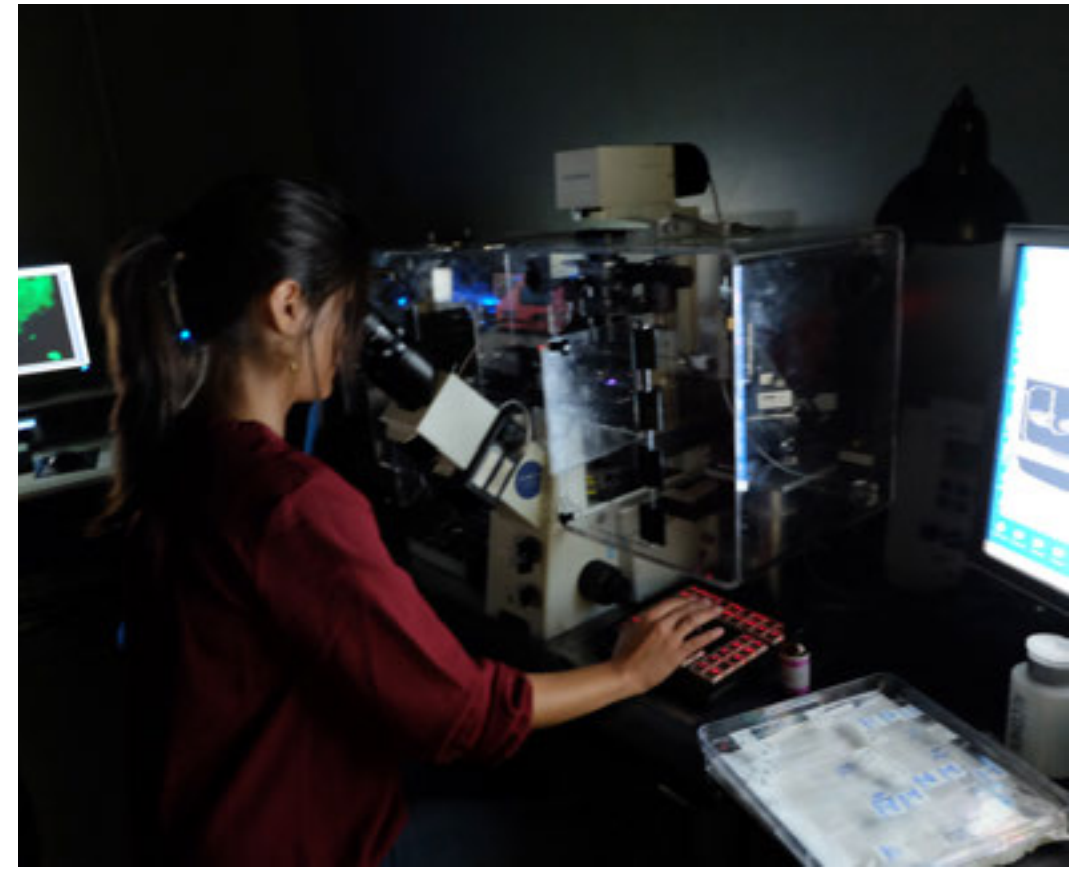
Marta Pinto, Technician
Joana Rodrigues, Technician
Rui Pedro Faísca, Pathologist | *Started in October*

Funding
Calouste Gulbenkian Foundation

UNIT OF IMAGING AND CYTOMETRY (UIC)

DESCRIPTION OF FACILITY

The *Unit of Imaging and Cytometry (UIC)* has been at the forefront of major technological developments at IGC, since its formal creation in 2003. Since then, the UIC has grown in personnel and technological spectrum to anticipate the demands of a growing base of users. Because cellular imaging and cytometry have been in high demand, and new systems and techniques are continuously developed, the facility expanded significantly to facilitate accessibility while introducing the latest innovations to the whole research community. To provide more dedicated and focused services on specific technical areas, the UIC was restructured in 2013 as three autonomous sub-units - Advanced Imaging, Flow Cytometry, and Electron Microscopy – that retain the "UIC" brand of excellence.



UIC: ADVANCED IMAGING

HEAD OF FACILITY
Martins, Gabriel

DESCRIPTION OF FACILITY

The *UIC: Advanced Imaging Unit* provides access and support to high-end light microscopy imaging needs of the whole IGC community. The Unit currently stands as an international reference laboratory, with cutting-edge techniques ranging from super-resolution, high-end widefield and confocal systems (high-throughput/screening capabilities), multiphoton, light-sheet microscopy, optical tomography and bioluminescence/fluorescence animal imaging. Some of these techniques are unique in Portugal and were developed in-house. The Unit is also responsible for general maintenance of optical instruments, including satellite microscopes throughout the IGC. Users are trained in dedicated workshops. The UIC also organises advanced workshops on light microscopy techniques, equipment setup, experimental design, collection of high quality data, and image processing and analysis.

PROJECTS AND MAIN ACHIEVEMENTS IN 2015

Participation in funded research projects:

COST action OC-2015-1-19619 BIAS4Life: A new Network of European BioImage Analysts to advance life science imaging (GGM participant)

PTDC/AAG-GLO/1926/2014 SHARKFIT: Impactos das alterações climáticas no início da ontogenia de tubarões temperados e tropicais (GGM participant)

POR-Lisboa, LISBOA-01-0162-FEDER-001151 - Lx-CLEM: Infraestrutura tecnológica para observação e análise correlativa da dinâmica e ultraestrutura celular por microscopias ótica e eletrónica (GGM participant)

Trans-Domain COST Action "Fast advanced Scintillator Timing (FAST)" TD1401 (GGM participant)

FCT EXPL/BIA-EVF/1211/2013: Bringing mammal antecessors back to life: evolution and preservation of Permian dicynodonts from Mozambique (GGM participant)

FCT-RECI/BEX-BCM/0083/2012: Imaging the structure and dynamics of molecules and complexes in living organisms (GGM participant)

FNI/Moçambique "Projecto PalNiassa: Estudo da Diversidade e Evolução dos Vertebrados do Pérmico Superior da Província do Niassa, Moçambique" (GGM participant).

PUBLICATIONS

Gomes, S.R., Rodrigues, G., **Martins, G.G.**, Roberto, M.A., Mafra, M., Henriques, C.M., Silva, J.C. (2015). In vitro *and* in vivo e*valuation of electrospun nanofibers of PCL, chitosan and gelatin: A comparative study*. **Mater Sci Eng C Mater Biol Appl.** 46: 348-58.

Gualda, E.J., Pereira, H., Vale, T., Estrada, M.F., Brito, C., Moreno, N. (2015). *SPIM-fluid: open source light-sheet based platform for high-throughput imaging*. **Biomed Opt Express**. 6(11): 4447-4456.

Zeng, W., Pirzgalska, R.M., Pereira, M.A.M., Kubasova, N., Barateiro, A., Seixas, E., Lu, Y., Kozlova, A., Voss, H., **Martins, G.G.**, Friedman, J.M., Domingos, A.I. (2015). *Sympathetic neuro- adipose connections mediate leptin-driven lipolysis*. **Cell**. 163(1): 84-94.

PROTOTYPES

Installation of prototype of SPIM-Fluid, flow light-sheet microscopy setup. **https://sites.google.com/site/openspinmicroscopy/**

EQUIPMENT

INSPECTION WIDE-FIELD LIGHT MICROSCOPES
- Olympus IMT-2
- Leica DMLB2
- Leica Stereoscope+color cam.
- Macro stage with epi+trans illumination+cam.

RESEARCH WIDEFIELD LIGHT MICROSCOPES
- Leica upright DMRA2
- DeltaVision - Deconvolution microscope
- Leica HCS microscope
- Nikon HCS microscope
- High-throughput microscope setup (custom-built)
- Zeiss high-throughput Biosafety B2 microscope
- Whole-animal imager, Hamamatsu Aequoria with EMCCD camera
- STORM super-resolution microscope (custom built)
- FCS/FLIM microsope (custom built)

CONFOCAL/3D IMAGING MICROSCOPES
- Confocal Leica SP5 (HyD detectors)
- Confocal Leica SP5 Inverted with environmental control
- Confocal Zeiss LSM 510
- Confocal Andor XD Spinning disk with environmental control.
- Confocal Andor W-1 wide FOV Spinning disk
- Nikon TIRFM/spinning disk with environmental control
- Prairie Multi-photon microscope with environmental control
- Light-sheet (SPIM and DSLM) microscope (custom built)
- OPenT- optical tomography scanner (custom built)

HIGH-END IMAGE ANALYSIS WORKSTATIONS
- Huygens workstation
- Imaris v6.4 + FIJI workstation
- Imaris v8.0 + FIJI workstation
- Deltavision deconvolution workstation

HEAD OF FACILITY

Email gaby@igc.gulbenkian.pt

PhD in Cell Biology and Anatomy School of Medicine and Biomedical Sciences, Buffalo, USA, 2004

Head of Facility since 2013

External Website
http://uic.igc.gulbenkian.pt/microscopy.htm

STAFF

Ânia S. Gonçalves, Microscopy Technician
Nuno Pimpão Martins, Microscopy Technician
Emílio Gualda, Developer Engineer | *Left in June*

Funding
Calouste Gulbenkian Foundation
Fundação para a Ciência e a Tecnologia

Outreach

IGC stand at Belém Art Fest'15 - hands-on activities, Belém, May.

Tour facility for several schools and the general public, Oeiras.

UIC: ELECTRON MICROSCOPY FACILITY

HEAD OF FACILITY
Tranfield, Erin

DESCRIPTION OF FACILITY

At the *Electron Microscopy Facility* at the IGC we believe that electron microscopy is a powerful research tool that can be used to address research questions in the life sciences.

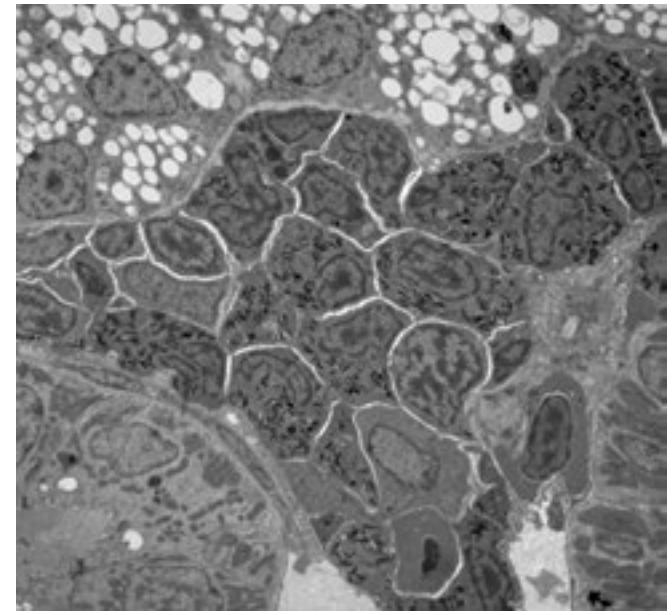
With this in mind we aim to:
• provide centralized, high quality electron microscopy infrastructure to support scientific investigation.
• offer electron microscopy services, mentorship and skill training.
• collaborate with researchers within our institute, our country and the scientific community abroad to foster knowledge of technical developments in electron microscopy.
The *EM Facility* has the necessary tools and experience to work with many different biological specimens using multiple technical approaches. When needed, we develop customized protocols for specialized research projects and we train users to process their samples and collect their data independently.

PROJECTS AND MAIN ACHIEVEMENTS IN 2015

Worked on 24 full service projects from groups from across Portugal, and had a growing number of independent users using the facility.

EQUIPMENT

- 1 Reichert Cryo-ultramicrotome
- 1 Leica UC7/FC7 Ultramicrotome
- 1 Wohlwend High Pressure Freezer
- 1 Leica Automatic Freeze Substitution Unit
- 1 Hitachi Transmission Electron Microscope
- 1 Pelco Microwave Processing System
- 1 Carbon Coater
- 1 Fluorescence Light Microscope



Hematopoietic cells in the head kidney of a healthy zebrafish. Samples processed and imaged by Ana Catarina Correia and Erin Tranfield in the IGC EMF for a project done by Inês Castro in the laboratory of Miguel Ferreira (Telomeres and Genome Stability).

HEAD OF FACILITY

Email etranfield@igc.gulbenkian.pt

PhD in Pathology and Laboratory Medicine
University of British Columbia, Vancouver, Canada, 2001

Head of Facility since 2013

External Website

http://uic.igc.gulbenkian.pt/emf.php

STAFF

André Barros, Technician | *Left in March*
Sara Bonucci, Technician
Ana Catarina Correia, Technician
Ana Laura Sousa, Technician

Funding
Calouste Gulbenkian Foundation

Outreach
Facility tour for high school students, Oeiras, October.

UIC: FLOW CYTOMETRY FACILITY

HEAD OF FACILITY
Gardner, Rui

DESCRIPTION OF FACILITY

The aim of the *Flow Cytometry Facility* is to provide high-quality technical and scientific support in multiparameter cell sorting and flow cytometry analysis to all researchers at the IGC as well as to outside groups and companies. The facility provides a unique service to allow ready access to a wide range of technologies and expertise in an integrated manner that helps drive research forward efficiently. The IGC *Flow Cytometry Facility* currently stands as a national and international reference for Flow Cytometry and high-throughput cell sorting. The unit is well equipped, with two multicolour high-speed cell sorters, five flow analyzers and a multiplex analyte reader. All users receive basic training in the systems in use, in troubleshooting, and advice on experimental design and data analysis. Due to the high-demand for new flow instruments and techniques the facility is continuously expanding and introducing the latest innovations in Flow Cytometry to the research community.

PUBLICATIONS

Kappel, C., Trost, G., Czesnick, H., Ramming, A., Kolbe, B., Vi, S.L., **Bispo, C.**, Becker, J.D., de Moor, C., Lenhard, M. (2015). *Genome-wide analysis of PAPS1-Dependent polyadenylation identifies novel roles for functionally specialized Poly(A) polymerases in* Arabidopsis thaliana. **PLoS Genet.** 11(8): e1005474.

Peca, I.N., Bicho, A., **Gardner, R.**, Cardoso, M.M. (2015). *Control of doxorubicin release from magnetic Poly(DL-lactide-co-glycolide) nanoparticles by application of a non-permanent magnetic field*. **J Nanopart Res.** 17(11): 427.

Rebelo, M., Tempera, C., Bispo, C., Andrade, C., **Gardner, R.,** Shapiro, H.M., Hänscheid, T. (2015). *Light depolarization measurements in malaria: A new job for an old friend*. **Cytometry A.** 87(5): 437-45.

Riddell, A., **Gardner, R.**, Perez-Gonzalez, A., Lopes, T., Martinez, L. (2015). *Rmax: A systematic approach to evaluate instrument sort performance using center stream catch*. **Methods**. 82: 64-73.

Traunecker, E., **Gardner, R.**, Fonseca, J.E., Polido-Pereira, J., Seitz, M., Villiger, P.M., Iezzi, G., Padovan, E. (2015). *Blocking of LFA-1 enhances expansion of Th17 cells induced by human CD14(+) CD16(++) nonclassical monocytes*. **Eur J Immunol.** 45(5): 1414-25.

EQUIPMENT

CELL SORTERS

- 1 MoFlo (4 lasers, 9 fluorescence detectors) Beckman Coulter
- 1 FACSAria (3 laser, 9 fluorescence detectors) BD Biosciences

ANALYSERS

- FACSCan (1 laser, 3 fluo-detectors) BD Biosciences
- 1 FACSCalibur (2 lasers, 4 fluo-detectors) BD Biosciences
- 1 CyAn ADP (3 lasers, 9 fluo-detectors, HTS plate loader) Beckman Coulter
- 1 SORP LSR Fortessa (3 lasers, 12 fluo-detectors, Small Particle Detection Option, HTS plate loader) BD Biosciences
- 1 Muse Cell Analyzer (1 laser, 2 fluo-detectors) Merck-Millipore
- 1 Magpix Multiplex Analyte Reader, Merck-Millipore

HEAD OF FACILITY

Email ruig@igc.gulbenkian.pt

PhD in Biomedicine
Universidade do Porto, Portugal, 2004

Head of Facility since 2013

External Website
http://uic.igc.gulbenkian.pt/flowcytometry.php

STAFF

Cláudia Andrade, Technician
Cláudia Bispo, Technician

Funding
Calouste Gulbenkian Foundation
Fundação para a Ciência e a Tecnologia

ACCOUNTING AND INTERNAL AUDIT

HEAD OF UNIT
Leite, José Mário

DESCRIPTION OF SERVICE

This service provides support in all administrative and accounting matters, including ordering and stores, financial and fiscal support.
The accounts office provides support in preparing financial reports of research projects, and in general accounting and management of projects.

The Accounting and financial reporting of research projects is executed by an external society: PWC.
The Procurement is executed by an external society: FlyBridge.
The internal auditing is executed by an external society: Deloitte.

HEAD OF UNIT

Email jleite@igc.gulbenkian.pt

Head of Unit since 1999

Other Roles at IGC
Deputy Director

STAFF

Fátima Mateus, Accounts Officer
Vítor Santos, Accounts and Information Officer
Abílio Simões, Stores Manager
Ana Sofia Oliveira, Team responsible PWC
João Braga, Accounts Officer PWC | *Left in December*
João Correia, Accounts Officer PWC | *Left in December*
Tânia Lobão, Accounts Officer PWC
Rafael Clemente | *Started in December*
António Bretanha, Procurement FlyBridge
Filipe Silva, Auditor Deloitte

ADMINISTRATIVE UNIT

HEAD OF UNIT
Martins, Greta

DESCRIPTION OF SERVICE

The Admin Unit is responsible for:
• Post-award project management of projects that are mostly financed externally;
• Admin assistance to the IGC Directors, researchers and visitors;
• Meetings organisation;
• Support to Purchasing;
• Accounting: insertion of payment entries on SAP and associated filing processes.
The unit has strong collaborations with the Purchasing and the Accounting Sectors of the institute.

NEWS IN 2015

The Admin Unit: Provided admin support to the IGC Directors and to approximately 77 Principal Investigators and/or Unit Heads and their groups; managed around 115 externally funded projects; peformed 29 financial reports; monitored and assisted purchasing processes through *LabOrders*; organised logistics for 66 seminar speakers and/or other researcher visitors; provided admin support to 29 incoming researchers; organised 13 meetings, national and international, for the IGC: PI Selection Colloquium, EU Infrafrontier Consortium, Fish Functionary Neuroanatomy, IGC SAB 2015, Ameegus2015, Evolutionary Predictability, Volkswagen Summer School, EMBO Practical course, EMBO Sectorial meeting, Drostuga 2015, Infecton & Immunity Symposium, Euraxess Roadshow and Postdoc retreat.

HEAD OF UNIT

Email gmartins@igc.gulbenkian.pt

Head of Unit since 2012

STAFF

Liliana Rodrigues, Secretary to the Director
Olena Shydenko, Secretary to the Deputy Directors
Pedro Alves, **Tatiana Rocha, Raquel Costa** (*Left in July*), **João Antunes** (*Started in July*; *left in December*) and **Anna Maria Fejfer** (*Started in December*), Admin Project Managers
Rita Gusmão and **André Sousa**, Admin Project Managers/ Purchasing Support Officers
Joana Gusmão, Purchasing Support Officer
Ana Maria Santos, Secretary
Jorge Costa, Collaborator

BIOSAFETY UNIT

HEAD OF UNIT
Carneiro, Tiago

DESCRIPTION OF SERVICE

The *Biosafety unit* is focused in promoting protection of all workers and visitors of the IGC. In addition, our implemented safety policies also aim to protect the environment and the community where we are.

The *Biosafety unit* works to implement rules that meet the best biosafety practices recommended by the European Union and the World Health Organisation.

Among the services we provide are:
• General safety training to all personal working at the IGC;
• Radiation safety training to work with radioactive isotopes. Currently, the IGC has permission from Direção Geral the Saúde (DGS) to work with P-32, P-33, S-35, C-14 and H-3;
• Training of researchers to work in a Biosafety Level 2 containment facility;
• Guidance on biological and chemical waste disposal and decontamination procedures;
• Assisting scientists with the biosafety procedures to adopt in their labs;
• Setting up and implementing emergency procedures and protocols.

HEAD OF UNIT

Email tcarneir@igc.gulbenkian.pt

PhD in Biomedical Sciences
Universidade de Lisboa, Portugal, 2006

Head of Unit since 2012

STAFF

Cátia Aleixo, Biosafety Trainee | *Started in March; left in December*

EQUIPMENT & TECHNICAL SUPPORT

HEAD OF UNIT
Moreno, Nuno

DESCRIPTION OF SERVICE

A technical platform aiming to support equipment acquisition, distribution and rational usage. Also, to support scientists form the institute on the prototyping of hardware apparatus for innovative experimental approaches (e.g. 3D printing and automation).
We work in close collaboration with core facilities for keeping with the high service standards and equipment uptime, by providing tools for better manage resources and by fostering best practices on financial models.

PUBLICATIONS

Gualda, E. J., **Moreno, N.** (2015). *3D Volume rendering of invertebrates using Light-Sheet Fluorescence Microscopy.* **Microscopy and Microanalysis** 21(S6): 2–3.

Gualda, E.J., Pereira, H., Vale, T., Estrada, M.F., Brito, C., **Moreno, N.** (2015). *SPIM-fluid: open source light-sheet based platform for high-throughput imaging.* **Biomed Opt Express.** 6(11): 4447-4456.

Portes, M. T., Damineli, D. S. C., **Moreno, N.**, Colaço, R., Costa, S., & Feijó, J. A. (2015). *The Pollen Tube Oscillator: Integrating Biophysics and Biochemistry into Cellular Growth and Morphogenesis.* **In Rhythms in Plants: Dynamic Responses in a Dynamic Environment**. (pp. 121–156). Cham: Springer International Publishing.

HEAD OF UNIT

Email moreno@igc.gulbenkian.pt

PhD in Biology and Biophysics
Universidade Nova de Lisboa, Portugal, 2009

Head of Unit since 2008

External website
nasaki.igc.gulbenkian.pt/equipment (only intranet)

STAFF

Ana Homem, Sterilization room management
Tiago Vale, Hardware engineer
Hugo Pereira, Technician
João Lagarto, R&D

GENERAL MAINTENANCE

HEAD OF UNIT
Leite, José Mário

DESCRIPTION OF SERVICE

This service provides support in all general maintenance (excluding scientific equipment and units), electricity, AVAC, buildings, gardening, cleaning and gives support to other activities that need it, such as garbage – general and biohazard – reconstruction and adaptation, etc.

HEAD OF UNIT

Email jleite@igc.gulbenkian.pt

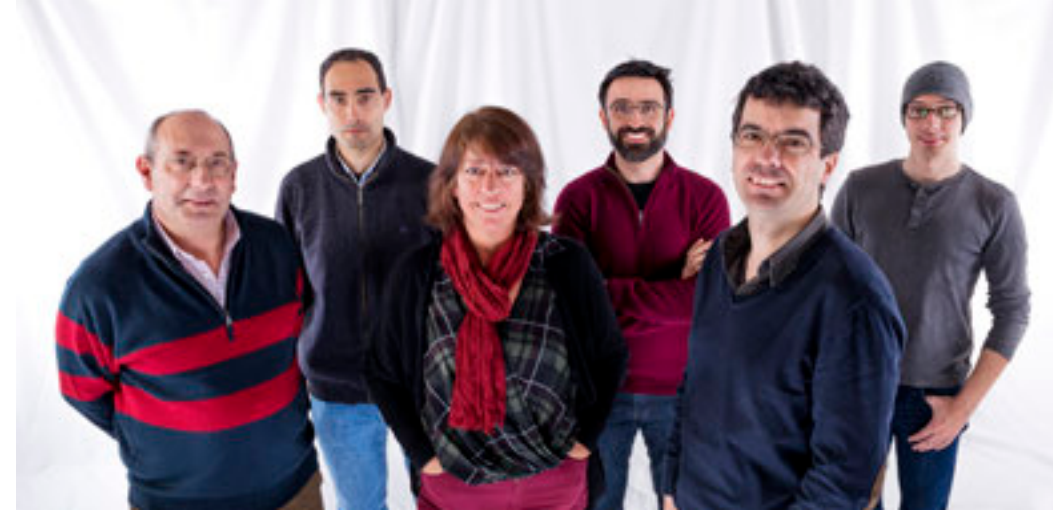
Head of Unit since 1999

Other Roles at IGC
Deputy Director

STAFF

Filipa Pardelha, Project Manager
Pedro Alves, Engineer for Infrastructure

EXTERNAL SUBCONTRACTING
TDGI
Cofeley



INFORMATICS UNIT

HEAD OF UNIT
Sousa, João

DESCRIPTION OF SERVICE

The IGC informatics (ITI) manages most of the ICT needs of the IGC including the development and maintenance of the IT and communications infrastructure, direct support to IGC users (helpdesk), training and consulting as a service, development and maintenance of the scientific computation farm, and application development. These services are multilayered and can be engaged fully or partially as needed.

