

**Science**



✦ Presentation of the awards for the Young Researchers Incentive Programme 2008, with the presence of the Minister for Science, Technology and Higher Education.



	Amounts in euros
Personnel costs	423 430
Operating costs	121 577
Departmental activities	315 629
Subsidies	712 430
<b>Total</b>	<b>1 573 190</b>
Receipts	5 977

In accordance with its statutory purposes and within the guidelines established by the Foundation for activities in the sciences, the Department had three structuring goals in 2008:

- › to foster creativity and rigour in scientific research;
- › to encourage links between science and culture;
- › to strengthen the interaction between science and society.

### Stimulating creativity and rigour in scientific research

#### Young Researchers Incentive Programme

The Young Researchers Incentive Programme pursued activities designed to support and stimulate young researchers, with applications being invited in four scientific areas:

- › finite mathematics (algebra and combinatorics, logic and group theory, optimisation and probability);
- › physics of low-dimensional systems (graphene, nano structures, chains, films, interfaces);
- › geophysics of the planet Earth (atmosphere, ice and oceans, climate, internal geophysics, seismic risk);
- › sensors: applications to chemistry and biology.

The programme gives two annual awards to high quality proposals from each scientific area, and simultaneously

provides support to implement them in the following year at Portuguese research centres. Fifty-nine applications were submitted in the four scientific areas. After due analysis, the Jury recommended that eight applications be granted. Each successful applicant received a total financial incentive of € 12,500, divided into two instalments, one of € 2,500 for the researcher, and the other of € 10,000, which was intended to help pay for the costs of undertaking the research. This latter instalment was paid to the institution where the research work is to be carried out.

### **Support Programme for Research in Life Sciences**

With the aim of stimulating originality and the development of new and creative ideas in the research work being undertaken in life sciences, this programme resulted from the desire to encourage young researchers working at centres of excellence to take more risks and to engage in cutting-edge research.

In 2008, awards were made to the following institutions:

- › Life and Health Science Research Institute of the University of Minho, to provide support for the implementation of the project “Identification of Key Neuroregulatory Molecules Expressed by Human Umbilical Cord Stem Cells”, supervised by António Osório Salgado;
- › Faculty of Medicine of the University of Porto, to provide support for the implementation of the project “Unravelling the Assembly of the Nociceptive System Circuitry along Mouse Development by Identifying Prrxl1 Gene Targets”, supervised by Filipe Almeida Monteiro.

Each of these institutions received a subsidy of

**[€50 000]**

### **Strengthening Basic Research**

Basic research was supported through the award of subsidies to various institutions, most notably:

- › Fundació Catalana per a la Recerca i la Inovació, for the holding of the EuroScience Open Forum (ESOF 2008), from 18 to 22 July in Barcelona, where some of the most recent developments in science were presented and discussed, as well as aspects linked to the relationship between science and society;
- › Higher Technical Institute (IST) of the Technical University of Lisbon, for the award of the Professor António da Silveira Prize, designed to reward the work of IST students in experimental physics displaying “academic excellence”;
- › Foundation of the Faculty of Science of the University of Lisbon, for the organisation of the Arrábida Meeting entitled “Complexity Sciences: Complexity and Political Simulation”;
- › Foundation of the University of Lisbon, to improve the infrastructure of the Botanical Garden, making it possible to continue the project for the upgrading of the Herbarium.





✚ National Meeting of the “New Talents in Mathematics” Programme, Luso, September, 2008.

### “New Talents in Mathematics” Programme

Every year, the “New Talents in Mathematics” Programme selects university students of Mathematics who demonstrate high academic merit and encourages the development of their mathematical knowledge and skills, supporting their work with recognised specialists who will act as tutors. Following a public competition, the Foundation awarded 20 merit grants to students attending the first, second and third years of a Mathematics degree in the academic year 2008-2009.

The 5th Mathematics Summer School – the Escola Diagonal – took place between 1 and 5 September, 2008, at the Mathematics Department of the University of Coimbra. This involved around 50 students, including university students, who attended two five-lesson courses, complemented by working sessions. This School preceded the 8th National Meeting of the “New Talents in Mathematics” Programme, which was held in Luso on 5 and 6 September. The main objectives were: to allow students from across the country to meet and exchange experiences about their respective academic environments; to draw up an overview of the work done under the programme; to hold scientific debates involving all participants (award-winners and tutors). The meeting also included a series of conferences by some students and guest professors from Portugal and abroad.

