ANNUAL REPORT 2017

INSTITUTO GULBENKIAN DE CIÊNCIA

COVER IMAGE

Sympathetic neurons (blue) in the thoracic ganglion of the sympathetic chain, in the mouse. © Roksana Pirzgalska, IGC.

This Annual Report covers the Instituto Gulbenkian de Ciência's financial year, from 1st January to 31st December 2017.

ANNUAL REPORT 2017

INSTITUTO
GULBENKIAN
DE CIÊNCIA

CONTENTS

Jonathan C. HOWARD

The Director's INTRODUCTION

Resilience

This is not to be the story of last year, but rather a retrospective about the last 5 years. The IGC celebrated its 50th year during 2011 and 2012 and in July 2012 there was a meeting at the Foundation to mark the end of the festivities, and also to announce the new IGC Director. I gave the usual speech, but included in it a metaphor to illustrate my sense of the fragility of its structure, the unusual, improbable, anti-entropic character, so precious, yet seemingly so vulnerable to all kinds of outside forces. My metaphor was the sandcastle, beautiful but fragile. How wrong I was.

In late 2012, when I took over as Director of the IGC from António Coutinho after his majestic 14 years in the rôle, it should have been easy to discern the key issues that were to dominate the next quinquennium. My optimism and lack of experience meant that all except one remained cryptic until they arrived. The first, recognised even before day one, was the management of human resources. With only 15 staff enabled by their permanent positions inside the Gulbenkian Foundation to enjoy the benefits of the professional Human Resources Service provided by the Foundation, the IGC itself carried responsibility for the care of its remaining 360 members, without a dedicated in-house office with professional skills. Despite the generous efforts that the administrative staff dedicated to resolving the many personnel issues that arise in such a large and diverse community, the reality has to be that our people did not get all the professional support they deserved. Inevitably, some of these problems ended up on my desk, the person perhaps of all the administration least qualified to help. Despite all the excuses I can dredge up, the plain fact is that inability to correct this extraordinary defect in the management of the IGC was the greatest failure of my tenure.

The second issue was money. The IGC's finances were, let us say, byzantine. The money was derived in part from the generous direct grant from the Gulbenkian Foundation, from numerous grant agencies, above all the national scientific research council, the FCT, and a considerable annual sum of money was paid to the IGC in rent by the at that time still just prenatal Neuroscience Programme of the Champalimaud Foundation. In itself this was not altogether a particularly complex scenario, but its accounting was split between that part of the budget due to the Foundation, and the other monies. The former was incorporated into the rest of the Foundation's budget, formal and unambiguous. The latter was incomparably more complex, its reporting was idiosyncratic, and it was not exposed to the same critical oversight from the Foundation. I got a tolerable insight into the overall budget situation of the IGC only about half way through my tenure as Director, after the Foundation itself began to take an informed interest in the totality of our financial situation.

Thirdly, I joined the IGC as Director at the end of 2012 under the shadow of the 2008 financial crisis when Portugal was widely known in financial circles as the first of the PIGS, a cruel acronym for 4 faltering European economies. Unsurprisingly, the economic crisis and its accompanying national austerity programme caused a collapse in competitive research grants from the FCT that cut deeply into the finances of all academic research institutions in Portugal. The IGC survived the crisis not only thanks to its constant support from the Gulbenkian Foundation but also to its "Exceptional" rating in a competitive national funding programme for institutional support. But this was only a partial mitigation of a crisis that resulted in a serious depression of research activity nationally. The FCT in 2012 was a national research funding organisation respected for the breadth of its support for basic science and lack of political interference. As the crisis grew, a significant part of national research funding was redirected through regional funding bodies receiving EU funds, established on different principles from the FCT and without a mandate for support of basic research. Thus the national funding climate for the IGC, devoted as it is to basic research, became more threatening and less predictable, leading many scientists at IGC to complain that the only way to conduct an internationally competitive research programme in Portugal is to win international grants, especially ERC grants. IGC scientists have been successful in securing these and other generous but intensely competitive international awards, but it is not a realistic basis on which to fund a whole institute. Competitive funding has been hard these last years, and before the change of government in 2016 the FCT took heavy criticism, both political and from sections of the Portuguese scientific community, for its attempts to sustain funding for the highest quality science on the basis of a completely inadequate budget, a valid strategy but brutal on work that was less competitively reviewed.

The change of government in 2016 saw a radical transformation of the national discourse on science. The FCT has become secondary to a major political initiative on science at ministerial level. However while waiting for new plans to be clearly articulated, in practice both the FCT and the IGC have till now been mostly conducting business as usual. For the IGC, however, the incomprehensi-

ble decision by the FCT to close down the direct competitive funding of PhD programmes (on the basis that some previously funded programmes were of low quality) has been a severe challenge. The modern IGC was born in the 1990s out of an extremely original, FCT-funded PhD programme, and it has been pioneering novel programmes ever since with support from the FCT. FCT funding has been the backbone of the internal PhD programme that has provided our outstanding PhD students over the years. The FCT will make a major mistake if it does not make exceptions for institutions that have devoted extraordinary time and effort to their PhD programmes and can attract exceptional students to Portugal from across the world.

The most important initiative of the new government has been a major restructuring of post-doctoral careers, setting down formal guidelines designed to end the fundamental uncertainties that

have dogged this difficult career stage over the years. The transformations include mandatory entry, within 2 years of completing the PhD, into employment contracts with taxation, social security payments and full benefits, bringing young scientists at last into the national social contract. The implementation of this admirable goal has been spreading through Europe during the last couple of decades; Portugal's new rules are not in themselves exceptional, and are widely welcomed. They are also, however, expensive, roughly doubling the institutional salary cost compared with a fellowship. The IGC, a private institution, has overused fellowships as an inexpensive, convenient and flexible instrument of employment over time, and is consequently liable for very substantial extra costs, a reality that has to be faced, but the justice of this transition is not in question.

The new legislation also brings with it implications for job security, an issue that the IGC, through its use of extended fellowship salaries for post-doctoral scientists, has till now been largely able to ignore. The job security offered by the new legislation to the IGC's outstandingly loyal, competent and versatile senior technicians, facility and lab managers, most of whom have PhDs, is a reward long past due. However the new legislation creates difficulties for the young independent scientists who use their time at the IGC to discover whether they have the qualities necessary for a lifetime of independent research, the last and most demanding stage in the maturation of a high-level research scientist. It is generally agreed that this discovery process may take 8-10 years. It is the intention neither of the host institute nor of the young scientist to convert this key formative stage into a permanent position. Such institutions, like the European Molecular Biology Laboratory in Heidelberg or the Francis Crick Institute in London usually have only enough permanent positions to provide some maturity and continuity. This structure provides a protected space for young scientists to develop their distinctive research programme, but absolutely relies on turnover. The best young scientists agree with this process; it is not some kind of punishment but rather a reward for showing exceptional promise. However, it remains to be seen how such a turnover policy can be implemented in Portugal. Legislation that confers automatic tenure after 5 years puts this decisive stage at risk and damages both the formation of the scientist and the future of the institute. How the IGC should respond is unclear. As it stands, the new legislation will harm institutes that are creating the very best young scientists for the international market. The government will have to decide whether job security for all compensates for this injury to one of Portugal's great successes.

These are all grave problems, and they have certainly contributed to anxiety within the IGC over the last few years. However there has been no panic, there has been no deterioration in the science, indeed some of the most important papers from the IGC for a long time have been published within the past quinquennium. Wherever grants have been available they have been successfully competed for and of these the IGC continues to win a disproportionate share of the most prestigious and most valuable. Throughout these difficult years the Scientific Advisory Board under the chairmanship of Kai Simons has given the IGC the most

"It could be written into the very stones of the IGC that we are here to share what we do, to combine our efforts to reach for a higher goal. We share our skills, our intelligence, our resources, as if they belonged not to ourselves as individuals but to the whole community of the IGC. This gives the IGC great strength, and in difficulties we use this strength together to resolve them."

extraordinary support. It is difficult to overstate how important their role has been in protecting our core values, and therefore the IGC itself. And we now have a new Director, Mónica Bettencourt Dias, a young researcher with exceptional gifts, a major international reputation, a burning enthusiasm for excellence, and the courage to speak her own mind out loud.

What are these qualities that the IGC possesses that enable it to weather such a tempest of troubles, to keep its standards and its scientists together through such an onslaught? I believe it is the underlying philosophy of the IGC established so presciently by António Coutinho in the 1990s. This philosophy asserts, firstly, the value of science itself as an achievement of the human mind and spirit, and secondly, the understanding that science is at once both a personal commitment by its practitioners, a vocation, and also an enterprise that gains its strength from sharing. I believe these characteristics are also respected by the Gulbenkian Foundation, who continue to provide essential financial support. It could be written into the very stones of the IGC that we are here to share what we do, to combine our efforts to reach for a higher goal. We share our skills, our intelligence, our resources, as if they belonged not to ourselves as individuals but to the whole community of the IGC. This gives the IGC great strength, and in difficulties we use this strength together to resolve them. To recall my sandcastle metaphor of 2012, in these 5 years one wave after another has washed over the IGC yet it is still standing proud. It is the sense of participation, of belonging, that infuses the IGC and gives it the extraordinary resilience I have seen in action for a long time, but never more so than in these last complex and difficult 5 years. The Director's responsibilities are many and complex, but none is more important than the preservation of this life-enhancing sense of belonging.

Organisation

The Instituto Gulbenkian de Ciência (IGC) was founded by the Calouste Gulbenkian Foundation (FCG) 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 FCG 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 ensures the ethical conduct of the scientific related to vertebrate animals or human beings.

** In September 2017 the Board of Trustees decided to dissolve the Management Committee.*

Calouste Gulbenkian Foundation Board of Trustees

Artur Santos Silva | President *(up to May 2017)*

Isabel Mota | President *(from May 2017; Trustee up to May 2017)*

Guilherme d'Oliveira Martins
Teresa Gouveia
Martin Essayan
José Neves Adelino
Pedro Norton *(from May 2017)*
Emílio Rui Vilar *
Joaquim Gomes Canotilho *

** Non-executive Trustees*

Instituto Gulbenkian de Ciência

Jonathan Howard | Director

José Mário Leite | Deputy Director
Jorge Carneiro | Deputy Director for Science

Scientific Advisory Board

Kai Simons | Chairman
Max Planck Institute, Dresden, Germany

Martin Raff
University College London, UK
David Sabatini
New York University, USA
Terrence Sejnowski
The Salk Institute, USA
Tony Hyman
Max Planck Institute, Dresden, Germany
Linda Partridge
Max Planck Institute, Cologne, Germany
Ruslan Medzhitov
Yale University, New Haven, USA
Paul Schmid-Hempel
ETH Zurich, Switzerland
Gines Morata
Centro de Biología Molecular Severo Ochoa, Spain

Ethics Committee

Tânia Carvalho PhD, DVM | Chairperson
Instituto de Medicina Molecular, Portugal

Carlos Penha-Gonçalves PhD, DVM
IGC
Manuel Rebelo PhD
IGC
Miguel Fontes MD
External member
Isabel Garcia Civil Servant
External member
Vera Martins PhD
IGC
Maria de Athayde Tavares Lawyer
External member
Vasco Trigo Journalist
External member
Ana Cristina Borges PhD
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:

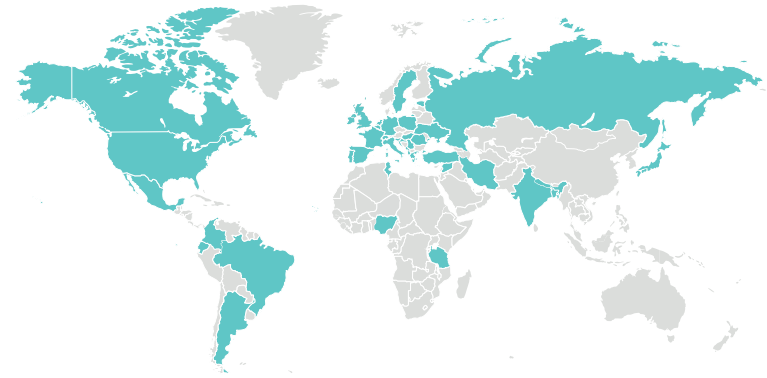
1. To promote multidisciplinary science of excellence in basic biological and biomedical research;
2. To identify, educate and incubate new research leaders, providing state-of-the-art facilities and full financial and intellectual autonomy to pursue research projects;
3. To promote the reciprocal exchange of knowledge between the laboratory bench, clinical medicine and industry with a view to enhancing the value of fundamental research to society;
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; 44 of these have moved on to other research institutes, 28 to research centres in Portugal.*

› *The IGC pioneered graduate training in Portugal. Since 1993, 10 PhD Programmes have been set up, with approximately 80 speakers/year/programme.*

› *By December 2017, more than 590 PhD students had started their science education at the IGC in programmes and research groups.*



41
Nationalities
281 Portuguese
131 Rest of the World

1	Albania	2	Croatia	1	Iran	5	Nigeria	1	Sweden
3	Argentina	1	Ecuador	2	Ireland	6	Poland	1	Switzerland
1	Bangladesh	1	Estonia	9	Italy	281	Portugal	1	Syria
1	Belgium	12	France	3	Japan	1	Romania	1	Tanzania
6	Brazil	11	Germany	1	Mexico	1	Russia	1	Tunisia
2	Canada	2	Greece	1	Montenegro	2	Serbia	1	Turkey
9	Cabo Verde	1	Hungary	1	Nepal	1	Slovenia	1	Ukraine
2	Colombia	9	India	4	Netherlands	16	Spain	3	United Kingdom
								3	United States

FACTS & FIGURES

As of 31st December 2017

412
People work at the IGC
Including 23 visitors
240 F | 172 M

91 Postdocs
102 PhD students
36 Research Groups' technicians
23 Masters students
5 Trainees
23 Visitors
2 PhD programmes
2 Departing Research Groups

298 Researchers
Of which 147 are PhD holders
(not including visitors)

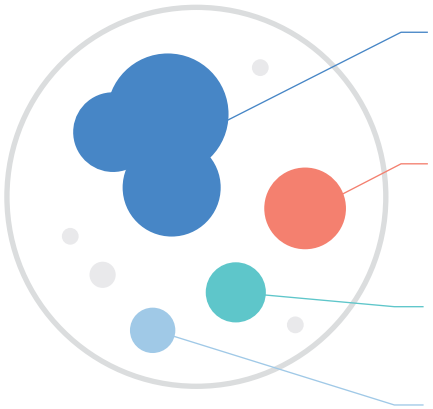
41 Group Leaders
23 Portuguese
18 Rest of the World
19 F | 22 M

11 Core Facilities
45 Core facility staff,
of which 15 are PhD holders
(5 Heads are also Group Leaders)

9 Services
35 Service unit staff,
of which 9 are PhD holders

SCIENTIFIC COMMUNICATION

PUBLICATIONS



In 2017

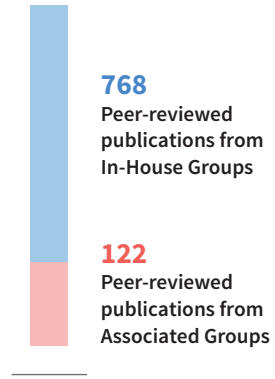
141
Peer-reviewed publications from In-House Groups

22
Peer-reviewed publications from Associated Groups

4
Book chapters

3
Proceedings

In the last 5 years

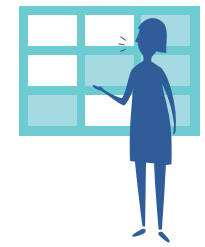


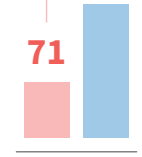
768
Peer-reviewed publications from In-House Groups

122
Peer-reviewed publications from Associated Groups

890
Total

PRESENTATIONS BY IGC RESEARCHERS





National Presentations

192

International Presentations

71

THESES

12 PhD

11 MSc

SEMINARS & MEETINGS

Conferences, Meetings & Workshops organised by IGC researchers

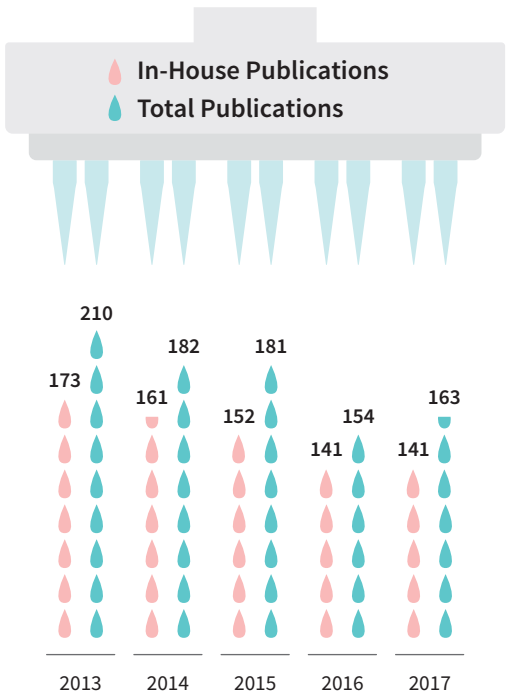
166

33

Seminars at IGC
99 from External speakers

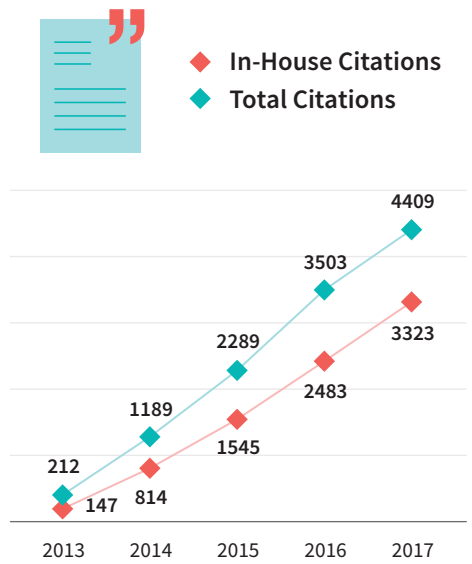
PUBLISHED ITEMS with IGC address in each year

Source: Web of Science, January 2018



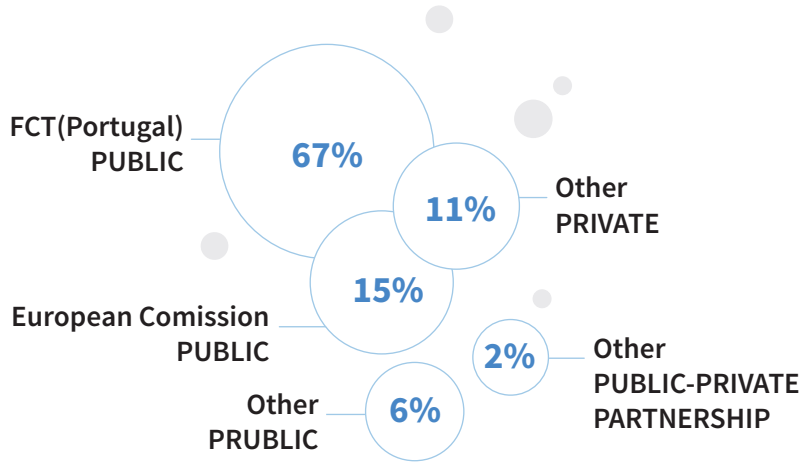
CITATIONS to IGC papers in each year

Source: Web of Science, March 2018

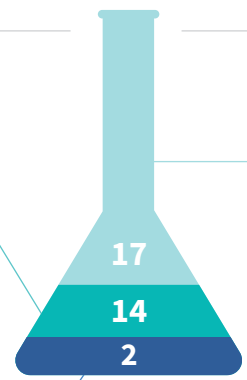


AWARDS & GRANTS secured by IGC researchers

RESEARCH GRANTS BREAKDOW by funding source 2013-2017



COMPETITIVE AWARDS



RESEARCH GRANTS STARTED IN 2017

2 Portugal 2020 PAC projects
1 FCT Investigator Exploratory
2 ERA NETs
1 ERC CoG
1 H2020 Infrastructures
1 HHMI International Research Scholar
1 Marie Curie ITN
1 EFSD/JDRF/Lilly European Programme in Type 1 Diabetes Research
1 ESCMID Research Grant
1 NEDAI Fellowship in Autoimmune Diseases
1 L'Oreal Women in Science Award
1 SPD/Charneco da Costa

OTHER RESEARCH GRANTS AWARDED IN 2017

2 ERC Consolidators

OTHER FUNDING STARTED IN 2017, including bilateral collaboration, travel grants and conference organization

3 EMBO workshops
3 Company of Biologists Scientific Meeting Grants
2 FLAD/NSF
1 Programa Pessoa Bilateral Cooperation Portugal/ France
1 Cooperação Científica e Tecnológica FCT/ Portugal-India 2017-2019
1 Volkswagen European Summer School
1 EMBO YIP Lecture
1 EMBO Keynote Lecture
1 EMBO YIP Network Support
1 EMBO Women in Science Lecture
1 EMBO Travel Grant
1 Tebu-Bio Researcher Travel Grant

60

PRIZES & HONOURS, including:

3 EMBO members
1 HHMI International Research Scholar
1 NEDAI Prize for Research in Autoimmunity

121 **GRANTS** *in the last 5 years*

Source: IGC Research Funding Affairs

Budget Overview 2017

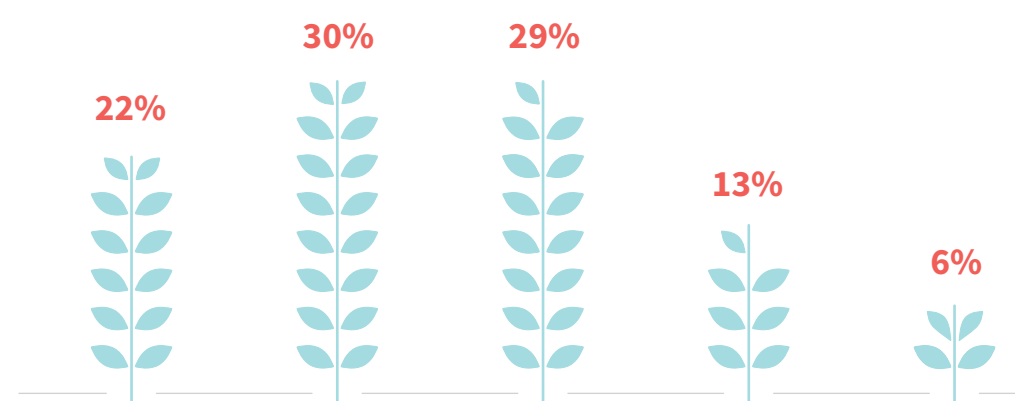
TOTAL BUDGET

15.3M €

46%
INTERNAL Funding
Including FCG

54%
EXTERNAL Funding

BREAKDOWN OF IGC EXPENDITURE



Personnel
Staff and Researchers

Fellowships

Operations
Facility costs, others

Infrastructure
Building maintenance and refurbishments

Equipment

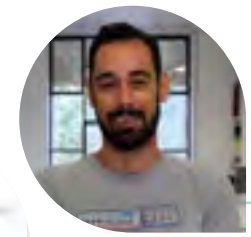
A walk through 2017

Citizens Forum: "How to make ourselves heard?"
The Science and Policy group at IGC and the Nova Institute of Philosophy organised an event to debate ways to improve communication between citizens and MPs.

NEUBIAS Conference at IGC and Calouste Gulbenkian Foundation
The meeting NEUBIAS2020 gathered, for the first time in Portugal, more than 200 specialists in bioimaging analysis, microscopists, analysts and computer engineers.

INFRAGECO – Taking a closer look at Biodiversity
The kick-off meeting of a new European project focused on Biodiversity, INFRAGECO, coordinated by Lounès Chikhi, group leader at IGC, took place at the IGC.

10th anniversary of the European Research Council
The IGC and its partner institutes at EU-LIFE congratulated the European Research Council (ERC) for its 10th anniversary, and joined the "ERC Week" with a multimedia campaign on social media.



Nuno Costa and Vital Domingues awarded by NEDAI
Costa and Domingues, PhD students at IGC, received the NEDAI Research Prize in Autoimmunity 2017 and a Fellowship in Autoimmune Diseases, respectively.

JAN

Erida Gjini and Luís Rocha awarded with grants from the Luso-American Development Foundation and the National Science Foundation
The two IGC group leaders will use these grants to foster a greater collaboration between Portuguese and American laboratories that are essential for the development of ongoing research projects.

FEB

IGC scientists took molecular biology to Nigeria
Ibukun Akinrinade, Concetta Valerio, Dora Szakonyi and Colin Adrain organised a practical course in molecular biology techniques at Bingham University in Nigeria.

Ceremony of the L'Oréal Portugal Medals for Women in Science 2016
Ana Rita Marques, postdoctoral researcher of the Cell Cycle Regulation group at IGC, was one of the four winners for her studies in the mechanisms of stability of centrioles.

MAR

Ceremony of the Pulido Valente Science Award 2016
Roksana Pirzgalska, PhD student from the Obesity group at IGC, was the winner of this award for the discovery that adipose tissue is innervated and that the direct activation of these neurons burns fat.

APR

International Day of Immunology
The IGC joined the Portuguese Society for Immunology (SPI) in preparing a programme full of activities for high school students to celebrate the International Day of Immunology.

Jessica Thompson awarded with grant from the European Society of Clinical Microbiology and Infectious Diseases
The IGC postdoctoral researcher will investigate whether a new approach harnessing the naturally occurring interactions between beneficial gut bacteria and the host immune system influences the outcome of malaria.

AmeeGuS – International joint PhD retreat
The 11th Annual Meeting of Gulbenkian Students (AmeeGuS) joined PhD students from the IGC and from Friedrich Miescher Institute (FMI, Basel).

Ana Domingos selected as a new International Research Scholar
Domingos, group leader at IGC, is one of the 41 scientists selected by the Howard Hughes Medical Institute (HHMI), the Bill & Melinda Gates Foundation, the Wellcome Trust and the Calouste Gulbenkian Foundation.

MAY

JUNE

Three IGC scientists elected EMBO Members
Paula Duque, Isabel Gordo and Miguel Soares, group leaders at IGC, were elected members of the European Molecular Biology Organization - EMBO.

Jardim de Verão
The IGC participated in the public event "Jardim de Verão", organised by the Calouste Gulbenkian Foundation.

IGC at NOS Alive music festival
The IGC and Everything is New, promoter of the NOS Alive festival, celebrated the 10th anniversary of the partnership that has resulted in the funding of 16 young scientists.

JULY

Summer School: "Host-microbe symbioses: from functional to ecological perspectives"
Organised by Karina Xavier and Luís Teixeira, group leaders at IGC, this summer school hosted 30 doctoral students from all over Europe.

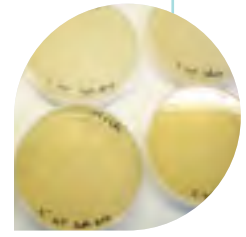
IGC Symposium 2017: Plant RNA Biology
This symposium, organised by Ana Confraria, Concetta Valerio and Dora Szakonyi, IGC postdoctoral researchers, brought together around 70 researchers to discuss recent research developments in the field of plant RNA biology.

European Researchers' Night 2017
The IGC participated at the European Researchers' Night, at Pavilhão do Conhecimento – Centro Ciência Viva, with science activities related to cancer and epidemics.

SEPT

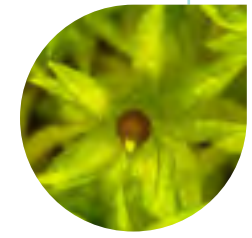
International joint Postdoc Retreat
This event brought together the postdoctoral community of the Babraham Institute, the Max Planck Institute for Plant Breeding Research and the IGC.

AUG



Isabel Gordo and Claudia Bank received new funding to study antimicrobial resistances
A consortium composed of two IGC groups and researchers from Universities in Canada and Denmark was awarded a grant under the ERA-NET scheme.

OCT



New European consortium: MossTech
IGC is the academic partner of a new industry-driven programme that aims to join universities, research centres and companies with the goal of finding new solutions for green biotechnology.

New e-book on Open Science, Open Data and Open Source
The IGC and the Naturalis Biodiversity Center launched a new e-book that addresses the use of open resources in scientific research.

Mónica Bettencourt Dias appointed Director of the IGC
The Board of Trustees of the Calouste Gulbenkian Foundation announced the appointment of Mónica Bettencourt Dias as the new Director of the IGC for the next five years.

Call for the 2018 PhD Programme IBB
The IGC PhD Programme in Integrative Biology and Biomedicine (IBB) opened a call for applications.

IGC Open Day – Universities
During the Science and Technology week, the IGC opened its doors to students from higher education. The programme included talks, round tables, lab visits and speed dating with scientists.

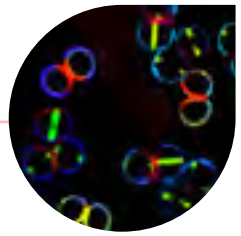
Job Shadowing – Scientist for a Day
The programme "Job Shadowing - Scientist for a Day" gave high school students the opportunity to spend an entire day with a scientist at the IGC, and learn more about science.

NOV

DEC

Ana Domingos and Luís Teixeira awarded with ERC Consolidator Grants
The funding from the European Research Council (ERC) will allow the two IGC group leaders to further develop their research programmes in neurosciences & metabolism, and infection & immunity, respectively.

2nd scientific meeting of PGCD students
Around 50 students of the Graduate Programme Science for Development (PGCD) gathered at Vimeiro to share the research developed during their PhD.



Call for the "Biology at the Host Microbe Interface" PhD Programme
This new PhD programme, organised by ITQB NOVA, IGC and iMM, opened a call for applications.

Isabel Gordo invited to the 27th Solvay Conference on Physics
The IGC group leader was one of the guests of this prestigious conference, this year entitled: "The physics of living matter: Space, time and information in biology".

Some Science Stories from 2017

New method better predicts the onset of seasonal flu epidemics

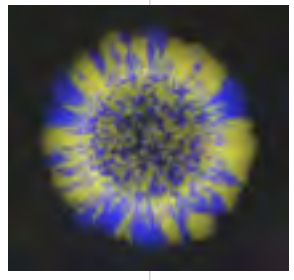
During the flu season, it is frequent for hospital emergency rooms and health care centres to become overcrowded, placing a high burden both on health services and on patients. In Europe, the estimated number of influenza cases is weekly reported by the European Centre for Disease Control, based on data collected from sentinel medical doctors. Despite being a very efficient surveillance mechanism, this system has known limitations and entails an inevitable delay between the actual onset of the seasonal epidemic and its detection.

In a study published in *PLoS Computational Biology*, Joana Goncalves-Sá's group presented a new method to identify the onset of the epidemic, anticipating current official alerts by several weeks. This method integrates information from different sources, namely the official influenza incidence rates, the close to real-time searches for flu-related terms on Google, and an on-call triage phone service. This information is then used to feed a mathematical and computational model that can identify changes in number of cases, thus signalling the beginning of the epidemic. Combined with the current surveillance system, this method may help health services to anticipate, prepare, and respond more promptly to the flu peak.

Won, M., Marques-Pita, M., Louro, C., **Gonçalves-Sá, J.** (2017) *Early and real-time detection of seasonal influenza onset.* **PLoS Comput Biol.** 13(2): e1005330.

New mechanism to fight multi-resistant bacteria revealed

As spread of multi-drug resistant bacteria increases, it is important to understand how are they being maintained in populations. Antibiotics target essential bacteria cellular functions. However, bacteria can evolve and become resistant to these drugs by acquiring mutations in genes involved in those functions. This comes at a cost for bacteria, as most drug-resistant mutations are prejudicial in the absence of the antibiotic. To overcome this, bacteria can acquire additional compensatory mutations.



How these compensatory mutations evolve in multi-drug resistant bacteria was completely unknown. Isabel Gordo and her team identified a compensatory mechanism in bacteria that might be used in the future as a new therapeutic target against multi-drug resistant bacteria. The IGC researchers showed that the pace of the compensatory adaptation in multi-drug resistant *Escherichia coli* (*E. coli*) strains is faster than for strains carrying a single resistance mutation. Most importantly, they were able to identify the key proteins involved in the compensatory mechanism of multi-drug resistant bacteria, which are proteins that link the ribosome to the RNA polymerase protein. These results came from the analysis of *E. coli* strains with single resistance to rifampicin and to streptomycin antibiotics, and strains with resistance to both antibiotics, grown in antibiotic-free media. The mechanism now discovered and published in *PLoS Biology*, might be generally used in several other multi-drug resistances, since antibiotics target the same cellular mechanisms.

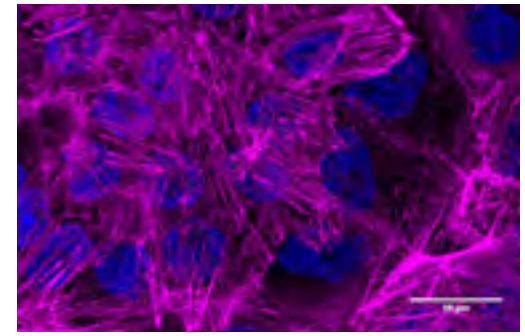
Moura de Sousa, J., Balbontin, R., Durão, P., **Gordo, I.** (2017) *Multidrug-resistant bacteria compensate for the epistasis between resistances.* **PLoS Biol.** 15(4): e2001741.

E. coli with different antibiotic resistances (in yellow and blue) evolving. © Paulo Durão, IGC.

Tumor cells get stiff before becoming invasive

The progression of breast cancer disease takes several stages, from a benign lesion to an invasive carcinoma, possibly with metastasis. But actually, only 20 to 50% of benign tumors end up as invasive cancer. Predicting what lesions are within this group could result in a better use of therapeutics accordingly to the severity of the disease. Florence Janody's group has been looking for signals inside the cells that could help predicting benign tumors that will progress to invasive carcinoma. Their attention focuses on the cell skeleton - the cytoskeleton -, an intricate network of fibers that can either exert or resist forces, and that may have an impact on tumor invasion and malignancy. These fibers can be organised into distinct architectures to confer cells a more rigid or soft structure.

In a study published in *Nature Communications*, the IGC team showed that breast cancer cells undergo a stiffening state prior to acquiring malignant features and becoming invasive. The researchers discovered that cell stiffening induces the activity of proteins that promote cell proliferation, driving the growth of benign tumors. Most importantly, this cell rigidity state also triggers the subsequent progression into invasive cancer.



Tavares, S., Vieira, A.F., Taubenberger, A.V., Araujo, M., Martins, N.P.S., Bras-Pereira, C., Polonia, A., Herbig, M., Barreto, C., Otto, O., Cardoso, J., Pereira-Leal, J.B., Guck, J., Paredes, J., **Janody, F.** (2017) *Actin stress fiber organization promotes cell stiffening and proliferation of pre-invasive breast cancer cells.* **Nat Comm.** 8: 15237.

Accumulation of cytoskeleton fibers (pink) in cancer cells. © Sandra Tavares, IGC.

Bacteria conversation can trigger plant pathogens virulence

Bacteria 'talk' to each other in order to adjust their behaviour to environmental changes or presence of other species. The 'language' used by bacteria is made of small chemical molecules that are released when bacteria reach high numbers.

In a study published in *mBio*, Karina Xavier's laboratory discovered that the virulence of pathogenic bacteria is precipitated in the presence of other pathogenic species that release chemical signals to the environment. The bacteria species used in this study was *Pectobacterium wasabiae*, an important group of plant pathogens that produce enzymes that degrade the cell wall of rooting plant tissue. Typically, this bacteria species needs to be at a high density to produce the chemical molecules that will activate their virulence response. But the IGC team discovered that its virulence response could be triggered earlier, even at low densities, if these bacteria eavesdrop on signals released by other pathogenic species present in the environment.

Valente, R.S., Nadal-Jimenez, P., Carvalho, A.F.P., Vieira, F.J.D., **Xavier, K.B.** (2017) *Signal integration in quorum sensing enables cross-species induction of virulence in* Pectobacterium wasabiae*.* **mBio.** 8: e00398-17.

Potato infected with *Pectobacterium wasabiae*. © Rita Valente, IGC.

A rusty and sweet side of sepsis

It is well known that sepsis patients vary in their response to infection and disease severity, depending on the type of infection as well as on their genetic characteristics, coexisting illnesses and age. A long lasting unsolved mystery relates to why despite an effective control of the infectious microorganisms by the use antibiotics, some patients succumb while others recover from the infection.
Over the past five years the research team led by Miguel Soares has put forward the concept that those individuals that do not succumb to sepsis develop a protective response that maintains the function of vital organs, conferring disease tolerance to the infection. In a study published in *Cell*, the IGC group proposes a new disease tolerance mechanism. The researchers discovered that controlling iron metabolism is required to sustain the production of glucose in the liver so that glucose can be used as a vital source of energy by other organs. This is required to maintain the function of those organs in response to infection and as such to prevent the development of lethal forms of sepsis. Involved in this mechanism is ferritin, a protein that controls iron in the liver. The IGC team observed that ferritin is absolutely required for the liver to produce glucose after an infection and hence to protect mice from succumbing to sepsis. When ferritin is absent, iron deregulates the expression of the enzyme Glucose 6 phosphatase and the liver loses its capacity to secrete glucose. This protective mechanism does no influence the microorganisms that are the underlying cause of the disease and as such is said to confer disease tolerance to sepsis.

Weis, S., Carlos, A.R., Moita, M.R., Singh, S., Blankenhaus, B., Cardoso, S., Larsen, R., Rebelo, S., Shäuble, S., del Barrio, L., Mithieux, G., Rajas, F., Lindig, S., Bauer, M., **Soares, M.P.** (2017) *Metabolic adaptation establishes disease tolerance to sepsis.* **Cell.** 169: 1-13.

Baker's yeast can help plants cope with soil contamination

Heavy metals and organic pollutants released into the environment by the industry, as well as the misuse of herbicides and pesticides commonly used in agriculture, negatively affect the quality of soils. Some plant species are able to remove soil contaminants and grow normally, but these are a small minority. Most plant species, including crops, cannot tolerate the toxic effects of soil pollutants, which dramatically impair their growth and development.
A research team led by Paula Duque discovered that two genes from *Saccharomyces cerevisiae* – a species of yeast used for baking, brewing, and winemaking – can increase plant resistance to a broad range of toxic substances, enabling their growth in contaminated soils. Results from the study published in *Scientific Reports* showed that after inserting either of the two yeast genes into *Arabidopsis thaliana*, the plants grew significantly better than wild-type plants in soils contaminated with herbicides, fungicides and heavy metals. The extrapolation of these observations to crops will require further experiments in *Arabidopsis* and in other plant species. But the results hold much promise to help solve a difficult environmental problem.

Remy, E., Niño-González, M., Godinho, C.P., Cabrito, T.P, Teixeira, M.C, Sá-Correia, I., **Duque, P.** (2017) *Heterologous expression of the yeast Tpo1p or Pdr5p membrane transporters in* Arabidopsis *confers plant xenobiotic tolerance.* **Sci Rep.** 7: 4529.

Arabisopsis thanliana. © Raquel Carvalho, IGC.

Making fat mice lean: Novel immune cells control neurons responsible for fat breakdown

The biological causes underlying obesity have been under intense scrutiny with studies suggesting a link between the nervous and the immune systems. A research team led by Ana Domingos discovered an unforeseen population of immune cells associated with neurons that play a direct role in obesity. These immune cells are a particular type of macrophages coined as SAMs (sympathetic neuron-associated macrophages).
The IGC team discovered that these macrophages are in intimate contact with the sympathetic neurons that innervate the adipose tissue. Once activated, these neurons release norepinephrine, a neurotransmitter that induces fat breakdown. SAMs work by clearing out norepinephrine, contributing to obesity by preventing subsequent fat reduction. By conducting genetic studies in mice, the researchers were able to pinpoint the molecular mechanism underlying SAM-mediated destruction of norepinephrine. The import mechanism of this neurotransmitter involves the protein Slc6a2, which acts as transporter for norepinephrine and is only present in SAMs but not in other immune cells. The IGC team further showed that blocking the import mechanism of norepinephrine by SAMs boosts fat breakdown, energy dissipation, and weight loss. These results, published in *Nature Medicine*, set the stage for the development of new anti-obesity therapies.

Pirzgalska, R. M., Seixas, E., Seidman, J. S., Link, V. M., Sanchez, N. M., Mahu, I., Mendes, R., Gres, V., Kubasova, N., Morris, I., Arús, B.A., Larabee, C. M., Vasques, M., Tortosa, F., Sousa, A.L., Anandan, S., Tranfield, E., Hahn, M.K., Iannacone, M., Spann, N.J., Glass, C.K., **Domingos, A.I.** (2017) *Sympathetic neuron-associated macrophages contribute to obesity by importing and metabolizing norepinephrine.* **Nat Med.** 23: 1309–1318.

New insights into the release of molecules involved in inflammatory diseases

Most proteins involved in communication between cells reside on the cell surface, hooked to the membrane. This is the case for the inflammatory molecule, TNF. When TNF is released from the membrane, it binds to its receptor on the cell surface, activating a cascade of events that change the cell's behaviour fundamentally, preparing the cell and surrounding tissue to fight infection. However, TNF is deregulated in a range of inflammatory diseases and is therefore the focus of several therapeutic strategies. Therapies for anti-inflammatory diseases focus on blocking the action of TNF. Although anti-TNF therapies are currently being used to treat patients, they do not always work efficiently.
In a study published in *Cell Reports*, a research team led by Colin Adrain pinpointed the precise molecular mechanisms involved in TNF release. It was already known that TNF molecules are cut from the cell surface by an enzyme called TACE that acts as "molecular scissors" to release TNF and other important molecules from the cell. The IGC researchers observed that the key to controlling these "scissors" lies on the regulation of a protein called iRhom2. An important feature of the newly identified mechanism is that the same protein, iRhom2, is important for controlling the release of growth factors that trigger cellular growth associated with many serious epithelial cancers.

Cavadas, M., Oikonomidi, I., Gaspar, C.J., Burbridge, E., Badenes, M., Félix, I., Bolado, A., Hu, T., Bileck, A., Gerner, C., Domingos, P.M., von Kriegsheim, A., **Adrain, C.** (2017) *Phosphorylation of iRhom2 controls stimulated proteolytic shedding by the metalloprotease ADAM17/TACE.* **Cell Rep.** 21(3): 745-757.

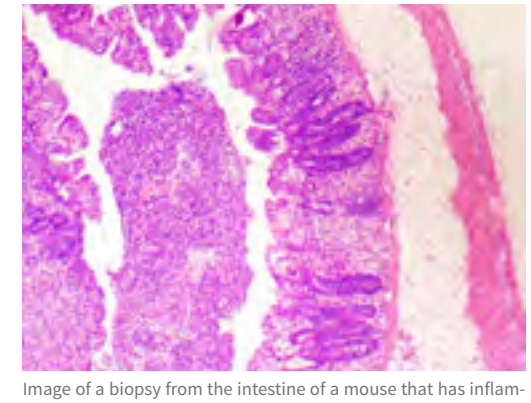


Image of a biopsy from the intestine of a mouse that has inflammatory bowel disease. © Pedro Faísca, IGC.

In the mood for love: Scientists explain periodicity in human reproduction

Why is that more babies are born in September than in other months of the year, in Northern hemisphere Western countries? Until now, it was mainly thought that the peak in conceptions in December was due to a biological adaptation to winter's shorter days and low temperatures, since in Northern countries the winter solstice occurs in this month. But lack of accurate worldwide data left this hypothesis untested.

Using worldwide data from Twitter and Google Trends, a research team led by Joana Gonçalves-Sá and Luís Rocha found that culture, and not only biology, drives human reproductive cycles. Their study, published in *Scientific Reports*, showed that there is a specific mood associated with religious celebrations, and that this "loving mood" can influence human reproductive behaviour. The research team set to track people's mood and online behaviour throughout the year, in different countries, from both Northern and Southern Hemispheres, and with different cultural traditions (Christian or Muslim). They found that online searches related to sex have a cyclical nature that correlates with a specific "loving mood", as independently detected on Twitter. Moreover, they saw that these cyclical patterns are very similar among countries that share the same cultural tradition but not necessarily among countries that share geographical location. Worldwide peaks of sexual interest exist and coincide with specific religious celebrations – Christmas in Christian countries, and Eid-al-Fits and Eid-al-Adha in Muslim countries – leading to peaks in birth rates 9 months later. Since these celebrations fall on the same date in both Northern and Southern Hemispheres, cultural traditions and not biology, must be driving these moods.

Wood, I.B., Varela, P. L., Bollen, J., Rocha, M.L., **Gonçalves-Sá, J.** (2017) *Human sexual cycles are driven by culture and match collective moods.* **Sci Rep.** 7: 17973.

Fish also need friends

The support that each individual receives from those around him/her influences his/her behaviour and can help the individual to surpass setbacks. Besides humans, other social animals are able to better recover from an adverse situation in the presence of their peers. The neural mechanisms that underlie the social support phenomenon are unknown, and that was what Rui Oliveira's team set to unveil.

In a study published in *Scientific Reports*, Oliveira's team showed that zebrafish need social support to overcome adverse circumstances and may, therefore, become a model of choice for studying this behaviour and its underlying neural mechanisms. Zebrafish exhibited less fear in a threatening situation when they could see and smell their shoal than when they were alone, revealing the presence of the social support phenomenon in this species. The researchers observed in zebrafish a specific pattern of activation in several brain areas (pre-optic area, amygdala) that are also involved in the same phenomenon in mammals. These similarities between the activated brain areas suggest zebrafish as an ideal model organism for research on social support, since it may reproduce neural mechanisms that also exist in humans.

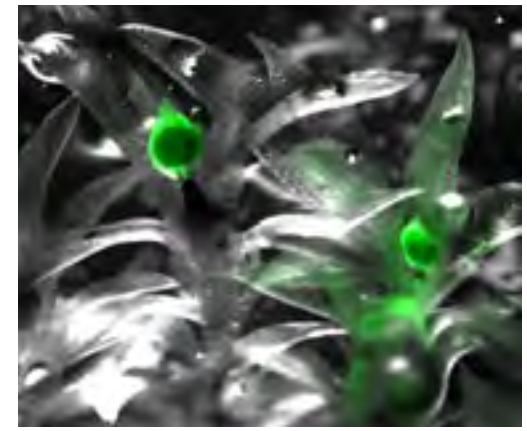
This study was conducted at the IGC, Champalimaud Research and ISPA-Instituto Universitário.

Faustino, A. I., Tacão-Monteiro, A., **Oliveira, R.F.** (2017). *Mechanisms of social buffering of fear in zebrafish.* **Sci Rep.** 7: 44329.

Watercolour © Rodrigo Abreu.

What do sex in moss and neurons have in common?

For many years biologists have wondered why plants have so many genes coding for proteins that are known to be essential for the nervous system of animals, called glutamate receptors (GLR). These proteins are key molecular players in how neurons talk inside our brain, playing a central role in memory and learning. However, plants have no neurons. Therefore why do some plants have even more genes for this kind of proteins than our own brain?



Physcomitrella patens. © Carlos Ortiz-Ramíréz.

The moss *Physcomitrella patens* is one of the early land plants, and contrary to higher plants, this organism has swimming sperm and only two copies of GLR genes. Using this plant, a research team led by José Feijó, former group leader at the IGC and currently at University of Maryland (USA), discovered new functions for GLR proteins. On one hand, the moss sperm uses these proteins to navigate its swimming towards the female organs and ensure offspring. On the other hand, these proteins play an important role in the control of gene expression, which is crucial for spore development.

Published in *Nature*, this study was initiated at Instituto Gulbenkian de Ciência and continued at University of Maryland, after Feijó's team moving there. It had the collaboration of Jörg Becker's team.

Ortiz-Ramírez, C., Michard, E., Simon, A.A., Damineli, D.S.C., Hernández-Coronado, M., Becker, J.D., **Feijó, J.A.** (2017) *Glutamate Receptor-like channels are essential for chemotaxis and reproduction in mosses.* **Nature.** 549: 91–95.

Zebrafish with cancer patients' tumors could be used for personalised treatment

Efficacy of anticancer treatments varies across patients. Drugs are normally not tested on a personalised level. Instead, their prescription follows the success rates obtained in clinical trials involving many patients. In a study initiated at IGC and further developed at the Champalimaud Centre for the Unknown, a research team led by Miguel Godinho Ferreira showed that zebrafish larvae may be used to choose, in less than 2 weeks, the best treatment for cancer patients.

The researchers transplanted into the fish tumoral masses from five patients with colorectal cancer and subjected the fish to the same chemotherapy as the patients. They observed that the outcome of the fish larvae response to chemotherapy coincided with what was observed in patients some time afterwards. The team further discovered that the fish model had an incredible resolution power, being capable to detect different treatment requirements in very genetically similar tumors.

Their observations revealed that changes to the tumor's response to a treatment could result from just a single mutation in RAS gene, a gene that is frequently altered in cancerous tumors.

Fior, R., Póvoa, V., Mendes, R.V., Carvalho, T., Gomes, A., Figueiredo, N., **Ferreira, M.G.** (2017) *Single-cell functional and chemosensitive profiling of combinatorial colorectal therapy in zebrafish xenografts.* **Proc Natl Acad Sci U.S.A.** 114: E8234-E8243.

Peptide-therapies for autoimmune diseases: the importance of data reproducibility to cover individual diversity

When the immune system fails to distinguish between healthy tissues and pathogenic threats it may give rise to autoimmune diseases, such as lupus, multiple sclerosis or Type 1 Diabetes. Allergies are other conditions where the immune system misdirects its activities. In the clinic, undesired immune activity targeted at allergens, can be successfully dampened through antigen-specific immunotherapy. The hope is that such tolerogenic vaccination, designed to establish immune tolerance, could also be a therapeutic option to prevent or cure autoimmune diseases. Few years ago, a promising study from Harvard Medical School described an insulin peptide that could fully prevent Type 1 Diabetes in mice that otherwise spontaneously develop this disease. The proposed biological mechanism was that the treatment favored the development of a subset of white blood cells, called "regulatory T cells", which function is to dampen immune responses.

