08 annual report

Spanish National Research Council

GOBIERNO DE ESPAÑA

MINISTERIO DE CIENCIA E INNOVACIÓN

CSIC

08

Spanish National Research Council

Annual Report

GOBIERNO DE ESPAÑA
MINISTERIO DE CIENCIA E INNOVACIÓN
CSIC

Table of contents

Introduction

Rafael Rodrigo
President of the CSIC

Barely twenty years have passed since the English physicist Tim Berners-Lee came up with the idea of the World Wide Web while working at CERN, but its effects are being felt in almost every sphere of human activity, and it is even leading to the disappearance of venerable paper-based publications, such as the traditional Annual Report by the Spanish National Research Council (CSIC), which this year, for the first time, is being presented only in electronic format, following the guidelines laid down by the 2006-2009 Action Plan, which envisages the digitisation of all the CSIC's publications and internal communications.

Indeed, given that the CSIC has a website which is updated daily, the very concept of an "activity report" has lost some of its meaning; today it is possible to follow the institution's activities directly via the web, or on a day-to-day basis in the media.

One important milestone to mention in the institutional context, however, was that in 2008 the Executive Council, at its first meeting of the year on 19 February, enacted the new status of the CSIC as a State Agency, as envisaged in its statutes, which were passed by Royal Decree 1730/2007 on 21 December 2007. Over the course of the year the various collegiate bodies envisaged in the statutes have been brought into operation: the Executive Council, Control Commission, Interterritorial Commission, and various meetings have been held enabling them to perform the functions assigned to them.

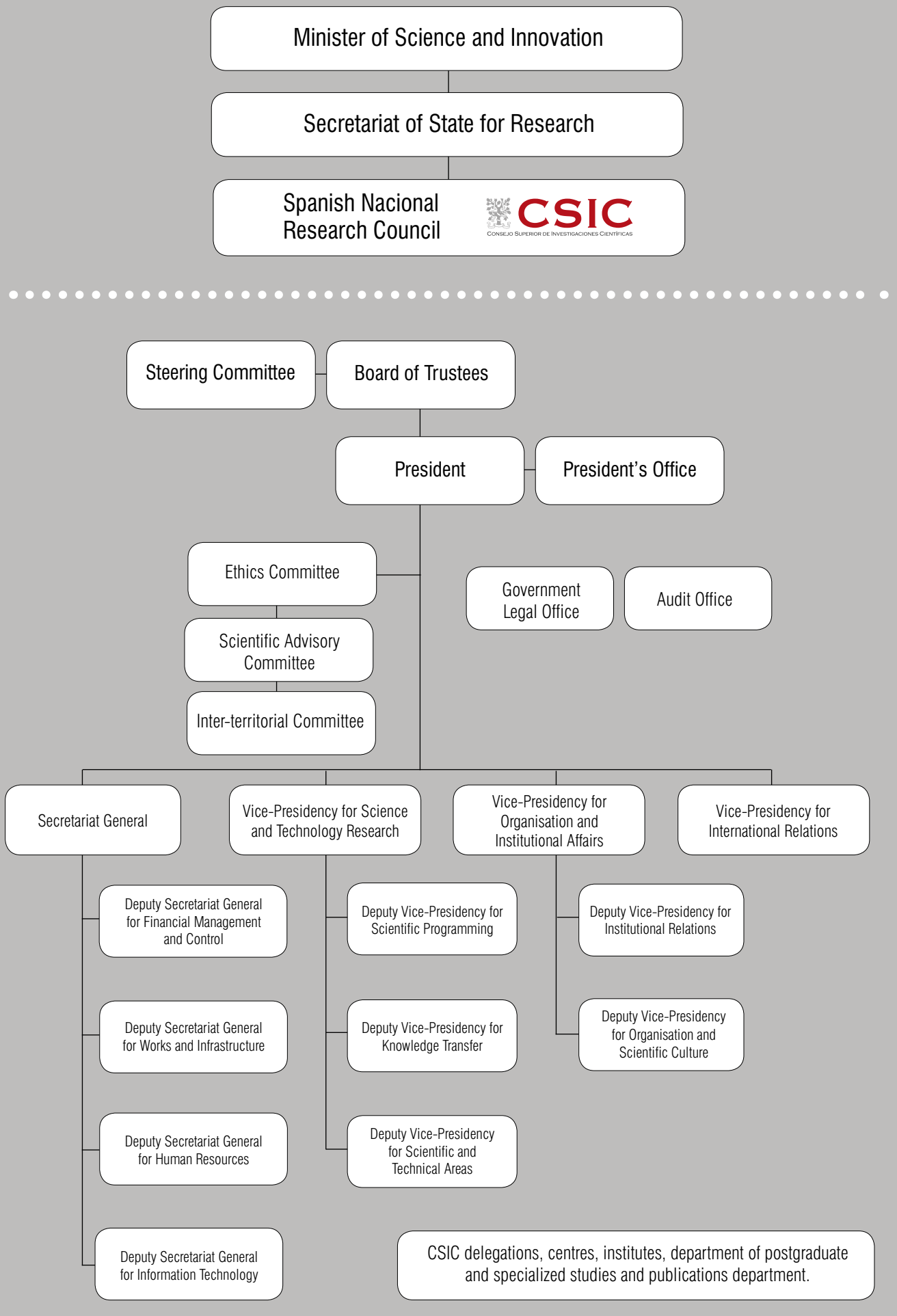
Another milestone was the start of the new 2010-2013 Action Plan, which has an external evaluation system similar to that used in the previous plan (2006-2009). For the first time this new Action Plan encompasses all the CSIC's functional units (Centres, Institutes, Horizontal Units and Scientific/Technical Infrastructures), representing another step forward in relation to the previous plan, which only included the Institutes and some of the Horizontal Units. This fact is another historic milestone, as it is the first time that the whole of an institution of the CSIC's characteristics is evaluated.

Also, as a result of the sustained increase in the budgetary allocations to R&D, it was possible to start building five new institutes, three of which belong to the biology and biomedicine area, one to Nanotechnology, another to Agrogenomics, as well as a large animal house, and to buy new premises in Brussels and Rome, lending support to the institution's internationalisation goals.

Another example of our activities in the service of the Spanish scientific community is the remodelling of the Juan Carlos I Antarctic Station, which is expected to be completed in time for the 2010-2011 season.

In relation to scientific and technical research, the summaries of the scientific/technical areas and those of the institutional coordinators describing some of the achievements of 2008 stand out. In a general way, the most important thing has undoubtedly been the fact that the organisation has continued increasing the quantity and quality of its scientific publications, its number of patents, projects, agreements and contracts, and has increased its human resources, both in terms of researchers and technical and management personnel. Altogether this has allowed us to continue to drive high quality research in Spain, generate new knowledge and transmit it to society, which in the final analysis, is what supports our work.

Thank you, then, to everyone, for the work done.


Minister of Science and Innovation
Secretariat of State for Research
Spanish Nacional Research Council
CSIC
Consejo Superior de Investigaciones Científicas
Steering Committee
Board of Trustees
President
President's Office
Ethics Committee
Scientific Advisory Committee
Inter-territorial Committee
Government Legal Office
Audit Office
Secretariat General
Vice-Presidency for Science and Technology Research
Vice-Presidency for Organisation and Institutional Affairs
Vice-Presidency for International Relations
Deputy Secretariat General for Financial Management and Control
Deputy Secretariat General for Works and Infrastructure
Deputy Secretariat General for Human Resources
Deputy Secretariat General for Information Technology
Deputy Vice-Presidency for Scientific Programming
Deputy Vice-Presidency for Knowledge Transfer
Deputy Vice-Presidency for Scientific and Technical Areas
Deputy Vice-Presidency for Institutional Relations
Deputy Vice-Presidency for Organisation and Scientific Culture
CSIC delegations, centres, institutes, department of postgraduate and specialized studies and publications department.

1 Organisation

MINISTER FOR SCIENCE AND INNOVATION

- Cristina GARMENDIA MENDIZÁBAL

STATE SECRETARY FOR RESEARCH

- Carlos MARTÍNEZ PÉREZ

EXECUTIVE BOARD

President
- Rafael RODRIGO MONTERO

Vice-President for Scientific and Technical Research
- Carmen PELÁEZ MARTÍNEZ

Vice-Presidency for Organisation and Institutional Relations
- Francisco Ramón MONTERO DE ESPINOSA FREIJO

Vice-President for International Relations
- Jose Juan SÁNCHEZ SERRANO

General Secretary
- Eusebio JIMÉNEZ ARROYO

Director of the President's Office
- Paz JUÁREZ HERRANZ

Assistant Vice-president for Scientific Programming
- Jose Vicente GARCÍA RAMOS

Assistant Vice-President for Technology Transfer
- José Luis de MIGUEL ANTÓN

Assistant Vice-President for Scientific Areas
- Juan José de DAMBORENEA GONZÁLEZ

Assistant Vice-President for Institutional Relations
- Rosina LÓPEZ-ALONSO FANDIÑO

Assistant Vice-President for Organisation and Scientific Culture
- Pilar TIGERAS SÁNCHEZ

Assistant General Secretary for Economic Affairs
- Carlos Manuel ABAD RUIZ

Assistant General Secretary for Works and Infrastructure
- Mª del Carmen GONZÁLEZ PEÑALVER

Assistant General Secretary for Human Resources
- Yolanda MARTÍNEZ SEVILLA

Assistant General Secretary for Computing
- Clara CALA RIVERO

Advisor to the Presidency
- Javier REY CAMPOS

Advisor of the Vice-Presidency for International Relations
- Maria Ángeles GÓMEZ RODRÍGUEZ

EXECUTIVE COUNCIL

President
- Rafael RODRIGO MONTERO

General Secretary for Science and Technology Policy
- José Manuel FERNÁNDEZ DE LABASTIDA Y DEL OLMO

Director-General for Planning and Coordination
- Juan José MORENO NAVARRO

Director General for the Promotion of Electronic Administration
- Juan Miguel MÁRQUEZ FERNÁNDEZ

Director-General for Industry
- Jesús CANDIL GONZALO

Director General for Advanced Therapies and Transplants
- Augusto SILVA GONZÁLEZ

Professor at the Computer Architecture Department. Polytechnic University of Catalonia
- Mateo VALERO CORTÉS

Researcher, Howard Hughes Medical Institute, New York (USA)
- Joan MASSAGUÉ SOLÉ

Director of the Max-Planck Institute of Quantum Optics, Garching (Germany)
- Ignacio CIRAC SASTURAIN

Director of Science Policy at the Gobierno Vasco (Basque Government)
- Alberto ANSUATEGI COBO

Director General for Research at the Government of Catalonia
- Ramón MORENO AMICH

Director General for International Cooperation
- Montserrat TORNÉ ESCASANY

Director General for Programmes and Knowledge Transfer
- Otilia MÓ ROMERO

Director General for Personnel Costs and Public Pensions
- Carmen ROMAN RIECHMANN

Director General of the Spanish Office of Climate Change
- Alicia MONTALVO SANTAMARÍA

General Manager of INGENASA
- Carmen VELA OLMO

CSIC Research Professor
- Mª Ángeles DURÁN HERAS

CSIC Research Professor
- Javier MARTÍNEZ DE SALAZAR BASCUÑANA

CSIC Tenured Scientist
- Emilio CRIADO HERRERO

CSIC Higher Scientific Officer
- Francisco LÓPEZ GRACIANI

Vice-Chancellor of Valencia University
- Francisco TOMÁS VERT

General Secretary of the CSIC
- Eusebio JIMÉNEZ ARROYO

SCIENTIFIC ADVISORY COMMITTEE

President of the CSIC
- Rafael RODRIGO MONTERO

Director of the CSIC's Chemical Technology Institute
- Avelino CORMA CANÓS

Technical General Secretary of ABENGOA, S.A.
- José DOMINGUEZ ABASCAL

Director of the CSIC Institute for Environmental Diagnostics and Water Studies
- Joan GRIMALT OBRADOR

Professor of Biochemistry and Molecular Biology. University of Oviedo
- Carlos LÓPEZ OTÍN

Computer Science Faculty. Montegancedo Campus, Madrid
- Manuel HERMENEGILDO SALINAS

Director General of the European Centre for Soft Computing (ECSC) Foundation
- Luis MAGDALENA LAYOS

Director of Fundación BBVA
- Rafael PARDO AVELLANEDA

General Manager for Technology, Refining, Marketing and LPG. Repsol-YPF, S.A. Madrid
- Eduardo ROMERO PALAZÓN

Deputy Director of the National Centre for Oncological Research
- María A. BLASCO MARHUEN

Vice Chancellor of the University of the Balearic Islands
- Montserrat CASAS AMETLLER

Lecturer at the University of Amsterdam
- Louise O. FRESCO

Deputy Vice-Chancellor for the European Higher Education Area at the Madrid Complutense University
- Covadonga LÓPEZ ALONSO

Scientific Director of Oryzon Genomics, Barcelona
- Tamara MAES

Research Professor at the Institute of Agrochemistry and Food Technology. CSIC.
- Amparo QUEROL SIMON

Researcher at the National Aerospace Technology Institute (INTA)
- Margarita YELA GONZÁLEZ

Scientific Researcher at the Madrid Materials Sciences Institute. CSIC.
- Pedro SERENA DOMINGO

CSIC Vice-President for Scientific and Technical Research
- Carmen PELÁEZ MARTÍNEZ

CSIC Vice-President for Organisation and Institutional Relations
- Francisco Ramón MONTERO DE ESPINOSA FREIJO

CSIC Vice-President for International Relations
- Jose Juan SANCHEZ SERRANO

Assistant Vice-President for the CSIC's Scientific Programming
- José Vicente GARCÍA RAMOS

Assistant Vice-President for Scientific/Technical Areas
- Juan José DE DAMBORENEA GONZÁLEZ

INTER-TERRITORIAL COMMITTEE

President of the CSIC
- Rafael RODRIGO MONTERO

Director of Science Policy at the Government of the Basque Region
- Alberto ANSUATEGI COBO

Director General for Research, Development and Innovation at the Galicia Regional Government
- Salustiano MATO DE LA IGLESIA

Secretary General for Universities, Research and Technology at the Andalusian Regional Government
- Francisco TRIGUERO RUIZ

Deputy councillor for Science and Technology at the Asturias Regional Government
- Herminio SASTRE ANDRÉS

Director General for Universities and Research at the Cantabrian Regional Government
- Andrés HOYO APARICIO

Director General for Innovation Government of La Rioja
- Javier UREÑA LARRAGÁN

Councillor for Education, Science and Research for the Government of the Murcia Region
- Juan Ramón MEDINA PRECIOSO

Deputy Councillor for Science and Technology at the Castile-La Mancha Regional Government
- Enrique DÍEZ BARRA

Director General of the Canary Islands Agency for Research, Innovation and the Information Society at the Government of the Canary Islands
- Juan RUIZ ALZOLA

Director General for Vocational Training and Universities at the Navarre Regional Government
- Pedro José GONZÁLEZ FELIPE

Commissioner for Universities and Research at the Department of Innovation, Universities and Enterprise of the Catalonia Regional Government
- Blanca PALMADA FÉLEZ

Regional Secretary for Universities and Science at the Valencia Regional Government
- Amparo CAMARERO OLIVAS

Technical General Secretary at the Department of Science, Technology and Universities at the Aragón Regional Government
- Rosa María BERNAL DELGADO

Director General for Universities and Research at the Madrid Regional Government
- Clara Eugenia NÚÑEZ ROMERO-BALMAS

Vice-President for Scientific and Technical Research
- Carmen PELÁEZ MARTÍNEZ

Assistant Vice-President for Organisation and Institutional Relations
- Rosina LÓPEZ-ALONSO FANDIÑO

Institutional Coordinator in the Madrid Region
- Pilar CANO DOLADO

Director General for Innovation and Business Competitiveness at the Extremadura Regional Government
- Jesús ALONSO SÁNCHEZ

Councillor for Economics, the Treasury and Innovation at the Government of the Balearic Islands
- Carles MANERA ERBINA

Director General for Universities and Research at the Regional Government of Castile-León
- Juan CASADO CANALES

CSIC Vice-President for Organisation and Institutional Relations
- Francisco Ramón MONTERO DE ESPINOSA FREIJO

CSIC Vice-President for International Relations
- José Juan SÁNCHEZ SERRANO

Assistant Vice-President for the CSIC's Scientific Programming
- José Vicente GARCIA RAMOS

Institutional Coordinator in Andalusia
- Fernando HIRALDO CANO

Institutional Coordinator in Aragón
- Mariano LAGUNA CASTRILLO

Institutional Coordinator in Castile-León
- Mariano SANCHEZ CRESPO

Institutional Coordinator in Catalonia
- Luis CALVO CALVO

Institutional Coordinator in Galicia
- Eugenio LABARTA FERNANDEZ

Institutional Coordinator in Valencia
- Antonio Pich ZARDOYA

Institutional Coordinator in the Balearic Islands
- Joaquín TINTORÉ SUBIRANA

General Secretary of the CSIC
- Eusebio JIMENEZ ARROYO

ETHICAL COMMITTEE

CSIC Research Professor
- Fernando BRIONES FERNÁNDEZ-POLA

CSIC Research Professor
- Manuel Reyes MATE RUPEREZ

CSIC Research Professor
- Pere PUIGDOMENECH ROSELL

Director General for Advanced Therapies and Transplants
- Augusto SILVA GONZÁLEZ

Ad honorem associated doctor at the CSIC
- Salvador DE AZA PENDÁS

CSIC Research Professor
- José Pío BELTRAN PORTER

CSIC Research Professor
- Miguel DELIBES DE CASTRO

CSIC Research Professor
- Manuela JUÁREZ IGLESIAS

CSIC Research Professor
- Carmen MIJANGOS UGARTE

Director of the CSIC's Medical Chemistry Institute
- Pilar GOYA LAZA

CSIC Higher Scientific Officer
- Mª Luisa SALAS GARCÍA

WOMEN AND SCIENCE COMMITTEE

President of the CSIC
- D. Rafael RODRIGO MONTERO

Assistant Vice-President for Scientific/Technical Areas
- D. Juan José DAMBORENEA GONZÁLEZ

CSIC Research Professor
- D. Felipe CRIADO BOADO

CSIC Research Professor
- Dª Mª Teresa ORTEGA MONASTERIO

CSIC Research Professor
- Dª Flora de PABLO DAVILA

CSIC Scientific Researcher
- Dª Joaquina ÁLVAREZ MARRÓN

CSIC Research Professor
- Dª Francisca SEVILLA VALENZUELA

CSIC Scientific Researcher
- Dª Francesca CAMPABADAL SEGURA

CSIC Scientific Researcher
- Dª Mª Jesús LÁZARO ELORRI

CSIC Research Professor
- Dª Alicia DURÁN CARRERA

CSIC Scientific Researcher
- Dª Mª Victoria MORENO ARRIBAS

CSIC Research Professor
- Dª Pilar NIEVA DE LA PAZ

CSIC Scientific Officer
- Dª Mª Luz MARTÍNEZ CANO

CSIC INSTITUTIONAL REPRESENTATION

Institutional Representation in Andalusia
D. Fernando Hiraldo Cano
Alfonso XII, 16
41002 Seville
Telf. 954.50.11.20 - Fax: 954.22.43.31

Institutional Representation in Aragón
D. Mariano Laguna Castrillo
Plaza Emilio Alfaro, 2-3
50003 – Saragossa
Telf. 976.46.96.08 - Fax: 976.46.96.09

Institutional Representation in the Canary Islands
D. Braulio Manuel Fraga González
Avda. Astrofísico Francisco Sánchez, 2
38205 La Laguna (Tenerife)
Telf. 922.25.17.28/25.21.44 - Fax: 922.26.01.35

Institutional Representation in Castile-León
D. Mariano Sánchez Crespo
Jesús Rivero Meneses, 2
47014 – Valladolid
Telf. 983.37.84.22 - Fax: 983.34.50.16

Institutional Representation in Catalonia
D. Luis Calvo Calvo
Egipciacas, 15
08001 – Barcelona
Telf. 93.442.65.76/442.91.23 - Fax: 93.442.74.24

Institutional Representation in Galicia
D. Eugenio Labarta Fernandez
Rua do Franco, 2
15701 – Santiago de Compostela (A Coruña)
Telf. 981.55.27.88 - Fax: 981.58.20.49

Institutional Representation in Madrid
Dª. Pilar Cano Dolado
Serrano, 113
28006 – Madrid
Telf. 91.585.53.44 - Fax: 91.585.52.97

Institutional Representation in Valencia
D. Antonio Pich Zardoya
Cronista Carreres, 11 – 2ºC
46003 – Valencia
Telf. 96.362.27.57 - Fax: 96.339.20.25

Institutional Representation in Rome
D. Ricardo Olmos Romera
Via di Torre Argentina, 18
00186 Rome (Italy)
Telf. 390668.10.00.21/23/24 - Fax: 390668.30.90.47

Institutional Representation in Brussels
D. Jorge Luis E. Velasco Gonzalez
Rue Trône, 62
1050 – Brussels (Belgium)
Telf: 32.2.2892562 - Fax: 32.2.2892565

ORGANISATION OF CENTRES AND INSTITUTES

Research Institutes and Centres

The Vice-Presidency for Organisation and Institutional Relations is responsible for the creation, elimination and restructuring of institutes and centres, and for the recognition of R&D units associated with the CSIC.