Most of the IGC infrastructure relies on the use of Open Source technologies and the competence of our dedicated staff to maintain a competitive level of service. Notable exceptions are the dedicated administrative applications that also rely on commercial applications and external consultants to maintain them.

The IGC has a modern IT infrastructure with a local data centre, redundant internet lines, Gigabit Ethernet to the desktop, campus-wide Wi-Fi, centralized file storage, internal helpdesk, knowledge base servers and fully integrated and automated intranet and user management.

HEAD OF UNIT

Email jsousa@igc.gulbenkian.pt

PhD in Theoretical Biochemistry Universidade de Lisboa, Portugal, 2002

Head of Unit since 2006

Other Roles at IGC
Head of Library

STAFF

João Garcia, Systems Analyst
Mário Gil Neto, Systems Administrator
Fernando Azevedo, Technician
Manuel Carvalho, Technician
Ana Maya, Technician

LIBRARY

HEAD OF UNIT
Sousa, João

DESCRIPTION OF SERVICE

The IGC library is an open access, specialized library in biomedicine. Its bibliographic collection covers Biology, Biochemistry, Genetics, Pharmacology, Microbiology, Physiology, Immunology, Virology, Cell Biology, Neuroscience and Developmental Biology.

The library is intended for researchers, faculty and visiting scientists, students and staff of the IGC, but is also opened to external users, either from the national scientific community or from higher education institutions. It aims to provide access to useful, diversified and up to date information, to improve services provided, to acquire, register, maintain and distribute scientific information of interest to or produced by researchers and students who work at the IGC.

The IGC library has a collection of printed journals in the field of health sciences, which spans almost 30 years. Currently it subscribes approximately 336 international scientific journals in electronic version.

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Other Roles at IGC
Head of ITI service

STAFF

Jorge Carneiro, Scientific Coordinator
Pedro Homem, Library Officer

RESEARCH FUNDING AFFAIRS

HEAD OF UNIT
Vidal, Sheila

DESCRIPTION OF SERVICE

The Research Funding Affairs Unit is responsible for the implementation of a pre-award grant administration service. Its main goal is to increase the IGC's capacity to attract competitive research funds launched by national, international, public and private grant programmes. This service reports directly to the IGC Director, understands the different grant policies & requirements and works in collaboration with researchers, the Admin & project management Unit and finance staff. Services offered to the researchers include: identification & dissemination of funding opportunities tailored to the needs of the institute; support the development & submission of grant proposals and; post-award grant agreements negotiation. The unit also organises and lectures several informative sessions and workshops for grant application training of in-house and external researchers at all career stages. This unit also monitors the impact of the services offered through the quantification of several criteria.

NEWS IN 2015

In 2015, this service supported researchers in attracting several external competitive research funds. IGC researchers secured or signed contracts for a total of 14 new external competitive research grants, 3 prizes as well as 14 other type of funds in a total amount of about 5,2 million EUR. In addition, 1 PhD fellowship, 4 Postdoctoral fellowships and 2 FCT Investigator research positions have started during 2015.

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PhD in Physiology of Invertebrates Paris Sud XI University, Orsay, France, 2004

Head of Unit since 2008

STAFF

Teresa Costa, Pre-Award Grant Manager

At the institutional level, the IGC, as an "Exceptional" FCT Research Unit, was awarded a budget of about 4 million EUR for 3 years starting on 1st January 2015. Additionally, the IGC received about 241,000 EUR from POR Lisboa-QREN 2007-2014 programme to co-fund 40% of the Advanced Imaging Unit equipment.

The IGC is also a partner of the GREEN-IT FCT Research Unit and the FCT PhD Programme "Plants for Life", both coordinated by ITQB; and 3 IGC members were selected to participate in European COST Actions.

PUBLICATIONS

Vidal, S., Laureano, R., Trindade, M. (2015). *Assessing the impact of Grant. Managers on the success of grant applications.* **Perspectives: Policy and Practice in Higher Education**, 19(3): 84-91.

RESEARCH STRUCTURES & NETWORKS

2015

RESEARCH STRUCTURES

UNIDADE DE INVESTIGAÇÃO – IGC

In the frame of a national call to evaluate and fund research centres in Portugal, promoted by Fundação para a Ciência e a Tecnologia (FCT), in 2015 the Instituto Gulbenkian de Ciência (IGC) became an independent 'Research Unit' (Unidade de Investigação). In this nationwide competition, the IGC was rated as "Exceptional", one of only eleven Research Units in all academic fields in the country.

The scientific programme of the IGC Research Unit is dedicated to complex fundamental problems that fall largely into four research domains, namely quantitative biology, evolutionary biology, cell and developmental biology, and immunobiology. Modelling, quantitative biology and evolution are the conceptual substrate of the IGC, and influence thinking at the IGC in many ways. The Research Unit Team consists of 12 Research groups, each a cluster of 3 (or more) autonomous labs with sizes ranging from 3 to 15 lab members.

The Research Units now established replace the former 'Laboratórios Associados', also funded by the FCT. Until now, the Instituto Gulbenkian de Ciência was part of the Laboratorio Associado ITQB (LA-ITQB) along with three other institutes of the Oeiras Campus: the Instituto de Tecnologia Química e Biológica (ITQB), the Instituto de Biologia Experimental (IBET), and the Centro de Estudos de Doenças Crónicas (CEDOC-UNL).

THE EUROPEAN MOUSE MUTANT ARCHIVE (EMMA)

Head of the Portuguese node: Jocelyne Demengeot

The laboratory mouse is the most important mammalian model for studying genetic and multi-factorial diseases in Man. The European Mouse Mutant Archive (EMMA) is a not-for-profit repository for the collection, archiving (via cryopreservation) and distribution of relevant mutant strains that are essential for biomedical research.

EMMA draws on the expertise of 16 leading research institutes across Europe, including the IGC, in Portugal. The IGC offers the crucial Germ-Free Service that generates, breeds and houses mice that are free of all microorganisms. These germ-free animals are crucial in studies aimed at understanding the effects of microorganisms on a host, or dissecting the molecular mechanisms underlying the function of the immune system.

The germ-free facility of the IGC has generated more than 20 different strains of germ-free mice, requested by researchers from Portugal, Germany, USA, France and the UK. The facility has the capacity to temporarily host scientists wishing to carry out their own research with mice at the IGC.

EMMA is part of the Infrafrontier Project, that links two complementary infrastructure networks with the aim of establishing a sustainable research infrastructure for systematic phenotyping, archiving and distribution of mouse models. The IGC is one of the Infrafrontier partners, together with research facilities, government departments and funding agencies from 13 European countries, Canada and Israel.

NATIONAL ROADMAP OF RESEARCH INFRASTRUCTURES OF STRATEGIC RELEVANCE

In 2013, FCT opened a call for research infrastructures to be included in the National Roadmap of Research Infrastructures of Strategic Relevance. This call aimed at assessing the existing research infrastructures, identifying national priority areas and introducing Portugal into the group of European countries who have produced their own national roadmaps in alignment with the European Strategic Forum on Research Infrastructures (ESFRI). In total, 40 infrastructures in all scientific domains were integrated in the Portuguese Roadmap, of which 23 are aligned with ESFRI. Four research structures of the IGC were selected to be included in the National Roadmap of Research Infrastructures:

- BioData.pt: Portuguese Biological Data Network (coordinated by José Pereira-Leal, IGC)
- PPBI: Portuguese Platform of BioImaging (coordinated by Paula Sampaio, Instituto de Biologia Molecular e Celular)
- GenomePT: National Facility for Genome Sequencing and Analysis (coordinated by Manuel Santos, University of Aveiro)
- CONGENTO: Consortium of Genetically Tractable Organisms (coordinated by Rui Costa, Champalimaud Foundation).

NETWORKS

EU-LIFE

EU-LIFE is a new alliance that gathers thirteen renowned European research centres in life sciences: CRG-Centre for Genomic Regulation, (Barcelona, Spain); VIB (Flanders, Belgium); Institut Curie (Paris, France); MDC-Max Delbrück Centre for Molecular Medicine, (Berlin, Germany); Instituto Gulbenkian de Ciência (Oeiras, Portugal); CeMM-Research Centre for Molecular Medicine of the Austrian Academy of Sciences (Vienna, Austria); IEO-European Institute of Oncology, (Milan, Italy); CEITEC-Central European Institute of Technology (Brno, Czech Republic); Netherlands Cancer Institute – Antoni van Leeuwenhoek (Amsterdam, Netherlands); FIMM-Institute for Molecular Medicine Finland (Helsinki, Finland); BRIC-Biotech Research and Innovation Centre (Copenhagen, Denmark); Babraham Institute (Cambridge, UK); FMI- Friedrich Miescher Institute for Biomedical Research (Basel, Switzerland).

Partners in EU-LIFE operate with similar principles of excellence, external review, integrity and independence, competitiveness, internationality, and social responsibility. EU-LIFE partners believe that they can join forces to better address complex questions in research, training and research management, thereby contributing to pushing European science forward. Specific working groups join efforts, share best practices, brainstorm, and design common activities in areas of common interest such as technology transfer, international collaboration, translational research, science communication, competitive funding strategies, recruitment and training.

EMBnet | European Molecular Biology Network

Head of the Portuguese node: Pedro Fernandes

The European Molecular Biology Network (EMBnet) Node is an international foundation that aggregates National Nodes and Specialist Nodes (industrial and research), that provide Bioinformatics infrastructural facilities in a geographically distributed way. Since its creation in 1988, EMBnet has evolved from an informal network of individuals in charge of maintaining biological databases into the only organisation worldwide bringing bioinformatics professionals to work together to serve the expanding fields of genetics and molecular biology. Although composed predominantly of academic nodes, EMBnet gains an important added dimension from its industrial members. The success of EMBnet is attracting increasing numbers of organisations outside Europe to join. With members in more than 30 countries, it promotes useful exchanges between them and facilitates the location of resources and people. EMBnet runs EMBnet Journal and produces training and reference materials such as the EMBnet Quick-Guides.

The IGC is a member of EMBnet since 1992. The role of the node has evolved according to the needs of the Portuguese community. One of its main activities, training and tuition in Bioinformatics, is strongly supported in EMBnet's pool of professional teaching staff.

GOBLET – Global Organisation for Bioinformatics Learning, Education and Training

GOBLET provides a global, sustainable support and networking structure for bioinformatics educators/trainers and students/trainees. This includes a training portal for sharing materials, tools, tips and techniques; guidelines and best practice documents; facilities to help train the trainers; and offering different learning pathways for different types of learner. It facilitates capacity development in bioinformatics in all countries and develops standards and guidelines for bioinformatics education and training. IGC is a member of GOBLET.

3

PUBLICATIONS

152
PEER REVIEWED
IN-HOUSE PUBLICATIONS

5
BOOK CHAPTERS

8

29
PEER REVIEWED
PUBLICATIONS FROM
ASSOCIATED GROUPS

PEER-REVIEWED PUBLICATIONS

2015

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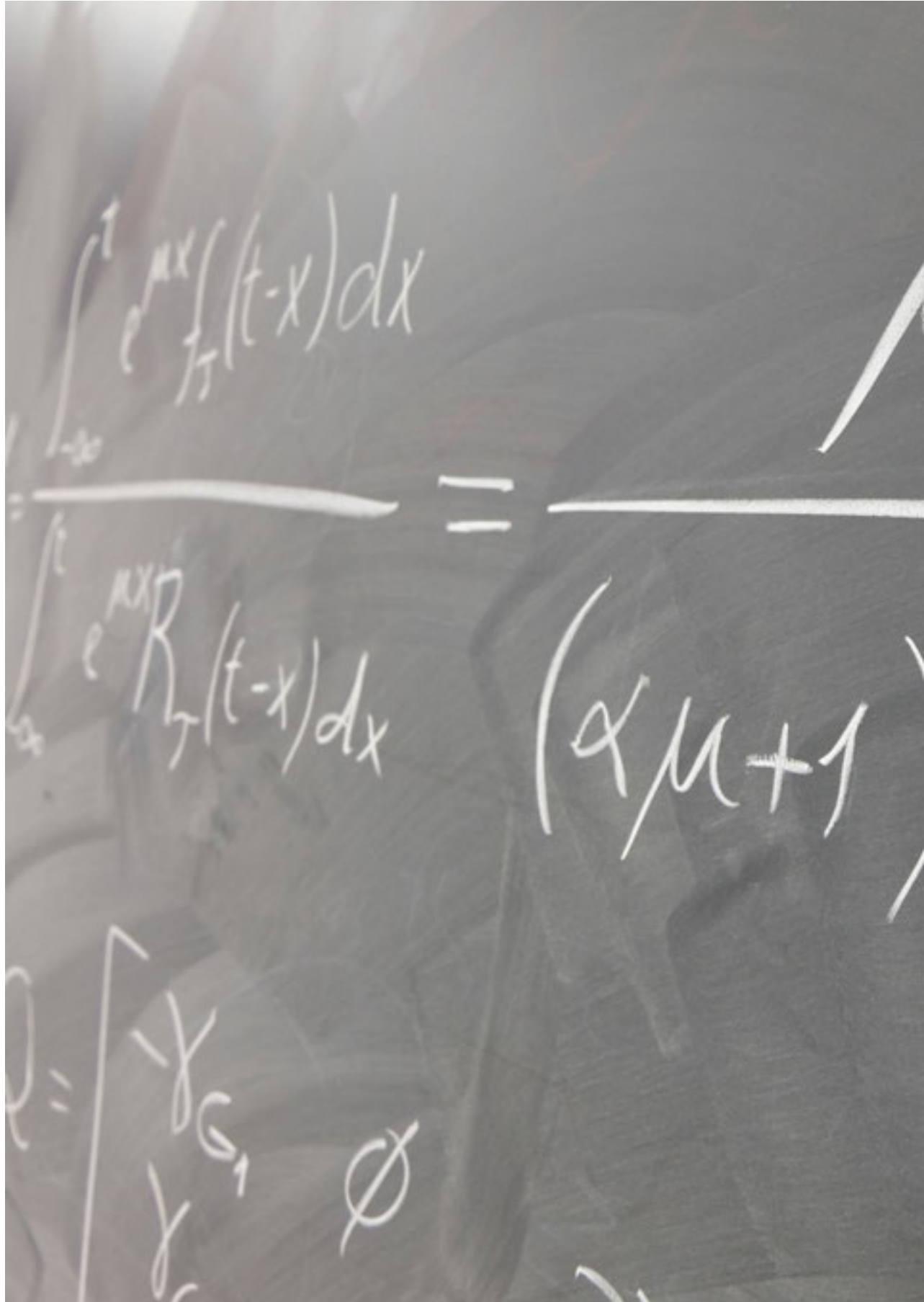
Portes, M. T., Damineli, D. S. C., Moreno, N., Colaço, R., Costa, S., & Feijó, J. A. (2015). *The Pollen Tube Oscillator: Integrating Biophysics and Biochemistry into Cellular Growth and Morphogenesis*. **In Rhythms in Plants: Dynamic Responses in a Dynamic Environment**. Cham: Springer International Publishing. pp. 121–156.

Wood, C.D., Guerrero, A., Priego-Espinosa, D.A., Martinez-Mekler, G., Carneiro, J., Darszon, A. (2015) *Sea Urchin Sperm Chemotaxis*. **Flagellar Mechanics and Sperm Guidance**. (Cosson JJ. Ed.) pp. 135-182.



ASSOCIATED GROUPS PUBLICATIONS

1. Basto, A.P., Badenes, M., Almeida, S.C., Martins, C., Duarte, A., Santos, D.M., Leitão, A. (2015). *Immune response profile elicited by the model antigen ovalbumin expressed in fusion with the bacterial OprI lipoprotein*. **Mol Immunol**. 64(1): 36-45.

2. Branco, C.C., Gomes, C.T., De Fez, L., Bulhões, S., Brilhante, M.J., Pereirinha, T., Cabral, R., Rego, A.C., Fraga, C., Miguel, A.G., Brasil, G., Macedo, P., Mota-Vieira, L. (2015). *Carriers of the complex allele HFE c.[187C>G;340+4T>C] have increased risk of iron overload in são miguel island population (Azores, Portugal).* **PLoS ONE**. 10(10): e0140228.

3. Cabral, R., Pires, R., Anjos, R., Branco, C.C., Maciel, P., Mota-Vieira, L. (2015). *Genealogical and molecular analysis of a family-based cohort of congenital heart disease patients from the São Miguel Island (Azores, Portugal).* **Ann Hum Biol. [Epub ahead of print].**

4. Gonçalves, A.C., Cortesão, E., Oliveiros, B., Alves, V., Espadana, A.I., Rito, L., Magalhães, E., Lobao, M. J., Pereira, A., Nascimento Costa, J.M., Mota-Vieira, L., Sarmento-Ribeiro, A.B. (2015). *Oxidative stress and mitochondrial dysfunction play a role in myelodysplastic syndrome development, diagnosis, and prognosis: A pilot study.* **Free Radic Res**. 49(9): 1081–1094.

5. Gonçalves, A.C., Cortesão, E., Oliveiros, B., Alves, V., Espadana, A.I., Rito, L., Magalhães, E., Pereira, S., Pereira, A., Costa, J.M.N., Mota-Vieira, L., Sarmento-Ribeiro, A.B. (2015). *Oxidative stress levels are correlated with P15 and P16 gene promoter methylation in myelodysplastic syndrome patients.* **Clin Exp Med. [Epub ahead of print].**

6. Graca, L. (2015). *Transplantation tolerance: Context matters*. **Eur J Immunol**. 45(7): 1921-5.

7. Guerreiro, C., Silva, B., Crespo, Â.C., Marques, L., Costas, S., Timóteo, Â., Marcelino, E., Maruta, C., Vilares, A., Matos, M., Couto, F.S., Faustino, P., Verdelho, A., Guerreiro, M., Herrero, A., Costa, C., de Mendonça, A., Martins, M., Costa, L. (2015). *Decrease in APP and CP mRNA expression supports impairment of iron export in Alzheimer's disease patients.* **Biochim Biophys Acta**. 1852(10): 2116-22.

8. Jahnsen, E.D., Trindade, A., Zauhn, H.C., Lehoux, S., Duarte, A., Jones, E.A. (2015). *Notch1 is pan-endothelial at the onset of flow and regulated by flow.* **PLoS ONE**. 10(4): e0122622.

9. Kruse, N. ... Martins, M., *et al.,* (2015). *Validation of a quantitative cerebrospinal fluid alpha-synuclein assay in a European-wide interlaboratory study.* **Neurobiol Aging**. 36(9): 2587-96.

10. Martinho, R.G., Guilgur, L.G., Prudêncio, P. (2015). *How gene expression in fast-proliferating cells keeps pace.* **Bioessays**. 37(5): 514-24.

11. Mateus, R., Lourenço, R., Fang, Y., Brito, G., Farinho, A., Valério, F. Jacinto, A. (2015). *Yap control of tissue growth relies on cell density and F-actin in zebrafish fin regeneration.* **Development**. 142(16): 2752-63.

12. Melo, B.C., Portocarrero, A., Alves, C., Sampaio, A., Mota-Vieira, L. (2015). *Paternal transmission of small supernumerary marker chromosome 15 identified in prenatal diagnosis due to advanced maternal age.* **Clin Med Insights Case Rep**. 8: 93-6.

13. Melo, M.S., Blanco, L., Branco, C.C., Mota-Vieira, L. (2015). *Genetic variation in key genes associated with statin therapy in the Azores Islands (Portugal) healthy population.* **Ann Hum Biol**. 42(3): 283-9.

14. Mello, G.B., Soares, S., Paton, J.J. (2015). *A scalable population code for time in the striatum*. **Curr Biol**. 25(9): 1113-22.

15. Miranda, A., Carvalho, L.M., Dionisio, F. (2015). *Lower within-community variance of negative density dependence increases forest diversity.* **PLoS ONE**. 10(5): e0127260.

16. Monteiro, M., Agua-Doce, A., Almeida, C.F., Fonseca-Pereira, D., Veiga-Fernandes, Graça, L. (2015). *IL-9 expression by invariant NKT cells is not imprinted during thymic development.* **J Immunol**. 195(7): 3463-71.

17. Murta, D., Batista, M., Silva, E., Trindade, A., Mateus, L., Duarte, A., Lopes-da-Costa, L. (2015). *Differential expression of Notch component and effector genes during ovarian follicle and corpus luteum development during the oestrous cycle.* **Reprod Fertil Dev**. 27(7): 1038-1048.

18. O'Dushlaine, C., ... Vicent, A.M, *et al.,* (2015). *Psychiatric genome-wide association study analyses implicate neuronal, immune and histone pathways.* **Nature Neurosc**. 18(2): 199-209.

19. Pedrosa, A.R., Graça, J.L., Carvalho, S., Peleteiro, M.C., Duarte, A., Trindade, A. (2015). *Notch signaling dynamics in the adult healthy prostate and in prostatic tumor development.* **Prostate. [Epub ahead of print].**

20. Pedrosa, A.R., Trindade, A., Fernandes, A.C., Carvalho, C., Gigante, J., Tavares, A.T., Diéquez-Hurtado, R., Yagita, H., Adams, R.H., Duarte, A. (2015). *Endothelial Jagged1 antagonizes DII4 regulation of endothelial branching and promotes vascular maturation downstream of DII4/Notch1.* **Arterioscler Thromb Vasc Biol**. 35(5): 1134-46.

21. Pedrosa, A.R., Trindade, A., Carvalho, C., Graça, J., Carvalho, S., Peleteiro, M.C., Adams, R.H., Duarte, A. (2015). *Endothelial Jagged1 promotes solid tumor growth through both pro-angiogenic and angiocrine functions.* **Oncotarget**. 6(27): 24404-23.

22. Schmolka, N., Wencker, M., Hayday, A.C., Silva-Santos, B. (2015). *Epigenetic and transcriptional regulation of γδ T cell differentiation: Programming cells for responses in time and space.* **Semin Immunol**. 27(1): 19-25.

23. Silva, R.D., Martinho, R.G. (2015). *Developmental roles of protein N-terminal acetylation.* **Proteomics**. 15(14): 2402-9.

24. Sousa, I., Shahram, F., Francisco, D., Davatchi, F., Abdollahi, B.S., Ghaderibarmi, F., Nadji, A., Shafiee, N.M., Xavier, J.M., Oliveira, S.A. (2015). *CCR1, KLRC4, IL12A-ASN1, STAT4, and ERAP1 are associated with Behçet's disease in Iranian.* **Arthritis Rheumatol**. 67(10): 2742-2748.

25. Thieleke-Matos, C., Lopes da Silva, M., Cabrita-Santos, L., Portal, M.D., Rodrigues, I.P., Zuzarte-Luis, V., Ramalho, J.S., Futter, C.E., Mota, M.M., Barral, D.C., Seabra, M.C. (2015). *Host cell autophagy contributes to* Plasmodium *liver development.* **Cell Microbiol. [Epub ahead of print].**

26. Vaz, S.O., Pires, R., Pires, L.M., Carreira, I.M., Anjos, R., Maciel, P., Mota-Vieira, L. (2015). *A unique phenotype in a patient with a rare triplication of the 22q11.2 region and new clinical insights of the 22q11.2 microduplication syndrome: a report of two cases.* **BMC Pediatr**. 15(1): 95.

27. Wang, Y., Antunes, M., Anderson, A.E., Kadrmas, J.L., Jacinto, A., Galko, M.J. (2015). *Integrin adhesions suppress syncytium formation in the* Drosophila *larval epidermis.* **Curr Biol**. 25(17): 2215-27.

28. Xavier, J.M., Davatchi, F., Abade, O., Shahram, F., Francisco, V., Abdollahi, B.S., Trindade, H., Nadji, A., Niloofar, M.S., Fahmida, G., Ligeiro, D., Oliveira, S.A. (2015). *Characterization of the major histocompatibility complex locus association with Behçet's disease in Iran.* **Arthritis Res Ther**. 17(1): 81.