Jocelyne Demengeot's team recently identified a subset of T cell exquisitely equipped to differentiate into regulatory T cells. To further probe the clinical relevance of their discovery, the team chose the insulin peptide-Type 1 Diabetes preclinical assay. Although strict measures were taken to mirror all experimental conditions reported in the Harvard study, the team could not reproduce the original findings. The same insulin peptide administrated to the same susceptible mouse strain had either no beneficial effect or in some cases even accelerated disease onset and worsened diabetes.

These results highlight that the success of peptide therapy in preclinical studies is conditioned by yet unidentified biological variables, with severe impact on reproducibility. Therefore, peptide therapy should be robust across preclinical assays, and unwanted side effects fully excluded, before being initiated in clinical trials in humans.

A fundamental principle in science is that data must be reproducible to be accepted as a basis for new knowledge. Scientists naturally integrate experimental models, previously developed by others, in their ongoing research to address further biological mechanisms. By doing so, they probe the reproducibility of previous findings.

Bergman, M., Lopes-Carvalho, T., Martins, A., Grieco, F.A., Eizirik, D.L., **Demengeot, J.** (2017) *Tolerogenic insulin peptide therapy precipitates type 1 diabetes.* **J Exp Med.** 214: 2153- 2156.

RESEARCH

298
Researchers

14
New Projects

41
Groups

141
Publications

Membrane Traffic

Group Leader | **Adrain, Colin**

Research Interests

- Regulation of signalling by metalloproteases.
- Control of adipose tissue homeostasis.

Lab Members in 2017

Marina Badenes · Postdoc
Miguel Cavadas · Postdoc
Abdulbasit Amin · IBB PhD Student
Catarina Gaspar · External PhD student
Ioanna Oikonomidi · IBB PhD student
Joana Perdigão · Masters student
Emma Burbridge · Lab Manager
Inês Félix · Technician

Funding

› European Commission
› Fundação para a Ciência e a Tecnologia
› Worldwide Cancer Research

Main Achievements

Allosteric regulation of the cell surface protease TACE by iRhom2. Our paper, published in *Cell Reports* (Cavadas *et al.*, 2017), focused on understanding a process called "shedding": the stimulated release of signalling molecules from the cell surface, by the protease TACE/ADAM17. We found that the induction of TACE's proteolytic activity in response to a range of TACE-activating stimuli, requires phosphorylation of a protein called iRhom2. iRhom2 phosphorylation triggers the recruitment of 14-3-3 proteins to iRhom2. This enforces the dissociation of TACE from iRhom2, exposing TACE to its substrates, enabling shedding.

iTap, a novel iRhom-binding cofactor, is essential for TNF release. In a biochemical screen, we identified a novel protein that we have named iTap (iRhom tail-associated protein). Our work shows that iTap is essential for stabilising complexes of iRhom and TACE at the cell surface. When iTap is ablated in mammalian cell lines or in primary human or mouse cells, TACE activity is blocked, preventing cells from secreting the inflammatory cytokine, TNF. Loss of iTap results in the degradation of iRhom and TACE, explaining why TNF release is blocked.

Control of adipose tissue homeostasis by iRhom2. We identified a novel function for iRhom2 in metabolic control. Our data suggest that iRhom2 promotes multiple aspects of metabolic syndrome in a mouse model of obesity.

Publications

› Cavadas, M., Oikonomidi, I., Gaspar, C.J., Burbridge, E., Badenes, M., Félix, I., Bolado, A., Hu, T., Bileck, A., Gerner, C., Domingos, P.M., von, K.A., **Adrain, C.** (2017) *Phosphorylation of IRHom2 controls stimulated proteolytic shedding by the metalloprotease Adam17/Tace*. **Cell Rep**. 21: 745-757.

› Johnson, N., Březinová, J., Stephens, E., Burbridge, E., Freeman, M., **Adrain, C.**, Strisovsky, K. (2017) *Quantitative proteomics screen identifies a substrate repertoire of rhomboid protease Rhbdl2 in human cells and implicates it in epithelial homeostasis*. **Sci Rep-UK**. 7: 7283.

Figure: Most proteins involved in communication between cells reside on the cell surface. These are tethered to the membrane, and often need to be released in order to function. This is the case for TNF, a molecule that triggers inflammatory responses during infection and inflammatory diseases. We discovered that the activation of TACE, the protein that functions as "molecular scissors" to release TNF from cells, is controlled by another protein located in the membrane, called iRhom2.

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Biophysics and Genetics of Morphogenesis

Group Leader | **Alves, Filipa**

Research Interests

Throughout development and growth, gene expression and cell metabolism are regulated both in space and time, leading to complex patterns of cell differentiation from seemingly simpler initial conditions. We use mathematical modelling to study how the dynamic behaviour of key regulatory networks can generate well-defined sharp state transitions in cells, triggered by critical changes in their biophysical parameters.

We are investigating two distinct, yet related, mechanisms:

1) Cells express different genes depending on their spatial location. We are analysing the pigmentation patterning in butterfly wings to investigate how local gene regulation and tissue architecture act together to define organised patterns of cell differentiation and how this interplay both generates and constrains the phenotypic variation observed within and between species.

2) Cells express different genes at different points in time. We are studying the developmental switch of ovary maturation in *Drosophila* as a model system for how the patterning of individual organs is coordinated in time as whole-body development and growth progress and how the regulatory mechanisms involved ensure robustness against environmental and physiological perturbations.

Main Achievements

To quantitatively describe the experimental results, we focused on disentangling different quantitative traits from complex patterning phenotypes by developing tailored image analysis methods for *Bicyclus* and *Drosophila* pigmentation patterns.

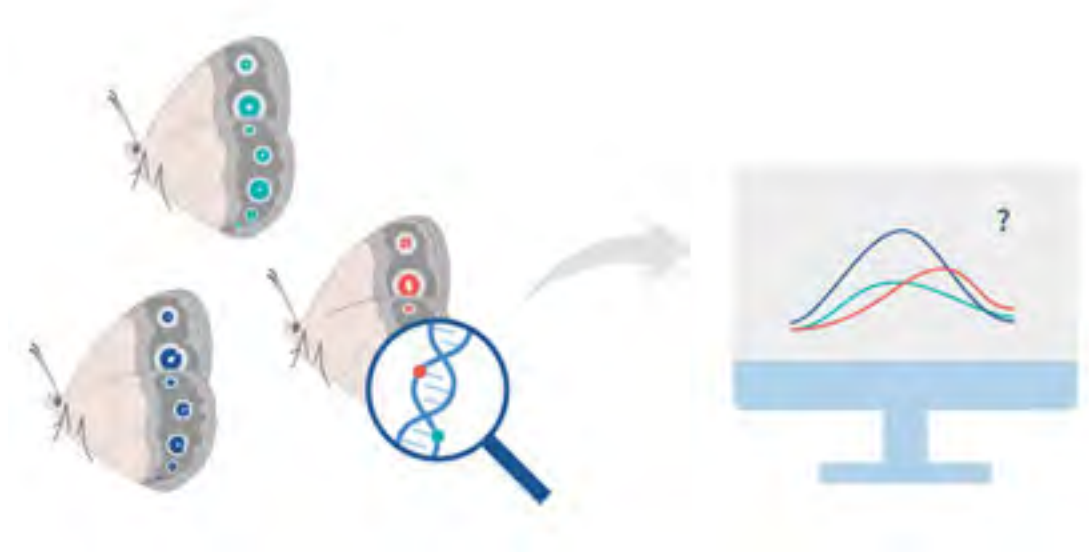

Figure: Butterflies offer a great example of genetic diversity within a species. Individuals of the same species show different pigmentation patterns in their wings. I have been developing new methods to analyse these patterns and to study how spatial location influences gene expression.

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Cell Biology of Viral Infection

Group Leader | **AMORIM, Maria João**

Research Interests

Influenza A virus (IAV) is a major human pathogen. We focus on how IAV modulates the host cell altering cellular architecture, membrane trafficking and host immunity to assist viral infection.

Lab Members in 2017

Marta Alenquer · Postdoc
Sílvia Costa · Postdoc
Temitope Akhigbe Etibor · PhD student, 2017 IBB | Started in September
Nuno Santos · PhD student, 2016 PGCD
Zoé Vaz Da Silva · PhD student, 2013 PIBS

Joana Perdigão · Masters student | Left in September
Ana Laura-Sousa · Masters student (joint student with EM facility) | Left in November
Luka Krampert · Undergraduate | Started in November
Filipe Ferreira · Lab manager

Funding

› Fundação para a Ciência e a Tecnologia

Main Achievements

We made considerable progress in understanding:
- **Viral assembly:** IAV genome contains 8 distinct RNA segments (vRNPs), packaged in a budding virion. Interestingly, the location of genome complex formation inside the host cell remains unclear. Recent reports propose that genome assembly and vRNP transport are inter-connected events. Our work supports a mechanistic model in which the virus induces changes in vRNP transport machinery (Rab11-vesicles) leading to zones of clustered vesicles in the cytosol. Clustered vesicles constitute hotspots with all viral RNA segments facilitating interactions and genome assembly.

Our group has greatly contributed to the molecular understanding of alterations in Rab11 associated machinery with infection, showing that some effectors loose the ability to interact with Rab11 (e.g. Rab11 family interacting proteins) whilst others retain their binding capacities (e.g. KIF13A), being important for viral replication in the host cell.
- **Modulation of host innate immunity:** Other membrane trafficking alterations occur upon infection. Using the mouse model, we identified the host GPI-anchored protein DAF as influenza A virulence factor that is modulated by infection, increasing the recruitment of monocytes and neutrophils to sites of infection.

Selected Publications

› Ramos-Nascimento, A., Kellen, B., Ferreira, F., Alenquer, M., Vale-Costa, S., Raposo, G., Delevoye, C., **Amorim, M.J.** (2017) *Kif13a mediates Influenza A virus ribonucleoproteins trafficking*. **J Cell Sci**. 130: 4038-4050.

› Sousa, A.L., Vale-Costa, S., **Amorim, M.J.**, Tranfield, E.M. (2017) *Using correlative light and electron microscopy to understand Influenza A viral assembly*. **Ultrastruct Pathol.** 41: 80-81.

** The complete list of publications is available on section 3. Publications.*

Figure: Influenza A virus is a major agent causing flu. Understanding how this virus assembles after infection can help us identifying more targeted approaches to fight it. We discovered the first molecular motor that efficiently transports viral particles from inside the cell to the surface.

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External Website · http://sites.igc.gulbenkian.pt/cbv/

Protein - Nucleic Acids Interactions

Group Leader | **ATHANASIADIS, Alekos**

Research Interests

For the vertebrate innate immune system, nucleic acids represent a major Pathogen Associated Molecular Pattern (PAMP) capable of triggering interferon responses and apoptotic/necroptotic cell death. We are interested in understanding how cells distinguish self-nucleic acids from foreign and the molecular mechanisms involved in maintaining homeostatic balance. We are studying the dsRNA sensing pathway and the role of A to I RNA editing to render cellular transcripts non recognisable by the innate immune sensors.

Lab Members in 2017

Bharath Srinivasan · Postdoc | Started in February
Lidia Jesus · Masters student | Started in February
Gabrielle Kosoy · Technician | Left in September

Funding

› Fundação para a Ciência e a Tecnologia

Main Achievements

We successfully characterised *in vivo* ligands of Zalpha domains. Such domains which are uniquely found in proteins involved in the ds-RNA sensing pathway have a role in detecting Influenza A and other viral RNAs. We have obtained transcriptome data of RNAs bound by Zalpha domains and have obtained crystals of complexes of Zalpha with candidate *in vivo* activator RNAs. We also have obtained proteome data on other proteins co-interacting to Zalpha ligands aiming to identify additional players of this pathway.

Publications

› Jesus, T.F., Moreno, J.M., Repolho, T., **Athanasiadis, A.**, Rosa, R., Almeida-Val, V.M.F., Coelho, M.M. (2017) *Protein analysis and gene expression indicate differential vulnerability of Iberian fish species under a climate change scenario*. **PLoS ONE**. 12: e0181325.

› Rakus, K., Ronsmans, M., Forlenza, M., Boutier, M., Piazzon, M.C., Jazowiecka-Rakus, J., Gatherer, D., **Athanasiadis, A.**, Farnir, F., Davison, A.J., Boudinot, P., Michiels, T., Wiegertjes, G.F., Vanderplasschen, A. (2017) *Conserved fever pathways across vertebrates: a Herpesvirus expressed decoy TNF-α receptor delays behavioral fever in fish*. **Cell Host Microbe**. 21: 244-253.

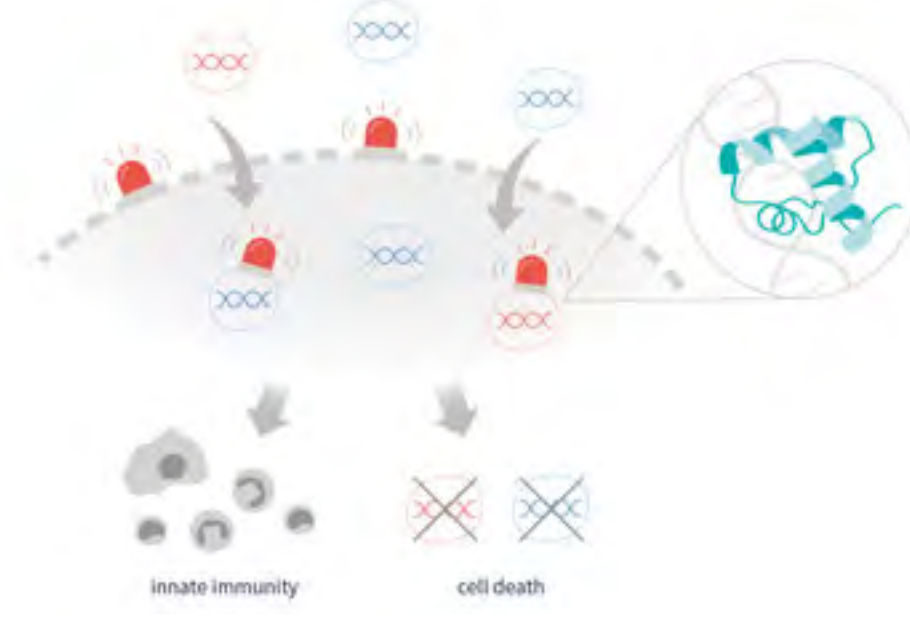

Figure: Innate immunity is the first-line of defence against invading viruses and bacteria. Involved in this process are specialized receptors that recognise pathogen molecular patterns and are capable of among others to detect nucleic acids. However, how exactly foreign nucleic acids (red) are distinguished from host DNA (blue) is poorly understood. Moreover, false recognition may lead to cell death events, often associated with autoinflammatory disorders. We study the molecular mechanisms behind those processes and aim to understand what consequences they might have on molecular evolution dynamics.

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Plant Stress Signalling

Group Leader | **BAENA GONZÁLEZ, Elena**

Research Interests

We are interested on the mechanisms underlying carbon sensing and management in plants at the cellular and whole plant levels. We further seek to understand how carbon management systems interact with other signalling pathways to drive adequate growth and developmental decisions. Our current efforts aim at dissecting the SnRK1 pathway, one of the major players of carbon signalling.

Lab Members in 2017

Ana Augusto · Postdoc
Leonor Margalha · Postdoc
Concetta Valerio · Postdoc | Left in December
Mattia Adamo · External PhD student
Carlos Elias · PhD student, 2013 PIBS
Filipa Lopes · External PhD student, 2017 Plants for Life | Started in June
Bruno Peixoto · External PhD student, 2016 Plants for Life
Diana Reis · Masters student | Started in September
Américo Rodrigues · Visiting scientist
Sjef Smeekens · Visiting scientist

Funding

› Fundação para a Ciência e a Tecnologia

Main Achievements

Following up on our previous finding that ABA activates and sustains SnRK1 signalling via inhibition of PP2C phosphatases, we have more recent evidence suggesting that the regulation of these two pathways is reciprocal and that SnRK1 is required for proper ABA signalling (work in progress). Current efforts seek to gain mechanistic insight into this connection.
Using a luciferase-based mutant screen we have identified several factors that influence SnRK1 activity. We are currently characterising in depth one of these, which corresponds to an E3 ubiquitin ligase. This factor negatively regulates SnRK1 stability, and this regulation is particularly important for the control of root growth and architecture (work in progress).
In collaboration with the group of Wolfgang Dröge-Laser (Würzburg University, Germany) we have shown that SnRK1 is important for the activation of branched-chain amino acid catabolism, which constitutes an alternative mitochondrial respiratory pathway, crucial for plant survival during energy stress.
Pedrotti, L., Weiste, C., Nägele, T., Wolf, E., Lorenzin, F., Dietrich, K., Mair, A., Weckwerth, W., Teige, M., Baena-González, E., Dröge-Laser, W. SnRK1-1 C/S1-bZIP signalling activates alternative mitochondrial metabolic pathways to ensure plant survival upon low energy stress. Plant Cell, *Accepted*.

Publications

› **Baena-González, E.**, Hanson, J. (2017) *Shaping plant development through the SNRK1-TOR metabolic regulators*. **Curr Opin Plant Biol**. 35: 152-157.

› Mancio-Silva, L., Slavic, K., Grilo, R.M.T., Grosso, A.R., Modrzynska, K.K., Vera, I.M., Sales-Dias, J., Gomes, A.R., MacPherson, C.R., Crozet, P., Adamo, M., **Baena-Gonzalez, E.**, Tewari, R., Llinás, M., Billker, O., Mota, M.M. (2017) *Nutrient sensing modulates malaria parasite virulence*. **Nature**. 547: 213-216.

Figure: The SnRK1 protein kinase allows plants to adjust their growth and development in accordance to the prevailing environment. Under adverse conditions (salinity, cold, heat, shading, nutrients, pathogens) SnRK1 confers stress tolerance and promotes survival by inducing defence responses at the expense of growth. When environmental conditions are favorable, SnRK1 activity is inhibited to allow growth and developmental progression.

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Evolutionary Dynamics

Group Leader | **BANK, Claudia**

Research Interests

Work in the *Evolutionary Dynamics* Group is focused on the study of evolution, and in particular on the population genetics of adaptation and speciation. Questions at the interface between theoretical and empirical biology are approached through theoretical modelling, computational methods, and statistical data analysis, and via targeted collaborations with wet-lab researchers.

Lab Members in 2017

Alexandre Blanckaert · Postdoc
Inês Fragata · Postdoc
Ana-Hermina Ghenu · PhD student, 2017 IBB
Marco Louro · PhD student, 2017 IBB | Started in July
Mark Schmitz · Visitor

Funding

› Fundação para a Ciência e a Tecnologia

Software Development

› The loss of a Dobzhansky-Muller incompatibility by immigration: a visualisation tool to track the discrete-time dynamics of a neutral DMI upon secondary contact, i.e. upon reconnection of two previously isolated populations, implemented in JavaScript and available as a web app. https://evoldynamics.org/tools/

Main Achievements

Research: How is speciation different between diploid and haplodiploid organisms? Inspired by our collaborators' findings in natural populations of wood ants in Finland, where the coexistence of hybrid incompatibility and heterozygote advantage create a rugged fitness landscape, we developed mathematical models to compare the evolutionary dynamics of hybrid populations of diploid and haplodiploid organisms. We showed that the evolutionary outcomes between genetic systems are dramatically different. Our results imply a specific signature of hybrid incompatibilities in haplodiploids. This, in turn, provides an alternative hypothesis why X chromosomes in diploids may appear as hotspots of speciation genes and sexual conflict. (A.-H. Ghenu*, A. Blanckaert*, R.K. Butlin, J. Kulmuni, and C. Bank. Conflict between heterozygote advantage and hybrid incompatibility in haplodiploids (and sex chromosomes). **Molecular Ecology**, *Accepted*.

Lab: Our lab was represented at various conferences in Europe and North America. Altogether, lab members gave 13 talks, 10 of which were invited. Furthermore, Claudia represented the lab during a month-long invited stay in the programme "Eco-Evolutionary Dynamics in Nature and the Lab" at the Kavli Institute for Theoretical Physics in Santa Barbara.

Publications

› Matuszewski, S., Ormond, L., **Bank, C.**, Jensen, J.D. (2017) *Two sides of the same coin: a population genetics perspective on lethal mutagenesis and mutational meltdown*. **Virus Evol.** 3(1): vex004.

› Ormond, L., Liu, P., Matuszewski, S., Renzette, N., **Bank, C.**, Zeldovich, K., Bolon, D.N., Kowalik, T.F., Finberg, R.W., Jensen, J.D., Wang, J.P. (2017) *The combined effect of Oseltamivir and Favipiravir on Influenza A virus evolution*. **Genome Biol Evol**. 9: 1913-1924.

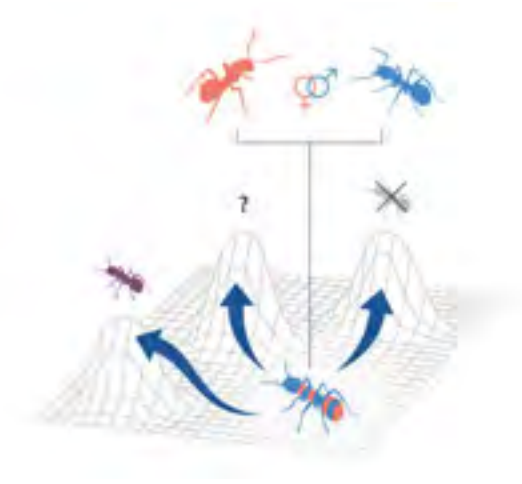

Figure: Hybridization, the interbreeding of individuals from two different species, is frequently observed in nature. Its consequences can be diverse, ranging from extinction to the evolution of a third, new, species. We developed mathematical models to predict whether a hybrid population of ants in Finland will eventually evolve into a new species or revert into one of its ancestors.

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Plant Genomics

Group Leader | **BECKER, Jörg**

Research Interests

Our group is interested in mechanisms controlling sexual reproduction and early embryogenesis. We are primarily studying these processes in two plant model species: The angiosperm *Arabidopsis thaliana* and the bryophyte *Physcomitrella patens*.

A particular focus of our work lies on (epi)genetic mechanisms acting during male gametogenesis. In *Arabidopsis*, the development of the male gametophyte involves reprogramming events at both genetic and epigenetic level, leading to a very distinct transcriptome in male gametes, accompanied by alterations in their epigenetic landscape with far-reaching implications for transposon silencing and transgenerational. We are analysing how these changes come about and what are their potential consequences after fertilisation.

Bryophytes were among the first colonisers of land. Based on the expectation that some key components have been evolutionarily conserved, irrespective of male gametes being free swimming in extant early land plants or being delivered passively within a pollen tube in angiosperms, the moss *Physcomitrella patens* serves as our model to study the evolution of (epi)genetic mechanisms governing male gametogenesis.

Lab Members in 2017

Ann-Cathrin Lindner · Postdoc
Anton Kermanov · PhD student, 2017 IBB | Started in September
Chandra Shekhar Misra · External PhD student, 2016 Plants for Life
Sónia Pereira · PhD student, 2016 IBB
Patrícia Pereira · External PhD student
Mário Santos · Lab manager
Rui Martinho · Visitor | Started in January

Main Achievements

In 2017, we have created a *Physcomitrella* RNA-Seq transcriptome atlas with a focus on all stages of male gametogenesis, to be included in the EVOREPRO database. In addition we have advanced significantly on the characterisation of *de novo* centriole formation using electron microscopy and immunofluorescence approaches.

Selected Publications

› Ortiz-Ramírez, C., Michard, E., Simon, A.A., Damineli, D.S.C., Hernández-Coronado, M., **Becker, J.D.**, Feijó, J.A. (2017) *Glutamate receptor-like channels are essential for chemotaxis and reproduction in mosses*. **Nature**. 549 (7670): 91–95.

› Ruprecht, C., Proost, S., Hernandez-Coronado, M., Ortiz-Ramirez, C., Lang, D., Rensing, S. A., **Becker, J. D.**, Vandepoele, K., Mutwil, M. (2017) *Phylogenomic analysis of gene co-expression networks reveals the evolution of functional modules*. **Plant J**. 90 (3): 447–465.

› Santos, M.R., Bispo, C., **Becker, J.D.** (2017) *Isolation of* Arabidopsis *pollen, sperm cells, and vegetative nuclei by Fluorescence-Activated Cell Sorting (FACS)*. **Methods Mol Biol**. 1669: 193-210.

**The complete list of publications is available on section 3. Publications.*

Funding

› European Comission
› Fundação para a Ciência e a Tecnologia

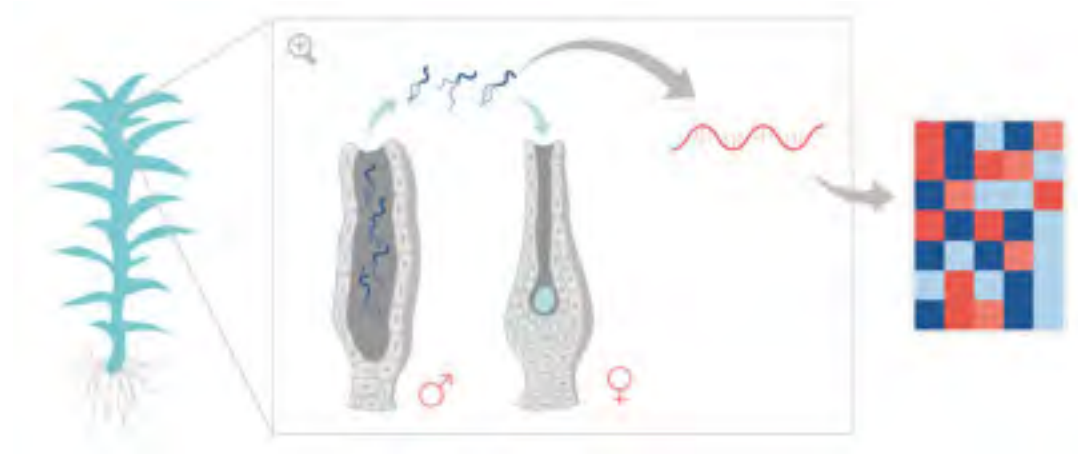

Figure: Moss is an early land plant and fertilization is performed by sperm that swim to the egg cell, contrary to flowering plants. We have identified all genes that are active during the development of moss male gametes, in order to study the evolution of sexual reproduction in plants.

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Variation: Development and Selection

Group Leader | **BELDADE, Patrícia**

Research Interests

Our Eco-Evo-Devo research combines concepts and approaches from different disciplines to characterise genetic and environmental factors accounting for intra-specific variation, the raw material for natural selection and a universal property of biological systems. Understanding the mechanisms that generate this variation is a key challenge. What are the genetic changes that contribute to evolutionarily relevant variation? How do they interact with environmental factors to regulate developmental trajectories and outcomes? For the dissection of variation in complex, diversified, and ecologically-relevant traits, the lab uses two complementary models: *Bicyclus anynana* butterflies and *Drosophila melanogaster* flies.

Lab Members in 2017

Erik Bergen · Postdoc
Ana Eugénio · PhD student, 2017-2018 IBB | Started in September
Elvira Lafuente · PhD student, 2013 PIBS
Yara K. Rodrigues · PhD student, 2015 PGCD
Nuno Soares · PhD student, 2013 PIBS
Carolina Peralta Silva · Technician

Funding

› Fundação para a Ciência e a Tecnologia

Main Achievements

In 2017, the lab focused mostly on the role of the external environment on the generation of phenotypic variation through effects on organismal development; a property called developmental plasticity. We studied genetic-by-environment effects to identify loci contributing to inter-genotype variation in plasticity and found: 1) little overlap between different plastic traits, 2) genes corresponding to a variety of functions, and 3) alleles for higher plasticity at low population frequencies. We also studied different types of environment-by-environment interactions to test whether effects are "additive", redundant, or synergistic. We tested interactions between: 1) developmental and adult environment, 2) day and night environment, and 3) different environmental cues.

Publications

› **Beldade, P.**, Peralta, C.M. (2017) *Developmental and evolutionary mechanisms shaping butterfly eyespots*. **Curr Opin Insect Sci.** 19: 22-29.

› Silva-Soares, N.F., Nogueira-Alves, A., **Beldade, P.**, Mirth, C.K. (2017) *Adaptation to new nutritional environments: larval performance, foraging decisions, and adult oviposition choices in* Drosophila suzukii. **BMC Ecol**. 17: 21.

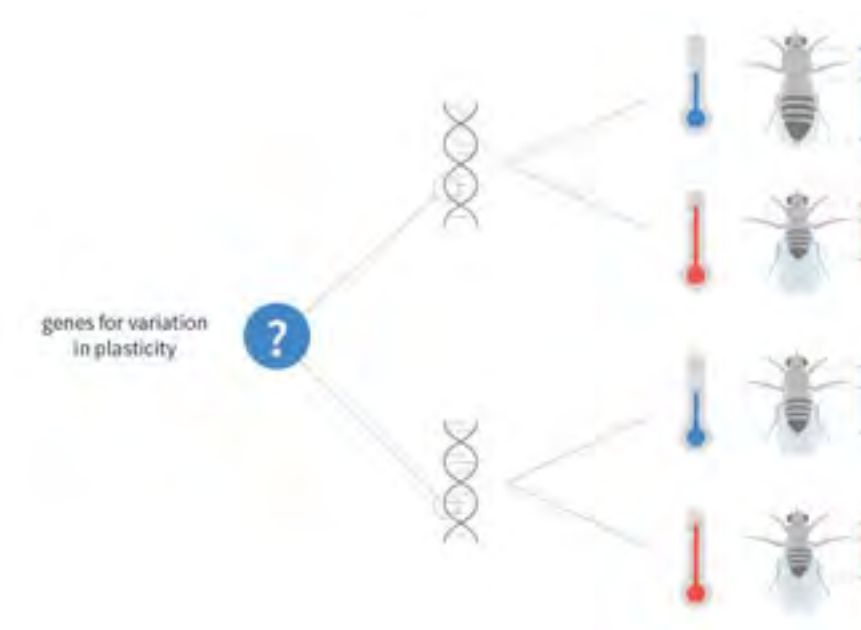

Figure: Different environmental conditions can affect developmental outcomes and lead to distinct body appearances. This developmental plasticity is heritable and can help organisms cope with environmental changes. We identified DNA sequence variants associated to variation in thermal plasticity for body size (thorax and abdomen lenght) in *Drosophila melanogaster* flies.

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Cell Cycle Regulation

Group Leader | **BETTENCOURT DIAS, Mónica**

Research Interests

Our laboratory is interested in general principles in biology regarding the counting and assembling of complex subcellular structures, and their variations observed during development, in disease and evolution. We use complex cytoskeletal assemblies, such as centrioles and cilia, as study subjects. We follow three complementary research lines in their output: mechanisms of biogenesis & function, disease (cancer) and evolution.

Lab Members in 2017

Daisuke Ito · Postdoc
Swadhin Jana · Postdoc
Carla Lopes · Postdoc
Ana Rita Marques · Postdoc
Gaëlle Marteil · Postdoc
Zitouni Sihem · Postdoc
Irina Fonseca · PhD student, 2016 PGCD
Marco Louro · PhD student, 2017 IBB | Started in November
Catarina Nabais · PhD student, 2014 IBB
Catarina Peneda · External PhD student, GABBA 2017 | Started in September
Sónia Pereira · PhD student, 2016 IBB
Sascha Werner · PhD student, 2013 PIBS | Left in December
Patrícia Rodrigues · Masters student
Mariana Faria · Lab Manager
Paulo Duarte · Technician
Susana Mendonça · Technician | Left in February
Ksenia Volkova · Trainee | Started in November

Funding

› European Research Council
› Fundação para a Ciência e a Tecnologia
› Programa de Atividades Conjuntas (PAC) - Fundação para a Ciência e a Tecnologia & Fundos Europeus Estruturais e de Investimento

Main Achievements

Cilia are evolutionarily conserved protrusions with many sensory and motility-related functions. To investigate the extent and causes of ciliary variation we generated a high-resolution structural and biochemical atlas of the ciliary base of four functionally distinct neuronal and sperm cilia types within an organism, *Drosophila melanogaster*. We uncovered both a common scaffold and diverse structures associated with different localisation of 15 evolutionarily conserved components. Our results offer a plausible explanation to how mutations in conserved ciliary base components lead to diseases in specific tissues.
We investigated the timing and extent of centrosome deregulation in cancer using the NCI60 panel of cancer cell lines and patient samples from breast cancer and from Barretts' esophagus. We have identified that centrosome deregulation is widespread in cancer, can occur quite early in tumorigenesis and is associated with very aggressive tumors with worse prognosis.

Publications

› Loncarek, J., **Bettencourt-Dias, M.** (2017) *Building the right centriole for each cell type*. **J Cell Biol. [Epub ahead of print]**.
› Marteil, G., Dias, L.M.A., **Bettencourt-Dias, M.** (2017) *Centrosome assembly: Reconstructing the core cartwheel structure* in vitro. **Curr Biol**. 27: R606-R609.
› Werner, S., Pimenta-Marques, A., **Bettencourt-Dias, M.** (2017) *Maintaining centrosomes and cilia*. **J Cell Sci**. 130: 3789-3800.

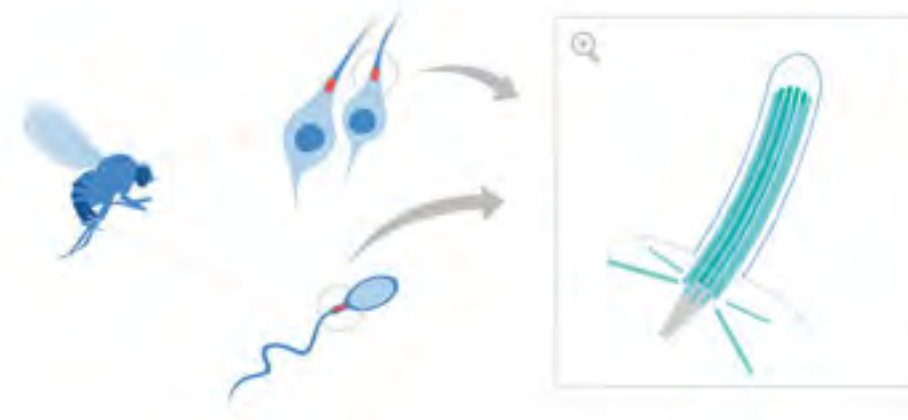

Figure: Cilia are hair-like structures that extend from the surface of many cells. They can have a motile function – in sperm, for instance – or can work as sensory antenna for the cell – as in neurons. We pinpointed the components that form cilia in neuronal and sperm cells of the fruit fly, opening way to better understand cilia diversity and diseases associated to cilia malfunctions.

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Quantitative Organism Biology

Group Leader | **CARNEIRO, Jorge**

Research Interests

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. 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.

Lab Members in 2017

Delphine Pessoa · PhD student, 2014 IBB
Eleonora Tulumello · PhD student, 2015 IBB
Pedro Silva · External PhD student
Marco Louro · Masters student | Left in September

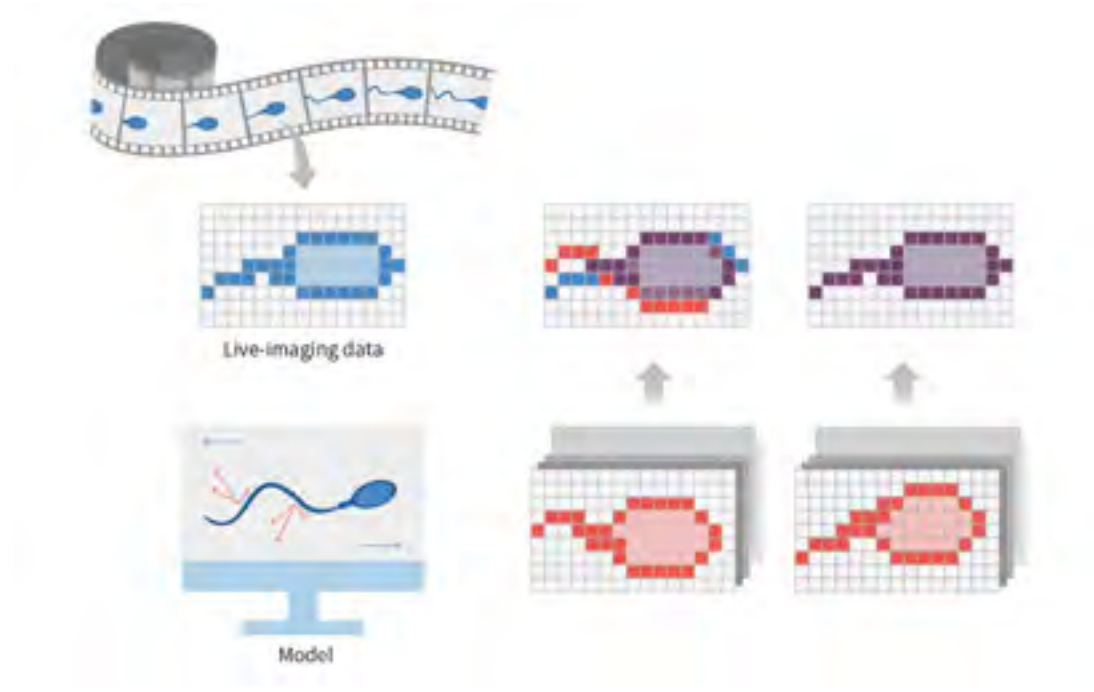

Figure: Computational models can help explain and predict biological organisation. We developed a model on how sperm cells swim that was calibrated by thorough quantitative comparison of the model predictions with live imaging frames. As a result, our model is able to predict the sperm cell's flagellum position in space based on information from the sperm heads.

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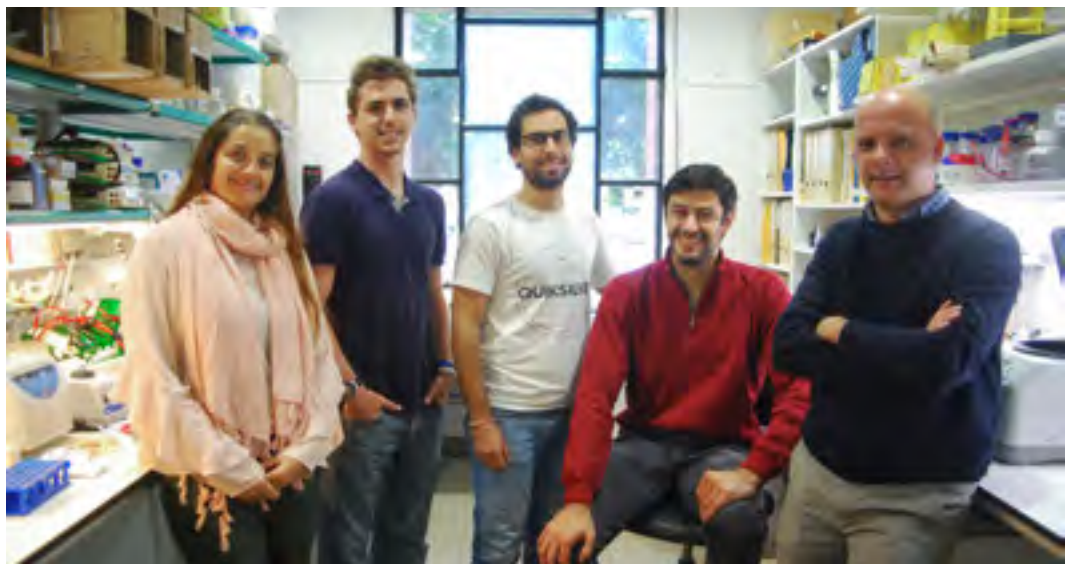
Molecular Neurobiology

Group Leader | **CASTRO, Diogo S.**

Research Interests

Work at the *Molecular Neurobiology* lab is focused on the gene regulatory networks in vertebrate neurogenesis that govern the balance between maintenance and differentiation of neural progenitor cells towards the neuronal fate. In addition, we also seek to understand to what extent the regulatory logic observed during development is used to maintain a neural-specific expression programme during cell division. In this context, the importance of so-called "mitotic bookmarking" by sequence-specific transcription factors is being investigated. Finally, our research aims also at understanding how key transcriptional regulators of neural development are hijacked in a malignant cell context.



Lab Members in 2017

Pedro Rosmaninho · Postdoc
André Madaleno · PhD student, 2017 IBB | Started in August
Mário Soares · PhD student, 2015 IBB

Diogo Soares · Masters student | Started in September
Vera Teixeira · Lab manager
Alexandre Raposo · Visitor

Main Achievements

Glioblastoma is the most common and aggressive brain tumor in adults, and is characterised by single malignant cell invasion of the brain parenchyma. Using a genomics approach, we showed that the EMT factor Zeb1 regulates an EMT-like programme in glioblastoma. Contrary to the common view that EMT factors act as transcriptional repressors, we found that genome-wide binding of Zeb1 associates with both activation and repression of gene expression in glioblastoma, depending on the mode of recruitment to gene regulatory regions. Amongst genes activated by Zeb1 are predicted mediators of tumor cell migration and invasion, many of which correlate with Zeb1 expression in patient tumor samples. Overall, our work provides an important insight into how EMT factors can coordinately regulate complex programmes of gene expression.

Publications

› Soares, M.A.F., **Castro, D.S.** (2017) *Chromatin immunoprecipitation from mouse embryonic tissue or adherent cells in culture, followed by Next-Generation Sequencing.* **Methods Mol. Biol. [Epub ahead of print].**

› Vasconcelos, F.F., **Castro, D.S.** (2017) *Coordinating neuronal differentiation with repression of the progenitor program: role of the transcription factor MyT1.* **Neurogenesis**. 4(1): e1329683.

Figure: We have been trying to understand what promotes the highly infiltrative behaviour that characterizes Glioblastoma tumors. With that aim, we investigate the function of Zeb1, a protein that can simultaneously activate and repress genes while promoting Glioblastoma invasiveness.

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Network Modelling

Group Leader | **CHAOUIYA, Claudine**

Research Interests

Complementary to experimental approaches, mathematical models allow to get further insights into the functioning of complex regulatory networks and to formulate hypotheses, e.g. identify proper strategies to enforce or prevent certain behaviours. We mainly rely on a discrete, logical framework, which can uncover key characteristics of the dynamics of such networks. Our activity is organised along three lines: 1) Theoretical work with the definition of efficient methods to analyse large models; 2) Computational work with the development of software tools; 3) Modelling work with the study of specific networks, in collaboration with experimentalists.

Lab Members in 2017

Gianluca Selvaggio · Postdoc | Started in July
Ana Morais · PhD student, 2016 IBB
Ricardo Pais · PhD student, 2013 PIBS
Jorge Pereyra · External PhD student | Started in September
Pedro Varela · External PhD student

Delora Baptista · Technician | Started in February; left in September
Tiago Pedreira · Technician
Pedro Monteiro · Visitor

Main Achievements

As a follow-up to our previous study for placental mammals, we have concluded a modelling work on the primary sex determination in avians (Sánchez & Chaouiya, submitted).
In the context of the CoMeDy project [A COmputational Modelling platform for Epithelial DYnamics to explore the role of epithelial-mesenchymal transition (EMT) and stemness acquisition in cancer recurrence], we have defined and analysed a logical model of the control of epithelial cell adhesion properties. This led to promising predictions to prevent or revert EMT that are currently being tested experimentally in F.Janody´s lab.
Concerning methodological achievements, we have explored how spatial constraints in sets of communicating cells may impact pattern formation.

Software Development

- GINsim: http://ginsim.org/
- EpiLog: http://epilog-tool.org

Funding

- Fundação para a Ciência e a Tecnologia
- Programa de Atividades Conjuntas (PAC) - Fundação para a Ciência e a Tecnologia & Fundos Europeus Estruturais e de Investimento

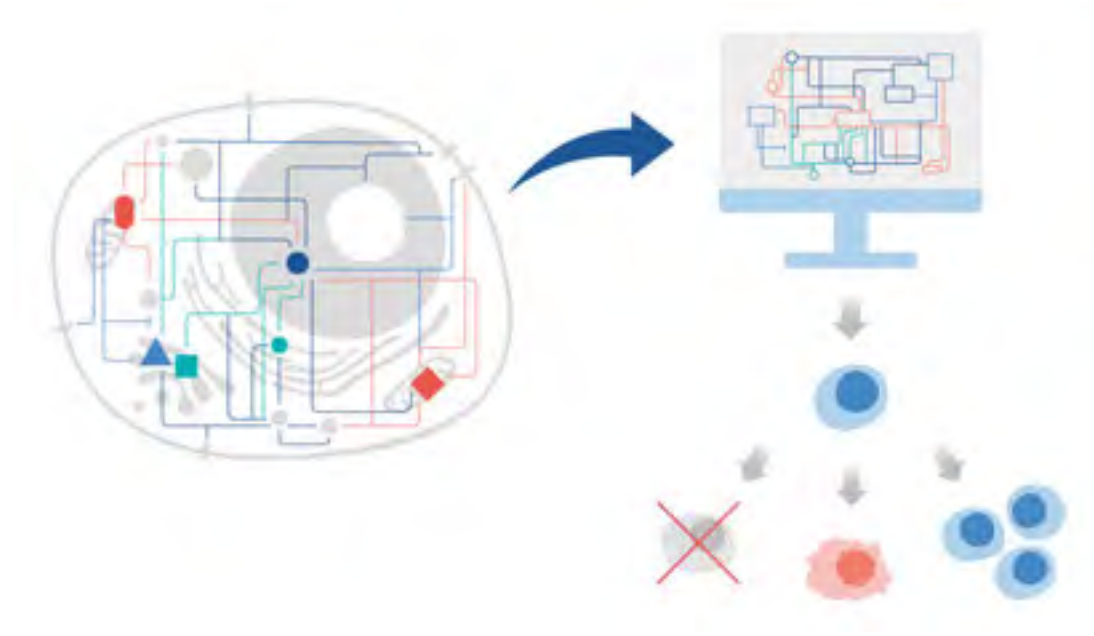

Figure: How do intricate and heterogeneous interaction networks can control cellular processes so precisely? Can we predict defective network components and design strategies to repair or overcome altered behaviours? To tackle such daunting questions, we build computational models from experimental and literature data. Part of our activity relates to methodological and software developments to advance the modelling of very large networks.

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Eco-Evolutionary Genetics

Group Leader | **CHELO, Ivo M.**

Research Interests

We use a multilevel approach that ranges from genes to ecosystems in the context of experimental evolution with the nematode *Caenorhabditis elegans* and bacteria such as *Escherichia coli* to understand how adaptation to stressful environments is affected by interactions between organisms. Our three main goals are: i) to understand the role of species interactions in adaptation to stressful abiotic conditions; ii) to find how host-microbe interactions affect the evolution of aging and which genes underlie this process; iii) to show how frequency- and density- dependent effects resulting from interactions between individuals affect ecological robustness of populations.

Lab Members in 2017

Ana Paula Marques · Postdoc
Josiane Santos · Postdoc | Started in July
Mariana Delgadinho · Masters student
Ana Laranjeira · Technician | Started in January
Thiago Guzella · Visitor | Left in March

Funding

› Fundação para a Ciência e a Tecnologia

Main Achievements

- Identified the genetic basis of adaptation of *Escherichia coli* to *C. elegans* growth conditions;
- Showed that adaptation of *Escherichia coli* to high salt concentrations comes with a fitness cost in low salt;
- Showed that adaptation of *E. coli* results in deleterious effects to *C. elegans*, due to an imposed delay in the worm's developmental rate.

Publications

› Noble, L.M., **Chelo, I.**, Guzella, T., Afonso, B., Riccardi, D.D., Ammerman, P., Dayarian, A., Carvalho, S., Crist, A., Pino-Querido, A., Shraiman, B., Rockman, M.V., Teotónio, H. (2017) *Polygenicity and epistasis underlie fitness-proximal traits in the Caenorhabditis elegans multiparental experimental evolution (CEMEE) panel*. **Genetics.** 207(4):1663-1685.

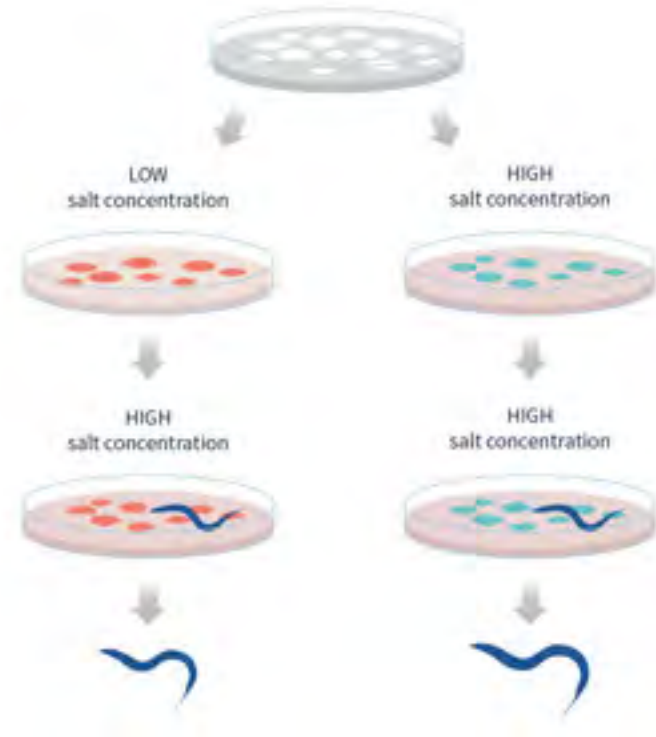

Figure: We are studying how adaptation to stressful environments can be affected by interactions between different organisms. Using as model organisms the tiny nematode *Caenorhabditis elegans* that feeds on *Escherichia coli* (*E.coli*) bacteria, we discovered that even when bacteria adapt to stressful conditions it may impact the nematode. Animals that feed on E. coli well adapted to high salt conditions are smaller than those that feed on bacteria that grow on normal levels of salt.