In 2008 the CSIC had 136 centres and institutions, of which 128 are research institutions (77 wholly CSIC-run centres and 51 joint centres). These are distributed throughout Spain, with the exception of 1 centre in Rome. Eight of these centres are Service Centres.

Joint Centres

These are Research Centres that are run jointly with other organisations and public or private institutions. In 2008 the CSIC had 51 joint centres in operation.

Associated Units

These are research units at public and private institutions which are associated with the CSIC through their research institutes and centres for a renewable three-year period. In 2008 the CSIC had 145 Associated Units, of which 9 began their links with the CSIC in that year and 22 had their agreements renewed.

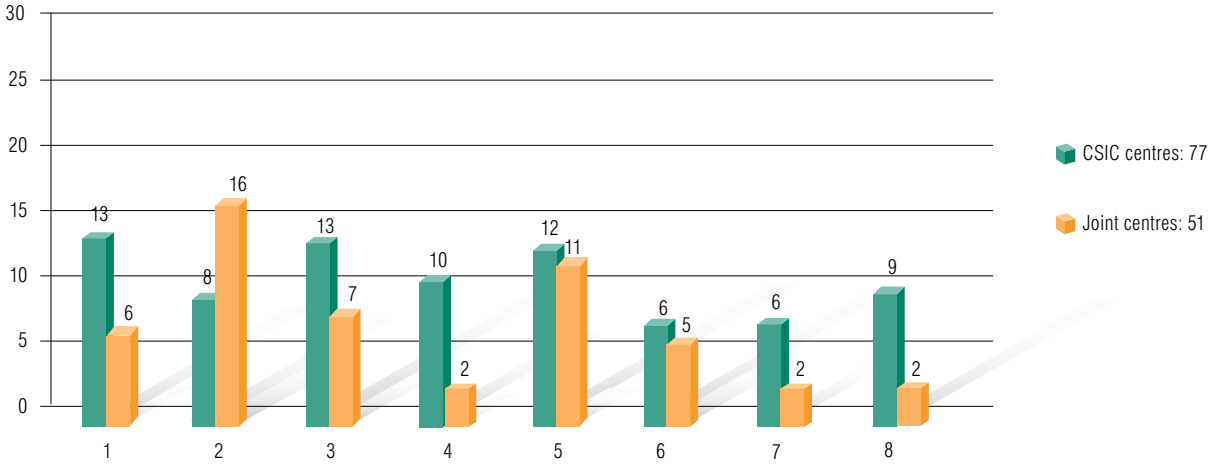
Service Centres

These are administrative and service centres that host a number of research institutions. In 2008 the CSIC had 9 service centres:

Service Centres

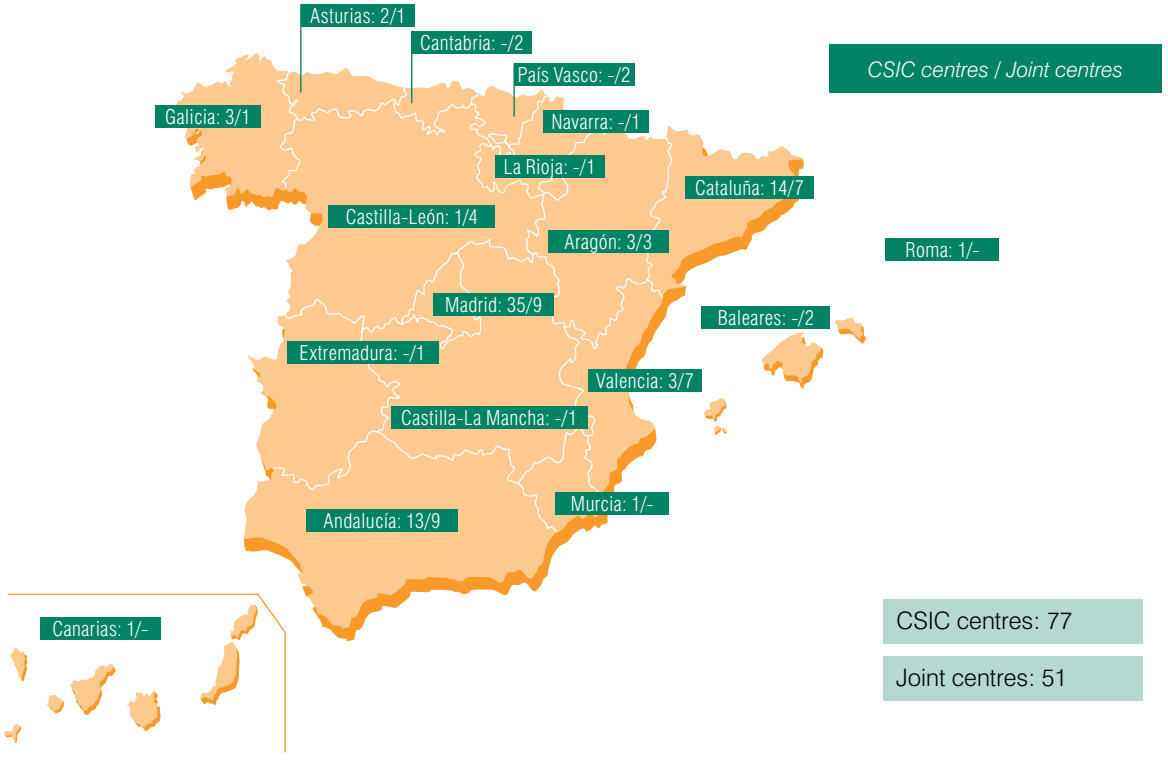
- The Isla Cartuja Scientific Research Centre (Centro de Investigaciones Científicas Isla Cartuja, CICIC), Sevilla, www.cartuja.csic.es
- The Environmental Sciences Centre (Centro de Ciencias Medioambientales, CCMA), Madrid, www.ccma.csic.es
- The Human and Social Sciences Centre (Centro de Ciencias Humanas y Sociales, CCHS), Madrid, www.cchs.es
- The Miguel A. Catalán Physics Centre (Centro Física Miguel A. Catalán, CFMAC), Madrid, www.cfmac.csic.es
- The National Microelectronics Centre (Centro Nacional de Microelectrónica, CNM), Barcelona, www.cnm.es
- The L. Torres Quevedo Physical Technology Centre (Centro de Tecnología Físicas L. Torres Quevedo, CETEF), Madrid, www.cetef.csic.es
- The Research and Development Centre (Centro de Investigación y Desarrollo, CID), Barcelona, www.cid.csic.es
- The Lora Tamayo Organic Chemistry Centre (Centro Química Orgánica Lora Tamayo, CENQUIOR), Madrid, www.cenquior.csic.es
- The Mediterranean Centre for Marine and Environmental Research (Centro Mediterráneo de Investigaciones Marinas y Ambientales, CMIMA), Barcelona, www.cmima.es

Own and joint research centres, by scientific-technical areas



1. Humanities and Social Sciences
2. Biology and Biomedicine
3. Natural Resources
4. Agricultural Sciences
5. Physical Sci. and Tech.
6. Materials Sci. and Tech.
7. Food Sci. and Tech.
8. Chemical Sci. and Tech.

Own and Joint research centres territorial distribution



LARGE SCIENTIFIC FACILITIES AND UNIQUE CENTRE

The CSIC's large scientific facilities are exceptional on account of their relatively high cost of investment and maintenance. This means that these facilities are made available to all scientists who need them for their research. The Ministry of Science and Innovation is responsible for classifying facilities as being of this type, and it keeps a register of large scientific facilities in Spain and of international facilities with Spanish participation. A number of these large facilities are managed by the CSIC. In 2008, the large scientific facilities for which the CSIC was responsible were:

The Spanish Juan Carlos I Antarctic Station

This large facility is being remodelled as it dates back to 1988 and was urgently in need of an upgrade. The project was completed in January 2008.

The project is based on four basic principles:

- **Maximum energy efficiency.** For this purpose a cogeneration system will be installed as a source of heat and power, complemented by systems using renewable energy sources.
- **Minimal environmental impact.** This is achieved through the generation and management of energy, near zero exterior maintenance and the improved quality of waste water leaving the site.
- Innovation, **using composite materials** for the external structure of the various modules and in the **treatment of waste water.**
- Making available installations that are up to the standard of research in Spain and which allow international cooperation to be strengthened.

The project, which has a budget of 11.58 million euros and is due to be completed within 36 months, was awarded to a consortium of three Spanish companies in early August. In parallel, the definitive Environmental Impact Assessment was conducted, in accordance with the Madrid Protocol on the protection of the Antarctic environment.

Implementation of the project involves close cooperation between the Marine Technology Unit (*Unidad de Tecnología Marina*, UTM) and the project staff with the Chilean Antarctic Institute (Inach), the Argentine Antarctic Directorate General (DGA) and technical staff from both Chile and Argentina.

Work to refurbish the foundations began during the 2008-2009 Antarctic season. The work is planned to be completed during the 2010-2011 season, provided the weather allows.

Some of the details of the project are:

Capacity of the new base: 24 people in individual rooms

Scope for future expansion to 45-50 people

New laboratory floor space: 223 m^2 (useable)

Communications: includes broadband

Volume of materials to transport: 5,000 m^3

Weight to transport: 3,500- 4,000 tonnes

Volume of materials to remove (current base): 1,500-2,000 m^3

Research work in the Spanish Juan Carlos I Antarctic Station.

In terms of its impact on research projects, the remodelling implies that it is necessary to dismantle most of the current modules to build the new ones. The new module occupies the same physical space as the existing ones, specifically the current habitation module, which houses the kitchen, toilets/bathrooms and dormitories. This means it is virtually impossible to remodel the base and continue research at the same time, as happened during the work on Hespérides half way through its useful life. To mitigate this situation two basic measures have been agreed with the National Plan Polar Programme:

- To give priority over a two year period to projects being run at the Gabriel de Castilla Base, with no new projects starting at the Juan Carlos I base.
- Maintain only "historical series" at the Juan Carlos I base. The aim is for the people responsible to visit only for the minimum time necessary to ensure maintenance and correct operation of the equipment. They will also utilise the journey to provisionally change the equipment currently in the scientific module. This operation began last year with the relocation of part of the meteorological station.

This is the best solution found, as not doing so would lead to a considerable delay, with the consequent negative impact on research work.

The Hespérides Oceanographic Vessel

The BIO Hespérides belongs to the Spanish navy. It is based in Cartagena, where it was built and also where it was launched on 12 March 1990. The research carried out on board is primarily directed and financed by the National R&D + innovation plan. The Marine Technology Unit (UTM) is responsible for maintenance of the vessel's scientific equipment and provides the technical and support personnel needed to run oceanographic surveys. The BIO Hespérides has performed numerous research surveys, covering over 300,000 nautical miles and hosting over a thousand researchers and technicians from Spain and abroad.

The Sarmiento de Gamboa Oceanographic Vessel

The oceanic research ship the Sarmiento de Gamboa, which was launched in 2006, is devoted to performing research in the waters of the Atlantic Ocean. It is therefore kitted out with a wide variety of scientific and technical equipment for oceanography, marine biology and geochemistry, together with laboratory and auxiliary equipment. It also incorporates the latest technology in advanced navigation systems (for example, dynamic positioning), and is the first Spanish oceanographic vessel to be able to work at great depth with ROVs (Remotely Operated Vehicle) and AUVs (Autonomous Underwater Vehicle). Through its Atlantic base at the UTM in Vigo, the CSIC is responsible for maintaining the ship's scientific equipment and providing technical personnel to support its oceanographic survey work.

The Hespérides Oceanographic Vessel.

The Sarmiento de Gamboa Oceanographic Vessel.

The National Microelectronics Centre Clean Room

The National Microelectronics Centre (Centro Nacional de Microelectrónica, CNM) clean room facilities are located at the CSIC's Institute of Microelectronics (Instituto de Microelectrónica) in Barcelona. These facilities are particularly well suited to R&D/innovation projects that require silicon device processing and characterisation. The organisation, management, and procedures of the clean room are well established and may be considered almost industrial. The centre also now has Nanofabrication Laboratory, which combines nanolithography tools with other technological processes available in the clean room for the fabrication of nanostructures, nanodevices, and nanosystems. Additionally, the specific technologies needed to create microsystems are available to the academic and industrial communities in the Microsystems Laboratory, which is purpose-designed for silicon micromachining techniques and corresponding characterisation processes.

Calar Alto Astronomy Centre

Located in the Sierra de los Filabres (Almería), the Centro Astronómico Calar Alto (Calar Alto Astronomy Centre) is managed jointly by the CSIC's Andalusian Astrophysics Institute, Granada, and the Heidelberg Institut für Astronomie (Max-Planck Society, Germany). The centre's large infrastructures include three telescopes with apertures of 1.23 m, 2.2 m and 3.5 m. The Calar Alto centre's characteristics make it the largest optical astronomy facility on the Spanish mainland.

The National Microelectronics Centre Clean Room.

Calar Alto Astronomy Centre.

European Synchrotron Radiation Laboratory (ESRF)

Located in Grenoble (France), the European Synchrotron Radiation Laboratory is a major European facility shared by 18 European countries. The ESRF operates Europe's most powerful synchrotron radiation source and each year plays host to thousands of researchers who visit it to conduct their experiments at the facility. Spain contributes 4% of the total budget. The CSIC is responsible for managing Spain's participation.

European Synchrotron Radiation Laboratory (ESRF).

Institut Laue-Langevin (ILL)

Located in Grenoble (France), the Institue Laue-Langevin is funded by 11 countries, including Spain. It was created in 1967 and it operates the most intense neutron source in the world together with a suite of 40 high-performance instruments. The ILL makes its facilities available to about 2000 visiting scientists coming from around the world every year to conduct over 900 experiments.

In addition to these acknowledged major facilities which are registered as such by the Ministry of Science and Innovation, the CSIC also has other unique installations of special interest and importance for the national scientific community. These include the Doñana Biological Reserve/Station near Seville, the Flora and Fauna collections of the Royal Botanical Garden and National Museum of Natural Sciences in Madrid, the Casa del Chapiz (School of Arab Studies, Granada), the Institución Milà i Fontanals (Barcelona), the Residencia de Estudiantes (Madrid), the Saharan Fauna Rescue Park, which is a part of the Arid Zone Experimental Station in Almería, the Galicia Biological Mission in Pontevedra, and the telescopes of the Sierra Nevada Observatory (Mohón del Trigo, Granada), which belong to the Andalusia Astrophysics Institute.

Institut Laue-Langevin (ILL).

Casa del Chapiz (Granada).

Royal Botanical Garden.

National Museum of Natural Sciences.

Residencia de Estudiantes (Madrid).

Doñana Biological Reserve / Station (Seville).

2

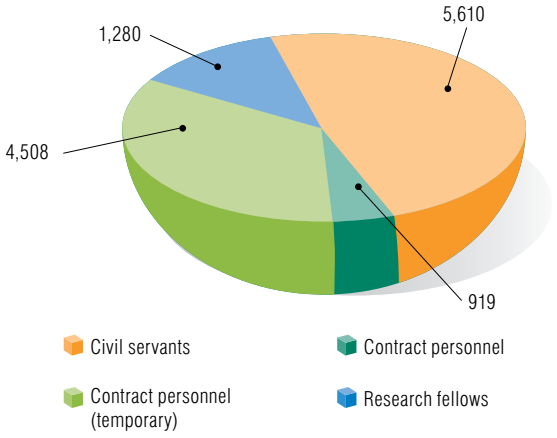
Human Resources

The Secretariat General for Human Resources, managed by the Secretariat General, is responsible for matters related to all CSIC personnel, as well as internal training of personnel, the social action programs and occupational safety.