29. Xavier, J.M., Shahram, F., Sousa, I., Davatchi, F., Matos, M., Abdollahi, B.S., Sobral, J., Nadji, A., Oliveira, M., Ghaderibarim, F., Shafiee, N.M., Oliveira, S.A. (2015). *FUT2: filling the gap between genes and environment in Behçet's disease?* **Ann Rheum Dis**. 74(3): 618-24.

4

PRIZES
&HONOURS

5
PRIZES

35
HONOURS

2 ERC Consolidator Grants

1 PLoS Genetics Research Prize 2015

1 Pfizer Prize for Basic Science 2015

1 Pulido Valente Science Award

1 EMBO Member nomination

1 Grande Oficial da Ordem Militar de Sant'iago da Espada

1 Laço Breast Cancer Grant 2015

1 Research Grant March of Dimes

PRIZES & HONOURS

2015

Adrain, Colin
Editorial Advisory Board Member, FEBS Journal

Editor, Viewpoints' section of FEBS journal

Braga Areal , Rômulo
SPI travel grant, Sociedade Portuguesa de Imunologia

Bettencourt Dias, Mónica
EMBO member, European Molecular Biology Organisation (EMBO)

ERC Consolidator Grant, European Research Council (ERC)

Laço Grant Jury member, Associação Laço

Correia, Ana Catarina
Fellowship Award, Christian Boulin Fellowship from EMBL

Coutinho, António
Grande Oficial da Ordem Militar de Sant'iago da Espada, Presidency of the Portuguese Republic

Demengeot, Jocelyne
PLoS Genetics Research Prize 2015 *(as co-author)*, PLoS Genetics

Duque, Paula
Member of Editorial Board, Scientific Reports - Nature Publishing Group (NPG)

Member of Executive Board, International PhD Programme in Plant Sciences - Plants for Life

Ferreira Moita, Luís
ERC Consolidator Grant, European Research Council (ERC)

Ferreira, Miguel Godinho
Member of FCT Scientific Council for the Life and Health Sciences, Fundação para a Ciência e a Tecnologia (FCT)

Fonseca, Rosalina
FCT Investigator, Fundação para a Ciência e a Tecnologia (FCT)

Gjini, Erida
Travel award, International Society for Evolution Medicine and Public Health

Invited grant reviewer, NWO - The National Science Organisation in the Netherlands (Earth and Life Sciences)

Gordo, Isabel
PLoS Genetics Research Prize 2015 *(as co-author)*, PLoS Genetics

FCT Investigator, Fundação para a Ciência e a Tecnologia (FCT)

Janody, Florence
Laço Breast Cancer Grant 2015, Associação Laço

Mallo, Moisés
Editorial Board member, Developmental Dynamics

Editorial Board, ISRN Developmental Biology

Academic Editor, PLoS ONE

Mena, Ana
Chair of the Science Communication Working Group, EU-LIFE

Mirth, Christen
Editorial Board member, Insect Biochemistry and Molecular Biology

Nabais, Catarina
Boehringer Ingelheim PhD fellowship, Boehringer Ingelheim Fonds

Oliveira, Rui
Member of FCT Scientific Council for the Natural and Environmental Sciences, Fundação para a Ciência e a Tecnologia (FCT)

Member of the ERC evaluation panel for the Life Sciences (LS8), European Research Council

Parkhouse, Michael
Pfizer Prize for Clinical Research 2015 *(as co-author)*, Sociedade de Ciências Médicas de Lisboa and Laboratórios Pfizer, Lda.

Portuguese Delegate, EU Cost Action TD1302 - CYSTINET

Portuguese Delegate, Ibero-latinoamericano network CYTED-ILA ("Hacia el control de la cysticercosis por *Taenia solium* en Ibero-Latinoamerica")

Advisory Group member, Volkswagen Foundation's African Iniciative

Penha-Gonçalves, Carlos
Research Grant March of Dimes, March of Dimes Foundation

Rocha, Luís
Trustees Award for Teaching Excellence 2015, Indiana University, School of Informatics & Computing

Silva, Vânia
SPI Travel Grant, Sociedade Portuguesa de Imunologia

EFIS Short Term Fellowship, European Federation of Immunological Societies

Soares, Miguel
Pfizer Prize for Basic Science 2015, Sociedade de Ciências Médicas de Lisboa and Laboratórios Pfizer, Lda.

Sobral, Daniel
PLoS Genetics Research Prize 2015 *(as co-author)*, PLoS Genetics

Tavares, Sandra
Liga Portuguesa Contra o Cancro/ Pfizer Research Award, Liga Portuguesa Contra o Cancro and Laboratórios Pfizer, Lda.

Teixeira, Luís
Member of Board of Directors, Scientific Secretary of Portuguese Society of Immunology

Vidal, Sheila
EARMA Working Group member, EARMA Working Group on Cultures and Diversity in Research Management and Administration

Xavier, Karina
PLoS Genetics Research Prize 2015 *(as co-author)*, PLoS Genetics

ERC Panel Member, European Research Council (ERC - 2016) Panel Member in the qualitative evaluation of completed ERC-funded projects

Yilmaz, Bahtiyar
Púlido Valente Science Award 2015, Fundação Púlido Valente and Fundação para a Ciência e a Tecnologia (FCT)

5

GRADUATE EDUCATION &TRAINING

151
STUDENTS ATTENDING ADVANCED TRAINING

2
PhD PROGRAMMES

81
PhD STUDENTS

1
ADVANCED TRAINING PROGRAMME

PhD PROGRAMME IN INTEGRATIVE BIOLOGY AND BIOMEDICINE

HEAD OF PROGRAMME
Sucena, Élio

DESCRIPTION OF THE PROGRAMME

The IGC PhD programme offers to a selected group of students the opportunity to learn biology from a combination of resident Institute researchers and invited faculty from many of the world's most prestigious scientific institutions. Students benefit from an intensive academic semester before choosing research groups to join, and writing their thesis projects. Candidates hail from all over the globe, and diverse academic backgrounds. The class of 2011-2012 was marked by a new international collaboration with the University of Cologne, and the Max Planck Institute for Plant Breeding Research involving bilateral student exchanges. This continuing programme inaugurates a new phase of international collaboration for our teaching programme, in addition to local partnerships with the Champalimaud Foundation Neuroscience Programme and the Instituto de Tecnologia Química e Biológica (ITQB) from Nova University of Lisbon. Students also benefit from many educational courses and workshops throughout their PhD, including our popular bioinformatics training programme, weekly seminars and an annual retreat. Graduate students drive social life at the Institute, organising cultural events year round. The IBB programme is supported by the Fundação para Ciência e a Tecnologia and the Calouste Gulbenkian Foundation.

HEAD OF PROGRAMME

Email esucena@igc.gulbenkian.pt

PhD in Evolution and Development, Genetics
University of Cambridge, UK, 2001

Head of Programme since 2013

Other Roles at IGC
Group Leader of Evolution and Development group

SUPPORT STAFF

Manuela Cordeiro, Administrative Assistant

STUDENTS ADMITTED IN 2015

NAME	NATIONALITY	FIRST DEGREE	INSTITUTION
Ana Rita Oliveira	Portugal	MSc (Evolutionary and Developmental Biology)	Faculdade de Ciências da Universidade de Lisboa, Portugal
Catalina Alvarez	Colombia	MSc (Microbiology)	Universidad de los Andes, Colombia
Eleonora Tulumello	Italy	MSc (Mathematics)	Universitá di Palermo, Italy
Henrique Colaço	Portugal	MSc (Pharmacy)	Faculdade de Farmácia da Universidade de Lisboa
Ibukun Akinrinade	Nigeria	MSc (Anatomy)	University of Ilorin, Nigeria
Inês Coelho	Portugal	MSc (Biochemistry)	Faculdade de Ciências da Universidade de Lisboa, Portugal
Luís Cardoso	Portugal	MSc (Evolutionary and Developmental Biology)	Faculdade de Ciências da Universidade de Lisboa, Portugal
Mário Soares	Portugal	MSc (Cell and Molecular Biology)	Universitá di Benevento, Italy/ Universidade de Coimbra, Portugal
Vital Domingues	Portugal	MSc (Medicine)	Faculdade de Medicina da Universidade do Porto, Portugal
Yash Pandya	Tanzania	MSc (Pharmacy)	School of Pharmacy, University of Reading, UK

MODULES | COURSES RUN IN 2015

JANUARY 5-9
HISTORY OF BIOLOGICAL CONCEPTS
Organiser: Élio Sucena (IGC, Portugal)
Faculty: Michael Dietrich (Dartmouth College, New Hampshire, USA), Lars Jansen, Élio Sucena, Jonathan Howard (IGC, Portugal)

JANUARY 12-20
STATISTICS AND QUANTITATIVE BIOLOGY
Organisers: Jorge Carneiro and Claudine Chaouiya (IGC, Portugal)
Faculty: Nuno Sepúlveda (London School of Hygiene & Tropical Medicine, UK), Jorge Carneiro, Claudine Chaouiya (IGC, Portugal)

JANUARY 21-22
STRUCTURAL BIOLOGY
Organiser: Alekos Athanasiadis (IGC, Portugal)
Faculty: Alekos Athanasiadis (IGC, Portugal)

JANUARY 22-FEB 6
INSIDE THE CELL/CELL BIOLOGY
Organisers: Raquel Oliveira, Colin Adrain, Maria João Amorim, Florence Janody and Mónica Bettencourt-Dias (IGC, Portugal)
Faculty: Daniel St Johnston (University of Cambridge, UK), Olivier Pertz (University of Basel, Switzerland), Yanlan Mao (University College London, UK), Margaret S. Robinson (Cambridge Institute for Medical Research, UK), Ari Helenius (ETH Zürich, Switzerland), Seamus Martin (Trinity College, Ireland),

Zuzana Storchova (Max Planck Institute of Biochemistry, Germany), Sérgio Almeida, Nuno Morais (Instituto de Medicina Molecular, Portugal), José Pereira-Leal, Raquel Oliveira, Colin Adrain, Maria João Amorim, Florence Janody, Mónica Bettencourt-Dias, Lars Jansen, Miguel Godinho, Helena Soares (IGC, Portugal)

FEBRUARY 9-13

BIOPHYSICS

Organisers: Filipa Alves and Ivo Telley (IGC, Portugal)

Faculty: Josef Givli (Israel Institute of Technology, Israel), Hans Meinhardt (Max Plank Institute for Developmental Biology, Germany), Cláudio Franco (Instituto de Medicina Molecular, Portugal), António Jacinto (CEDOC-Chronic Diseases Research Centre, Portugal), Jorge Carneiro, Gabriel Martins, Dani Bodor (IGC, Portugal)

FEBRUARY 23-27

DEVELOPMENTAL BIOLOGY

Organisers: Diogo Castro and Moisés Mallo (IGC, Portugal)

Faculty: Deneen Wellik (University of Michigan Medical Center, USA), Jonas Muhr (Karolinska Institutet, Sweden), Joaquín Rodríguez León (Universidad de Extremadura, Spain), Rui Martinho (Universidade do Algarve, Portugal), Cristina Borges (CEDOC-Chronic Diseases Research Centre, Portugal), Élio Sucena, Ivo Chelo, Diogo Castro, Moisés Mallo (IGC, Portugal)

MARCH 2-6

EVOLUTION

Organisers: Isabel Gordo and Lounès Chikhi (IGC, Portugal)

Faculty: Weini Huang (Max Planck Institute For Evolutionary Biology, Germany), Susan F Bailey (Aarhus University, Denmark), Isabel Gordo, Lounès Chikhi, Ivo Chelo, Lília Perfeito, Ana Sousa, Ricardo Ramiro, Roberto Balbontin (IGC, Portugal)

MARCH 9-13

EVOLUTION, DEVELOPMENT AND ECOLOGY

Organisers: Patrícia Beldade and Christen Mirth (IGC, Portugal)

Faculty: Christian Braendle (Université Nice Sophia Antipolis, France), Johannes Jaeger (Centre de Regulació Genòmica-Barcelona, Spain), Frederik Nijhout (Duke University, USA), Takaaki Daimon (University of Tokyo, Japan), Patrícia Beldade, Christen Mirth (IGC, Portugal)

MARCH 15-20

ECOLOGY

Organiser: Sara Magalhães (Faculdade de Ciências da Universidade de Lisboa, Portugal)

Faculty: Lukas Schärer (University of Basel, Switzerland), Marc-André Selosse (Centre d'Ecologie Fonctionnelle et Evolutive - CNRS, France), Sara Magalhães (Faculdade de Ciências da Universidade de Lisboa, Portugal)

MARCH 23-31

HOST-PATHOGEN INTERACTIONS/IMMUNOBIOLOGY

Organisers: Luis Teixeira and Miguel Soares (IGC, Portugal)

Faculty: Siamon Gordon (University College London, UK), Sidonia Fagarasan (RIKEN, Japan), Sergei Grivennikov (Fox Chase Cancer Center, USA), Bruno Silva Santos (Instituto de Medicina Molecular, Portugal), Padraic Fallon (School of Medicine, Dublin, Ireland), Kathleen McCoy (University of Bern, Switzerland), Jonathan Howard, Luís Ferreira Moita, Vasco Barreto, Jocelyne Demengeot, Helena Soares, António Coutinho, Miguel P. Soares, Luís Teixeira (IGC, Portugal)

APRIL 8-16

NEUROBIOLOGY - BRAIN AND BEHAVIOUR

Organisers: Rui Oliveira, Ana Domingos (IGC, Portugal) and Alfonso Renart (Champalimaud Neuroscience Programme, Portugal)

Faculty: Shelley Adamo (Dalhousie University, Canada), Redouan Bshary (Université de Neuchâtel, Switzerland), Hans Hofmann (University of Texas at Austin, USA), Monica Dus (University of Michigan, USA), Denis Burdakov (The Francis Crick Institute, UK), Joe Paton, Inbal Israely, Mike Orger, Carlos Ribeiro, Megan Carey, Christian Machens, Marta Moita, Susana Lima, Gonzalo Polavieja (Champalimaud Neuroscience Programme, Portugal)

APRIL 17-23

FROM CELLS TO ORGANISMS

Organisers: Karina Xavier and Miguel Godinho Ferreira (IGC, Portugal)

Faculty: Vera Gorbunova (University of Rochester, USA), Marek Basler (Biozentrum, Switzerland), Adriano O. Henriques (Instituto de Tecnologia Química e Biológica, Portugal), Bruno Bernardes de Jesus, Sandrina Pereira (Instituto de Medicina Molecular, Portugal)

APRIL 24-30

SYSTEMS BIOLOGY

Organisers: Claudine Chaouiya and Jorge Carneiro (IGC, Portugal)

Faculty: Ioannis Xenarios (Swiss Institute of Bioinformatics, Switzerland), Albert Goldbeter (Université libre de Bruxelles, Belgium), Christine Brun (Technological Advances for Genomis and Clinics INSERM-UMR 1090, France), Susana Vinga (Instituto Superior Técnico, Portugal), Claudine Chaouiya (IGC, Portugal)

MAY 4-8

PLANT SCIENCE (Cologne, Germany)

Organiser: Isabell Witt (Max Planck Institute for Plant Breeding Research, Germany)

Faculty: Cathie Martin (John Innes Centre, Norwich, UK), Andreas Weber, Urte Schluter, Andrea Brautigam (Heinrich-Heine-Universität Düsseldorf, Germany), Jörg Becker, Paula Duque, Elena Baena-Gonzalez (IGC, Portugal), Ute Hocker, Maria Albani, Martin Hülskamp (Botanical Institute Cologne Biocenter, Germany)

MAY 11-15

HYPOTHESIS DRIVEN RESEARCH

Organisers: Jocelyne Demengeot and José Pereira-Leal (IGC, Portugal)

Faculty: Jocelyne Demengeot, José Pereira-Leal (IGC, Portugal)

GRADUATE PROGRAMME SCIENCE FOR DEVELOPMENT

HEAD OF PROGRAMME
Gonçalves-Sá, Joana

DESCRIPTION OF THE PROGRAMME

The Graduate Programme Science for Development (PGCD) is an advanced training programme designed to prepare students from the various Portuguese Speaking African Countries (PALOP) to pursue research careers in Science and Technology, particularly in the Life Sciences.
It is currently being developed as a partnership between the IGC, the Fundação para a Ciência e a Tecnologia and the Ministry of Higher Education, Science and Innovation of Cape Verde, with three main goals:
1) To train the next generation of Portuguese-speaking African students, giving them the opportunity to learn advanced science;
2) To improve the quality of science education and scientific research in the Portuguese-Speaking African Countries;
3) To use science and technology as effective tools for development.
The programme offers basic training in the life sciences, particularly Plant Biology, Marine Biology and Tropical Diseases, consisting of one year of graduate courses, taking place in Praia, Cape Verde, followed by a 40 month research period leading to PhD thesis, divided between the home countries and select institutes and universities abroad.

HEAD OF PROGRAMME

Email mjsa@igc.gulbenkian.pt

PhD in Molecular & Cell Biology
Universidade Nova de Lisboa, 2010

Head of Programme since 2012

Other Roles at IGC
Group leader of the Science & Policy group

SUPPORT STAFF

Carla Lima Semedo, Assistant
Inês Maciel, Assistant | *Started in January*
Manuela Cordeiro, Assistant | *Left in July*

STUDENTS ADMITTED IN 2015

NAME	NATIONALITY	FIRST DEGREE	INSTITUTION
Ana Lina Rodrigues	Cape Verde	Biology	Universidade de Cabo Verde, Cape Verde
Armando Semo	Mozambique	Biomedical Sciences	Universidade Eduardo Mondlane, Mozambique
Abdul Fahamo	Mozambique	Statistics	Universidade Eduardo Mondlane, Mozambique
Baltazar Cá	Guinea-Bissau	Tropical Health	Universidade Nova de Lisboa, Portugal
Crispiniano Furtado	Cape Verde	Mathematical Engineering	Universidade do Porto, Portugal
Elias Maxombe	Mozambique	Geography	Universidade Pedagógica, Mozambique
Gaspar da Graça	Sao Tome and Principe	Biology	Instituto Superior Politécnico de São Tomé, Sao Tome and Principe
Illyane Martins Lima	Cape Verde	Pharmaceutical Biotechnology	Universidade de Coimbra, Portugal
Kaori Fonseca	Cape Verde	Biotechnology of Marine Resources	Instituto Politécnico de Leiria, Portugal
Lucindo Cardoso de Pina	Cape Verde	Biological Sciences	Universidade de Cabo Verde, Cape Verde
Maria Helena António	Mozambique	Oceanography	Universidade Eduardo Mondlane, Mozambique
Pâmela Borges	Cape Verde	Biomedical Engineering	Universidade de Coimbra, Portugal
Raquel Delgado	Cape Verde	Human Biology and Environment	Universidade Nova de Lisboa, Portugal
Sara Baptista	Cape Verde	Public Health	Universidade Católica, Portugal
Yara Rodrigues	Cape Verde	Cellular and Molecular Biology	Universidade Federal de Paraíba, Brazil

MODULES | COURSES RUN IN 2015

JANUARY 12-16
HISTORY OF CONCEPTS IN BIOLOGY
Organiser: Thiago Carvalho (IGC, Portugal)
Faculty: Rui Martinho (Universidade do Algarve, Portugal), Joaquín Leon (Universidad de Extremadura, Spain)

JANUARY 19-23
GENES AND DNA
Organiser: Miguel Godinho Ferreira (IGC, Portugal)
Faculty: Rui Martinho and João Matos (Universidade do Algarve, Portugal), José Antão (Instituto Superior de Agronomia, Portugal)

JANUARY 26-29
THEORETICAL BIOLOGY
Organiser: Jorge Carneiro (IGC, Portugal)
Faculty: Filipa Alves (IGC, Portugal), Tiago Paixão (Institute of Science and Technology, Austria)

JANUARY 30
MOLECULAR BIOLOGY
Organiser and Faculty: Joana Sá (IGC, Portugal), José Antão (Instituto Superior de Agronomia, Portugal)

FEBRUARY 2-6
TRAFFICKING AND SIGNALLING
Organisers: Joana Loureiro (IGC, Portugal), Nuno Correia Santos (Instituto de Medicina Molecular, Portugal)
Faculty: Jorge Azevedo (Instituto de Biologia Molecular e Celular, Portugal)

FEBRUARY 9-13
CELL CYCLE
Organisers: Susana Godinho (St. Barts, UK), Raquel Oliveira (IGC, Portugal)
Faculty: Dinis Calado (London Research Institute, UK), Joana Paredes (IPATIMUP, Portugal), Elsa Logarinho (Instituto de Biologia Molecular e Celular, Portugal)

FEBRUARY 16-20
BIOINFORMATICS
Organiser: José Leal (IGC, Portugal)
Faculty: Ricardo Leite (IGC, Portugal), Hugo Verli (Universidade Federal do Rio Grande do Sul, Brazil)

FEBRUARY 23-27
DEVELOPMENT
Organiser: António Jacinto (CEDOC-Chronic Diseases Research Centre, Portugal)
Faculty: Leonor Saúde (Instituto de Medicina Molecular, Portugal), Rita Fior (IGC, Portugal)

MARCH 2-6
BIODIVERSITY, GENOMICS AND CONSERVATION
Organiser: Nuno Ferrand (Research Center in Biodiversity and Genetic Resources, Portugal)
Faculty: Raquel Vasconcelos and Fernando Sequeira (Research Center in Biodiversity and Genetic Resources, Portugal)

MARCH 9-13
PLANT BIOLOGY AND BIOCHEMISTRY
Organiser: Paula Duque (IGC, Portugal)
Faculty: Américo Rodrigues, Anabela Bernardes da Silava and Cristina Cruz Houghton (Faculdade de Ciências da Universidade de Lisboa, Portugal)

MARCH 16 -20
PLANT STRESS AND PHYSIOLOGY
Organiser: Elena Baena (IGC, Portugal)
Faculty: Nélson Saibo (Instituto de Tecnologia Química e Biológica, Portugal), José Feijó (University of Maryland, USA)

MARCH 23-27
PLANT BIOTECHNOLOGY
Organiser: Fátima Grossi de Sá (Universidade de Brasilia, Brazil)
Faculty: José Dijair Antonino de Souza Junior (Universidade de Brasilia, Brazil)

APRIL 13-17
INTRODUCTION TO MARINE BIOLOGY
Organiser: Manuel dos Santos (Instituto Superior de Psicologia Aplicada, Portugal)
Faculty: Joana Robalo (Instituto Superior de Psicologia Aplicada, Portugal)

APRIL 20-14
MARINE ECOLOGY
Organiser: Maria Dornelas (St. Andrews, UK)
Faculty: Miguel Barbosa (St. Andrews, UK), Roberta Bonaldo (Universidade de São Paulo, Brazil)

APRIL 27-MAY 1
AQUATIC PLANTS AND ALGAE
Organiser: Ester Serrão (Universidade do Algarve, Portugal)
Faculty: Joel Creed (Universidade do Estado do Rio de Janeiro, Brazil), Salomão Bandeira (Universidade Eduardo Mondlane, Mozambique), Aschwin Engelen (Universidade do Algarve, Portugal)

MAY 4-8
POPULATION GENETICS AND EVOLUTION OF MARINE ORGANISMS
Organiser: Ricardo Beldade (Centre National de la Recherche Scientifique, France)
Faculty: Rui Faria (Universidade do Porto, Portugal), Sérgio Floeter (Universidade Federal de Santa Catarina, Brazil)

MAY 11-15
AQUACULTURE AND FISHERIES
Organiser: Karim Erzini (Universidade do Algarve, Portugal)
Faculty: Cláudia Aragão (Universidade do Algarve, Portugal)

MAY 25-29
TROPICAL AGRICULTURE
Organiser: Manuel Correira (Instituto Superior de Agronomia, Portugal)
Faculty: Manuel Valeriano Madeira and, João Neves Martins (Instituto Superior de Agronomia, Portugal), José Alexandre Andrade (Universidade de Évora, Portugal)

JUNE 1-5
IMMUNOLOGY
Organiser: Vasco Barreto (IGC, Portugal)
Faculty: Raffaella Gozzelino (CEDOC-Chronic Diseases Research Centre, Portugal), Ana Maria Caetano Faria (Universidade Federal de Minas Gerais, Brazil), André Vale (Instituto de Biofísica Carlos Chagas Filho, Brazil)

JUNE 8-12
IMMUNITY OF HOST-PATHOGEN INTERACTIONS
Organiser: Helena Soares (IGC, Portugal)
Faculty: Marcelo Bozza (Universidade Federal do Rio de Janeiro, Brazil), Margarida Saraiva (Instituto de Biologia Molecular e Celular, Portugal), Sílvia Portugal (National Institute of Health, USA)

JUNE 15-19
VECTOR-BORNE DISEASES
Organiser: Maria Mota (Instituto de Medicina Molecular, Portugal)
Faculty: Silvia Boscardin (Universidade de São Paulo, Brazil), Vanessa Zuzarte Luís (Instituto de Medicina Molecular, Portugal), Luís Teixeira (IGC, Portugal)

JUNE 22-26
INTESTINAL INFECTIONS
Organiser: José Paulo Gagliardi Leite (Fundação Osvaldo Cruz, Brazil)
Faculty: Aldo Lima (Universidade Federal do Ceará, Brazil), Filipe Costa (Fiocruz, Brazil)

JUNE 29-JULY 3
TROPICAL MEDICINE AND CLINICAL MICROBIOLOGY
Organisers: Emilia Valadas and Thomas Hanscheid (Instituto de Medicina Molecular, Portugal)
Faculty: Sandra Aguiar and Carla Santos (Instituto de Medicina Molecular, Portugal)

JULY 6-10
NON-INFECTIOUS DISEASES
Organiser: Marly Cardoso (Universidade de São Paulo, Brazil)
Faculty: Suely Gimeno (Universidade Federal de São Paulo, Brazil), Márcia Machado (UFC, Brazil)

JULY 13-17
EPIDEMIOLOGY
Organiser: Laura Rodrigues (London School of Hygiene & Tropical Medicine, UK)
Faculty: Nuno Sepúlveda and Gabriela Gomes (London School of Hygiene & Tropical Medicine, UK)

JULY 20-24
PUBLIC HEALTH
Organiser: Susana Nery (University of Queensland, Australia)
Faculty: Amabélia Rodrigues (Bandim, Guinea-Bissau), Maria Jesus Trovoada (Ministry of Health, Sao Tome and Principe), Eusébio Macete (Manhiça Health Research Centre, Mozambique)

JULY 27-31
SKILLS IN SCIENCE
Organiser: Ana Godinho (Fundação para a Ciência e a Tecnologia, Portugal)
Faculty: Ana Mena (IGC, Portugal), Margarida Trindade (ISCTE-Instituto Universitário de Lisboa, Portugal), Sheila Vidal (IGC, Portugal)

GULBENKIAN TRAINING PROGRAMME IN BIOINFORMATICS

HEAD OF PROGRAMME
Fernandes, Pedro

DESCRIPTION OF THE PROGRAMME

The Gulbenkian Training Programme in Bioinformatics (GTPB) provides practical skills in Bioinformatics.
The general objective is to efficiently deliver skills while ensuring maximal autonomy in their usage. It consists of short, intensive training courses, held in a specialised training room where the focus on the e-learner is maximised. The courses are taught and fully documented in English. The majority of the course participants are graduate students and mature researchers. In 2015, the GTPB has provided 11 training courses to a grand total of 151 participants, 78 from Portuguese institutions, 43 from the IGC and 30 from foreign institutions. The courses are self-assessed by the participants through a standardised questionnaire. GTPB experiments with innovative training methodologies, aiming at increasing the learning rate and ensuring the consolidation of new skills. Such improvements are regularly providing valuable input to the lifelong learning community that trains Bioinformatics users and developers.