Under the scope of its basic activities in the field of mathematics, the Department also awarded a subsidy of € 15,000 to support the scientific activities of the International Mathematics Centre, namely its Summer School.

## Promoting links between science and culture

### Conferences and seminars

The Department promoted the conference cycle “At the Frontier of Science”, consisting of eight monthly lectures given between 12 December 2007 and 16 July 2008. On 30 January, Ana Viana-Baptista, from ISEL – Lisbon Higher Institute of Engineering – gave the lecture entitled “Can we Predict a Tsunami?”; on 20 February, Tiago Flemia de Oliveira Outeiro, from the Institute of Molecular Medicine of the University of Lisbon, spoke about “Mad Cows, Neurotic Yeasts and a Return to the Future”; on 26 March, José Xavier spoke about “Icebergs, Snow and Lots of Penguins: The Reasons for the International Polar Year”; “The ‘Birth’ of the Cell – A Guided Tour through the Microscope” was the theme of the lecture given by Hélder Maiato from the Institute of Molecular and Cellular Biology of the University of Porto; on 14 May,



✚ “The Revolutionary Role of Nanotechnology and Stem Cells in Regenerative Medicine”, lecture from the “At the Frontier of Science” conference cycle, given by Manuela Gomes, from the Institute of Biotechnology and Bioengineering of the University of Minho.

Manuela Gomes, from IBB – the Institute of Biotechnology and Bioengineering of the University of Minho, spoke about “The Revolutionary Role of Nanotechnology and Stem Cells in Regenerative Medicine”; on 18 June, Ricardo Aguiar, of INETI – the National Institute of Engineering, Technology and Innovation, gave the lecture entitled “Global Warming: The Path to Self-Destruction or to Planetary Climatic Engineering?”; and finally, on 16 July, José Manuel Afonso, from the Lisbon Astronomical Observatory, brought the cycle to an end, with his talk on the theme “At the Frontier of the Universe: In Search of the End of the Age of Darkness”.



✚ “Darwin: Between Heaven and Earth”, first lecture in the cycle “Darwin: On the Road to Evolution”. Lecture given on 15 October by Carlos Marques da Silva from the University of Lisbon.

As part of the “Leonardo da Vinci – The Genius” exhibition, on public display from 14 March to 22 June 2008 at the Science Museum of the University of Lisbon, three lectures were given in Auditorium 2 of the Gulbenkian Foundation, coordinated by João Caraça. The lecture “Leonardo: From the Hermetic to the Visionary” was given by Alexandre Quintanilha on 3 April; on 29 April, Jorge Calado spoke on the theme “Leonardo: The Imperfect Man”; the Director of the Science Department brought this cycle of lectures to an end, on 20 May, speaking on the theme of “Leonardo: The Infinite Curiosity”.

During the last quarter of the year, the first three monthly lectures were given in the cycle “Darwin: On the Road to Evolution”. This cycle was created with the aim of preparing the ground for the circulation of ideas and learning that would be provided by the “Darwin’s Evolution” exhibition, due to be held in the Foundation’s Temporary Exhibition Gallery between 12 February and 24 May 2009. On 15 October, Carlos Marques da Silva, from the University of Lisbon, gave the lecture entitled “Darwin: Between Heaven and Earth”; on 5 November, Patrícia Beldade, from the University of Leiden and the Gulbenkian Institute of Science, spoke about “Evolution and Development: Variations at Two Speeds and with Many Colours”; on 16 December, Nuno Ferrand, from the University of Porto, gave a lecture on “Evolution and Biogeography: Why are there so many Species on Earth?”.

A seminar was held, entitled “A Ciência e a Política – Scientific Advice and Policy Making: Where Are We Heading?”, an initiative that had originally been included in the Foundation’s Fiftieth Anniversary Commemorations, but was rescheduled for 22 and 23 January, 2008. This seminar brought together a group of specialists and political decision-makers with the aim of contributing to a better understanding of the decision-making processes that critically involve science, as well as the impact of scientific knowledge in defining strategies that are geared towards the future.