Image: "Pelican nebula", by Tomás Mazón Serrano (Fotciencia 08)

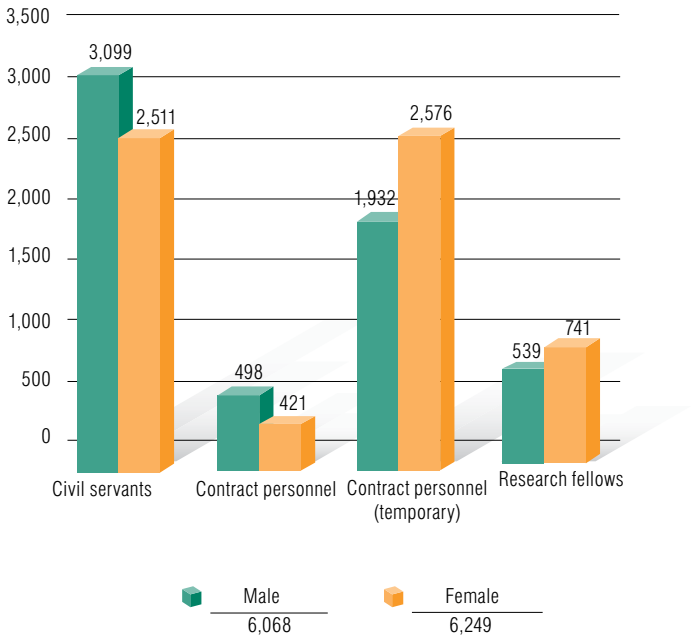
PERSONNEL

Staff distribution

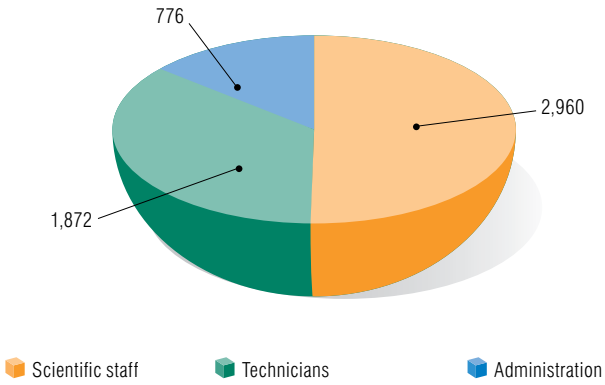


TOTAL	12,317

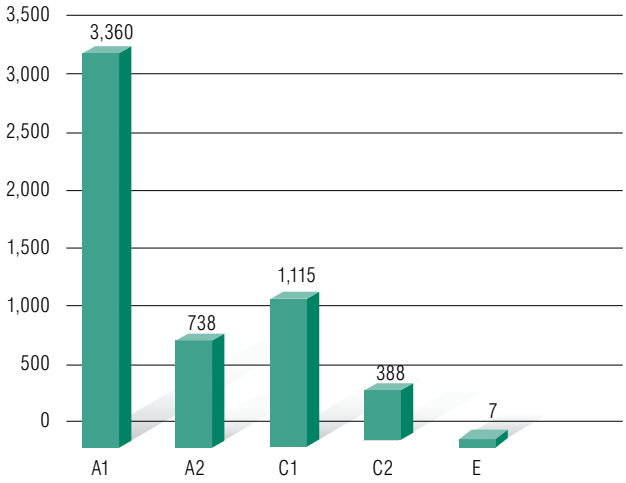
Staff distribution by gender/type



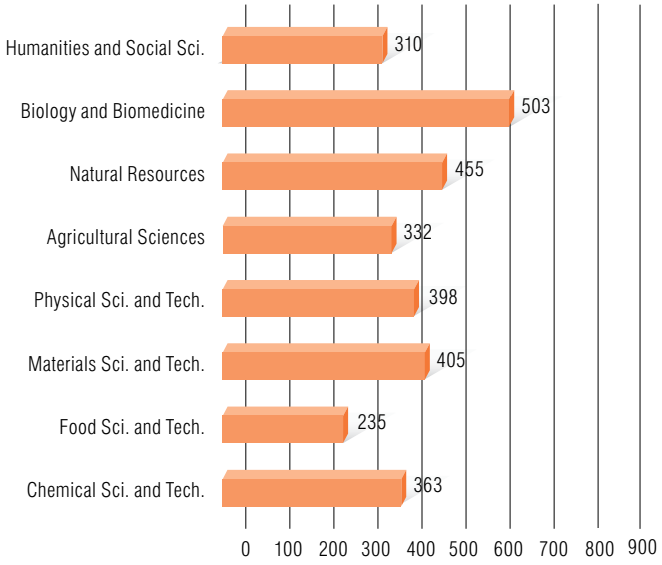
Civil servants. Distribution by type of personnel



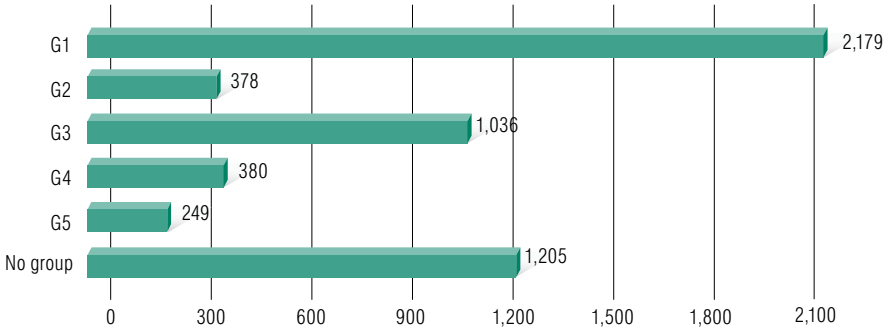
Civil servants. Distribution by group



Civil servants. Distribution by scientific areas



Contract Personnel. Distribution by professional group



SOCIAL ACTION

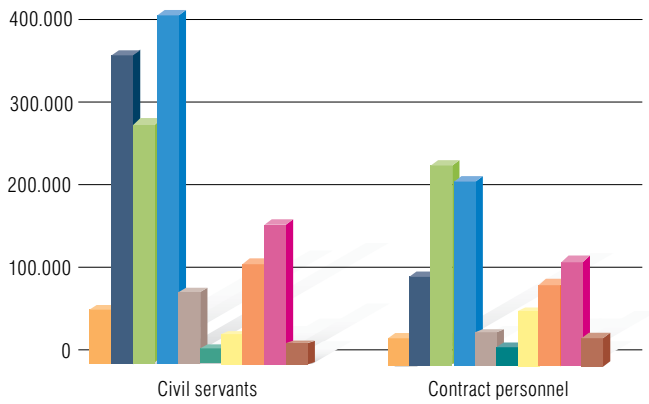
The Social Action Plan is devoted to financing actions and programmes of a social nature in order to improve the social well-being of the CSIC's public employees. The following categories of staff can apply for the aid established in the plan:

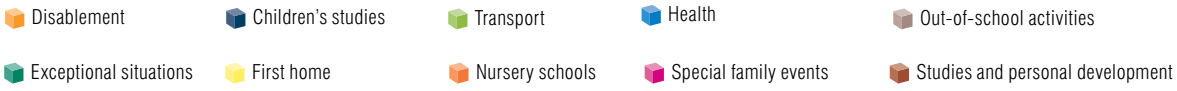
- Civil servants
- Employees on permanent contracts
- Employees on temporary contracts

The Plan was drawn up by the CSIC's Joint Social Action Commission following the general criteria set out in the Trade Union-Administration Agreements of 1991, 1994 and 2002, and by the General Joint Social Action Commission and was approved by the CSIC's decentralised board.

In 2008 the investment came to **€ 2,546,468.47**

Employees with civil servant status

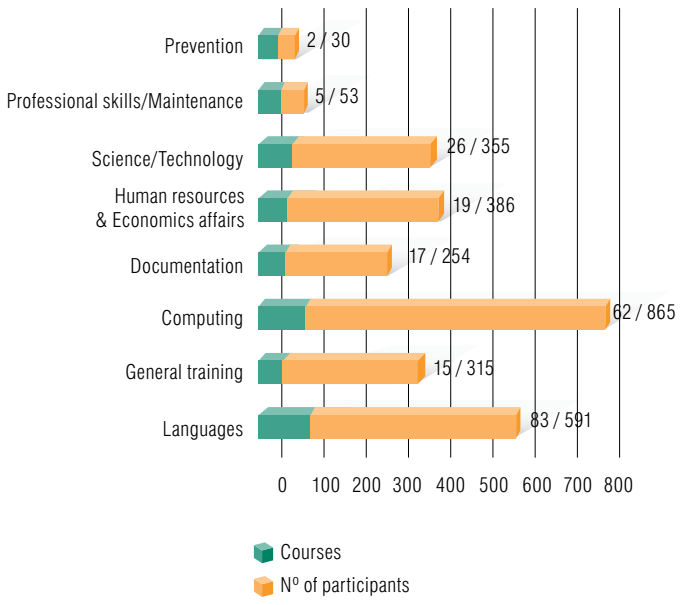




INTERNAL TRAINING

The CSIC's training plan is aimed at all the organisation's employees, including civil servants and contract employees, whether temporary or permanent. The overall aim is the on-going development of employees' personal qualifications and skills. This is pursued with a two-fold purpose: raising the quality of the services and activities undertaken by the organisation, and enabling all employees to improve their professional capabilities, while also promoting their personal development and facilitating their mobility and their opportunities for promotion within the administration. The Plan had a budget of € 747,634.08, of which € 407,000 was provided by the CSIC and € 340,634.08 was a subsidy from INAP for the implementation of on-going training plans for public sector employees.

Participants in training actions by themes



OCCUPATIONAL RISK PREVENTION AREA

OCCUPATIONAL RISK PREVENTION AREA - 2008		
INITIAL ASSESSMENTS		35
REVIEWS OF ASSESSMENTS		20
SPECIFIC EVALUATIONS		29
TRAINING ACTIVITIES		39
ACCIDENTS RECORDED	WITH TIME OFF WORK	131
	WITHOUT TIME OFF WORK	333
HEALTH MONITORING	MEDICAL ATTENTION	4576
	MEDICAL CHECK-UPS	307 (63% attendance out of 487 appointments)
	VACCINATIONS	329
	PSYCHO-SOCIAL EVALUATION	19
	EPIDEMIOLOGICAL STUDIES	6
	ASSESSMENT OF JOB CHANGES ON HEALTH GROUNDS	44 (16 due to pregnancies)
	STUDY OF OCCUPATIONAL ILLNESSES	16

Risk assessments

35 initial assessments, 20 revisions of assessments, 29 specific assessments.

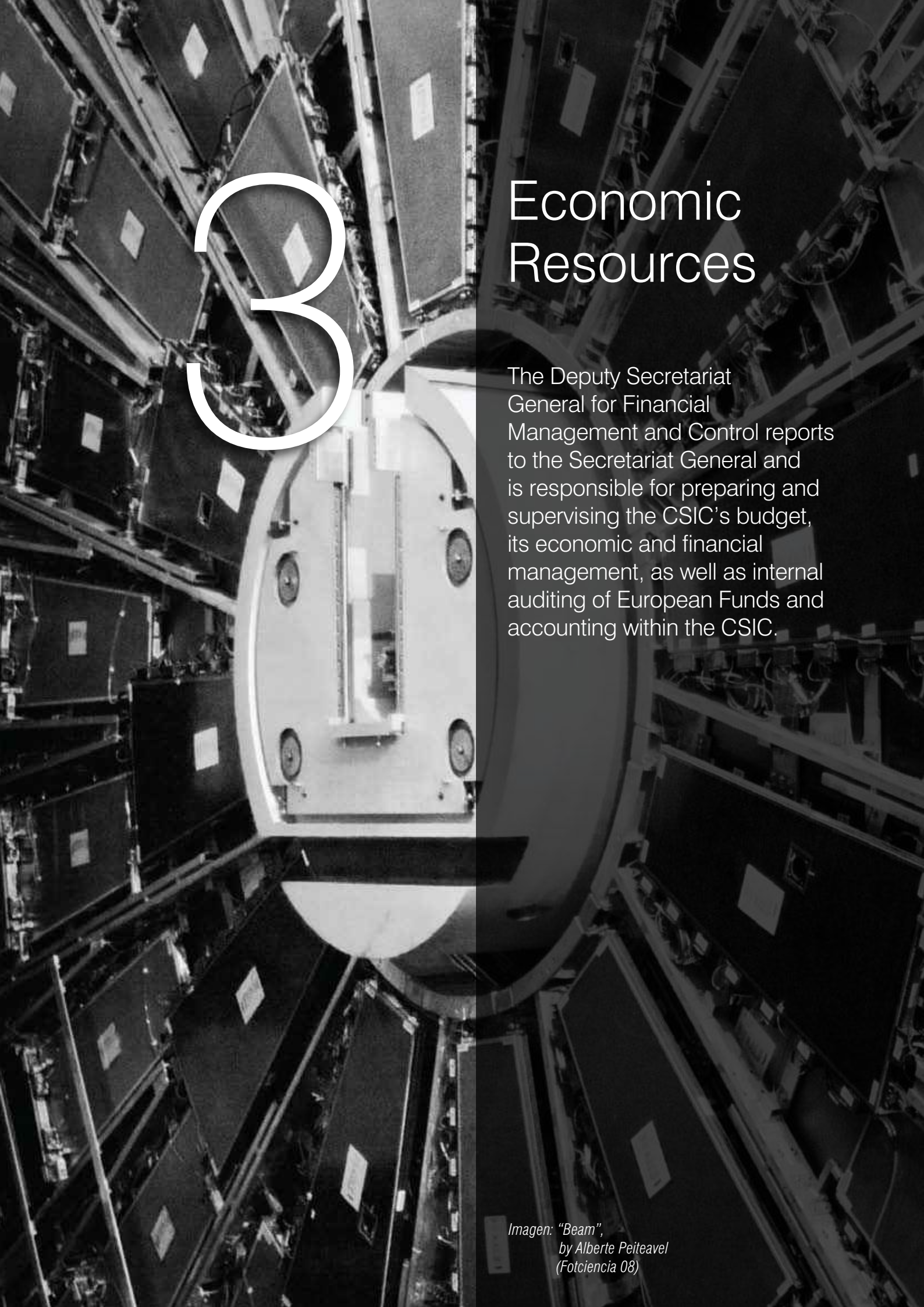
Accidents recorded

A total of 464 workplace accidents occurred in 2008, of which 131 resulted in time being taken off work.

Health Monitoring

This comprises a team of health-care practitioners whose aim is to conduct periodic monitoring of employees' health according to the risks inherent in their work.

- Medical attention was given in 4,576 instances.
- 307 medical check-ups were performed (63% attendance rate out of the 487 people given an appointment).
- 19 psycho-social assessments.
- 6 epidemiological studies.
- 329 vaccinations.
- 44 assessments of job changes on health grounds, 16 of which were due to pregnancies.
- 16 occupational illness studies.

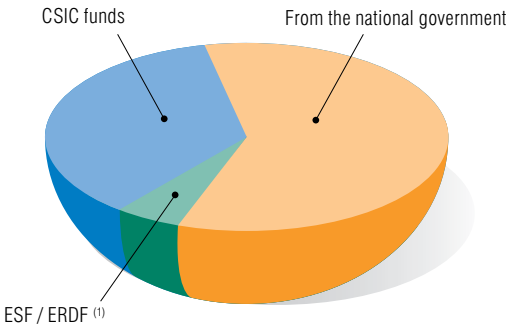


3 Economic Resources

The Deputy Secretariat General for Financial Management and Control reports to the Secretariat General and is responsible for preparing and supervising the CSIC's budget, its economic and financial management, as well as internal auditing of European Funds and accounting within the CSIC.

Imagen: "Beam", by Alberte Peiteavel (Fotciencia 08)

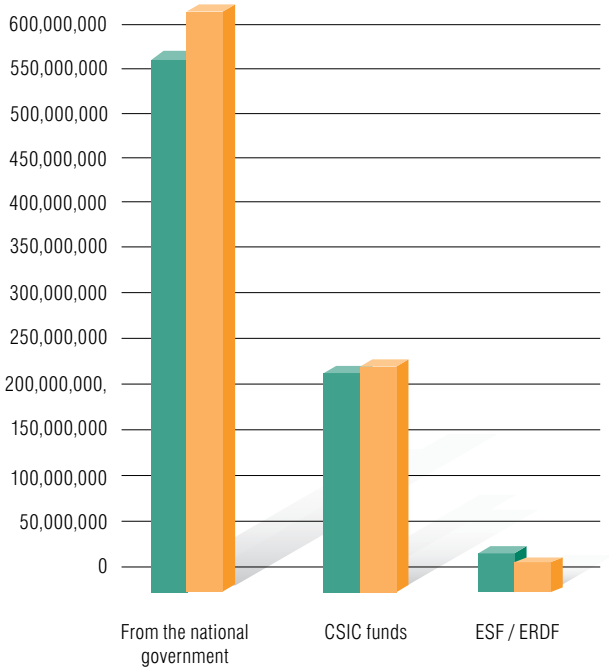
CSIC Funding 2008



Funding	TOTAL (€)	%
	621,953,677.62	70.74
	244,553,501.30	27.81
	12,713,039.32	1.45
Total	879,220,218.24	100

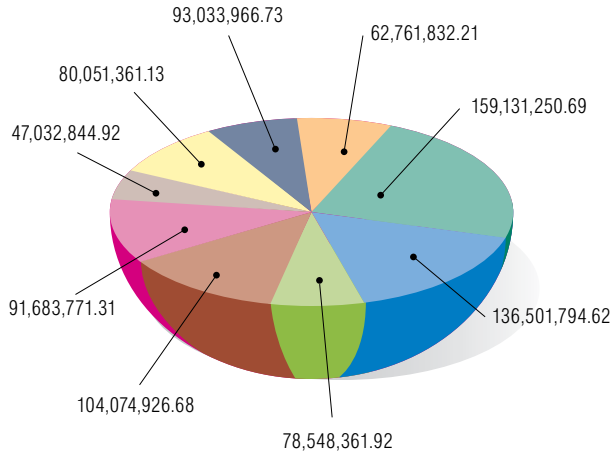
(1) ESF= European Social Fund
ERDF= European Regional Development Fund

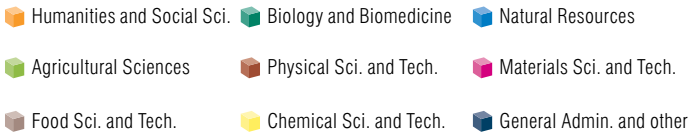
CSIC Funding 2007-2008 (€)



	2007		2008	
SOURCE	AMOUNT (€)	%	AMOUNT (€)	%
From National government	556,745,129.17	69.54	621,953,677.62	70.74
CSIC funds	212,856,644.03	26.59	244,553,501.30	27.81
ESF / ERDF	30,978,775.29	3.87	12,713,039.32	1.45
Total	800,580,548.49		879,220,218.24	

Distribution of expenditure by scientific area 2008 (€)