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Population and Conservation Genetics

Group Leader | **CHIKHI, Lounès**

Research Interests

We are interested in the way genetic and genomic data are influenced by the recent evolutionary history of species. The amount of genetic diversity and the differentiation observed today between populations is the result of a complex history that includes demographic events such as population collapses, expansions, or admixture. This also includes spatial processes whereby populations may go through periods of connectivity or disconnection.

To study this, we develop new and use/test existing methods to improve our understanding 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, or the recent history of humans and Neanderthals) to conservation genetics of wild (e.g. orang-utans, lemurs, dolphins) and domesticated species (e.g. cattle, sheep).

Our work involves fieldwork in Madagascar, Guiné-Bissau and Portugal, and the genetic and genomic typing of endangered species, data analysis and simulation. We collaborate with the lab Evolution & Diversité Biologique, in Toulouse, where Lounès Chikhi is a Senior researcher (Directeur de Recherche) and with various institutions, including several in Portugal, the UK (Cardiff and Bristol University), Germany (Hanover), France (Institut de Mathématiques de Toulouse), Madagascar (Univ. Mahajanga, Antananarivo, Antsirana), or Malaysia (Danau Girang Field Station).

Selected Publications

› Banks, M.A., Patel, E.R., **Chikhi, L.**, Salmona, J. (2017) *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.). 2015. *Primates in Peril: The World's 25 Most Endangered Primates 2016-2018.* pp 40-43. IUCN SSC Primate Specialist Group (PSG), International Primatological Society (IPS), Conservation International (CI), and Bristol Zoological Society, Arlington, VA.

› Prunier, J.G., Dubut,V., **Chikhi, L.**, Blanchet, S. (2017). *Contribution of spatial heterogeneity in effective population sizes to the variance in pairwise measures of genetic differentiation*. **Methods Ecol Evol**. 8(12):1866-1877.

› Salmona, J., Heller, R., Quéméré, E., **Chikhi, L.** (2017) *Climate change and human colonization triggered habitat loss and fragmentation in Madagascar*. **Mol Ecol.** 26(19):5203-5222.

**The complete list of publications is available on section 3. Publications.*

Funding

› Fundação para a Ciência e a Tecnologia

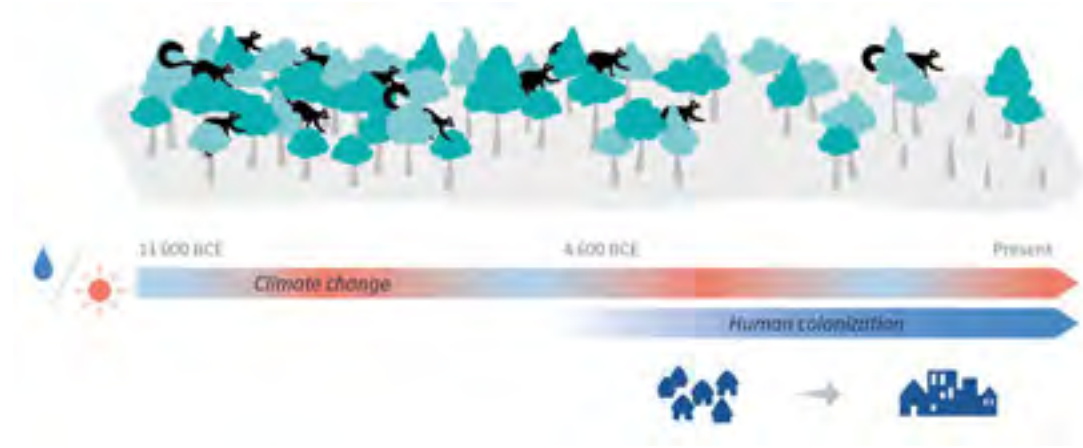

Figure: Lemurs are an endangered group that only exists in Madagascar. Our recent study shows that the connectivity and population size of two species of lemurs were greatly affected by climate changes events that occurred around 4200 years ago. Subsequent human settlements also played a role in deforestation, contributing to a fragmented habitat for lemurs.

Lab Members in 2017

Inês Carvalho · Postdoc
Bárbara Parreira · Postdoc
Tânia Rodrigues · Postdoc
Gabriele Sgarlata · PhD student, 2016 IBB
Barbara Le Pors · Technician

Adam Marques · Technician | Started in April
Isa Pais · Technician | Left in April
Tiago Maié · Trainee
Tiago Zoeten · Trainee | Left in November
Patricia Santos · Visitor

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Lymphocyte Physiology

Group Leader | **DEMENGEOT, Jocelyne**

Research Interests

We address the mechanisms of immune regulation, and their dysfunction, in the context of autoimmune diseases, pregnancy, cancer and immune therapies, in mice and humans.

Lab Members in 2017

Íris Caramalho · Postdoc
Vital Domingues · PhD student, 2015 IBB
José Santos · PhD student, 2014 IBB
Vânia Silva · PhD student, 2013 PIBS
Eleonora Tulumello · PhD student, 2015 IBB
Marie Louise Bergman · Lab manager
Inês Cabral · Technician
Vasco Correia · Technician | Left in December
Marie Bonnet · Visitor | Left in June
Francisca Fontes · Visitor
Sandra Gama · Visitor
Paula Matoso · Visitor
Afonso Mota · Visitor | Left in February

Funding

› Association Française Contre les Myopathies
› Maratona da Saúde
› Programa de Atividades Conjuntas (PAC) - Fundação para a Ciência e a Tecnologia & Fundos Europeus Estruturais e de Investimento

Main Achievements

We published a new mouse model suitable to address the threats imposed by the upstream molecular process of lymphocyte development on the vertebrate genome, and the consequences of lymphocyte production disorders on pathophysiological processes.
We published the demonstration that novel peptide-specific therapies for Type 1 Diabetes bear high risk of disease worsening.
We implemented and tested several tumor models in two mouse strains to address the contribution of *de novo* generated regulatory T cells to natural immune surveillance of cancer and to the outcome of immune check-point therapies.
We concluded a 24-month long monitoring of 200 autoimmune patients under TNF-inhibitor therapies, to evaluate the impact of drug immunogenicity on clinical strategies and outcome, with the objective to develop and implement a patient tailored protocol for therapeutic decisions.
We characterised and collected samples from a cohort of 100 very early onset Type 1 Diabetes patients, in collaboration with the Dona Estefania Hospital, to address the genetic architecture of this intriguing novel health and societal challenge.

Selected Publications

› Bergman, M., Lopes-Carvalho, T., Martins, A., Grieco, F.A., Eizirik, D.L., **Demengeot, J.** (2017) *Tolerogenic insulin peptide therapy precipitates Type 1 Diabetes*. **J Exp Med**. 214: 2153-2156.

› Bonnet, M., Sarmento, L.M., Martins, A.C., Sobral, D., Silva, J., **Demengeot, J.** (2017) *iRAGu: A novel inducible and reversible mouse model for ubiquitous recombinase activity*. **Front Immunol.** 8: 1535.

› Garcês, S., **Demengeot, J.** (2017) *The immunogenicity of biologic therapies.* **Curr Probl Dermatol. [Epub ahead of print].**

**The complete list of publications is available on section 3. Publications.*

Figure: Type 1 Diabetes is a lifelong autoimmune disease generally diagnosed before 18 years of age, whose prevalence and severity is increasing in preschool children. We characterised, collected and processed samples from a cohort of Type 1 Diabetes patients. We performed genome analysis to identify genetic factors underlying the anticipated disease onset in very young patients. This work will determine the specific aetiology of early Type 1 Diabetes.

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Obesity

Group Leader | **DOMINGOS, Ana I.**

Research Interests

Our laboratory investigates the neuroimmune mechanisms underlying obesity. We focus on sympathetic neurons that innervate the adipose tissue as they have the capacity to drive fat mass reduction. We aim at understanding the biology of these neurons so that we can pave the way to the development of anti-obesity therapies.

Lab Members in 2017

Chelsea Larabee · Postdoc | Started in June
Noelia Martínez-Sánchez · Postdoc | Started in January
Elsa Seixas · Postdoc
Inês Mahú · PhD student, 2014 IBB
Roksana Pirzgalska · External PhD student, MIT | Portugal
Bernardo Arús · Masters student | Started in June
Miguel Costa · Masters student | Started in July
Francesco Diversi · Masters student | Started in October
Vitka Gres · Technician | Started in April
Raquel Mendes · Technician | Started in March
Imogen Morris · Technician | Left in April
Andreia Barateiro · Visitor
Miguel Vasques · Visitor

Funding

› Howard Hughes Medical Institute
› Welcome Trust
› European Molecular Biology Organization
› Human Frontier Science Program
› Fundação para a Ciência e a Tecnologia
› Maratona da Saúde

Main Achievements

We have discovered that the neuroadipose connection, which is central in fat mass loss, is subject to immune regulation. We discovered that specialised immune cells, named sympathetic-nerve associated macrophages (SAMs), contribute to obesity. SAMs use specialised molecular machinery for clearing up an anti-obesity neurotransmitter (norepinephrine) that is released by sympathetic nerves in fat. These results were published in *Nature Medicine*, and have been featured in *Science*, *Science Signalling*, *Nature Medicine*.
We identified a new druggable mechanism for managing the global obesity epidemic and we have thus filed a provisional patent protecting drugs acting on the aforementioned mechanism.

Selected Publications

› Barateiro, A., Mahú, I., **Domingos, A.I.** (2017) *Leptin resistance and the neuro-adipose connection*. **Front Endocrinol (Lausanne)**. 8: 45.

› Pereira, M.M.A., Mahú, I., Seixas, E., Martinéz-Sánchez, N., Kubasova, N., Pirzgalska, R.M., Cohen, P., Dietrich, M.O., López, M., Bernardes, G.J.L., **Domingos, A.I.**(2017) *A brain-sparing diphtheria toxin for chemical genetic ablation of peripheral cell lineages*. **Nat Commun**. 8: 14967.

› Pirzgalska, R.M., Seixas, E., Seidman, J.S., Link, V.M., Sánchez, N.M., Mahú, I., Mendes, R., Gres, V., Kubasova, N., Morris, I., Arús, B.A., Larabee, C.M., Vasques, M., Tortosa, F., Sousa, A.L., Anandan, S., Tranfield, E., Hahn, M.K., Iannacone, M., Spann, N.J., Glass, C.K., **Domingos, A.I.** (2017) *Sympathetic neuron-associated macrophages contribute to obesity by importing and metabolizing norepinephrine*. **Nat Med**. 23: 1309-1318.

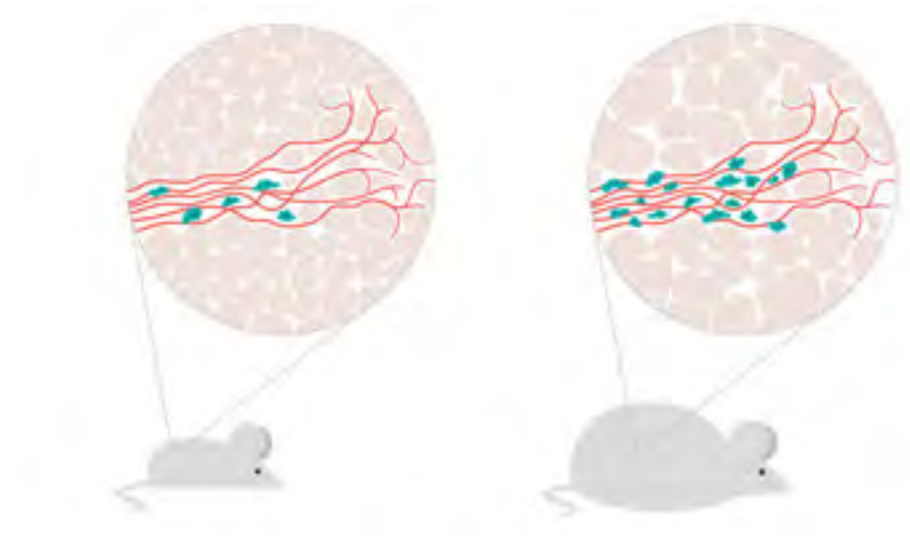

Figure: Recently we discovered that the adipose tissue (fat) is innervated by a set of sympathetic neurons (red) that induces fat breakdown. Now, we discovered a novel population of immune cells - SAMs - that is associated with these neurons and play a direct role in obesity. Obese mice have many more SAMs (green) attached to neurons than lean mice. We also observed SAMs in human samples, and this opens a new path to therapy.

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Plant Molecular Biology

Group Leader | **DUQUE, Paula**

Research Interests

Our group uses *Arabidopsis thaliana* as a model system to investigate how plants respond to environmental stress at the molecular level. We focus on the role of alternative splicing, a key posttranscriptional regulatory mechanism likely to contribute to the stress tolerance essential for plant survival. Another major line of work in the lab is uncovering roles for transporters of the Major Facilitator Superfamily (MFS) in plant abiotic stress responses. Interestingly, the functional analysis of these membrane proteins has revealed striking examples of the biological impact of alternative splicing in plants.

Lab Members in 2017

Tom Laloum · Postdoc
Guiomar Martín · Postdoc
Esther Novo-Uzal · Postdoc
Dale Richardson · Postdoc
Dóra Szakonyi · Postdoc

Alba Rodríguez-Díez · PhD student, 2016 IBB | Started in January
María Niño-González · External PhD student, 2015 MolBios
Rui Martins · External PhD student, 2017 Plants for Life | Started in June

Funding

› Fundação para a Ciência e a Tecnologia

Main Achievements

In support of a role for alternative splicing in plant stress tolerance, we found that loss of function of several *Arabidopsis* SR proteins, comprising a conserved family of alternative splicing modulators, results in altered responses to different abiotic stresses during early plant growth. Strikingly, all these stress response defects are accompanied by impaired sensitivity to the abscisic acid (ABA) stress hormone, suggesting that alternative splicing controls plant stress tolerance during early plant development largely by targeting components of the ABA signalling pathway.
Through collaborative work with other research groups, our lab also reported in 2017 that splicing inhibition triggers ABA-related plant stress responses, and that heterologous expression of two yeast MFS membrane transporters in *Arabidopsis* confers plant tolerance to a wide range of toxic compounds.

Selected Publications

› Laloum, T., Martín, G., **Duque, P.** (2017) *Alternative splicing control of abiotic stress responses*. **Trends Plant Sci. [Epub ahead of print].**

› Ling, Y., Alshareef, S., Butt, H., Lozano-Juste, J., Li, L., Galal, A.A., Moustafa, A., Momin, A.A., Tashkandi, M., Richardson, D.N., Fujii, H., Arold, S., Rodriguez, P.L., **Duque, P.**, Mahfouz, M.M. (2017) *Pre-mRNA splicing repression triggers abiotic stress signaling in plants*. **Plant J.** 89: 291-309.

› Remy, E., Niño-González, M., Godinho, C.P., Cabrito, T.R., Teixeira, M.C., Sá-Correia, I., **Duque, P.** (2017) *Heterologous expression of the yeast Tpo1p or Pdr5p membrane transporters in* Arabidopsis *confers plant xenobiotic tolerance*. **Sci Rep-UK**. 7: 4529.

Figure: Most plant species cannot tolerate the toxic effects of soil pollutants, which dramatically impair their growth and development. We discovered that *Saccharomyces cerevisiae*, a species of yeast used for baking, brewing, and winemaking, can make plants more resilient to toxic compounds. The small flowering plant *Arabidopsis thaliana* carrying the yeast genes can grow significantly better than wild-type plants in contaminated soils.

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Telomeres and Genome Stability

Group Leader | **FERREIRA, Miguel Godinho**

Research Interests

Our main goal is to understand the mechanisms that promote the rise of cancer incidence with age and to understand the role telomeres play on this phenomenon. Telomeres protect the ends of chromosomes from inappropriately being recognised as a double strand break and constant DNA erosion. Due to telomere shortening, senescent cells accumulate with age. These cells secrete a very distinct set of signalling factors, proteases and other molecules (SASP). SASP promotes both malignant phenotypes in culture and tumor growth and invasiveness *in vivo*. The "seed-and-soil" theory proposes the importance of the microenvironment for carcinogenesis. With aging, senescent cells with short telomeres may provide the right soil for tumors to arise in a non-cell autonomous manner.

Lab Members in 2017

Bruno Bastos · Postdoc | Started in November
Mounir El Mai · Postdoc
Kety Giannetti · Postdoc | Started in September
Patrícia Napoleão · Postdoc | Started in July
Jose Planells · Postdoc
Akila Sridhar · Postdoc
Pâmela Borges · PhD student, 2015 PGCD
Edison Carvalho · PhD student, 2014 PGCD
Kirsten Lex · PhD student, 2013 PIBS
Tânia Ferreira · Lab manager
Sónia Rosa · Wing Technician
Aneta Spoz · Trainee | Started in September; left in November
Asya Martirosyan · Trainee | Left in August
Ana Margarida Figueira · Trainee | Left in March

Main Achievements

We have been using zebrafish chimeras to disentangle cell-autonomous from non-cell-autonomous effects of telomere-shortening. This system allows us to maintain mixed tissues of telomerase proficient and deficient cells throughout development and adult life. We injected tert proficient melanoma progenitor cells either into wt or *tert* mutant recipient embryos. As expected, tumors arise in both adult animals. However, the *tert* mutant environment significantly increases tumor incidence, more than duplicating the number of cases. Our results show that organismal telomere shortening plays a crucial role for the age-related increased risk of cancer.

Publications

› Fior, R., Póvoa, V., Mendes, R.V., Carvalho, T., Gomes, A., Figueiredo, N., **Ferreira, M.G.** (2017) *Single-cell functional and chemosensitive profiling of combinatorial colorectal therapy in zebrafish xenografts*. **Proc Natl Acad Sci U.S.A**. 114: E8234-E8243.

Funding

› Fundação para a Ciência e a Tecnologia

Figure: Telomeres are important protective structures at the tips of chromosomes. Throughout aging, there is a natural shortening of telomeres (wt), but the pace of shortening is much faster if organisms that lack the enzyme telomerase (tert). We discovered that fish mutated for this enzyme age prematurely. Strikingly they also accelerate the onset of cancer in young individuals. Therefore, telomere shortening may be responsible for the higher incidence of cancer during aging.

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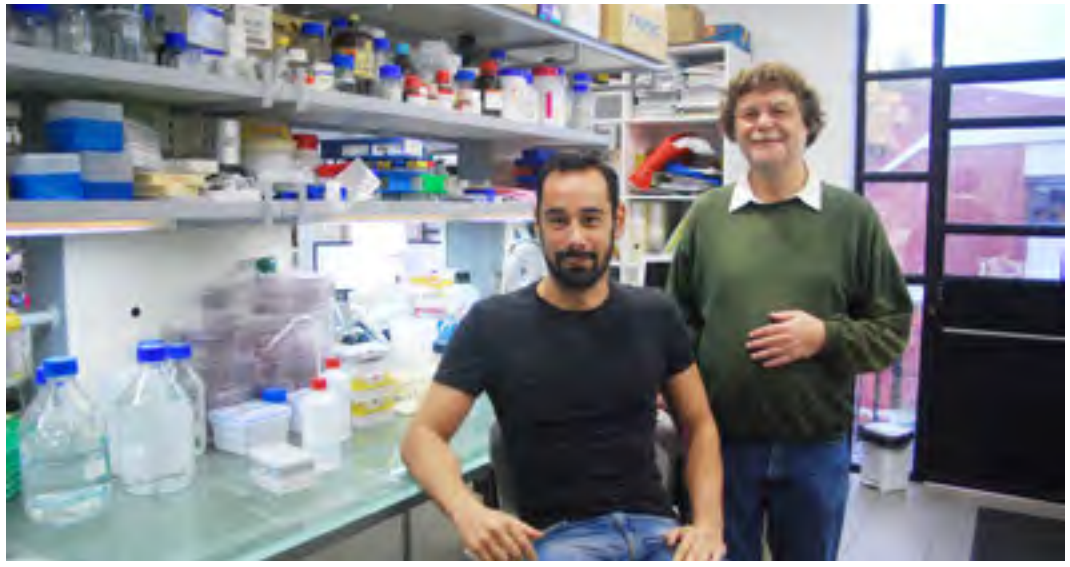
Lupus and Autoreactive Immune Repertoires

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. We are particularly interested in the role of T-cell regulation. We have previously found particular relations between antibody reactivity and regulatory T-cells (Tregs) in unaffected relatives of SLE patients. This reflects the upregulation of the IL-2 receptor CD25 on Tregs upon activation that allows relatives to compensate shared CD25 reduction on developmentally early Tregs. In patients with manifest SLE, however, CD25 undergoes little upregulation and remains low. This context has recently gained public interest since low-dose IL-2 therapy, which corrects CD25 deficiency, was found clinically promising for SLE.



Lab Members in 2017

Nuno Costa · External PhD student

Main Achievements

In SLE patients studied longitudinally, deficient Treg CD25 upregulation reflects a characteristically altered dynamic turnover of Treg as well as T-helper cells, which we modelled mathematically. It includes a surprising instability of activated Treg frequencies over time, with individual degrees of fluctuation strongly correlated to individual disease activity, autoantibodies and lymphopenia. Clonal analysis further suggests that altered dynamics, in a context with SLE-associated lymphopenia, can drive temporary expansions of pathogenic T-helper clones. We hypothesize that such expansions, due to destabilised T-cell regulation, may be a key factor triggering disease flares in SLE.

Publications

› Costa, N., Marques, O., Godinho, S.I., Carvalho, C., Leal, B., Figueiredo, A.M., Vasconcelos, C., Marinho, A., Moraes-Fontes, M.F., Gomes da Costa, A., Ponte, C., Campanilho-Marques, R., Cóias, T., Martins, A.R., Viana, J.F., Lima, M., Martins, B., **Fesel, C.** (2017) T*wo separate effects contribute to regulatory T-cell defect in SLE patients and their unaffected relatives.* **Clin Exp Immunol**. 189(3):318-30.

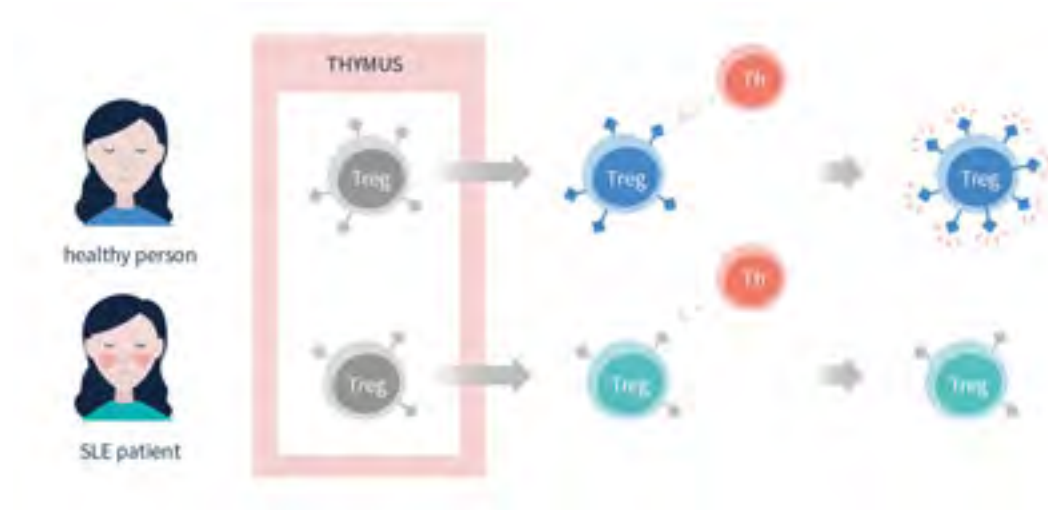


Figure: Systemic Lupus Erythematosus (SLE) is a human autoimmune disease characterized by altered physiologies and immune responses that can affect diverse organs, particularly through tissue damage. T-cells are generated in the thymus and have an important role in the immune response, including the generation of self-reactive antibodies. Some T-cells (Treg) have immunoregulatory functions and specific receptors (CD25) important for them. In SLE patients, there is a heritable deficiency of CD25 receptors in early Tregs, as well as a separate defect in later peripheral upregulation of CD25 that leads to Treg instability. This distinction may help develop Treg-directed therapies.

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Mathematical Modelling of Biological Processes

Group Leader | **GJINI, Erida**

Research Interests

Our research centers on mechanistic determinants of infection dynamics in a single host and propagation in populations. Considering host-pathogen scenarios under interventions, we study the role of host immune components in infection resolution, and their implications for strain competition, drug resistance management, and evolution. In polymorphic microbial ecosystems, we aim to identify key principles of strain interaction that drive coexistence and stability.

Lab Members in 2017

Francisco Paupério · Masters student | Started in November
Joana Teixeira · Masters student | Left in August
Patrícia Brito · Visitor

Funding

› Fundação Luso-Americana para o Desenvolvimento

Main Achievements

We successfully completed the paper on how pneumococcus vaccine effects across multiple settings. This study integrates pre- and post-vaccine data under one dynamic model to enable comparison of key parameters, and suggests environmental gradients modulating PCV7 vaccine success in the field.
We continued work on microbial interaction networks and ecological dynamics, in collaboration with Dr. Sten Madec (U.Tours), extending a previous study (Gjini & Madec, 2016) to an n-strain system. We also outlined future directions for this research in planned joint grant applications.
We started collaboration with the Wood Lab in Michigan, where we integrate theoretical predictions (from Gjini & Brito, 2016) with empirical simulations of 'immunity' *in vitro*, examining population size feedbacks on competition between sensitive and resistant bacteria during antibiotic treatment.
We have 2 papers in preparation: one with former student Joana Teixeira, and another paper on pharmaco-dynamic modelling and bacterial heterogeneity.

Publications

› Gaivão, M., Dionisio, F., **Gjini, E.** (2017) *Transmission fitness in co-colonization and the persistence of bacterial pathogens*. **Bull Math Biol**. 79: 2068-2087.

› **Gjini, E.** (2017) *Geographic variation in pneumococcal vaccine efficacy estimated from dynamic modeling of epidemiological data post-PCV7*. **Sci Rep-UK**. 7: 3049.

› **Gjini E.** (2017) *Human African Trypanosomiasis: What are the prospects for control?* **Human Parasitic Diseases**. (9) 1179570017700644.

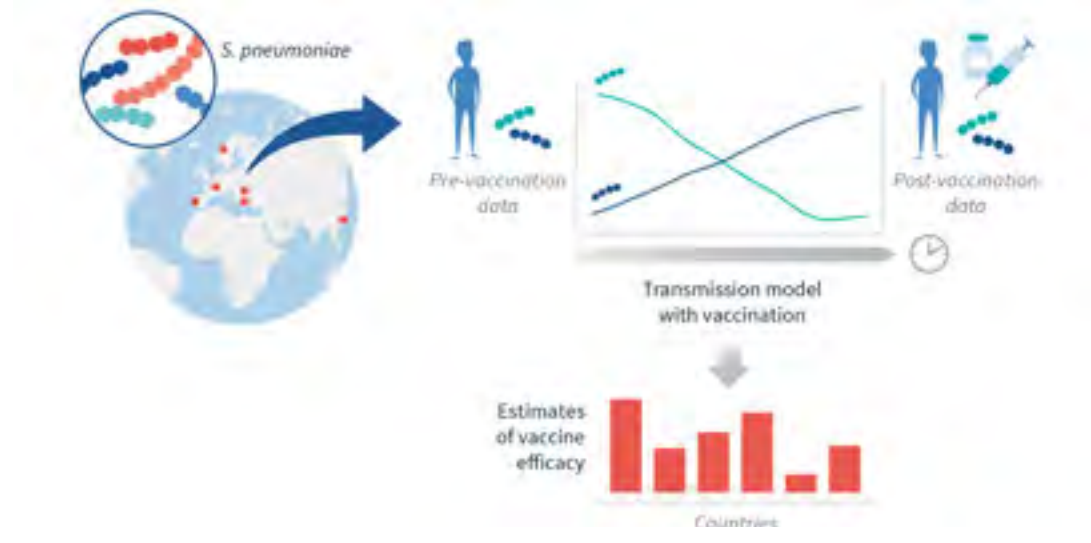

Figure: One of the main agents of pneumonia is *Streptococcus pneumoniae*. Vaccines can control some strains of these bacteria, but their net efficacy may vary in different populations. We estimated PCV7 vaccine effects across multiple settings, integrating pre- and post-vaccine data from different countries under one dynamic model. This multi-site-one-model approach enables the comparison of key parameters, and suggests environmental gradients for vaccine success in the field.

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Science & Policy

Group Leader | **GONÇALVES-SÁ, Joana**

Research Interests

Individuals decide how to vote, whether or not to stay at home when they feel sick. In isolation, these individual decisions have a negligible social outcome, but collectively they determine the results of an election and the start of an epidemic. For many years, studying these processes was limited to observing outcomes or to analysing small samples. New data sources and analysis tools have made it possible to study the behaviour of large numbers of individuals, enabling the emergence of large-scale quantitative social research. At the S&P group we are interested in understanding these decision-making events, particularly the behaviours that affect health and disease. Thus, we use a systems-level and big data approach to study complex problems at the interface between Biology, Computation, Social Sciences and Mathematics. These include epidemiology, risk awareness, critical thinking, and their applications to human-behaviour.

Lab Members in 2017

Frederico Francisco · Postdoc | Left in March
Caetano Mendes · PhD student, 2013 PIBS | Left in June
Cláudio Haupt · Masters student | Started in March
Lourenço Oliveira · Trainee | Started in June

Paulo Almeida · Technician
Manuel Marques Pita · Visitor
Inês Maciel · Administrative personnel
Carla Semedo · Administrative personnel

Main Achievements

Jan: The first Citizen Forum (JGS, PA co-organisers): A panel of randomly selected citizens spent 2 days deliberating on "How to make citizens heard by the politicians?". Results were presented to the President of the Portuguese Republic.
Jun: 50 Lab in a Box (LiB) kits were sent to all schools in Cabo Verde.
Sep: Second LiB teacher training workshop.
Dec: Wood *et al.*, Sci Rep, showed that human reproduction follows predictable patterns, associated with online searches and collective emotions. This paper made it to the top 5% most referenced articles (Altmetric).

Publications

› Won, M., Louro, C., Marques-Pita, M., **Gonçalves-Sá, J.** (2017) *Early detection of the flu season*. **PLoS Comput Biol.** 13(2): e1005330.

› Wood, I.B., Varela, P.L., Bollen, J., Rocha, L.M., **Gonçalves-Sá, J.** (2017) *Human sexual cycles are driven by culture and collective moods.* **Sci Rep-UK**. 7: 17973.

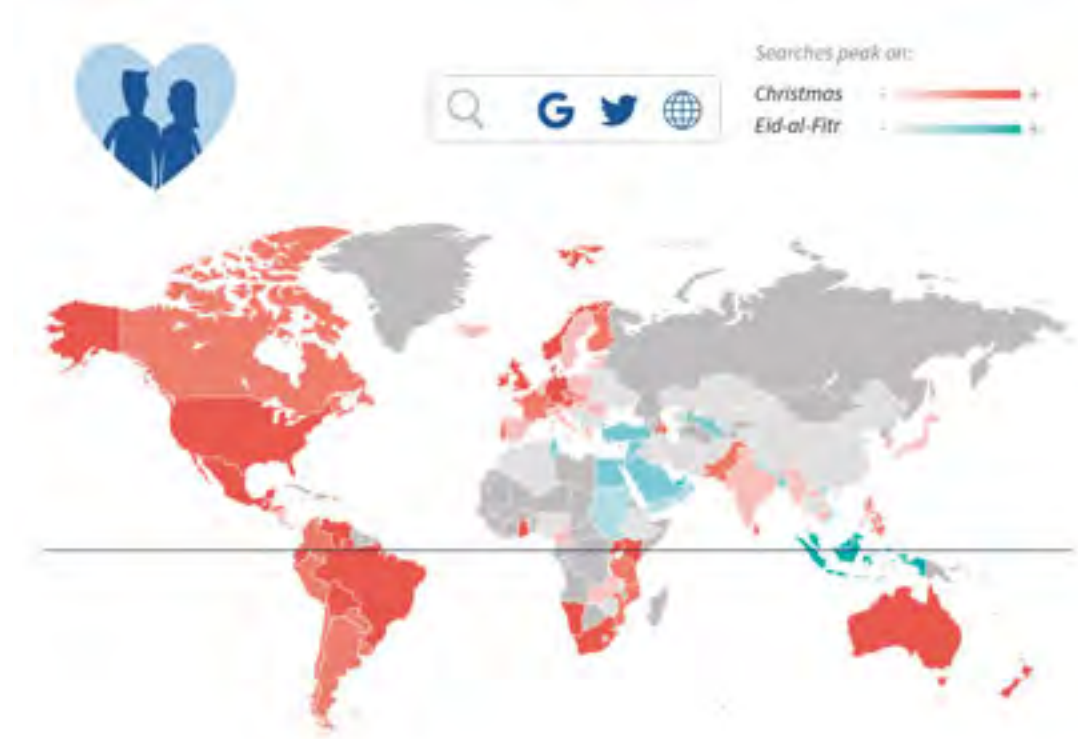

Figure: We discovered that there is a "loving mood", around specific celebrations, and that this mood is associated with an increase in both online and offline sexual interest. By analyzing data from Google Trends, Twitter, and other sources, we found that online searches for sex have a cyclical nature peaking around major cultural festivities (Christmas in Christian countries and Eid-al-Fitr in Muslim countries), regardless of hemisphere location. These also correlate with an increase in births, 9 months later.

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Evolutionary Biology

Group Leader | **GORDO, Isabel**

Research Interests

We are interested in combining both theoretical and empirical work with the aim to a better understanding of the major forces that shape variation in natural populations, particularly microbial populations. We are using *E. coli* as a model organism to test theoretical predictions about the evolution of mutation rates and the genetics of adaptation. A key ecosystem of current major interest is the microbiota of the mammalian gut. We perform *in vivo* experimental evolution to study the role of mutation and horizontal gene transfer in structuring the emergence and maintenance of strain variation of commensal species colonising the intestine. Particular focus of our research relates to metabolic traits and pathogenic traits such as resistance to antibiotics.

Lab Members in 2017

Roberto Balbotín · Postdoc
Paulo Durão · Postdoc
Nelson Frazão · Postdoc
Ozhan Ozkaya · Postdoc
Ricardo Ramiro · Postdoc

Hugo Barreto · PhD student, 2017 IBB | Started in June
João Batista · External PhD student | Left in January
Luís Cardoso · PhD student, 2015 IBB
Daniela Güleresi · Lab manager

Main Achievements

Escherichia coli is both a harmless commensal in the intestines of many mammals, and inhabits the gut microbiota of all humans. *E. coli* is also a dangerous opportunistic pathogen, capable of causing severe disease. In the context of its life as a commensal of a mammalian host we have shown that *E. coli* undergoes rapid reverse evolution in metabolic genes and that this process is able to maintain polymorphism by competition for limited resources.
In the context of commensal to pathogen transition, using *in vitro* experimental evolution, we have shown that a commensal strain, under continuous pressure from macrophages, recurrently acquired a transposable element insertion, which resulted in two key phenotypic changes: increased intracellular survival, through the delay of phagosome maturation and increased ability to escape macrophages. We also have quantified the rate of acquisition of mutations that reduce the cost of multidrug resistance, a study that unravelled a novel genetic target potentially important to combat multi-resistant bacteria.

Selected Publications

› Moura de Sousa, J., Balbontín, R., Durão, P., **Gordo, I.** (2017) *Multidrug-resistant bacteria compensate for the epistasis between resistances*. **PLoS Biol**. 15: e2001741.

› Proença, J.T., Barral, D.C., **Gordo, I.** (2017) *Commensal-to-pathogen transition: one-single transposon insertion results in two pathoadaptive traits in* Escherichia coli *-macrophage interaction*. **Sci Rep-UK**. 7: 4504.

› Sousa, A., Ramiro, R.S., Barroso-Batista, J., Güleresi, D., Lourenço, M., **Gordo, I.** (2017) *Recurrent reverse evolution maintains polymorphism after strong bottlenecks in commensal gut bacteria*. **Mol Biol Evol**. 34(11):2879-2892.

**The complete list of publications is available on section 3. Publications.*

Funding

› Fundação para a Ciência e a Tecnologia
› Programa de Atividades Conjuntas (PAC) - Fundação para a Ciência e a Tecnologia & Fundos Europeus Estruturais e de Investimento

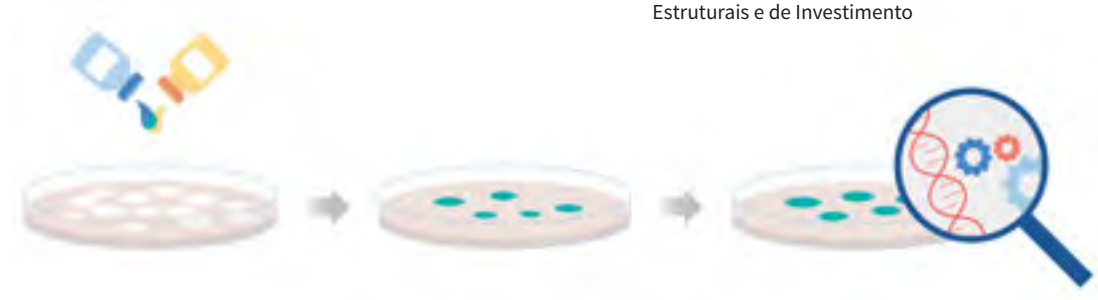

Figure: Antibiotic-resistant bacteria have mutations that most often are prejudicial in the absence of the drug. To overcome this, bacteria need to acquire additional compensatory mutations. We identified the key proteins involved in the compensatory mechanism of multi-drug resistant bacteria (green), a feature that might be used in the future as a new therapeutic target.

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Host-Pathogen Co-Evolution

Group Leader | **HOWARD, Jonathan C.**

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 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.

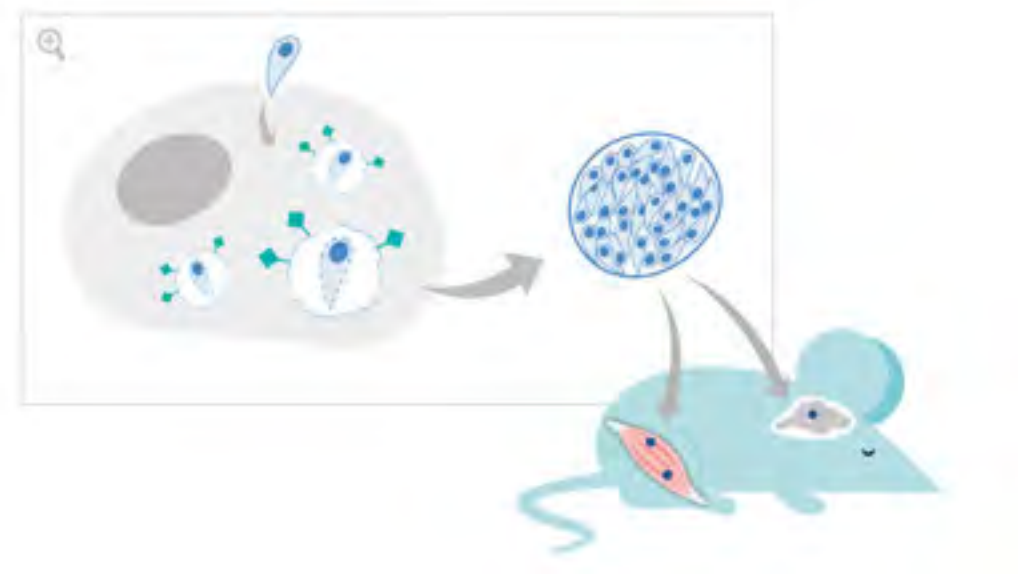

Figure: *Toxoplasma gondii* is an intracellular protozoan parasite that infects about 35% of the human population, world-wide, even in highly developed countries. Infected people carry dormant cysts in their brains. Most people are unaware of the infection but it can be dangerous for the unborn baby if a pregnant woman becomes infected. The infection is exchanged between cats and the small wild animals, like mice, that cats catch and eat. We are studying proteins from the immune system of the mouse that disrupt the intracellular niche where the parasites are located before they establish dormant cysts in brain and muscle, just as in humans.

Lab Members in 2017

Joana Loureiro · Postdoc
Martha Meneses · PhD student, 2015 IBB
Ana Rodrigues · PhD student, 2015 PGCD
Cláudia Campos · Lab manager
Camille Lunen · Visitor

Funding

› Fundação Calouste Gulbenkian

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Actin Dynamics

Group Leader | **JANODY, Florence**

Research Interests

Epithelial cell carcinogenesis is a multistep process by which cells acquire successive phenotypic and molecular properties from sustained cell proliferation and survival to invasive and metastatic capacities. These properties arise upon genomic and epigenetic alterations, as well as upon reciprocal dialogue of cancer cells with the surrounding microenvironment. The cytoskeleton constitutes a signal transmission axis between the microenvironment and the genome, suggesting that its deregulation contributes to all stages in the evolution of epithelial cancers. We aim to understand how cytoskeletal deregulation underlies benign tumor development and their progression into invasive cancer.

Lab Members in 2017

Patrícia Guerreiro · Postdoc | Started in February
Archana Pawar · Postdoc | Started in February
Praachi Jain · PhD student, 2014 IBB
Sandra Tavares · PhD student, 2012 PIBS | Left in January
Clara Barreto · Masters student

Main Achievements

Using a human mammary cell line with conditional Src activation, we have reported that cells undergo a stiffening state prior to acquiring malignant features. This state is characterised by the transient accumulation of stress fibers and upregulation of Ena/VASP-like (EVL). EVL, in turn, organises stress fibers leading to transient cell stiffening, ERK-dependent cell proliferation, as well as, enhances Src activation and the progression towards a fully transformed state. While cell softening allows for cancer cell invasion, our work reveals that stress fiber-mediated cell stiffening could drive tumor growth. Our work also demonstrates that mechanical signals exerted by the cytoskeleton transmit biological signals from the cancer cell surface to the nucleus to influence cancer cell programming.

Publications

› Tavares, S., Vieira, A.F., Taubenberger, A.V., Araújo, M., Martins, N.P., Brás-Pereira, C., Polónia, A., Herbig, M., Barreto, C., Otto, O., Cardoso, J., Pereira-Leal, J.B., Guck, J., Paredes, J., **Janody, F.** (2017) *Actin stress fiber organization promotes cell stiffening and proliferation of pre-invasive breast cancer cells*. **Nat Commun**. 8: 15237.

Funding

› Fundação para a Ciência e a Tecnologia
› Programa de Atividades Conjuntas (PAC) - Fundação para a Ciência e a Tecnologia & Fundos Europeus Estruturais e de Investimento

Figure: The progression of breast cancer disease takes several stages, from a benign lesion to an invasive carcinoma, possibly with metastasis. We discovered that prior to becoming invasive, cells undergo a transient stiffening state caused by the accumulation of fibers of the cytoskeleton (the cell skeleton, in red).

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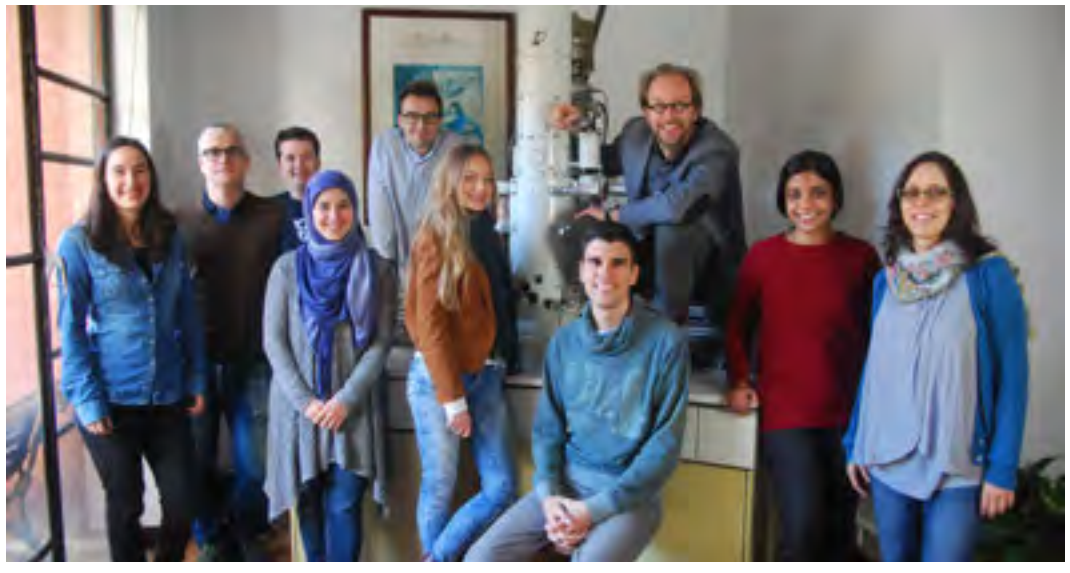
Epigenetic Mechanisms

Group Leader | **JANSEN, Lars E.T.**

Research Interests

The genome is propagated through cell division by duplication of a full set of chromosomes followed by the faithful separation of each chromosome copy into two new daughter cells during mitosis. In addition, so-called "epigenetic" chromosome structures that maintain functional chromosomes and that "memorise" the transcriptional state of a cell lineage is also maintained through mitotic and sometimes even meiotic divisions. Although the mechanism of duplication and mitotic transmission of DNA sequences has been worked out decades ago, how the more fluid epigenetic information of gene activities and chromosome structure is maintained in time is not understood. We are interested in resolving this.



Lab Members in 2017

Inês Milagre · Postdoc
Sreyoshi Mitra · Postdoc
Marina Pineda · Postdoc
Wojciech Siwek · Postdoc
Ana Stankovic · PhD student, 2012 PIBS
Dragan Stajic · PhD student, 2013 PIBS
Sebastiaan Van Den Berg · PhD student, 2017 IBB | Started in June
Sahar Tehrani · PhD student, 2017 IBB | Started in June
João Mata · Technician

Funding

› European Research Council

Main Achievements

In 2017, we completed a major research line in our lab that focused on how epigenetically-controlled centromeric chromatin is replicated along the cell cycle. This work, driven by Ana Stankovic, a PhD student has revealed how major cell cycle kinases link the process of centromeric chromatin assembly to cell cycle progression. This work was published in *Molecular Cell*. Ana Stankovic along with Lars Jansen, contributed a chapter to a new reference text, "Centromeres and Kinetochores" that bundles all current knowledge on centromere biology from world leaders in this field.

Publications

› Stankovic, A., Guo, L.Y., Mata, J.F., Bodor, D.L., Cao, X., Bailey, A.O., Shabanowitz, J., Hunt, D.F., Garcia, B.A., Black, B.E., **Jansen, L.E.T.** (2017) *A dual inhibitory mechanism sufficient to maintain cell-cycle-restricted CENP-A assembly*. **Mol Cell**. 65: 231-246.

› Stankovic, A., **Jansen, L.E.T.** (2017) *Quantitative microscopy reveals centromeric chromatin stability, size, and cell cycle mechanisms to maintain centromere homeostasis.* **Prog Mol Subcell Biol.** 56: 139-162.

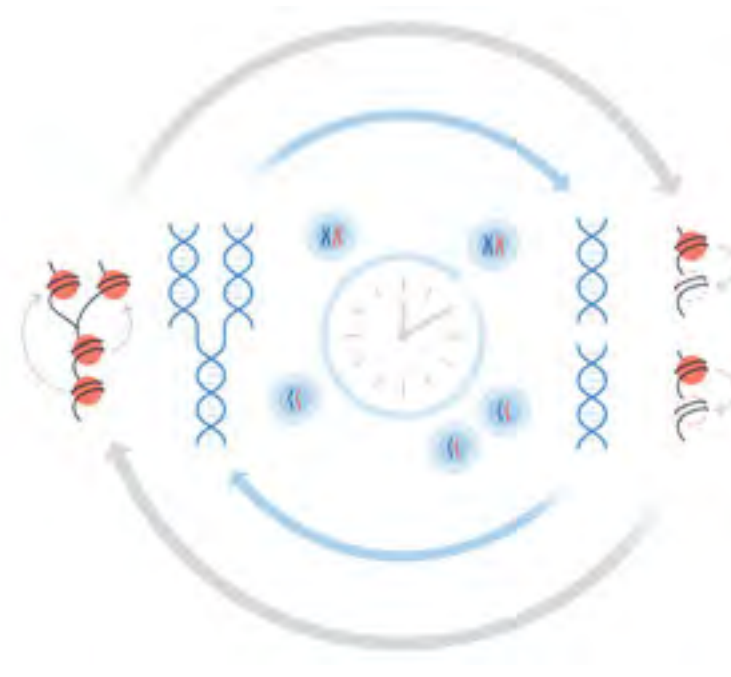


Figure: During the cell cycle (inner circle), chromosomes are split and copied to form new daughter cells. Throughout this process, there is duplication and inheritance of genes (middle circle). We now discovered that proteins bound tightly to the DNA are inherited in addition to genes, a process called epigenetic inheritance (outer circle). Everytime the cell divides, these proteins make copies of themselves, just like DNA, and are passed on from on cell to the next.