HEAD OF PROGRAMME

Email pfern@igc.gulbenkian.pt

Head of Programme since 1999

External Website
http://gtpb.igc.gulbenkian.pt/bicourses

MODULES | COURSES RUN IN 2015

Organiser: Pedro Fernandes

APRIL 13-17
IB15F - INTRODUCTORY BIOINFORMATICS
Faculty: David P Judge (Cambridge University, UK), Pedro Fernandes (IGC, Portugal) and Javier Santoyo Lopez (University of Edinburgh, UK)

APRIL 22-24
PHSMCP15 - PROMOTER HUNTING AND SYSTEMS MODELLING OF CELLULAR PATHWAYS
Faculty: Alexander Kel (genXplain GmbH, Germany) and Christoph Wierling (Alacris Theranostics GmbH, Germany)

APRIL 27-30
SMLMC15 - STRUCTURAL MODELLING FOR LARGE MACROMOLECULAR COMPLEXES
Faculty: Joanna Kasprzak (International Institute of Molecular and Cell Biology and Adam Mickiewicz University, Poland) and Mateusz Dobrychłop (Adam Mickiewicz University, Poland)

MAY 11-15
ARANGS15 - AUTOMATED REPRODUCIBLE ANALYSIS OF NGS DATA
Faculty: Darin London (Duke University Medical Center, USA) and Rutger Vos (Naturalis, The Netherlands)

MAY 25-28
MEVR15 - MOLECULAR EPIDEMIOLOGY OF VIRUSES USING R
Faculty: Simon Frost (Cambridge University, UK)

JUNE 15-19
IBSTATB15 - INTRODUCTORY BIOSTATISTICS FOR BIOLOGISTS
Faculty: Ana Luísa Papoila (Faculdade de Ciências Médicas, Portugal), Fernanda Diamantino (Faculdade de Ciências da Universidade de Lisboa, Portugal)

JULY 6-9
PGDH15 - POPULATION GENETICS AND DEMOGRAPHIC HISTORY: MODEL-BASED APPROACHES
Faculty: Mark Beaumont (University of Bristol, UK), Lounès Chikhi (IGC, Portugal) and Willy Rodriguez (Université de Toulouse, France)

JULY 20-24
BPBR15 - BIOINFORMATICS USING PYTHON FOR BIOMEDICAL RESEARCHERS
Faculty: Allegra Via (Universita di Roma, Italy) and Kaja Milanowska (Igor Mckiewicz University, Poland)

SEPTEMBER 7-10
PDA15 - PROTEOMICS DATA ANALYSIS
Faculty: Lennart Martens (University of Ghent, Belgium), Harald Barsnes and Marc Vaudel (University of Bergen, Norway)

SEPTEMBER 28 – OCTOBER 1
GACT15 - GENOMIC ARCHITECTURE OF COMPLEX TRAITS
Faculty: Arcadi Navarro, Juan A. Rodriguez and David Allen Hugues (Universidad Pompeu Fabre, Spain)

NOVEMBER 30 - DECEMBER 3
TBHD15 - TRANSLATIONAL BIOINFORMATICS IN HEALTH AND DISEASE
Faculty: Fátima Al-Shahrour, Elena Piñeiro and Javier Perales (Centro Nacional de Investigaciones Oncológicas, Spain)

DECEMBER 14-18
IB15S - INTRODUCTORY BIOINFORMATICS
Faculty: David P Judge (Cambridge University, UK), Pedro Fernandes (IGC, Portugal) and Bert Overduin (University of Edinburgh, UK)

POSTDOCTORAL TRAINING

SCIENTIFIC COORDINATOR
Xavier, Karina

DESCRIPTION OF THE PROGRAMME

The IGC has a creative and engaging Postdoctoral community that run several activities throughout the year, aiming to promote the professional development of all IGC Postdocs, to foster a solid institutional environment capable of sustaining this progress, and to provide "peer support" network for all postdocs. These activities are organised by a Postdoc Committee, composed of a group of volunteer Postdoctoral fellows elected every year, and supported by the IGC Directors, mentoring group leaders, and heads of facilities and services. Workshops, seminars, retreats and social events are some of the activities being held at the IGC.

POSTDOCTORAL COMMITTEE
2015

Rita Carlos
Concetta Valerio
Paula Ramos-Silva
Birte Blankenhaus
Dale Richardson
Jose Planells

ACTIVITIES

In 2015, several initiatives took place, encompassing workshops, seminars, social events and the comprehensive implementation of the private Health Insurance Programme, secured by previous committees.

SEMINAR SERIES

PhD/Postdoc seminars

Throughout the year, Postdocs and senior PhD students had the opportunity to give a 30 minutes seminar for the IGC community.

'Career path in science' seminars

Inspiring scientists and professionals from science-related areas share their personal experiences and address different career options and scientific challenges in an informal seminar. In 2015, seven Career path seminars took place at IGC: three senior scientists and four on alternative careers (Science administration, Intellectual Property and Technology Transfer Manager, Professional Editor, and Head of Service Facilities).

Workshops

Four workshops to improve skills and science were provided in 2015 including: i) how to build your CV; ii) how to communicate your science to lay audiences; iii) scientific writing; iv) recognizing and communicating your skills to make informed career choices and increase personal effectiveness. To organise these workshops, the Postdoc Committee liaised with in-house experts of the Research Funding Affairs and the Science Communication & Outreach units, as well as with external experts, such as Barbara Janssens, Career Manager at the German Cancer Research Centre (DKFZ), in Germany and Sarah Blackford, Head of Education and Public affairs of Society for Experimental Biology, in UK.

ANNUAL POSTDOC RETREAT

The IGC annual Postdoc retreat has slowly expanded over the years to include more institutes in the Lisbon area and lay the fertile ground for networking outside of the IGC. In 2015, the retreat brought together researchers from the major life sicences research institutes including IGC, iBET, ITQB, iMM, and CCU. Over a hundred postdocs participated on a three-day retreat focused on scientific interactions, networking and career development.

PORTUGUESE CLASSES

The Postdoc Committee runs Portuguese language classes for international peers joining the IGC community for a nominal fee.

SUMMER INTERNSHIP PROGRAMME

COORDINATOR

Amorim, Maria João

DESCRIPTION OF THE PROGRAMME

The IGC and Oxford University established in 2014 a partnership via the Oxford University Internship Programme to bring to the IGC young science undergraduates from the University, for an 8-week lab internship, each fully supported by the University. In 2015, 3 students spent the summer with different IGC groups.

Groups that hosted the internship in 2015:

Cell Biology of Viral Infection
Membrane Traffic
Network modelling

COORDINATOR

Email mjamorim@igc.gulbenkian.pt

Funding
University of Oxford

THESES

2015

BSc THESES

Manguinhas, Rita
Papel do citoesqueleto de actina na manutenção da plasticidade sináptica
Universidade Nova de Lisboa, Portugal - June 2015

Martins, Raquel
The effect of chronic unpredictable stress on cellular aging in zebrafish
Universidade de Lisboa, Portugal - April 2015

Nascimento, Ana
The role of ARL15 in influenza A virus infection
Universidade do Porto, Portugal - September 2015

Simões de Matos, Brigite
Desenvolvimento de mutantes de *E.coli* para uso como referência em ensaios de fitness e adaptação com *Caenorhabditis elegans*
Universidade de Évora, Portugal - July 2015

MSc THESES

Araújo, Margarida
***Helicobacter hepaticus* colonization in mice: newborn tolerance properties and distribution throughout the gut**
Universidade Lisboa, Portugal - October 2015

Azevedo Gaivão, Maria
Mathematical modelling of co-colonization and within-host abundance ratios in multi-type pathogen dynamics
Universidade de Lisboa, Portugal - July 2015

Dores, Katharina
How do cancer cells cope with supernumerary centrosomes?
Universidade Nova de Lisboa, Portugal - November 2015

Eugénio, Ana Teresa
Effect of environment and genetic background on transposable element activity in *Drosophila melanogaster*
Universidade de Lisboa, Portugal - October 2015

Ferreira Cunha, Sónia
Avaliação da eficácia da vacina contra malária placentária em modelo experimental
Universidade de Lisboa, Portugal - October 2015

Madeira, Natália
Social memory in zebrafish: behavioural assessment and the role of Brain-Derived Neurotrophic Factor (BDNF)
Universidade de Lisboa, Portugal - December 2015

Martins Eduardo, Gustavo
Impact of chromossomal structure on the evolution of *Schizosaccharomyces pombe* undergoing mutation accumulation
Universidade Nova de Lisboa, Portugal - December 2015

Mendonça, Susana
Protocol optimization for the ultra-structural preservation of cilia in *Drosophila melanogaster*'s antenna
Universidade de Lisboa, Portugal - November 2015

Morais, Ana Catarina
How does chromosomal instability affect the tempo and mode of adaptation
Universidade de Lisboa, Portugal - December 2015

Moura, Pedro
Determining the mechanism of inhibition of TLR3 by the I329L ASFV protein
Universidade de Lisboa, Portugal - July 2015

Nunes, Júlia
Reconstitution of *Drosophila* fertilization for time-lapse imaging
Universidade de Lisboa, Portugal - November 2015

Paulo, Tânia
Testing endosymbiont-mediated immune protection in a novel host species
Universidade de Lisboa, Portugal - September 2015

Pereira, Mafalda
Role of sympathetic innervation in obesity
Universidade Nova de Lisboa, Portugal - October 2015

Pereira, Sónia
Deciphering the role of antherozoid specific DNA methyltransferases in *Physcomitrella patens*
Universidade de Lisboa, Portugal - November 2015

Teixeira, Andreia
Morphological and behavioural variation in ants: comparing species, castes, and individuals
Universidade de Lisboa, Portugal - November 2015

Silva, Carolina
Genetics of diversification: a hotspot locus for pigmentation evolution
Universidade de Lisboa, Portugal - November 2015

Vovchko, Halyna
Development of bioassays for discerning autoantibody-mediated beta cell dysfunction
Universidade de Lisboa, Portugal - July 2015

PhD THESES

Abreu, Rodrigo
Social eavesdropping in zebrafish
Universidade Nova de Lisboa, Portugal - December 2015

Bodor, Dani
Quantitative centromere epigenetics
Universidade Nova de Lisboa, Portugal - June 2015

Carneiro, Madalena
The role of short telomeres as cause of natural aging in zebrafish
Universidade Nova de Lisboa, Portugal - October 2015

Garcês, Sandra
The clinical relevance of drug immunogenicity
Universidade de Lisboa, Portugal - March 2015

Gouveia, Zélia
Targeting Heme with single domain antibodies
Universidade Nova de Lisboa, Portugal - June 2015

Gouw, Marc
New tools for old organelles: Bioinformatics for Evolutionary Cell Biology
Universidade Nova de Lisboa, Portugal - July 2015

Hernandez-Coronado, Marcela
Comparative transcriptome analysis in the moss *Physcomitrella patens* and the genetic basis of key reproductive innovations
Universidade Nova de Lisboa, Portugal - July 2015

Margalha, Leonor
Regulation of SnRK1-dependent energy signalling by SUMOylation
Universidade Nova de Lisboa, Portugal - October 2015

Mendes, Cláudia
Nutritional plasticity and evolutionary diversification in the *Drosophila* ovary
Universidade Nova de Lisboa, Portugal - May 2015

Oliveira, Gonçalo
Social modulation of androgens in humans: Psychological mechanisms and adaptive function
Instituto Superior de Psicologia Aplicada, Portugal - December 2015

Ramirez, Carlos
Generation of *Physcomitrella patens* transcriptome atlas and identification of GLR genes as crucial mediators of reproduction processes in early land plants
Universidade Nova de Lisboa, Portugal - January 2015

Salmona, Jordi
Comparative conservation genetics of several threatened lemur species living in fragmented environments - A glimpse through natural history of northern Madagascar lemurs
Universidade Nova de Lisboa, Portugal - December 2015

Teles, Magda
Socially driven changes in neural and behavioural plasticity in zebrafish
Universidade de Lisboa, Portugal - December 2015

Trancoso, Inês
DNA editors of the adaptive immune system – physiology, repair regulation and evolution
Universidade Nova de Lisboa, Portugal - September 2015

Vasconcelos, Francisca
Ascl1 and MyT1 transcriptional networks in vertebrate neurogenesis
Universidade Nova de Lisboa, Portugal - September 2015

Yilmaz, Bahtiyar
A natural protective mechanism against malaria – The role of gut flora
Universidade Nova de Lisboa, Portugal - February 2015

TEACHING AT OTHER PhD PROGRAMMES

2015

Alves, Filipa
Quantifying natural colour patterns
Course on Image Analysis, Instituto de Biotecnología de la Universidad Nacional Autónoma de México, Cuernavaca, Mexico
November 2015

Amorim, Maria João
Viruses and the recycling endosome
Molecular Mecanisms of Disease PhD Programme, University of Coimbra, Portugal
November 2015

Baena-González, Elena
Functional genomics and methods for gene identification
International PhD programme Plants for Life, ITQB, Oeiras, Portugal
April 2015

Barreto, Vasco
RAG proteins and receptor diversity
Immunology course, GABBA Programme, Porto, Portugal
March 2015

Becker, Jörg
Microarrays as tools to decipher biological processes
PhD Programme in Molecular Biosciences, ITQB, Oeiras, Portugal
February 2015

(Epi)genetic Basis of Sexual Reproduction in Land Plants: A Focus on the Male Gametes
International PhD Programme Plants for Life, ITQB, Oeiras, Portugal
March 2015

How microarrays and deep sequencing transform today's biology
International PhD Programme Plants for Life, ITQB, Oeiras, Portugal
May 2015

Microarrays and deep sequencing as tools to decipher biological processes
BioSys PhD Programme FCUL, Lisboa, Portugal
May 2015

Bettencourt Dias, Mónica
GABBA Programme, Porto, Portugal
April 2015

KITP course
August 2015

Carneiro, Jorge
Statistics and Models for Quantitative Image Analysis
Instituto de Biotechnologia, UNAM, Cuernavaca, Mexico
November, 2015

Castro, Diogo S.
Transcriptional control of vertebrate neurogenesis by Proneural and Notch pathways
GABBA Programme, Porto, Portugal
July 2015

Chaouiya, Claudine
Logical modelling
Cajal Advanced Neuroscience Training "Bioinformatics for the neuroscience", Bordeaux, France
September 2015

Regulatory & signalling network modelling
PhD Programme in Molecular Biosciences, ITQB, Oeiras, Portugal
February 2015

Chelo, Ivo
Experimental evolution: Theory and current practices
Institute de Biologie de l'École Normale Supérieure, Paris, France
November 2015

Duque, Paula
Alternative splicing controls translation efficiency of a membrane transporter to promote plant tolerance to zinc
BioSys PhD Programme FCUL, Lisboa, Portugal
January 2015

Ecophysiology & Plant Interactions
PhD Programme in Molecular Biosciences, ITQB, Oeiras, Portugal
March 2015

Ecophysiology & Plant Interactions
International PhD Programme Plants for Life, ITQB, Oeiras, Portugal
April 2015

Ferreira, Miguel Godinho
From Cells to Organism
ITQB PhD Programme, Oeiras, Portugal
March 2015

Gjini, Erida
Mathematical Modelling for Medicine and Public Health
Evolutionary Medicine, Faculdade de Ciências Médicas, Universidade Nova de Lisboa
April 2015

Jansen, Lars
Chromatin-based epigenetic inheritance: Lessons from the mammalian centromere
Oncology Graduate School Amsterdam, Netherlands Cancer Institute, The Netherlands
May 2015

Mallo, Moisés
The spinal cord
Axonal regeneration module of the GABBA Programme, Porto, Portugal
July 2015

Martins, Gabriel G.
Introduction to Light Microscopy
ITQB PhD Programme, Oeiras, Portugal
April 2015

Considerations about light detection in microscopy
BioSys PhD Programme FCUL, Lisboa, Portugal
March 2015

Mirth, Christen
Theory and Methods in Eco Devo
Multi-level Modelling and Morphogenesis, John Innes Centre, Norwich, UK
July 2015

Nutritional Geometry/ Plasticity and Foraging Behaviour/ Evolution of Foraging Preferences
5th TReND school on Insect Neuroscience and Drosophila *Neurogenetics, Kampala International University (KIU), Tanzania*
August 2015

Phenotypic Plasticity and the Evolution of Polyphenisms
Conceptual and Methodological Foundations of Evolutionary Developmental Biology (Evo-Devo), Venice, Italy
October 2015

Moita Luís Ferreira
Immunology module of the GABBA Programme, Porto, Portugal
March 2015

Parkhouse, Michael
Control de la cisticercosis
Universidad de Cuenca, Ecuador
November 2015

Penha Gonçalves, Carlos
Translational Genomics
Curso Doutoral em Medicina e Curso Doutoral em Mecanismos de Doença e Medicina Regenerativa, Lisboa, Portugal
March 2015

Pereira Leal, José
Bioinformatics
Doctoral Programmes in Bioengineering and in Medicine, Portugal
February 2015

Rebelo, Manuel
Biotério e regulamentação para experimentação animal
Programa de Doutoramento em Ciências da Saúde, Faculdade de Medicina da Universidade de Coimbra, Portugal
October 2015

Rocha, Luís M.
Director of the Complex Networks and Systems PhD Programme at Indiana University, USA

Complex Systems Seminar I
Complex Networks and Systems PhD Programme at Indiana University, USA

Introduction to Informatics
Complex Networks and Systems PhD Programme at Indiana University, USA

Soares, Miguel
Immunology module of the GABBA Programme, Porto, Portugal
March 2015

Course "Advanced Immunology", Institut Pasteur, Paris, France
December 2015

Sobral, Daniel
Introduction to NGS
ITQB PhD Programme, Oeiras, Portugal
February 2015

Tranfield, Erin
Introduction to Electron Microscopy
PhD Programme in Molecular Biosciences, ITQB, Oeiras, Portugal
January 2015

Xavier, Karina B.
Manipulation of the quorum sensing signal AI-2 affects the antibiotic-treated gut microbiota
BioSys PhD programme, FCUL, Lisboa, Portugal
February 2015

6

SEMINARS AND MEETINGS

92
INTERNAL SPEAKERS

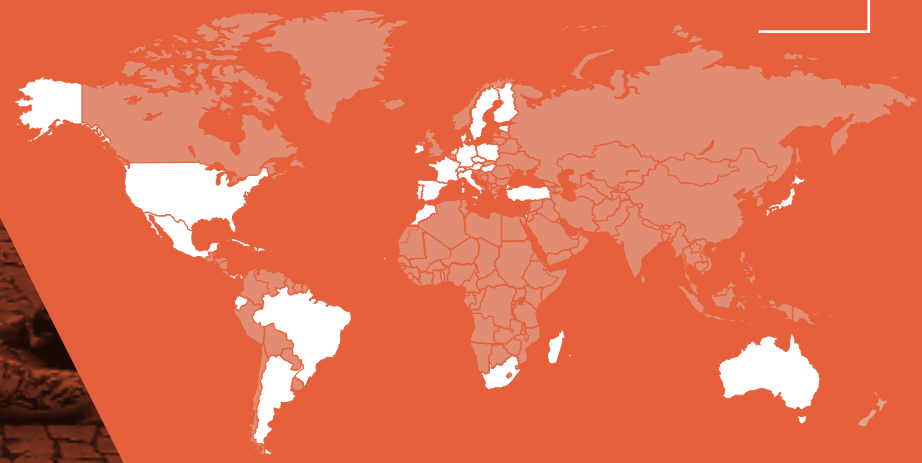
122
EXTERNAL SPEAKERS

PRESENTATIONS BY IGC RESEARCHERS

23
MEETINGS, CONFERENCES AND WORKSHOPS HELD AT THE IGC

53
AT NATIONAL MEETINGS

169
AT INTERNATIONAL MEETINGS



SEMINARS AT THE IGC

2015

JANUARY

Date 07.01
Title **Myosin and actin steer plant cell division**
Speaker Magdalena Bezanilla
Affiliation University of Massachussets, USA

Date 09.01
Title **DNA Evolution and the multi model regress**
Speaker Michael R. Dietrich
Affiliation Department of Biological Sciences, Dartmouth College, USA

Date 09.01
Title **From evolution of excitability in phytoplankton to responses to a changing ocean**
Speaker Colin Brownlee
Affiliation Plymouth Marine Biological Laboratory, UK

Date 13.01
Title **That which does not kill us makes us stronger**
Speaker Luís Moita
Affiliation IGC

Date 14.01
Title **Novel concepts and tools for studying adaptive cell reprogramming in applied systems 'alternative breathing' in Alentejo**
Speaker Birgit Arnholdt Schmitt
Affiliation Instituto de Ciências Agrárias e Ambientais Mediterrânicas, Portugal

Date 20.01
Title **Packing and Gluing DNA molecules for mitosis**
Speaker Raquel Oliveira
Affiliation IGC