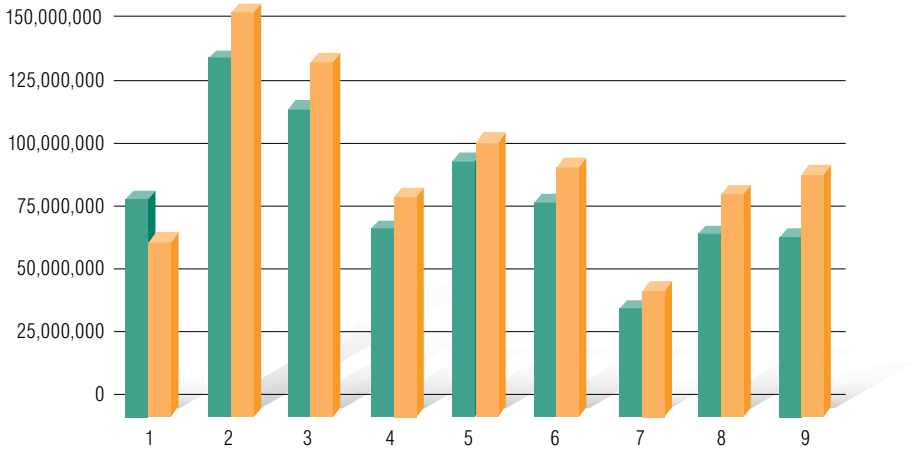




TOTAL	852,820,110.21 € *

* Competitive funds and funds from the national government

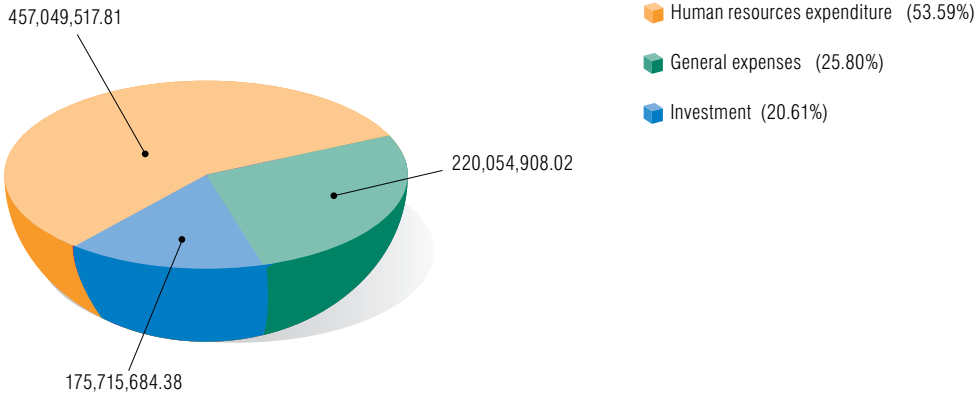
Distribution of expenditure by scientific area 2007-2008 (€)



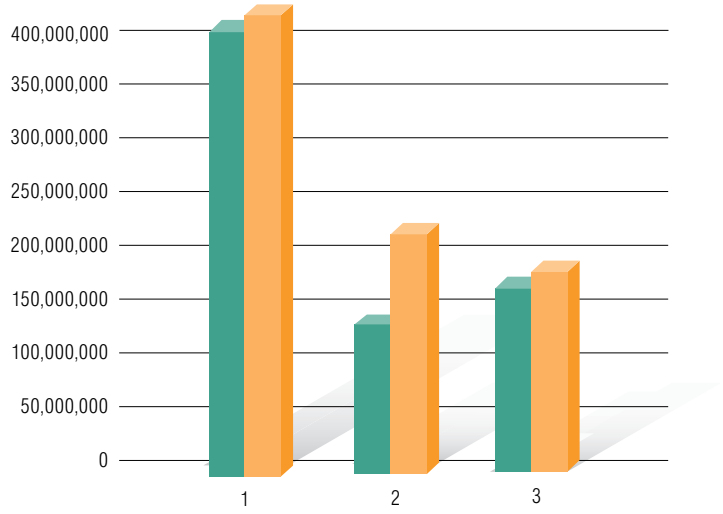
1. Humanities and Social Sciences
2. Biology and Biomedicine
3. Natural Resources
4. Agricultural Sciences
5. Physical Sci. and Tech.
6. Materials Sci. and Tech.
7. Food Sci. and Tech.
8. Chemical Sci. and Tech.
9. General Admin. and other

	2007	2008
Area	Expenditure (€)	Expenditure (€)
1,	78,252,845.52	62,761,832.21
2.	146,008,968.69	159,131,250.69
3.	118,203,460.26	136,501,794.62
4.	71,469,836.22	78,548,361.92
5.	97,689,304.09	104,074,926.68
6.	77,381,464.73	91,683,771.31
7.	35,261,173.3	47,032,844.92
8.	69,478,381.96	80,051,361.13
9.	68,195,267.55	93,033,966.73
Total	761,940,702.32	852,820,110.21

Distribution by type of expenditure 2008 (€)



Distribution by type of expenditure 2007-2008 (€)



1. Human resources expenditure
2. Current expenditure on goods and services
3. Investment

Type	2007 Total (€)	2008 Total (€)
1.	418,874,175.13	457,049,517.81
2.	175,089,861.34	220,054,908.02
3.	167,976,665.85	175,715,684.38
Total	761,940,702.32	852,820,110.21

Administrative budget 2008 (€)

State General Budget	2008					
	Initial budget	Modifications	Definitive budget	Recognised obligations	Available credit	Remainder from 2008 Budget
I	339,026,160.00	5,141,765.00	344,167,925.00	312,480,085.69	31,687,839.31	31,687,839.31
II	71,751,900.00	965,710.41	72,717,610.41	71,905,524.18	812,086.23	812,086.23
III	330.00	-	330.00	-	330.00	330.00
IV	7,010,420.00	483,377.08	6,527,042.92	5,991,714.93	535,327.99	535,327.99
VI	183,837,850.00	22,283,258.99	206,121,108.99	198,823,107.19	7,298,001.80	7,298,001.80
VII	14,945,240.00	1,048,589.38	15,993,829.38	14,383,326.22	1,610,503.16	1,610,503.16
VIII	644,890.00	-	644,890.00	141,566.44	503,323.56	503,323.56
IX	8,606,930.00	5,410,054.84	14,016,984.84	14,016,984.84	-	-
Total	**625,823,720.00**	**35,332,755.7**	**660,189,721.54**	**617,742,309.49**	**42,447,412.05**	**42,447,412.05**

Administrative budget 2007-2008 (€)

State General Budget	2007			2008		
	Definitive budget	Recognised obligations	Obligations as a % of total definitive budget	Definitive budget	Recognised obligations	Obligations as a % of total definitive budget
I	326,973,408.00	289,583,973.19	88.56	344,167,925.00	312,480,085.69	90.79
II	61,432,815.27	61,268,916.49	99.73	72,717,610.41	71,905,524.18	98.88
III	330.00	-	-	330.00	-	-
IV	5,178,267.90	5,145,324.72	99.36	6,527,042.92	5,991,714.93	91.80
VI	185,247,872.38	184,654,892.10	99.68	206,121,108.99	198,823,107.19	96.46
VII	17,958,010.00	17,950,881.69	99.96	15,993,829.38	14,383,326.22	89.93
VIII	5,822,870.00	134,415.28	2.31	644,890.00	141,566.44	21.95
IX	300,000.00	300,000.00	100.00	14,016,984.84	14,016,984.84	100.00
Total	**602,913,573.55**	**559,038,403.47**	**92.72**	**660,189,721.54**	**617,742,309.49**	**93.57**

Budgetary modifications 2008 (€)

Initial budget	625,823,720.00
Modifications	34,366,001.54
Definitive budget	**660,189,721.54**

Administrative budget 2007-2008 (€)

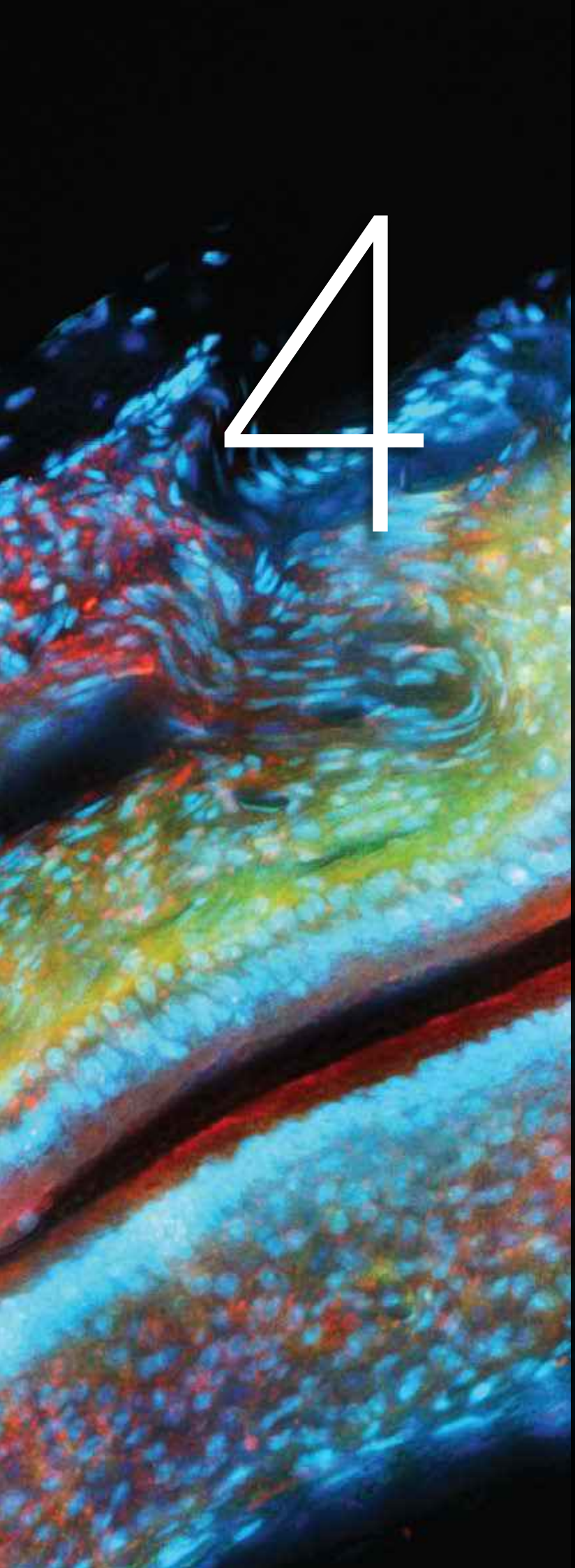
State General Budget	2007			2008		
	Definitive budget	Recognised obligations	Obligations as a % of total definitive budget	Definitive budget	Recognised obligations	Obligations as a % of total definitive budget
I	-	-	-	-	-	-
II	-	-	-	-	-	-
III	187,570.00	165,795.00	88.39	182,250.00	185,470.80	101.77
IV	368,335,920.00	368,614,286.57	100.08	390,922,045.00	391,303,426.74	100.10
V	30,539,311.17	1,654,550.94	5.42	39,750,709.84	-	-
VII	203,205,882.38	216,939,657.67	106.76	228,689,826.70	243,036,552.96	106.27
VIII	644,890.00	134,415.28	20.84	644,890.00	141,566.44	21.95
IX	-	215,199.00	-	-	-	-
Total	**602,913,573.55**	**587,723,904.46**	**97.48**	**660,189,721.54**	**634,667,016.94**	**96.13**

Commercial operations 2007-2008 (€)

	Importes
Prepaid income from previous year	245,865,929.56
Cancelled rights from previous years	-56,651.08
Rights recognised during the year	283,209,936.72
Payments collected in advance and passed to next year	-284,465,713.90
Commercial Income	244,553,501.30
Commercial expenses	235,077,800.72
Earnings from Commercial Operations	**9,475,700.58**

Summary of CSIC operating budget 2008 (€)

Administrative budget			
Recognised rights	634,667,016.94	Recognised obligations	617,742,309.49
Commercial operations			
Income	244,553,501.30	Expenses	235,077,800.72
TOTAL	**879,220,518.24**		**852,820,110.21**



4

Scientific Activity

National

The Deputy Vice-Presidency for Scientific Programming is run by the Vice- Presidency for Science and Technology. This division handles and manages the research projects presented by CSIC research personnel to the calls by National, Sectorial and Regional Plans, as well as Special Actions and Complementary Actions for Infrastructure. The Division is also in charge of maintaining and updating the CSIC database on scientific activity, coordinating prospective studies and analysis, as well as evaluating productivity of research personnel.

International

The Vice-Presidency for International Relations, under the Vice-Presidency for Organisation and Institutional Affairs, is the unit responsible for the international scientific policy. Its Departments for Bilateral and Multilateral Relations and European Communities manage the programmes for international cooperation, exchange of researchers with other institutions, as well as contracts and projects from the EU Frame Programmes or any other issue in the international context.

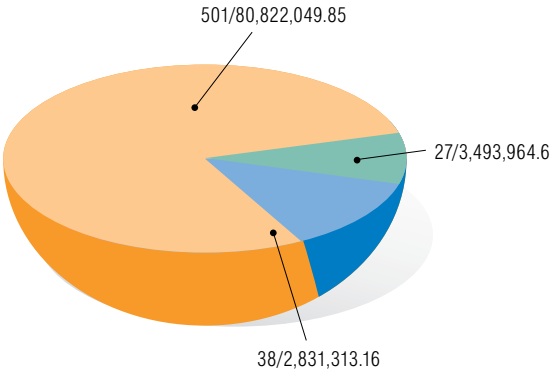
Image: "Vomero-nebulosa", by Carlos de la Rosa Prieto (Fotciencia 08)

NATIONAL SCIENTIFIC ACTIVITY

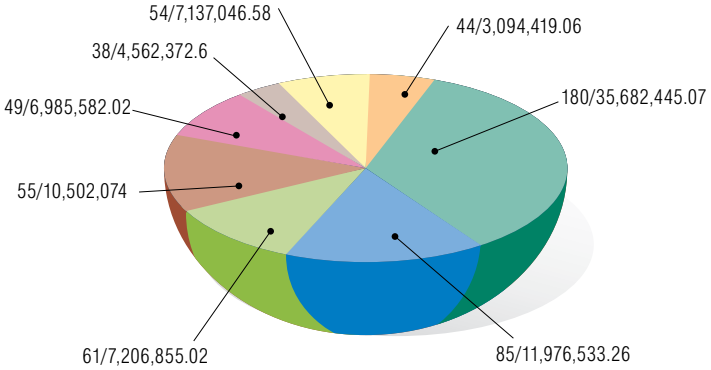
Projects approved 2008

Total projects	566

Total funding (€)	87,147,327.61



Projects/Funding (€)



Projects/Funding (€)

R&D Programmes

National Programmes
Health research
Reg. Gov.

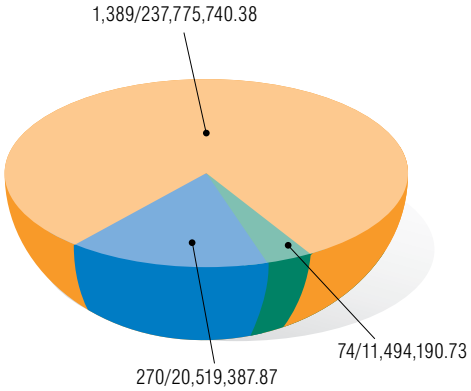
Scientific Areas

Humanities and Social Sci.
Biology and Biomedicine
Natural Resources
Agricultural Sciences
Physical Sci. and Tech.
Materials Sci. and Tech.
Food Sci. and Tech.
Chemical Sci. and Tech.
Central Organisation

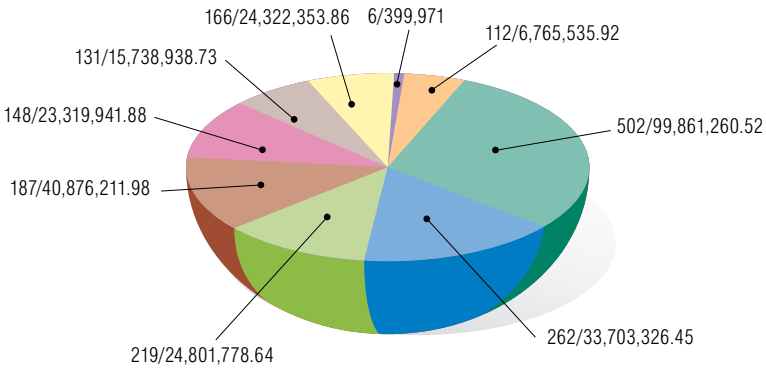
Projects in progress in 2008

Total projects	1,733

Total funding (€)	269,789,318.98



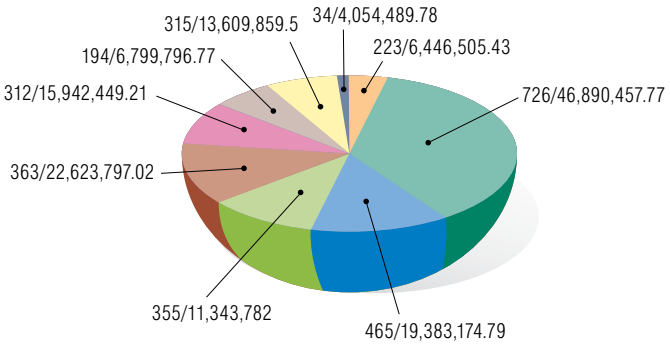
Projects/Funding (€)



Projects/Funding (€)

Total funding (internal and external)

Total actions	2,987
Financing 2008 (€)	147,094,312.27

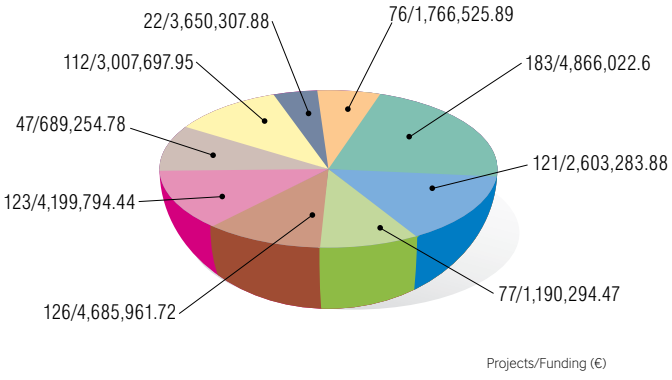


Area	Internal funding %	External funding %	Total funding %
1.	6.63%	3.89%	4.38%
2.	18.25%	34.89%	31.88%
3.	9.77%	13.93%	13.18%
4.	4.46%	8.43%	7.71%
5.	17.58%	14.89%	15.38%
6.	15.75%	9.75%	10.84%
7.	2.59%	5.07%	4.62%
8.	11.28%	8.80%	9.25%
9.	13.69%	0.34%	2.76%

1. Humanities and Social Sci. 2. Biology and Biomedicine 3. Natural Resources 4. Agricultural Sciences 5. Physical Sci. and Tech.
6. Materials Sci. and Tech. 7. Food Sci. and Tech. 8. Chemical Sci. and Tech. 9. Central organisation