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Patterning and Morphogenesis

Group Leader | **MALLO, Moisés**

Research Interests

The ultimate goal of our research group is to understand how patterning information is translated in morphogenetic processes during vertebrate embryonic development. One of our main current focuses aims at determining what regulates the function of the axial progenitors that make the different body elements and the role they play in the evolution of the vertebrate body plan. Most of our work uses the mouse as the model system by means of *in vivo* genetic analysis complemented with *in vitro* differentiation systems involving stem and progenitor cells. We have recently incorporated other model systems to address Evo-Devo questions derived from our research.

Lab Members in 2017

Ana Rita Aires · Postdoc
Ana Casaca · Postdoc
Luísa Machado · Postdoc
André Dias · PhD student, 2017 IBB | Started in July
Anastasiia Lozovska · PhD student, 2017 IBB | Started in July
Irma Varela Lasheras · PhD student, 2012 PIBS
André Mesquita · Masters student | Left in September

Funding

› Fundação para a Ciência e a Tecnologia
› Santa Casa da Misericórdia de Lisboa

Main Achievements

We have identified the mechanisms regulating the relocation of the axial progenitors from the epiblast to the tailbud during the trunk to tail transition. We have shown that Snai1 is the key regulator of this process. This gene triggers an epithelial to mesenchymal transition in the progenitors that is functionally different to the one involved in gastrulation: instead of activating mesodermal fates on those progenitors, it keeps them in a progenitor state able to further extend the body axis. We have also shown that Gdf11 modulates the capacity of the tailbud-resident axial progenitors to further extend the axis. Indeed, Gdf11 mutant embryos have more progenitors than their wild type littermates, and longer embryonic axis. In addition, inhibition of Gdf11 signalling rescues the ability of tailbud progenitors to grow *in vitro*.

Publications

› Losa, M., Latorre, V., Andrabi, M., Ladam, F., Sagerström, C., Novoa, A., Zarrineh, P., Bridoux, L., Hanley, N.A., **Mallo, M.**, Bobola, N. (2017) *A tissue-specific, GATA6-driven transcriptional program instructs remodeling of the mature arterial tree*. **eLife** 6: e31362.

› **Mallo, M.** (2017) *Reassessing the role of Hox genes during vertebrate development and evolution*. **Trends Genet. [Epub ahead of print].**

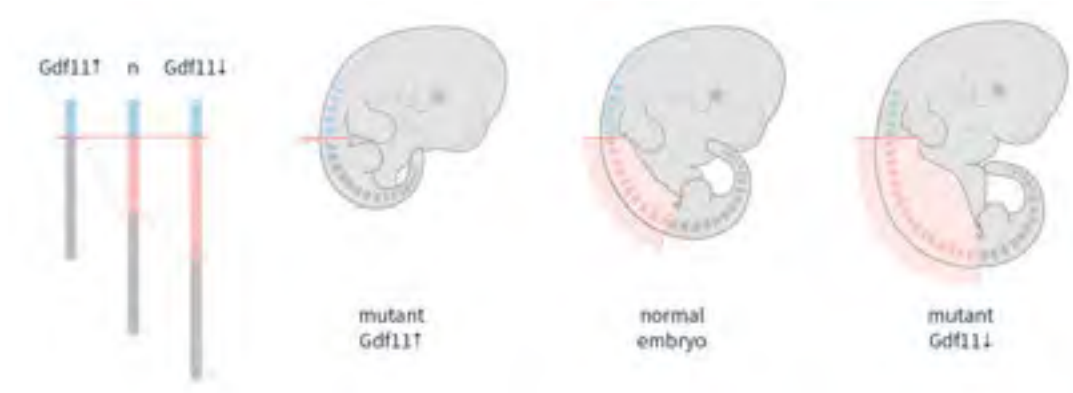

Figure: Each region of the body is formed in a specific order, from head to tail, under specific genetic instructions. We are investigating which key genes control the formation of tissues that make the trunk (pink) and what regulates the transition to make the tail. A key gene in this latter process is Gdf11. Mouse embryos with early activation of this gene have no trunk (mutant Gdf11↑), and those with late activation of the gene may have very long trunks, with extra vertebras (mutant Gdf11↓).

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Lymphocyte Development and 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.

Lab Members in 2017

Luna Ballesteros · Postdoc
Rafael Paiva · PhD student, 2016 IBB
Camila Ramos · PhD student, 2017 IBB | Started in July
Bruna Martins · Undergraduate student | Started in January; left in June
Joana Silva · Technician | Left in March
Carolina Alves · Lab manager
Daniela Zanatta · Lab manager | Started in June; left in December

Main Achievements

We are addressing whether development of T cell acute lymphoblastic leukemia is affected by the quality of the precursors seeding the thymus: all of them are deficient for interleukin 7 receptor (IL-7r), but each with a different level of immune deficiency. A manuscript is to be submitted in early 2018.

Rafael Paiva presented his results in an oral communication at the Annual Congress of the European Hematology Association in Madrid and a poster at the Annual Meeting of the Portuguese Society of Immunology. Vera Martins was an invited speaker at the *International Symposium on Cell Competition* in Sapporo, Japan.

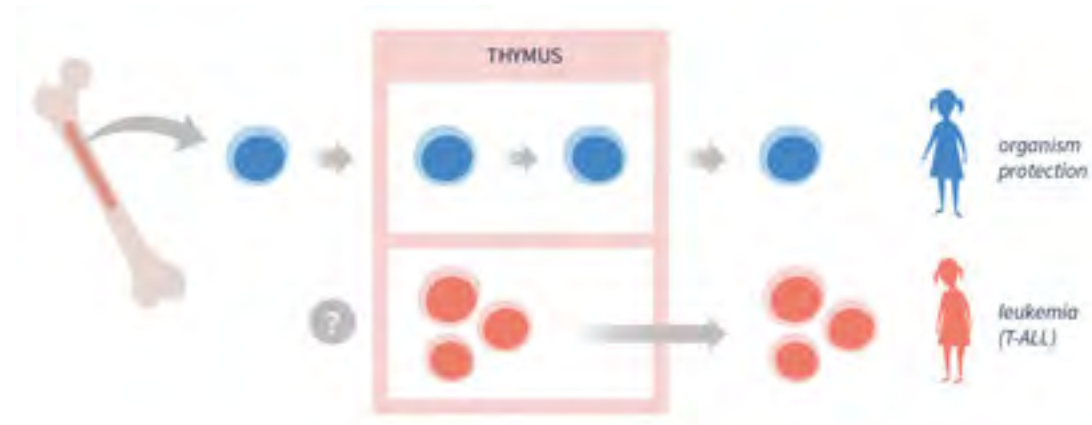

Figure: Stem cells that reside in the marrow of the bones generate all cells of the blood. This includes T cells, that are essencial to life, and protect the organism by fighting infections. T cells are formed from immature progenitor cells that leave the bone marrow and seed the thymus. There, these cells learn to be T cells, and become mature. When leaving the thymus, T cell are mature and ready to fight infections. Nevertheless, like all cell types of the organism, T cell precursors in the thymus can give rise to cancer (leukemia). Our lab studies normal T cell development, and leukemia originating from developing T cells, i.e. T cell acute lymphoblastic leukemia (T-ALL).

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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.

Lab Members in 2017

Takashi Koyama · Postdoc
Nuno Soares · PhD student, 2013 PIBS
Pedro Antunes · Technician

Funding

› Fundação para a Ciência e a Tecnologia

Main Achievements

Macronutrient balancing in larvae: deciding what, and how much, to eat
Our first achievement was to generate insight into how animals choose what and how much to eat by exploring how the fruit fly larvae (*Drosophila melanogaster*) make foraging decisions across a range of nutritional conditions. We found that larvae will overconsume on protein poor foods to reach the target amount of protein required. These data provide a foundation for understanding how these decisions are made at the level of neural circuits.

Species and sex-specific responses to nutrition
The impacts of diet on an animal's biology change according to the animal's life stage, their sex, their health status, and their species-specific requirements. Our second achievement in 2017 involves characterising how differences in between species and between the sexes of the same species mould how nutrition affects morphology and life history.

Selected Publications

› Almeida de Carvalho, M.J., **Mirth, C.K.** (2017) *Food intake and food choice are altered by the developmental transition at critical weight in* Drosophila melanogaster. **Anim Behav**. 126: 195-208.

› Shingleton, A.W., Masandika, J.R., Thorsen, L.S., Zhu, Y., **Mirth, C.K.** (2017) *The sex-specific effects of diet quality versus quantity on morphology in* Drosophila melanogaster. **R Soc Open Sci**. 4: 170375.

› Silva-Soares, N.F., Nogueira-Alves, A., Beldade, P., **Mirth, C.K.** (2017) *Adaptation to new nutritional environments: larval performance, foraging decisions, and adult oviposition choices in* Drosophila suzukii. **BMC Ecol**. 17: 21.

**The complete list of publications is available on section 3. Publications.*

Figure: While most fruit fly species exploit rotting plant parts, some species can also feed on ripe fruit. We now discovered that this can be due to differences in their preference for protein concentration in the diet. The fruit fly species *Drosophila biarmipes* (green) prefers the high protein concentration that exists in rotting fruit, whereas *Drosophila suzukii* (blue), which has adapted to use ripening fruit, can perform well in poor protein diets as well.

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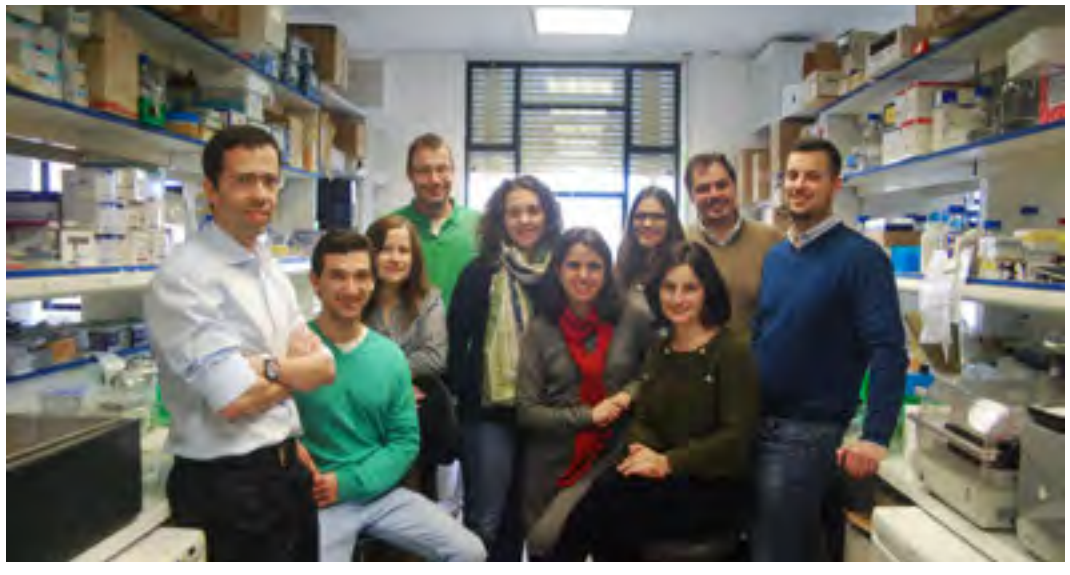
Innate Immunity and Inflammation

Group Leader | **MOITA, Luís Ferreira**

Research Interests

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 characterised. The central goal of this research programme is to identify and characterise 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.



Lab Members in 2017

Ana Costa · Postdoc
Rita Ferreira · Postdoc | Left in February
Catarina Moita · Postdoc
Philipp Seidel · Postdoc
Katharina Willmann · Postdoc | Started in May
Henrique Colaço · PhD student, 2015 IBB
Isa Santos · External PhD student
Tiago Velho · External PhD student
André Barros · Technician
Dora Pedroso · Technician
Susana Moreira · Visitor

Funding

› European Research Council
› Fundação para a Ciência e a Tecnologia

Main Achievements

1. Identification of novel clinical approved drugs that can be used to induce Disease Tolerance. 2. Discovered that the function of γδ-T cells is inhibited in obstructive sleep apnea patients, a likely mechanistic link to the increased susceptibility to cancer in these patients. 3. Characterised circadian rhythm and sleep architecture abnormalities in sleep apnea patients, opening the way for more effective treatment options.

Selected Publications

› Faridi, M.H., Khan, S.Q., Zhao, W., Lee, H.W., Altintas, M.M., Zhang, K., Kumar, V., Armstrong, A.R., Carmona-Rivera, C., Dorschner, J.M., Schnaith, A.M., Li, X., Ghodke-Puranik, Y., Moore, E., Purmalek, M., Irizarry-Caro, J., Zhang, T., Day, R., Stoub, D., Hoffmann, V., Khaliqdina, S.J., Bhargava, P., Santander, A.M., Torroella-Kouri, M., Issac, B., Cimbaluk, D.J., Zloza, A., Prabhakar, R., Deep, S., Jolly, M., Koh, K.H., Reichner, J.S., Bradshaw, E.M., Chen, J., **Moita, L.F.**, Yuen, P.S., Tsai, W.L., Singh, B., Reiser, J., Nath, S.K., Niewold, T.B., Vazquez-Padron, R.I., Kaplan, M.J., Gupta, V. (2017) *CD11B activation suppresses TLR-dependent inflammation and autoimmunity in systemic lupus erythematosus.* **J Clin Invest**. 127: 1271-1283

› Moreira, S., Rodrigues, R., Barros, A.B., Pejanovic, N., Neves-Costa, A., Pedroso, D., Pereira, C., Fernandes, D., Rodrigues, J.V., Barbara, C., **Moita, L.F.** (2017) *Changes in expression of the clock gene in obstructive sleep apnea syndrome patients are not reverted by continuous positive airway pressure treatment*. **Front Med (Lausanne)**. 4: 187.

› Soares, M.P., Teixeira, L., **Moita, L.F.** (2017) *Disease tolerance and immunity in host protection against infection*. **Nat Rev Immunol**. 17: 83-96.

**The complete list of publications is available on section 3. Publications.*

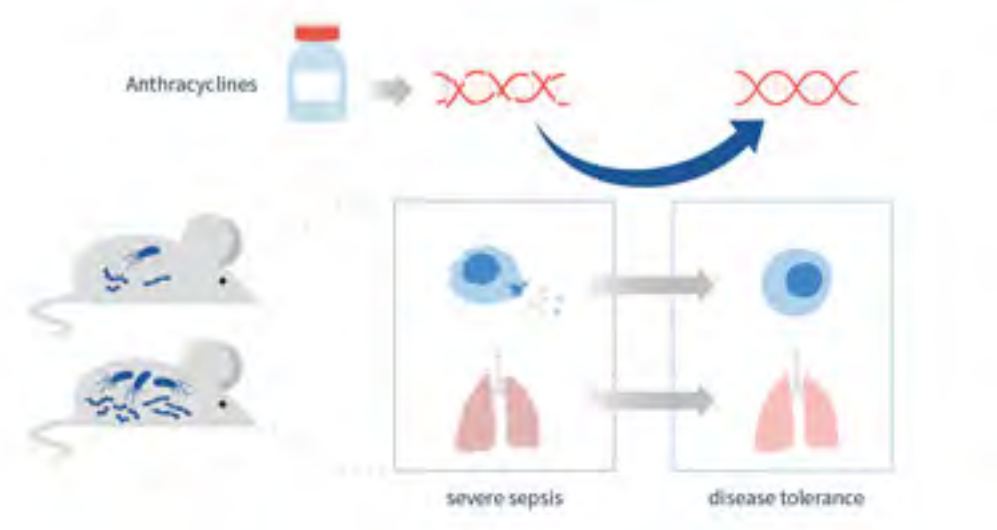


Figure: Severe sepsis is a life-threatening condition where there is a deregulated systemic inflammatory response to an infection, and for which there are limited therapeutic options. As a defence strategy, the organism relies on tissue damage control mechanisms that prevent the deleterious effects of pathogens, a process known as disease tolerance. We used the mouse model to show that some drugs, like anthracyclines, confer protection against sepsis by increasing disease tolerance to infection, limiting disease severity irrespectively of pathogen load. However, this salutary effect is dependent on the activation of DNA damage response and cell destruction pathways in the lung.

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Chromosome Dynamics

Group Leader | **OLIVEIRA, Raquel A.**

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. Our laboratory adopts a multidisciplinary approach 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.

Lab Members in 2017

Sara Carvalhal · Postdoc
Leonardo Guilgur · Postdoc
Margarida Araújo · PhD student, 2017 IBB | Started in July
Catarina Carmo · PhD student, 2017 IBB | Started in July
Mihailo Mirkovic · PhD student, 2014 IBB
Ewa Piskadlo · PhD student, 2013 PIBS | Left in December
Cíntia Ramos · PhD student, 2014 PGCD
Alexandra Tavares · Lab manager

Main Achievements

Our recent work uncovers how mitotic sister chromatid resolution is a highly dynamic and reversible process. We demonstrate that condensin I complexes are constantly required to direct topoisomerase II activity to prevent the introduction of erroneous entanglements in the DNA molecules (Piskaldo *et al.*, eLife 2017). These findings provide a much more dynamic view on the process of chromosome assembly and elucidate how chromosome catenation can influence both the individualisation and the compaction of mitotic chromatin (see Piskadlo and Oliveira, Int. J. Mol. Sci. 2017, for extended discussion).

Publications

› Mirkovic, M., **Oliveira, R.A.** (2017) *Centromeric cohesin: Molecular glue and much more*. **Prog Mol Subcell Biol**. 56: 485-513.

› Piskadlo, E., Tavares, A., **Oliveira, R.A.** (2017) *Metaphase chromosome structure is dynamically maintained by condensin I-directed DNA (de)catenation*. **eLife**. 6: e26120.

› Piskadlo, E., **Oliveira, R.A.** (2017) *A topology-centric view on mitotic chromosome architecture*. **Int J Mol Sci.** 18(12): 2751.

Funding

› European Research Council
› European Molecular Biology Organization
› Fundação para a Ciência e a Tecnologia

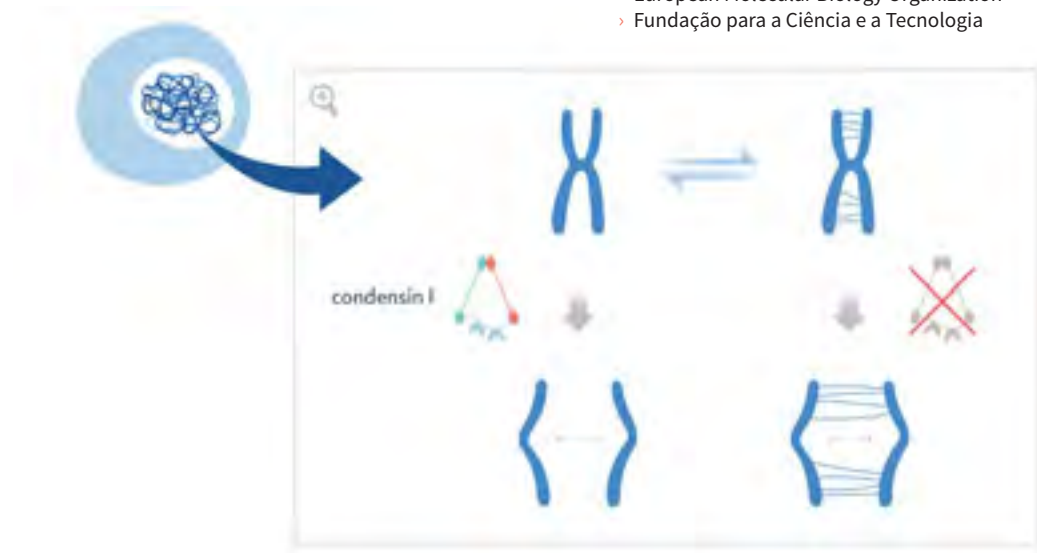

Figure: The DNA, packed inside the nucleus of each cell, can easily become entangled and knotted. When a cell divides, these DNA knots must be resolved for efficient separation to the daughter cells. The protein complex Condensin I is necessary for maintaining the chromosomal architecture, which is intrinsically connected with the resolution of such DNA knots. In the absence of Condensin I, cells are unable to separate their DNA strands with drastic consequences to the cell. The maintenance of chromosome architecture is a very dynamic process, that requires constant action of Condensin I.

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Integrative Behavioural Biology

Group Leader | **OLIVEIRA, Rui F.**

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. For this purpose we use zebrafish and other selected fish species as study models. Current research questions centre on four topics:

1. Evolution of social cognition and of its neuromolecular mechanisms;
2. Genomic and epigenomic mechanisms of social plasticity;
3. Neuroendocrinology of social interactions;
4. Cognitive bias and susceptibility/resilience to disease.

Lab Members in 2017

Felipe Espigares · Postdoc
Ana Nunes · Postdoc
Magda Teles · Postdoc
Susana Varela · Postdoc | Started in May
Ibukun Akinrinade · PhD student, 2015 IBB
Sara Cardoso · External PhD student
Ana Sofia Félix · External PhD student
Cláudia Gonçalves · PhD student, 2016 PGCD
Júlia Pinho · External PhD student
Leonor Carreira · Masters student
Benedita Cyrne · Masters student | Started in June
Daniela Santos · Masters student
Nasser Karmali · Trainee | Left in February
Pedro Marinho · Trainee | Started in January; left in February
Diogo Ribeiro · Volunteer
Diana Abad · Visitor | Started in September
Etienne Lein · Visitor | Started and left in April
José Ricardo Paula · Visitor | Started in December
Manuel Sapage · Visitor | Started in November
María Scaia · Visitor | Started in August

Main Achievements

During 2017 three main studies found that: (1) social buffering of fear response occurs in zebrafish; (2) cognitive appraisal is used by fish to allocate value and salience to environmental stimuli generating emotion-like states; and (3) the adult response to stress and social stimuli depends on neuropeptide switching between corticotropin-releasing hormone (CRH) and oxytocin in a newly identified subset of oxytocin neurons, which is orchestrated by the developmental transcription factor orthopedia (Otp). These studies support the use of zebrafish as a translational model in affective and social neuroscience, which traditionally has used almost exclusively rodents and primates.

Selected Publications

› Cardoso, S.D., Gonçalves, D., Goesmann, A., Canário, A.V.M., **Oliveira, R.F.** (2017) *Temporal variation in brain transcriptome is associated with the expression of female mimicry as a sequential male alternative reproductive tactic in fish*. **Mol Ecol. [Epub ahead of print]**.

› Faustino, A.I., Tacão-Monteiro, A., **Oliveira, R.F.** (2017) *Mechanisms of social buffering of fear in zebrafish*. **Sci Rep-UK**. 7: 44329.

› Wircer, E., Blechman, J., Borodovsky, N., Tsoory, M., Nunes, A.R., **Oliveira, R.F.**, Levkowitz, G. (2017) *Homeodomain protein Otp affects developmental neuropeptide switching in oxytocin neurons associated with a long-term effect on social behavior*. **eLife**. 6: e22170.

**The complete list of publications is available on section 3. Publications.*

Funding

› BIAL
› Fundação para a Ciência e a Tecnologia

Figure: We demonstrated for the first time that fish have emotional states, and respond differently to the same stimulus depending on the way they assess it. To evaluate the emotional states we tested the levels of a stress hormone (cortisol), which brain areas are activated and how fish interact with each other.

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External Website · https://oliveiralab.org/

Infections & Immunity

Group Leader | **PARKHOUSE, Michael**

Research Interests

- Pathogen modulation of host cell biology and innate immunity
- Control of neurocysticercosis

Lab Members in 2017

Sílvia Correia · Postdoc
Rute Nascimento · Postdoc
Ana Rita Ferreira · Masters student | Started in September
Júlio Henriques · Masters student
Diogo Tomaz · Technician
Catarina Azevedo · Trainee | Left in July

Funding

› Fundação para a Ciência e a Tecnologia

Main Achievements

- Work continues on defining the mechanisms of three African Swine Fever genes that inhibit the interferon response.
- The African Swine Fever virus non-essential, non-homologous, gene I329L which inhibits Toll-like receptor activation through two mechanisms, has been deleted from the virus and is being tested as a vaccine.
- The non-homologous HCMV gene UL76 induces cell cycle arrest via its conserved N-terminal domain and induces expression of IL-8 via its variable C-terminal domain.
- A lateral flow assay has been developed for the rapid detection of extraparenchymal neurocysticercosis and has been used for diagnosis in Mexico and Ecuador.

Publications

› Arias, M., de la, T.A., Dixon, L., Gallardo, C., Jori, F., Laddomada, A., Martins, C., **Parkhouse, R.M.E.**, Revilla, Y., Rodriguez, F.A.J. (2017) *Approaches and perspectives for development of African swine fever virus vaccines*. **Vaccines (Basel)**. 5(4). pii: E35.

› Cortez, M.M., Rojas, G.C., **Parkhouse, R.M.E.** (2017) *The Hp10 Taenia monoclonal antibody-based ELISA detects a similar protein in the vesicular fluid of* Taenia hydatigena. **Trop Anim Health Pro. [Epub ahead of print].**

› **Parkhouse, R.M.E.**, Carpio, A., Campoverde, A., Sastre, P., Rojas, G., Cortez, M.M. (2017) *Reciprocal contribution of clinical studies and the Hp10 antigen ELISA for the diagnosis of extraparenchymal neurocysticercosis*. **Acta Trop.** 178: 119-123.

Figure: The African Swine Fever is an infectious disease caused by a virus that usually results in the death of infected pigs. Currently there is no vaccine to fight this virus. Based on our studies on the molecular mechanisms of this virus, we are now testing a new vaccine made of a virus that has a gene inhibiting the immune response deleted.

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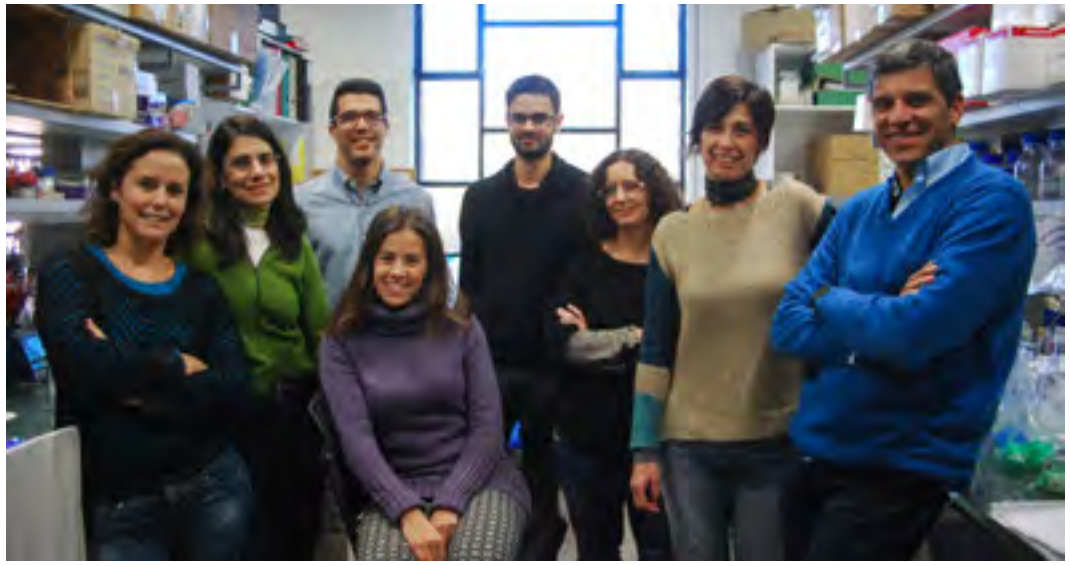
Disease Genetics

Group Leader | **PENHA GONÇALVES, Carlos**

Research Interests

Our research in genetics of inflammatory responses to malaria infection drove us to ask how infection/inflammation impacts on cellular metabolism and organ physiology. Main lines of research are:
- How placental inflammation caused by malaria leads to placental dysfunction with a specific interest in the interlink of innate specific pathways and vasoregulatory systems;
- The role of brain microvessel endothelial cells in the inflammatory response that leads to development of cerebral malaria with a focus on the role of interferon in breakage of blood-brain barrier integrity;
- The inflammatory responses in the liver during acute and chronic insults with the aim of understanding the contribution of macrophage phenotypic transitions in resolution of liver damage.



Lab Members in 2017

Luciana Moraes · Postdoc
Rita Neres · Postdoc
Teresa Pais · Postdoc
Inês Coelho · PhD student, 2015 IBB
Yash Pandya · PhD student, 2015 IBB
Nádia Duarte · Lab manager
Alexander Marta · Trainee | Started in October
Rita Patarrão · Visitor

Main Achievements

- Uncover that TLR4 expression takes part in the trophoblast cell response to *Plasmodium*-infected erythrocytes, including the control of endothelin expression and protects the foetus survival during malaria in pregnancy.
- Setting up a method for isolation, purification and imaging of mouse trophoblasts.
- Demonstrate that expression of interferon by brain microvessels endothelial cells *in vivo* and *in vitro* is induced by *Plasmodium* molecular components.
- Setting up a method to cultivate brain endothelial cells to study permeability of endothelial junctions.
- Finding that TREM2 plays a role in the macrophages phenotype shifts during liver fibrosis and fibrosis.

Selected Publications

› Gonçalves, L.A., Rodo, J., Rodrigues-Duarte, L., de Moraes, L.V., **Penha-Gonçalves, C.** (2017) *Hgf secreted by activated Kupffer cells induces apoptosis of* Plasmodium-*infected hepatocytes*. **Front Immunol**. 8: 90.

› Rolim, I., Duarte, N., Barata, G., Costa, J., Gardete-Correia, L., Boavida, J., Duarte, R., Raposo, J., Peerally, Z., Catarino, M., **Penha-Gonçalves, C.** (2017) *Immunoglobulin m gene association with autoantibody reactivity and type 1 diabetes*. **Immunogenetics**. 69: 429-437.

**The complete list of publications is available on section 3. Publications.*

Funding

› European Foundation for the Study of Diabetes
› Fundação para a Ciência e a Tecnologia (FCT)
› March of Dimes
› Programa de Atividades Conjuntas (PAC) - FCT & Fundos Europeus Estruturais e de Investimento

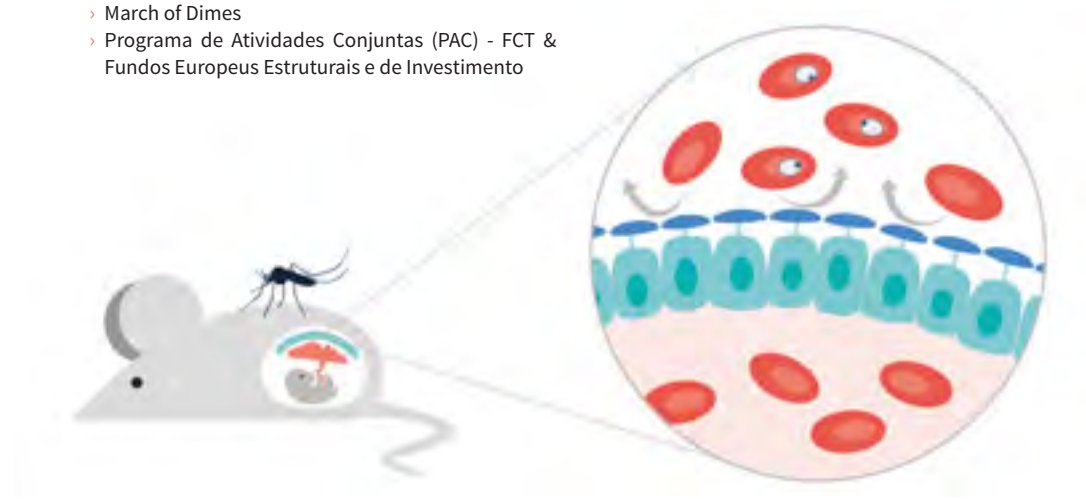


Figure: Malaria in pregnancy causes a range of adverse effects in the fetus. Many of these effects are thought to derive from a placental inflammatory response that results from interaction of infected red blood cells with the placental tissue. We discovered that TLR4 (blue), a protein that activates the immune system, is involved in this interaction and has a protective role in fetus survival.

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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, and in the medical applications of evolutionary genomics.

Our specific domains of application revolve around the endomembrane system, microtubule organising centres and systems where cells live inside other cells (endosymbiosis, endoparasitism, endosporulation).

Lab Members in 2017

Ricardo Leite · Postdoc
Paula Silva · Postdoc
Jaroslaw Surkont · Postdoc | Left in October
Ana Paula Aguiar · PhD student, 2014 PGCD
Marc Gouw · Visitor

Selected Publications

- Braga, S., Cardoso, J., Andre, S., Brito, M., Sanchez, P., Orvalho, L., Salgado, L., Dias, S., **Pereira-Leal, J.B.**, Passos-Coelho, J.L. (2017) *Does hypoxic response mediate primary resistance to Sunitinib in untreated locally advanced breast cancer?*. **Curr Cancer Drug Tar**. 17: 62-73.
- Brito, P.H., Chevreux, B., Serra, C.R., Schyns, G., Henriques, A.O., **Pereira-Leal, J.B.** (2017) *Genetic competence drives genome diversity in* Bacillus subtilis. **Genome Biol Evol**. 10(1):108-124.
- Surkont, J., Diekmann, Y., **Pereira-Leal, J.B.** (2017) *Rabifier2: an improved bioinformatic classifier of Rab GTPases*. **Bioinformatics**. 33: 568-570.

**The complete list of publications is available on section 3. Publications.*

Funding

- Fundação para a Ciência e a Tecnologia

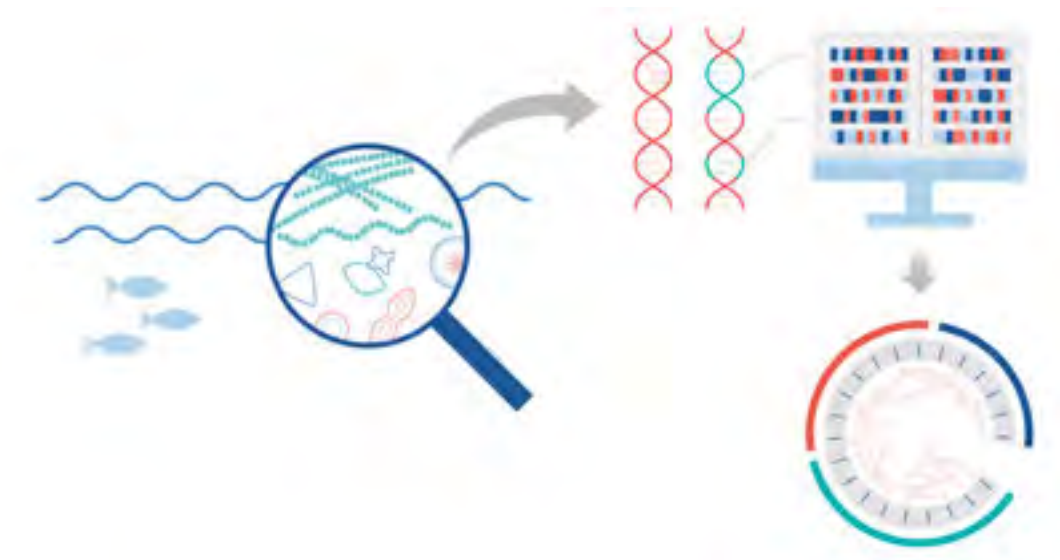

Figure: Computational genomics make use of genome sequences and related data to develop models and statistical analysis that help deciphering biologic questions. Undestanding how the evolution of genomes and protein varieties drive the evolution of organisms is one of our main goals.

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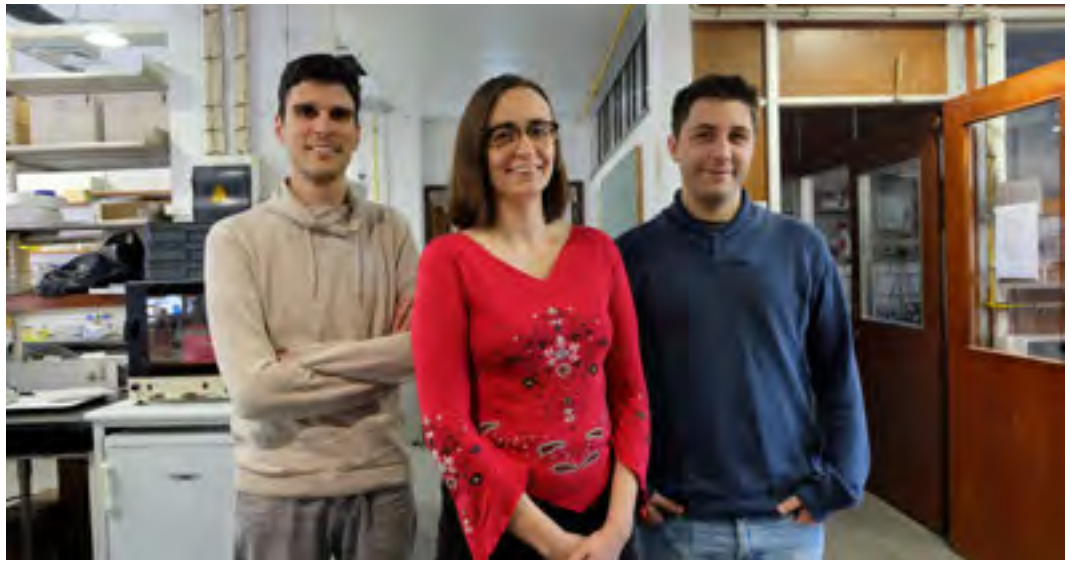
Evolution and Genome Structure

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 the way we see ourselves.

Our lab 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.



Lab Members in 2017

Diogo Santos · PhD student, 2014 IBB
Dragan Stajic · PhD student, 2013 PIBS
Mariana Delgadinho · Masters student

Funding

› Fundação para a Ciência e a Tecnologia

Main Achievements

During this year, we demonstrated how additive changes in growth rate become epistatic on fitness. This implies that the fitness effect of almost all mutations will depend on the genetic background. We are preparing a manuscript demonstrating this dependence and suggesting ways to better measure fitness and epistasis in experimental evolution. Moreover, we developed a new model, based on a Power-Law function that accurately describes the fitness changes observed in multiple evolution experiments. Namely, it describes and predicts the ubiquitous observation of diminishing returns epistasis. This manuscript is also in preparation.

In collaboration with the *Eco-Evolutionary Genetics* group, we are developing a bacteria-nematode system to study the evolution of a nematicidal protein.

In collaboration with the *Epigenetic Mechanisms* group, we demonstrated the number and type of mutations that are adaptive changes with the presence of silencing mechanisms.

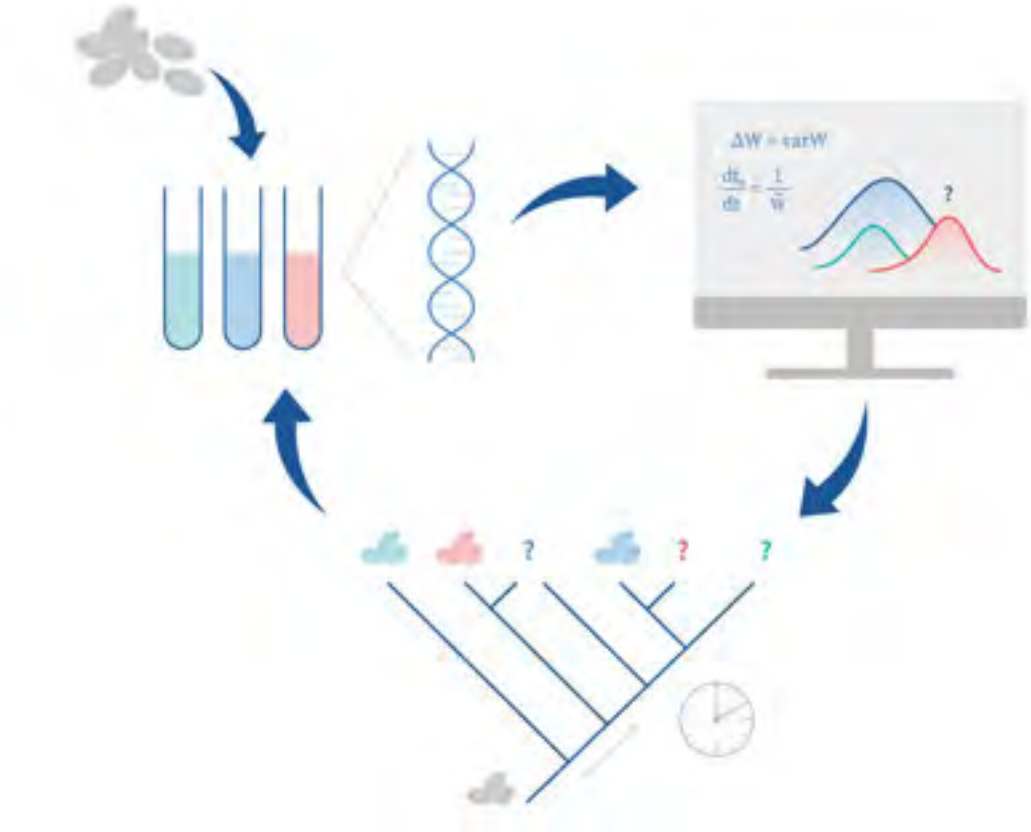


Figure: At the Evolution and Genome Structure Group we ask fundamental questions about how organisms evolve, particularly about how they adapt to new environments. We use the model organism fission yeast, as well as models and computer simulations, to examine the patterns of adaptation starting from different genotypes. We then use that information to make predictions about evolution, and validate them with new experiments in the lab.

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Complex Adaptive Systems and Computational Biology

Group Leader | **ROCHA, Luís M.**

Research Interests

The group focuses on tackling multi-level complexity involved in human health, with projects organised in three main threads: complex networks & systems, computational & systems biology, and computational intelligence. Ongoing research ranges 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.

Lab Members in 2017

Rion Correia · External PhD student
Nathan Ratkiewicz · External PhD student

Funding

- Fudação Luso-Americana para o Desenvolvimento, Portugal
- National Science Foundation, USA
- National Institutes of Health, USA
- Indiana University Precision Health Initiative, USA

Software Development

- SyMPToM - Social Media Public Health Monitoring: http://symptom.soic.indiana.edu/
- CANA -A python package for quantifying control and canalization in Boolean Networks: https://github.com/rionbr/CANA

Main Achievements

In terms of research outputs, we are particularly happy with being awarded a prestigious National Science Foundation NRT training grant on Complex Networks and Systems, as well as the *Nature Scientific Reports* paper with PhD student Ian Wood, in collaboration with Joana Sá's lab. This paper was very well received by the community and media - currently the 7th highest Altmetric in *Scientific Reports* (253rd in all journals). The PI received many invitations to speak as keynote in conferences and seminars, such as Humboldt-Universität zu Berlin, NetSci 2017, Instituto Superior Técnico, Complex Networks 2017, and Fundação Gulbenkian (Jardim de Verão). PI was on sabbatical as a Fullbright Scholar and became a Visiting Professor at the Center for Theoretical Physics at the Aix-Marseille University, France.

Selected Publications

- Correia, R.B, de Araújo, L.P., Mattos, M.M., Wild, D., **Rocha, L.M.** (2017). *City-wide analysis of drug-drug-interactions*. **Translational Bioinformatics Conference 2017**. Sep. 29-Oct.1st, Los Angeles, CA.
- Wood, I.B., Varela, P.L., Bollen, J., **Rocha, L.M.**, Gonçalves-Sá, J. (2017) *Human sexual cycles are driven by culture and match collective moods*. **Sci Rep-UK**. 7: 17973.

**The complete list of publications is available on section 3. Publications.*

Figure: More and more data is being generated that can have an impact on human health. To establish comprehensive models, we are analyzing data at different levels of complexity, from molecular to cellular, from organism to populations and societies, covering literature and social media information.

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Inflammation

Group Leader | **SOARES, Miguel P.**

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.

Lab Members in 2017

Patricia Amador · Postdoc
Birte Blankenhaus · Postdoc | Left in March
Faouzi Braza · Postdoc
Ana Rita Carlos · Postdoc
Rui Martins · Postdoc | Started in June
Susana Ramos · Postdoc
Jessica Thompson · Postdoc | Started in November

Vital Domingues · PhD student, 2015 IBB
Ana Ribeiro · PhD student, 2012 PIBS | Left in June
Sumnima Singh · PhD student, 2013 PIBS
Pedro Ventura · Masters student | Left in October
Silvia Cardoso · Technician
Sofia Rebelo · Lab manager
Joana Gomes · Visitor | Started in January

Funding

› Bill & Melinda Gates Foundation
› European Commission
› European Research Council
› European Society of Clinical Microbiology and Infectious Diseases
› Fundação para a Ciência e a Tecnologia

Main Achievements

We discovered that disease tolerance to sepsis relies on a crosstalk between adaptive responses controlling iron and glucose metabolism, required to maintain blood glucose within a physiologic range compatible with host survival.
We continued efforts establishing the relative contribution of labile heme. Given the current limitation in methodologies allowing the accurate quantification of labile heme, we generated a panel of heme-specific single domain antibodies that allow for the characterisation of released heme during hemolysis.
Moreover, we collaborated with the group of Prof. Gabriel Nuñez to establish that IL-22 controls iron-dependent nutritional immunity against systemic bacterial infections via a mechanism that relies on heme scavenging by hemopexin.

Selected Publications

› Gouveia, Z., Carlos, A.R., Yuan, X., Aires-da-Silva, F., Stocker, R., J, M.G., Leal, S.S., Gomes, C.M., Todorovic, S., Iranzo, O., Ramos, S., Santos, A.C., Hamza, I., Gonçalves, J., Soares, M.P. (2017) *Characterization of plasma labile heme in hemolytic conditions*. FEBS J. 284(19):3278-3301.

› Soares, M.P., Teixeira, L., Moita, L.F. (2017) *Disease tolerance and immunity in host protection against infection*. Nat Rev Immunol. 17: 83-96.

› Weis, S., Carlos, A.R., Moita, M.R., Singh, S., Blankenhaus, B., Cardoso, S., Larsen, R., Rebelo, S., Schäuble, S., Del, B.L., Mithieux, G., Rajas, F., Lindig, S., Bauer, M., Soares, M.P. (2017) *Metabolic adaptation establishes disease tolerance to sepsis*. Cell. 169: 1263-1275.

**The complete list of publications is available on section 3. Publications.*

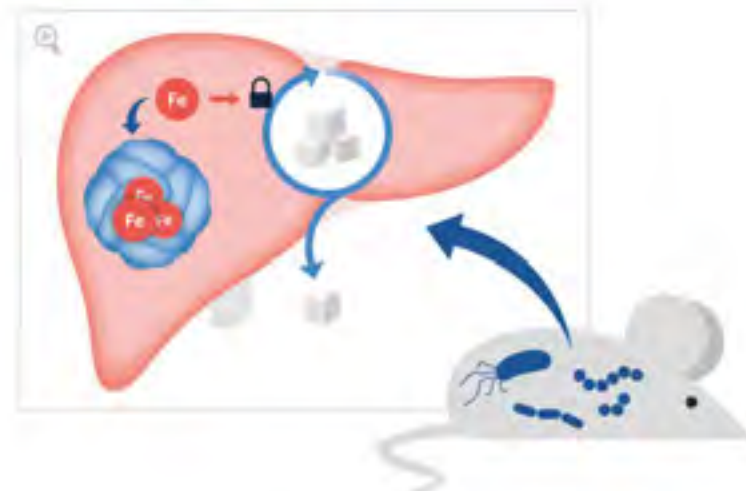

Figure: Sepsis consists of a deregulated body's response to infection, causing metabolic disfunction and organ damage, ultimately leading to death. We discovered a protective mechanism against this condition conferring disease tolerance to sepsis. We showed that iron metabolism controls the production of glucose (sugar) in the liver, so that glucose can be used as a vital source of energy preventing metabolic disfunction and organ collapse.

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Evolution and Development

Group Leader | **SUCENA, Élio**

Research Interests

Our lab explores the interplay between evolutionary and developmental biology. Studying this interface provides insight into the mechanisms at either level as well as those operating across levels that ultimately shape biological variation and diversity. We approach this concept experimentally through experimental evolution and the comparative method, exploring the genetic, physiological and population levels. Using *Drosophila melanogaster* as a reference model and other insect species, we study, a) transcriptional regulation evolution, b) immune cell function diversity and hematopoiesis and, c) the evolution of the immune response.

Lab Members in 2017

Kohtaro Tanaka · Postdoc
Vitor Faria · External PhD student | Left in June
Ana Morais · PhD student, 2016 IBB
Catarina Nunes · PhD student, 2016 IBB
Tânia Paulo · PhD student, 2017 IBB | Started in July
Julien Marcetteau · Masters student | Left in September
Nuno Martins · Masters student | Left in September
Joana Carvalho · Technician
Ana Eugénio · Technician | Left in September
Marília Santos · Technician | Left in June

Funding

› Fundação para a Ciência e a Tecnologia

Main Achievements

Building upon our previously published study on the regulatory evolution of a recently duplicated gene family, we have shown that diverse *cis*-regulatory mechanisms, including the novel tissue-specific enhancers, differential inactivation, and enhancer sharing, contribute to expression pattern evolution. Our analysis reveals a surprisingly variable *cis*-regulatory architecture, in which the CRMs driving conserved expression domains change in number, location, and specificity.

We have performed infections on spider mites to test the putative physiological consequences of an apparent absence of immune genetic repertoire observed in our annotation of the genome. We show that *T. urticae* has lost the capacity to mount an induced immune response against bacteria, in contrast to other mites and chelicerates and to *Drosophila*. Our results reinforce the putative evolutionary link between ecological conditions regarding exposure to bacteria and the architecture of the immune response.