Date 21.01
Title IGC PhD Seminars: **CIS Regulatory basis of transcriptional divergence between recent gene duplicates**
Speaker Kohtaro Tanaka
Affiliation IGC

Date 21.01
Title IGC PhD Seminars: **Developmental and paleontological insights into skull bone homology and evolution**
Speaker Rui Castanhinha
Affiliation IGC

Date 23.01
Title **Epithelial polarity and spindle orientation**
Speaker Daniel Saint Johnston
Affiliation Gurdon Institute, UK

Date 26.01
Title **Imaging spatio temporal signaling programs regulating cell morphogenesis**
Speaker Olivier Pertz
Affiliation Department of Biomedicine, University of Basel, Switzerland

Date 27.01
Title **Gut microbiota elicits a protective immune response against malaria transmission**
Speaker Miguel Soares
Affiliation IGC

Date 27.01
Title **Getting in Shape: *in vivo* and *in silico* studies of tissue mechanics in growth control**
Speaker Yanlan Mao
Affiliation MRC Laboratory for Molecular Cell Biology, University College London, UK

Date 28.01
Title IGC PhD Seminars: **Quantitative Centromere Epigenetics**
Speaker Dani Bodor
Affiliation IGC

Date 30.01
Title **Positioning the nucleus in muscle cells**
Speaker Edgar Gomes
Affiliation Instituto de Medicina Molecular, Portugal

FEBRUARY

Date 02.02
Title **Coated vesicle adaptors**
Speaker Margaret Scottie Robinson
Affiliation Cambridge Institute for Medical Research, UK

Date 03.02
Title **Viral entry mechanisms**
Speaker Ari Helenius
Affiliation ETH Zürich, Institute of Biochemistry, Switzerland

Date 05.02
Title **Dynamic karyotype, dynamic proteome: how aneuploidy affects human cells**
Speaker Zuzana Storchova
Affiliation Max Planck Institute of Biochemistry, Germany

Date 10.02
Title **Models for organiser formation: the BMP Chordin interaction for the establishment of the dorsoventral axis from a pattern forming perspective**
Speaker Hans Meinhardt
Affiliation Max Planck Institute for Developmental Biology, Germany

Date 10.02
Title **Artificial selection reveals the costs and benefits of large brain size in a vertebrate**
Speaker Alex Kotrschal
Affiliation University of Stockholm, Sweden

Date 11.02
Title IGC PhD Seminars: **Dissecting the biophysical mechanisms underlying regeneration of complex organs in vertebrates**
Speaker Joana Monteiro
Affiliation IGC

Date 11.02
Title IGC Postdoc Seminars: **Advanced microscopy techniques developed at the Imaging Facility**
Speaker Emílio Gualda Manzana
Affiliation IGC

Date 13.02
Title **The impact of genetic background on the evolutionary path of populations**
Speaker Lília Pefeito
Affiliation IGC

Date 18.02
Title IGC PhD Seminars: **Newborn colonization with *Helicobacter hepaticus* induces long lasting tolerance in mice**
Speaker Rômulo Areal
Affiliation IGC

Date 18.02
Title IGC Postdoc Seminars: **Small but mighty: genetic and phenotypic basis of *Escherichia coli* small colony variants**
Speaker Ricardo Ramiro
Affiliation IGC

Date 23.02
Title **HLA as a biomarker for immunogenicity and update on the two faced T cell epitope: Role of "Self" and "Other" in Vaccines and Therapeutics**
Speaker Annie de Groot
Affiliation Institute for Immunology and Informatics, University of Rhode Island and CEO/CSO EpiVax, Inc., Providence, Rhode Island, USA

Date 24.02
Title **What, how, why? Problems in co evolution**
Speaker Jonathan Howard
Affiliation IGC

Date 25.02
Title IGC PhD Seminars: **Can the transcription factor Nrf2 inhibit Rip3K dependent programmed cell death?**
Speaker Ana Ribeiro
Affiliation IGC

Date 25.02
Title IGC Postdoc Seminars: **Macrophages control tissue homeostasis via Ferritin heavy chain**
Speaker Birte Blankenhaus
Affiliation IGC

Date 25.02
Title **Transcriptional control of cortical stem cell proliferation**
Speaker Jonas Muhr
Affiliation Ludwig Institute for Cancer Research, Karolinska Institute, Sweden

Date 25.02
Title **Career Path in Science**
Speaker Deneen Wellik
Affiliation University of Michigan Medical Center, USA

Date 26.02
Title **A reserve Hox expressing population functions in the adult musculoskeletal system**
Speaker Deneen Wellik
Affiliation University of Michigan Medical Center, USA

Date 27.02
Title **The development of colour**

patterns in fishes: Towards an understanding of the evolution of beauty
Speaker Christiane Nüsslein Volhard
Affiliation Max Planck Institute for Developmental Biology, Germany

MARCH

Date 03.03
Title **A to I RNA editing: New roles for a multifaceted post transcriptional mRNA modification**
Speaker Alekos Athanasiadis
Affiliation IGC

Date 04.03
Title IGC PhD Seminars: **Characterization of stable bacterial communities in laboratory and wild *Drosophila* populations**
Speaker Inês Pais
Affiliation IGC

Date 06.03
Title **Opposing effects of folding and assembly chaperones on evolvability of Rubisco**
Speaker Paulo Durão
Affiliation Max Planck Institute of Biochemistry, Germany

Date 10.03
Title **Regulatory T cells in Systemic Lupus: from phenotyping toward cellular dynamics**
Speaker Constantin Fesel
Affiliation IGC

Date 11.03
Title IGC PhD Seminars: **Short telomeres in key tissues initiate local and systemic aging in zebrafish**
Speaker Madalena Carneiro
Affiliation IGC

Date 13.03
Title **The developmental physiology of body size**
Speaker Fred Nijhout
Affiliation Department of Biology, Duke University, USA

Date 16.03
Title **Early events in type 1 diabetes pathogenesis**
Speaker Dan Holmberg
Affiliation Lund University, Sweden

Date 17.03
Title **Manipulation of the quorum sensing signal AI 2 affects the antibiotic treated gut microbiota**
Speaker Karina Xavier
Affiliation IGC

Date 18.03
Title IGC Postdoc Seminars: **ATM: novel role in the protection against hemolytic conditions?**
Speaker Rita Carlos
Affiliation IGC

Date 18.03
Title IGC PhD Seminars: **Crosstalk between ABA and SnRK1 mediated energy signaling**
Speaker Mattia Adamo
Affiliation IGC

Date 20.03
Title **Of fluorescent sperm in a transparent flatworm: using functional genomics to study sex in a simultaneous hermaphrodite**
Speaker Lukas Scharer
Affiliation University of Basel, Switzerland

Date 24.03
Title **Phenotypic Mosaicism: A new concept on macrophage activation**
Speaker Siamon Gordon
Affiliation University College London, UK

Date 25.03
Title IGC PhD Seminars: **Actin, we have a problem: Cross talk between Src signaling activity and F actin during tumoral transformation**
Speaker Sandra Tavares
Affiliation IGC

Date 25.03
Title IGC Postdoc Seminars: **Loss of telomerase in zebrafish triggers mitochondrial dysfunction**
Speaker Inês Pimenta de Castro
Affiliation IGC

Date 25.03
Title **Career Path in Science**
Speaker Sandra Aresta
Affiliation Institut de Recherche pour le Développement, France

Date 27.03
Title **The interaction of influenza A virus genome with the recycling endosome**
Speaker Maria João Amorim
Affiliation IGC

Date 30.03
Title **Tumor elicited inflammation - how cytokines link immune system and tumor progression**
Speaker Sergei Grivennikov
Affiliation Fox Chase Cancer Center, USA

Date 31.03
Title **Modelling stories illustrating the versatility of the logical formalism**
Speaker Claudine Chaouiya
Affiliation IGC

APRIL

Date 06.04
Title **A lost World**
Speaker Valeria Souza
Affiliation Instituto de Ecología, UNAM, Mexico and University of Minneapolis, USA

Date 07.04
Title **Land plant evolution from the perspective of a tiny moss**
Speaker Jörg Becker
Affiliation IGC

Date 08.04
Title **Mind control in the real world: Parasitic manipulation of behaviour**
Speaker Shelley Adamo
Affiliation Department of Psychology and Neuroscience, Dalhousie University, Canada

Date 08.04
Title IGC PhD Seminars: **Molecular mechanism of cell cycle coupling to centromeric chromatin propagation**
Speaker Ana Stankovic
Affiliation IGC

Date 08.04
Title **Bioinformatics Unit @ IGC**
Speaker Daniel Sobral
Affiliation IGC

Date 09.04
Title **Marine cleaning mutualism: from game theory to endocrinology and cognition**
Speaker Redouan Bshary
Affiliation Institute of Biology, University of Neuchâtel, Switzerland

Date 10.04
Title **Evolution of the social brain**
Speaker Hans Hofmann
Affiliation University of Texas at Austin, USA

Date 15.04
Title IGC PhD Seminars: **Transposable element dynamics in response to environmental perturbation**
Speaker Marta Marialva
Affiliation IGC

Date 15.04
Title IGC Postdoc Seminars: **Transcriptional control of vertebrate neurogenesis by Proneural and Notch pathways**
Speaker Cátia Laranjeira
Affiliation IGC

Date 15.04
Title ITQB IGC Plant Interaction Meeting: **Transcriptome Profiling of Moss Spermatogenesis**
Speaker Marcela Coronado
Affiliation IGC

Date 15.04
Title ITQB IGC Plant Interaction Meeting: **How can a light regulated protein (OsPIF4) be involved in rice root curling?**
Speaker André Cordeiro
Affiliation ITQB

Date 15.04
Title **Glucose sensing in rodent hypothalamus**
Speaker Denis Burdakov
Affiliation The Francis Crick Institute, UK

Date 15.04
Title **Molecular and neuronal basis for nutrient sensing in *Drosophila***
Speaker Monica Dus
Affiliation University of Michigan, USA

Date 16.04
Title **Making and breaking neuromuscular synapses**
Speaker Steven Burden
Affiliation Skirball Institute, Departments of Neuroscience & Cell Biology, NYU School of Medicine, USA

Date 17.04
Title **Mechanisms and function of mitochondrial inheritance in germ line stem cells**
Speaker Ruth Lehmann
Affiliation HHMI, Skirball Institute and Department of Cell Biology, NYU School of Medicine, USA

Date 20.04
Title **Control of microtubule functions by posttranslational modifications: Cell Cycle, Cilia, Neurons**
Speaker Carsten Janke
Affiliation Institut Curie, France

Date 21.04
Title **Characterization of the molecular and neuroendocrine mechanisms triggered by kisspeptins in the brain of male European sea bass (*Dicentrarchus labrax*) related with puberty and fertility**
Speaker Felipe Espigares
Affiliation Department of Fish Physiology and Biotechnology, Institute of Aquaculture of Torre la Sal (IATS), Spanish National Research Council (CSIC), Spain

Date 21.04
Title **Structure, function and dynamics of Type VI secretion system**
Speaker Marek Basler
Affiliation University of Basel Biozentrum, Switzerland

Date 22.04
Title IGC Postdoc Seminars: **Deciphering molecular mechanisms of plasma membrane repair – the unexpected role of Rab3a**
Speaker Marisa Encarnação

Affiliation CEDOC

Date 22.04
Title IGC PhD Seminars: **Melanoma progression requires the activation of telomere maintenance mechanisms**
Speaker Joana Nabais
Affiliation IGC

Date 24.04
Title **Mechanisms of longevity and cancer resistance in long lived rodent species**
Speaker Vera Gorborora
Affiliation Department of Biology, University of Rochester, USA

Date 24.04
Title **From computational model to experimental design and validation: application of logical modelling to the infiltrating proangiogenic monocytes in breast cancer**
Speaker Ioannis Xenarios
Affiliation Vital IT Unil, CIG Lausanne, Switzerland

Date 28.04
Title **Interactomes of multifunctional proteins**
Speaker Christine Brun
Affiliation TAGC Inserm U1090, Université Aix Marseille, France

Date 28.04
Title **Variation and ancestral states in cellular evolution**
Speaker José Pereira Leal
Affiliation IGC

Date 29.04
Title **Hybrid methods as a strategy for predicting the structure of large macromolecular complexes**
Speaker Joanna M. Kasprzak
Affiliation Adam Mickiewicz University & International Institute of Molecular and Cell Biology, Poland

Date 29.04
Title IGC PhD Seminars: **Immunity and colour pattern formation: insights from butterfly wings**
Speaker Maria Adelina Jerónimo
Affiliation IGC

Date 29.04
Title IGC Postdoc Seminars: **Architectural landscape of diverse ciliary functions**
Speaker Swadhin Chandra Jana
Affiliation IGC

Date 30.04
Title **The balance between cell cycle arrest and cell proliferation: Cdk oscillations drive the mammalian cell cycle**
Speaker Albert Goldbeter
Affiliation Université Libre de Bruxelles, Belgium

Date 05.05
Title **Can (big) data help us solve real world problems?**
Speaker Joana Sá
Affiliation IGC

Date 06.05
Title IGC PhD Seminars: **A tale of trunks: how Gdf11/Oct4 interactions control mouse trunk length**
Speaker Rita Aires
Affiliation IGC

Date 06.05
Title IGC Postdoc Seminars: **Bacterial signalling in the gut microbiota**
Speaker Jessica Thompson
Affiliation IGC

MAY

Date 06.05
Title **Springer UpDates**
Speaker Diana Alkema and Adriano Crespo
Affiliation Springer, Portugal

Date 07.05
Title **Facilitating Science: best of both worlds?**
Speaker Rui Gardner
Affiliation IGC

Date 12.05
Title **Different cells count differently: centrosome number and structure regulation in development and disease**
Speaker Mónica Dias
Affiliation IGC

Date 13.05
Title IGC Postdoc Seminars: **The Alzheimer's risk factors Bin1 and CD2AP differentially regulate the endocytic generation of amyloid ?**
Speaker Florent Ubelmann
Affiliation CEDOC

Date 13.05
Title IGC PhD Seminars: **Conquering land: *Physcomitrella* and the genetic basis of key reproductive innovations**
Speaker Marcela Coronado
Affiliation IGC

Date 15.05
Title **The acrosome reaction, a unique exocytotic event key for fertilization**
Speaker Alberto Darszon
Affiliation Instituto de Biotecnología, Universidad Nacional Autónoma de México, México

Date 18.05
Title **Pharmacologic activation of integrin CD11b/CD18 As a novel mechanism to suppress inflammatory injury**
Speaker Vineet Gupta
Affiliation Department of Immunology/Microbiology, Rush University Medical Center, USA

Date 19.05
Title **Frequency dependent selection in *C. elegans*: undisclosed games in the struggle for existence in a Petri dish**
Speaker Ivo Chelo
Affiliation IGC

Date 20.05
Title **Probing transcriptional mechanisms by retro biochemistry and single molecule imaging**
Speaker Robert Tjian
Affiliation University of California, Berkley and Howard Hughes Medical Institute, USA

Date 22.05
Title **The Lagoon, or, how to create a new science**
Speaker Armand Leroi
Affiliation Department of Life Sciences, Imperial College London, UK

Date 25.05
Title **Chromatin dynamics and genomic integrity: Interplay between histone deposition and condensins**
Speaker Marina Murillo
Affiliation Andalusian Centre for Molecular Biology and Regenerative Medicine, Spain

Date 26.05
Title **Dynamic memories: how past experience can shape the future**
Speaker Rosalina Fonseca
Affiliation IGC

Date 27.05
Title IGC PhD Seminars: **p62/SQSTM1 is selectively required for phagosomal maturation of apoptotic cell**
Speaker Inês Santarino
Affiliation CEDOC

Date 27.05
Title IGC Postdoc Seminars: **Variability in centriole number and length is a hallmark of cancer**
Speaker Gaelle Marteil
Affiliation IGC

Date 28.05
Title **The genomics of clinal adaptation in *Drosophila***
Speaker Thomas Flatt
Affiliation Université de Lausanne, Switzerland

Date 29.05
Title **Hybrids of *Saccharomyces* yeast**
Speaker Duncan Greig
Affiliation Max Planck Institute for Evolutionary Biology, Germany

Date 29.05
Title **The evolution of developmental regulation in spiders and flies: diversification of body plans and body parts**
Speaker Alistair McGregor
Affiliation Oxford Brookes University, UK

JUNE

Date 02.06
Title **From mice to snakes: understanding the differences in vertebrate body shape**
Speaker Moisés Mallo
Affiliation IGC

Date 03.06
Title IGC PhD Seminars: **Social life of bacteria: cheating on cheaters prevents the tragedy of the commons**
Speaker Ozhan Oskaya
Affiliation IGC

Date 03.06
Title IGC Postdoc Seminars: **A reporter system to quantify miRNA activity in *Arabidopsis* protoplasts**
Speaker Ana Confraria
Affiliation IGC

Date 04.06
Title **Beyond the schools rankings: measuring and understanding student progression**
Speaker João Oliveira Baptista
Affiliation Direção Geral de Estatísticas de Educação e Estatística, Portugal

Date 05.06
Title **Shedding light on alternative splicing**
Speaker Alberto Kornblihtt
Affiliation Facultad de Ciencias Exactas y Naturales, University of Buenos Aires, Argentina

Date 08.06
Title **Heme mediated diversification of immunoglobulin specificity - mechanism and physiological significance**
Speaker Jordan Dimitrov
Affiliation INSERM UMRS 1138, Centre de Recherche des Cordeliers, France

Date 09.06
Title **Lessons from bloodless worms**
Speaker Iqbal Hamza
Affiliation Department of Animal and Avian Sciences, University of Maryland, USA

Date 09.06
Title **Turning DNA into a molecular shock absorber**
Speaker Kerry Bloom
Affiliation Department of Biology, University of North Carolina at Chapel Hill, USA

Date 09.06
Title **The outside inside: host microbe interactions at the gut interface**
Speaker Luís Teixeira
Affiliation IGC

Date 09.06
Title **New and unexpected aspects of mitotic control**
Speaker Bill Earnshaw
Affiliation Wellcome Trust Centre for Cell Biology, UK

Date 11.06
Title **Insights into RNA interference pathways that control arbovirus replication in mosquito cells**
Speaker Alain Kohl
Affiliation MRC University of Glasgow, Centre for Virus Research, UK

Date 12.06
Title **Trafficking and regulation of Wnt proteins**
Speaker Jean Paul Vincent
Affiliation MRC National Institute for Medical Research, UK

Date 16.06
Title **Shattered tolerance**
Speaker Jorge Carneiro
Affiliation IGC

Date 17.06
Title Career Path in Science Seminars: **Leaving a research career – Hard, challenging, EXCITING!**
Speaker Marta Agostinho
Affiliation EU-LIFE Consortium, CRG-Barcelona, Spain

Date 17.06
Title IGC PhD Seminars: **A 3D kinematic cell motility model to analyze spermatozoan motility in high frame rate imaging data**
Speaker Pedro Silva
Affiliation IGC

Date 17.06
Title ITQB IGC Plant Interaction Meeting: ***Lathyrus cicera*: the first steps of an orphan crop in the omics era**
Speaker Nuno Almeida
Affiliation ITQB

Date 17.06
Title ITQB IGC Plant Interaction Meeting: **Using complementary mass spectrometry strategies to identify new phosphorylation sites in key proteins of C4 photosynthesis in maize**
Speaker Bruno Alexandre
Affiliation ITQB

Date 18.06
Title **EU LIFE alliance: news and views**
Speaker Marta Agostinho
Affiliation EU-LIFE Consortium, CRG-Barcelona, Spain

Date 18.06
Title **Imaging mass cytometry technology and progress in multiparameter assays**
Speaker Vladimir Baranov
Affiliation Fluidigm Corp., Proteomics Division, Canada

Date 19.06
Title **Hearing in *Drosophila* – channels, motors, and opsins**
Speaker Martin Göpfert
Affiliation Dept. Cellular Neurobiology, Schwann Schleiden Centre for Molecular Cell Biology, Germany

Date 19.06
Title **Environmental sensing by innate lymphocytes**
Speaker Henrique Veiga Fernandes
Affiliation Instituto de Medicina Molecular, Portugal

Date 19.06
Title **Neuronal circuits in control of metabolism**
Speaker Jens Brüning
Affiliation Max Planck Institute for Metabolism Research, Germany

Date 23.06
Title **Environmental effects on the generation of genetic and phenotypic variation**
Speaker Patrícia Beldade
Affiliation IGC

Date 24.06
Title IGC Postdoc Seminars: **Ssu72 phosphatase regulates telomere length in *S. pombe***
Speaker Jose Escandell
Affiliation IGC

Date 25.06
Title **Moving beyond the parts list of the centrosome**
Speaker Elif Nur Firat Karalar
Affiliation Koç University, Turkey

Date 26.06
Title **Sex allocation in haplodiploids: conflict by the sexes, for the sexes**
Speaker Sara Magalhães
Affiliation Faculdade de Ciências, Universidade de Lisboa, Lisboa

Date 30.06
Title **Aftermath of inflammation in liver and in the placenta**
Speaker Carlos Penha Gonçalves
Affiliation IGC

JULY

Date 01.07
Title IGC Postdoc Seminars: **Influenza A virus infection "Stalls" sorting of recycling endosomes**
Speaker Sílvia Costa
Affiliation IGC

Date 01.07
Title IGC Postdoc Seminars: **Physical characterization of nuclear movement in the preblastoderm embryo of *Drosophila melanogaster***
Speaker Jorge Carvalho
Affiliation IGC

Date 03.07
Title **Evolution of *Mycobacterium tuberculosis* at three spatio temporal scales**
Speaker Francois Balloux
Affiliation University College London, UK

Date 07.07
Title **Network Science Delivers: from fact checking to understanding biochemical control and collective behaviour in human pathology**
Speaker Luís Rocha
Affiliation IGC

Date 09.07
Title **Centrioles and primary cilia: mechanisms and functional consequences**
Speaker Lukas Cajanek
Affiliation Faculty of Medicine, Masaryk University, Czech Republic

Date 09.07
Title **The role of plant ABC transporters in plant hormone transport**
Speaker Enrico Martinoia
Affiliation University of Zurich, Switzerland

Date 10.07
Title **Integrated analysis of anti fungal innate immunity in *C. elegans***
Speaker Jonathan Ewbank
Affiliation Centre d'Immunologie de Marseille Luminy, France

Date 13.07
Title **Joubert syndrome and related ciliopathies: a paradigm to understand the concept of splitting and lumping in mendelian disorders**
Speaker Enza Maria Valente
Affiliation Neurogenetics Unit, CSS Mendel Institute & Dept. of Medicine and Surgery, University of Salerno, Italy

Date 13.07
Title **How bacteria distinguish self from other**
Speaker Bonnie L. Bassler
Affiliation Princeton University and Howard Hughes Medical Institute, USA

Date 21.07
Title **Autoimmune diseases, beyond immune tolerance and within disease tolerance**
Speaker Jocelyne Demengeot
Affiliation IGC

Date 24.07
Title **Living in a microbial world: Deciphering the molecular language of partnership**
Speaker Margaret McFall Ngai
Affiliation Pacific Biosciences Research Center, University of Hawai'i at Manoa, USA

Date 28.07
Title **Short telomeres trigger local and systemic aging in zebrafish**
Speaker Miguel Godinho Ferreira
Affiliation IGC

Date 31.07
Title **Altering microbiota affects disease risks in humans**
Speaker Martin Blaser
Affiliation New York University Langone Medical Center, USA

SEPTEMBER

Date 01.09
Title **"You're in pretty good shape, for the shape you're in.": Reflections on the past 5 years in the Development, Evolution and the Environment lab**
Speaker Christen Mirth
Affiliation IGC

Date 08.09
Title **Trafficking control in the secretory pathway**
Speaker Colin Adrain
Affiliation IGC

Date 09.09
Title IGC PhD Seminars: **The correct cues can directly regulate pollen tube growth through plant specific anion transporters the GABA effect**
Speaker Patrícia Gonçalves
Affiliation IGC

Date 11.09
Title **The piRNA pathway in the *Drosophila* ovary: a small RNA based genome immune system**
Speaker Julius Brennecke
Affiliation IMBA Institute of Molecular Biotechnology, Austria

Date 15.09
Title **Cell competition and T cell acute lymphoblastic leukemia**
Speaker Vera Martins
Affiliation IGC