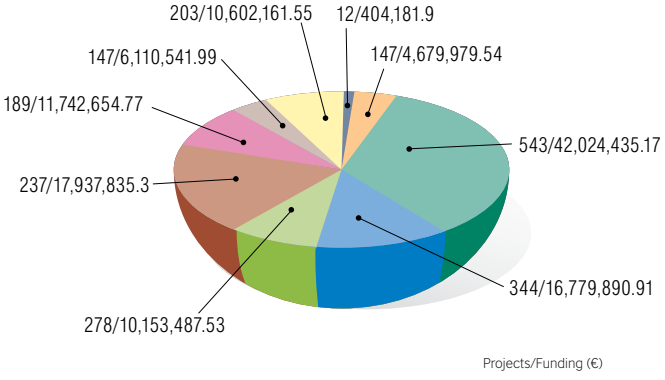
Internal funding (Special Actions & "In-house" Projects)

Total actions	887
Annual total for 2008 (€)	26,659,143.61



External funding (Special Actions & Research Projects)

Total actions	2.100
Annual total for 2008 (€)	120,435,168.66



Projects approved by R&D Programmes

R&D PROGRAMME	Projects	Total funding (€)	Total annual 2008 (€)
INV.FUND.NO ORIENTADA.- BIOMEDICINE	45	10,488,280.04	5,338,752.28
INV.FUND.NO ORIENTADA.- BIOTECHNOLOGY	34	7,073,660.05	4,904,521.49
INV.FUND.NO ORIENTADA.- POLITICAL SCIENCE, SOCIOL. & GEOGRAPHY.	1	67,760.00	8,131.20
INV.FUND.NO ORIENTADA.- SOCIAL SCIENCES	8	701,800.04	343,213.23
INV.FUND.NO ORIENTADA.- ECONOMICS	6	759,275.02	258,500.27
INV.FUND.NO ORIENTADA.- ENERGY	9	921,536.00	819,440.28
INV.FUND.NO ORIENTADA.- PHILOLOGY AND PHILOSOPHY	11	696,597.00	306,645.72
INV.FUND.NO ORIENTADA.- PHYSICS	12	1,363,670.00	758,537.76
INV.FUND.NO ORIENTADA.- PARTICLE PHYSICS	6	2,188,527.00	1,242,604.78
INV.FUND.NO ORIENTADA.- HISTORY AND ART	16	673,002.00	604,236.47
INV.FUND.NO ORIENTADA.- MATHEMATICS	4	356,587.00	257,223.08
INV.FUND.NO ORIENTADA.- AGROFOODS RESOURCES AND TECHNOLOGIES	71	9,241,980.06	7,523,516.30
INV.FUND.NO ORIENTADA.- ASTRONOMY AND ASTROPHYSICS	13	3,449,710.00	3,758,582.42
INV.FUND.NO ORIENTADA.- BIODIVERSITY, EARTH SCI. & GLOBAL CHANGE	60	8,298,906.01	4,518,979.65
INV.FUND.NO ORIENTADA.- FUNDAMENTAL BIOLOGY	82	17,348,980.08	13,150,832.33
INV.FUND.NO ORIENTADA.- CHEMICAL SCIENCES AND TECHNOLOGIES	28	3,756,808.00	2,462,841.68
INV.FUND.NO ORIENTADA.- CONSTRUCTION	2	204,248.00	261,120.00
INV.FUND.NO ORIENTADA.- INDUSTRIAL DESIGN AND PRODUCTION	6	1,005,631.00	865,203.72
INV.FUND.NO ORIENTADA.- MATERIALS	44	6,527,950.02	4,018,413.68
INV.FUND.NO ORIENTADA.- MEANS OF TRANSPORT	1	42,350.00	32,186.00
INV.FUND.NO ORIENTADA.- ELECTRONICS AND COMMUNICATIONS TECH.	8	2,004,728.00	407,976.19
INV.FUND.NO ORIENTADA.- ENVIRONMENTAL SCI. & TECHNOLOGIES	17	2,804,659.02	963,950.42
CONSERVATION AGROFOODS GENETIC RESOURCES	11	331,897.20	198,015.15
HEALTH-CARE RESEARCH FUND	27	3,493,964.60	1,940,639.45
REGIONAL RTD PLAN	1	23,375.00	5,720.00
ARAGON GOVT. CALL FOR PROPOSALS	4	189,333.00	107,777.75
GALICIA RESEARCH PROMOTION	11	887,722.90	439,896.32
PROMOTION OF EQUAL OPPORTUNITIES FOR MEN AND WOMEN	1	2,000.00	2,000.00
FUNDACION SENECA	1	30,000.00	13,800.00
FUNDACION INVEST. MEDICA MUTUA MADRILEÑA	1	17,430.00	8,715.00
FOUNDATIONS	1	75,000.00	49,000.00
ANDALUSIA RESEARCH PLAN	1	101,000.00	116,083.78
ASTURIAS REGIONAL RESEARCH PLAN	5	367,785.96	248,780.36
ASTURIAS SCI., TECH. & INNOV. PLAN 2008-2010 AID	4	872,666.00	286,675.00
ALZHEIMER'S & RELATED DISEASES RESEARCH PROJ. AID	6	240,000.30	88,864.20
CASTILE-LEON RESEARCH PROJ. PROGRAMME	3	27,000.00	27,000.00
ENERGY & CLIMATE CHANGE RESEARCH, DEV. & INNOV. PROJ (P.N.I.C.D.I.T.)	1	84,000.00	22,000.00
NATIONAL PARKS SUBSECTOR	4	427,508.31	240,263.32
Total	**566**	**87,147,327.61**	**56,600,639.28**

Summary of projects approved by R&D Programmes

R&D PROGRAMME	Projects	Total funding (€)
NATIONAL PROGRAMMES	501	80,822,049.85
HEALTH RESEARCH	27	3,493,964.60
REGIONAL GOVERNMENT	38	2,831,313.16
Total	**566**	**87,147,327.61**

Projects approved by scientific area

AREA	Projects	Total funding (€)
HUMANITIES AND SOCIAL SCIENCES	44	3,094,419.06
BIOLOGY AND BIOMEDICINE	180	35,682,445.07
NATURAL RESOURCES	85	11,976,533.26
AGRICULTURAL SCIENCES	61	7,206,855.02
PHYSICAL SCIENCES AND TECHNOLOGY	55	10,502,074.00
MATERIALS SCIENCES AND TECHNOLOGY	49	6,985,582.02
FOOD SCIENCES AND TECHNOLOGY	38	4,562,372.60
CHEMICAL SCIENCES AND TECHNOLOGY	54	7,137,046.58
Total	**566**	**87,147,327.61**

Special actions approved in 2008 by scientific area

	National Plans		Regional Programmes et al.		Total		
AREA	Actions	Total Funding (€)	Actions	Total Funding (€)	Actions	Total Funding (€)	%Total Funding
HUMANITIES AND SOCIAL SCIENCES	14	158,600.00	14	1,083,050.00	28	1,241,650.00	15%
BIOLOGY AND BIOMEDICINE	9	196,000.00	8	184,008.00	17	380,008.00	5%
NATURAL RESOURCES	21	1,174,526.00	22	533,150.22	43	1,707,676.22	21%
AGRICULTURAL SCIENCES	6	47,000.00	38	421,464.18	44	468,464.18	6%
PHYSICAL SCIENCES AND TECHNOLOGY	18	1,609,196.00	11	172,197.00	29	1,781,393.00	22%
MATERIALS SCIENCES AND TECHNOLOGY	8	863,889.33	11	232,583.04	19	1,096,472.37	13%
FOOD SCIENCES AND TECHNOLOGY	8	202,561.00	7	212,292.00	15	414,853.00	5%
CHEMICAL SCIENCES AND TECHNOLOGY	10	675,802.00	14	211,824.00	24	887,626.00	11%
CENTRAL Organisation	4	122,000.00	2	22,000.00	6	144,000.00	2%
TOTAL	**98**	**5,049,574.33**	**127**	**3,072,568.44**	**225**	**8,122,142.77**	**100%**

CSIC Scientific Programme 2008

	Special Actions		"In-house" projects		Confinanded projects (CM -CSIC)		Total		
AREA	Actions	Total Funding (€)	Actions	Total Funding (€)	Actions	Total Funding (€)	Actions	Total Funding (€)	% Total Funding
HUMANITIES AND SOCIAL SCIENCES	1	50,000.00	74	1,692,375.89	1	24,150.00	76	1,766,525.89	7%
BIOLOGY AND BIOMEDICINE	7	199,391.81	162	4,300,630.79	14	366,000.00	183	4,866,022.60	18%
NATURAL RESOURCES	7	184,252.36	112	2,355,781.52	2	63,250.00	121	2,603,283.88	10%
AGRICULTURAL SCIENCES	7	109,473.20	68	1,028,621.27	2	52,200.00	77	1,190,294.47	4%
PHYSICAL SCIENCES AND TECHNOLOGY	7	138,898.53	115	4,449,663.19	4	97,400.00	126	4,685,961.72	18%
MATERIALS SCIENCES AND TECHNOLOGY	10	253,901.70	105	3,700,742.74	8	245,150.00	123	4,199,794.44	16%
FOOD SCIENCES AND TECHNOLOGY	0	-	45	649,754.78	2	39,500.00	47	689,254.78	3%
CHEMICAL SCIENCES AND TECHNOLOGY	7	145,264.65	101	2,750,083.30	4	112,350.00	112	3,007,697.95	11%
CENTRAL Organisation	4	68,782.00	18	3,581,525.88	0	-	22	3,650,307.88	14%
TOTAL	**50**	**1,149,964.25**	**800***	**24,509,179.36**	**37**	**1,000,000.00**	**887**	**26,659,143.61**	**100%**

*Includes projects financed by CSIC and CSIC-13 Fund.

Projects in effect in 2008 by R&D Programme

R&D PROGRAMME	Projects	Total funding (€)	Total annual 2008 (€)
NATIONAL BIOMEDICINE PROGRAMME	83	20,928,039.00	5,224,867.47
NATIONAL MEANS OF TRANSPORT PROGRAMME	3	212,213.39	48,527.11
NATIONAL BIODIVERSITY, EARTH SCI. & GLOBAL CHANGE PROGRAMME	91	12,126,483.27	2,700,539.14
NATIONAL ASTRONOMY AND ASTROPHYSICS PROGRAMME	15	3,148,904.00	579,733.02
NATIONAL FUNDAMENTAL BIOLOGY PROGRAMME	119	25,369,953.53	5,550,012.99
NATIONAL BIOTECHNOLOGY PROGRAMME	52	12,663,134.00	2,925,694.35
NATIONAL SOCIAL SCIENCE, ECONOMICS & JURISPRUDENCE PROGRAMME	12	1,109,812.00	299,962.99
NATIONAL ENVIRONMENTAL SCIENCE AND TECHNOLOGY PROGRAMME	34	5,916,900.00	1,451,994.83
NATIONAL CHEMICAL SCIENCE AND TECHNOLOGY PROGRAMME	49	6,800,442.00	1,675,829.92
NATIONAL INDUSTRIAL DESIGN AND PRODUCTION PROGRAMME	10	1,330,274.00	350,586.09
NATIONAL ENERGY PROGRAMME	9	1,311,277.00	278,345.13
NATIONAL PHYSICS PROGRAMME	22	2,825,515.77	823,690.83
NATIONAL PARTICLE PHYSICS PROGRAMME	13	6,639,521.68	1,362,654.02
NATIONAL HUMANITIES PROGRAMME	46	2,104,432.00	567,499.48
NATIONAL CONSTRUCTION PROGRAMME	12	1,517,756.03	399,223.50
NATIONAL MATHEMATICS PROGRAMME	3	454,960.00	109,190.40
NATIONAL MATERIALS PROGRAMME	79	15,505,545.00	4,046,269.21
NATIONAL AGROFOODS RESOURCES AND TECHNOLOGIES PROGRAMME	137	19,991,620.00	3,366,063.52
NATIONAL ELECTRONICS & COMMUNICATIONS TECHNOLOGY PROGRAMME	25	4,083,508.00	999,539.83
NATIONAL INFORMATION SOCIETY SERVICES TECHNOLOGY PROGRAMME	1	61,710.00	12,342.00
NATIONAL INFORMATION TECHNOLOGIES PROGRAMME	6	671,550.00	226,608.80
NATIONAL SPACE PROGRAMME	13	8,301,810.00	1,602,979.54
INV.FUND.NO ORIENTADA.- BIOMEDICINE	45	10,488,280.04	7,650,412.23
INV.FUND.NO ORIENTADA.- BIOTECHNOLOGY	34	7,073,660.05	5,423,712.23
INV.FUND.NO ORIENTADA.- POLITICAL SCI., SOCIOLOGY & GEOGRAPHY	1	67,760.00	51,497.60
INV.FUND.NO ORIENTADA.- SOCIAL SCIENCES	8	701,800.04	506,448.46
INV.FUND.NO ORIENTADA.- ECONOMICS	6	759,275.02	332,413.47
INV.FUND.NO ORIENTADA.- ENERGY	9	921,536.00	740,747.48
INV.FUND.NO ORIENTADA.- PHILOLOGY AND PHILOSOPHY	11	696,597.00	529,413.72
INV.FUND.NO ORIENTADA.- PHYSICS	12	1,363,670.00	1,102,368.08
INV.FUND.NO ORIENTADA.- PARTICLE PHYSICS	6	2,188,527.00	1,547,282.66
INV.FUND.NO ORIENTADA.- HISTORY AND ART	16	673,002.00	500,571.23
INV.FUND.NO ORIENTADA.- MATHEMATICS	4	356,587.00	271,006.12
INV.FUND.NO ORIENTADA.- AGROFOODS RESOURCES AND TECHNOLOGIES	71	9,241,980.06	7,475,993.39
INV.FUND.NO ORIENTADA.- ASTRONOMY AND ASTROPHYSICS	13	3,449,710.00	3,061,883.70
INV.FUND.NO ORIENTADA.- BIODIVERSITY, EARTH SCI. & GLOBAL CHANGE	60	8,298,906.01	6,086,406.17
INV.FUND.NO ORIENTADA.- FUNDAMENTAL BIOLOGY	82	17,348,980.08	12,126,513.96
INV.FUND.NO ORIENTADA.- CHEMICAL SCIENCES AND TECHNOLOGIES	28	3,756,808.00	2,990,059.75
INV.FUND.NO ORIENTADA.- CONSTRUCTION	2	204,248.00	155,228.48
INV.FUND.NO ORIENTADA.- INDUSTRIAL DESIGN AND PRODUCTION	6	1,005,631.00	790,415.56
INV.FUND.NO ORIENTADA.- MATERIALS	44	6,527,950.02	5,173,323.91
INV.FUND.NO ORIENTADA.- MEANS OF TRANSPORT	1	42,350.00	32,186.00
INV.FUND.NO ORIENTADA.- ELECTRONICS AND COMMUNICATIONS TECH.	8	2,004,728.00	1,677,325.23
INV.FUND.NO ORIENTADA.- ENVIRONMENTAL SCI. & TECHNOLOGIES	17	2,804,659.02	2,270,943.44

CONT.

MINISTRY OF HOUSING	1	78,762.00	41,532.00
A.E. SPORT AND PHYSICAL ACTIVITY	3	217,101.83	70,167.31
A.E. MANAGEMENT OF NAT. RESOURCES, HABITATS & ECOSYSTEMS	2	440,562.49	186,808.50
FUNCTIONAL FOODS	2	220,704.00	55,686.39
AID TO INFRASTRUCTURE & TRANSPORT GROUPS/CONSORTIA	1	119,509.00	26,473.00
AID TO PR. E. PLAN DE C, T. E INN. ASTURIAS 2008-2010 (PCTI)	4	872,666.00	301,555.00
ALZHEIMER'S & RELATED DISEASES RESEARCH PROJ. AID	6	240,000.30	80,000.10
CONSERVATION AGROFOODS GENETIC RESOURCES	25	909,384.30	309,728.40
MURCIA CALL FOR RTD PROJECT PROPOSALS	5	491,790.73	163,437.34
ARAGON GOVT. CALL FOR PROPOSALS	10	493,709.00	218,093.75
BALEARIC ISLANDS RESEARCH PROJ. CALL FOR PROPOSALS	3	114,000.00	42,000.00
STRENGTHENING & DEVELOPING OTRIS	6	399,971.00	260,181.90
PROTECTED NATURAL SPACES	14	997,510.68	228,760.63
HEALTHCARE TECHNOLOGY EVALUATION. FIS	2	92,565.00	38,115.00
WILD FAUNA	2	129,736.80	44,393.60
GALICIA RESEARCH PROMOTION	54	3,577,410.93	1,028,857.53
PROMOTION OF EQUAL OPPORTUNITIES FOR MEN AND WOMEN	1	2,000.00	2,000.00
HEALTH-CARE RESEARCH FUND	72	11,401,625.73	4,264,663.24
FUNDACION INVEST. MEDICA MUTUA MADRILEÑA	1	17,430.00	8,715.00
FUNDACION SENECA	20	1,049,846.00	287,966.00
FOUNDATIONS	2	79,000.00	38,500.00
ANDALUSIA RESEARCH PLAN	2	280,000.00	161,000.00
ASTURIAS PLAN FOR SCIENCE, TECHNOLOGY & INNOVATION 2006-2009	7	804,080.69	424,087.22
VALENCIA SCIENTIFIC RESEARCH PROMOTION PLAN	9	214,085.00	115,575.00
MURCIA REGION RESEARCH PLAN	3	227,568.00	72,723.20
TERUEL SPECIFIC RESEARCH PLAN	1	139,656.00	59,300.40
MADRID REGIONAL PLAN	99	10,146,279.26	3,373,251.51
REGIONAL RTD PLAN	1	23,375.00	11,935.00
ASTURIAS REGIONAL RESEARCH PLAN	6	514,281.96	81,104.58
CASTILE-LA MANCHA RESEARCH PROJECTS PROGRAMME	7	506,435.00	193,084.90
CASTILE-LEON RESEARCH PROJ. PROGRAMME	32	1,013,926.00	494,663.00
ENERGY & CLIMATE CHANGE RESEARCH, DEV. & INNOV. PROJ. (P.N.I.C.D.I.T.)	1	84,000.00	-
AGRICULTURAL RESOURCES AND TECHNOLOGIES	4	243,405.00	109,015.80
NATIONAL PARKS SUBSECTOR	3	280,603.31	13,500.00
AGROFORESTRY GREENHOUSE EFFECT SINKS	3	160,135.96	49,430.00
SUSTAINABLE ENVIRONMENTAL MANAGEMENT TECHNOLOGIES	1	154,197.00	76,790.00
Total	**1733**	**269,789,318.98**	**108,031,402.34**

Summary of projects by R&D Programme

R&D PROGRAMME	Projects	Total funding (€)	Total annual 2008 (€)
NATIONAL PROGRAMMES	74	11,494,190.73	4,302,778.24
HEALTH RESEARCH	1389	237,775,740.38	96,665,674.97
REGIONAL GOVERNMENT	270	20,519,387.87	7,062,949.13
TOTAL	**1733**	**269,789,318.98**	**108,031,402.34**