Publications

› Baudouin-Gonzalez, L., Santos, M.A., Tempesta, C., **Sucena, É.**, Roch, F., Tanaka, K. (2017) *Diverse cis-regulatory mechanisms contribute to expression evolution of tandem gene duplicates*. **Mol Biol Evol**. 34(12): 3132–3147.

› Faria, V.G., **Sucena, É.** (2017) *From nature to the lab: establishing* Drosophila *resources for evolutionary genetics.* **Front Ecol Evol**. 5:61.

› Santos-Matos, G., Wybouw, N., Martins, N.E., Zélé, F., Riga, M., Leitão, A.B., Vontas, J., Grbić, M., Van Leeuwen, T., Magalhães, S., **Sucena, É**. (2017) Tetranychus urticae *mites do not mount an induced immune response against bacteria*. **Proc R Soc B.** 284(1856): 20170401.

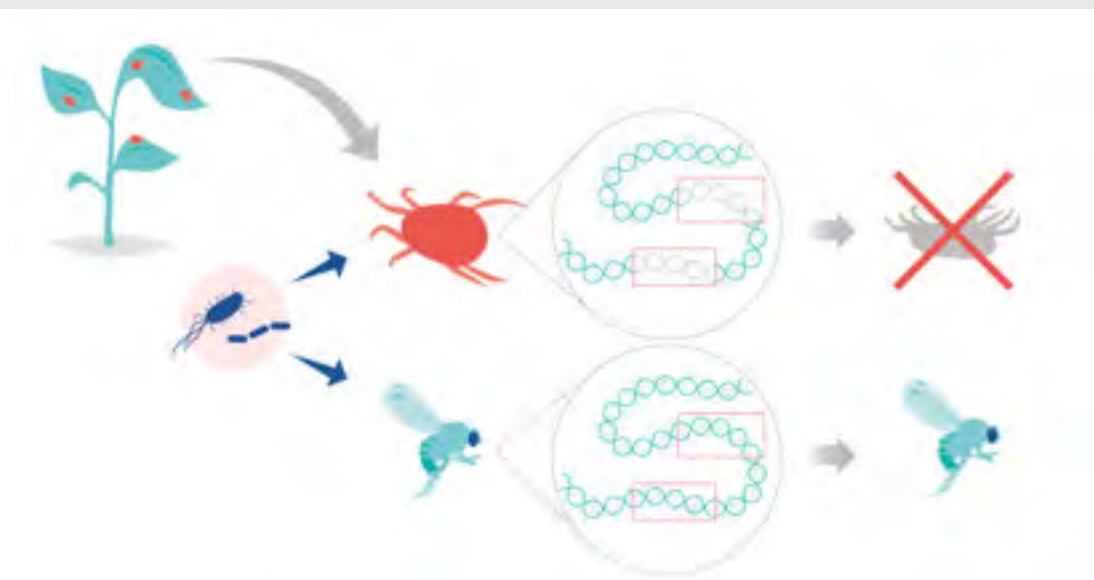

Figure: Spider mites are tiny animals that can have a devastating impact on crops. Unlike other arthropods, these animals lack some immune genes (red rectangles). Now, we discovered that spider mites rapidly die when infected with bacteria, since they cannot mount an effective immune response.

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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* confers resistance to RNA viruses in *D. melanogaster*. We want to understand the molecular basis of this induced resistance. Finally, we are 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.

Lab Members in 2017

Rupinder Kaur · Postdoc | Started in November
Nelson Martins · Postdoc
Elves Duarte · PhD student, 2014 PGCD
Gonçalo Matos · PhD student, 2016 IBB
Inês Pais · PhD student, 2012 PIBS
Marta Silva · Masters student
Gustavo Eduardo · Technician
Miguel Landum · Technician
Rita Valente · Lab manager
Ana Carvalho · Trainee | Started in February
Thomas Graham · Trainee | Left in April
Catarina Carmo · Visitor

Main Achievements

Co-organised, together with K. Xavier (IGC,) M. McFall-Ngai (Univ. Hawaii) and M. Blaser (New York Univ.), an international PhD students Summer School on Host-microbe Symbioses, at IGC. In this two-weeks course participated 34 PhD students and 18 lecturers.
Received an ERC Consolidator Grant to study *Wolbachia*-host interactions.

Publications

- Chrostek, E., **Teixeira, L.** (2017) *Comment on Rohrscheib et al. 2017* "Intensity of mutualism breakdown is determined by temperature not amplification of *Wolbachia* genes". **PLoS Pathog**. 13: e1006540.
- Chrostek, E., **Teixeira, L.** (2017) *Within host selection for faster replicating bacterial symbionts*. **bioRxiv**. 222240. doi:10.1101/222240
- Soares, M.P., **Teixeira, L.**, Moita, L.F. (2017) *Disease tolerance and immunity in host protection against infection*. **Nat Rev Immunol**. 17: 83-96.

Funding

- Fundação para a Ciência e a Tecnologia

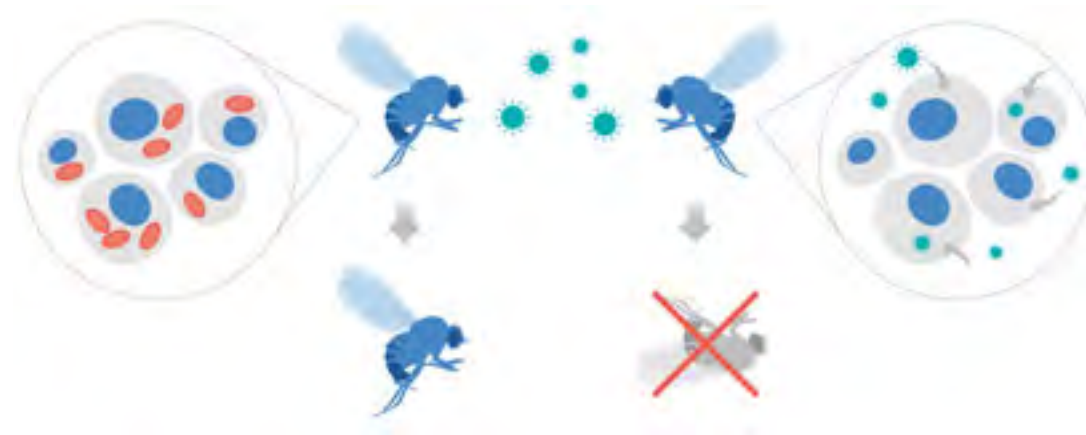

Figure: Many viral diseases, such as Dengue or Zika, are transmitted to humans via insects. An unforeseen ally in fighting this kind of viral diseases is *Wolbachia* (red), a bacterium that naturally infects insects and protects them against viral infections. Using fruit flies as an insect model, we are studying the genes of *Wolbachia* and of the host that are involved in antiviral protection.

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Physical Principles of Nuclear Division

Group Leader | **TELLEY, Ivo A.**

Research Interests

We are a multidisciplinary team interested in the physical aspects of intracellular organisation. As a model system, we study the earliest stages of *Drosophila* development, from the oocyte to fertilisation to preblastoderm cleavages. Our group is developing three research tracks: 1) We focus on minimal chemical and physical cues that determine oocyte polarity. 2) We study the chemo-mechanical mechanisms leading to pronuclear fusion in the fertilised egg, and how the syncytial embryo defines the inter-nuclear distance during syncytial divisions. 3) Taking our fundamental research one step further, we investigate how intracellular microbes modulate these early developmental events to their advantage. The scientific methods we adopt are reconstitution approaches in egg explants, physical and chemical manipulation combined with time-lapse light microscopy and image processing while taking advantage of *Drosophila* genetics.

Lab Members in 2017

Jorge Carvalho · Postdoc
Amid Massouh · Postdoc
Diana Vieira · Postdoc | Started in January
Margarida Araújo · PhD student, 2017 IBB | Started in August

Catarina Nabais · PhD student, 2014 IBB
Ojas Deshpande · PhD student, 2013 PIBS
Pedro Sampaio · External PhD student
Gustavo Eduardo · Technician

Main Achievements

- Invitation to publish our unique *Drosophila* egg explant method in the second volume of *Mitosis and Meiosis*, first published in 1997 in the *Methods in Cell Biology* series. De-Carvalho, J., Deshpande, O., Nabais, C., Telley, I.A. A cell-free system of *Drosophila* egg explants supporting native mitotic cycles. Meth Cell Biol. 145, part B, *In press*.
- Invitation of Ivo Telley to speak at the University of Regensburg as part of the German research focus programme SFB960 "Principles of RNP biogenesis and control of their function" in which he presented the single embryo extract method with its potential for RNA biochemistry and visualisation.
- Podium presentation by Jorge Carvalho at the 3rd International Mechanobiology Conference, held at the National University of Singapore.

Funding

- European Commission
- Fundação para a Ciência e a Tecnologia
- Human Frontiers Science Program

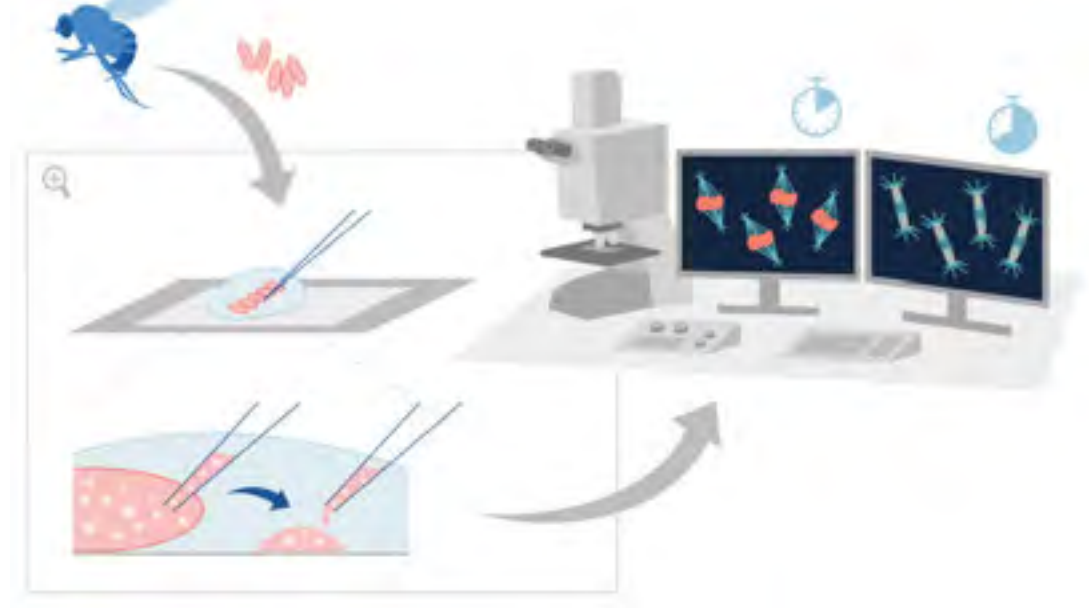

Figure: The arrangement and positioning of nuclei in the cell rely on complex physical principles and biochemical interactions. Our aim is to understand the physical aspects of intracellular organisation, by using a novel approach that combines the manipulation of endogenous cellular components, using *Drosophila* embryos, and time-lapse microscopic visualization.

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BAZINGA!

Bacterial Signalling

Group Leader | **XAVIER, Karina B.**

Research Interests

Bacteria coordinate group behaviours through production, release, and detection of small chemical signals, autoinducers, via a cell-cell signalling process called quorum sensing. Many of these behaviours are important in the regulation of virulence and many other functions involved in bacteria-host interactions. The bacteria-host interactions controlled by quorum sensing include interactions, which are hostile or beneficial for the host. We are interested in understanding how bacterial signalling shapes the multi-species bacterial communities that can be found in animals and plants and how these communities affect host physiology.

Lab Members in 2017

Vitor Cabral · Postdoc
Tanja Dapa · Postdoc | Started in June
Jessica Thompson · Postdoc | Left in September
Ana Rita Oliveira · PhD student, 2015 IBB
Ozhan Ozkaya · PhD student, 2012 PIBS
Filipe Vieira · External PhD student, 2016 MolBios
Inês Torcato · External PhD student, 2015 MolBios
Margarida Correia · Masters student | Started in November
Miguel Pedro · Masters student
André Carvalho · Technician | Left in September
Catarina Pinto · Technician | Left in June
Joana Amaro · Lab manager

Main Achievements

We investigated the quorum sensing circuit that regulates virulence in *Pectobacterium wasabiae*, an important group of plant pathogens and studied how this bacterium integrates different signals to regulate its virulence factors. Typically, *P. wasabiae* needs to be at a high density to produce the chemical molecules that will activate their virulence response. But we showed that its virulence response could be triggered at low densities if these bacteria eavesdrop on signals released by other pathogenic species present in the environment. This mechanism enables *P. wasabiae* to join related bacterial species in the effort to degrade host tissue in multispecies plant lesions. Our work provides support for the hypothesis that interspecies interactions are among the major factors influencing the network architectures observed in bacterial quorum sensing pathways.

Publications

› Özkaya, Ö., **Xavier, K.B.**, Dionisio, F., Balbontín, R. (2017) *Maintenance of microbial cooperation mediated by public goods in single and multiple traits scenarios.* **J Bacteriol**. 199(22): e00297-17.

› Valente, R.S., Nadal-Jimenez, P., Carvalho, A.F.P., Vieira, F.J.D., **Xavier, K.B.** (2017) *Signal integration in quorum sensing enables cross-species induction of virulence in* Pectobacterium wasabiae. **mBio**. 8 (3): e00398-17.

Funding

› Fundação para a Ciência e a Tecnologia
› Programa de Atividades Conjuntas (PAC) - Fundação para a Ciência e a Tecnologia & Fundos Europeus Estruturais e de Investimento

Figure: Bacteria "talk" to each other using a language of small chemical molecules that are released to the environment and sensed by other bacteria. We discovered that the virulence of *Pectobacterium wasabiae* (red), a plant pathogen, can be triggered earlier, even at low densities, if these bacteria eavesdrop on signals released by other pathogenic species (blue) present in the environment.

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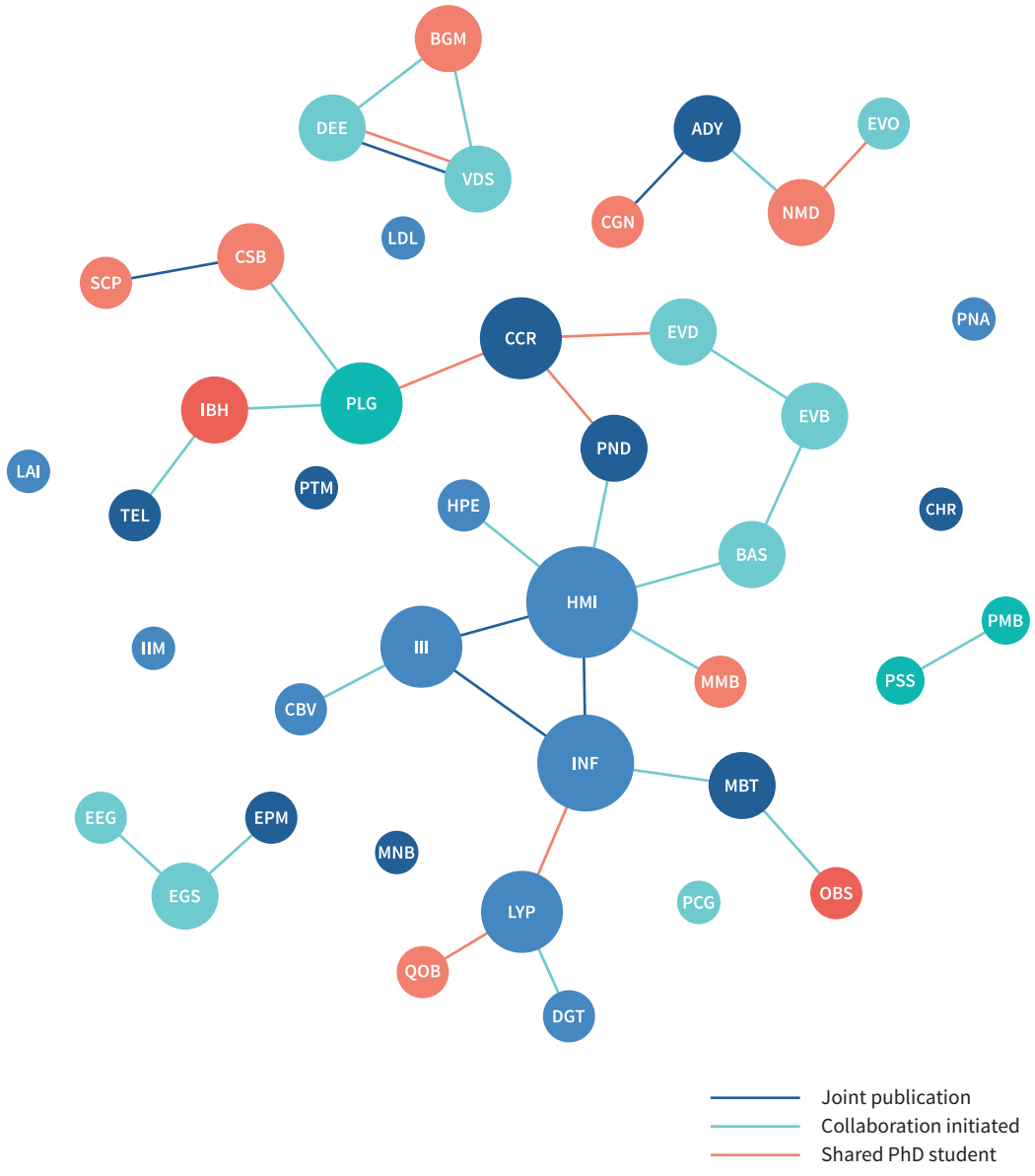
External Website · https://www.facebook.com/bacterialsignalling/

In-House Collaborations 2017



Cell and Developmental Biology

MBT	Membrane Traffic | Adrain, Colin
CCR	Cell Cycle Regulation | Bettencourt Dias, Mónica
MNB	Molecular Neurobiology | Castro, Diogo S.
TEL	Telomeres and Genome Stability | Ferreira, Miguel Godinho
ADY	Actin Dynamics | Janody, Florence
EPM	Epigenetic Mechanisms | Jansen, Lars E.T.
PTM	Patterning and Morphogenesis | Mallo, Moisés
CHR	Chromosome Dynamics | Oliveira, Raquel A.
PND	Physical Principles of Nuclear Division | Telley, Ivo A.

Quantitative and Computational Biology

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

Plant Biology

PSS	Plant Stress Signalling | Baena González, Elena
PLG	Plant Genomics | Becker, Jörg
PMB	Plant Molecular Biology | Duque, Paula

Immunobiology

CBV	Cell Biology of Viral Infection | Amorim, Maria João
PNA	Protein - Nucleic Acids Interactions | Athanasiadis, Alekos
LYP	Lymphocyte Physiology | Demengeot, Jocelyne
LAI	Lupus and Autoreactive Immune Repertoires | Fesel, Constantin
HPE	Host-Pathogen Co-Evolution | Howard, Jonathan C.
LDL	Lymphocyte Development and Leukemogenesis | Martins, Vera
III	Innate Immunity and Inflammation | Moita, Luís Ferreira
IIM	Infections & Immunity | Parkhouse, Michael
DGT	Disease Genetics | Penha Gonçalves, Carlos
INF	Inflammation | Soares, Miguel P.
HMI	Host-Microorganism Interactions | Teixeira, Luís

Evolutionary Biology

EVD	Evolutionary Dynamics | Bank, Claudia
VDS	Variation: Development and Selection | Beldade, Patrícia
EEG	Eco-Evolutionary Genetics | Chelo, Ivo A.
PCG	Population and Conservation Genetics | Chikhi, Lounès
EVB	Evolutionary Biology | Gordo, Isabel
DEE	Development, Evolution and the Environment | Mirth, Christen
EGS	Evolution and Genome Structure | Perfeito, Lília
EVO	Evolution and Development | Sucena, Élio
BAS	Bacterial Signalling | Xavier, Karina B.

Neurobiology

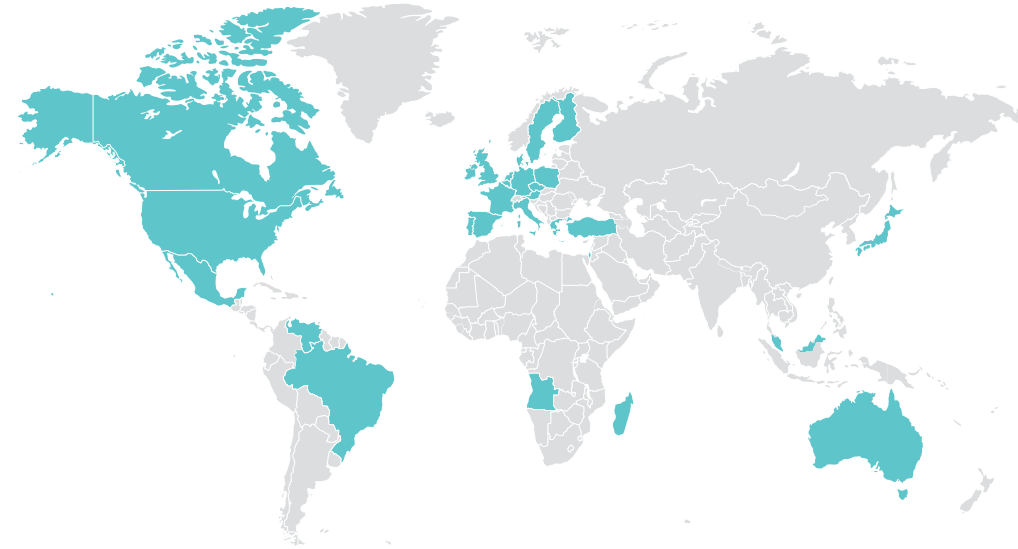
OBS	Obesity | Domingos, Ana I.
IBH	Integrative Behavioural Biology | Oliveira, Rui F.

External Collaborations 2017

In 2017, the IGC researchers collaborated with researchers from the following external institutions:

EUROPE

Aarhus University, Denmark
Aix-Marseille Université, France
Barcelona Supercomputing Center-Centro Nacional de Supercomputación, Spain
Barts Cancer Institute, UK
Biotechnology Center, Germany
Bristol University, UK
Cardiff University, UK
Center for Sepsis Control and Care, Germany
Centre de Physique Theorique, Campus de Luminy, France
Centro de Investigación en Medicina Molecular y Enfermedades Crónicas, Universidade de Santiago de Compostela, Spain
Centro Nacional de Biotecnología, Spain
Champaulimaud Centre for the Unknown, Portugal
CNRS- Centre de Biologie du Developpement, Université Paul Sabatier, France
CRG-Barcelona, Spain
Edinger Institute of Neurology, Frankfurt Medical School, Germany
EMBL, Germany
Faculdade de Ciências da Universidade de Lisboa, Portugal
Gregor Mendel Institute, Austria
Hospital Curry Cabral, Portugal
Hospital de Santa Maria, Portugal
Hospital de Santo António, Portugal
Hospital Dona Estefânia, Portugal
I3S, Portugal
IBMCP, UPV-CSIC, Spain
ICBAS/Universidade do Porto, Portugal
Inserm, University of Lille, France
Institut Curie, France
Institut de Mathématiques de Toulouse, France
Institut National de la Recherche Agronomique, France
Institut Necker Enfants Malades, INSERM/CNRS, France
Institut Pasteur, France
Institute de Biologie de l'École Normale Supérieure, France
Institute for Medical Immunology, Belgium
Institute for Stroke and Dementia Research, Germany
Institute of Biological and Medical Imaging, Helmholtz Zentrum München, Germany
Institute of Environmental Sciences, Poland
Institute of Medical Sociology, Germany
Institute of Organic Chemistry and Biochemistry, Czech Republic
Institute of Science and Technology Austria, Austria
Instituto de Medicina Molecular, Portugal
Instituto de Tecnologia Química e Biológica, Portugal
Instituto Politécnico Leiria, Portugal
Instituto Português de Oncologia, Portugal
Instituto Superior Técnico, Portugal
IPATIMUP, Portugal
ISI Foundation, Italy
Karolinska Institutet, Sweden
King's College London, UK
Koç University, Turkey
Leiden University Medical Center, The Netherlands
London School of Hygiene and Tropical Medicine, UK
Max F. Perutz Laboratories, Austria
Max Planck Institute for Molecular Plant Physiology, Germany
Medical University of Innsbruck, Austria
Ministério da Educação e da Ciência, Portugal
MPI for Molecular Plant Physiology, Germany
MRC Centre for Regenerative Medicine, University of Edinburgh, UK
Pirbright Institute, UK
Radboud University Medical Center, The Netherlands
Roslin Institute, University of Edinburgh, UK
San Raffaele Scientific Institute, Italy
School of Life Sciences, UK
The Sainsbury Laboratory, UK
Trinity College, Ireland
Twincore, Germany
ULB Center for Diabetes, Belgium
Umeå University, Sweden
Universidade do Algarve, Portugal
Universidade Nova de Lisboa, Portugal
Universitá di Ferrara, Italy
Universitätsklinikum Freiburg, Germany



Université de Tours, France
Université Paul Sabatier, France
University of Bielefeld, Germany
University of Cologne, Germany
University of Copenhagen, Denmark
University of Durham, UK
University of Edinburgh, UK
University of Glasgow, UK
University of Hannover, Germany
University of Helsinki, Finland
University of Leicester, UK
University of Leuven, Belgium
University of Liège, Belgium
University of Manchester, UK
University of Nice, France
University of Patras, Greece
University of Santiago de Compostela, Spain
University of Sheffield, UK
University of Southern Denmark, Denmark
University of Vienna, Austria
University of Wuerzburg, Germany
ZMBH, Germany

AMERICA

Arizona State University, USA
Carleton University, Canada
Dana-Farber Cancer Institute, USA
Indiana University, USA
Janelia Farm Research Campus, USA
Michigan State University, USA
Montreal Neurological Institute, McGill University, Canada
Rush University, USA
UNAM, Mexico
Universidad de Carabobo, Venezuela
Universidade de São Paulo, Brazil
Universidade Federal de Minas Gerais, Brazil
Universidade Federal de Pernambuco, Brazil
Universidade Federal do Rio de Janeiro, Brazil
University of Chicago, USA
University of Delaware, USA
University of Houston, USA
University of Maryland, USA
University of Massachusetts Medical School, USA
University of Michigan, USA
University of Ottawa, Canada
University of Pennsylvania, USA
University of Tennessee, USA
Virginia Tech, USA

ASIA

Danau Girang Field Centre, Malaysia
Mechanobiology Institute, Singapore
National Institute of Genetics, Japan
Weizmann Institute of Science, Israel

AFRICA

Faculdade de Medicina de Benguela, Angola
Université de Mahajanga, Madagascar
Université d'Antsiranana, Madagascar

AUSTRALIA

Monash University, Australia
Victor Chang Cardiac Research Institute, Australia

External Associated Groups 2017

The following researchers develop their scientific programmes at external associated institutes and research centres, maintaining strong scientific collaborations with IGC groups, and access to IGC facilities.

BELO, José António
CEDOC – Chronic Diseases Research Center, Faculdade de Ciências Médicas, Universidade Nova de Lisboa, Portugal

CAREY, Megan
Champalimaud Research, Portugal

COSTA, Rui M.
Columbia's Zuckerman Institute, USA and Champalimaud Research, Portugal

DIAS, Sérgio
Instituto de Medicina Molecular, Portugal

DIONÍSIO, Francisco
Faculdade de Ciências da Universidade de Lisboa, Portugal

DUARTE, António
Centre for Interdisciplinary Research in Animal Health (CIISA), Faculdade de Medicina Veterinária, Universidade de Lisboa

FARO, José
Universidad de Vigo, Spain

FERNANDES, Lisete
Biosystems and Integrative Sciences Institute (BioISI), Portugal

GRAÇA, Luís
Instituto de Medicina Molecular, Portugal

HENRIQUE, Domingos
Instituto de Medicina Molecular, Portugal

ISRAELY, Inbal
Department of Pathology and Cell Biology, Columbia University, USA

JACINTO, António
CEDOC – Chronic Diseases Research Center, Faculdade de Ciências Médicas, Universidade Nova de Lisboa, Portugal

LIMA, Susana
Champalimaud Research, Portugal

MAINEN, Zachary
Champalimaud Research, Portugal

MARTINHO, Rui
Centre for Biomedical Research, Universidade do Algarve, Portugal

MOITA, Marta
Champalimaud Research, Portugal

MOTA, Maria
Instituto de Medicina Molecular, Portugal

MOTA VIEIRA, Luísa
Divino Espírito Santo Hospital, Universidade dos Açores, Azores, Portugal

OLIVEIRA, Sofia
Instituto de Medicina Molecular, Portugal

ORGER, Michael
Champalimaud Research, Portugal

PATON, Joseph
Champalimaud Research, Portugal

RIBEIRO, Carlos
Champalimaud Research, Portugal

SAÚDE, Leonor
Instituto de Medicina Molecular, Portugal

SILVA SANTOS, Bruno
Instituto de Medicina Molecular, Portugal

SIMAS, João Pedro
Instituto de Medicina Molecular, Portugal

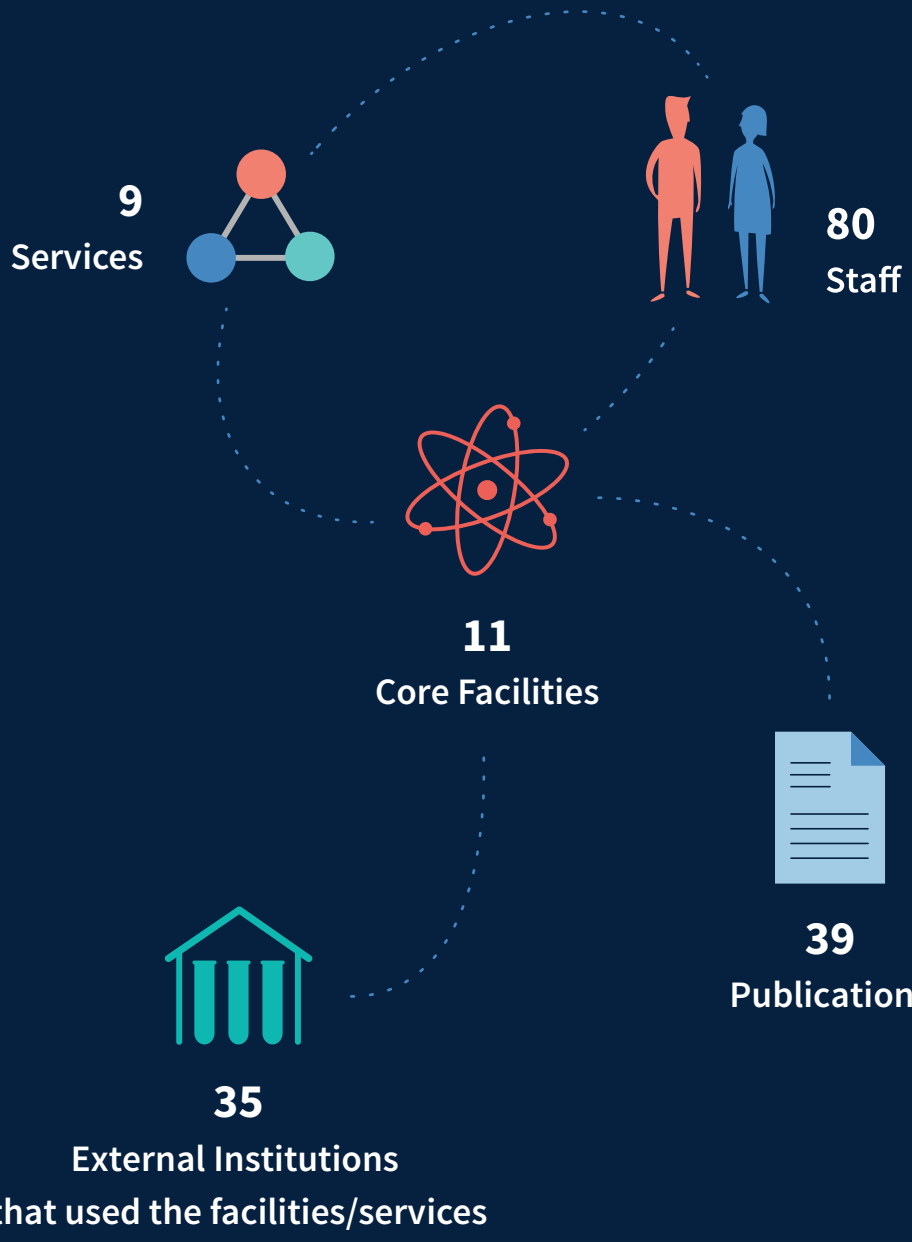
SOARES, Helena
Faculdade de Ciências da Universidade de Lisboa, Portugal

THORSTEINSDÓTTIR, Solveig
Faculdade de Ciências da Universidade de Lisboa, Portugal

VASCONCELOS, Maria Luísa
Champalimaud Research, Portugal

VICENTE, Astrid
BioSystems & Integrative Sciences Institute (BioISI), Universidade de Lisboa, Portugal and Instituto Nacional de Saúde Dr. Ricardo Jorge, Portugal

SUPPORT TO RESEARCH



Animal House Facility

Head | **REBELO, Manuel**

Staff in 2017

Joana Bom · Manager of the Germ-Free/Gnotobiology Facility
Ana Cristina Borges · Manager of the Aquatic Facility
Liliana Vieira · Manager of the Fly Facility
Sandra Crisóstomo · Technician
Maysa Franco · Technician
Ana Sofia Leocádio · Technician
Carina Monteiro · Technician
Marília Pereira · Technician
Pedro Pinto · Technician
Ana Ribeiro · Technician
Inês Santos · Technician
Liliana Vale · Technician
Adérito Vieira · Technician
Carla Almada · Animal care staff
Cláudia Gafaniz · Animal care staff
João Lopes · Animal care staff
Lévi Pires · Animal care staff
Graça Ramalho · Animal care staff
Marco Rocha · Animal care staff
Mário Rocha · Animal care staff
Carine Santos · Animal care staff | Started in January

Description of Facility

The Animal House Facility (AHF) is a Core Facility that provides infrastructure and services for model organism-based research at the IGC that includes Rodent, Aquatic (zebrafish and frog) and Fly Facilities. The AHF seeks to integrate management of the different animal facilities, namely by sharing technological development and good practices among different animal models. The AHF staff duties include husbandry procedures, general maintenance of facilities and equipment, advanced services such as Rederivation, Cryopreservation, Gnotobiology, production of germ-free animals, assistance to researchers, colony maintenance, animal importation and exportation, organisation of Laboratory Animal Science (LAS) courses, and support on legal issues. The AHF team is composed of managers, specialised technicians and caretakers for each species, combining flexibility and adaptability: personnel is trained in more than one species, allowing the Core Facility to easily adapt to research dynamics. This particularity promotes a culture of shared values and principles that contributes to a close relation with the researchers.

News in 2017

› April: Research Infrastructure CONGENTO funded by FCT.

› Aquatic Facility - Setup of Facility for the killifish Nothobranchius furzeri.

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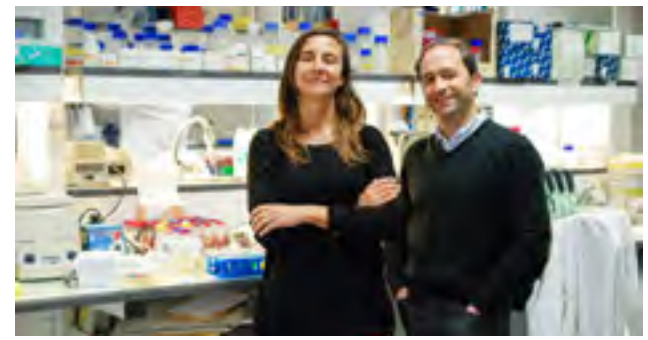
Transgenics Unit

Head | **MALLO, Moisés**



Staff in 2017

Ana Nóvoa · Technician (microinjection in mice)
Diogo Manoel · Technician (microinjection in fly) | Left in June

Publications

› Losa, M., Latorre, V., Andrabi, M., Ladam, F., Sagerström, C., Novoa, A., Zarrineh, P., Bridoux, L., Hanley, N.A., **Mallo, M.**, Bobola, N. (2017) *A tissue-specific, GATA6-driven transcriptional program instructs remodeling of the mature arterial tree.* **eLife.** 6: e31362.

Description of Facility

The Transgenics Unit generates genetically modified mouse and *Drosophila* strains for research groups at the IGC.
Our work with mice includes:
› Production of transgenic mice by pronuclear DNA injection using both conventional expression constructs and BACs;
› Introduction of targeted modifications into endogenous genomic loci both following embryonic stem cell-mediated approaches and with the CRISPR/Cas9 technology.
Our work with *Drosophila melanogaster* includes:
› A microinjection service to generate transgenic or mutant flies, via p-element, ΦC31 or CRISPR/Cas9 methods;
› Microinjection for purposes other than the production of transgenic flies (e.g. *Wolbachia* transfer).

News in 2017

During 2017 we produced 15 mouse lines with targeted genomic modifications using CRISPR/Cas9. They included straight knock-outs and a variety of other genomic modifications, including knock-ins (introducing tags and cre recombinase), specific modifications in open reading frames, and introduction of LoxP sites. The standard use of a combination of Cas9 with Rad51 together with single stranded DNA replacement templates consistently increased our efficiency of homologous recombination. In addition, we kept our regular production of transgenic mouse lines and embryos using both regular DNA constructs and BACs.
The *Drosophila* Transgenesis service worked until June. During this time we generated 31 stable germ-line transgenic lines (21 P-element and 11 ΦC31) and 6 CRISPR lines, with a global success rate of 97.4%.

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External Website · http://facilities.igc.gulbenkian.pt/transgenics/transgenics.php

Plant Facility

Staff in 2017

Vera Nunes · Technician

New Equipment in 2017

› Aralab reach-in S600

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 three custom-made fully controlled growth chambers with short-day and long-day light settings, as well as a walk-in plant growth room and six small reach-in chambers that allow the performance of cell-based assays and more precise phenotypical analyses.
Three research groups (Plant Genomics, Plant Molecular Biology and Plant Stress Signalling) make use of the IGC Plant Facility.

Funding from Calouste Gulbenkian Foundation, Portugal

Publications

› Ortiz-Ramírez, C., Michard, E., Simon, A.A., Damineli, D.S.C., Hernández-Coronado, M., **Becker, J.D.**, Feijó, J.A. (2017) *Glutamate receptor-like channels are essential for chemotaxis and reproduction in mosses*. **Nature.** 549 (7670): 91–95.

› Remy, E., Niño-González, M., Godinho, C.P., Cabrito, T.R., Teixeira, M.C., Sá-Correia, I., **Duque, P.** (2017) *Heterologous expression of the yeast Tpo1p or Pdr5p membrane transporters in* Arabidopsis *confers plant xenobiotic tolerance.* **Sci Rep.** 7(1): 4529.

› Santos, M.R., Bispo, C., **Becker, J.D.** (2017) *Isolation of* Arabidopsis *pollen, sperm cells, and vegetative nuclei by Fluorescence-Activated Cell Sorting (FACS).* **Methods Mol Biol.** 1669: 193-210.

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IGC Webpage · http://www.igc.gulbenkian.pt/facilities/plants

Bioinformatics and Computational Biology Unit

Head | **SOBRAL, Daniel**

Staff in 2017

Daniel Faria · Postdoc (Elixir-Excelerate)
Tiago Macedo · System administrator
Maria Belén Carbonetto · Bioinformatics specialist (ONEIDA) | Started in July
João Costa · Bioinformatics specialist
Daniel Neves · Bioinformatics specialist (BioData.pt) | Started in November
Mauro Truglio · Bioinformatics specialist | Left in July

Description of Facility

The Bioinformatics Unit (UBI) provides consulting services in bioinformatics and computational biology. We provide a broad range of support for ongoing studies requiring external expertise in bioinformatics, including: training and consulting on the use of bioinformatic tools; development of databases and data-warehousing solutions; development of bioinformatics pipelines for genomic analysis; next generation sequencing (NGS) data analysis.

News in 2017

The Bioinformatics Unit has provided more than 500 hours of direct support to IGC research groups, and 132 hours to external users. In collaboration with the Genomics facility, we have consolidated the implementation of the MinION long read sequencing technology. We have continued collaborating with the INCD national cloud infrastructure computation (INCD) for the provision of galaxy-based training sessions in the use of bioinformatics tools. In the context of the ONEIDA project, we have recruited a post-doctoral bioinformatics specialist to expand our capacity in the domain of metagenomics. The BioData.pt national infrastructure officially started in July 2017, and we have recruited a new bioinformatics specialist to expand the UBI capacity to provide bioinformatics user support to researchers in Portugal. We have continued our international collaborations in the context of the European Elixir consortium. We strengthened our collaboration with the GTPB programme by providing practical courses on RNA-Seq and introductory NGS data analysis.

Publications

› Bonnet, M., Sarmento, L.M., Martins, A.C., **Sobral, D.**, Silva, J., Demengeot, J. (2017) *iRAGu: A novel inducible and reversible mouse model for ubiquitous recombinase activity.* **Front Immunol.** 8: 1525.

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

Gene Expression Unit

Head | **BECKER, Jörg**

Staff in 2017

Sara Ramos · Technician
João Sobral · Technician

New Equipment in 2017

- Illumina NextSeq 500, ONEIDA (LISBOA-01-0145-FEDER-016417), co-funded by FEEI and FCT
- AATI Fragment Analyzer, ONEIDA (LISBOA-01-0145-FEDER-016417), co-funded by FEEI and FCT
- Hamilton Starlet 8 Channels, ONEIDA (LISBOA-01-0145-FEDER-016417), co-funded by FEEI and FCT
- Promega Glomax Explorer, GenomePT (Lisboa-01-0145-FEDER-022184), funded by FCT

Description of Facility

The unit provides Next Generation Sequencing using its Illumina MiSeq and NextSeq 500 sequencers. These services include:

- Whole-genome sequencing using a low-cost Nextera protocol;
- RNA-Seq using SMART-Seq2 or QuantSeq;
- Metagenomics (V4 region of 16S rRNA);
- Nucleic Acid quality control with AATI Fragment Analyzer.

In addition DNA microarray services are available on request.

News in 2017

Since January 2017 we are part of the Omics Core of ONEIDA (http://www.itqb.unl.pt/oneida). This network supported the acquisition of new equipment (NextSeq 500, AATI Fragment Analyzer and Hamilton Starlet), allowing us to decrease sequencing costs and increase our range of services offered. ChIP-Seq and RNA-Seq of bacteria are currently being implemented.
In addition, we are a node of the Portuguese research infrastructure GenomePT since June 2017. Funds are being applied to move the unit to larger premises and acquire additional equipment.
In 2017, the Gene Expression has produced 1.6 Terabases of sequencing data with its MiSeq and NextSeq 500.

Selected Publications

- Batista, R., Fonseca, C., Planchon, S., Negrão, S., Renaut, J., & Oliveira, M. M. (2017). *Environmental stress is the major cause of transcriptomic and proteomic changes in GM and non-GM plants.* **Sci Rep.** 7(1): 10624.
- Ortiz-Ramírez, C., Michard, E., Simon, A.A., Damineli, D.S.C., Hernández-Coronado, M., **Becker, J.D.**, Feijó, J.A. (2017) *Glutamate receptor-like channels are essential for chemotaxis and reproduction in mosses.* **Nature.** 549 (7670): 91–95.

** The complete list of publications is available on section 3. Publications.*

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IGC Webpage · http://www.igc.gulbenkian.pt/facilities/genexpression
External Website · http://facilities.igc.gulbenkian.pt/geneexpression/geneexpression.php

Genomics Unit

Head | **PENHA GONÇALVES, Carlos**

Staff in 2017

João Costa · Genotyping service
Susana Ladeiro · Sequencing service

New Equipment in 2017

- MinIon system for Nanopore methodology development

Description of Facility

The unit provides expertise and technological support for research at the genome scale and is composed by Genotyping and Sequencing Services:

- The Genotyping Service offers the AgenaBio 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, AgenaBio 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.

News in 2017

The *Genomics Unit* established methodology for long read sequencing of bacterial genomes using Nanopore technology, allowing the closure of bacterial genomes and access to structural variation information.

Publications

- Matos, M., Xavier, J. M., Abrantes, P., Sousa, I., Rei, N., Davatchi, F., Shahram, F., Jesus, G., Barcelos, F., Vedes, J., Salgado, M., Abdollahi, B. S., Nadji, A., Moraes-Fontes, M. F., Shafiee, N. M., Ghaderibarmi, F., Vaz Patto, J., Crespo, J. and Oliveira, S. A. (2017) *IL10 low-frequency variants in Behçet's disease patients.* **Int J Rheum Dis.** 20: 622–627.
- Noble, L.M, Chelo, I., Guzella, T., Afonso, B., Riccardi, D.D., Ammerman, P., Dayarian, A., Carvalho, S., Crist, A., Pino-Querido, A., Shraiman, B., Rockman, M.V., Henrique Teotónio, H. (2017). *Polygenicity and epistasis underlie fitness-proximal traits in the caenorhabditis elegans multiparental experimental evolution (CeMEE) panel.* **Genetics.** 207(4): 1663-1685.

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External Website · http://facilities.igc.gulbenkian.pt/genomics/genomics.php

Histopathology Unit

Head | **FAÍSCA, Pedro**

Staff in 2017

Joana Rodrigues Lóis · Histology Technician
Marta Pinto · Histology Technician

New Equipment in 2017

› NanoZoomer Slide Scanner

News in 2017

› Pedro Faísca was nominated Head of unit.
› Miguel Soares was nominated Scientific Advisor of the unit.
› The facility services were officially opened to external users.
› The unit received two externship students that resulted in two Masters studies.

Description of Facility

The *Histopathology Unit* (HU) has two major roles: provide high quality preparations for microscopy and pathology support to IGC scientists investigating animal models of human disease.
Therefore, the HU provides the following services: Processing and paraffin embedding; Microtome sectioning; Cryostat; Vibratome; Staining (H&E, Gram, Giemsa, Ziehl-Neelsen, PAS, Luxol Fast Blue, Masson's Trichrome, Nissl, Perls, Carstairs' Method, Luna stain and others); Training for new users in sample preparation, in cryostat sectioning and vibratome; Planning and implementation of different histological techniques including Immunohistochemistry; Pathology assessment and assistance in study design; High quality image acquisition and slide scanner; Health monitoring of the institute´s animal models.
The HU is open to all internal groups in IGC but also to associated laboratories, academic institutions and private companies.

Selected Publications

› Fior, R., Póvoa, V., Mendes, R.V., Carvalho, T., Gomes, A., Figueiredo, N., **Ferreira, M.G.** (2017) *Single-cell functional and chemosensitive profiling of combinatorial colorectal therapy in zebrafish xenografts.* **Proc Natl Acad Sci USA.** 114(39): E8234-E8243.

› Weis, S., Carlos, A.R., Moita, M.R., Singh, S., Blankenhaus, B., Cardoso, S., Larsen, R., Rebelo, S., Schäuble, S., Del, B.L., Mithieux, G., Rajas, F., Lindig, S., Bauer, M., **Soares, M.P.** (2017) *Metabolic adaptation establishes disease tolerance to sepsis.* **Cell.** 169: 1263-1275.

* *The complete list of publications is available on section 3. Publications.*

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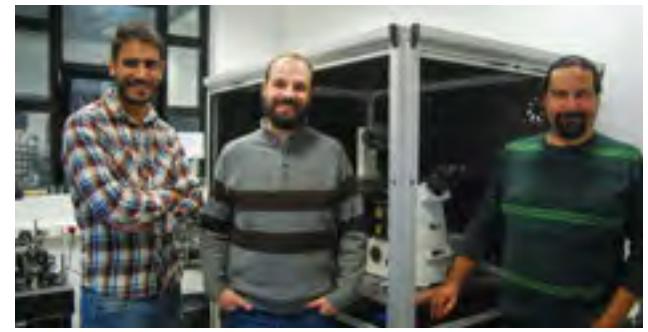
IGC Webpage · http://www.igc.gulbenkian.pt/facilities/histopathology
External Website · http://facilities.igc.gulbenkian.pt/histopathology/histopathology.php

Advanced Imaging Unit

Head | **MARTINS, Gabriel**



Staff in 2017

Nuno Pimpão Martins · Microscopy Technician
Hugo Pereira · Microscopy Technician

New Equipment in 2017

› GE OMX SIM super-resolution microscope - ERC

Software Development in 2017

› New version of OpenSpin microscopy plugin for MicroManager; open-source acquisition software for mesoscopic imaging. Available at: http://sites.google.com/site/openspinmicroscopy

› Several scripts for bioimage analysis, available at: http://facilities.igc.gulbenkian.pt/microscopy/microscopy-macros.php

Description of Facility

The Advanced Imaging unit provides access and support to high-end light microscopy to the whole IGC community. The unit currently stands as an international reference, with flagship techniques such as super-resolution, high-throughput wide-field, multiphoton, light-sheet microscopy, optical tomography and macro bioluminescence. Some of these techniques are unique in the country 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 regularly through personalised training sessions and internal workshops. The unit also organises advanced workshops on light microscopy, equipment set-up, experimental design and image processing & analysis.

News in 2017

Organisation of 1st NEUBIAS2020 international symposium and two training schools; OpenSpin light-sheet prototype upgraded to fast-synch and line-scan mode; OPenT prototype upgraded to automated illumination, fast-synch acquisition and semi-auto pre-process; ready to deploy for public access in early 2018; 2p microscope upgraded with GaAsP detectors and sample atmospheric control; The unit produced two publications and contributed (with authorship) in another six.