Date 16.09
Title IGC PhD Seminars: **Modelling thyroid cancer in zebrafish**
Speaker Ana Almeida
Affiliation IGC

Date 16.09
Title IGC Postdoc Seminars: **Growth blocking peptides as nutrition sensitive signals for insulin secretion and body size regulation**
Speaker Takashi Koyama
Affiliation IGC

Date 16.09
Title ITQB IGC Plant Meeting: **Regulation of gene expression by RNA secondary structures**
Speaker Dora Szakonyi
Affiliation IGC

Date 16.09
Title ITQB IGC Plant Meeting: **Sumoylation represses SnRK1 dependent energy signaling in *Arabidopsis***
Speaker Leonor Margalha
Affiliation IGC

Date 17.09
Title **Transparent publishing: how to share reproducible data**
Speaker Bernd Pulverer
Affiliation The EMBO Journal, Germany

Date 18.09
Title **A quantitative geometric description of atomic cell behaviours during animal embryogenesis sheds light on tissue morphogenesis and cell fate specification**
Speaker Patrick Lemaire
Affiliation Centre de Recherche de Biochimie Macromoléculaire, France

Date 22.09
Title **Behavioural and evolutionary ecology of social cognition: experimental approaches in zebrafish**
Speaker Rui Oliveira
Affiliation IGC

Date 23.09
Title IGC PhD Seminars: **Tackling the enigmatic role of condensin I : sister chromatids resolution or structural enforcement?**
Speaker Ewa Piskadlo
Affiliation IGC

Date 23.09
Title IGC Postdoc Seminars: **An *Arabidopsis* splicing factor confers salt stress tolerance to germinating seeds and regulates genes involved in photosynthesis, retrotransposition and stress response**
Speaker Dale Richardson
Affiliation IGC

Date 25.09
Title **Stress induced mutagenesis in bacteria**
Speaker Ivan Matic
Affiliation L'Université Paris Descartes, France

Date 29.09
Title **Quantifying natural colour patterns**
Speaker Filipa Alves
Affiliation IGC

Date 30.09
Title IGC PhD Seminars: **Are there Rab GTPases in Archaea?**
Speaker Jaroslaw Surkont
Affiliation IGC

Date 30.09
Title IGC Postdoc Seminars: **Genomic dynamics in *Bacillus subtilis*, patterns of niche adaptation and domestication**
Speaker Patrícia Brito
Affiliation IGC

OCTOBER

Date 02.10
Title **Self organisation processes: from the cell to marine ecosystems**
Speaker Eric Karsenti
Affiliation EMBL, Germany

Date 05.10
Title **Global and targeted DNA demethylation during iPSC reprogramming**
Speaker Inês Milagre
Affiliation Babraham Institute, UK

Date 06.10
Title **Cytoskeletal regulators link cell stiffness to Src dependent tumour growth**
Speaker Florence Janody
Affiliation IGC

Date 07.10
Title **Biology of mammalian prions**
Speaker Adriano Aguzzi
Affiliation Institute of Neuropathology, University Hospital of Zürich, Switzerland

Date 07.10
Title **How to get published in Nature Communications**
Speaker Vera Domingues
Affiliation Nature Communications, UK

Date 08.10
Title **Regulation and function of the SnRK1 energy sensing kinase**
Speaker Filip Rolland
Affiliation Molecular Plant Biology, KU Leuven, Belgium

Date 08.10
Title Career Path in Science Seminar: **Becoming a Manuscript Editor**
Speaker Vera Domingues
Affiliation Nature Communications, UK

Date 09.10
Title **SUMO unchained: How SUMO proteases and specific ubiquitin ligases control SUMO modified forms of proteins reproductive innovations**
Speaker Jürgen Dohmen
Affiliation Institute for Genetics University of Cologne, Germany

Date 09.10
Title **Novel approaches to aging: senescence and reprogramming**
Speaker Manuel Serrano
Affiliation Spanish National Cancer Research Centre (CNIO), Spain

Date 12.10
Title **Joining the online conversation how to use social media to communicate your science**
Speaker Catarina Vicente
Affiliation Node & Online editor, Development, UK

Date 13.10
Title **Lean on Body Neurons**
Speaker Ana Domingos
Affiliation IGC

Date 14.10
Title IGC PhD Seminars: **Impact of Galalpha1 3Galbeta1 4GlcNAc R (alpha gal) expression on host microbe interactions**
Speaker Sumnima Singh
Affiliation IGC

Date 14.10
Title IGC Postdoc Seminars: **Regulation of gene expression by RNA secondary structures**
Speaker Dora Szakonyi
Affiliation IGC

Date 16.10
Title **Vacuolar rupture caused by invasive bacterial pathogens causes and consequences**
Speaker Jost Enninga
Affiliation Institut Pasteur, Paris

Date 20.10
Title **Natural selection in the bacteria: the death and resurrection of a gene in the mouse intestine**
Speaker Isabel Gordo
Affiliation IGC

Date 21.10
Title IGC PhD Seminars: **Premature sister chromatid separation is poorly detected by the spindle assembly checkpoint due to system level feedbacks**
Speaker Mihailo Mirkovic
Affiliation IGC

Date 22.10
Title **Deregulation of circadian time and its correlation with tumour progression**
Speaker Angela Relógio
Affiliation Institute for Theoretical Biology, Germany

Date 22.10
Title **Anion transport in lysosomal function and cell volume regulation – from biophysics to physiology**
Speaker Tobias Stauber
Affiliation Institute of Chemistry and Biochemistry, Freie Universitaet Berlin, Germany

Date 23.10
Title **Touch me, Touch me not: variation in social interactions in fruit flies**
Speaker Frederic Mery
Affiliation CNRS, Gif sur Yvette, France

Date 27.10
Title **Nuclear Positioning 2.0 : *Drosophila* early embryogenesis under a new light**
Speaker Ivo Telley
Affiliation IGC

Date 30.10
Title **Mechanisms of asymmetric cell division**
Speaker Yves Barral
Affiliation Institute of Biochemistry, ETH Zurich, Switzerland

NOVEMBER

Date 03.11
Title **On the importance of being structured: coalescence rates and human evolution: Lessons for inference of ancestral population sizes?**
Speaker Lounès Chikhi
Affiliation IGC

Date 06.11
Title **Reshaping optical imaging through advances in fluorescence and optoacoustic methods**
Speaker Vasilis Ntziachristos
Affiliation IBMI, Helmholtz Zentrum München, Germany

Date 06.11

Title **Before, during and after the storm: The return of CD28 superagonist therapy to clinical development**
Speaker Thomas Hünig
Affiliation Institute for Virology and Immunobiology, Germany

Date 10.11
Title **Transcription control of vertebrate neurogenesis by Ascl1/Mash1**
Speaker Diogo Castro
Affiliation IGC

Date 11.11
Title IGC PhD Seminars: **Socially driven changes in neural and behavioural plasticity in zebrafish**
Speaker Magda Teles
Affiliation IGC

Date 11.11
Title IGC Postdoc Seminars: **Functional tetraspanin associations in sperm cells and their relevance in double fertilization**
Speaker Leonor Boavida
Affiliation IGC

Date 13.11
Title **Exploring a mutualism: The transmission mechanisms and the role of *Wolbachia* endosymbionts in a human parasite, the filarial nematode**
Speaker Frederic Landmann
Affiliation Centre de Recherche de Biochimie Macromoléculaire, France

Date 13.11
Title **Frataxin knockdown in *Drosophila* alters mitochondrial homeostasis and degradation in muscles and glia**
Speaker Juan Navarro
Affiliation Institut für Zoologie, Universität Regensburg, Germany

Date 16.11
Title **Cell polarity and pheromone gradient tracking in yeast**
Speaker Daniel Lew
Affiliation Duke University School of Medicine, USA

Date 17.11
Title **Plant SnRK1 kinases are novel components of abscisic acid signaling**
Speaker Elena Baena
Affiliation IGC

Date 17.11
Title **Past, Present and Future of Science Publishing: How the scientific community has failed to use the Internet to improve the ways we communicate with each other and the public, and how we can fix it**
Speaker Michael Eisen
Affiliation University of California Berkeley, USA

Date 18.11
Title **Activation of enhancer activity in the *Drosophila* embryo**
Speaker Michael Eisen
Affiliation University of California Berkeley, USA

Date 20.11
Title **Recent concepts on the role of DNA damage and the ubiquitin system in the regulation of the innate immune system**
Speaker Nelson Gekara
Affiliation Molecular Infection Medicine Sweden, Nordic EMBL Partnership for Molecular Medicine, Sweden

Date 24.11
Title **An *Arabidopsis* RNA binding protein conferring seed tolerance to drought and salt stress during germination**
Speaker Paula Duque
Affiliation IGC

Date 25.11
Title IGC PhD Seminars: **Adaptive immunity increases the pace and predictability of evolutionary change in commensal gut bacteria**
Speaker João Batista
Affiliation IGC

Date 25.11
Title IGC Postdoc Seminars: **iRhom, the tumor necrosis factor converting enzyme (TACE) trafficking regulator, is stabilized in response to PMA**
Speaker Miguel Cavadas
Affiliation IGC

Date 27.11
Title **What does mathematics have to do with cancer research?**
Speaker Simon Tavaré
Affiliation Cancer Research UK Cambridge Institute, University of Cambridge, UK

DECEMBER

Date 01.12
Title **DNA damage response independent protection against sepsis**
Speaker Luis Moita
Affiliation IGC

Date 04.12
Title **Engineering nitrogen fixing symbiotic associations in cereals**
Speaker Giles Oldroyd
Affiliation Department of Cell & Developmental Biology, John Innes Centre, UK

Date 09.12
Title IGC Postdoc Seminars: **Functional genomics of neurogenesis: A crosstalk between Notch/RBPJ and Ascl1 transcriptional pathways**
Speaker Alexandre Raposo
Affiliation IGC

Date 09.12
Title IGC Postdoc Seminars: **Early programming of the oocyte epigenome temporally controls late prophase I chromosome activity**
Speaker Paulo Navarro Costa
Affiliation IGC

Date 09.12
Title ITQB IGC Plant Interaction Meeting: **Characterization of bHLH transcription factors of the key C4 photosynthetic enzyme NADP ME**
Speaker Ana Rita Borba
Affiliation ITQB

Date 09.12
Title ITQB IGC Plant Interaction Meeting: **Different cells count differently: centrosome number and structure regulation in development and disease**
Speaker Tiago Jorge
Affiliation IGC

Date 11.12
Title **A mechanism of DNA double strand break repair by transcript RNA**
Speaker Francesca Storici
Affiliation School of Biology, Georgia Institute of Technology, USA

Date 14.12
Title **Responsible Research and Innovation (RRI) in practice: agendas, processes and outcomes**
Speaker Carlos Catalão
Affiliation Agência Nacional para a Cultura Científica Ciência Viva, Portugal

Date 14.12
Title **From Nature to the Lab: a story with five chapters and twenty years told in forty minutes**
Speaker Margarida Matos
Affiliation Centre for Ecology, Evolution and Environmental Changes, Portugal

Date 14.12
Title **Lining up the 'omics: a multi level approach to understanding local adaptation in saker falcons**
Speaker Michael Bruford
Affiliation School of Biosciences, Cardiff University, UK

Date 15.12
Title **Biogeographic origins and patterns of diversification in the amphibians and reptiles (and other vertebrates) of Madagascar**
Speaker Miguel Vences
Affiliation Division of Evolutionary Biology, Technical University of Braunschweig, Germany

Date 15.12
Title **Intracellular endosymbiont selection contributes to *Drosophila* adaptation to viral infection**
Speaker Élio Sucena
Affiliation IGC

Date 15.12
Title **Dry forest, biodiversity and vicariance**
Speaker Lucienne Wilmé
Affiliation Madagascar Research & Conservation Programme, Madagascar

Date 16.12
Title IGC Postdoc Seminars: **Centrosomes in cancer: when we have one too many**
Speaker Carla Lopes
Affiliation IGC

Date 16.12
Title IGC Postdoc Seminars: ***Escherichia coli* adaptation to the mouse gut – mimicking nature**
Speaker Nelson Frazão
Affiliation IGC

Date 17.12
Title **Collagen export from the endoplasmic reticulum**
Speaker António Santos
Affiliation CRG-Barcelona, Spain

Date 17.12
Title **The plant lytic vacuole: space filler, garbage bag, or something more interesting?**
Speaker Dale Sanders
Affiliation Department of Metabolic Biology, John Innes Centre, UK

Date 17.12
Title **BioID-ing the human centrosome cilium interface**
Speaker João Gonçalves
Affiliation The Lunenfeld Tanenbaum Research Institute, Canada

Date 18.12
Title **Regulators of inflammatory responses**
Speaker Thirumala Devi Kanneganti
Affiliation Department of Immunology, St. Jude Children's Research Hospital, USA

CONFERENCES & MEETINGS AT THE IGC

2015

TRAFFIC CLUB

Traffic club brings together several groups of the CEDOC and the IGC to discuss projects and review literature on the topic.

Organiser: Maria João Amorim (IGC)

PLANT INTERACTIONS MEETING

Monthly meetings amongst plant groups in the Oeiras campus. These meetings are organised monthly to promote interactions amongst plant research groups in the Oeiras Campus and beyond. Two talks with their respective Q&A sessions are followed by an informal gathering for further discussion.

Organisers: Ana Confraria (IGC) and Tiago Lourenço (ITQB)

CAREER PATH IN SCIENCE SEMINAR SERIES AT IGC

Regularly throughout the year, well-established invited scientists give an informal seminar based on their personal experience in terms of career options and challenges. The talks last approximately for one hour and are accompanied by drinks and snacks. In 2015 we had seminars given by scientists in academics, facilities, science editors, science administration, and other alternative careers in science.

Organisers: Karina Xavier and Postdoc Committee

FCT R&D PROJECTS IN ALL SCIENTIFIC DOMAINS CALL 2014 - HOW TO APPLY

JANUARY 12

The *FCT Projects on R&D in all Scientific Domains* national call for funds can provide researcher with up to 200.000 Euros funding for a maximum of 36 months research project. This work session aims to inform and guide potential applicants (PI & postdoctoral fellows) into the insights of the application procedure and online-forms, hopefully providing advice for future success. A total of 35 potential applicants attended this session.

Organisers: Research Funding Affairs Unit (Speaker: Sheila Vidal)

WORKSHOP ON "IMPROVING SKILLS TO BETTER COMMUNICATE WITH LAY AUDIENCES"

FEBRUARY 20 AND 27

The main aim of this workshop is to improve the communication skills of postdoctoral fellows when addressing lay audiences. Some strategies and tips were discussed, together with written and oral exercises. A total of 11 postdoctoral fellows attended this workshop, which is included in the Postdoctoral Workshop Series: *Skills and tools to improve your career.*

Organisers: Science Communication Unit and Postdoctoral committee (Speakers: Ana Mena and Inês Domingues)

WORKSHOP ON "ADVICE AND TIPS TO IMPROVE YOUR CV"

MARCH 6 AND 13

This workshop aim is to provide advices and tips in a practical setting to help young researchers to compose a more effective and tailored scientific CV. A scientific *Curriculum Vitae* is the most common communication tool used to self-marketing expertises when applying for academic/ research jobs, fellowships or grants. A total of 12 postdoctoral fellows attended this workshop, which is included in the Postdoctoral Workshop Series: *Skills and tools to improve your career.*

Organisers: RFA Unit and Postdoc Committee (Speakers: Sheila Vidal and Teresa Costa)

MOUSE MICROBIOTA: GENOTYPE-PHENOTYPE CONTROL AND TECHNOLOGICAL CHALLENGES

MARCH 26-27

Dissecting the dialogue between the host and its microbiota is an essential element of modern organism-centred Biology. Understanding this complex relationship requires specific equipment and skills. In this workshop, it was reviewed some of the most advanced findings addressing the interaction of the microbiota and mouse genotypes to produce a range of phenotypes. Also, infrastructure needs and experimental strategies required for the development of this thriving research field were discussed. This workshop brought together 12 speakers and 70 participants.

Organisers: Jocelyne Demengeot and Joana Bom

Sponsors: EU-FP7 (Infrafrontier 3I consortium), Ultragen, Orm

WORKSHOP ON "FUNCTIONAL NEUROANATOMY OF FISH: MAPPING BEHAVIOURAL AND INTERNAL STATES INTO THE BRAIN"

APRIL 10-11

The main aim of this workshop was to bring together researchers working on fish behavioural neuroscience with an interest in mapping behavioural and internal states into underlying brain circuits. Three key questions were addressed: (1) How to establish brain homologies between different species? (2) How to quantify relevant behaviours and internal states in order to map them into specific brain areas? (3) How to visualize brain activity in relation to behaviour?

Organisers: Rui F. Oliveira (IGC) and Lars Ebbesson (Univ. Bergen, Norway)

Sponsors: FP7-COPEWELL Project, European Commission

HOW TO APPLY TO THE 2015 FCT CALL FOR INDIVIDUAL FELLOWSHIPS

APRIL 20

Annually FCT open calls to fund PhD or postdoc fellowships. This session aims to inform and guide potential applicants on how to apply to the 2015 FCT Call for Doctoral (BD) and Postdoctoral fellowship (BPD) hopefully providing advice for future success. We intent to clarify questions and help to solve specific regarding procedures, online-forms, rules and give some tips and numbers to help potential candidates to be more successful. A total of 22 potential applicants attended this session.

Organisers: Research Funding Affairs Unit (Speaker: Teresa Costa)

FLOW CYTOMETRY: FUNDAMENTALS AND APPLICATIONS

APRIL 20-24

The workshop, aimed at both experienced and inexperienced researchers, covered the fundamentals of Flow Cytometry, focused on the main applications run at the IGC. Topics included Planning a Flow Experiment, Cell Dynamics (cell death, cell cycle, proliferation), Multicolour Flow, Small Particle analysis, High Throughput Flow, Cell Sorting as well as Data Analysis and Publishing.

Organisers: Flow Cytometry Facility/Enzifarma

Sponsors: Enzifarma

SYMPOSIA IN CELL DIVISION

MAY 18

Seminars by Peter Lenart, Florence Janody, Isabel Vernos, Marie Helene Verlhac, Edgar Gomes.

Organisers: Mónica Bettencourt Dias

Sponsors: EMBL

H2020 INFORMATIVE SESSION: 2015 MARIE S. CURIE INDIVIDUAL FELLOWSHIPS

JUNE 4

The Marie Sklodowska-Curie Individual Fellowships support 1 to 2 year postdoctoral research involving mobility within and beyond Europe. The aim of this informative session is to guide potential candidates through the general conditions and rules of this call. Special attention will be given to the eligibility rules, typical activities expected to be developed during the postdoctoral training and the evaluation criteria. A total of 11 potential applicants attended this session.

Organisers: Research Funding Affairs Unit (Speaker: Teresa Costa)

CAREER DEVELOPMENT WORKSHOP FOR YOUNG PRINCIPAL INVESTIGATORS. GERM STORIES – FIVE DECADES IN MICROBIOLOGY, SCENE II

JUNE 8-10

This master course included a 3 day-lecture series aimed at young principal investigators to reflect about the development scientific careers. The 3 main topics covered included: I - Building and Leading a Research Group; II - Scientific Writing and Publishing; III - What research is worth doing? 16 young principal investigators from ITQB and IGC attended the course.

Organisers: Karina Xavier (IGC), Raquel Sá-Leao (ITQB), Roberto Kolter (Havard)

FORECASTING EVOLUTION?

JULY 8 – 11

Evolutionary biology is changing its focus from reconstructing history to predicting future processes. For a number of systems, quantitative prediction methods have emerged recently or will be available in the near future. These include parallel evolution experiments with microbes, viral evolution and epidemiology, somatic evolution of cancer and cancer therapy, and evolutionary ecology. This meeting brings together experts on all of these areas to discuss what is, what may become, and what is not predictable in evolution.

Organisers: Isabel Gordo (IGC), Michael Lässig (University of Cologne) and Ville Mustonen (Wellcome Trust Sanger Institute)

Sponsors: DFG, Wellcome Trust, Instituto Gulbenkian de Ciência

EUROPEAN SUMMER SCHOOL "HOST-MICROBE SYMBIOSES – OLD FRIENDS AND FOES"

JULY 19- AUGUST 1

In the Summer School "Host-microbe symbioses – old friends and foes" we explored the stable host-microbe interactions as a spectrum from parasitic to mutualistic. It is becoming clear that most animals and plants associate with microbes during their life and that these greatly influence host biology. During this two-weeks course we explored this field with leading scientists that bring a broad range of expertise and approaches. The Summer School was targeted at second or later years PhD students. The main aim of this course was to help the students define their future research interests. 34 PhD students of 17 different nationalities attended the course and by 14 invited speakers.

Organisers: Karina Xavier (IGC), Luis Teixeira (IGC)

Sponsors: Volswagen Foundation, Calouste Gulbenkian Fundation and Câmara Municipal de Oeiras

EMBO PRACTICAL COURSE ON MEASURING INTRA-SPECIES DIVERSITY USING HIGH-THROUGHPUT SEQUENCING

JULY 27 – 31

This EMBO Practical Course aimed to show evolutionary biologists and population geneticists the potentials and perils of using high throughput sequencing to estimate intra-specific genetic diversity, from individuals to populations. Participants had the opportunity to interact with experienced researchers that have successfully applied the technology in a wide variety of high impact studies, and learn from their successes as well as from their failures. Participants listened to theoretical lectures and practiced some of the techniques used in those high impact studies.

Organisers: Daniel Sobral, Pedro Fernandes, Jeffrey Barrick

Sponsors: EMBO

FIRST EMBO OBESITY SECTORIAL MEETING

AUGUST 8-10

The 1st EMBO Obesity Sectorial Meeting brought together EMBO Young investigators with an interest in Obesity research.

Organiser: Ana Domingos

Sponsors: EMBO

IGC'S PRACTICAL COURSE ON ANIMAL HANDLING AND EXPERIMENTATION IN MICE AND ZEBRAFISH

SEPTEMBER 29 – OCTOBER 2

People working with laboratory animals need to be trained and educated, and the acquired competence evaluated. This course is directed to users of Animal House Facilities that need to be licensed by DGAV (Direção Geral de Alimentação e Veterinária) in order to work with animals. The objective of the course is to present principles that are essential for the humane use and care of vertebrate laboratory animals and for the quality of research

Organisers: Ana Sofia Leocádio, Manuel Rebelo and Jocelyne Demengeot

Sponsors: Ultragene and Tecniplast

SUPER-RESOLUTION MICROSCOPY IN INFECTION AND IMMUNITY SYMPOSIUM

OCTOBER 21 - 22

Microscopy has been a major driving force in Cell Biology. Its inception in the 16th century led to the first 'wave of discovery' - the finding and comprehension of cells and their internal structure. However, the intrinsic limitations of light microscopes prevent the accurate resolution of structures smaller than 300 nm. It took 3 centuries to achieve a second 'wave of discovery' - the development of Electron Microscopes (EM) able to overcome this limit, offering a new view into the realm of small biological complexes, such as Viruses. We are now at the forefront of a third 'wave of discovery' brought about by the recent development of Super-Resolution light microscopy – a range of methods that approach the resolution of EM with the added capability of live cell imaging and molecule-specific labelling. Super-Resolution microscopy promises exciting new insights into how pathogens penetrate into host cells and what mechanisms contribute towards their survival and escape from immune detection.

Organisers: Helena Soares (IGC & CEDOC), Mariana Pinho (ITQB), Nuno Moreno (IGC) and Ricardo Henriques (UCL)

Sponsors: Ibidi, zeiss, svi, Nikon,Hamamatsu, FEI, Cirklo, Innova, MTBrandao, Chroma, ASI, Andor, Monocomp, Picoquant, Leica, MCL

EURAXESS ROADSHOW 2016

OCTOBER 28

This tour was a pan-European information campaign organised by Euraxess that visited 34 European cities in 16 countries, targeted at students and young researchers, to raise awareness of the Euraxess network in the assistance of researcher mobility. The IGC was chosen as the "Lisbon stop". Other than IGC researchers, we received around 50 visitors from the Lisbon area– mainly final-year university students. Activities included some outdoor activities as well as workshops and seminars that counted on the presence of high authorities of the FCT and the IGC as well as interventions from IGC members as well as other local research institutions such as the ITQB, the Champalimaud Foundation and the UNL.