Projects in effect by scientific area

AREA	Projects	Total funding (€)	Total annual 2008 (€)
HUMANITIES AND SOCIAL SCIENCES	112	6,765,535.92	3,127,229.54
BIOLOGY AND BIOMEDICINE	502	99,861,260.52	40,917,027.17
NATURAL RESOURCES	262	33,703,326.45	13,608,205.69
AGRICULTURAL SCIENCES	219	24,801,778.64	9,297,423.35
PHYSICAL SCIENCES AND TECHNOLOGY	187	40,876,211.98	15,449,003.42
MATERIALS SCIENCES AND TECHNOLOGY	148	23,319,941.88	10,221,360.73
FOOD SCIENCES AND TECHNOLOGY	131	15,738,938.73	5,573,934.99
CHEMICAL SCIENCES AND TECHNOLOGY	166	24,322,353.86	9,577,035.55
CENTRAL Organisation	6	399,971.00	260,181.90
Total	**1733**	**269,789,318.98**	**108,031,402.34**

Actions in effect in 2008 granted by R&D Programmes

	Projects			Special Actions			Total Actions		Budget		
AREA	Projects	Total annual 2008 (€)	Total funding (€)	Actions	Total annual 2008 (€)	Total funding (€)	Nº	%	Total annual 2008 (€)	Total funding (€)	%
HUMANITIES AND SOCIAL SCIENCES	112	3,127,229.54	6,765,535.92	35	1,552,750.00	1,641,550.00	147	7.00%	4,679,979.54	8,407,085.92	3.89%
BIOLOGY AND BIOMEDICINE	502	40,917,027.17	99,861,260.52	41	1,107,408.00	2,286,508.00	543	25.86%	42,024,435.17	102,147,768.52	34.89%
NATURAL RESOURCES	262	13,608,205.69	33,703,326.45	82	3,171,685.22	4,839,420.22	344	16.38%	16,779,890.91	38,542,746.67	13.93%
AGRICULTURAL SCIENCES	219	9,297,423.35	24,801,778.64	59	856,064.18	1,998,264.18	278	13.24%	10,153,487.53	26,800,042.82	8.43%
PHYSICAL SCIENCES AND TECHNOLOGY	187	15,449,003.42	40,876,211.98	50	2,488,831.88	4,009,065.44	237	11.29%	17,937,835.30	44,885,277.42	14.89%
MATERIALS SCIENCES AND TECHNOLOGY	148	10,221,360.73	23,319,941.88	41	1,521,294.04	2,041,267.37	189	9.00%	11,742,654.77	25,361,209.25	9.75%
FOOD SCIENCES AND TECHNOLOGY	131	5,573,934.99	15,738,938.73	16	536,607.00	859,907.00	147	7.00%	6,110,541.99	16,598,845.73	5.07%
CHEMICAL SCIENCES AND TECHNOLOGY	166	9,577,035.55	24,322,353.86	37	1,025,126.00	1,195,926.00	203	9.67%	10,602,161.55	25,518,279.86	8.80%
CENTRAL Organisation	6	260,181.90	399,971.00	6	144,000.00	144,000.00	12	0.57%	404,181.90	543,971.00	0.34%
Total	**1,733**	**108,031,402.34**	**269,789,318.98**	**367**	**12,403,766.32**	**19,015,908.21**	**2100**	**100%**	**120,435,168.66**	**288,805,227.19**	**100%**

Summary of scientific activity in 2008

	External funding			CSIC scientific programming			TOTAL			
AREA	Actions	Total Funding (€)	Funding 2008 (€)	Actions	Total Funding (€)	Funding 2008 (€)	Actions	Total Funding (€)	Funding 2008 (€)	% End. 2008
HUMANITIES AND SOCIAL SCIENCES	147	8,407,085.92	4,679,979.54	76	3,761,216.92	1,766,525.89	223	12,168,302.84	6,446,505.43	4%
BIOLOGY AND BIOMEDICINE	543	102,147,768.52	42,024,435.17	183	9,989,878.25	4,866,022.60	726	112,137,646.77	46,890,457.77	32%
NATURAL RESOURCES	344	38,542,746.67	16,779,890.91	121	5,584,545.90	2,603,283.88	465	44,127,292.57	19,383,174.79	13%
AGRICULTURAL SCIENCES	278	26,800,042.82	10,153,487.53	77	2,872,121.10	1,190,294.47	355	29,672,163.92	11,343,782.00	8%
PHYSICAL SCIENCES AND TECHNOLOGY	237	44,885,277.42	17,937,835.30	126	11,782,696.64	4,685,961.72	363	56,667,974.06	22,623,797.02	15%
MATERIALS SCIENCES AND TECHNOLOGY	189	25,361,209.25	11,742,654.77	123	9,051,293.15	4,199,794.44	312	34,412,502.40	15,942,449.21	11%
FOOD SCIENCES AND TECHNOLOGY	147	16,598,845.73	6,110,541.99	47	1,428,284.17	689,254.78	194	18,027,129.90	6,799,796.77	5%
CHEMICAL SCIENCES AND TECHNOLOGY	203	25,518,279.86	10,602,161.55	112	5,661,758.96	3,007,697.95	315	31,180,038.82	13,609,859.50	9%
CENTRAL Organisation	12	543,971.00	404,181.90	22	9,194,753.49	3,650,307.88	34	9,738,724.49	4,054,489.78	3%
Total	**2,100**	**288,805,227.19**	**120,435,168.66**	**887**	**59,326,548.58**	**26,659,143.61**	**2987**	**348,131,775.77**	**147,094,312.27**	**100%**

CONSOLIDER PROGRAMME

The CSIC coordinates these following CONSOLIDER projects granted during 2008

Code	Type	Situation	Area	Title	Applied for	Granted
20082B9020	CONSOLIDERC	CURRENT	BIOLOGY AND BIOMEDICINE	Plasmid module interconnections and genomes of pathogenic bacteria	1,979,400	3,600,000
20083M9040	CONSOLIDERC	CURRENT	NATURAL RESOURCES	Malaspina circumnavigation expedition 2010: Global change and exploration of the biodiversity of the global ocean	4,314,457.41	5,528,000
20085P9030	CONSOLIDERC	CURRENT	PHYSICAL SCIENCES AND TECHNOLOGY	Canfranc Underground Physics	8,498,000	6,000,000
20086G9010	CONSOLIDERC	CURRENT	MATERIALS SCIENCES AND TECHNOLOGY	Surface functionalisation of materials for high value-added applications	0	5,400,000

INTERNATIONAL SCIENTIFIC ACTIVITY
PARTICIPATION IN EUROPEAN R&D PROGRAMMES

FRAMEWORK PROGRAMMES

2008 is the second year of implementation of the 7th Framework Programme (2007-2013). The principles on which this Framework Programme are based are flexibility and simplification of procedures. It also aims to have a broader and more inclusive scope than its predecessors. FP7 is made up of four specific programmes: Cooperation, Ideas, People and Capabilities; and various different funding systems exist in each of these programmes: Collaboration programmes (PCOL), Coordination and support actions (CSA), Collaboration programmes-CSA (PCOL-CSA), Support for researcher training and career development, also known as Marie Curie Actions (MCA), Support for research at the frontiers of knowledge, through projects financed by the European Research Council (ERC) for both young and established researchers ("Starting Grants", ERCSG; "Advanced Grants", ERCAG) and research subsidies to benefit specific groups, small and medium-sized companies (S-SMES). Over the course of 2008 calls for proposals were published in all the specific FP7 programmes and in all modes of funding.

Additionally, projects funded in FP6 calls continued to be executed in most of the specific programmes: Focus and integration of the research community (Integration), Structure of the European research space (Structure) and Euratom. The only exception was in the programme to strengthen the foundations of the European research area, where there are currently no projects underway. All the FP6 instruments have been executed: Marie Curie Actions (MCA), Coordination Actions (CA), Specific Aid Actions (SAA), Integrated Infrastructure Initiatives (I3), Specific Projects (STREP), Integrated Projects (IP) and Network of Excellence (NoE).

2008 is the first year with significant returns under FP7, which will enable an initial evaluation of the CSIC's results in this framework programme. 2008 also allows us to present the final data on the CSIC's participation in FP6. However, a comparative analysis of FP6 and FP7 is difficult, as we are comparing total data with initial data, and as already mentioned, the terminology, topics, and forms of funding are different.

Projects Approved in 2008

In 2008, subsidy agreements were signed on 86 FP7 projects and actions, with a total funding commitment of 25,314,272 euros. Extraordinarily, an FP6 Marie Curie Action with funding of 234,163 euros was also signed.

Tables 1, 2 and 3 present the details of the FP7 projects approved in 2008, classed by area of knowledge, specific programme and mode of funding.

Projects active in 2008

There were a total of 250 projects and action active in 2008 (including those approved in 2008), corresponding to 156 under FP6 and 94 under FP7.

The data presented in the Table show the FP6 and FP7 projects and actions underway in 2008, classified by the CSIC's areas of knowledge. Tables 5 and 6 show the breakdown by specific programme in FP 6 and FP7, respectively, and tables 7 and 8, show the data broken down by FP6 or FP7 instrument. Funding figures are not available annualised for each year of execution. The funding data in the tables refer to total funding committed for the projects, as reflected in the accounts.

Leadership

The CSIC has coordinated four the projects approved in 2008, three in the cooperation programme and one in the capacities programme, for a total amount of 2,226,605 euros. The projects coordinated by the CSIC and the researchers responsible are listed below:

- "An ambulatory BCI-driven tremor suppression system based on functional electrical stimulation", Ramón Ceres Ruiz, Instituto de Automática Industrial (Institute of Industrial Automation, IAI)
- "Bottom-up resolution of functional enantiomers from self-organised monolayers", David Amabilino, Instituto de

Ciencia de Materiales de Barcelona (Barcelona Materials Science Institute, IMAB)

- "NANOstructured active MAGneto-plasmonic Materials", Antonio Garcia Martín, Instituto de Microelectrónica de Madrid (Madrid Microelectronics Institute, IMM-CNM)
- "Mediterranean innovation and research coordination action", Rafael Rodríguez Clemente, Estación Biológica de Doñana (Doñana Biological Station).

Funding was obtained for five research projects for young researchers in the first European Research Council (ERC) call for proposals ("Starting Grant"-ERC), providing a total of 5,472,341 euros. The research projects and researchers responsible are the following:

- "Contour dynamics and singularities in incompressible flows". Diego Córdoba, Instituto de Ciencias Matemáticas (Institute of Mathematical Sciences, IMAFF)
- "Topological, geometric and analytical study of singularities". Javier Fernández de Bobadilla, Instituto de Ciencias Matemáticas (Institute of Mathematical Sciences, IMAFF)
- "The intellectual and material legacies of late medieval Sephardic Judaism: an interdisciplinary approach". Esperanza Alfonso, Instituto de Lenguas y Culturas del Mediterráneo y Oriente Próximo (Institute of Mediterranean and Near Eastern Languages and Cultures, CCHS)
- "Role of the Gadd45 family and p38 MAPK in tumour suppression and autoimmunity". Jesús Salvador, Centro Nacional de Biotecnología (National Biotechnology Centre, CNB)
- "High-throughput integrated photonic lab-on-a-DVD platforms". Andreu Llobera, Instituto de Microelectrónica de Barcelona (Barcelona Microelectronics Institute, IMB-CNM)

A total of 17 active projects were coordinated by the CSIC in 2008 (13 under FP6 and 4 under FP7).

Total FP6 and FP7 funding

Total funding obtained by the CSIC over the course of FP6 as a whole came to 98,805,406 euros, corresponding to 403 projects and actions. Total earmarked funding obtained by the CSIC in FP7 through to December 2008 came to 26,933,599 euros, corresponding to 94 projects and actions.

PROJECTS UNDER OTHER EUROPEAN PROGRAMMES

Additionally, in 2008 approval was given for continued participation in other European projects outside of the Framework Programme, but financed by the European Commission. These included: The International Cooperation Programme with Latin America (ALFA), Joint Research Centre (JRC), European Coal and Steel Community (ECSC), the Competition and Innovation Programme (CIP), the Programme for School Education (COMENIUS), Programme for the development of culture (CULTURE), Leonardo training programme (LEONARDO), Programme for the protection of nature and the environment (LIFE), Programme for the modernisation of higher education (TEMPUS).

A total of 21 actions are underway, of which six were approved in 2008, with a total funding commitment of 770,466 euros. Only one of these research projects was coordinated by the CSIC, with a total budget of 151,976 euros.

Table 9 shows the data for European projects not belonging to the Framework Programme which had approval and were underway in 2008.

EUROPEAN SCIENCE FOUNDATION (ESF)

The European Science Foundation (ESF) is a non-governmental organisation bringing together scientific institutions from 30 countries which fund or perform research (research centres, academies, etc.) The CSIC has played an active role in many of its activities, including network programmes in all scientific disciplines, which are financed à la carte. In 2008 the CSIC co-financed and participated in 33 network programmes and earmarked funding for 6 new programmes due to start next year with a duration of 3-5 years. These programmes are:

- The EuroGlycosciences Forum (Euroglycoscience)
- Experimental Pragmatics in Europe (EURO-XPRAG)
- The Identification of Novel Genes and Biomarkers for Systemic Lupus Erythematosus (BIOLUPUS)
- Interactions of Low-Dimensional Topology and Geometry with Mathematical Physics (ITGP)
- Quantum Spin Coherence and electronics (QSpiCE)
- Academic Patenting in Europe: Database sharing, applications and extensions (APE)

The CSIC has also taken part in other activities, such as meetings to discuss the future outlook for a given area (so-called "forward looks"), exploratory workshops, and discussion fora ("MO fora"). More details of these are given below.

Exploratory Workshops

The CSIC has taken part in/coordinated five Exploratory Workshops:

- Science and Technology of Agreement
- Heterochromatin Structure and Function: From Repetitive DNA Sequences to Epigenetics
- EuroIce2008
- Surveying Immigrant Population in Studies of Social and Political Participation: Methodological and Technical Challenges
- Seismic Oceanography

MO Fora

- "From principles to practice: How European Research Organisations implement research integrity guidelines?"

Table 1: Nº FP7 projects and actions approved in 2008 and total funding earmarked. Breakdown by scientific area.

SCIENTIFIC AREA	Number	Funding (€)
HUMANITIES AND SOCIAL SCIENCES	4	1,672,074
BIOLOGY AND BIOMEDICINE	19	2,982,030
NATURAL RESOURCES	16	3,443,860
AGRICULTURAL SCIENCES	4	4,563,783
PHYSICAL SCIENCES AND TECHNOLOGIES	16	4,862,861
MATERIALS SCIENCE AND TECHNOLOGY	10	3,483,582
FOOD SCIENCE AND TECHNOLOGY	10	2,295,070
CHEMICAL SCIENCES AND TECHNOLOGIES	7	2,011,012
Overall total	**86**	**25,314,272**

Table 2: Nº FP7 projects and actions approved in 2008 and total funding earmarked. Breakdown by specific programme.

PROGRAMME	Number	Funding (€)
CAPACITIES	18	3,656,491
COOPERATION	44	10,793,912
IDEAS	5	1,944,731
PEOPLE	18	8,590,407
EURATOM	1	328,731
Overall total	86	25,314,272

Table 3: Nº projects and actions approved in 2008 and total funding earmarked. Breakdown by instrument.

INSTRUMENT	Number	Funding (€)
MARIE CURIE ACTION	18	3,746,598
CSA (Coordination support action)	14	1,236,441
PCOL-CSA	8	1,278,567
PCOL (Collaboration project)	40	13,575,553
ERC-SG and ERC-AG (Young researcher and established resercher projects)	5	5,472,341
S-PYMES	1	4,772
Overall total	**86**	**25,314,272**

Table 4: Nº projects and actions underway in 2006 through FP6 and FP7 and total funding earmarked. Breakdown by scientific area.

SCIENTIFIC AREA	FP6 projects and actions underway in 2008		FP7 projects and actions underway in 2008	
	Number	Funding (€)[1]	Number	Funding (€)
HUMANITIES AND SOCIAL SCIENCES	2	461,658	4	1,101,478
BIOLOGY AND BIOMEDICINE	48	15,343,018	20	6,010,722
NATURAL RESOURCES	34	11,298,967	18	2,602,144
AGRICULTURAL SCIENCES	9	1,137,452	5	409,431
PHYSICAL SCIENCES AND TECHNOLOGIES	14	4,488,296	19	5,414,841
MATERIALS SCIENCE AND TECHNOLOGY	20	9,279,433	10	3,553,081
FOOD SCIENCE AND TECHNOLOGY	4	2,749,014	10	4,627,761
CHEMICAL SCIENCES AND TECHNOLOGIES	25	8,868,005	8	3,214,141
Overall total	**156**	**53,625,845**	**94**	**26,933,599**

[1] Annualised funding figures are not available for projects for each year of implementation. The funding data in the tables refer to total funding committed for the projects, as reflected in the accounts.

Table 5: Nº FP6 projects and actions approved in 2008 and total funding earmarked. Breakdown by specific programme.

PROGRAMME	Number	Funding (€)
INTEGRATION	120	42,424,734
STRUCTURING	35	11,180,861
STRENGTHENING	0	0
EURATOM	1	20,250
Overall total	**156,625**	**53,625,845**

Table 6: Nº FP7 projects and actions approved in 2008 and total funding earmarked. Breakdown by specific programme.

PROGRAMME	Number	Funding (€)
CAPACITIES	19	3,568,778
COOPERATION	44	13,150,105
IDEAS	5	5,472,341
PEOPLE	25	4,281,597
EURATOM	1	460,778
Overall total	**94**	**26,933,599**

Table 7: Nº FP6 projects and actions approved in 2008 and total funding earmarked. Breakdown by instrument.

INSTRUMENT	Number	Funding (€)
MARIE CURIE ACTION	31	8,613,830
AC	4	1,109,944
AAE	4	1,459,024
I3	2	769,759
STREP	48	21,630,558
IP	52	14,659,663
NOE	15	5,383,067
Overall total	**156**	**53,625,845**

Table 8: Nº FP7 projects and actions approved in 2008 and total funding earmarked. Breakdown by instrument.

INSTRUMENT	Number	Funding (€)
ACCION MARIE CURIE	25	4,281,598
CSA (Coordination support action)	14	1,236,441
PCOL-CSA	9	2,104,406
PCOL (Collaboration project)	40	13,575,553
ERC-SG and ERC-AG (Young researcher and established researcher projects)	5	5,472,341
S-PYMES	1	263,260
Overall total	**94**	**26,933,599**

Table 9: Nº European projects outside the Framework Programme approved and underway in 2008 and total funding earmarked. Breakdown by specific programme.