Selected Publications

› Gualda, E.J., Pereira, H., **Martins, G.G.**, Gardner, R., Moreno, N. (2017). *Three-dimensional imaging flow cytometry through light-sheet fluorescence microscopy.* **Cytometry A.** 91(2): 144-151.

› Miura, K., Colombelli, J., Cordelières, F., Paul-Gilloteaux, P., Tosi, S., Gavalda, C.P., Munck, S., Fernandez-Rodriguez, J., **Martins, G.G.** (2017). *NEUBIAS Conference in Lisbon: A new venue for bioimage analysts.* **G.I.T. Imaging & Microscopy.** 3: 8-9.

* *The complete list of publications is available on section 3. Publications.*

Email · gaby@igc.gulbenkian.pt
IGC Webpage · http://www.igc.gulbenkian.pt/facilities/uic/imaging
External Website · http://facilities.igc.gulbenkian.pt/microscopy/microscopy.php

Electron Microscopy Facility

Head | **TRANFIELD, Erin**

Staff in 2017

Sara Bonucci · Technician
Tomás Silva · Technician | Started in October
Ana Laura Sousa · Technician

News in 2017

In 2017, the Electron Microscopy Facility hosted several courses, delivered many oral presentations at several European electron microscopy meetings and was involved in training new users from within the IGC and our neighbouring academic community. The technical skills of the facility have continued to expand and now include advanced 3D electron tomography and multiple correlative light and electron microscopy approaches.

Description of Facility

The Electron Microscopy Facility at the IGC helps national and international scientists apply a wide variety of electron microscopy approaches to their scientific questions. The team performs tasks from simple negative staining experiments to more complex experiments like high pressure freezing and freeze substitution of very delicate sample. Available equipment give users multiple approaches for sample preparation, allowing experiments to be tailored to exactly the question under investigation. The facility is equipped to preserve samples using conventional chemical fixation, microwave chemical fixation, and high pressure freezing. Other methods frequently used are the Tokuyasu technique for immunogold labelling of antigens of interest. The two transmission electron microscopes are able to perform 2D and 3D imaging. The facility does full service work, but we also offer the option for new users to be trained on all aspects of electron microscopy to facilitate their application of electron microscopy to their research.

Publications

› Gorgulho, R., Jacinto, R., Lopes, S.S., Pereira, S.A., **Tranfield, E.M.,** Martins, G.G., Gualda, E.J., Derks, R.J.E., Correia, A.C., Steenvoorden, E., Pintado, P., Mayboroda, O.A., Monteiro, E.C., Morello, J. *Usefulness of zebrafish larvae to evaluate drug-induced functional and morphological renal tubular alterations.* **Arch Toxicol.** 92(1): 411-423.

› Pirzgalska, R.M., Seixas, E., Seidman, J.S., Link, V.M., Sánchez, N.M., Mahú, I., Mendes, R., Gres, V., Kubasova, N., Morris, I., Arús, B.A., Larabee, C.M., Vasques, M., Tortosa, F., Sousa, A.L., Anandan, S., **Tranfield, E.**, Hahn, M.K., Iannacone, M., Spann, N.J., Glass, C.K., Domingos, A.I. (2017) *Sympathetic neuron-associated macrophages contribute to obesity by importing and metabolizing norepinephrine.* **Nat Med.** 23: 1309-1318.

Email · etranfield@igc.gulbenkian.pt
IGC Webpage · http://www.igc.gulbenkian.pt/facilities/uic/emf
External Website · http://facilities.igc.gulbenkian.pt/electronmicroscopy/electronmicroscopy.php

Flow Cytometry Facility

Head | **MONTEIRO, Marta**

Staff in 2017

Mariana Fernandes · Flow Cytometry research support specialist

New Equipment in 2017

› Fluidics upgrade to FACSAria IIu cell sorter (IGC internal funds)

News in 2017

› Upgrade of FACSAria cell sorter, leading to increased stability and expanded applications.
› Implementation of an internal regular training programme for new users of the facility.
› Organisation of an international Flow Cytometry course that received more than 100 participants.

Description of Facility

The *Flow Cytometry Facility* (IGC-FCF) offers high quality flow cytometry services and expertise to the researchers at IGC, as well as to outside groups and companies. The main focus of our services is to: facilitate the access to state-of-the-art flow cytometry techniques and instrumentation; develop and implement new methods and solutions to support project development; offer scientific and technical consultation; promote advanced training and the best practices in Flow Cytometry.
The IGC-FCF stands as a national and international reference for flow cytometry and high-throughput cell sorting. Instrumentation includes two multicolor high-speed cell sorters, four analysers and a multiplex analyte reader. Laboratory staff is well trained and SOP are implemented to comply with the highest quality standards required to ensure reproducibility in science. The need to find solutions to support research projects drives a continuous development of the facility, which closely follows the advances in the flow cytometry field, collaborates with innovative projects, creates novel tools and methods to advance research and implements strategies to improve the quality of the provided services.

Selected Publications

› Gualda, E.J., Pereira, H., Martins, G.G., Gardner, R., Moreno, N. (2017). *Three-dimensional imaging flow cytometry through light-sheet fluorescence microscopy.* **Cytometry A.** 91(2): 144-151.

› Santos, M.R., Bispo, C., **Becker, J.D.** (2017) *Isolation of* Arabidopsis *pollen, sperm cells, and vegetative nuclei by Fluorescence-Activated Cell Sorting (FACS).* **Methods Mol Biol.** 1669: 193-210.

› Weis, S., Carlos, A.R., Moita, M.R., Singh, S., Blankenhaus, B., Cardoso, S., Larsen, R., Rebelo, S., Schäuble, S., Del, B.L., Mithieux, G., Rajas, F., Lindig, S., Bauer, M., Soares, M.P. (2017) *Metabolic adaptation establishes disease tolerance to sepsis.* **Cell.** 169: 1263-1275.e14.

** The complete list of publications is available on section 3. Publications.*

Email · mmonteiro@igc.gulbenkian.pt
IGC Webpage · http://www.igc.gulbenkian.pt/facilities/uic/cytometry
External Website · http://facilities.igc.gulbenkian.pt/flowcytometry/flowcytometry.php

Antibody Service

Head | **DEMENGEOT, Jocelyne**

Staff in 2017

Ana Regalado · Technician

Description of Facility

The Facility provides support to researchers wishing to produce, purify and label monoclonal antibodies (mAbs). It also maintains a collection of hybridomas and purified and coupled antibodies for IGC ressearchers.

The Antibody service offers the following services:

› Quality control of hybridomas:
- Mycoplasma testing and cleaning;
- Quantification of Ig production by ELISA.

› Small to medium scale Ig production from QC hybridomas *in vitro* (10 to 100mg):
- Optimisation of production by sub-cloning;
- Adaptation to serum free or IgG depleted media;
- Purification by Protein A/G chromatography and protein quantification;
- QC by protein gel electrophoresis.

› Conjugation of monoclonal antibodies to small molecules for FACS, Western or immunohistology.

Email · jocelyne@igc.gulbenkian.pt
IGC Webpage · http://www.igc.gulbenkian.pt/facilities/antibody
External Website · http://facilities.igc.gulbenkian.pt/antibodies/antibodies.php

Technico-Scientific Support

Head | **MORENO, Nuno**

Description of Service

Our service supports facilities on a technical and managerial level, namely: homogenise the way internal accounting is made, develop tools to facilitate the communication to users and reporting, implementation of IOT (Internet Of Things) on the institute with over 250 sensors and actuators, running a seminar series dedicated to techniques and applications, development of simple robots to minimize HR burdening, 3D printing of custom devices for scientists. We also work tight together with procurement and facilities for equipment and other infrastructural related acquisition. Nuno Moreno is the chair of the Core facilities working group of EU-LIFE.

Staff in 2017

Ana Homem · Technician
Tiago Vale · Technician
Luis Marcelo · Masters student | Started in March
Luis Oliveira · Masters student | Started in March
Bernardo Monteiro · Trainee | Started in February; left in June

Email · moreno@igc.gulbenkian.pt
IGC Webpage · http://www.igc.gulbenkian.pt/facilities/tss

Publications

› Gualda, E.J., Pereira, H., Martins, G.G., Gardner, R., **Moreno, N.** (2017) *Three-dimensional imaging flow cytometry through light-sheet fluorescence microscopy.* **Cytometry A.** 91: 144-151.

› Ubelmann, F., Burrinha, T., Salavessa, L., Gomes, R., Ferreira, C., **Moreno, N.**, Guimas, A.C. (2017) *BIN1 and CD2AP polarise the endocytic generation of beta-amyloid.* **EMBO Rep.** 18: 102-122.

Biosafety

Head | **CARNEIRO, Tiago**

Description of Service

The IGC recognises the importance of ensuring the health and safety of all personnel within its campus. The ultimate goal of the Biosafety Unit is to create a safety awareness culture where safety is so entrenched in everyone that the natural conduct is to support safety practices. Hence, the Biosafety Unit is committed to make available the adequate resources to support research with all relevant safety statutes, regulations and codes of practice.

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IGC Webpage · http://www.igc.gulbenkian.pt/facilities/biosafety

News in 2017

In 2017, the IGC became part of the "Instituto Português da Qualidade" technical commission that will develop standards for the work within Biosafety Level 3 facilites in Portugal "CT 207 - Desenvolvimento e tradução de documentos normativos relativos à biossegurança em laboratórios que manipulam agentes biológicos e toxinas".

Administrative Unit

Head | **MARTINS, Greta**

Description of Service

The Administrative Unit is responsible for: a) Post-award management of scientific projects – external and internal funding; b) Administrative assistance to the IGC Directors and researchers; c) Assistance to new incoming researchers to the IGC; d) Logistics for seminar and other visitors; e) Meetings organisation; f) Processing of fellowships; g) Accounting processes in SAP. We collaborate with the accounting and purchasing sectors.

Email · gmartins@igc.gulbenkian.pt
IGC Webpage · http://www.igc.gulbenkian.pt/facilities/adminunit

Staff in 2017

Liliana Rodrigues · Secretary to the Director
Olena Shydenko · Secretary to the Deputy Directors
Pedro Alves · Meetings and Seminar Logistics Organisation | Left in July
Anna Maria Fejfer · Meetings and Seminar Logistics Organisation
Tatiana Rocha · Admin Project Manager
Rita Gusmão · Admin Project Manager
André Sousa · Admin Project Manager
Jorge Costa · Chauffeur (collaborator)

News in 2017

As the team was reduced by one member mid-year, the unit was restructured to reduce some of its services. Additionally, with the help of Nuno Moreno, internal workflows related to registration fees processing were improved and a new tool is being developed on Lab Orders for more efficient management of projects. We participated in an ERCEA Grant Management Workshop in Brussels, organised the preparation of a sudden audit visit by FCT on a random project at the IGC and participated in the Euraxess Annual Conference in Amsterdam. We also provided short training periods in project management to two IGC colleagues. In 2017, we provided logistics and admin support for: 10 international and/or national meetings; 48 seminar and/or other scientific visitors to the IGC; 26 new incoming researchers, including visas and social security. The team managed around 135 external scientific projects, prepared 25 financial reports and processed 395 fellowships.

General Maintenance

Head | **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.

Email · jleite@igc.gulbenkian.pt

Staff in 2017

Pedro Alves · Technician
João Madureira · Technician
Filipa Pardelha · Technician | Left in December
External subcontracting:
TDGI
Lisvento

Research Funding Affairs

Head | **VIDAL, Sheila**

Description of Service

The Research Funding Affairs Unit (RFA 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 Unit, the Director and both Deputy Directors. Services offered to the researchers include: identification & dissemination of funding opportunities tailored to the needs of the institute; support to the development & submission of grant proposals and; post-award negotiation of grant agreements. The unit also organises several informative sessions and workshops for grant application training of in-house and external researchers at all career stages. Finally, this unit also monitors the impact of the services offered through the quantification of several criteria.

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IGC Webpage · http://www.igc.gulbenkian.pt/facilities/rfaunit

Staff in 2017

Teresa Costa · Pre-Award Grants Advisor

News in 2017

During 2017, this service supported researchers in attracting several research funds. IGC researchers secured a total of 14 new external competitive research grants, 21 fellowships/work contracts, 4 prizes, as well as, 16 other type of funds, in a total amount of about 6,5 million EUR. In addition, IGC secured extra 1,87 million EUR from its involvement in 4 National Infrastructures Roadmap projects. In 2017, the RFA Unit implemented "Welcome info" sessions. These informative sessions aim at informing postdocs who have recently joined the IGC (last 3-6 months) about the services and tools provided by the RFA Unit.

Accounting and Internal Audit

Head | **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 office provides support in preparing financial reports of research projects, 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.

Email · jleite@igc.gulbenkian.pt

Staff in 2017

Fátima Mateus · Accounts Officer
Vítor Santos · Accounts and Information Officer
Joana Gusmão · Accounts Officer
Abílio Simões · Stores Manager
Ana Sofia Oliveira · Team responsible (PWC)
Tânia Lobão · Accounts Officer (PWC)
Ana Maria Monteiro Carvalho · Administrative (PWC)
António Bretanha · Procurement (FlyBridge)
Bruno Pinto · (FlyBridge)
Paulo Silva · (FlyBridge)

Informatics Unit

Head | **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. 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 center, redundant internet lines, Gigabit Ethernet to the desktop, campus-wide Wi-Fi, centralised file storage, internal helpdesk, knowledge base servers and fully integrated and automated intranet and user management.

Staff in 2017

João Garcia · Systems Analyst
Mário Neto · Systems Administrator
Fernando Azevedo · Technician
Manuel Carvalho · Technician
Abisola Akinrinade · Developer | Started in March

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IGC Webpage · http://www.igc.gulbenkian.pt/facilities/informatics

Library

Head | **SOUSA, João**

Description of Service

The IGC's library is an open access, specialised 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. 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.

Staff in 2017

Jorge Carneiro · Scientific Coordinator
Pedro Homem · Library Officer
Abisola Akinrinade · Developer | Left in March

Email · jsousa@igc.gulbenkian.pt
IGC Webpage · http://www.igc.gulbenkian.pt/facilities/library

Science Communication

Head | **MENA, Ana**

Description of Service

The IGC runs a dedicated science communication and outreach programme, which actively engages IGC researchers, staff and PhD students in a dialogue with the 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. Our programme involves the media, students, teachers, general public, artists and policy makers.

Publications

› Oliveira, M.J., Sousa, J.P., Costa, V.C., Oliveira, S.M., **Mena, A.** (2017). *Musical Morphogenesis – A self-organizing system.* In M.J. de Oliveira and F.C. Osório, **KINE[SYS]TEM From Nature to Architectural Matter International Conference** (pp. 235-245). Portugal: DINÂMIA'CET-IUL.

Email · anamena@igc.gulbenkian.pt
IGC Webpage · http://www.igc.gulbenkian.pt/outreach

Staff in 2017

Vanessa Borges · Public Engagement Officer
Inês Bravo · Communications Officer | Started in July
Inês Domingues · Communications Officer
Catarina Júlio · Science Education Officer | Left in February
Edmilson Moreira · Trainee | Started in May; left in July
Carla Araújo · Visitor | Started and left in November

News in 2017

Scientific achievements were disseminated via traditional and social media. The IGC ran hands-on activities in primary schools, hosted visits from high-school students, provided material for scientific activities, and organised a job-shadowing programme. Also, the IGC participated in the International Immunology Day, FCG Summer Festival 'Jardim de Verão', NOS Alive music festival, European Researchers Night, Science & Technology week, and organised the 1st edition of an Open Day for university students. The complete list of activities can be found in the Public Engagement section.

Research Structures & Networks

Research Structures

UNIDADE DE INVESTIGAÇÃO – IGC

The Instituto Gulbenkian de Ciência (IGC) is an independent 'Research Unit' (Unidade de Investigação) rated as "Exceptional" under the international evaluation of Portuguese scientific research and technological development promoted by Fundação para a Ciência e a Tecnologia (FCT), in 2015. 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.

GREEN- IT

The GREEN-IT Research Unit addresses the challenge of ensuring food security for an evergrowing population, focusing on the impacts of climate change on crop production in the Mediterranean area. To this end, GREEN-IT also uses model systems such as *Arabidopsis thaliana* to advance basic knowledge on conserved mechanisms relevant to crops, and integrates the three plant research groups at the IGC. The Unit links five institutes ITQB, iBET, IGC, INIAV and INSA, creating a privileged environment and providing a unique set of conditions for career development of researchers working on plant sciences.

NATIONAL ROADMAP OF RESEARCH INFRASTRUCTURES OF STRATEGIC RELEVANCE

Four research structures of the IGC are 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).

These research infrastructures are funded by the Programa Operacional Lisboa 2020 - FEEI (FEDER 2015-2020) and Fundação para a Ciência e a Tecnologia.

INFRAFRONTIER

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. Infrafrontier is the European Research Infrastructure for the development, phenotyping, archiving, and distribution of mammalian models. Infrafrontier draws on the expertise of 23 leading research institutes across 14 member states of the EU, including the IGC, in Portugal. The IGC offers a 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 facility, which has the capacity to temporarily host scientists wishing to carry out their own research with the mice at the IGC itself, has generated more than 20 different strains of germ-free mice, requested by researchers from several European countries.

BiodivERsA

Coordinator: Lounès Chikhi, IGC
BiodivERsA is a pan-European network coordinated by Lounès Chikhi at IGC that aims to promote research on biodiversity and ecosystem services, and offering innovative opportunities for the conservation and sustainable management of biodiversity. BiodivERsA is funded under the Horizon 2020 ERA-NET COFUND scheme.

EVOREPRO

Coordinator: Jörg Becker, IGC
EVOREPRO is a European and US consortium coordinated by Jörg Becker at IGC that aims to study the evolution of sexual reproduction in plants. The project is funded under the scope of ERA-CAPS, a European network dedicated to support research activities in Plant Sciences. This study will allow the identification of genes useful to the agricultural industry, with the aim of improving the reproduction of crop species, and ultimately to increase their yield.

Networks

EU-LIFE

EU-LIFE is an alliance that gathers thirteen renowned European research centres in life sciences: CRG-Barcelona (Spain); VIB (Belgium); Institut Curie (France); Max Delbrück Center for Molecular Medicine (Germany); Instituto Gulbenkian de Ciência (Portugal); CeMM (Austria); IEO (Italy); CEITEC (Czech Republic); NKI – Antoni van Leeuwenhoek (Netherlands); FIMM (Finland); BRIC (Denmark); Babraham Institute (UK); FMI (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 practice, 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. EU-LIFE has been established as a voice for research institutes in European policy, currently participating in the two stakeholders' platforms that advise regularly Commissioner Moedas and European Commission's DG RTD - the Open Science Policy Platform and the European Research Area Stakeholders' platform.

ELIXIR

ELIXIR brings together life science resources from across Europe. These resources include databases, software tools, training materials, cloud storage and supercomputers. The goal of ELIXIR is to coordinate these resources so that they form a single infrastructure that makes it easier for scientists to find and share data, exchange expertise, and agree on best practices. Together with INESC-ID, ITQB and iBET, IGC is in the consortium that started ELIXIR Portugal and contributes actively to its Platforms. Moreover, IGC is a contractor in the H2020 EXCELERATE Project, that aims at accelerating the deployment of ELIXIR infrastructural services. Formed in 2017, BioData.pt, a national bioinformatics network focused on adding value to biological information, started to operate as the national node of ELIXIR.

EMBnet

IGC node manager: Pedro L. Fernandes

The European Molecular Biology Network (EMBnet) is a network of academic partners that provide connections between communities of users and providers of bioinformatics resources. It has spearheaded a series of relevant initiatives to support the development of interconnected community resources. The IGC is an institutional member of EMBnet since 1992.

GOBLET

IGC representative, Chair of the LET Committee: Pedro L. Fernandes

GOBLET, the Global Organisation for Bioinformatics Learning, Education and Training, is a focused group that dedicates systematic efforts to develop and enhance Bioinformatics Training and Education methods, sharing best practice in teaching and learning methods and supporting bioinformatics trainers and teachers worldwide. The IGC is a member of GOBLET since its inception in 2012.

NEUBIAS

IGC representative: Gabriel G. Martins (WG2 leader); Nuno P. Martins (co-organiser of NEUBIAS school in Sweden)

NEUBIAS is a Network of European BioImage Analysts which aims to advance life science imaging, maximize impact of imaging technology and boost productivity of bioimaging-based research projects in Europe. NEUBIAS collaborates with EU imaging research infrastructures to set up best practice guidelines for image analysis. The Action is creating interactive databases for tools and workflows with annotated image sample datasets, to help matching practical needs in biological problems with software solutions, and to benchmark these tools. NEUBIAS also developed a novel training programme with three levels of schools, open textbooks and offers travel grants in a Short Term Scientific Missions programme to foster collaborations, technology access and knowledge transfer for scientists and specialists.

PUBLICATIONS

141
Peer reviewed
in-house publications

22
Peer reviewed
publications from
associated groups

4
Book Chapters

3
Proceedings

Peer-reviewed Publications 2017

In-House Publications

1. Almeida-Carvalho, M.J., Berh, D., Braun, A., Chen, Y., Eichler, K., Eschbach, C., Fritsch, P.M.J., Gerber, B., Hoyer, N., Jiang, X., Kleber, J., Klämbt, C., König, C., Louis, M., Michels, B., Miroschnikow, A., Mirth, C., Miura, D., Niewalda, T., Otto, N., Paisios, E., Pankratz, M.J., Petersen, M., Ramsperger, N., Randel, N., Risse, B., Saumweber, T., Schlegel, P., Schleyer, M., Soba, P., Sprecher, S.G., Tanimura, T., Thum, A.S., Toshima, N., Truman, J.W., Yarali, A., Zlatic, M. (2017) *The ol1mpiad: concordance of behavioural faculties of stage 1 and stage 3* Drosophila *larvae*. **J Exp Biol**. 220: 2452-2475.

2. Almeida de Carvalho, M.J., Mirth, C.K. (2017) *Food intake and food choice are altered by the developmental transition at critical weight in* Drosophila melanogaster. **Anim Behav**. 128: 195-208.

3. Arias, M., de la, T.A., Dixon, L., Gallardo, C., Jori, F., Laddomada, A., Martins, C., Parkhouse, R.M., Revilla, Y., Rodriguez, F.A.J. (2017) *Approaches and perspectives for development of African swine fever virus vaccines*. **Vaccines (Basel)**. 5(4). pii: E35.

4. Azevedo, E., Barata, M., Marques, M.I., Caeiro, M.F. (2017) Lulworthia atlantica*: a new species supported by molecular phylogeny and morphological analysis*. **Mycologia**. 109: 287-295.

5. Baena-González, E., Hanson, J. (2017) *Shaping plant development through the Snrk1-TOR metabolic regulators*. **Curr Opin Plant Biol**. 35: 152-157.

6. Barateiro, A., Mahú, I., Domingos, A.I. (2017) *Leptin resistance and the neuro-adipose connection*. **Front Endocrinol (Lausanne)**. 8: 45.

7. Baudouin-Gonzalez, L., Santos, M.A., Tempesta, C., Sucena, É., Roch, F., Tanaka, K. (2017) *Diverse cis-regulatory mechanisms contribute to expression evolution of tandem gene duplicates*. **Mol Biol Evol**. 34: 3132-3147.

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2. Correia, R.B, de Araújo, L.P., Mattos, M.M., Wild, D., Rocha, L.M. (2017). *City-wide analysis of drug-drug-interactions*. **Translational Bioinformatics Conference 2017**. Sep. 29-Oct.1st, Los Angeles, CA.

3. Correia, R.B, Wood, I.B., Ratkiewicz, N.D., Miller, W.R. Rocha, L.M. (2017) *Public health monitoring of drug interactions, patient cohorts, and behavioral outcomes via network analysis using multi-source user timelines*. **Conference on Complex Systems 2017**. Sep. 17 – 22, Cancun, Mexico.

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Associated groups

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5. Domingues, I.L., Gama, J.A., Carvalho, L.M., Dionisio, F. (2017) *Social behaviour involving drug resistance: the role of initial density, initial frequency and population structure in shaping the effect of antibiotic resistance as a public good*. **Heredity**. 119: 295-301.

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15. Maceiras, A.R., Almeida, S.C.P., Mariotti-Ferrandiz, E., Chaara, W., Jebbawi, F., Six, A., Hori, S., Klatzmann, D., Faro, J., Graca, L. (2017) *T follicular helper and T follicular regulatory cells have different TCR specificity*. **Nat Commun**. 8: 15067.

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PRIZES & HONOURS

Prizes & Honours 2017

AMORIM, Maria João
Selected for the 2017 USA International Visitor Leadership Programme, project "Women in STEM Fields", US Government

BANK, Claudia
Board of Recommenders, Peer Community in Evolutionary Biology

BELDADE, Patrícia
Scientific committee, Joint meeting of ESEB, SSE, ASN, SSB: Evolution 2018

BONUCCI, Sara
RMS Travel Award to MMC Conference, Royal Microscopy Society, UK

CABRAL, Vitor
Postdoctoral Fellowship, Fundação para a Ciência e a Tecnologia

CARREIRA, Leonor
Best Student Contribution, Portuguese Ethological Society, 14th Meeting of the Portuguese Ethological Society, ISPA, Portugal

CAVADAS, Miguel
Postdoctoral fellowship, Fundação para a Ciência e a Tecnologia

CHIKHI, Lounès
Editorial board, Heredity

COSTA, Nuno
NEDAI Prize for Research in Autoimmunity 2017, NEDAI

DEMENGEOT, Jocelyne
ERC panel member, European Research Council

AFM-Généthon panel member, AFM-Généthon

HCERES panel member, High Council for Evaluation of Research and Higher Education

DOMINGOS, Ana I.
International Research Scholar, Howard Hughes Medical Institute

DOMINGUES, Vital
Fellowship in Autoimmune Diseases NEDAI 2017, Sociedade Portuguesa de Medicina Interna

DUQUE, Paula
EMBO Member, European Molecular Biology Organization

DURÃO, Paulo
Postdoctoral fellowship, Fundação para a Ciência e a Tecnologia

EL MAI, Mounir
Postdoctoral fellowship, Fundação para a Ciência e a Tecnologia

FAÍSCA, Pedro
Reelected President, Portuguese Society of Veterinary Pathology 2017-2019

Member of Scientific committee, XXII Meeting of the Portuguese Society of Animal Pathology

FERREIRA, Miguel Godinho
Advisory Editorial Board, Life Science Alliance (EMBO Press, Rockefeller University Press, and Cold Spring Harbor Laboratory Press)

FRAGATA, Inês
Board of Recommenders, Peer Community in Evolutionary Biology

GJINI, Erida
Nomination for the most successful young researcher in natural and exact sciences, National Academy of Sciences of Albania

Member of Albanian Young Academy of Sciences, Albanian Young Academy of Sciences

Member of The Institute of Mathematics and its Applications, Institute of Mathematics and its Applications

Member of the local organising committee, European Conference of Mathematical Biology 2018

GORDO, Isabel
EMBO Member, European Molecular Biology Organization

ERC panel member, European Research Council

LOPES, Carla
Postdoctoral fellowship, Fundação para a Ciência e a Tecnologia

Travelling Fellowship, Journal of Cell Science

MALLO, Moisés
Editorial Board, Developmental Dynamics

Editorial Board, ISRN Developmental Biology

Academic Editor, PLoS ONE

Editorial Board, Cell Communication & Adhesion

MARGALHA, Leonor
Postdoctoral fellowship, Fundação para a Ciência e a Tecnologia

MARTIN, Guiomar
EMBO Long-Term fellowsip, European Molecular Biology Organization

MARTINEZ, Noelia
Postdoctoral fellowship, Xunta de Galizia, Spain

MARTINS, Rui
EMBO Long-Term fellowship, European Molecular Biology Organization

MENA, Ana
Chair of Science Communication Working Group, EU-LIFE

MIRKOVIC, Mihailo
Best Talk Prize, Drostuga Conference, Tomar, Portugal

MIRTH, Christen
Future Fellowship, Australian Research Council

OLIVEIRA, Rui F.
President, Society for Social Neuroscience

PARREIRA, Bárbara
Postdoctoral fellowship, Fundação para a Ciência e a Tecnologia

RAMIRO, Ricardo
Postdoctoral fellowship, Fundação para a Ciência e a Tecnologia

ROCHA, Luís M.

Recognition Award for Service, Complex Networks 2017, The 6th International Workshop on Complex Networks & their Applications, Lyon, France

Fulbright American Scholar, The J. William Fulbright Foreign Scholarship Board

ROSMANINHO, Pedro

Best Poster Prize, XV Meeting of the Portuguese Society for Neuroscience

SANTOS, Josiane

Postdoctoral fellowship, Fundação para a Ciência e a Tecnologia

SATURNINO, Magda

Postdoctoral fellowship, Fundação para a Ciência e a Tecnologia

SIWEK, Wojciech

Postdoctoral fellowship, Fundação para a Ciência e a Tecnologia

SOARES, Mário

Paolo Bianco Prize for Best Poster, XIII Hydra Summer School

SOARES, Miguel P.

EMBO Member, European Molecular Biology Organization

F1000 member, Immunity to Infections

Member of the Scientific Committee, XLI Congress of Brazilian Society of Immunology: "Mucosal Immunology"

SOUSA, Ana Laura

RMS Travel Award to MMC Conference, Royal Microscopy Society, UK

SUCENA, Élio

Elected member, Council of the European Society for Evolutionary Biology (ESEB)

TEIXEIRA, Luís

Editorial Board (Academic Editor), PLoS Biology

VIDAL, Sheila

Member of the Coordination Group, Plataforma de Interface a Ciência (PIC)

Member of the EU-LIFE Working Group on Grants and Funding Strategies, EU-LIFE

Member of the EARMA Working Group on Cultures and Diversity in Research Management and Administration, European Association of Research Managers and Administrators (EARMA)

XAVIER, Karina

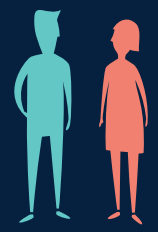
Jury member, Angelini University Award

GRADUATE EDUCATION & TRAINING

2
PhD Programmes

1
Advanced Training Programme

102
PhD Students



167
Students attending Advanced Training

PhD Programme in Integrative Biology and Biomedicine | IBB

Head | **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 2017 maintains its international collaboration with the University of Cologne, and the Max Planck Institute for Plant Breeding Research, as well as local partnerships with the Champalimaud Research (Champalimaud Foundation) and the Instituto de Tecnologia Química e Biológica (ITQB-NOVA). 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 all year round. The IBB programme is supported by the Fundação para Ciência e a Tecnologia and the Calouste Gulbenkian Foundation and its students are awarded their degrees from the Universidade Nova de Lisboa.

Email · esucena@igc.gulbenkian.pt
IGC Webpage · http://www.igc.gulbenkian.pt/education/ibbprogramme

Support Staff

Ana Aranda da Silva · Administrative Assistant | Started in January

Students admitted in 2017

Ana-Hermina Ghenu	Romanian	MSc Genetics and Evolutionary Biology	McMaster University, Canada
Anastasiia Lozovska	Ukranian	MSc Physiology of Humans and Animals	Taras Shevchenko National University of Kyiv, Ukraine
André Miguel Gomes Duarte de Sousa Dias	Portuguese	MSc in Evolutionary and Development Biology	Faculdade de Ciências da Universidade de Lisboa, Portugal
André Mendonça Madaleno	Portuguese	Medicine	Trinity College Dublin, Ireland
Anton Kermanov	Russian	MSc in Genetics	Southern Federal University, Russia
Camila Veludo Ramos	Portuguese	MSc in Bioinformatics and Computational Biology	Faculdade de Ciências da Universidade de Lisboa, Portugal
Catarina Sofia Rodrigues do Carmo	Portuguese	MSc in Molecular Genetics	Universidade do Minho, Portugal
Hugo Manuel Condessa Barreto	Portuguese	MSc in Applied Microbiology	Faculdade de Ciências da Universidade de Lisboa, Portugal
Marco António Dias Louro	Portuguese	MSc in Bioinformatics and Computational Biology	Faculdade de Ciências da Universidade de Lisboa, Portugal
Margarida Maria Mimoso Reis Araújo	Portuguese	MSc in Evolutionary and Development Biology	Faculdade de Ciências da Universidade de Lisboa, Portugal
Sahar Seyed HassanTehrani	Iranian	MSc in Cellular and Molecular Biology	National Institute of Genetic Engineering and Biotechnology, Iran
Sebastiaan Jan Wigger van den Berg	The Netherlands	MSc in Molecular and Cellular Life Sciences	Utrecht University, The Netherlands
Tânia Filipa Teixeira Paulo	Portuguese	MSc in Evolutionary and Development Biology	Faculdade de Ciências da Universidade de Lisboa, Portugal
Temitope Akhigbe Etibor	Nigerian	MSc in Anatomy	University of Ilorin, Nigeria

Modules & Courses ran in 2017

JANUARY 9-13

History of Biological Concepts

Organiser: Élio Sucena (IGC, Portugal)
Faculty: Michael Dietrich (Dartmouth College, USA), Lars Jansen (IGC, Portugal) and Rui Oliveira (IGC and ISPA, Portugal).

JANUARY 9-20

Statistics and Quantitative Biology

Organisers: Jorge Carneiro and Claudine Chaouiya (IGC, Portugal)
Faculty: Thiago Guzella (École Normale Supérieure, France), Jorge Carneiro and Claudine Chaouiya (IGC, Portugal).

JANUARY 23-27

Structural and Molecular Biology

Organisers: Lars Jansen and Alekos Athanasiadis (IGC, Portugal)
Faculty: Ben Black (University of Pennsylvania, USA), Elio Abbondanzieri (Delft University, The Netherlands), Moisés Mallo, Alekos Athanasiadis and Lars Jansen (IGC, Portugal).

JANUARY 30-3 FEBRUARY

Biophysics

Organisers: Ivo Telley and Filipa Alves (IGC, Portugal)
Faculty: Alvaro Crevenna, Afonso Duarte, Ricardo Louro, Manuela Pereira, Smilja Todorovic, James Yates (ITQB-NOVA, Portugal), Susana

Modules & Courses ran in 2017 (cont.)

Lopes (CEDOC, Portugal), Ana Milas, Nenad Pavin (Department of Physics, University of Zagreb, Croatia), Gabriel Martins, Erin Tranfield, Ivo Telley and Filipa Alves (IGC, Portugal).

FEBRUARY 6-22

Cell Biology

Organisers: Mónica Bettencourt Dias, Florence Janody, Raquel Oliveira, Maria João Amorim and Colin Adrain (IGC, Portugal)
Faculty: Robert Grosse (University of Marburg, Germany), Philippe Bastin (Institut Pasteur, France), Sophie Martin (University of Lausanne, Switzerland), Sarah McClelland (Barts Cancer Institute, UK), Manuel Muñiz (University of Sevilla, Spain), Jason Mercer (MRC Laboratory for Molecular Cell Biology, UK), Margarida Amaral (FCUL, Portugal), Pedro Domingos (ITQB-NOVA, Portugal) Mónica Bettencourt Dias, Florence Janody, Raquel Oliveira, Maria João Amorim and Colin Adrain (IGC, Portugal).

FEBRUARY 29-MARCH 10

Host-Pathogen Interactions/Immunobiology

Organisers: Luís Moita, Luís Teixeira and Miguel Soares (IGC, Portugal)
Faculty: Myriam Aouadi (Karolinska Institute, Sweden) Vasco Barreto (CEDOC, Portugal), Bruno Lemaitre (EPFL, Switzerland), Bruno Silva Santos (iMM, Portugal), Henrique Veiga-Fernandes (Champalimaud Foundation, Portugal), António Coutinho, Jocelyne Demengeot, Ana Domingos, Jonathan Howard, Vera Martins, Luís Moita, Miguel Soares and Luís Teixeira (IGC, Portugal).

MARCH 13-17

Developmental Biology

Organisers: Diogo Castro and Moisés Mallo (IGC, Portugal)
Faculty: Fernando Roch (Centre de Biologie du Développement, France)
Rita Fior (Champalimaud Foundation, Portugal), Ana Tavares (UNL, Portugal), Pablo Navarro (Institute Pasteur, France), Nicoletta Bobola (University of Manchester, UK), Andrew Oates (University College London, UK), Vera Martins, Diogo Castro and Moisés Mallo (IGC, Portugal).

MARCH 20-24

Evolution

Organisers: Isabel Gordo, Lounès Chikhi and Claudia Bank (IGC, Portugal)
Faculty: Andrea Betancourt and Jonathan Bollback (University of Liverpool, UK), Lounès Chikhi (CNRS, France and IGC, Portugal), Claudia Bank, Ivo Chelo, Isabel Gordo, Lilia Perfeito, Alexandre Blanckaert and Inês Fragata (IGC, Portugal).

MARCH 27-31

Evolution, Development and Ecology

Organisers: Patrícia Beldade and Ivo Chelo (IGC, Portugal)
Faculty: Abderrahman Khila (Institute of Functional Genomics, France) Alistair MacGregor (Oxford Brookes University, UK), Christen Mirth (Monash University, Australia and IGC, Portugal) Patrícia Beldade, Ivo Chelo, Takashi Koyama, Khotaro Tanaka and Erik van Bergen (IGC, Portugal).

APRIL 03-07

Neurobiology

Organisers: Rui F. Oliveira (ISPA and IGC, Portugal)
Faculty: Don Pfaff (Rockefeller University, USA), Luísa Vasconcelos, Marta Moita (Champalimaud Foundation, Portugal), Catharine Rankin (UBC, Canada), Rosalina Fonseca (CEDOC, Portugal), Alex Jordan (MPI, Germany), Rui Oliveira (ISPA and IGC, Portugal), Ana Domingos, Magda Teles, Ana Rita Nunes and Felipe Espigares (IGC, Portugal).

APRIL 09-14

Ecology

Organiser: Sara Magalhães (FCUL, Portugal)
Faculty: Marc-André Selosse (Musée National d'Histoire Naturelle, France), Ioannis Michalakis (IRD-Montpellier, France) and Sara Magalhães (FCUL, Portugal).

APRIL 24-28

Plant Biology (Cologne, Germany)

Organiser: Isabell Witt (University of Cologne, Germany)
Faculty: Alga Zuccaro, Gunther Döhlemann, Ute Höcker, Maria Albani and Stanislav Kopriva (University of Cologne, Germany), Jane Parker (Max Planck Institute for Plant Breeding Research, Germany), Margarida Oliveira (ITQB-NOVA, Portugal), Markus Pauly (Heinrich-Heine-Universität), Paula Duque, Elena Baena González and Jörg Becker (IGC, Portugal).

MAY 02-04

Bioinformatics

Organiser: Pedro Fernandes (IGC, Portugal)
Faculty: David P. Judge, Pedro Fernandes and Daniel Sobral (IGC, Portugal).

MAY 08-12

Systems Biology

Organiser: Claudine Chaouiya (IGC, Portugal)
Faculty: Jean Clairambault (INRIA Paris Research Centre, France), Paulien Hogeweg (Utrecht University, The Netherlands), Isabel Rocha (Universidade do Minho, Portugal), Luis Rocha (Indiana University, USA and IGC, Portugal) Claudine Chaouiya and Erida Gjini (IGC, Portugal).

MAY 15-19

From Cells to Organisms

Organisers: Karina Xavier, Miguel Godinho Ferreira and Ana Domingos (IGC, Portugal)
Faculty: Nazif Alic, (University College London, UK), Helena Soares, António Jacinto (CEDOC, Portugal), Leonor Saúde, Luísa Figueiredo (iMM, Portugal), Ivo Boneca (Institut Pasteur, France), Karina Xavier, Miguel Godinho Ferreira and Ana Domingos (IGC, Portugal).

MAY 22-26

Hypothesis-Driven Research

Organisers: Jocelyne Demengeot and José Pereira Leal (IGC, Portugal)
Faculty: Jocelyne Demengeot, José Pereira Leal, António Coutinho (IGC, Portugal).

JUNE 5-9

Methods in Integrative Biology

Organisers: Nuno Moreno and Jörg Becker (IGC, Portugal)
Faculty: Gholamreza Hassan Zadeh (VIB, Belgium), João Frazão (Champalimaud Foundation, Portugal), Jose Feijó (University of Maryland, USA), Pedro Santos (Universidade do Minho, Portugal), Ana Regalado, Carlos Penha, Daniel Sobral, Gabriel Martins, Jörg Becker, Jorge Carneiro, Manuel Rebelo, Mariana Fernandes, Marta Monteiro, Moisés Mallo, Nuno Moreno, Nuno Pimpão, Pedro Faísca, Pedro Fernandes and Erin Tranfield (IGC, Portugal).

Graduate Programme Science for Development | PGCD

Head | **GONÇALVES-SÁ, Joana & BELDADE, Patrícia**

Description of the Programme

The Graduate Programme Science for Development (PGCD in the Portuguese Acronym) is an advanced training programme, designed to prepare students from the various Portuguese Speaking African Countries (PALOP) and East-Timor to pursue research careers in Science and Technology. This programme, started in January 2014, is organised by the IGC with the support of the MESCI, Cabo Verde, the FCT, Portugal and CAPES, Brazil, and several sponsors, most notably Merck. The programme offers basic training in the life sciences, paying particular attention to Plant Biology, Marine Biology and Tropical Diseases. In addition to the science curriculum, the PGCD students have an English course, the language of science. The programme's structure consists on one year of graduate courses, taking place in Praia, Cabo Verde, followed by a 3 to 4 year research period leading to a PhD thesis. The research period will be divided between the home countries and selected institutes and universities abroad.

The main goals of the PGCD are three-fold:

1) To train a new generation of excellent Portuguese-speaking African and Timorese students, giving them the opportunity to learn advanced science and become scientists;

2) To improve the quality of science education and scientific research in the PALOP and East-Timor;

3) To use science and technology as effective tools for development.

Email · mjsa@igc.gulbenkian.pt; pbeldade@igc.gulbenkian.pt
IGC Webpage · http://www.igc.gulbenkian.pt/education/pgcd
External Website · http://pages.igc.gulbenkian.pt/pgcd/

Support Staff

Carla Semedo · PGCD Coordinator in Cabo Verde
Inês Maciel · Assistant

Students admitted in 2017

Albasini Caniço	Mozambique	Agronomy	Universidade Eduardo Mondlane, Mozambique
Benilde Pondeca	Mozambique	Biology	Universidade Eduardo Mondlane, Mozambique
Cruz Sebastião	Angola	Clinical Analysis and Public Health	Universidade Agostinho Neto, Angola
Denise Camacho	Cabo Verde	Biotechnology	Universidade Jean Piaget, Cabo Verde
Deisy Rocha	Cabo Verde	Pharmaceutical Sciences	Universidade de Aveiro, Portugal
Ednilson Varela	Cabo Verde	Biochemistry	Universidade Federal de Viçosa, Brazil
Emanuel Nunes	Cabo Verde	Biology	Direcção Geral das Pescas, Cabo Verde
Esperança Ussene	Mozambique	Medicine	Universidade Eduardo Mondlane, Mozambique
Eunice Silva	Cabo Verde	Biomedical Engineering	Universidade de Coimbra, Portugal
Ezídio Cuamba	Mozambique	Ecology	Universidade Lurio, Mozambique
Fredilson Melo	Cabo Verde	Biochemistry	Universidade Nova de Lisboa, Portugal
Gilson Semedo	Cabo Verde	Biology	INIDA, Cabo Verde
Márcio Sitoe	Mozambique	Agronomy	Universidade Estadual de Londrina, Brasil

Modules & Courses ran in 2017

JANUARY 16 – 20

PGCD17 - History and hypothesis-driven research

Organiser: Miguel Godinho Ferreira (IGC, Portugal)
Faculty: Isabel Gordo (IGC, Portugal), Rui Martinho (Universidade do Algarve, Portugal).

JANUARY 23 – 27

PGCD17 - Experimental approaches

Organiser: Raquel Oliveira (IGC, Portugal)
Faculty: Rita Teodoro, Catarina Homem (CEDOC, Portugal).

JANUARY 30 – FEBRUARY 03

PGCD17 - Quantitative biology

Organisers: Jorge Carneiro and Ivo Chelo (IGC, Portugal)
Faculty: Nuno Sepulveda (LSHTM, UK).

FEBRUARY 06 – 10

PGCD17 - Bionformatics

Organiser: Nuno Morais Barbosa (IMM, Portugal)
Faculty: Inês Santiago (Cancer Research, UK), Benilton Carvalho (UNICAMP, Brazil).

FEBRUARY 13 – 17

PGCD17 - Evolution

Organiser: Ivo Chelo (IGC, Portugal)
Faculty: Ana Margarida Sousa (Universidade de Aveiro, Portugal), Rui Castanhinha (Museu Lourinhã, Portugal).

FEBRUARY 20 – 24

PGCD17 - Developmental Biology

Organiser: António Jacinto (CEDOC, Portugal)
Faculty: Rita Fior (Champalimaud Foundation,

Modules & Courses ran in 2017 (cont.)

Portugal), Leonor Saúde and Sérgio Dias (iMM, Portugal).

FEBRUARY 27 – MARCH 03

PGCD17 - Biodiversity

Organiser: Alexandra Magro (Université de Toulouse, France)
Faculty: Emilie Lecompte (Université de Toulouse, France), Miguel Sequeira (Universidade da Madeira, Portugal).

MARCH 06 –10

PGCD17 - Cell Biology

Organiser: Mónica Bettencourt Dias (IGC, Portugal)
Faculty: Helder Maiato (I3S, Portugal), Edgar Gomes (iMM, Portugal), Susana Godinho (QMUL, UK).

MARCH 13 –17

PGCD17 - Molecular Biology

Organiser: Fabiana Herédia (CEDOC, Portugal)
Faculty: Alisson Gontijo, Guadalupe Cabral and Mónica Roxo-Rosa (CEDOC, Portugal).

MARCH 27 –31

PGCD17 - Biology, Ecology & Biodiversity of Marine Systems

Organiser: Miguel Barbosa (St. Andrews, UK)
Faculty: Alfredo Ojangurren (St. Andrews, UK).

APRIL 03 –07

PGCD17 - Marine Population Phylogenies , Genetics and Genomics

Organiser: Ricardo Beldade (CNRS, France)
Faculty: Sara Rocha (Universidad de Vigo, Spain), Giacomo Bernardi (UCSC, USA).

APRIL 17 –21

PGCD17 - Aquaculture and Fisheries

Organiser: Claudia Aragão (CCMAR, Portugal)
Faculty: Margarida Castro (CCMAR, Portugal).

APRIL 24 –28

PGCD17 - Aquaculture and Fisheries

Organiser: Ester Serrão (Universidade do Algarve, Portugal)
Faculty: Peter Wirz (Universidade da Madeira, Portugal), Jorge Assis (Universidade do Algarve, Portugal), Salomão Bandeira (UEM, Mozambique).

MAY 01 –05

PGCD17 - Plant Biology & Biochemistry

Organiser: Paula Duque (IGC, Portugal)
Faculty: Alessandro Ramos (UENF, Brazil), Manuela Costa (Universidade do Minho, Portugal), Anabela Silva (FCUL, Portugal).

MAY 08 –12

PGCD17 - Plant Stress and Nutrition

Organiser: Elena Baena González (IGC, Portugal)
Faculty: Alessandro Ramos and Gonçalo Souza (UENF, Brazil).

MAY 15 –19

PGCD17 - Biotechnology Techniques

Organiser: Fátima Grossi (Universidade de Brasília, Brazil)
Faculty: Patrícia Pelegrini (Universidade de Brasília, Brazil).

MAY 22 –26

PGCD17 - Tropical Agriculture

Organiser: Manuel Correia (ISA, Portugal)
Faculty: José Alexandre (Universidade de Évora, Portugal), João Neves Martins and Manuel Madeira (ISA, Portugal).

JUNE 05 –09

PGCD17 - Immunology

Organiser: Vasco Barreto (CEDOC, Portugal)
Faculty: Raffaella Gozzelino (CEDOC, Portugal), Afonso Almeida (iMM, Portugal).

JUNE 12 –16

PGCD17 - Immune Chronic Diseases

Organiser: Helena Soares (CEDOC, Portugal)
Faculty: Silvia Portugal (University of Heidelberg, Germany), Paula Videira (FCT-UNL, Portugal), Nuno Osório (Universidade do Minho, Portugal).

JUNE 19 –23

PGCD17 - Vector-borne Diseases

Organiser: Maria Mota (iMM, Portugal)
Faculty: Vanessa Zuzarte, Fabien Guegan and António Mendes (iMM, Portugal).

JUNE 26 –30

PGCD17 - Intestinal Infections & Parasitology

Organiser: Marize Miagostovich (Fiocruz, Brazil)
Faculty: Regina Domingues and Leandro Lobo (UFRJ, Brazil).

JULY 03 –07

PGCD17 - Tropical Medicine

Organiser: Thomas Hanscheid (iMM, Portugal)
Faculty: Carla Santos and Robert Badura (iMM, Portugal), Margarida Vigário (Universidade da Madeira, Portugal).

JULY 10 –14

PGCD17 - Public Health

Organiser: Inácio Mandomando (CISM, Mozambique)
Faculty: Cesário Martins (Bandim, Guiné Bissau), Miguel Brito (CISA, Angola), Lara Gomez (UniPiaget, Cabo Verde), Tomás Valdez (INSP, Cabo Verde), Dario Dantas dos Reis (UNICA, Cabo Verde).

JULY 24 –27

PGCD17 - Science Communication and Research Management

Organiser: Sheila Vidal (IGC, Portugal)
Faculty: Ana Mena, Inês Domingues, Teresa Costa and Inês Bravo (IGC, Portugal) Margarida Trindade (ITQB-NOVA, Portugal).