Organisers: Local Organiser for Euraxess: Greta Martins

Sponsors: European Commission, Euraxess

"WORKSHOP: FUNDING OPPORTUNITIES" UNDER THE SCOPE OF THE EURAXESS ON TOUR 2015 AT THE IGC

OCTOBER 28

Sooner than expected, young researchers have to spend a large part of their time communicating their scientific ideas to funding agencies to obtain the necessary funds to carry out research and progress in their academic careers. The aim of this workshop is to raise a better understanding of the international funding environment. In addition, it also intends to guide on the insights of the most well-known international funding opportunities sponsoring highest quality young research.

Organisers: Admin Team Unit and RFA Unit (Speaker: Sheila Vidal)

SECOND JOINT POSTDOC RETREAT (IGC/ITBQ/IBET/CF/IMM)

NOVEMBER 4-6

This meeting served to gather postdoctoral researchers from the Lisbon Area to promote scientific collaboration and career development. The meeting included: i) a debate with leaders from the research institutes on the future of the postdoc in the scientific community, ii) an interactive scientific exchange round-table presentation, iii) a full-day workshop on professional development and career options, iv) Q&A discussion panels on perspectives of successful young investigators, v) a final session on entrepreneurship and start-up companies with invited speakers from Portuguese companies in the area of medical science and biotechnology, vi) various social activities.

Organisers: IGC Postdoc Committee together with representatives of the other institutions

Sponsors: FCT, Setúbal city hall and the following companies: TebuBio, STABvida, NZYtech, Beckman Coulter Genomics, Soquimica, Enzymatic, Solitica, Dias de Sousa, SantaCruz

FIRST SCIENTIFIC MEETING OF AFRICAN AND TIMORESE GRADUATED STUDENTS

DECEMBER 17

This mini-symposium gathered the African and Timorese students community that is conducting a PhD thesis in Portugal, aiming at sharing scientific knowledge. Renowned scientists, such as Dale Sanders, Director of John Innes Research Institute (UK), and the Nobel laureate Craig Mello (University of Massachusetts, USA) participated in this event, interacting with the students. About 40 students from three different programmes (PGCD, Gulbenkian Fellowships, and Programa Ciência Global of Fundação para a Ciência e a Tecnologia) attended this symposium.

Organisers: Joana Gonçalves-Sá (PGDB)

PRESENTATIONS BY IGC RESEARCHERS

2015

AT INTERNATIONAL MEETINGS AND SEMINARS

Adrain, Colin

Trafficking control of ADAMs, key regulators of inflammation and cell fate decisions
Czech Academy of Sciences
Prague, Czech Republic
October 2015

Alves, Filipa

Quantifying and modelling patterned cell fate determination
John Innes Centre
Norwich, UK
October 2015

Amorim, Maria João

Influenza A virus infection "stalls" sorting of recycling endosomes
Gordon Research Conferences
Girona, Spain
June 2015

Baena-González, Elena

Regulation of SnRK1 signalling by SUMOylation
Max Planck Institute of Molecular Plant Physiology
Golm, Germany
February 2015

Regulation of SnRK1 signaling by SUMOylation
Max Planck Institute for Molecular Plant Breeding
Cologne, Germany
May 2015

Energy signaling: connecting environmental stress and plant growth
University of Utrecht
Utrecht, The Netherlands
June 2015

Regulation of SnRK1 kinases: a first step towards linking environmental stress and plant growth
Julius-Maximilians-Universität Würzburg
Würzburg, Germany
July 2015

Energy signaling: connecting environmental stress and plant growth
University of Turku
Turku, Finland
September 2015

Becker, Jörg

Evolution of Sexual Reproduction in Plants (EVOREPRO)
ERA-CAPS 2nd Grant Holders Workshop
Lisboa, Portugal
May 2015

A NOT so simple change of fate: NOT1 as a major regulator of late gametophyte maturation
University of Zurich, Institute of Plant Biology
Zurich, Switzerland
May 2015

Reshaping the (epi)genetic landscape of the male gametophyte for genome stability and transgenerational inheritance
Fisiología Vegetal 2015
Toledo, Spain
June 2015

A transcriptome atlas of Physcomitrella patens provides insights into the evolution and development of land plants
Moss 2015
Cancun, Mexico
December 2015

Beldade, Patrícia

Eco-evo-devo: mechanisms underlying variation & diversity in adaptive traits
Turkish Evolution Conference
Ankara, Turkey
February 2015

Bettencourt Dias, Mónica

Evolutionary Cell Biology
March 2015

Janelia Farm
USA
March 2015

Szeged, Hungary
June 2015

Vienna Biocenter
Vienna, Austria
June 2015

Physics of Life Sciences
Cambridge, UK
September 2015

Cytoskeleton Meeting
Cologne, Germany
September 2015

EMBO Cell Cycle meeting
Baeza, Spain
October 2015

EMBO members meeting
Heidelberg, Germany
October 2015

Boavida, Leonor

Functional Tetraspanin associations in sperm cells and their relevance in double fertilization
EMBO Signaling in Plant Development
Brno, Czech Republic
September 2015

Braga Areal, Rômulo

Newborn colonization with *Helicobacter hepaticus* induces long lasting tolerance in mice
RIKEN IMS Summer Programme (RISP)
Yokohama, Japan
June 2015

Brito, Patrícia

Genomic dynamics in *Bacillus subtilis*, patterns of niche adaptation and domestication
8th International conference on gram-positive microorganisms; 18th international conference on Bacilli
Tuscany, Italy
June 2015

Cardoso, Sara

Brain transcriptome analysis of alternative reproductive tactics in a blenniid fish
2015 J.B. Johnston Club for Evolutionary Neuroscience Annual Meeting
Chicago, USA
October 2015

Carneiro, Madalena

Molecular signatures of aging in telomerase mutant zebrafish
Fusion Conferences - Interventions in Aging
Cancun, Mexico
February 2015

Carvalho, Inês

Using habitat modelling to identify hot spots for cetaceans off São Tomé Island (*São Tomé and Príncipe*) – Implications for conservation
29th European Cetacean Society Conference
Malta
March 2015

The biology of a myth: how historical sources help explaining patterns of cetaceans occurrence
Oceans Past V Conference
Tallinn, Estonia
May 2015

Carvalho, Jorge

Space constraints in mitosis
10th European Biophysics Congress
Dresden, Germany
July 2015

Castro, Diogo

Ascl1/Mash1 coordinately regulates gene expression and the chromatin landscape during neurogenesis
ISSCR 2015 Annual Meeting
Stockholm, Sweden
June 2015

Transcriptional control of vertebrate neurogenesis by the proneural factor Mash1/Ascl1
Max Delbrück Centre for Molecular Medicine
Berlin, Germany
November 2015

Chelo, Ivo

Maintaining the dynamics of genetic variation during experimental adaptation of sexual populations
Institute of Environmental Sciences
Krakow, Poland
September 2015

Chaouiya, Claudine

A discrete model of eggshell patterning reveals cell-autonomous and juxtacrine effects
Workshop Statistical Physics Approaches to Systems Biology
Havana, Cuba
March 2015

Tutorial Logical modelling of regulatory networks
12th Basel Computational Biology Conference (BC^2)
Basel, Switzerland
June 2015

A computational modelling approach to decipher the regulatory control of *Drosophila* eggshell
Centro de Investigaciones Biologicas (CSIC)
Madrid, Spain
September 2015

Logical modelling
Worskhop & Tutorial 16th Int Conf on Syst Biol (ICSB)
Singapore
November 2015

When intricate regulatory networks defy intuition: computational models to decipher the control of cellular processes
Cancer Research Centre of Marseille
Marseille, France
December 2015

Chikhi, Lounès

Some issues on structure, the Neolithic transition and aDNA
Okinawa Institute of Science and Technology (OIST)
Okinawa, Japan
January 2015

Some genetic consequences of population and social structure
12th African Small Mammals Symposium
Mantasoa, Madagascar
April 2015

Demographic inference using genetic data from a single individual: separating population size variation from population structure
TiBE: 2015 meeting
Porto, Portugal
June 2015

From conservation genetics to conservation genomics of northern Madagascar lemurs
TiBE: 2015 meeting
Porto, Portugal
June 2015

Some genetic consequences of population and social structure
CIRAD
Reunion Island, France
November 2015

Chrostek, Ewa

Mutualistic and pathogenic symbionts of *Drosophila melanogaster*
École Polytechnique Fédérale de Lausanne

Lausanne, Switzerland
January 2015

Mutualism breakdown by *Wolbachia* genes amplification
8th Congress of the International Society of Symbiosis
Lisboa, Portugal
July 2015

Correia, Rion

Detecting conflict in social unrest using Instagram
International Conference on Computational Social Science
Helsinki, Finland
June 2015

Polarization in the US Congress
The 8th Annual Conference of the Comparative Agendas Project (CAP)
Lisboa, Portugal
June 2015

Deshpande, Ojas

Cytoskeletal dynamics during inter-nuclear spacing in the *Drosophila* syncytial embryo
EMBO Cell Cycle Workshop
Budapest, Hungary
September 2015

Domingos, Ana

Helmoltz - Nature Medicine Meeting
Munich, Germany

EMBO 1st Sectorial Obesity Meeting
Oeiras, Portugal

2015 EMBO YIP Meeting
Barcelona, Spain

EMBO Meeting
Birmingham, UK

Max Plank Institute for Neurobiology
Munich, Germany

Babraham Institute
Cambridge, UK

University of Utrecht
Utrecht, The Netherlands

University of Amsterdam
Amsterdam, The Netherlands

Duque, Paula

The *Arabidopsis* SR45 splicing factor, a regulator of plant sugar responses, modulates stability of the energy-sensing SnRK1 protein kinase
3rd Post-EURASNET Meeting on RNA Alternative Splicing
Trieste, Italy
April 2015

The *Arabidopsis* SR45 splicing factor, a negative regulator of sugar and ABA signalling, modulates stability of the energy-sensing SnRK1 protein kinase
Posttranscriptional Gene Expression Regulation in Plants (PGRP) Meeting
Paris, France
July 2015

Alternative splicing regulates translation of a membrane transporter to control plant zinc tolerance
2nd Summer Academy in Plant Molecular Biology
Freundenstadt, Germany
July 2015

On the functional relevance of alternative splicing in plants: translational regulation of root membrane protein controls tolerance to zinc toxicity
Centre de Recerca en Agrigenomica (CRAG)
Barcelona, Spain
November 2015

Ferreira, Miguel Godinho

Short telomeres in key tissues triggers local and systemic aging in zebrafish
Telomeres and Telomerase Meeting
Cold Spring Harbor, USA
May 2015

Short telomeres in key tissues triggers local and systemic aging in zebrafish
HHMI Annual Meeting
USA
May 2015

The role of telomeres in cancer and ageing
8th International Fission Yeast Meeting
Kobe, Japan
June 2015

The role of telomeres in cancer and ageing
Zebrafish Disease Model Conference 8
Boston, USA
August 2015

The role of telomeres in cancer and ageing in *zebrafish*
Biochemistry Research Seminar Series, Life Course Institute
Galway, Ireland
November 2015

Fonseca, Rosalina

The nature of the synaptic tag: a structural hypothesis
Hippocampal Spring Meeting
Taormina, Italy
June 2015

The nature of the synaptic tag: a structural hypothesis
Nplast Meeting
Utrecht, The Netherlands
July 2015

Garcês, Sandra

Is Immunogenicity Clinicaly Relevant?
Pfizer Africa Middle East ERA Summit
Marrakech, Morocco
February 2015

Immunogenicity and its Implications in Clinical Practice
Latin America Progress & Promise Meeting
Panama City, Panama
May 2015

Revisiting the Pharmacokinetis of TNF inhibitors
Immunogenicity and Rheumatic Diseases Interactive & Share Experience (iRISE) Summit
Cape Town, South Africa
May 2015

How to set up an immunogenicity testing clinic in hospital and testing experience
iRISE Summit
Cape Town, South Africa
May 2015

Drug level testing in the treatment paradigm: the missing step?
2015 EULAR - European Congress of Rheumatology
Rome, Italy
June 2015

Immunogenicity – from the concept to its applicability in clinical practice
2015 Romanian National Congress of Rheumatology
Bucharest, Hungary
September 2015

Gardner, Rui

Conflict Resolution
CYTO2015
Glasgow, UK
June 2015

Using Rmax to evaluate cell sorter performance
CYTO2015
Glasgow, UK
June 2015

Conflict Management in the SRL
IV Core Management Workshop
Lausanne, Switzerland
August 2015

Rmax: Protocol and uses
Big Apple Flow Cytometry Network (BAFN)
New York, USA
October 2015

Gjini, Erida

Linking the niche and neutral theory in *Pneumococcus* dynamics and vaccine effects
6th Workshop Dynamical Systems Applied to Biology and Natural Sciences (DSABNS 2015)
Lisboa, Portugal
February 2015

Integrating antimicrobial therapy with host immunity to fight resistant infections: classical vs. adaptive treatment
The International Society for Evolution, Medicine, & Public Health Inaugural Meeting
Tempe, USA
March 2015

How classical and adaptive regimes interact with host immunity in antibiotic treatment of resistant infections
Evolutionary Analysis Group, IBAHCM
Glasgow, UK
October 2015

Dynamics at the edge of neutrality: how direct competition mediates coexistence and vaccine effects in multi-strain pathogen systems
Department of Mathematics, University of Tours
France
December 2015

Gonçalves-Sá, Joana

Human sexual cycles are driven by culture and collective moods
Computational Social Science Winter Symposium
Cologne, Germany
November 2015

Science Education and African Development
Several academic and political events in Argentina, Cabo Verde, Portugal and Spain

Gordo, Isabel

Cost of resistance can be overridden by the adaptive potential of resistant bacteria
1st International Caparica Conference in Antibiotic Resistance (ic2ar)
Costa da Caparica, Portugal
January 2015

Adaptive immunity and the predictability of *E. coli* adaptation to the gut
SMBE Congress
Vienna, Austria
July 2015

Fitness of resistance alleles and stress
32nd Annual Meeting of NSCMID Infection and antibiotics
Umeå, Sweden
September 2015

Transposable elements drive *E. coli* adaptation to host environments
EMBO|EMBL Symposium: The Mobile Genome - Genetic and Physiological Impacts of Transposable Elements
Heidelberg, Germany
September 2015

Evolution of bacteria in the guts of healthy and immune compromised mice
Yakult Symposium
Sao Paulo, Brazil
November 2015

Jana, Swadhin

FASEB Cilia and Biology Meeting
Snowmass, USA
July 2015

Jansen, Lars

Chromatin-based epigenetic inheritance: lessons from the centromere
Max Planck Dortmund
Dortmund, Germany
February 2015

Mechanisms of cell cycle coupling to centromeric chromatin propagation
Babraham Institute
Cambridge, UK
March 2015

Mechanisms of cell cycle coupling to centromeric chromatin propagation
4th Dynamic kinetochore workshop
Copenhagen, Denmark
May 2015

Chromatin-based epigenetic inheritance: lessons from the centromere
New York University
New York, USA
June 2015

Chromatin-based epigenetic inheritance: lessons from the centromere
EPIGEN-MiChroNetwork Chromatin Seminar
Milan, Italy
September 2015

Mechanisms of chromatin-based epigenetic inheritance
UMC

Utrecht, The Netherlands
October 2015

Júlio, Catarina

'There is Science Here!'- An innovative programme for kindergarten and primary schools
12th International Conference Hands-on Science (HSCI2015)
Funchal, Portugal
July 2015

Lafuente, Elvira

Genetic basis of variation in thermal plasticity for body pigmentation and size
Annual Congress of the European Society for Evolutionary Biology (ESEB)
Lausanne, Switzerland
August 2015

Leite, Ricardo

Biosynthesis of Chitin in Alveolates: Molecular, evolutionary and chemical-physical characterisation of marine protozoan derived Chitin
Max Planck for Polymer Research
Mainz, Germany
April 2015

Mallo, Moisés

Generating shape diversity in the vertebrate body
Darwin's Day Symposium, University of Haifa
Haifa, Israel
February 2015

Deciding between making trunk or tail structures during vertebrate development
CABD, University Pablo Olavide
Seville, Spain
May 2015

From mice to snakes: understanding the differences in vertebrate body shape
Cell- and tissue communication during organogenesis
Les Treilles, France
September 2015

Making trunk or tail structures: who decides?
3rd Meeting of the SPBD
Algarve, Portugal
October 2015

Can embryonic development provide insights into regeneration approaches?
1st Iberian Symposium on Spinal Cord Injury
Alcoitão, Portugal
November 2015

Martins, Gabriel

Biology? In fast timing!
FAST COST action, WG5 meeting
Prague, Czech Republic
April 2015

Deep revelations...on beams of light
International Seminar on Light and its applications, Academia das Ciencias de Lisboa
Lisboa, Portugal
November 2015

Minhós, Tânia

Demographic bottleneck in two arboreal primates: a consequence of forest exploitation
TiBE - global biodiversity change - from genes to ecosystems
CIBIO-InBIO
Porto, Portugal
June 2015

Genetic consequences of human forest exploitation for two primate species in Guinea Bissau
5th Iberian Primatological Conference
Évora, Portugal
November 2015

Mirth, Christen

Regulating body size: integrating environmental conditions with developmental processes
Keynote Speaker at the BCN Developmental Biology Joint Retreat
Sant Feliu de Guixols, Spain
March 2015

Plasticity and Evolution of Body Size and Shape
Development and Evolution Seminar Series at Department of Zoology, University of Cambridge
Cambridge, UK
May 2015

Phenotypic plasticity and the evolution of plasticity
Keynote Seminar, Multi-level Modelling and Morphogenesis, John Innes Centre
Norwich, UK
July 2015

Moita, Luís Ferreira

Inflammation: the importance of being tolerant
6th AIMS Meeting
Lisboa, Portugal
March 2015

Keynote speaker at the Kick-off meeting of the sepsis group
Jena, Germany
August 2015

Nabais, Catarina

Spatial regulation of centriole biogenesis
Boehringer Ingelheim Fellow Meeting
Kleinwalsertal, Austria
August 2015

Oliveira, Ana Rita

Gut bacterial interspecies communication
Microbiotec15, Congress of Microbiology and Biotechnology 2015
Évora, Portugal
December 2015

Oliveira, Raquel

How do cells deal with premature sister chromatid separation?
EMBO workshop: Dynamic kinetochore
Copenhagen, Denmark
May 2015

Condensins and mitotic chromosome organisation: sister chromatid resolution vs chromatin compaction
EMBO Workshop: SMC proteins - Chromosomal organisers from bacteria to human
Vienna, Austria
May 2015

Building up mitotic chromosomes: sister chromatid resolution and chromatin compaction
EMBO Workshop on DNA Topoisomerases, DNA topology and Human Health
Les Diablerets, Switzerland
September 2015

Oliveira, Rui

Neuromolecular mechanisms of social learning in zebrafish
17th Annual Genes, Brain & Behaviour Meeting (IBANGS 2015)
Uppsala, Sweden
May 2015

Neuromolecular mechanisms of social learning and eavesdropping in zebrafish
Behaviour2015: 34th International Ethological Conference
Cairns, Australia
August 2015

Studying fish social behaviour and cognition: implications for fish welfare and conservation
XV European Congress of Ichthyology
Porto, Portugal
September 2015

Social transmission of fear in zebrafish
2015 Annual Meeting of the Society for Social Neuroscience
Chicago, USA
October 2015

Parkhouse, Michael

Interacción patógeno-huesped y el control de enfermedades infecciosas
Centro de Investigaciones y de Estudios Avanzados, IPNS
Mexico City, Mexico
February 2015

Mecanismos de evasión por patógenos providen una estratégia racional para controlar enfermedades infecciosas y no-infecciosas
Universidad Internacional Menéndez Pelayo
Santander, Spain
August 2015

Como hacer una vacuna
Universidad de Cuenca
Cuenca, Ecuador
November 2015

Parreira, Bárbara

Modelling the genetic consequences of social structure
TiBE - global biodiversity change - from genes to ecosystems
CIBIO-InBIO
Porto, Portugal
June 2015

Social structure matters: on some genetic consequences of mating systems, dispersal and sampling
5th Iberian Primatological Conference
Évora, Portugal
November 2015

Pereira Leal, José

Evolution of Intracellular Communication
Summer Programme in Quantitative Biology
California, USA
September 2015

Planells, José

Ssu72 phosphatase regulates telomere length in *S. Pombe*
Telomeres and Telomerase Meeting
Cold Spring Harbor, USA
May 2015

Rebelo, Manuel

Ethics Committee's review process in the implementation of the 3Rs
International Conference of Alternatives to Animal Experimentation
Lisboa, Portugal
May 2015

Rocha, Luís

Detecting conflict in social unrest using Instagram
Conference on Complex Systems
Tempeh, USA
September 2015

Redundancy and control in complex networks
Conference on Complex Systems
Tempeh, USA
September 2015

Extraction of pharmacokinetic evidence of drug Interactions in literature and social media
Translational Bioinformatics
Conference
Tokyo, Japan
November 2015

Genes, Computers, and Collective Behaviour
University of Tokyo, Computer Science Department Colloquium
Tokyo, Japan
November 2015

Redundancy and control in complex networks
Santa Fe Institute Workshop
Santa Fe, USA
December 2015

Rodriguez, Willy

Demographic inference using genetic data from a single individual: separating population size variation from population structure
Muséum National d'Histoire Naturelle
Paris, France
January 2015

Using patterns in the DNA for model selection in population genetics
Rencontres de Statistiques Mathématiques, BoSanTouVal VII
Bagnères-de-Luchon, France
March 2015

Utilisation des bibliothèques "numpy" et "scipy" pour l'inférence démographique à partir de données génomiques
Institut de Recherche en Informatique de Toulouse
Toulouse, France
May 2015

Comparing two simple models in Population Genetics
Institut de Mathématiques de Toulouse
Toulouse, France
November 2015

Application d'un modèle de chaîne de Markov cachée à

la reconstruction de l'histoire démographique à partir de l'ADN
Institut de Mathématiques de Toulouse
Toulouse, France
December 2015

Salmona, Jordi
Towards conservation genomics of northern Madagascar mouse lemur
12th African Small Mammals Symposium
Mantasoa, Madagascar
April 2015

Towards conservation genomics of northern Madagascar mouse lemur
TiBE – Global Biodiversity Change – From Genes To Ecosystems
CIBIO-InBIO
Porto, Portugal
June 2015

Santos, Diogo
The impact of genomic rearrangements on the evolutionary path of populations
Forecasting evolution?
Lisboa, Portugal
July 2015

Silva, Zoé
Deficiency in regulators of complement activation - DAF and CD59 - protects against influenza A virus infection
Keystone Symposia on Innate Immunity and Determinants of Microbial Pathogenesis
California, USA
April 2015

Soares, Miguel
The Keap1/Nrf2 Pathway in Health and Disease
Biochemical Society
Cambridge, UK
January 2015

Gordon Research Conference - 2015
Glycobiology
Pisa, Italy
March 2015

Kymab meeting
Cambridge, UK
April 2015

Cambridge Immunology Strategic Network
Cambridge, UK
May 2015

NAT Conference
Nantes, France
June 2015

NY Blood Center
New York, USA
June 2015

Columbia University
New York USA
June 2015

Memorial Sloan-Kettering Cancer Center
New York, USA
June 2015

Institute of Physiology, University of Zürich
Zurich, Switzerland
July 2015

Institut Kunst
Basel, Switzerland
October 2015

ETH Zurich, Institute of Microbiology
Zurich, Switzerland
November 2015

UMR1331 INRA/INP/UPS Team E09 "Prevention, Promotion of Carcinogenesis by Food"
Toulouse, France
November 2015

Soares, Nuno
Understanding nutritional adaptation to new ecological niches: the case of *Drosophila suzukii*
Annual European Meeting of PhD Students in Evolutionary Biology (EMPSEB)
Stirling, UK
September 2015

Sousa, Ana Margarida
The repeatability of *Escherichia coli* evolution in its natural environment
Forecasting Evolution?, Calouste Gulbenkian Foundation
Lisboa, Portugal
July 2015

Teixeira, Luís
Identification of stable and beneficial *Drosophila* gut microbiota
8th Congress of the International Society of Symbiosis
Lisboa, Portugal
July 2015

Telley, Ivo
An *ex vivo* approach to study the mechanics of nuclear positioning in syncytial embryos
CRG-Barcelona
Barcelona, Spain
October 2015