PROGRAMME	European non-FP projects approved in 2008		European non-FP projects underway in 2008	
	Number	Funding (€)	Number	Funding (€)
ALFA			1	4,431
CCI	1	146,000	1	146,000
ECSC	3	413,173	12	2,054,835
PIC	1	159,754	1	159,754
COMENIUS			1	6,504
CULTURE			1	181,485
LEONARDO	1	51,539	1	51,539
LIFE			2	757,381
TEMPUS			1	33,850
Overall total	**6**	**770,466**	**21**	**3,395,779**

BILATERAL RELATIONS

2008 BUDGET SPENDING BY ORGANISATIONS

Country	Organisation	Study visits (€)	Projects (€)	Others (€)
ARGENTINA	CONICET		164,850.00	
AUSTRIA	AUSTRIAN ACADEMY OF SCIENCES	4,344.54		
BULGARIA	BULGARIAN ACADEMY OF SCIENCES	2,316.49	38,910.59	
BELGIUM	KATHOLIEKE UNIVERSITEIT TE LEUVEN	5,255.79		
BRAZIL	CNPq		9,843.42	
CANADA	NATIONAL RESEARCH COUNCIL		595,770.00	0.00
CHILE	UNIVERSITY OF CHILE		26,725.25	
CHILE	CONICYT		28,211.52	
CHILE	UNIVERSITY OF SANTIAGO DE CHILE		18,045.20	
CHILE	INTERNATIONAL C. FOR CANCER	0.00		
CHINA	CHINESE ACADEMY OF SCIENCES	5,323.16		
CHINA	NSFC	1,916.56		
COLOMBIA	COLCIENCIAS		14,448.27	
COSTA RICA	CRUSA	2,492.00	50,000.00	
COSTA RICA	INBIO	5,169.00		
COSTA RICA	UNIVERSITY OF COSTA RICA	6,718.98	13,432.00	87,067.96
CUBA	MINISTRY OF SCIENCE, TECHNOLOGY AND THE ENVIRONMENT	9,600.00		
CZECH REPUBLIC	CZECH ACADEMY OF SCIENCES	3,350.00	45,611.65	
GERMANY-DFG	DFG	3,152.24		
EGYPT	ACADEMY OF RESEARCH	5,648.30		
ESTONIA	ESTONIAN ACADEMY OF SCIENCES	1,800.00	6,354.09	
FRANCE	CNRS	55,615.63		10,900.00
FRANCE	INSERM		2,070.00	
UK-British Council	THE BRITISH COUNCIL	7,268.37		15,000.00
UK-British Academy	THE BRITISH ACADEMY		7,200.00	
UK-Royal Society	THE ROYAL SOCIETY		26,199.53	
HUNGARY	HUNGARIAN ACADEMY OF SCIENCES	0.00	20,852.03	
ITALY	CNR		50,000.00	
JAPAN	JSPS		36,082.16	
KOREA	KOSEF	6,384.46		
MOROCCO	CNCPRST		56,477.34	
MEXICO	UNAM	27,325.72		1,763.39
MEXICO	CONACYT		53,060.41	
PERU	CONCYTEC		8,539.00	
POLAND	POLISH ACADEMY OF SCIENCES	17,208.46	43,075.81	
PORTUGAL	FUNDAÇAO PARA A CIENCIA E TECNOLOGIA (FCT)		24,180.18	
RUSSIA	RUSSIAN ACADEMY OF SCIENCES	36,238.76		
SLOVAKIA	SLOVAK ACADEMY OF SCIENCES	2,065.00	16,455.77	

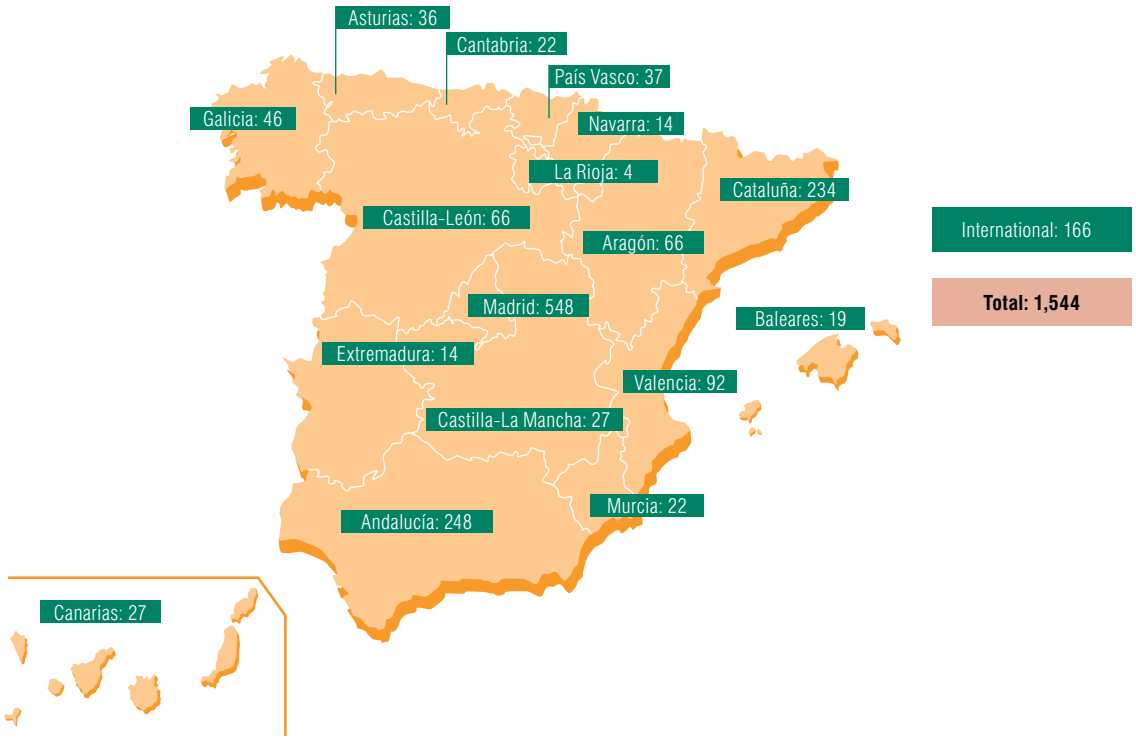
CONT.

Country	Organisation	Study visits (€)	Projects (€)	Others (€)
URUGUAY	UNIVERSITY OF THE REPUBLIC OF URUGUAY		24,422.24	
VENEZUELA	CENTRAL UNIVERSITY OF VENEZUELA	3,000.00		
VENEZUELA	VENEZUELAN INSTITUTE OF SCIENTIFIC RESEARCH (IVIC)	6,718.38		
TAIWAN	NATIONAL SCIENCE COUNCIL (NSC)	8,884.07	19,884.28	30,934.00
		227,795.91	**1,400,700.74**	**145,665.35**

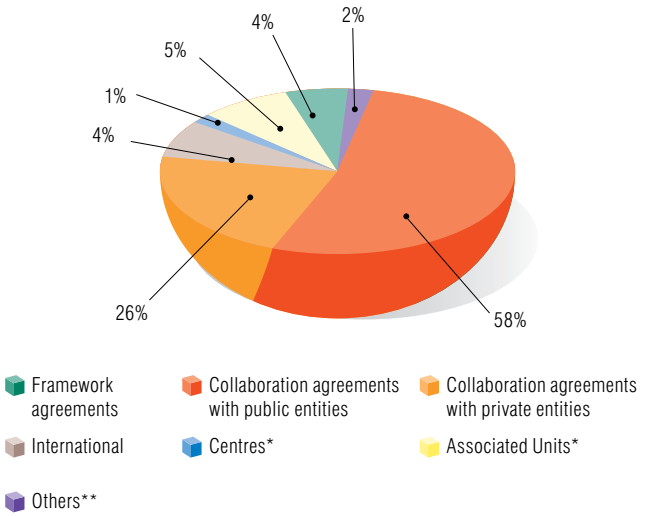
Mobility call for proposals - 2008	Number of visits granted	Expenditure (€)
CSIC researchers abroad	80	197,102.62
Foreign researchers at the CSIC	35	72,221.67
		269,324.29

COLLABORATION AND FRAMEWORK AGREEMENTS

Collaboration and framework agreements in effect in 2008 by regional government



Collaboration and framework agreements signed in 2008

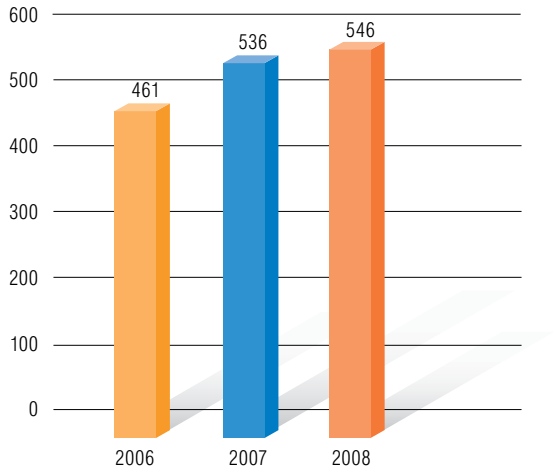


COLLABORATION AND FRAMEWORK AGREEMENTS SIGNED			
	2006	**2007**	**2008**
Framework agreements	13	13	16
Collaboration agreements with public entities	205	268	263
Collaboration agreements with private entities	92	107	114
International	38	32	20
Centres*	5	8	3
Associated Units*	33	24	22
Others **			9
TOTAL	**386**	**452**	**447**

* They are collaboration agreements signed for the creation of centres and associated units.
** Protocol, laboratory and remodelling.

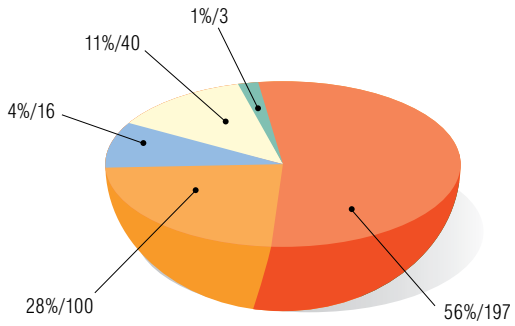
Data are not definitive.

Collaboration and framework agreements negotiated



Source: CSIC BDCE

Collaboration and framework agreements finished in 2008



Framework agreements*
Collaboration agreements with public entities
Collaboration agreements with private entities
Centres**
International
Associated Units**
Others**

Total: 357

* They are collaboration agreements signed for the creation of centres and associated units.
** Protocol, laboratory and remodelling.

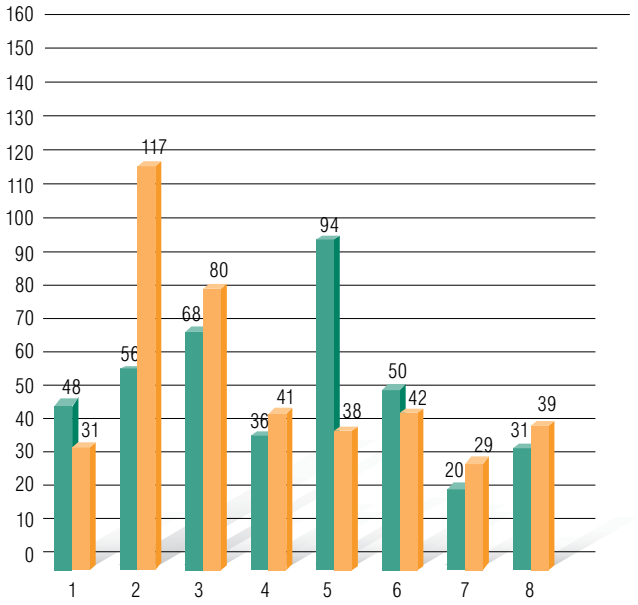
Data are not definitive.

Summary

COLLABORATION AND FRAMEWORK AGREEMENTS 2008	
In effect	1,544
Signed	447
Negotiated	546
Finished	357

Data are not definitive.

RECRUITMENT OF RESEARCH STAFF



Male	403
Female	417
Total	820

1. Humanities and Social SS.
2. Biology and Biomedicine
3. Natural Resources
4. Agricultural Sciences
5. Physical SS. and Tech.
6. Materials SS. and Tech.
7. Food SS. and Tech.
8. Chemical SS. and Tech.

CSIC SCIENTIFIC PRODUCTION

Area	Articles in SCI/SSCI-listed journals	Articles in non-SCI/SSCI-listed journals	Books	Thesis	Patents
1.	237	456	168	46	0
2.	1,709	86	16	216	56
3.	1,343	350	42	86	2
4.	725	132	23	63	24
5.	1,612	408	30	72	19
6.	1,524	122	13	79	21
7.	541	99	4	40	17
8.	1,063	109	18	70	41
Total	8,754	1,762	314	672	180

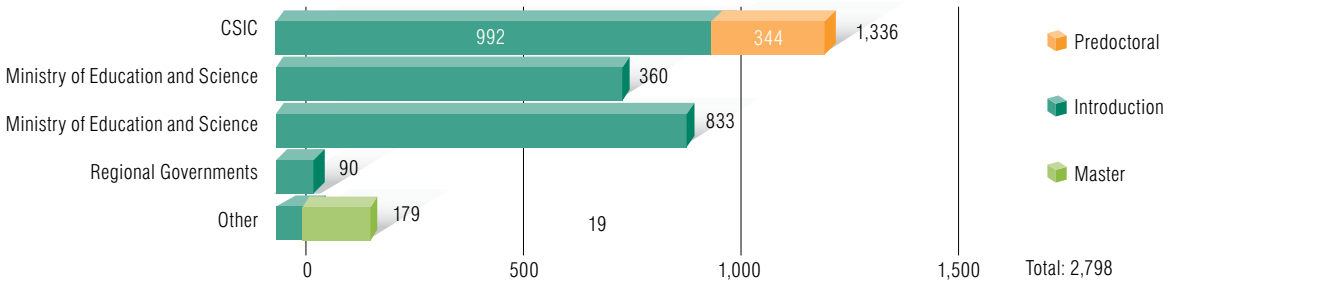
5 Research Training

The training of researchers is managed by the Department of Postgraduate and Specialized Studies, under the authority of the Vice-Presidency for Science and Technology. This department manages the majority of the fellowships granted by the CSIC and other institutions, and monitors and publicizes the specialization and high-level specialization courses offered by CSIC scientific personnel. The department's mission is to serve the institutes and centres, and in particular to aid students and graduates carrying out scientific research in the CSIC.

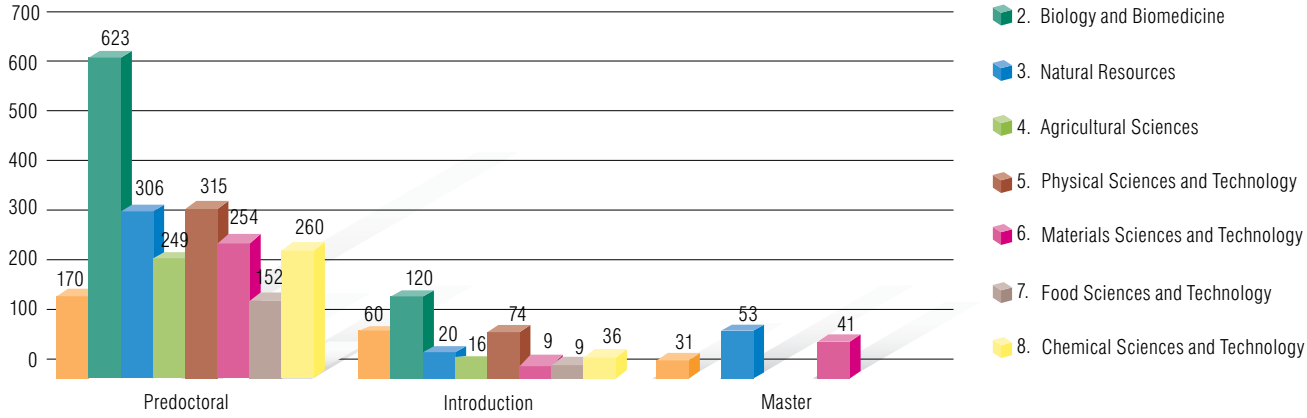
Image: "Graceful movement", by Mª Teresa Corcuera, Fernando Gómez, Daniel Val and Mª José Alonso. (Fotciencia 08)

CSIC RESEARCH FELLOWS

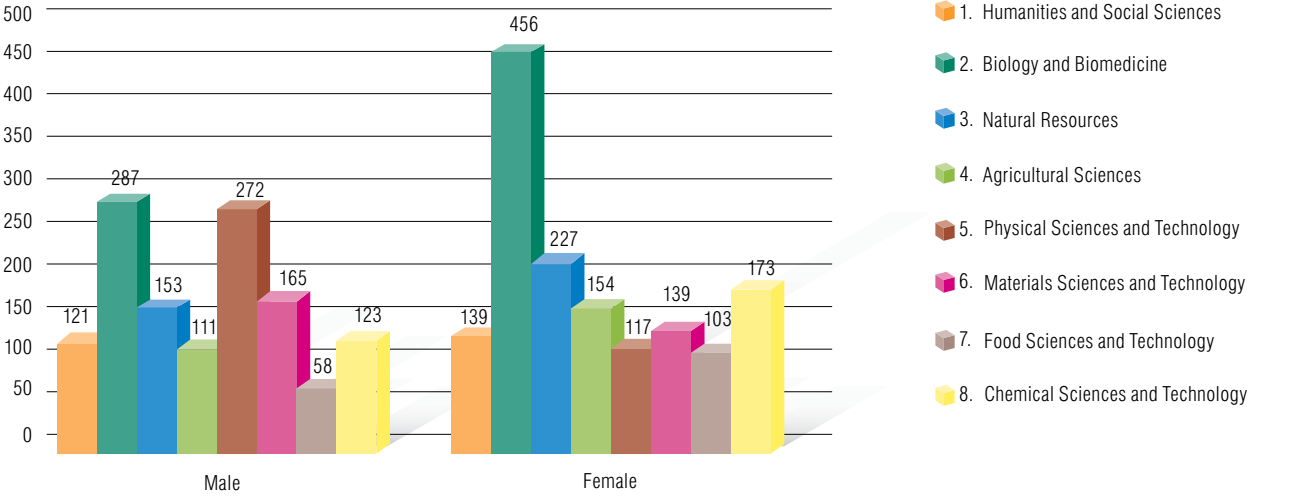
Distribution by funding institutions



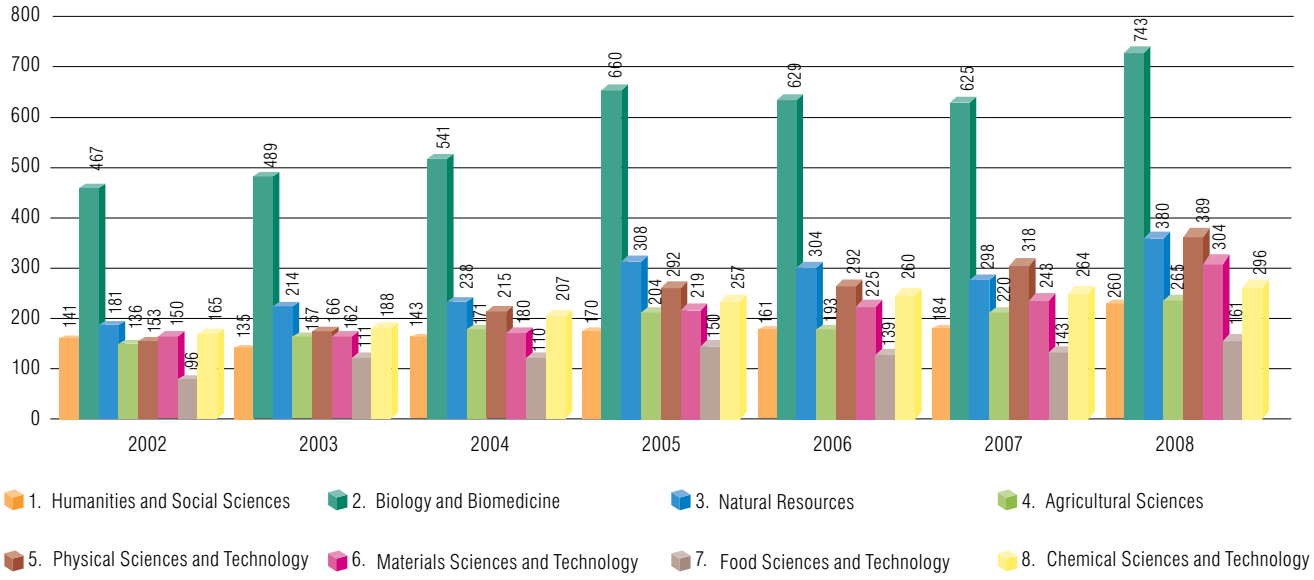
Distribution of research fellows by scientific area and situation 2008