Gulbenkian Training Programme in Bioinformatics | GTPB

Head | **FERNANDES, Pedro L.**

Description of the Programme

The GTPB runs face-to-face Bioinformatics Training Courses regularly at the Instituto Gulbenkian de Ciência since 1999. Up to now, more than 5150 course participants have acquired practical skills that they can use with a high degree of independence.

The Programme consists in a series of short, intensive hands-on courses delivered and fully documented in English. The design of the courses is based on sets of carefully chosen exercises, flanked by short lectures and participative interaction sessions. The training methodology is based on active learning principles. A set of courses addresses recognised needs in a stable manner, whereas new themes are introduced each year to allow for novel areas where Bioinformatics is making new impacts. In 2017, the GTPB trained 167 students from 13 nationalities. Of these, 125 were from Portuguese institutions, 82 from the IGC and 32 were from foreign institutions.

Email · pfern@igc.gulbenkian.pt
IGC Webpage · http://www.igc.gulbenkian.pt/education/gtpb
External Website · http://gtpb.igc.gulbenkian.pt/bicourses

Support Staff

Joana Marques · | Started in October
Alexandra Caetano · | Started in November

Modules & Courses ran in 2017

Organiser: Pedro L. Fernandes

MARCH 6-10

PDA17 - Proteomics Data Analysis

Faculty: Lennart Martens (Ghent University and VIB, Belgium), Harald Barsnes and Astrid Guldbrandsen (University of Bergen, Norway).

MARCH 13-17

PGDH17 - Population Genetics and Demographic History: model-based approaches

Faculty: Mark Beaumont (University of Bristol, UK), Lounès Chikhi (CNRS, France & IGC, Portugal), Willy Rodriguez (INRA, France), Bárbara Parreira (IGC, Portugal) and Vitor Sousa (cE3c, Portugal).

APRIL 10-13

ABSTAT17 - Advanced Biostatistics for Bioinformatics Tool Users using R

Faculty: Lisete Sousa (FCUL, Portugal) and Carina Silva (ESTeSL, Portugal).

APRIL 17-20

ADER17 - Analysis of Differential Expression with RNAseq

Faculty: Daniel Sobral, Daniel Faria and Mauro Truglio (IGC, Portugal).

MAY 8-12

ELB17F - Entry Level Bioinformatics (First course in 2017)

Faculty: David P. Judge (Freelance independent Bioinformatics instructor, UK), Pedro L. Fernandes and Daniel Sobral (IGC, Portugal).

SEPTEMBER 11-15

IBSTATB17 - Introductory Biostatistics for Biologists

Faculty: Ana Luísa Papoila (NMS-UNL, Portugal), Maria Fernanda Diamantino (FCUL, Portugal).

SEPTEMBER 20-22

IO17 - Large-scale bioinformatics for Immuno-Oncology

Faculty: Francesca Finotello (Medical University of Innsbruck, Austria) and Frederica Eduati (EMBL & JRC-COMBINE, Germany).

NOVEMBER 6-10

ELB17S – Entry Level Bioinformartics (Second course in 2017)

Faculty: David P. Judge (Freelance independent Bioinformatics instructor, UK), Pedro L. Fernandes and Daniel Sobral (IGC, Portugal).

NOVEMBER 14-17

PM17 – Precision medicine

Faculty: Fátima Al-Shahrour, Javier Perales and Elena Piñero (CNIO, Spain).

NOVEMBER 27-30

PPB17 - Programming in Python for Biologists

Faculty: Allegra Via (IMBP-CNR, Italy), Pedro L. Fernandes (IGC, Portugal) and David P. Judge (Freelance independent Bioinformatics instructor, UK).

DECEMBER 4-7

ADER17S - Analysis of Differential Expression with RNAseq

Faculty: Daniel Sobral, Daniel Faria and Daniel Neves (IGC, Portugal).

Postdoctoral Training

Scientific Coordinator | **JANSEN, Lars E.T.**

Description of the Programme

The IGC Postdoc Committee organises activities throughout the year aimed to improve professional skills and to promote interactions within the Postdoc community. Among these we organised weekly Postdocs and PhD seminars, encouraging researchers to present their data and ideas and obtain feedback on their research from the IGC community. We hosted and organised the visit of an external speaker (Dr. Ana Losada, Madrid) to the institute. Together with the RFA Unit, we hosted a CV improvement workshop for students and Postdocs. To take advantage of the experience of senior IGC scientists we started the "Coffee with the PI" sessions to promote Postdocs and PIs relationships with informal conversations about science, lab management, grants, publications, etc. Moreover, to improve the integration of foreign researchers in the country, we helped organise Portuguese classes, subsidised by IGC.
Finally, the Committee organised an Annual Postdoc Retreat. This year we had a Science-focused retreat jointly with the Babraham Institute (UK) and the Max-Planck Institute for Plant Breeding Research (Germany) in Vimeiro, Portugal. During this retreat we put together a workshop in Science Communication with Dr. Vasco Trigo (Portugal) and we promoted networking and science discussion in an informal but stimulating environment, among postdocs and with the invited speakers that participated: Prof. Mariano Barbacid (Spain), Dr. Gad Asher (Israel), Prof. Jane Parker and Prof. George Coupland (Germany).

Email · ljansen@igc.gulbenkian.pt
IGC Webpage · http://www.igc.gulbenkian.pt/education/pdtraining
External Website · https://www.facebook.com/igcpostdocs/

Postdoc Committee in 2017

Luna Ballesteros
Faouzi Brazza
Vitor Cabral
Mounir El Mai
Tom Laloum
Inês Milagre
Marina Murillo

Summer Internship Programme

Coordinator | **AMORIM, Maria João**

Description of the Programme

Since 2014, the IGC and University of Oxford run a programme aiming to bring young science undergraduates to the IGC for an 8-week lab experience. This programme has since then expanded to accommodate undergraduates studying at other universities in Europe and also from the Lisbon area, including Universidade Nova de Lisboa, Universität Karlsruhe, Pierre and Marie Curie University, Poznan University of Life Science, among others. In 2017, the IGC hosted 9 talented summer students that enjoyed the atmosphere of the IGC and experienced the life of a researcher.

Hosting groups in 2017

Obesity
Neurobiology Mechanisms
Evolutionary Biology
Diseases Genetics
Epigenetic Mechanisms
Bacterial Signalling

Theses 2017

BSc Theses

MARTINS, Bruna

Cloning Cre Recombinase into Bcl11b locus
Supervisor: Vera Martins
Universidade Nova de Lisboa, Portugal - March

MSc Theses

DELGADINHO, Mariana

Characterisation of the selective potential for the improvement of Cry toxins with nematicidal activity
Supervisors: Ivo Chelo and Lília Perfeito
Universidade de Aveiro, Portugal - December

HAUPF VIEIRA, Cláudio

Online behavioral patterns in a health crisis setting: the 2009 pandemic
Supervisor: Joana Gonçalves-Sá
Universidade de Lisboa, Portugal - December

MESQUITA, André

Functional analysis of candidate genes affecting Hoxa10 activity
Supervisor: Moisés Mallo
Universidade de Lisboa, Portugal - November

NOGUEIRA ALVES, André

From plasticity to robustness: Mechanisms coordinating organ size and pattern
Supervisor: Christen Mirth
Universidade de Lisboa, Portugal - October

PERDIGÃO, Joana

Influenza A modulation of cytokine release from macrophages
Supervisors: Colin Adrain and Maria João Amorim
Universidade de Coimbra, Portugal - September

PINTO DE JESUS, Lídia Andreia

Exploration of ligands for the innate immune specific Zalpha domain
Supervisor: Alekos Athanasiadis
Instituto Superior Técnico de Lisboa, Portugal - November

RODRIGUES, Patrícia

Identification and characterization of new players involved in the centriole maintenance programme
Supervisor: Mónica Bettencourt Dias
Universidade de Lisboa, Portugal - December

SOUSA, Ana Laura

Characterising the formation and functional role of vesicular clustering during IAV
Supervisor: Maria João Amorim
Universidade de Lisboa, Portugal - November

TEIXEIRA, Joana

Evolutionary dynamics of bacterial populations under antibiotic treatment
Supervisor: Erida Gjini
Universidade de Lisboa, Portugal - July

TRAVANCA DOS SANTOS, Daniela Filipa

The role of an oxytocin-like peptide in social reward in zebrafish
Supervisor: Rui Oliveira
Universidade de Aveiro, Portugal – December

VENTURA, Pedro

Macrophages control tissue homeostasis via Ferritin heavy chain
Supervisor: Miguel P. Soares
Universidade Nova de Lisboa, Portugal - October

PhD Theses

GATES, Alexander

The anatomical and effective structure of complex systems
Supervisor: Luís M. Rocha
Indiana University, USA

JERÓNIMO, Maria Adelina

The origin and development of novelty: eyespots and immunity
Supervisor: Patrícia Beldade
Universidade Nova de Lisboa, Portugal - February

LAFUENTE, Elvira

Evolution and regulation of developmental plasticity: body size and pigmentation in *Drosophila*
Supervisor: Patrícia Beldade
Universidade Nova de Lisboa, Portugal - December

MANICKA, Santosh

The role of canalization in the spreading of perturbations in Boolean network
Supervisor: Luís M. Rocha
Indiana University, USA

MENDES, Caetano

Model-based inferences in hostpathogen-symbiont interactions: Implications for the design of experimental and observational studies
Supervisor: Joana Gonçalves-Sá
Universidade Nova de Lisboa, Portugal - April

ÖZKAYA, Özhan

Dynamics of interbacterial cooperation and cheating
Supervisor: Karina Xavier
Universidade Nova de Lisboa, Portugal - May

PAIS, Inês

Stable and beneficial gut bacteria in *Drosophila melanogaster*
Supervisor: Luís Teixeira
Universidade Nova de Lisboa, Portugal - January

PISKADLO, Ewa

Maintenance of metaphase chromosome architecture by condensin I
Supervisor: Raquel Oliveira
Universidade Nova de Lisboa, Portugal - October

RIBEIRO, Ana

Nrf2 confers disease tolerance to bloodstream infections
Supervisor: Miguel P. Soares
Universidade Nova de Lisboa, Portugal - June

SILVA, Pedro

Quantitative image analysis of cells using morphodynamical models: Sea urchin sperm as case study
Supervisor: Jorge Carneiro
Universidade Nova de Lisboa, Portugal - May

STANKOVIC, Ana

Cell cycle-based mechanism of epigenetic centromere propagation
Supervisor: Lars Jansen
Universidade Nova de Lisboa, Portugal - April

WERNER, Sascha

The role of intraflagellar transport in cilia maintenance
Supervisor: Mónica Bettencourt Dias
Universidade Nova de Lisboa, Portugal - November

Teaching at other PhD Programmes 2017

AMORIM, Maria João

Viruses and the recycling endosome
Advanced course in "Molecular Mechanisms of Disease", PhD Programme, Faculdade de Medicina, Universidade de Coimbra, Portugal - November

BAENA-GONZÁLEZ, Elena

The plasticity of plant development
ITQB Plants for Life PhD programme, Universidade Nova de Lisboa, Portugal - March

BECKER, Jörg

From data generation to biological insights using transcriptomics
ITQB MolBioS PhD Programme, Universidade Nova de Lisboa, Portugal - February

(Epi)genetic basis of sexual reproduction in land plants: A focus on the male gametes
ITQB Plants for Life PhD Programme, Universidade Nova de Lisboa, Portugal - March

BELDADE, Patrícia

Adaptive developmental plasticity: ExE and GxE
Vienna Graduate School of Population Genetics, Austria - April

CARAMALHO, Íris

Cellular and genetic mechanisms of self-tolerance and autoimmunity
BioFIG BioSYS PhD Programme, Faculdade de Ciências da Universidade de Lisboa, Portugal - June

CASTRO, Diogo S.

Neurogenesis in the embryonic vertebrate embryo
GABBA Graduate Program in Areas of Basic and Applied Biology, Universidade do Porto, Portugal - July

CHAOUIYA, Claudine

Logical modelling of signalling and regulatory networks
ITQB MolBioS PhD Programme, Universidade Nova de Lisboa, Portugal - February

Logical modelling of signalling and regulatory networks
ITQB Plants for Life PhD programme, Universidade Nova de Lisboa, Portugal - March

DOMINGOS, Ana I.

Neuroscience camp, Porto Alegre, Brazil - March

Nutrition & Health
Technical University of Munich, Germany - May

Nutrition & Health
Bordeaux Neurocampus, France - September

DUQUE, Paula

An *Arabidopsis* splicing factor regulating tolerance to stress during seed germination
BioFIG BioSYS PhD Programme, Faculdade de Ciências da Universidade de Lisboa, Portugal - January

HOWARD, Jonathan C.

Host-parasite coevolution between *Toxoplasma gondii* an the house mouse
Instituto de Medicina Molecular PhD programme, Universidade de Lisboa, Portugal - December

JANODY, Florence

Model organisms to study cell and developmental biology
GABBA Graduate Program in Areas of Basic and Applied Biology, Universidade do Porto, Portugal - July

MALLO, Moisés

Genetic control of vertebrate axial extension
Developmental Biology module, Instituto de Medicina Molecular PhD programme, Universidade de Lisboa, Portugal - January

MARTINS, Gabriel

Light microscopy
ITQB MolBioS PhD Programme, Universidade Nova de Lisboa, Portugal - January

Mesoscopic imaging
BioFIG BioSYS PhD Programme, Faculdade de Ciências da Universidade de Lisboa, Portugal - July

OLIVEIRA, Raquel A.

Coping with wrong chromosome numbers during development
YIP PhD course, Germany - November

REBELO, Manuel

Biotério e regulamentação para experimentação animal
Programa de Doutoramento em Ciências da Saúde, Faculdade de Medicina da Universidade de Coimbra, Portugal - October

SOARES, Miguel P.

Infection & Disease susceptibility
Advanced Immunology Course, Institut Pasteur, Paris, France - December

SOBRAL, Daniel

RNA-Seq data Analysis
Molecular biology meets bioadhesion research, Innsbruck, Austria - September

TRANFIELD, Erin

Introduction to Electron Microscopy
ITQB MolBioS PhD Programme, Universidade Nova de Lisboa, Portugal - January

XAVIER, Karina B.

Bacterial intercellular communication in the mammalian gut
Programa de Doutoramento em Ciências da Saúde da Faculdade de Medicina da Universidade de Coimbra, Portugal - December

Bacterial Signalling
GABBA Graduate Program in Areas of Basic and Applied Biology, Universidade do Porto, Portugal - May

Bacterial quorum sensing in the mammalian gut microbiota
BioFIG BioSYS PhD Programme, Faculdade de Ciências da Universidade de Lisboa, Portugal - Janeiro

SEMINARS & MEETINGS

Presentations by IGC researchers

71 at National Meetings

192 at International Meetings

Seminars

- **67** Internal seminars
- **99** Seminars by external speakers

33 Meetings, Conferences and Workshops organised by IGC scientists

Seminars at the IGC 2017

January

03.01
Shaping plant growth and development via Snrk1 kinases
Elena Baena
IGC

10.01
Alternative splicing regulation of plant stress responses mediated by the ABA phytohormone
Paula Duque
IGC

13.01
Why study sex by the sea?: Marine organisms and the problem of fertilization and cell cleavage
Michael Dietrich
Dartmouth College, New Hampshire, USA

17.01
Molecular and structural basis of NFKB-dependent transcriptional inhibition by anthracyclines
Luís Ferreira Moita
IGC

18.01
***Drosophila melanogaster* has a stable, beneficial, and host-specific gut microbiota**
Inês Pais
IGC

19.01
Requirement for PLK1 kinase activity in the maintenance of a robust spindle assembly checkpoint
Aisling O'Connor
Centre for Chromosome Biology, National University of Ireland Galway, Ireland

24.01
Dissecting ultimate and proximate mechanisms of *Drosophila* immunity
Élio Sucena
IGC

25.01
Resistants resisting resistance
Roberto Balbontín
IGC

27.01
Dynamic Dps - how bacteria pack their DNA up when the going gets tough
Elio Abbondanzieri
Delft University of Technology, The Netherlands

31.01
Dissecting mitotic chromosome structure by acute protein inactivation
Raquel Oliveira
IGC

February 2017

01.02
Art forms in nature: the impact of biological imagery on modern art
Simon Bill
IGC

03.02
Forces and shapes in the mitotic spindle
Nenad Pavin
Department of Physics, Faculty of Science, University of Zagreb, Croatia

07.02
Blocking necroptosis establishes disease tolerance to infection
Miguel Soares
IGC

07.02
Formin and function in cellular actin assembly
Robert Grosse
Institute of Pharmacology, Faculty of Medicine, University of Marburg, Germany

09.02
Tubulin polyglutamylation determines railway tracks for intraflagellar transport
Philippe Bastin
Department of Parasites & Insect Vectors, Institut Pasteur

10.02
Fertilisation in yeast: how to mate once and only once
Sophie Martin
Department of Fundamental Microbiology, University of Lausanne, Switzerland

13.02
Pathways to chromosomal instability in cancer
Sarah McClelland
Barts Cancer Institute, UK

13.02
***Plasmodium falciparum*: tales of an underglycosylated parasite**
Luis Izquierdo
Barcelona Institute for Global Health

14.02
Fitness landscapes in adaptation and speciation
Claudia Bank
IGC

17.02
Membrane trafficking control by cargo receptors
Manuel Muñiz
University of Seville, Spain

20.02
28 hours later: vaccinia-induced cell motility facilitates virus spread
Jason Mercer
University College London, UK

21.02
The problems of foreign travel: resistance of the house mouse to *Toxoplasma gondii* in Brazil
Jonathan Howard
IGC

24.02
From functional genomics of CFTR traffic to systems biology of cystic fibrosis: finding pathways and therapeutic approaches
Margarida D. Amaral
Faculdade de Ciências da Universidade de Lisboa, Portugal

March 2017

01.03
The other side of the story - how phosphatases control telomere length
José Planells
IGC

03.03
The *Drosophila-Spiroplasma* interaction as a model to dissect the molecular mechanisms underlying insect endosymbiosis
Bruno Lemaitre
Global Health Institute, EPFL

10.03
Revealing the role of Kupffer cells in insulin resistance through next generation sequencing
Myriam Aouadi
Karolinska Institutet, Sweden

14.03
Sympathetic Obesity
Ana Domingos
IGC

14.03
TF-mediated epigenetic (?) memory in ES cells
Pablo Navarro
Institut Pasteur, France

15.03
The fate of the liger: when Simba meets Shere khan
Alexandre Blanckaert
IGC

16.03
Symbiosis and immunity: insights into host-*Wolbachia*-virus trinity
Rupinder Kaur
University of Vienna, Austria

16.03
A tissue-specific, GATA6-driven transcriptional program instructs remodelling of the mature arterial tree
Nicoletta Bobola
University of Manchester, UK

17.03
Period and Pattern in the Embryo
Andrew Oates
University College London, UK

20.03
'The Two Cultures' - Where are we now?
Simon Bill
IGC

21.03
The challenge of predicting fitness and adaptation in evolving organisms
Lília Perfeito
IGC

22.03
Free iron in sera of patients with sickle cell disease contributes to the release of neutrophil extracellular traps
Kristof Van Avondt
Sanquin Research, and Landsteiner Laboratory, AMC

23.03
Mutational effects in cis- and trans-regulatory elements give rise to transgressive expression phenotypes
Jon Bollback
University of Liverpool, UK

24.03
Transposable element evolution in *Drosophila*
Andrea Betancourt
University of Liverpool, UK

29.03
Molecular bases of *Wolbachia*-host interaction
Elves Duarte
IGC

31.03
Investigating the genomic, genetic and development bases of animal diversification
Alistair McGregor
Oxford Brookes University, UK

April 2017

04.04
Modulation of amino acid catabolism drives *E. coli* adaptation to the mouse gut in the absence of inter-species competitors
Karina Xavier
IGC

05.04
New insights into *C. elegans* learning and behaviour using a high-throughput, high resolution machine vision tracker
Catharine Rankin
University of British Columbia, Vancouver, Canada

06.04
Social cognition and collective intelligence in fishes
Alex Jordan
Max Planck Institute, Dept. Collective Behaviour, Konstanz, Germany

06.04
Dissecting epigenetic centromere inheritance
Patrick Heun
Wellcome Centre for Cell Biology, Edinburgh, UK

07.04
The molecular pathways that specify centromeres and contribute to their function and integrity
Daniele Fachinetti
Institut Curie, France

07.04
Stem cells and brain function: an exploration into deriving and identifying "neuronal cell types", and their potential therapeutic uses
Donald Pfaff
Rockefeller University, USA

11.04
Computational modelling to uncover the regulation of cancer cell adhesion
Claudine Chaouiya
IGC

18.04
Connected instability of T-cell regulation and homeostasis in systemic lupus erythematosus
Constantin Fesel
IGC

18.04
Networks of human contacts: from data to applications
Alain Barrat
Centre de Physique Théorique, Marseille, France

19.04
Heme meets glucose - how can ferritin prevent iron-heme from impacting on glucose metabolism?
Ana Rita Carlos
IGC

26.04
How alpha-gal shaped human-microbiota evolution
Sumnima Singh
IGC

May 2017

02.05
Ancestrality and diversification of cilia and centrosomes
Mónica Bettencourt Dias
IGC

05.05
Learning about the roles of selection and demography on population divergence: a genomics perspective
Vítor Sousa
cE3c – Centre for Ecology, Evolution and Environmental Changes, Universidade de Lisboa, Portugal

09.05
Bridging membrane trafficking with complement in the context of influenza A virus infection
Maria João Amorim
IGC

10.05
Why is evolution important in cancer and what mathematics should be used to treat cancer? Focus on drug resistance
Jean Clairambault
MAMBA team, INRIA Paris Research Centre & Jacques-Louis Lions Lab, UPMC, France

10.05
Clostridium joins the inter-species talk
Inês Torcato
IGC

11.05
Breeding system evolution: the significance of adult sex ratio
Tamás Székely
Milner Centre for Evolution, University of Bath, UK

12.05
Towards a mechanistic genotype-phenotype map: proteins and pathways
David A. Liberles
Department of Biology and Center for Computational Genetics and Genomics, Temple University, USA

12.05
Long term information integration: evolution of evolution
Paulien Hogeweg
Bioinformatics group, Utrecht University, The Netherlands

15.05
Nutritional programming of lifespan by FOXO inhibition on sugar-rich diets
Nazif Alic
Institute of Healthy Ageing and Department of Genetics, University College London, UK

16.05
***C. elegans* and *E. coli* experimental adaptation to osmotic stress**
Ivo Chelo
IGC

17.05
The dual role of ZEB1 in glioblastoma cancer stem cells
Pedro Rosmaninho
IGC

18.05
Following evolution after the horizontal transfer of synonymous versions of an antibiotic resistance gene
Stéphanie Bedhomme
Centre d'Ecologie Fonctionnelle et Evolutive Montpellier, France

19.05
The role of peptidoglycan as a signalling molecule in the host
Ivo Boneca
Institute Pasteur, France

19.05
The ribosome as a metabolite sensor: sucrose regulated protein translation and the control of plant metabolism and growth
Sjef Smeekens
Utrecht University, The Netherlands

24.05
Siderophore-mediated cooperation and exploitation in bacteria: from the lab to the field
Rolf Kümmerli
Department of Plant and Microbial Biology, University of Zürich, Switzerland

24.05
Gut-brain glucose signalling in energy homeostasis
Gilles Mithieux
Nutrition Diabète et cerveau, INSERM U1213, Lyon, France

24.05
Thymus autonomy relies on DN3 thymocytes
Rafael Paiva
IGC

26.05
MicroRNAs and the evolution of insect metamorphosis
Xavier Belles
Institute of Evolutionary Biology, Spain

26.05
Heart disease: what goes wrong inside the cell
Elisabeth Ehler
King's College London, UK

June 2017

06.06
Traction forces control PLK4 recruitment to ensure correct centrosome duplication and prevent aneuploidy
Elisa Vitiello
Laboratory of Interdisciplinary Physics, Saint Martin d'Heres, France

06.06
The regulation of vertebrate body formation
Moisés Mallo
IGC

07.06
Do ongoing thymic activities play a role in tumor immune tolerance?
José Santos
IGC

09.06
Virus evolution and the predictability of next year's flu
Richard Neher
Biozentrum, University of Basel, Switzerland

09.06
A story of how cells sense, signal and act upon R-loops
Srchaitanya Sridhara
Instituto de Medicina Molecular, Portugal

12.06
Liquid droplet formation by HP1? Suggests a role for phase separation in heterochromatin
Adam G. Larson
University of California, San Francisco, USA

13.06
Cerebral malaria pathogenesis: an interfering role for the brain endothelium
Carlos Penha Gonçalves
IGC

16.06
ER stress signalling in development of obesity and type 2 diabetes
Umut Ozcan
Harvard Medical School, Division of Endocrinology, USA

19.06
Linking senescence and inflammation: the senescence-associated secretory phenotype (SASP)
Jesús Gil
MRC London Institute of Medical Sciences, UK

21.06
Screening for novel factors affecting cell cycle stability of CENP-A nucleosomes in human centromeres
Sreyoshi Mitra
IGC

23.06
Linear ubiquitin chains go viral
Brian Ferguson
Division of Immunology Department of Pathology, University of Cambridge, UK

27.06
Telomere shortening increases the incidence of cancer in a non-cell autonomous manner
Miguel Godinho Ferreira
IGC

28.06
Signal integration in quorum sensing: how your

neighbours' craziness can make you go crazy!
André Carvalho
IGC

29.06
Tech Minutiae Seminar: Primeflow RNA assay - an approach to detect rna and protein simultaneously by flow cytometry
Neus Romo
LabClinics Field Application Scientist

30.06
Epigenetic reprogramming in mammalian development
Wolf Reik
The Babraham Institute, UK

July 2017

04.07
RNA degradation by the plant RNA exosome involves both phosphorolytic and hydrolytic activities
Natalia Sikorska
University of Strasbourg, France

04.07
Neurocysticercosis: a neglected neglected tropical disease
Michael Parkhouse
IGC

05.07
When the centrosome and the nucleus break up: nucleus-independent spatial patterning in the syncytial embryo!
Jorge Carvalho
IGC

07.07
Exploring the functional specificity of cohesin variant complexes
Ana Losada
Chromosome Dynamics Group, Spanish National Cancer Research Centre (CNIO), Spain

07.07
Molecular architecture of the epithelial apical junctional complex studied by quantitative proximity proteomics and electron microscopy imaging
Alexander Ludwig
School of Biological Sciences, Nanyang Technological University, Singapore

11.07
Thymic involution, friend or foe
Jocelyne Demengeot
IGC

12.07
Timing is everything: centrosomes & cancer
Carla Lopes
IGC

14.07
Immunometabolic regulation of aging
Vishwa Deep Dixit Yale School of Medicine, USA

18.07
Better than your eyes
Jorge Carneiro
IGC

19.07
De novo ganglion cell genesis by targeted expression of KLF4 in retinal progenitors with restricted neurogenic potential
Mariana Silveira
Instituto de Biofísica Carlos Chagas Filho, Instituto de Ciências Biomédicas, UFRJ, Brasil

19.07
What is the timescale of evolution?
Diogo Santos
IGC

21.07
Cell stress at the edge of inflammation and tumorigenesis – the microbial twist
Dirk Haller
School of Life Sciences Weihenstephan of the Technical University of Munich ZIEL – Institute for Food & Health

24.07
Visual Perception: An interdisciplinary field
Simon Bill
IGC

25.07
Microbial interactions in co-colonization: diversity, stability and perturbations
Erida Gjini
IGC

26.07
Unchanged for one billion years - role of pericentriolar matrix in centriole biogenesis
Daisuke Ito
IGC

27.07
The cradle of thymopoiesis: single cell characterisation of thymopoiesis initiating progenitors in the mouse embryo
Tiago C. Luis
John Radcliffe Hospital, University of Oxford, UK

28.07
Metabolic and hormonal regulation of *Drosophila* neural stem cell fate
Catarina Homem
CEDOC - Chronic Diseases Research Centre |Nova Medical School, Portugal

September 2017

05.09
Natural selection in gut microbiota: a place where Fisher, Muller, Metchnikoff and McClintock may meet
Isabel Gordo
IGC

05.09
Developmental dysfunction of VIP interneurons impairs cortical circuits
Renata Batista-Brito
Yale School of Medicine, USA

08.09
Coexistence: the ecology and evolution of tropical biodiversity
Jan Sapp
York University, Canada

12.09
Wolbakian - *Drosophila-Wolbachia* interactions at the molecular level
Luis Teixeira
IGC

12.09
The sound of one wing flapping: the ciliated mechanoreceptors of *Drosophila* hearing
Daniel Eberl
University of Iowa, USA

12.09
How old are you: what's your gut feeling?
Mounir El Mai
IGC

14.09
A computer- and pipette-assisted excursion into and perspective on the population and evolutionary dynamics of lytic and temperate bacteriophage
Bruce Levin
Emory University, USA

15.09
Antibiotics as life style drugs: the joint action of antibiotics and the immune system in the treatment of acute, normally self-limiting bacterial infections
Bruce Levin
Emory University, USA

19.09
Thymus autonomy and Leukemogenesis
Vera Martins
IGC

20.09
Subjective evaluations of stimuli: impact on stress response
Felipe Espigares
IGC

21.09
Design principles of adaptive immune systems
Thomas Boehm
Max Planck Institute of Immunobiology and Epigenetics, Freiburg, Germany

22.09
NETs – the second function of chromatin
Arturo Zyclinsky
Max Planck Institute for Infection Biology, Berlin, Germany

22.09
Lipidomics and initiation of infection and inflammation
Edward A. Dennis
University of California at San Diego, La Jolla, USA

22.09
Mechanisms of herpes simplex virus cell-to-cell spread
Colin Crump
University of Cambridge, UK

25.09
The peroxisomal matrix protein import machinery
Jorge Azevedo
I3S, Portugal

26.09
Why some zebrafish get more stressed than others, and why do they care about others? Two chronicles from a fish lab
Rui Oliveira
IGC

29.09
***Drosophila* as a model for cancer**
Cayetano González
Institute for Research in Biomedicine, Spain

October 2017

02.10
Cilia assembly and transport
Gaia Pigino
Max Planck Institute of Molecular Cell Biology and Genetics, Germany

03.10
iRhoms: novel physiological roles and trafficking regulators
Colin Adrain
IGC

04.10
Centriole abnormalities and cancer: the chicken-and-egg paradox
Gaëlle Marteil
IGC

10.10
A decade of sperm cell (epi) genomics – from bulk to single cells
Jörg Dieter Becker
IGC

11.10
The role of the chloroplast as a plant growth regulator
Guiomar Martin
IGC

12.10
Cell competition between normal and transformed epithelial cells in mammals
Yasuyuki Fujita
Institute for Genetic Medicine, Japan

13.10
Evolution of resistance under weak or no antibiotic

selection
Dan Andersson
Uppsala University, Sweden

17.10
RNA surveillance in vertebrate cells, an overview
Alekos Athanasiadis
IGC

19.10
Genome organisation by condensin complexes
Christian Haering
EMBL, Germany

19.10
Biophysical properties of chromosomes
Sarah Cuylen-Haering
EMBL, Germany

19.10
Rest now to be active later: adult neural stem cells return to quiescence
Noelia Urban
Francis Crick Institute, UK

20.10
Can eukaryotes distinguish chromosomal (self) and non-chromosomal (non-self) DNA from each other?
Yves Barral
ETH, Switzerland

20.10
A conserved role for reactive oxygen species during early embryonic development and appendage regeneration
Enrique Amaya
University of Manchester, UK

24.10
Trying to put science into policy
Joana Gonçalves-Sá
IGC

25.10
Dendritic cells as orchestrators of immunity and resilience
David Sancho Madrid
CNIC- Fundación Centro Nacional de Investigaciones Cardiovasculares Carlos III, Spain

25.10
Zygotic chromatin assembly at fertilisation
Paulo Navarro-Costa
IGC

31.10
City-wide and social media analysis of drug-drug-interactions: towards understanding the multi-level complexity of human health
Luís Rocha
IGC

November 2017

02.11
Bringing research back to the 21st century: open source and open access as solutions to current academic shortcomings
André Maia Chagas
Werner Reichardt Centre for Integrative Neuroscience, Tubingen University; Co-Founder: Prometheus Science; Creator of Openeuroscience

02.11
A logical model of early steps of metastasis process in colon cancer
Laurence Calzone
Institut Curie, France

02.11
Systems level analysis of drug resistance and metastasis in breast cancer
Özgür Şahin
Bilkent University-Ankara, Turkey

02.11
Mesenchymal-epithelial transition generates cells with novel phenotypic and expression signatures
Patrícia Oliveira
I3S, Portugal

03.11
The genetic landscape underlying T cell development in zebrafish
Thomas Boehm
Max Planck Institute of Immunobiology and Epigenetics, Freiburg, Germany

06.11
Novel therapeutics for the treatment of obesity and diabetes
Timo Müller
Institute for Diabetes and Obesity, Germany

07.11
Cytoskeletal deregulation is sufficient to promote cellular transformation
Florence Janody
IGC

08.11
"Talk your way into it": enhancing bacterial signalling to mediate recovery of gut microbiota functions
Ana Rita Oliveira
IGC

10.11
Can 'immunological surgery' change clinical practice in cancer care?
Markus Maeurer
Karolinska Institutet, Sweden

13.11
New mechanisms for the control of flagellum length in Trypanosomes
Philippe Bastin
Institute Pasteur, France

14.11
Human spermatozoa with a twist
Johanna Höög
Department of Chemistry and Molecular Biology, University of Gothenburg, Sweden

14.11
Centrosomes and cilia in human brain development and cancer
Jay Gopalakrishnan
Laboratory for Centrosome and Cytoskeleton Biology, University of Cologne

16.11
Diversity and response in immune repertoires
Aleksandra Walczak
Laboratoire de Physique Théorique Ecole Normale Supérieure, France

16.11
Stimulating proteasome activity for the treatment of age-related neuro-degenerative diseases
Hermann Steller
The Rockefeller University, USA

16.11
Optimal immune systems
Thierry Mora
Laboratoire de Physique Théorique Ecole Normale Supérieure, France

17.11
How an organelle gets into shape
Tom A. Rapoport
Harvard Medical School, USA

21.11
Sympathetic Neuroimmunity for Obesity
Ana Domingos
IGC

22.11
Dissecting the function of centriolar satellites as key regulators of the centrosome/cilium complex
Elif Nur Firat Karalar
Department of Molecular Biology and Gentics, Koç University, Turkey

22.11
Compensatory evolution in the mammalian gut: which paths towards a higher fitness are taken by resistant bacteria?
Luis Cardoso
IGC

23.11
Dissecting the effect of stress on brain and behavior using zebrafish
Soojin Ryu
German Resilience Center & Focus Program Translational Neuroscience (FTN), Germany

23.11
Spatiotemporal proteomics analysis of the centrosome proteome
Jens S. Andersen
Department of Biochemistry and Molecular Biology, University of Southern Denmark, Denmark

24.11
Neural circuits for feeding, hunting and aggression
Ivan Araújo
Yale University School of Medicine, USA

27.11
Control of plant growth and development by the light environment
Ute Höcker
Botanical Institute, Cologne, Germany

28.11
Partitioning phenotypic variation in genetic and environmental components
Patrícia Beldade
IGC

29.11
Telomeres as a "chromatin privileged region"
Edison Carvalho
IGC

December 2017

05.12
On SINS and dolphins
Lounes Chikhi
IGC

06.12
Can condensin from budding yeast function in fruit fly embryos?
Ewa Piskadlo
IGC

13.12
"Guys we are getting late!": induction of a development delay in *Drosophila* by *Pectobacterium* is mediated by quorum sensing
Filipe Vieira
IGC

15.12
Innovation in photonic imaging for high-content analyses in biological systems
Spencer Shorte
Institute Pasteur, France

18.12
Unobserved heterogeneity in demography, epidemiology, ecology, and microbiology…
Gabriela Gomes
Liverpool School of Tropical Medicine, UK, and Centro de Investigação em Biodiversidade e Recursos Genéticos, Universidade do Porto, Portugal

20.12
The impact of partial cohesion loss in chromosome fidelity
Sara Carvalhal
IGC

Meetings, Conferences & Workshops 2017

MONTHLY

ITQB-IGC Plant Interaction Meetings

Monthly meetings for the plant scientists working in different institutes in the Oeiras Campus.
Organisers: Ana Confraria (IGC) and Tiago Lourenço (ITQB)
Oeiras, Portugal

January

JANUARY 23-27

TReND-Nigeria Molecular Biology Workshop

The course with 25 participants comprised theoretical and practical classes aiming to provide a robust introduction to molecular biology and gene editing techniques (e.g. cloning, CRISPR, DNA, RNA and protein methods). The course also included a Science Policy Lecture supported by the European Molecular Biology Organization.
Organisers: Concetta Valerio, Ibukun Akinrinade, Dora Szakonyi, Colin Adrain (IGC)
Sponsors: EMBO, Company of Biologists, Open Plant Fund, NZYTech, NeuroMagendie Institute, Crowdfunding
Bingham University, Abuja, Nigeria

JANUARY

Microworkshop on IMAGEJ/FIJI Micro-Workshop in Image Processing and Analysis

UIC: Advanced Imaging users were trained in basics of processing and analysis of microscopy images.
Organisers: Nuno Martins and Hugo Pereira (IGC)
Sponsor: IGC
IGC, Oeiras, Portugal

February

FEBRUARY 12-15

NEUBIAS Training School for Early Career Investigators TS2

Introduction to image analysis techniques and automation with open-source software toolboxes.
Organisers: Gabriel Martins, Pedro Fernandes, Nuno Martins, Hugo Pereira (IGC)
Sponsors: COST, IGC
IGC, Oeiras, Portugal

FEBRUARY 12-15

NEUBIAS Training School for Bioimage Analysts TS3

Image analysis workflow construction.
Organisers: Gabriel Martins (IGC), Kota Miura (CMCI - EMBL), Jean-Yves Tinevez (Institut Pasteur)
Sponsors: COST, IGC
IGC, Oeiras, Portugal

FEBRUARY 15-17

NEUBIAS 2020 Symposium

Meeting dedicated to image analysis, gathered more than 220 participants and most experts in the field who engaged in fruitful networking activities between the field of computer science and Bioimaging.
Co-organiser: Gabriel Martins (IGC)
Sponsors: 17 open-source software partners, COST, FCT/IGC and commercial partners: GE, Acquifer, Arivis, Zeiss, Birtplane, Leica and SVI.
FCG, Lisbon, Portugal

March

MARCH 16

Annual NEUINF Meeting

The annual scientific meeting of the transnational collaborative project: "Master regulators of neuroinflammation in parasitic brain infections" was held at IGC and attended by principal investigators and postdocs of the five partners including the project coordinator, Martin Rottenberg. The participants presented and discussed their progresses and achievements during the second year of the project. At the end, each partner proposed their goals for the third and last year of the project.
Organisers: Carlos Penha-Gonçalves and Teresa F. Pais (IGC), ERA-NET NEURON
IGC, Oeiras, Portugal

May

MAY 19-20

XXII Meeting of the Portuguese Society of Animal Pathology

Co-organiser: Pedro Faísca (IGC)
ICBAS/UP, Porto, Portugal

MAY 24

Cytometry Data Analysis in FLOWJO V10 Workshop

The Cytometry Data Analysis in FlowJo v10 was an exceptional training seminar given by Christoph Freier, application scientist with FlowJo, in which 70 participants had learnt the basics and more advanced tools of this flow cytometry analysis software.
Organisers: IGC Flow Cytometry Facility
IGC, Oeiras, Portugal

MAY 29-31

Electron Microscopy Course

A 3-day course, hosted in conjunction with INSA to introduce participants to electron microscopy sample preparation, including room temperature preparation and cryo preparation.
Organisers: Luísa Jordão (INSA) and Erin Tranfield (IGC)
Sponsors: Leica, FEI, Linde, Delta, Paralab
INSA, Lisboa and IGC, Oeiras, Portugal

MAY 31 - JUNE 4

TOXO-14 | The 14th Biennial Conference of the *Toxoplasma gondii* Research Community

TOXO-14 brought the community of scientists interested in *Toxoplasma gondii* together (more than 200 attendees).
Co-organiser: Jonathan Howard (IGC)
Sponsor: Fundação Calouste Gulbenkian
Tomar, Portugal

June

JUNE 4-9

18th International Congress of Comparative Endocrinology

Co-organiser: Christen Mirth
Lake Louise, Canada

JUNE 5-9

Methods in Integrative Biology

Modern biology poses complex problems that can only be technically addressed by multidisciplinary approaches and a high level of specialisation. This is the genesis of core facilities and scientific services, serving as accelerators for research by providing some technical abstraction and standardising applications. This workshop aimed to give to PhD students, early postdocs, and technicians a general overview of the current technical approaches in modern biology, including hands-on in the labs. It also raised awareness of the services available.
Organisers: Nuno Moreno and Jörg Becker (IGC)
Sponsors: Hamamatsu, Leica, Ibidi, VWR, Fisher, Agilent, Taper
IGC, Oeiras, Portugal

JUNE 29

Primeflow RNA ASSAY - An Approach to Detect RNA and Protein Simultaneously by Flow Cytometry

In this technical seminar (included in the Tech Minutiae® series), Neus Romo, application scientist with LabClinics, presented a recent technology allowing the simultaneous assessment of RNA, miRNA and/or protein expression in individual cells by Flow Cytometry.
Organisers: IGC Flow Cytometry Facility
IGC, Oeiras, Portugal

July

JULY

IMAGEJ/FIJI Micro-Workshop "From Workflows to Macros"

UIC: Advanced Imaging power users were trained in basics of scripting (macros) for analysis in ImageJ.
Organisers: Nuno Martins and Hugo Pereira (IGC)
Sponsor: IGC
IGC, Oeiras, Portugal

JULY 9-21

Host-Microbe Symbioses: From Functional To Ecological Perspectives

The course covered the subject from complementary perspectives: from the host and the microbe perspective, from a functional, ecological, or evolutionary approach, looking at microbes as pathogens or mutualists, and as one-to-one interactions or complex multi-organisms consortiums. Partic-

ipants were exposed to leaders in the field with different expertise and experience in studying symbiosis from all these different angles. Ecology was discussed from lecturers applying it to study host and symbionts but also from a fundamental point of view, unbiased from current host-microbe research. The course consisted of general lectures, research seminars and development of a research grant proposal. Thirty-four students and 18 lecturers participated in this course.
Organisers: Luis Teixeira, Karina Xavier (IGC), Martin Blaser (NYU), Margaret McFall-Ngai (University of Hawaii)
Sponsors: Fundação Calouste Gulbenkian, Volkswagenstiftung, Wissenschatkolleg zu Berlin
IGC, Oeiras, Portugal

JULY 30 - AUGUST 4

Behaviour2017

Joint Meeting of the 35th International Ethological Conference and the ASAB (Association for the Study of Animal Behaviour) Summer Meeting 2017. Total of 956 attendees.
Organisers: Rui Oliveira (Chair of the Local Organising Committee)
Sponsors: ASAB, Cascais City Hall, ISPA, Champalimaud Foundation, Noldus, Zantikis, OUP, Springer
Estoril Congress Center, Estoril, Portugal

August

AUGUST 24-26

Australian Fly Meeting

Co-organiser: Christen Mirth (IGC)
Sponsors: Pathtech, IDT, Biological Sciences, BestGene, Leica
Warburton, Australia

September

SEPTEMBER 8-9

Drostuga 2017 – Annual Portuguese *Drosophila* Meeting

This meeting brought together 104 participants, and had 3 Keynote speakers - Irene Miguel-Aliaga (Imperial College London), Claudio E. Sunkel (IBMC) and Pavel Tomancak (MPI Dresden). The meeting had 18 short talks and 41 posters.
Organisers: Ivo Telley (IGC), Eurico Morais-de-Sá (I3S), Eduardo Moreno (Champalimaud Research), Rui Martinho (Universidade do Algarve)
Sponsors: The Company of Biologists, Bestgene, Izasa Scientific, Leica Microsystems, FEBS Journal, LabOrders, Cidade de Tomar, Instituto Politécnico de Tomar
Hotel dos Templários, Tomar, Portugal

SEPTEMBER 11-14

NEUBIAS Training School for Early Career Investigators

Introduction to image analysis techniques and automation with open-source software toolboxes.
Organisers: Nuno Martins (IGC), Carolina Wahlby (Uppsala University)
Sponsors: COST, University of Gothenburgh
University of Gothenburg, Gothenburg, Sweden

SEPTEMBER 17 – 21

EMBO Workshop on DNA Topoisomerases and DNA Topology

Organisers: Caroline Austin (Newcastle University), Andrzej Stasiak (University of Lausanne), Jorge Bernardo Schvartzman (Centro de Investigaciones Biológicas), Anna Helene Bizard (University of Copenhagen), Raquel Oliveira (IGC)
Sponsors: EMBO, SKMB, The Company of Biologists
Les Diablerets, Switzerland

SEPTEMBER 25

BIODATA.PT Kickstart Meeting

A presentation of the major goals of the infrastructure was presented to all the institutions involved in BioData.pt, as well as other major stockholders.
Organisers: Daniel Sobral, José Pereira Leal (IGC), Ana Maya (FCG)
Fundação Calouste Gulbenkian, Lisbon, Portugal

SEPTEMBER 27-28

IGC Symposium 2017: Plant RNA Biology

International scientific symposium with around 75 participants. The meeting, covering major research areas of plant RNA biology including RNA processing, degradation and structure as well as small and long non-coding RNAs, was organised by IGC postdocs and gathered 69 participants from Europe (UK, Germany, France, Denmark, Hungary, Poland, Czech Republic, Portugal, Spain, Netherlands, Austria, Switzerland, Italy), the USA, South Korea, Taiwan and Israel;
Organisers: Concetta Valerio, Ana Confraria, Dora Szakonyi (IGC)
Main sponsors: IGC, EMBO, Company of Biologists, Oeiras City Hall, Enzifarma, Aralab
Other sponsors/support: The FEBS Journal, Solitica, Tebu-bio, STAB VIDA
IGC, Oeiras, Portugal

October

OCTOBER 16-19

IGC Practical Course on Animal Handling and Experimentation in Mice and Zebrafish

Under the scope of Laboratory Animal Science courses, this course fulfills a legal requirement for researchers and technicians working with laboratory animals. Following the recent recommendations FELASA 2015, enrollment in species-specific modules was possible. In addition, contents were harmonised with other courses provided within the frame of CONGENTO Infrastructure. The number of attendees was 30. The theoretical part of the course was done through an e-learning system provided by the Sociedade Portuguesa de Ciências de Animais de Laboratório - SPCAL.
Organiser: Animal House Facility, IGC
Sponsors: IGC, Ultragene, Grupo Taper
IGC, Oeiras, Portugal

OCTOBER 16-20

1st FLxflow Course: Principles and Applications of Flow Cytometry

The 1st FLxFlow Course: Principles and Applications of Flow Cytometry received more than 109 attendees from academic and non-academic institutions of Portugal and all across Europe who had benefited from more than 20 hours of theoretical talks, workshops, technical seminars and a whole day of hands-on practice, covering basic to advanced topics of Flow Cytometry. Faculty included two highly recognised speakers in the field, Derek Davies from the Francis Crick Institute in London, UK, and Tim Bushnell, from the University of Rochester Medical Center, USA, in addition to other national and international speakers and the organisers. The course had two social events to promote informal discussions amongst participants and the speakers and to facilitate networking.
Organisers: FLxFlow network (comprised by the Flow Cytometry facilities from IGC, IMM, Champalimaud Foundation and CEDOC)
Sponsors: Enzifarma/BD Biosciences, Beckman Coulter, Cirklo, FlowJo, Grupo Taper/BioLegend, LabClinics, Miltenyi Biotec, SYSMEX
Instituto de Medicina Molecular, Lisbon, Portugal

OCTOBER 22-25

JEDI Meeting

Conference series that brings together Principal Investigators who have some interest in the study of *Drosophila*, and who run their starting or consolidating research group within Europe.
Co-organiser: Raquel Oliveira (IGC)
Sponsor: EMBO
Porto Conte, Sardinia, Italy

OCTOBER 23-27

ELIXIR-EXCELERATE Workshop On Genome Assembly And Annotation

This was a practical course aimed at researchers interested in learning more about genome assembly and annotation.
Organisers: Daniel Sobral, Pedro Fernandes (IGC), Henrik Lanz (NBIS, Uppala University)
IGC, Oeiras, Portugal

November

NOVEMBER

II Graduate Programme Science for Development (PGCD) PhD Students Meeting

With a Round Table on "Reducing Brain Drain in Africa"
Organisers: Joana Gonçalves-Sá, Patrícia Beldade (IGC), Sara Baptista and Yara Rodrigues (PGCD students)
Vimeiro, Portugal

NOVEMBER 17-21

EMBO Proteostasis Workshop

This first EMBO workshop on Proteostasis was attended by ca. 140 attendees, most of which were international. The meeting covered a range of topics including: Protein Folding, Chaperones and Quality Control; Regulation of Proteostasis; ER Associated Protein Degradation; Ubiquitination/Aging; Proteostasis in Neurodegenerative and Other Disorders; Proteostasis in Inflammation and Disease.
Organisers: Pedro Domingos (ITQB), Colin Adrain (IGC)
Sponsors: EMBO. Supported by IGC and ITQB.
Ericeira, Portugal

NOVEMBER 30

Social Media Workshop @ IGC

This one day workshop was designed to introduce IGC researchers to social media and help them identify the best channels to promote their work,

connect with other scientists and be an active communicator, voicing their opinions on scientific issues that might matter to society.
Twenty researchers attended the workshop.
Organiser: Inês Domingues (IGC)
IGC, Oeiras, Portugal

December

DECEMBER 11-12

European Pathosurveillance Network Meeting

Organiser: Pedro Faísca (IGC)
Instituto Politécnico de Viseu, Portugal

DECEMBER 12-14

Methods in Integrative Biology II

Organiser: Pedro Faísca (IGC)
IGC, Oeiras, Portugal

DECEMBER 21

Mini-Symposium: "A Decade Integrating Biology (in) Research and Training: 10 Years of MSc in Evolutionary and Developmental Biology"

This mini-symposium aimed at promoting interactions among students, teachers and researchers. Opportunities and challenges in Evolutionary and Developmental Biology research were discussed, focusing on the science that EDB Masters students are undertaking, acknowledging their career paths over the past decade (120 participants).
Organiser: Élio Sucena (IGC)
Co-organisers: Gabriela Rodrigues, Manuela Coelho, Sara Magalhães, Solveig Thorsteinsdottir, Vítor Sousa (FCUL)
Sponsors: APBE, SPBD, FCUL
Faculdade de Ciências da Universidade de Lisboa, Lisbon, Portugal

Presentations by IGC Researchers 2017

At INTERNATIONAL Meetings and Seminars

ADRAIN, Colin

Control of ADAM metalloprotease signalling
School of Immunology/Biochemistry, Trinity College, Dublin, Ireland - March

iRhoms: key regulators of inflammation, growth factor signalling, and metabolism
Department of Genetics, Trinity College, Dublin, Ireland - April

Regulation of the ADAM17 pathway during inflammation, growth factor signalling and metabolism
Centre for Cancer Research & Cell Biology, Queen's University Belfast, Northern Ireland, UK - May

AMORIM, Maria João

Modulation of DAF and CD59 by influenza A viruses
Influenza Update meeting, University of Roslin, Edinburgh, UK - November

ATHANASIADIS, Alekos

Nucleic acids recognition by the vertebrate innate immune system
CEITEC, Brno, Czech Republic - February

BAENA-GONZÁLEZ, Elena

University of Leuven (KU Leuven), Leuven, Belgium - June

SEB meeting, Gothenburg, Sweden - July

Max Planck Institute for Molecular Plant Physiology, Golm, Germany - October

BANK, Claudia

Sounds of silence - the fitness landscape of synonymous mutations
Workshop Co-evolution, Fitness landscapes and Epistasis, Paris, France - March

Genetic incompatibilities in the presence of gene flow
Genetics of Migration, Plön, Germany - April

Evolutionary rescue from mutational meltdown
SMBE 2017, Austin, Texas, USA - July

Fitness landscapes and the predictability of evolution
GRC Microbial Population Biology, Andover, New Hampshire, USA - July

Fitness landscapes and the predictability of evolution
Carleton University, Ottawa, Canada - July

Fitness landscapes and the predictability of evolution
University of Ottawa, Ottawa, Canada - July

Fitness landscapes and the predictability of evolution
Kavli Institute for Theoretical Physics, Santa Barbara, USA - August

Fitness landscapes and the predictability of evolution
UC Merced, California, USA - August

BELDADE, Patrícia

Genetic basis of variation in developmental plasticity
TULIP 2017, France - April

Eco-Evo-Devo: shaping phenotypic variation and diversity
"Women in Evolution", part of the Seminars of the Barcelona Biomedical Research Park, Barcelona, Spain - May

Adaptive developmental plasticity: ExE and GxE in insect body size and pigmentation
French Annual Congress of Population Genetics and Evolution, "Petit Poids Deridés", France - June

BETTENCOURT DIAS, Mónica

Diversity of ciliary bases
Keystone Cilia Meeting, USA - February

Centrosomes in Development, Evolution and Disease

Stowers Institute, Kansas, USA - March

Centrosome Biogenesis, Right Time, Right Place, Right Number
Cold Spring Harbor Symposia, USA - June

Centrosomes and Cancer
11th International PhD Student Cancer Conference (IPSCC), Berlin, Germany - June

Diversity of the ciliary base
Gordon Conference on Motile and Contractile Systems, USA - July

Centrosome Biogenesis, Right Time, Right Place, Right Number
Roscoff Cell Cycle Meeting - September

Centrosome Biogenesis, Right Time, Right Place, Right Number
EMBO Centrosome meeting - September

Centrosomes in Development, Evolution and Disease
Three Spanish societies - October

BLANCKAERT, Alexandre

The resolution of genetic incompatibility in a hybrid population
MMEE 2017, London, UK - July

The resolution of genetic incompatibility in a hybrid population
XII International Symposium on Littorinid Biology and Evolution, Sweden - August

The intricate dynamics of hybrid speciation
Seminar Population Genetics, University of Vienna, Vienna, Austria - October

BOM, Joana

An innovative and sustained strategy for mouse gnotobiology experimentation: combined use of isolators and IVC system
The joint Congress of the 19th International Symposium on Gnotobiology, the 50th Congress of Japanese Association of Germfree Life and Gnotobiology and the 39th Congress of the Society for Microbial Ecology and Disease, Tokyo, Japan - June

BONUCCI, Sara

***Arabidopsis thaliana*: Ultrastructural Preservation for Electron Microscopy**
MMC2017, Manchester, UK - July

BORGES, Ana Cristina

Implementation of a zebrafish health program contributes to better husbandry practices
Aquaculture America 2017, San Antonio, USA - February

CARDOSO, Sara

Plastic sex roles in the peacock blenny, *Salaria pavo*: a transcriptomic perspective
Evolution of Sex Roles Workshop, Tihany, Hungary - April

Alternative reproductive tactics and sex role reversal in the peacock blenny *Salaria pavo*, a transcriptomic analysis
Behaviour2017 - Joint Meeting of the 35th International Ethological Conference and the Association for the Study of Animal Behaviour Summer Meeting 2017, Estoril, Portugal - August

CARVALHO, Jorge

Nucleus-independent spatial patterning in the syncytial embryo
3rd International Symposium on Mechanobiology, National University of Singapore, Singapore - December

CASTRO, Diogo S.