Trancoso, Inês
AID and Repair in Class Switch Recombination
Max Planck Institute of Immunobiology and Epigenetics
Freiburg, Germany
February 2015

Tranfield, Erin
Optimizing and adapting sample preservation protocols for Transmission Electron Microscopy
4th Joint Congress of the Portuguese and Spanish Microscopy Societies
Porto, Portugal
September 2015

Vidal, Sheila
Assessing the impact of Grant Managers on the success of grant application
21st Annual Conference EARMA 2015
Leiden, The Netherlands
June 2015

Recognition of the profession: Professional development and Certificate Programme
21st Annual Conference EARMA 2015
Leiden, The Netherlands
June 2015

The IGC and Funding Opportunities for Postdoctoral in Portugal
Netherland Cancer Institute
Amsterdam, The Netherlands
July 2015

Werner, Sasha
FliACT Summer School
Lisboa, Portugal
September 2015

Xavier, Karina
Manipulating interspecies quorum sensing in bacterial consortia
Centre of Excellence in Bacteriology, University of Geneva
Geneva, Switzerland
February 2015

Manipulating interspecies quorum sensing in bacterial consortia
Laboratoire de Chimie Bactérienne
Marseille, France
March 2015

Manipulation of the quorum sensing signal AI-2 affects the antibiotic-treated gut microbiota
Bacterial Networks (BACNET/15) – ESF-EMBO Symposium
Spain
May 2015

Manipulation of the quorum sensing signal AI-2 affects the antibiotic-treated gut microbiota
8th Congress of the International Symbiosis Society
Lisboa, Portugal
July 2015

Manipulating interspecies quorum sensing in bacterial consortia
Max Planck Institute for Terrestrial Microbiology
Marburg, Germany
September 2015

AT NATIONAL MEETINGS AND SEMINARS

Alves, Filipa
Quantitative phenotype classification
DiA meeting, Faculdade de Ciências da Universidade de Lisboa (FCUL)
Lisboa, Portugal
April 2015

Mathematical modelling in developmental biology
Quantitative Biology and Bioinformatics Colloquium, Instituto Superior de Psicologia Aplicada (ISPA)
Lisboa, Portugal
May 2015

Quantifying and modelling patterned cell fate determination
SoftMatter@PT Workshop, Faculdade de Ciências da Universidade de Lisboa (FCUL)
Lisboa, Portugal
July 2015

Amorim, Maria João
The interaction of influenza A virus with the recycling endosome
Encontro Nacional de Estudantes de Biologia (ENEB)
Braga, Portugal
March 2015

Motivation to do science
Associação Nacional de Estudantes de Medicina (ANEM)
Lisboa, Portugal
July 2015

Becker, Jörg
(Epi)genetic basis of sexual reproduction in land plants: A focus on the male gametes
Instituto de Ciências Agrárias e Ambientais Mediterrânicas (ICAAM)
Évora, Portugal
February 2015

Braga Areal, Rômulo
Newborn colonization with Helicobacter hepaticus induces long lasting tolerance in mice
XLI Annual Meeting of the Portuguese Society for Immunology
Braga, Portugal
October 2015

Brás-Pereira, Catarina
***dachshund* potentiates Hedgehog signaling to ensure correct *Drosophila* retinogenesis**
Tomar, Portugal
September 2015

Caramalho, Íris
Human regulatory T cell differentiation
Faculdade de Ciências da Universidade de Lisboa
Lisboa, Portugal
May 2015

Castro, Diogo
Transcriptional control of vertebrate neurogenesis by the proneural factor Mash1/Ascl1
XIV Meeting of the Portuguese Society for Neurosciences
Póvoa de Varzim, Portugal
June 2015

Chelo, Ivo
Experimental evolution of sexual populations to characterize the genetic architecture of complex traits
*Instituto de Biomedicina (*iBiMED*), Universidade de Aveiro*
Aveiro, Portugal
October 2015

Costa, Teresa
Overview of the Annual EARMA Conference 2015 and identification of network and training opportunities for the development of the Portuguese Research Manager Community
Finca-Pé Meetings
Lisboa, Portugal
July 2015

Demengeot, Jocelyne
Layers of regulation and window of opportunity in autoimmunity
Instituto Medicina Molecular
Lisboa, Portugal
May 2015

Duque, Paula
Alternative splicing of root membrane transporter controls plant tolerance to zinc toxicity
Instituto de Tecnologia Química e Biológica (ITQB)
Oeiras, Portugal
November 2015

Splicing alternativo de um transportador em *Arabidopsis*: Quando um gene vale por dois
Faculdade de Ciências da Universidade de Lisboa (FCUL)
Lisboa, Portugal
December 2015

Ferreira, Miguel Godinho
The role of telomeres in cancer and ageing
Jornadas Nacionais de Ciências Biomédicas
Faro, Portugal
March 2015

Gjini, Erida
The role of host immunity in resistance management: perspectives from mathematical models
1st Porto Meeting in Mathematics and Biology
Porto, Portugal
June 2015

Gonçalves, Sá Joana
Data Mining for Decision-Making: Effectiveness and Risks
Coping With Health Risks in the Big Data Age, Centro de Estudos sobre a Mudança Socioeconómica e o Território do ISCTE-Instituto Universitário de Lisboa (DINÂMIA'CET-IUL)
Lisboa, Portugal
June 2015

Data mining for decision-making
L2F seminars, Instituto de Engenharia de Sistemas e Computadores-Instituto Superior Técnico (INESC-IST)
Lisboa, Portugal
October 2015

Janody, Florence
A study in *Drosophila*, human cells and breast tumours reveals a role of cytoskeletal regulators in Src-dependent tumour growth
Tomar, Portugal
September 2015

Lafuente, Elvira
Genetic basis of variation in thermal plasticity for body pigmentation
Encontro Nacional de Biologia Evolutiva (ENBE)
Lisboa, Portugal
December 2015

Mallo, Moisés
The control of anatomical diversity among vertebrates
Instituto de Investigação em Ciências da Vida e Saúde (ICVS), Universidade do Minho
Braga, Portugal
January 2015

Genetic control of anatomical diversity among vertebrates
Instituto de Biologia Molecular e Celular (IBMC), Universidade do Porto
Porto, Portugal
January 2015

Margalha, Leonor
Sumoylation represses SnRK1-dependent energy signalling in *Arabidopsis*
Instituto de Tecnologia Química e Biológica (ITQB)
Oeiras, Portugal
September 2015

Marques Pita, Manuel
Computation Analysis of the Law-Making Process: Flu as a Case Study
Coping With Health Risks in the Big Data Age, Centro de Estudos sobre a Mudança Socioeconómica e o Território do ISCTE-Instituto Universitário de Lisboa (DINÂMIA'CET-IUL)
Lisboa, Portugal
June 2015

Martins, Gabriel
Novel developments in Bioimaging in the life-sciences
Global Health and Tropical Medicine sessions, Instituto de Higiene e Medicina Tropical (IHMT)
Lisboa, Portugal
March 2015

What Darwin couldn't see: optics and evolution
Darwin's tea party Meeting, Universidade de Lisboa
Lisboa, Portugal
April 2015

Mena, Ana
Morfogénese de um projeto
SciCom Pt 2015
Lagos, Portugal
May 2015

Moita, Luís Ferreira
Inflammation: the importance of being tolerant
XXI Jornadas de Pediatria
Lisboa, Portugal
February 2015

Oliveira, Rui
Behavioural and neuromolecular mechanisms of social cognition in zebrafish
Champalimaud Neuroscience Symposium
Lisboa, Portugal
September 2015

Pereira, Sónia
Transcriptomic atlas of *Physcomitrella* patens to decipher the evolution of epigenetic mechanisms in land plants
Jornadas Portuguesas de Genética
Braga, Portugal
May 2015

Piskadlo, Ewa
Tackling the enigmatic role of condensin I - Sister chromatids resolution or structural enforcement?
Drostuga 2015
Tomar, Portugal

Raposo, Alexandre
Ascl1/Mash1 coordinately regulates gene expression and the chromatin landscape during neurogenesis
3rd Meeting of the Portuguese Society for Developmental Biology
Faro, Portugal
October 2015

Rocha, Luís
Structure and Dynamics on Networks: from fact-checking to biochemical control
Fundação Champalimaud
Lisboa, Portugal
July 2015

Rosmaninho, Pedro
Zeb1 potentiates gene transcription genome-wide in Glioblastoma Multiform Cancer Stem Cells via a novel Lef1 dependent mechanism
XIV Meeting of the Portuguese Society for Neurosciences
Póvoa de Varzim, Portugal
June 2015

Salmona, Jordi
Towards conservation genomics of northern Madagascar mouse lemur
Annual Meeting of Gulbenkian Students (AmeeGuS)
Mondim de Basto, Portugal
May 2015

Soares, Miguel
Sociedade Portuguesa de Imunologia
Braga, Portugal
October 2015

Sociedade Portuguesa de Hematologia
Figueira da Foz, Portugal
November 2015

Sobral, João
Miseq – Play, Pause, Rewind
2nd Illumina User Group Meeting
Aveiro, Portugal
November 2015

Sousa, Ana Laura
Aplicações da Microscopia Eletrónica em Investigação
Simpósio Técnico de Anatomia Patológica
Porto, Portugal
March 2015

Sousa, Ana Margarida
Natural selection in bacteria colonizing the intestinal tract: a serendipitous case of reverse evolution
Instituto de Biomedicina (iBiMED), *Universidade de Aveiro*
Aveiro, Portugal
July 2015

Tavares, Sandra
The actin cytoskeleton: a key mediator of pre-malignant breast cancer expansion
Faro, Portugal
July 2015

Teixeira, Luís
Linking genotype to phenotype in the antiviral endosymbiont *Wolbachia*
Instituto de Higiene e Medicina Tropical (IHMT)
Lisboa, Portugal
April 2015

The Toll-Dorsal pathway is required for resistance to viral oral infection in *Drosophila*
XLI Annual meeting of the Portuguese Immunology Society
Braga, Portugal
October 2015

Telley, Ivo
Physical approaches for the study of insect embryo development
Instituto Superior Técnico
Lisboa, Portugal
November 2015

Thompson, Jessica
Cyclic di-GMP signalling and *E. coli* colonisation of the mouse gut
Immunology and Infection Meeting
Lisboa, Portugal
October 2015

Valerio, Concetta
Deciphering the multifaceted cross-talk between ABA and SnRK1
Instituto de Tecnologia Química e Biológica (ITQB)
Oeiras, Portugal
November 2015

Vidal, Sheila
Overview of the Annual EARMA Conference 2015 and identification of network and training opportunities for the development of the Portuguese Research Manager Community
Finca-Pé Meetings
Lisboa, Portugal
July 2015

Advices and tips to improve your CV
EURAXESS on Tour 2015
Faro, Portugal
October 2015

Funding Opportunities for Postdoctoral fellowships
EURAXESS on Tour 2015
Faro, Portugal
October 2015

Funding Science
I Scientific Meeting of the African and Timor Graduate Students
Oeiras, Portugal
December 2015

Vieira, Filipe
The impact of the phytopathogen *Pectobacterium carotovorum* in *Drosophila melanogaster* development
Jornadas de Investigação em Biologia III, Faculdade de Ciências da Universidade de Lisboa (FCUL)
Lisboa, Portugal
February 2015

Won, Miguel
Early Detection of Influenza Epidemic Outbreaks
Coping With Health Risks in the Big Data Age, Centro de Estudos sobre a Mudança Socioeconómica e o Território do ISCTE-Instituto Universitário de Lisboa (DINÂMIA'CET-IUL)
Lisboa, Portugal
June 2015

Early Detection of the Flu Onset
4ª Reunião de Vigilância Epidemiológica da Gripe em Portugal
Lisboa, Portugal
October 2015

Xavier, Karina
Manipulation of the quorum sensing signal AI-2 affects the antibiotic-treated gut microbiota
Instituto Medicina Molecular (IMM)
Lisboa, Portugal
July 2015

7

PUBLIC ENGAGEMENT IN SCIENCE

>2000
VISITORS IN PUBLIC EVENTS

~100
RESEARCHERS ENGAGED IN OUTREACH ACTIVITIES

263
STUDENTS VISITED THE IGC

2
NEW MULTIMEDIA RESOURCES

2
TEACHER TRAINING PROGRAMMES

3
PARTICIPATIONS IN FESTIVALS

1
ARTIST IN RESIDENCE

SCIENCE COMMUNICATION & OUTREACH

HEAD OF FACILITY
Mena, Ana

DESCRIPTION

The IGC runs a dedicated science communication and outreach programme, which actively engages IGC researchers, staff and PhD students in a dialogue with society. We aim at promoting the values of science, namely, critical thinking, honesty and ethics, and openness to share and discuss new knowledge, encouraging public engagement in science. We also aim to raise the profile of the IGC and its research, both nationally and internationally. Our programme involves a broad range of audiences: the media, students, teachers, general public, artists and policy makers.

PROJECTS AND MAIN ACHIEVEMENTS IN 2015

INSTITUTIONAL COMMUNICATION

NEW MEDIA

31,185
FANS ON FACEBOOK

2,484
FOLLOWERS ON TWITTER

201,090
VIEWS ON THE YOUTUBE CHANNEL

493,272
IGC WEBSITE VISITS

MEDIA OFFICE

39%
INTERNATIONAL MEDIA OUTLETS

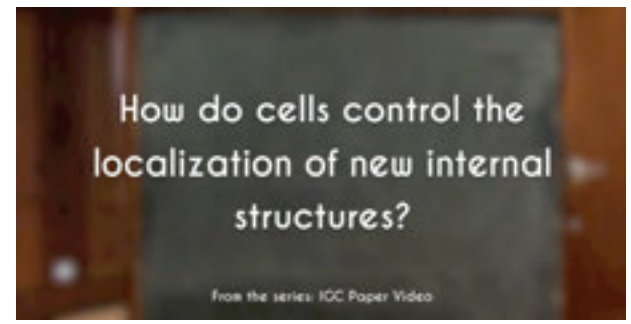
61%
PORTUGUESE MEDIA OUTLETS

18
PRESS RELEASES
were sent out announcing research developments and awards accomplished by IGC scientists

479
NEWS CLIPPINGS
mentioning the IGC were registered, (values are underestimates).

Production of multimedia resources

The first episode of a new series of videos was released in 2015. This series aims at bringing scientific results of research developed at the IGC to a wider audience, through our social media channels. The video "How do cells control the localization of new internal structures" had 1020 views on YouTube. Based on the scientific article published in *Dev Cell* by Mónica Bettencourt-Dias' laboratory, the video counted with the participation of Carla Lopes and Swadhin Jana.



First episode of the series IGC Paper video: *How do cells control the localization of internal structures*, with Carla Lopes and Swadhin Jana from Cell Cycle Regulation group.

HEAD OF UNIT

Email anamena@igc.gulbenkian.pt

PhD in Cell Biology
Universidade Nova de Lisboa, Portugal, 2008

Head of Unit since 2012

STAFF

Vanessa Borges, Communication Officer
Inês Domingues, Communication Officer
Catarina Júlio, Communication Officer

Collaborators
Élia Morais (Centro de Formação

SCIENCE EDUCATION PROJECTS

Teacher training programme for Pre- and Primary School Teachers: 'Aqui há Ciência! Oeiras'

This collaborative project aims to develop in-class laboratory activities and teacher training for pre- and primary schools, using methodologies in inquiry-based learning. The fourth edition of this project occurred from January until July 2015, with a small group of 5 selected and invited teachers from 2 local schools. We accompanied and provided support to the group of selected teachers in 11 actions to implement activities in the classroom.

Partners: Oeiras City Council and Instituto Superior Técnico (Portugal)
Funding: Oeiras City Council (Portugal)

Primary school students developing activities in the classroom.

Teacher training programme for High School Teachers: Workshop 'Inspirar Ciência – A Matemática para a Vida'

This teacher-training course aimed to provide new tools to communicate and stimulate students' interest in Mathematics. During the course, participant teachers used mathematical concepts and topics of the school curriculum to solve current problems on modelling and analysis of biological systems. This year, 25 high school teachers attended the 4 days workshop and 8 IGC scientists were involved in the training. This workshop was certified for teachers' continuous professional development by the Scientific and Pedagogical Council of Continuing Education of the Ministry of Education and Science.

Collaborators: Centro de Formação das Escolas de Torres Vedras e Lourinhã, Portugal.

Workshop Inspirar Ciência class of 2015. 25 high school Math teachers spent 4 days of intense scientific discussions and group work at IGC with 8 IGC scientists.

Schools' outreach

In 2015, 223 students from 8 high schools (from Barreiro, Sintra, Serpa, Estoril, Coimbra, Oeiras, Linda-a-Velha, and Denmark) and 40 students from 2 universities (Instituto Superior de Técnico e Instituto Superior de Psicologia Aplicada) visited the IGC. We received 13 requests either to visit the IGC or to provide material or assistance in the development of experiments.

High school students counting colonies for an experiment in the context of a school visit to the IGC.

"Genes et al" - The IGC website for teachers

This website joins resources developed at the IGC for the life sciences teaching and learning. It is dedicated to teachers from primary to high school, educators, science communicators and all enthuses of life sciences. The resources available include experimental activities suitable for the classroom and divided by school years, videos illustrating biological processes and articles focusing areas of cutting-edge research. During 2015, the website had 2,122 visualizations, corresponding to 1,138 users, and 39 downloads. Due to technical issues, the website had to be restructured during the second semester of the year.

Online Education Resources

The video "My genes: should or should I not know who I am" is a new animation aimed at high school students. Launched in the beginning of 2015, it addresses genetic and heredity concepts, as well as societal and ethical aspects related to genome-generated knowledge, and it has 4200 views on YouTube.

The video *My gene: should or should I not know who I am* was released in 2015 and is available on YouTube with subtitles in English and Portuguese.

PUBLIC EVENTS

IGC presence at Belém Art Fest | 15-16 May, 2015

In 2015, the IGC was invited to participate for the first time in Belém Art Fest, a music and art festival that takes place in 3 museums in Belém (Lisbon). An exhibition showing how different animals perceive nature, and a fluorescent room with luminescent biological samples were the activities taken to the festival. About 400 visitors passed by the IGC space.

The IGC has been invited to participate in the music and art festival *BelémArtFest* in 2015 bringing scientists and scientific activities to the public.

IGC presence at NOS Alive 15 | 9-11 July, 2015

Science, music and art came together for the eight year running at the NOS Alive'15 music festival. During the three days of this major music and art event the main activities at the IGC corner were speed dating with scientists, a biodiversity game, a card game addressing tu-

das Escolas de Torres Vedras e Lourinhã, Portugal)
Fundação para a Computação Científica Nacional (Portugal)
Maria de Assis (DESCOBRIR – the Gulbenkian Education Programme for Culture and Science, Portugal)
Simão Costa (LabMóvel, Portugal)
Alexandra Paio, Maria João de Oliveira and Sancho Oliveira (Vitruvius FabLab, ISCTE-IUL, Portugal)
Maria João Leão and Sofia Rodrigues (Maratona da Saúde)

IGC Participants in Science Communication and Outreach Activities

Teacher training programmes
Filipa Alves; Patricia Brito; Erida Gjini; Claudine Chaouiya; Jorge Carneiro, Pedro Angelo Silva; Daniel Sobral; Pedro Fernandes

Schools' outreach:
Animal House Facility; Advanced Imaging Unit; Biosafety Unit; Actin Dynamics; Cell Cycle Regulation; Development, Evolution and the Environment; Electron Microscopy Unit; Evolution and Development; Flow Cytometry Facility; Gene Expression Unit; Genomics Unit; Host-Pathogen Co-Evolution; Inflammation; Patterning and Mophogenesis; Physical Principles of Nuclear Division; Telomeres and Genome Stability; Transgenics Unit

IGC at Belém ArtFest
Integrative Behavioural Biology; Advanced Imaging Unit

IGC at NOS Alive'15
Actin Dynamics; Population and Conservation Genetics and around 60 volunteers of other reserach groups

IGC at GreenFest
Maria João Amorim; Mónica Bettencourt Dias; Paula Duque; Delphine Pessoa; Lisa Bergman; Catarina Pereira; Isa Pais; Mário Soares; Ioanna Oikonomidi; Miguel Cavadas

Art and science projects
Luís Rocha, Manuel Marques-Pita and Ana Mena

mour formation, a photo exhibition of the NOS Alive fellows, and molecular cooking (in partnership with the *Cooking Lab* company). Around 60 IGC volunteers made these activities possible for about 1500 young people who visited the IGC corner.

The IGC stand at NOS Alive'15 where around 60 scientists talked about science and performed hands-on activities during the 3 days of the festival.

IGC presence at GreenFest | 8-11 October, 2015

During this year, the IGC was also invited to participate in GreenFest, a festival that addresses the environment and health sustainability. Ten scientists volunteered either to give a talk or participate in a speed-dating activity.

IGC scientists during the first day of the festival.

ART AND SCIENCE PROJECTS

'Musical Morphogenesis'

Musical Morphogenesis is an interactive installation that translates in sound, light and movement the development of a flower, unveiling the role of genetic networks during that process. During 2015, work has been done to ameliorate and implement new features in this installation.

Collaborators: DESCOBRIR – the Gulbenkian Education Programme for Culture and Science, LabMóvel, and Vitruvius FabLab - ISCTE-Instituto Universitário de Lisboa
Sponsors: Fundação Calouste Gulbenkian

Composer in Residence: Camille van Lunen

The French-Dutch composer and singer Camille van Lunen joined the IGC in October as Artist in Residence galvanising a torrent of musical engagement and activity from IGC members including forming a choir. Camille's activity has also been generously supported by Risto Nieminen, Director of Gulbenkian Musica, and colleagues.

Camille van Lunen after the opening concert at IGC.

FUNDRAISING

DESCRIPTION

The IGC develops an in-house programme aimed at raising private funds for science through fundraising initiatives with private companies, charities and the general public.
The IGC is under the Scientific Sponsorship Law. This law provides tax benefits for science-related donations by either individuals or companies.

PROJECTS AND MAIN ACHIEVEMENTS IN 2015

THE IGC – EVERYTHING IS NEW (EIN) PARTNERSHIP: NOS ALIVE – IGC RESEARCH FELLOWSHIPS

Established in 2007, the partnership between the Instituto Gulbenkian de Ciência (IGC) and Everything is New, promoter of the NOS Alive music festival, aims to bring science closer to the Portuguese society and to raise funds for scientific research. In addition to the IGC participation in the NOS Alive music festival, this partnership results in two research fellowships per year, funded by Everything is New, that allow young graduates to start their scientific careers. In 2015, Patrícia Santos and Margarida Araújo received a fellowship to develop one-year research projects at the Population and Conservation Genetics, and the Actin Dynamics research groups, respectively. These projects were carried out at the IGC with practical works in France and United Kingdom. Since 2008, over 400 young graduates around the country have applied to these fellowships, and 12 received a fellowship. In 2015, 2 NOS Alive-IGC alumni were conducting a postdoc abroad, 5 were doing a PhD, and the other 3 were pursuing research projects.

COLEÇÃO CIÊNCIA – A PARTNERSHIP BETWEEN THE IGC AND VISTA ALEGRE

A collection of porcelain products, *Coleção Ciência*, results from a partnership between the IGC and Vista Alegre, a prestigious and market leader Portuguese porcelain manufacturer. Young scientists obtained the original images of this collection, as part of their research at the IGC. Part of the money raised by selling this collection has been used in scientific meetings organised by the PhD students and postdocs from the IGC.
In 2015, the porcelain Coleção Ciência was available at the IGC and at the Calouste Gulbenkian Foundation.

FUNDRAISING ACTIVITIES ORGANISED BY THE IGC PhD DELEGATES AND POSTDOCTORAL COMMITTEE

Several fundraising activities (beer hours, wine hours, thematic parties, etc.) were organised in 2015 to raise funds for the 9th PhD AMeeGuS meeting and for the Postdoctoral retreat, via donations from attendees at the events, both from IGC staff and the general public.

ACKNOWLEDGMENTS

We are grateful to everyone at the IGC - researchers, students and staff - who supplied information, text and images used in this report.

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The Instituto Gulbenkian de Ciência (IGC) Annual Report is also available to download from the IGC website at ***www.igc.gulbenkian.pt***

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First published by the Instituto Gulbenkian de Ciência, 2016

www.igc.gulbenkian.pt

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