❖ “Leonardo: The Infinite Curiosity”, lecture included in the cycle “Leonardo da Vinci – The Genius”.





- ✦ Presentation of the awards of the “Bento de Jesus Caraça – The Mathematician of Freedom” competition, a joint initiative of the National Reading Plan (PNL), the Research Centre for Interactive Technologies (CITI) and the Foundation.

Another event organised under the scope of conferences and seminars was the meeting of the team of scientific consultants from various European Union countries involved in the research project “The Future of Representative Democracy”, coordinated by John Keane, from the Centre for the Study of Democracy of the University of Westminster. This meeting took place at the Foundation on 17 and 18 October.

As far as the support given for the promotion of scientific culture is concerned, attention is drawn to the “Bento de Jesus Caraça – The Mathematician of Freedom” competition, a joint initiative of the National Reading Plan (pnl), the Research Centre for Interactive Technologies (citi) of the Faculty of Social and Human Sciences of the New University of Lisbon and the Foundation. This competition was intended to distinguish websites conceived and designed by students from the 3rd cycle of basic education and by students from secondary education.

### Scientific exhibitions

Contacts were established and important preparatory work undertaken for the “Darwin’s Evolution” exhibition, which will be held in the Foundation’s Temporary Exhibition Gallery from 12 February to 24 May 2009, celebrating the 200th anniversary of the birth of Charles Darwin, and simultaneously the 150th anniversary of the publication of his seminal masterpiece *The Origin of Species*.

Work was also undertaken on the preparation of the catalogue that will accompany the exhibition and will be published in Portuguese and English.

In parallel to the “Darwin’s Evolution” exhibition, other activities will also be organised for audiences of all ages, namely the creation of the blog <http://a-evolucao-de-darwin.weblog.com.pt/> to allow for the daily discussion of themes related to evolution. The educational programme, open to schools from both basic and secondary education, includes guided tours of the exhibition and the delivery

of the “School Pack” containing a guide for teachers and information packs for the different levels of education, and the Portuguese versions of the book *Darwin’s Origin of Species – A Biography*, by Janet Browne, and the brochure *Evolution*, by Daniel Loxton.

As a further part of these educational activities, a competition entitled “Darwin Returns to the Galapagos Islands” was organised, aimed at students from the 3rd cycle of basic education and secondary education, in which the 1st prize consists of a trip to the Galapagos archipelago. The results of this competition will be announced in March 2009.

In the second half of 2009, the “Darwin’s Evolution” exhibition will be shown at the Museo Nacional de Ciencias Naturales, in Madrid.

## **Strengthening the interaction between science and society**

### **Science and Society Programme**

Under the scope of this programme, grants were awarded to the following institutions:

- ▶ Centre for Research and Studies in Sociology of ISCTE for the first year of the implementation of the research project entitled “Open Science: Researching, Publishing and Disseminating Science in the Network Society”;
- ▶ Institute of Strategic and International Studies for the holding of the 2nd, 3rd and 4th workshops organised as part of the project “Dialogues for a Sustainable Development – India and the European Union”;
- ▶ Yale University Grants to fund the first year of the research project “Linear vs Polarizing Trends in World Social Processes”;
- ▶ Institute of Social Sciences of the University of Lisbon, for the European Values Study 2008, in order to undertake a comparative and longitudinal analysis of the processes of change in the social values of Europeans, in relation to a range of fields in the life of society;
- ▶ Centre for the Study of Democracy of the University of Westminster, to support the first year of the implementation of the research project “The Future of Representative Democracy”, which is designed to answer the fundamental question regarding the current state and the likely future of representative democracy;
- ▶ ADIS – Atelier d’Intervention Sociologique do Centre d’Analyse et d’Intervention Sociologiques (CADIS), École des Hautes Études en Sciences Sociales (EHESS), for the implementation of the first phase of the research project “Découvrir et s’engager: les spécificités de la recherche en sciences sociales”, which is designed to examine and question the specificities of research in the social sciences.