Transcriptional control of vertebrate neurogenesis by the proneural factor Ascl1/Mash1
Department of Experimental and Health Sciences, Universitat Pompeu Fabra, Barcelona, Spain - January

Transcriptional control of vertebrate neurogenesis by the proneural factor Ascl1/Mash1
Institut de Biologie de l'École Normale Superieure, Paris, France - November

CHAOUIYA, Claudine

Qualitative dynamical modelling of (multi-) cellular networks
COMPSYSBIO 2017, Advanced Lecture Course on Computational Systems Biology, Aussois, France - March

Reversed dynamics to uncover basins of attraction of asynchronous logical models
SysMod track session (computational modelling of biological systems) of the ISMB/ECCB conference, Praga, Czech Republic - July

Standards for logical models: current status of SBML qual & SED-ML
4th CoLoMoTo meeting, IBENS, Ecole Normale Supérieure, Paris, France - July

A logical model of cancer cell adhesion properties in the context of Epithelial-Mesenchymal Transition
Workshop WS4, Logical modelling of biological regulatory networks, BC^2 Conference, Basel, Switzerland - September

Standardisation effort from the Consortium for Logical Models and Tools (CoLoMoTo)
COMBINE "Computational Modeling in Biology" Network Meeting, Milan, Italy - October

Methodological advances to tackle biological questions through logical modelling
Workshop "Computational approaches for the study of blood cell specification", IBENS, Ecole Normale Supérieure, Paris, France - October

Prolifération, différenciation, mort cellulaire? Comprendre le destin des cellules en modélisant leurs réseaux moléculaires
11ème Colloque sur la Modélisation des Systèmes Réactifs, Marseille, France - November

CHELO, Ivo M.

Experimental adaptation of *E. coli* to a complex and structured environment
Congress of the European Society for Evolutionary Biology, Groningen, The Netherlands - August

CHIKHI, Lounès

On the importance of being structured: How should we interpret genomic data from habitat fragmentation in Madagascar to recent human evolution
University of Vienna, Vienna, Austria - January

Population and Conservation Genetics, Research carried out at the IGC
University of Vienna, Vienna, Austria - January

The IICR (inverse instantaneous coalescence rate) as a summary of genomic diversity: insights into demographic inference and model choice
Population Biology and Genetics Meeting, Orsay University, France - June

This is *not* the title of my talk: On the importance of being structured: How should we interpret genomic data (from habitat fragmentation in Madagascar to recent human demographic history)
Danau Girang Field Centre, University of Sabah, Malaysia - July

Demographic inference in structured populations
Ferrara University, Italy - September

CORREIA, Rion

Assessing DDI relevance using large databases spanning from social media to published literature
14th European ISSX Meeting, International Society for the Study of Xenobiotics, Cologne, Germany - June

Public health monitoring of drug interactions, patient cohorts, and behavioural outcomes via network analysis using multi-source user timelines
The Conference on Complex Systems, Cancun, Mexico - September

DOMINGOS, Ana I.

Sympathetic Neuroimmunity for Obesity
University of Michigan, Ann Arbor, USA - January

Sympathetic Neuroimmunity for Obesity
EMBO Immunology Sectorial, Italy - February

Neurons and Obesity
Neuroscience camp, Porto Alegre, Brazil - March

Neuroimmunity for Obesity
Hospedale St Matteo, Milan, Italy - April

Sympathetic Neuroimmunity for Obesity
Festival of Neuroscience / British Neuroscience Association, Birmingham, UK - April

Sympathetic Neuroimmunity for Obesity
TUM, Munich, Germany - May

Sympathetic Neuroimmunity for Obesity
EU-LIFE Meeting, Berlin, Germany - May

Sympathetic Neuroimmunity for Obesity
24th European Congress on Obesity, Porto, Portugal - May

Sympathetic Neuroimmunity for Obesity
Karolinska Intituet, Stockholm, Sweden - June

Sympathetic Neuroimmunity for Obesity
Oxford University, UK - June

Sympathetic Neuroimmunity for Obesity
IMP, Vienna, Austria - June

Sympathetic Neuroimmunity for Obesity
MRC Imperial College, London, UK - August

Sympathetic Neuroimmunity for Obesity
Immunometabolism Nature Medicine Meeting, Fiji - August

Sympathetic Neuroimmunity for Obesity
University of Bordeaux, France - September

Sympathetic Neuroimmunity for Obesity
Immunogenetics 2017, Alabama, USA - October

Sympathetic Neuroimmunity for Obesity
Macrophage Symposium, VIB, Belgium - October

DUQUE, Paula

Alternative splicing control of ABA-mediated stress responses during early plant development
IGC Symposium 2017: Plant RNA Biology, Oeiras, Portugal - September

Alternative splicing control of plant responses to environmental stress
International Centre for Genetic Engineering and Biotechnology, Italy - October

Alternative splicing control of plant stress tolerance
EMBO Members' Meeting 2017, Germany - October

ESPIGARES, Felipe

Cognitive bias and cellular aging: impact of stress perception on telomere length
Behaviour2017 - Joint Meeting of the 35th International Ethological Conference and the Association for the Study of Animal Behaviour Summer Meeting 2017, Estoril, Portugal - August

FERREIRA, Miguel Godinho

Non-cell autonomous effects of telomere shortening in cancer and ageing
Telomere and Telomerase Meeting, CSHL, USA - May

Non-cell autonomous effects of telomere shortening in cancer and ageing
2nd Molecular Biology of Ageing Meeting, Groningen, The Netherlands - October

Non-cell autonomous effects of telomere shortening in cancer and ageing
Università degli Studi di Milano, Italy - November

Activation of the Akt/Foxo pathway switches apoptosis to senescence in tert-/- zebrafish
Telomeres in Health, Aging and Disease workshop, Faculdade de Medicina de Botucatu, UNESP, São Paulo, Brasil - December

FRAGATA, Inês

Sounds of Silence: the fitness landscapes of synonymous mutations
MMEE 2017, London, UK - July

Deciphering the expression-fitness landscape across genes and environments
ESEB 2017, Groningen, The Netherlands - August

FRANCISCO, Frederico

Attitudes towards science as a source of risk in policy making
26th Society for Risk Analysis Annual Conference (SRA-E 2017), Lisbon, Portugal - June

GJINI, Erida

Incorporating evolutionary dynamics into infection models with antibiotic treatment
8th Workshop DSABNS 2017, Universidade de Évora - February

Using mathematics to understand infection dynamics and antibiotic treatment
National Academy of Sciences of Albania, Tirana, Albania - May

Microbial interactions, dynamics and interventions: from data to processes with mathematical models
Systems Biology Center at Michigan Medical School, University of Michigan, Ann Arbor, USA - October

GORDO, Isabel

Tempo and mode of evolutionary change in the gut microbiota as revealed by *E. coli*
Institute of Evolutionary Biology, Edinburgh, UK - February

Rate and pattern of evolutionary change in the gut microbiota as revealed by a commensal bacteria
Genetics Department, Cambridge University, UK - February

Mutation and horizontal gene transfer as drivers of *E. coli* evolution in the mouse gut
Evolution 2017, Portland,USA - June

Evolution of bacteria colonizing the intestinal tract: mutation versus horizontal gene transfer events as drivers of adaptation
FEMS, Valencia, Spain - July

Evolution in the microbiota
27th Solvay Conference on Physics - The Physics of Living Matter: Space, Time and Information in Biology, Brussels, Belgium - October

Evolution of commensal bacteria in the gut
SMBE meeting, Kaziranga, India - December

GONÇALVES-SÁ, Joana

Early detection of the flu season
26th Society for Risk Analysis Annual Conference (SRA-E 2017), Lisbon, Portugal - June

Gauging fear in the social network era
26th Society for Risk Analysis Annual Conference (SRA-E 2017), Lisbon, Portugal - June

Science and Policy
Data Science for Social Good, Summer School, Nova School of Business and Economics, Lisbon, Portugal - June

Data Science for Health Policy
Data Science for Social Good Event, Nova School of Business and Economics, Lisbon, Portugal, Lisbon, Portugal - August

GUILGUR, Leonardo

The developing brain is the limiting tissue to ensure normal lifespan after induced aneuploidy in flies
25th European *Drosophila* Research Conference, Imperial College, UK - September

The developing brain is the limiting tissue to ensure normal lifespan after induced aneuploidy in flies
IX Latin American Society for Developmental Biology Meeting, Colombia - October

HOWARD, Jonathan C.

Polymorphic variation in a mouse resistance mechanism and the colonization of Brazil
University of Münster, Germany - April

Host-parasite coevolution between *Toxoplasma gondii* and the house mouse
University of Veterinary and Animal Science, Lahore, Pakistan - October

2nd PHENOMIN Scientific Advisory Board Meeting, Center of Immunophenomics – CIPHE

Marseille, France - November

Site Visit Review Panel, Francis Crick Institute, London, UK - November

JANODY, Florence

Actin stress fiber organisation promotes cell stiffening and proliferation of pre-invasive brear cancer cells
FEBS Advanced Lecture Course and European Cytoskeletal Forum Meeting 2017, Helsinki, Finland - June

JANSEN, Lars

Epigenetics and the mechanisms of chromatin inheritance applied to the nervous system
Lectures in Neuroscience, Universidade Federal do Rio Grande do Sul, Porto Alegre, Brazil - March

Epigenetic control of centromeres and gene expression
FMI, Basel, Switzerland - June

Centromeric chromatin inheritance along the cell cycle
EMBO Dynamic kinetochore workshop, Edinburgh, UK - June

Mechanisms of chromatin-based epigenetic inheritance
LMS London Institute of Medical Sciences, London, UK - July

Cell cycle control of centromere assembly and inheritance
Cell cycle inside out, Roscoff, France - September

LEITE, Ricardo B.

Aquatic toxins
EMBO: Tree building: Advanced concepts and practice of phylogenetic analysis, Universidade do Algarve - April

LOPEZ, Saioa

The genetic legacy of Zoroastrianism in Iran and India - Insights into

population structure, gene flow and selection
European Society of Human Genetics, Copenhagen, Denmark - May

MALLO, Moisés

The mechanisms controlling the trunk size of vertebrates
Villefranche-sur-mer Developmental Biology Laboratory, France - January

A life for Oct4 outside embryonic stem cells
Center for Cancer Research (CIC), University of Salamanca, Spain - April

Genetic networks defining vertebrate trunk length
Max-Planck Institute for Molecular Genetics, Berlin, Germany - May

Building different body shapes with a similar set of regulators
GABBA symposium 2017 "Nano 2 Universe", i3S, Porto, Portugal - July

Mechanisms regulating vertebrate body formation along its anterior-posterior axis
FEBS3+, 1st Joint Meeting of the French-Portuguese-Spanish Biochemical and Molecular Biology Societies, Barcelona, Spain - October

A genetic toolkit to generate anatomical variability in vertebrates
VIII Meeting of Young Investigators Abroad, MUNCYT, La Coruña, Spain - December

MARTINS, Gabriel

NEUBIAS: Advanced training in bioimage analysis
FOM - Focus on Microscopy Meeting, University Bordeaux, France - April

Three-dimensional light microscopy Pollen Network-Imaging Workshop, University of Maryland, USA - April

MARTINS, Rui

The impact of hemolysis and heme release on the susceptibility to bacterial infections
YSA Symposium 2017, Vienna, Austria - June

The impact of hemolysis and heme release on the susceptibility to bacterial infections
Meeting of the German, Austrian and Swiss societies for Hematology and Oncology, Stuttgart, Germany - September

MARTINS, Vera

Cell competition in the thymus and the consequences of its disruption
International Symposium of Cell competition, apoptosis and Cancer, Sapporo, Japan - August

Cell competition in the thymus
XV Congress Iberic Society of Citometry, Lisbon, Portugal - May

MENA, Ana

How, why and to whom communicate your research?
Biodiversa meeting, Instituto Gulbenkian de Ciência, Portugal - March

IGC Science Communication and Outreach
Institut Curie Retreat in Lisbon, Portugal - September

MIRTH, Christen

Variation in the macronutrient environment affects morphology and behaviour
University of Helsinki, Finland - January

The effects of nutrition on life history and behaviour
University of Calgary, Canada - May

From Plasticity to robustness: coordinating organ size and pattern
International Congress for Comparative Endocrinology, Lake Louise, Canada - May

Ecdysone coordinates organ size and pattern
International Insect Hormone Workshop, Nasu, Japan - July

Plasticity in body size and shape: how environmental conditions modify development to generate phenotypic variation
Symposium on Animal Development and its Evolutionary Variation, Cambridge, UK - September

MOITA, Luís Ferreira

Sepsis: the importance of being tolerant
EPFL, Lausanne, Switzerland - January

Sepsis: the importance of being tolerant
22nd IS on Infections in the Critically Ill Patient and Sepsis Symposium, Porto, Portugal - February

Sepsis: the importance of being tolerant
EFIS, Lisbon, Portugal - March

Sepsis: the importance of being tolerant
MIMS, Umea, Sweden - April

Sepsis: the importance (and danger) of being tolerant
Sepsis Update, Weimar, Germany - July

Homeostasis Perturbations: in Sickness and in Health
EMBO workshop on proteostasis, Ericeira, Portugal - November

MONTEIRO, Marta

Improving facility management by tailor made software
V Core Management Workshop "Training the Trainers", Centre for Genomic Regulation, Barcelona, Spain - July

MONTEIRO, Pedro

On the structure and robustness of gene regulatory network Boolean functions
4th CoLoMoTo meeting, Ecole Normale Supérieure, Paris, France - July

MORENO, Nuno

A non-zero-sum approach to negotiation
V Core Management Workshop, Centre for Genomic Regulation, Barcelona, Spain - July

OIKONOMIDI, Ioanna

iTAP, a novel iRhom-interactor, is required for TNF shedding
EMBO Proteostasis meeting, Ericeira, Portugal - November

OLIVEIRA, Raquel A.

Condensin I directs sister chromatid resolution throughout metaphase
Chromosome Dynamics, Gordon Research Conference, Italy - May

Chromosome dynamics during mitosis
University of Bayreuth, Germany - June

Chromosome Dynamics
EMBO workshop on DNA topoisomerases and DNA topology, Switzerland - September

Coping with wrong chromosome numbers during development
2017 JEDI Meeting, Italy - October

Coping with wrong chromosome numbers during development
2017 Champalimaud Research Symposium, Lisbon, Portugal - October

OLIVEIRA, Rui F.

Nonapeptide regulation of social behaviour: lessons from fish
Neural Systems and Behaviour Course Lectures' Series/ Marine Biological Laboratory, Woods Hole, USA - June

Neurogenomic mechanisms of behavioural plasticity in fish: a conceptual framework illustrated by the ecological modulation of reproductive behaviour in a blenny
10th Indo-Pacific Fish Conference, Papette, Tahiti - October

Socially-driven changes in the social decision-making network of zebrafish
Annual Meeting of the Society for Social Neuroscience, Washington DC, USA - November

Nonapeptide regulation of social behaviour: an eco-evo-devo approach in zebrafish
5th Israeli Meeting of Zebrafish as a Model for Biomedical Research/ Ben Gurion University of Negev, Beer Sheva, Israel - December

PAIS, Inês

***D. melanogaster* has stable, beneficial and host-specific gut microbiota**
Ecological Immunology Workshop 2017, Blossin, Germany - August

PAIVA, Rafael

Thymus autonomy relies on a small population of thymocytes that self renews, pre-congress meeting on molecular aspects of hematological disorders
Annual Congress of the European Hematology Association, Madrid, Spain - June

PARKHOUSE, Michael

Application and limitations of antibody and antigen detection in the diagnosis of cysticercosis
Final Conference European Network on Taeniosis/Cysticercosis, Greece - October

Identification of tapeworm carriers through detection of coproantigen
Final Conference European Network on Taeniosis/Cysticercosis, Greece - October

PEREIRA, Hugo

OPenT - simplified acquisition and processing of optical tomography datasets
1st NEUBIAS2020 Conference, IGC/FCG, Portugal - February

RICHARDSON, Dale

The *Arabidopsis* SCL30a RNA-binding protein confers ABA-dependent salt and osmotic stress tolerance during seed germination
IGC Symposium 2017: Plant RNA Biology/Instituto Gulbenkian de Ciência, Oeiras, Portugal - September

ROCHA, Luís M.

Material Turing machines: the active and passive modes of information in life and collective intelligence
Emerging Activity-Relating Things, Hermann von Helmholtz-Zentrum für Kulturtechnik, Humboldt-Universität zu Berlin, Germany - February

Canalization in the dynamics of complex networks drives dynamics, criticality and control
Controlling Complex Systems. NETSCI2017 Satellite, Indianapolis, USA - June

The effective structure of complex networks: Canalization in the dynamics of complex networks drives dynamics, criticality and control
The Conference on Complex Systems, Cancun, Mexico - September

City-wide analysis of drug-drug-interactions
Translational Bioinformatics Conference 2017, Los Angeles, USA - September

Resilience, control & synchronisation
Complex Networks 2017, the 6th International Workshop on Complex Networks and their Applications, Lyon, France - November

RODRIGUES, Yara K.

Combined effects of day and night temperature on thermally plastic traits
European Meeting of PhD Students in Evolutionary Biology, Poland - September

SANTOS, Diogo

From phenotypes to fitness – Time is relative in Evolution
Mathematical Models in Ecology and Evolution, UK - July

SOARES, Miguel P.

Microbiota control of malaria transmission
Twinbrook Seminar Series, National Institute of Health, Maryland, USA - January

Disease tolerance: a defense strategy against infection
2nd Midwinter Conference Advances in Immunobiology, Tirol, Austria - January

Metabolic adaptation as a defense strategy against infection
Institut d'Immunonologie Medicale, Université Libre de Bruxelles, Belgium - March

Microbiota control of malaria transmission
GLICOVAX Training Event II, Instituto de Medicina Molecular, Lisbon, Portugal - March

Metabolic adaptation as a defense strategy against infection
Berlin Life Science Colloquium, Max Planck Institute for Infection Biology, Berlin, Germany - April

Disease tolerance
"How host microbe coevolution forged the immune system", Collège de France, Paris, France - May

Metabolic adaptation in disease tolerance to infection
New York University School of Medicine, Immunology Club,USA - May

Metabolic adaptation establishes disease tolerance to sepsis
American Thoracic Society 2017 International Conference, Washington, USA - May

Suppression of TNF-induced Necrosis by Nrf2 confers disease tolerance to infection
SINAL: 8th meeting on signal transduction, Lisbon, Portugal - June

Disease tolerance: a defense strategy against malaria
Gordon Research Conference in Malaria, Les Diablerets, Switzerland - July

Metabolic adaptation in disease tolerance to infection
Meakins-Christie Labs, Research Institute of the MUHC, Montreal, Canada - September

Metabolic adaptation in disease tolerance to infection
42nd Congress of the Brazilian Society of Immunology, Mucosal Immuno 2017, Salvador, Brazil - October

Metabolic adaptation in disease tolerance to infection
"Cutting Edge Topics: Seminars in Immunology & Infection Biology" ETH Zürich, Institute of Microbiology, Switzerland - October

Evolutionary loss of α1,3-galactosyltransferases enhanced resistance to pathogens
Department Microbiology and Molecular Medicine, University of Geneva, Switzerland - October

Metabolic adaptation in disease tolerance to infection
EMBO Members' Meeting, Heidelberg, Germany - October

Evolutionary loss of α1,3-galactosyltransferases enhanced resistance to pathogens
Institut de Salut Global de Barcelona, Spain - November

Metabolic adaptation in disease tolerance to infection
Michaelmas term 2017 series of Immunology in Pathology seminars, Cambridge regional group of the British Society for Immunology, Cambridge, UK - November

SOUSA, Ana Laura

All for one and one for all: a multi-methodology approach to the study of influenza a virus at the nanoscale
MMC2017, Manchester, UK - July

STAJIC, Dragan

The role of epigenetic mechanisms in adaptive evolution
Gordon Research Conference - Molecular mechanisms in evolution, USA - June

The role of epigenetic mechanisms in adaptive evolution
ESEB meeting, The Netherlands - August

TEIXEIRA, Luís

Linking genotype to phenotype in the antiviral endosymbiont *Wolbachia*
EMBL, Heidelberg, Germany - February

Antiviral protection by the endosymbiotic bacteria *Wolbachia*
EPFL, Lausanne, Switzerland - May

Maintenance of mutualism in host-symbiont interactions
EU-LIFE Principle of Homeostasis meeting, MDC-Berlin, Germany - May

Discussion leader: "Emerging model systems"
Gordon Research Conference on Animal-microbe symbioses, West Dover, USA - June

Natural host-microbiome interactions in *Drosophila*: from defensive endosymbionts to gut microbiota
Workshop "Understanding the Beneficial Role of the Microbiota in Animals and Plants", Baeza, Spain - September

TELLEY, Ivo

The spatial organiser in the *Drosophila* syncytial embryo
SFB960 Seminar Series, University of Regensburg, Germany - August

TRANFIELD, Erin

EMBL Electron Tomography Workshop, Heidelberg, Germany - April

Microtubule organisation in a *Xenopus laevis* meiotic spindle resolved with electron tomography
MC2017 - Microscopy Conference meeting of the Austrian, German and Swiss microscopy societies, Lausanne, Switzerland - August

Using Correlative light and electron microscopy to find the needle in the haystack
University of Regensburg, Germany - August

VAN BERGEN, Erik

Matching morphology and behaviour for effective crypsis
Behaviour 2017, Estoril, Portugal - July

VAZ-DA-SILVA, Zoé

Modulation of DAF and CD59 by influenza A viruses
27th Annual Meeting of the Society for Virology, Margurg, Germany - March

XAVIER, Karina

Bacterial interspecies quorum sensing in the mammalian gut microbiota
Symposium - Symbiosis and cohabitation – Institut de France, Académie des Sciences, Paris, France - April

Manipulation of the interspecies quorum sensing signal in mouse gut

Gordon Research Conference on Multi-Drug Efflux Systems, Galveston, USA - March

Manipulation of interspecies quorum sensing signalling in the mouse gut
Baylor College of Medicine, Molecular Virology and Microbiology Seminar Series, Texas, USA - March

At NATIONAL Meetings and Seminars

ADRAIN, Colin

iRhoms and regulation of ADAM17
Departamento de Química e Bioquímica da Faculdade de Ciências, Universidade de Lisboa - October

iRhoms: novel physiological roles and trafficking regulators
Instituto de Medicina Molecular, Lisbon - October

AGUIAR, Ana Paula

Unveiling cyanobacteria diversity
Building Bridges Through Science, Vimeiro, Portugal - November

AMORIM, Maria João

Mechanisms of influenza A virus assembly
BioSAM conference, Faculdade de Ciências, Universidade de Lisboa - April

BAENA-GONZÁLEZ, Elena

III Bioengineering Week, Instituto Superior Técnico, Lisbon - March

SINAL, 8th Meeting on Signal Transduction, Lisbon - June

BARRETO, Hugo

Domestication leads to rapid loss of social traits in wild *Bacillus subtilis*
Encontro Nacional de Biologia Evolutiva, Universidade do Algarve, Faro - December

BECKER, Jörg

Arrays and NGS at the IGC
Champalimaud Centre for the Unknown, Lisbon - March

Microarrays and NGS at the IGC
Jornadas de Biotecnologia e Bioinformática, Escola Superior de Tecnologia do Barreiro - May

ONEIDA Omics Core – Genomics and Metagenomics
ONEIDA kick-off meeting, Instituto de Tecnologia Química e Biológica, Oeiras - June

NGS & Microarrays at IGC
Advanced course on Genomics, Metagenomics and Bioinformatics, Universidade do Minho, Braga - June

BETTENCOURT DIAS, Mónica

Centrosomes and Cancer
PAC cancer meeting, Porto - January

IPS_ESE - Instituto Politécnico de Setúbal / Escola Superior de Educação - January

CARREIRA, Leonor

Animacy perception in zebrafish: neural mechanisms and modulation by oxytocin-like peptides
14th Meeting of the Portuguese Ethological Society, ISPA, Lisbon - Julho

CARDOSO, Luís

The role of selection in promoting stable polymorphisms through loss of function and dependency
XLI Jornadas Portuguesas de Genética, Aveiro - June

CASTRO, Diogo S.

Gene regulatory networks in vertebrate neurogenesis
Instituto de Investigação e Inovação em Saúde, Universidade do Porto - March

MyT1 counteracts the neural progenitor programme to promote vertebrate neurogenesis
XV Meeting of the Portuguese Society for Neuroscience, Braga - May

CHAOUIYA, Claudine

Computational models unravel the functioning of regulatory networks
Computational Biology and Bioinformatic Seminars, Instituto de Medicina Molecular, Lisbon - February

Computational modelling to uncover the functioning of regulatory networks
XLI Jornadas de Genetica, Aveiro - June

Uncovering basins of attraction in asynchronous Boolean models. Application to assess genetic alterations in cancer networks
3rd Porto Meeting in Mathematics and Biology, Porto - June

Functioning of cellular networks revealed through logical modelling
Summer School in Computational Biology, Coimbra - September

DEMENGEOT, Jocelyne

Immunology made easy for the Clinician: Biological drug efficacy and safety in autoimmunity and cancer
V Congresso Nacional De Autoimunidade, NEDAI, Lisbon - April

DESHPANDE, Ojas

Microtubule based nuclear spacing in the *Drosophila* syncytial embryo
Drostuga – Annual Portuguese *Drosophila* Meeting, Tomar - September

DOMINGUES, Inês

Research institutions and social media: science engaging channels for the public and scientists
SciCom.pt 2017, Coimbra - October

DUQUE, Paula

Alternative splicing control of plant stress tolerance
Jornadas da Sociedade Portuguesa de Genética /Universidade de Aveiro - June

"Splicing" alternativo e a resposta das plantas ao meio ambiente
IVº Encontro Internacional Casa das Ciências, Faculdade de Ciências da Universidade de Lisboa - July

FAÍSCA, Pedro

The utility of reticulin in the diagnosis of hepatocellular carcinoma in a mouse model and its application to the canine species
XXII Meeting of the Portuguese Society of Animal Pathology, ICBAS, Porto - May

FERREIRA, Miguel Godinho

Mechanisms of telomere maintenance in Cancer Stem Cells
Kick-Off Meeting Project PAC - CANCEL_STEM, IPATIMUP/I3S, Porto - January

Development of a functional assay for personalised chemotherapy
Faculdade de Farmácia de Lisboa - February

GONÇALVES-SÁ, Joana

Decision-making in energy policy
Course in Energy Transfers, Instituto Superior Técnico, Lisbon - June

Ciência Aberta para além do Acesso Aberto
Ciência 2017, Lisbon - July

Data mining for policy making
Faculdade de Medicina da Universidade de Coimbra - October

Replacing the ivory and exiting the tower
Encontros Ciência Aberta, Ministério da Ciência, Inovação e Ensino Superior, Lisbon - October

40 Years of Debates - A computational approach to the study of the Portuguese Parliament
ICS-UL, Lisbon - November

Early and real-time detection of influenza onset
Nova School of Business and Economics, Lisbon -December

GORDO, Isabel

Microbiota e resistência aos antibióticos
Simpósio de Atualização em Nefrologia, Lisbon - February

JANODY, Florence

CSC Cytoskeleton: membrane/actin interaction in the acquisition of stem cell properties in cancer
Kick-Off CANCEL-STEM meeting, Porto - January

Actin-dependent cell stiffening and the acquisition of distinct cancer features
CEDOC, Lisbon - March

JANSEN, Lars

Epigenetic control of centromeres and gene expression
Biochemistry JorTec, Costa da Caparica - February

Chromatin-based epigenetic inheritance
CBMR - Centre for Biomedical Research, Universidade do Algarve, Faro - February

Mechanisms of chromatin-based epigenetic inheritance
I3S, Porto - May

LEITE, Ricardo B.

Metagenomics Assessment of BIOMETORE samples
Open Day Biometore, IPMA - April

MACHADO, Luisa

Caracterização molecular de progenitores neuro-mesodérmicos (NMPs): possível estratégia de

regeneração espinal
Conferências Santa Casa Neurociências 2017, Lisbon - November

MALLO, Moisés

The mechanisms controlling the trunk size of vertebrates
Instituto de Medicina Molecular, Lisbon - January

Making mice with specific genomic modifications
X ENEBIOQ, Braga - April

O que é que controla o número e tipo de progenitores da medula espinal?
Conferências Santa Casa Neurociências 2017, Lisbon - November

MENA, Ana

Ética, Ciência e Sociedade
Academia de Ciências de Lisboa - April

Uma compositora em residência e três movimentos de ciência
SciCom.pt 2017, Coimbra - October

Improving skills to better communicate with lay audiences
Career Opportunities for Postdoctoral Researchers in Life Sciences, Lisbon - November

MIRKOVIC, Mihailo

Neuronal development restricts organism recovery upon reversible loss of cohesin and consequent aneuploidy
Ameegus PhD retreat - May

Neuronal development restricts organism recovery upon reversible loss of cohesin and consequent aneuploidy
Drostuga Annual Portuguese *Drosophila* Meeting, Tomar - September

MOITA, Luís Ferreira

Sepsis: the importance (and danger) of being tolerant
2nd Symposium on Immunomodulation in Cancer & Regeneration, i3S, Porto - June

Sepsis: the importance (and danger) of being tolerant
CEDOC, Lisbon - July

NABAIS, Catarina

Kinetics of centriole biogenesis in space and time
Drostuga Annual Portuguese *Drosophila* Meeting, Tomar - September

NAVARRO-COSTA, Paulo

The epigenetic regulation of fertilisation
Centro de Neurociências e Biologia Celular, Coimbra - October

When sex and chromatin come together
CEDOC, Lisbon - November

When sex and chromatin come together
Instituto de Medicina Molecular, Lisbon - December

PAIS, Teresa F.

Mechanisms of Type I IFN pathogenicity in experimental cerebral malaria
XLIII SPI Annual Meeting 2017, Porto - June

PERALTA, Carolina M.

Genetics of diversification: a hotspot locus for wing pattern evolution
BED 10 Symposium: A decade integrating biology (in) research and training, Faculdade de Ciências da Universidade de Lisboa - December

RIBEIRO, Diogo

Genotype-environment interaction in the effects of the oxytocin receptor gene on zebrafish social behavioor
14th Meeting of the Portuguese Ethological Society, ISPA, Lisbon - July

ROCHA, Luís M.

Structure and dynamics of complex systems: from social media mining to control of biochemical networks
Instituto de Sistemas e Robotica, Instituto Superior Tecnico, Lisbon - February

The impact of automation and online technologies in society
Antecipar o futuro : 10 tecnologias que podem mudar as nossas vidas, Public debate sponsored by the EU Commissioner for Research, Science and Innovation, Lisbon - January

RODRIGUES, Yara K.

Combined effects of day and night temperature on thermally plastic traits
II Graduate Programme Science for Development (PGCD) PhD Students Meeting, Vimeiro - October

SOBRAL, João

Metagenomics at IGC
Seminário de Metagenómica, Biocant, Cantanhede - June

NGS services at IGC
4ª Reunião de Utilizadores de Plataformas NGS, Porto - October

SOUSA, Ana Laura

Correlative Light Electron Microscopy (CLEM): Applications in research
Electron Microscopy Course - May

TEIXEIRA, Luís

Endosymbiotic bacteria protection against viruses
IV Jornadas de Bioquímica, Porto - April

Bacterial symbionts of *Drosophila*
CEDOC, Lisbon - May

TORCATO, Inês

Quorum sensing signal recognition by a novel AI-2 receptor from *Clostridia*
Microbiotec17 - National Congress of Microbiology and Biotechnology 2017, Porto - December

TRANFIELD, Erin

Improvements in ultrastructure preservation by cryo-immobilization
Electron Microscopy Course - May

VIEIRA, Filipe

Induction of a development delay in *Drosophila* by *Pectobacterium* is mediated by quorum sensing
Drostuga Annual Portuguese *Drosophila* Meeting, Tomar - September

Quorum sensing regulation in *Erwinia carotovora* affects development of *Drosophila melanogaster* upon infection
Microbiotec17 - National Congress of Microbiology and Biotechnology, Porto - December

PUBLIC ENGAGEMENT IN SCIENCE

~ 2200
Visitors in Public Events

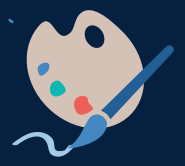
872
Students participated in Science Education projects

152
Researchers & Technicians engaged in Outreach Activities

25
New Multimedia Resources

5
Participations in Public Events

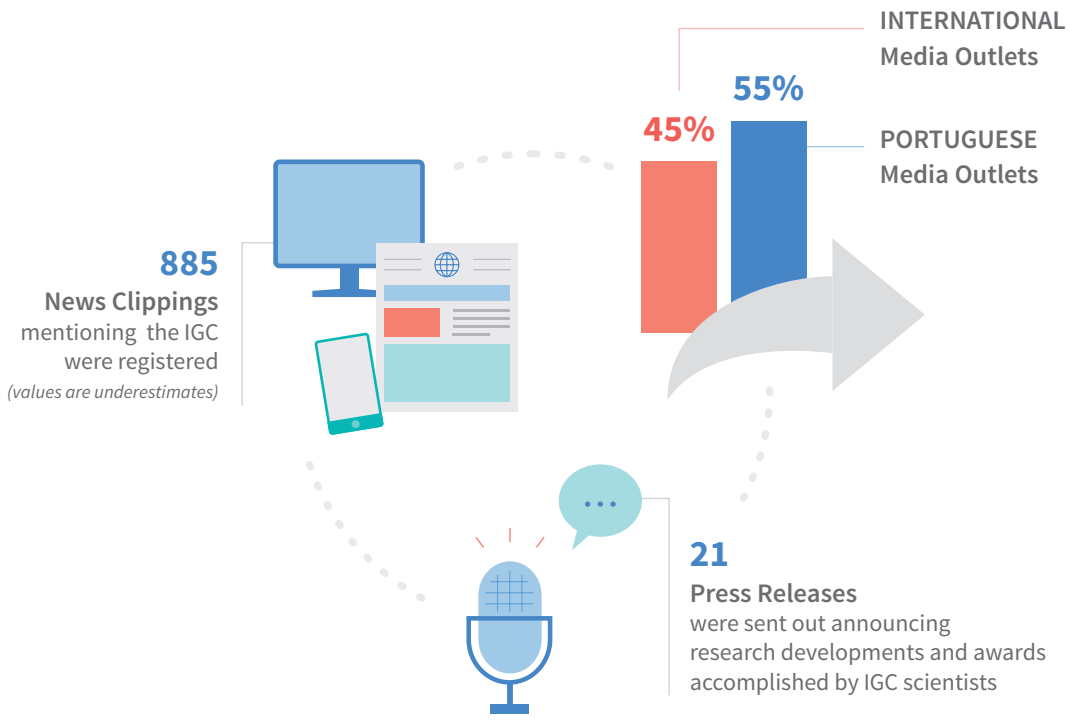
3
Education Projects



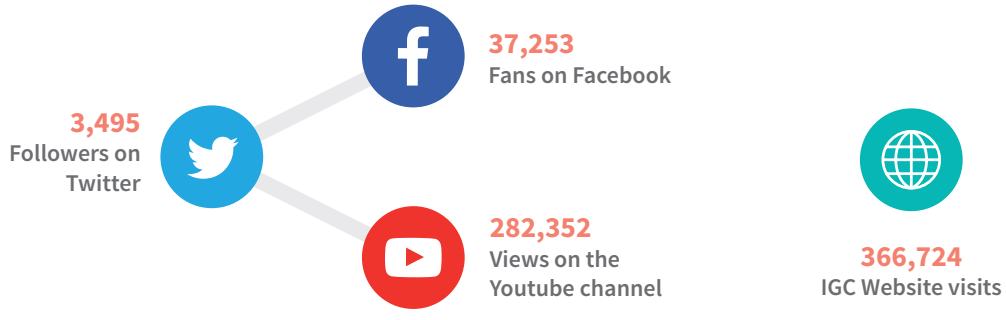
1
Artist in Residence

Public Engagement in Science 2017

MEDIA OFFICE



NEW MEDIA



Institutional Communication

Production of multimedia resources

Seven episodes of the video series "PhD in a minute" were produced in 2017, introducing the thesis work developed by IGC PhD candidates. A new video entitled "How to maintain mitotic chromosome architecture?" from the "IGC paper video" series was released, covering the scientific article published in eLife by Raquel Oliveira's laboratory. Furthermore, the IGC produced a series of videos to celebrate important dates: a) the IGC joined the ERC 10th anniversary celebrations with a social media campaign built on 6 videos with testimonials from IGC scientists awarded with ERC grants and from the IGC Director; b) on the 10th anniversary of the IGC-NOS Alive partnership the IGC produced 10 videos with NOS Alive-IGC fellows talking about the research they have been pursuing; c) to celebrate the 150th Anniversary of Marie Curie, our current Marie Skłodowska-Curie Actions fellows were introduced in a video.

The work of the IGC PhD students explained in a 1-minute videos.

Science Education Projects

"Lab in a Box" – science experiments for students in Africa

Aiming at improving scientific literacy and stimulating experimental work as part of the science education curricula in African schools, this project is based on the concept of a mini-lab provided in a box, containing very simple and inexpensive materials that can support the development of experiments in Biology, Ecology, Geology, Chemistry and Physics. In 2017, professors and researchers from Instituto Superior Técnico, Universidade de Lisboa, provided specific training on Physics experiments to 20 Cape-Verdean high-school teachers. The Instituto Camões, the UNESCO National Commission, and the Ministry of Education of Cabo Verde support Lab in a Box.

A Lab in a Box teacher training Physics session in Cabo Verde.

Pre- and primary schools science education programme: "Aqui Há Ciência! Ciências da Vida"

This programme was created in 2012 to develop in-class laboratory activities and teacher training for pre- and primary schools. This year, the teacher-training component was replaced by the implementation of activities in the classroom. Two IGC trainers developed 29 actions in 12 schools from Oeiras Municipality.

Partners: Oeiras City Council (Portugal)
Funding: Oeiras City Council (Portugal)

Primary school students during a hands-on activity class.

Schools' outreach

In 2017, 74 students from 3 high schools (Lisbon, Parede and Cartaxo), and 36 students from 2 universities (ISPA-IUL and Universidade de Lisboa) visited the IGC. In addition, a group of 23 students from an association that supports underprivileged communities in Amadora also visited the IGC. One of our scientists went to a high school in Barreiro to talk about science with students from the 10th and 12th grade. In total, we received 30 requests, either to visit the IGC, to go to the schools, or to provide material or assistance in the development of science projects.

Job-shadowing - Scientist for a Day

This was a new programme initiated in 2017 with the aim of supporting high school students in their career choice. Students were invited to spend an entire day with a scientist at the IGC, and learn more about the life of scientists and scientific research. Twenty-five students from 13 schools enrolled in this programme.

A student follows an IGC scientist during one day.

Public Events

International Day of Immunology

28 APRIL

To celebrate the International Day of Immunology, the IGC prepared a full programme of activities with lectures, visits to the laboratories and hands-on activities to learn immunology concepts. Five IGC research groups and one facility interacted with 50 students and 5 teachers from 2 high schools (from Lisbon).

Students learning the work of immunologists at IGC.

FCG Summer Festival: "Jardim de Verão"

JULY

From 23 June to 20 July, the Calouste Gulbenkian Foundation (FCG) hosted "Jardim de Verão", an event that consists on a diversified cultural programme showcasing the multifaceted interventions of FCG in the field of arts, science, and community projects it supports and promotes. The IGC participated in "Jardim de Verão" with several activities targeting families and the general public. Three IGC scientists and an artist in residence participated in the Speaker's corner, talking about their research and activities at the IGC; a hands-on activity on plant biology research was developed in the garden of the FCG for families; the conference "The insects around us: diverse, useful and lethal" was organised by Luis Teixeira, and hosted international experts; and the IGC promoted the public screening of the film "The Art and Science of Travelling" by Alaa Abi Haidar. Overall, more than 430 people engaged in IGC-promoted events.

Speaker's corner of Jardim de Verão at FCG.

IGC at NOS Alive'17

7-9 JULY

Science and music came together for the 10th year running at the NOS Alive'17 music festival. This year, the IGC corner offered to its visitors a science gymkhana with 4 activities, speed-dating with scientists, a photo exhibition of the NOS Alive fellows, and a "If you were a scientist what would you like do discover?" board, where visitors could write their ideas. At the entrance of the stand, a Plinko game indicated which activity visitors should take. In the last day of the festival, a short ceremony to celebrate the 10th anniversary of the IGC partnership with NOS Alive took place, during which it was offered to Álvaro Covões, CEO of *Everything is New*, a book with the history of the NOS Alive-IGC fellows. Forty-seven IGC volunteers made these activities possible for about 1458 young people who visited the IGC corner.

Festivalgoers participating in the science gymkhana at NOS Alive.

IGC at the European Researchers' Night

29 SEPTEMBER

The IGC participated in the European Researchers' Night with two activities held at Pavilhão do Conhecimento, in Lisbon. About 100 visitors were invited to play a game that explored different factors that might raise the probability of getting cancer, and to learn how mathematics and computational biology can help in disease control and epidemics.

Visitors at the IGC corner during the European Researchers' Night.

Open Day for University Students

20 NOVEMBER

Within the scope of the Science and Technology week, the IGC held its first Open Day for University Students. Aimed at providing a complete vision on the research done at the IGC and training opportunities, the event's programme was tailored for students undergoing a BSc. or Masters. It included 6 lectures on the main research areas of the IGC; 3 round tables addressing training programmes, careers in science, and the technology behind science; visits to laboratories and facilities; and speed dating with scientists. Seventy-two IGC researchers and technicians interacted with 142 students that participated in this event.

Visitors during lab tours on the Open Day for University Students.

Art & Science Projects

Artist in Residence: Simon Bill

From November 2016 to July 2017 the IGC hosted as Artist in Residence the British visual artist and novelist Simon Bill. During his residence, Simon gave a few lectures on the interface between painting and science, and organised a painting club for IGC scientists.

Simon Bill, artist in residence at IGC.

Music at the IGC

Under the direction of the former Artist in Residence Camille van Lunen, the IGC choir continued to work on pieces from George Gershwin and Cole Porter. There was a public performance in May for the IGC community.

Scene of the public performance of the IGC choir.

Other Participations

The IGC community participated in the *March for Science* held in Lisbon on the 22nd of April, interacting with society. Some scientists participated in the science fair that occurred after the March.

Fundraising 2017

The IGC runs fundraising initiatives with private companies, charities and the general public to raise private funds for science. The IGC is under the Scientific Sponsorship Law. This law provides tax benefits for science-related donations by either individuals or companies.

Major Projects

The IGC – Everything is New (EIN) Partnership: NOS Alive – IGC research fellowships

This year, the IGC celebrated the 10th anniversary of the partnership established with *Everything is New*, promoter of the NOS Alive music festival. This partnership results in the IGC participation in this music festival and in two research fellowships per year that allow young graduates to start their scientific careers. In 2017, Alexander Marta and Francisco Paupério received a fellowship to develop one-year research projects at the Disease Genetics, and at the Mathematical Modelling of Biological Processes research groups, respectively. The practical works of these projects were carried out at the IGC, and in the USA and Brazil. Since 2008, over 500 young graduates around the country have applied to these fellowships, and 16 received a fellowship. In 2017, 3 NOS Alive-IGC alumni were conducting a postdoc abroad, 7 were doing a PhD, and the other 4 were pursuing research projects.

IGC corner at NOS ALIVE'17.

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. In 2017, the porcelain Coleção Ciência was available at the IGC and at the Calouste Gulbenkian Foundation.

Fundraising activities organised by the IGC PhD Delegates and Post-Doctoral Committee

Several fundraising activities (beer hours, thematic parties, etc.) were organised in 2017 to raise funds for the 11th PhD AMeeGuS meeting and for the Post-Doctoral retreat, via donations from attendees at the events, both from IGC staff and the general public.

Acknowledgements

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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/annualreport

If you would like to receive a copy of this report, on a USB memory stick, please contact:

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