### **Publications**

Janet Browne’s *Darwin’s Origin of Species – A Biography* was translated into Portuguese and published in partnership with Gradiva under the title *A Origem das Espécies de Darwin – Uma Biografia*.



Andre Patwao

At the Open Day, audiences of all ages had the chance to get to know more about the research that is undertaken at the Institute.

	Amounts in euros
Personnel costs	1 518 722
Operating costs	2 005 423
Subsidies and grants	2 222 305
Departmental activities	6 284 248
<i>Investment</i>	<i>2 103 056</i>
<b>Total</b>	<b>12 030 698</b>
Receipts	6 553 006

\* The amounts indicated refer to funds managed by the Calouste Gulbenkian Foundation, excluding other financing assigned directly to researchers, students or technicians or managed by other bodies.

In 2008, the Gulbenkian Institute of Science (IGC) continued to pursue its mission of carrying out scientific research and postgraduate training in biomedicine so as to contribute towards the creation of new leaders in the Portuguese scientific community and the implantation and development of programmes of scientific research of guaranteed excellence. IGC operates as a host institution, providing an exceptional intellectual environment, excellent premises, equipment and competitive services at an international

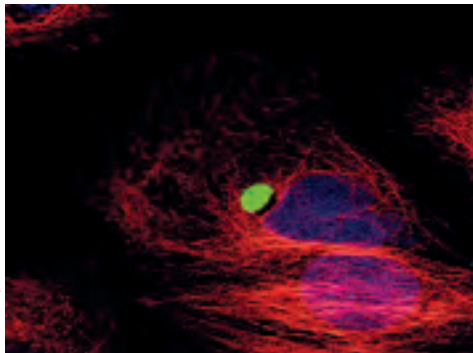
level for Portuguese and foreign researchers who establish their own research groups here and develop their respective research programmes under conditions of complete intellectual and financial autonomy.

## Research

In 2008, research at IGC was carried out by 33 research groups and seven small teams of research fellows – independent researchers who established and developed independent lines of research, in keeping with an institutional coherence guaranteed by the director and supported by the Scientific Advisory Board. In 2008, 18 external groups based at other Portuguese institutions continued to be associated with the Institute.

The Institute's scientific interests are centred on research into the genetic and molecular bases for the development and evolution of complex systems, based on approaches centred upon the organism, and using multiple animal models: ranging from bacteria and yeasts to the fruit fly, zebra fish and mice. Under the scope of its activities, the following thematic areas were

consolidated: evolutionary biology, the genetic makeup of complex diseases and of resistance to infection, cellular biology, cell cycle control and DNA repair, inflammation, immunity and auto-immune diseases, the biological development of animals and plants, behavioural neurobiology, and theoretical and computational biology.



Mafalda Lopes da Silva

✦ A liver cell (hepatocyte) infected with the malaria parasite *Plasmodium berghei*, 24 hours post infection. The parasite is shown in green; the nucleus of the cell in blue and the skeleton of the cell in red.





✚ One of the laboratories of the Gulbenkian Institute of Science.

In 2008, 96 articles were published in international journals, as were two chapters in books, while over 300 papers were given by IGC researchers at international congresses or scientific meetings. IGC was the host institution for the partial or total completion of seven doctoral theses, 13 master's degree theses and one degree thesis.

Thanks to the support of the Calouste Gulbenkian Foundation, IGC has access to technological platforms and services with high standards in terms of both facilities and human skills: confocal and multiphotonic microscopy, high-speed cell sorting (by Facs), DNA sequencing and genotyping, *Genechip* technology with genome expression, an animal room and service for the production of transgenic mice, preparation of monoclonal antibodies, level 3 bio-safety laboratories and a high-performance infrastructure for computations in bioinformatics.

In 2008, the human skills and competences of several of these services were strengthened with the recruitment of researchers already possessing doctorates, who help to guarantee an excellent response, in terms of accessibility, quality and sustainability, to the needs of the research groups. Work also began in 2008 on the restructuring of some of the services, with the aim of enlarging and/or improving facilities, in preparation for the reception of new groups in 2009.

## Postgraduate teaching

With the systematic support of the Calouste Gulbenkian Foundation, postgraduate teaching has always been a major component of IGC activities. In 2008, no less than four doctoral programmes were in operation at the Institute, enjoying the support of the Calouste Gulbenkian and Champalimaud Foundations, as well as the Foundation for Science and Technology (FCT). The Gulbenkian Doctoral Programme in Computational Biology – enjoying the support

of Siemens SA Portugal for its formation – was held for the fourth and final time. All told, this programme will have trained 46 PhD holders in this highly essential area of modern biomedicine.

The second editions were organised of the Gulbenkian/Champalimaud Doctoral Programme in Neuroscience and the Gulbenkian Life Science Doctoral Programme, this being an internal doctoral programme run by IGC, dedicated to recruiting students for the Institute's laboratories.

The 32 students enrolled at the Institute in 2008 consisted of both Portuguese and foreign researchers, recruited through international competitive applications. They joined those who had already passed through IGC, raising the total to 460 and forming a quite enviable network of *alumni*, spread throughout the world's best research centres.

2008 also brought the opening of the Doctoral Programme for Physicians, resulting from an initiative introduced by the Gulbenkian Foundation, in partnership with the Champalimaud Foundation, the Portuguese Ministry of Health and FCT. This programme is designed for doctors, specialist interns or practising specialists, who are highly motivated to take part in clinical research or clinical translation activities and wish to become involved in the future in multidisciplinary cooperative projects as a complement to their activity as attending physicians. Ten doctors enrolled in the programme in 2008, specialising in the areas of gynaecology and obstetrics, oncology, rheumatology, ophthalmology, haematology, general surgery and paediatrics. Some of the programme's training modules were given at IGC, benefiting greatly from the presence of these exceptional students, as well as from the contribution of visiting lecturers from some of the world's best centres.

An integral part of the efforts to provide continuing training for the Institute's researchers is the international seminar programme, which benefits from the participation of recognised world leaders in biomedicine. In 2008, just as in previous years, more than 200 guest scientists passed through IGC, many of whom were involved in the teaching of the doctoral programme courses. IGC is also a regular meeting point for scientists, who come here to take part in meetings, workshops and scientific conferences; in 2008, 20 international meetings took place at IGC, organised by its researchers.

## **Involvement of society in science**

In recognition of the role played by scientists in the fostering of informed discussions on scientific matters with non-scientific audiences, IGC continues to run a programme dedicated to the communication of science. The aims of this programme are to promote IGC's image and the research carried out at the Institute, as well as to encourage the involvement of society in scientific research and its funding. Through activities based on direct, two-way communication and dialogue, the programme for the communication of science is aimed at the media, teachers and students, the general public and special interest groups, such as patients' associations.

In 2008, IGC took part for the very first time in the European "Researchers' Night". Two thousand visitors participated in this initiative, financed by the European Commission, with the aim of bringing researchers and citizens closer together, in order to break away from the stereotypical image



JoceLyne Demengent

✦ Visitors to the IGC Open Day in October, 2008.

of scientists and bring them more into touch with society. An important feature of “Researchers’ Night” was the raising of funds for leukaemia research, through the organisation of a race, with people’s contributions being sent to the Portuguese Association Against Leukaemia.

Another partnership designed to encourage the participation of society in the funding of scientific research was set up with Everything is New, the promoters of the art and music event OptimusAlive!-Oeiras. This resulted in the award of two research scholarships in the area of biodiversity to two recent graduates selected on the basis of a national competition, enabling them to undertake one-year research projects at IGC and at research centres in Malaysia and London.

The third IGC Open Day was also held, with the Institute being visited by 1,100 people, who had the chance to get to know the research environment better, coming into contact with scientists and other members of IGC.

The programme of school visits was continued, with 25 visits and 805 secondary school students from the 9th to the 12th years visiting the Institute. Based on the reactions of both students and teachers, the aims of the visits – to bring students and teachers into direct contact with cutting-edge research and to encourage them to take up scientific careers – seem to have been achieved.

In 2008, the IGC newsletter, *Quinta Grande*, was launched. This is intended to be a privileged vehicle for the Institute’s internal and external communication with partners, supporters, other scientific research institutes, students and the general public.