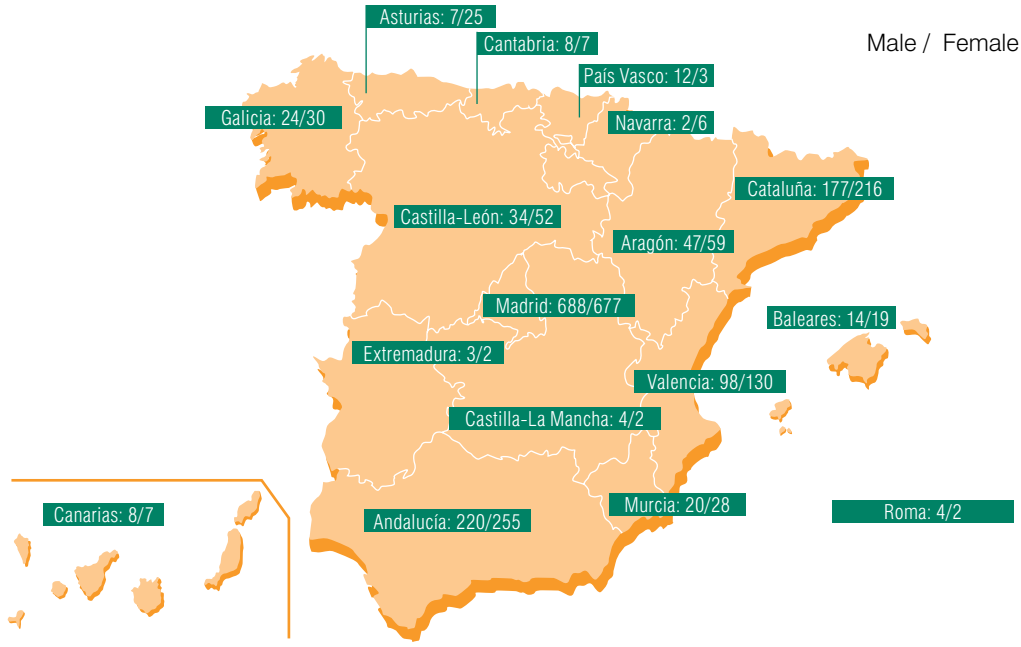
Distribution of research fellows by scientific area and gender 2008



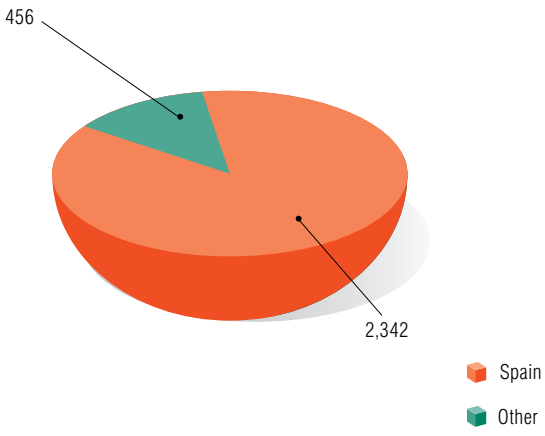
Annual change in number of research fellows by scientific area 2003-2008



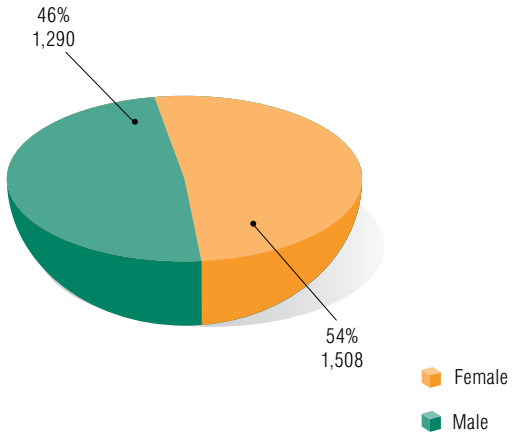
Distribution of research fellows by region and gender 2008



Distribution of research fellows by nationality

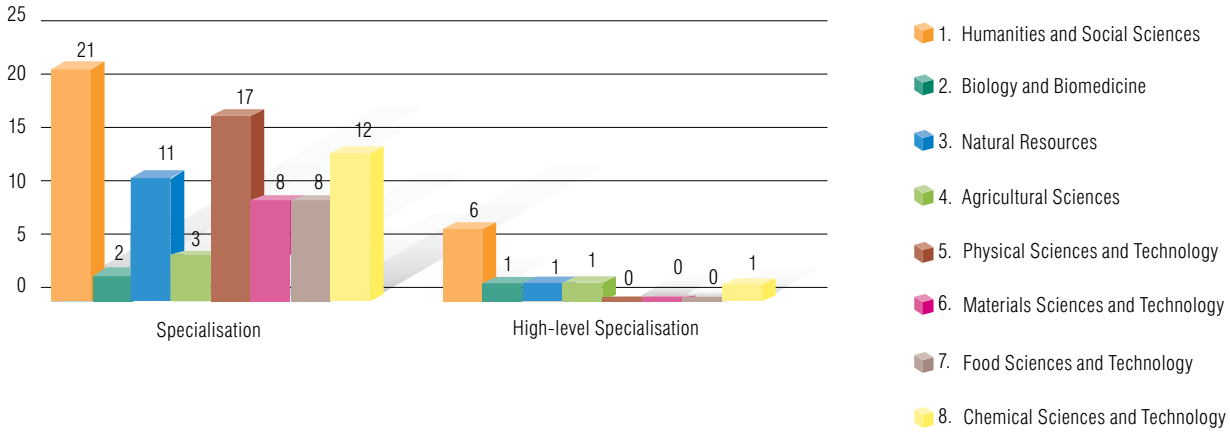


Training personal distribution by gender

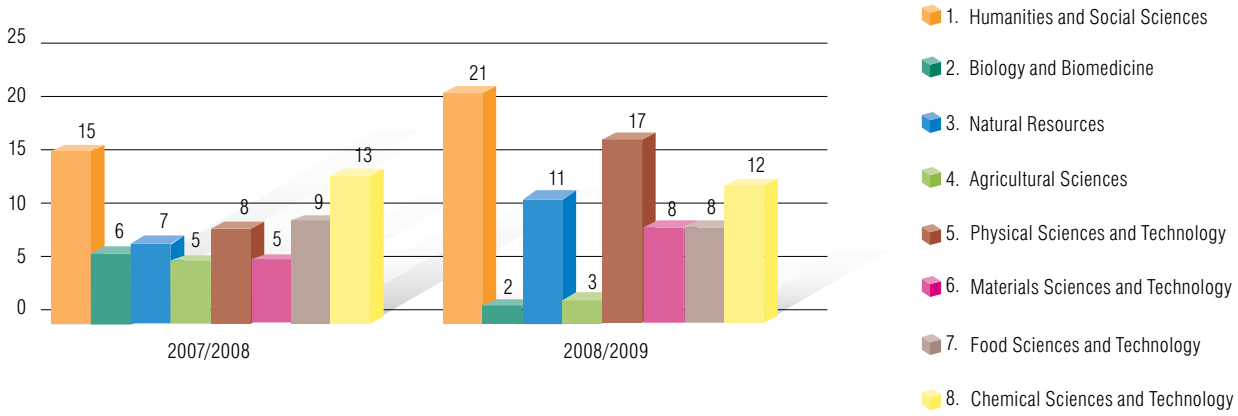


POSTGRADUATE COURSES

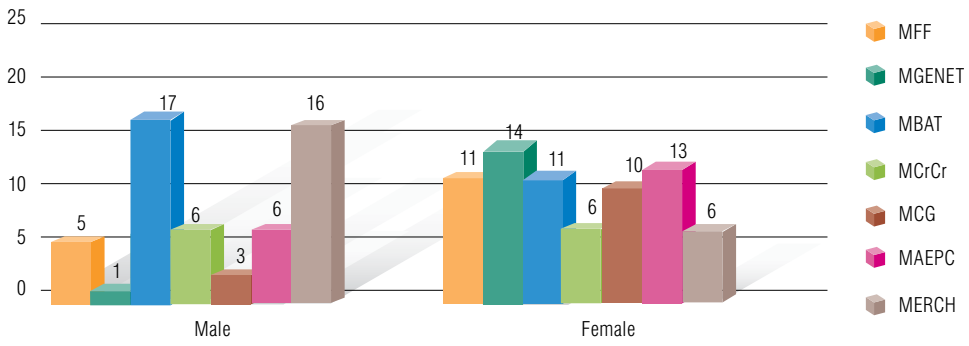
Distribution of Postgraduate Courses by scientific area 2008



Annual progress of highly specialised post-graduate courses



Distribution of students by gender on CSIC-UIMP official masters degree courses



Masters in:

MFF: Phonetics and phonology.

MGENET: Gender equality in the Humanities, social sciences and jurisprudence.

MBAT: Biodiversity in tropical regions.

MCrCr: Crystallography and crystallisation.

MCG: Global change.

MAEPC: Advanced specialisation in plastics and rubbers.

MERCH: Renewable energy, fuel cells and hydrogen.

6 Knowledge Transfer

The Deputy Vice-Presidency for Knowledge Transfer, which forms part of the Vice-Presidency for Science and Technology, attempts to convey the CSIC's scientific capacities and technological achievements to all Spanish and international socioeconomic sectors. Its principal objective is to assure that the greatest number of CSIC capacities and scientific-technical achievements are transformed into social, economic, and cultural well-being for society at large.

Image: "Barrika", by Ander Gómez Blanco (Fotciencia 08)

2008 was the year in which the CSIC became a State Agency. In this context the Technology Transfer Office came to occupy the position of an deputy vice-presidency in the new structure chart, when it was given the title of the Deputy Vice-Presidency for Knowlege Transfer (Vicepresidencia Adjunta de Transferencia de Conocimiento, VATC), and now reports to the Vice-Presidency for Scientific and Technical Research. This move up the structure chart represents the fulfilment of one of the strategic objectives of the 2006-2009 Action Plan, namely "to incorporate the knowledge transfer function into the processes by which the strategies the CSIC are defined and those of the bodies that oversee their correct implementation."

This change was completed with the definition of a new list of posts, which was included in the 2010-2013 Action Plan, and which, when completed, will bolster the VATC's capacity to serve knowledge transfer in the CSIC. In 2008 three new civil servant positions were opened up for applications, and by the time of publication of this annual report, these positions had been filled and their holders are due to take up their new jobs in 2009.

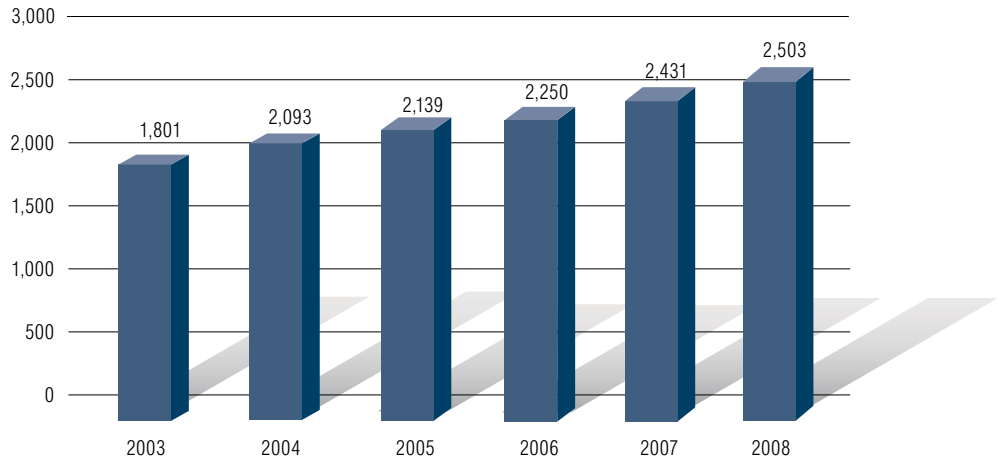
The technology transfer unit has its head office in Madrid, and it also has offices in Barcelona, Granada, Murcia, Santiago de Compostela, Seville, Valencia, Valladolid and Saragossa. In 2008 the VATC had a staff of thirty-six. This figure is unchanged from the previous year.

INSTRUMENTS USED FOR TECHNOLOGY TRANSFER

The CSIC uses the following instruments to commercialise the knowledge it generates:

- On-demand R&D contracts, with business funding.
- Collaborative R&D contracts in which the funding from business is added to public support from national or regional government budgets for cooperation between companies and public research centres. The TRACE and PROFIT programmes, and their regional equivalents, belong to this category.
- Protection of research results depending on their characteristics and those of the target customer, for example protection in the form of patents, industrial secrets, etc. The aim of this instrument is to preserve the value of the results so as to make collaboration attractive to companies. Transfer to the productive sector takes place through one of the two following instruments.
- Licensing titles to ownership of knowledge (or secret knowledge) to businesses.
- Creation of technology-based firms using the CSIC's findings or capabilities. This instrument enables the CSIC to collaborate with sponsors, which may include the organisation itself, its researchers or other companies, in setting up a new, technology-driven company using the results of research.

Growth in the number of researchers taking part in contracts and agreements between the CSIC and companies and institutions in the period 2003-2008.



RESULTS OF TRANSFER ACTIVITIES IN 2008[1]

The tables and figures accompanying this text give information on the results of knowledge transfer obtained over the course of 2008, and in the most significant cases, their development since 2003[2].

The total funding committed in 2008 through contracts and agreements between the CSIC and other institutions and businesses grew by 19% compared to the previous year. The majority of this growth (34%) corresponded to agreements with public institutions, while growth in contracts with businesses grew by just 7%.

The CSIC's applications for Spanish patents reached record numbers in 2008. The 159 applications filed represent an increase of 34% and four applications more than the target set in the 2006 – 2009 Action Plan (see table 6.3 on page 198). The figure of 88 international PCT applications filed during the year represents an increase of 37%.

Finally, before moving on to look at progress in the area of business creation, it is worth noting the number of licensing contracts in the year. At 49, this was also a historically high figure, well above the target of 38 set in the 2006-2009 Action Plan.

The current economic climate, with a widespread shortage of finance, particularly in the second half of 2008, has affected the creation of new businesses in general, and technology-based start-ups in particular. The consolidated comparative data for 2007 and 2008 on start-ups published by the National Statistics Institute (Instituto Nacional de Estadística, INE) in its press release on 16 March 2009 highlights the following: a) The main legal form taken by businesses is that of a limited liability company ("sociedad limitada" or S.L.), which accounts for 98% of the total; b) the average subscribed capital of each limited company set up in 2008 was 94,000€, a drop of 3.4% on the previous year; and, c) there was a 44.7% fall in the number of companies created in 2008 compared to the previous year, a steeper decline than in the case of joint-stock companies (which fell by 41%).

Number of contracts and agreements between the CSIC and companies and institutions in 2008 with their funding commitment. Breakdown by scientific area.

SCIENTIFIC AREA	Contracts and agreements signed in 2008		Contracts and agreements in effect in 2008	
	Number	Funding (€'000)	Number	Funding (€'000) (for 2008)
HUMANITIES AND SOCIAL SCIENCES	114	6,357.20	186	6,062.46
BIOLOGY AND BIOMEDICINE	200	13,126.44	597	12,954.48
NATURAL RESOURCES	224	11,736.03	418	15,180.50
AGRICULTURAL SCIENCES	121	3,218.40	336	3,923.63
PHYSICAL SCIENCES AND TECHNOLOGIES	83	2,506.03	246	9,434.61
MATERIALS SCIENCE AND TECHNOLOGY	353	12,998.45	726	13,077.19
FOOD SCIENCE AND TECHNOLOGY	163	4,081.19	310	3,282.82
CHEMICAL SCIENCES AND TECHNOLOGIES	175	10,713.19	399	10,380.23
NO AREA	14	04.85	47	0.60
Overall total	**1,447**	**64,741.77**	**3,265**	**74,296.51**

[1] Methodological note: The data in this section do not include the figures concerning relationships between the CSIC and companies within the European Union Framework Programme.

[2] Methodological note: In 2003 the CSIC's corporate database and data-entry procedures were modified. For this reason we have opted to show only the data series for this year.

In this context, the following remarks should be made about the specific data on the CSIC's technology-based businesses: a) All these businesses are limited liability companies, in line with the general situation; b) There was a 50% drop in new technology-based start-ups accompanied by the CSIC's technology transfer unit (VATC), which was also in line with the situation in the Spanish economy as a whole; and c) the average subscribed capital of each of these new businesses was €3,100 (barely 4% of the national average). This fact has a direct impact on the feasibility and future development of these companies, compromising the effectiveness of the transfer of the CSIC's know-how to the market.

In 2008 just one company was started. At the time of writing this annual report, two companies had been started in 2009. There are currently five new initiatives underway, waiting for the launch in the second quarter of 2009 of a communication action from among the 33 initiatives indicated for the 2010-2013 Action Plan.

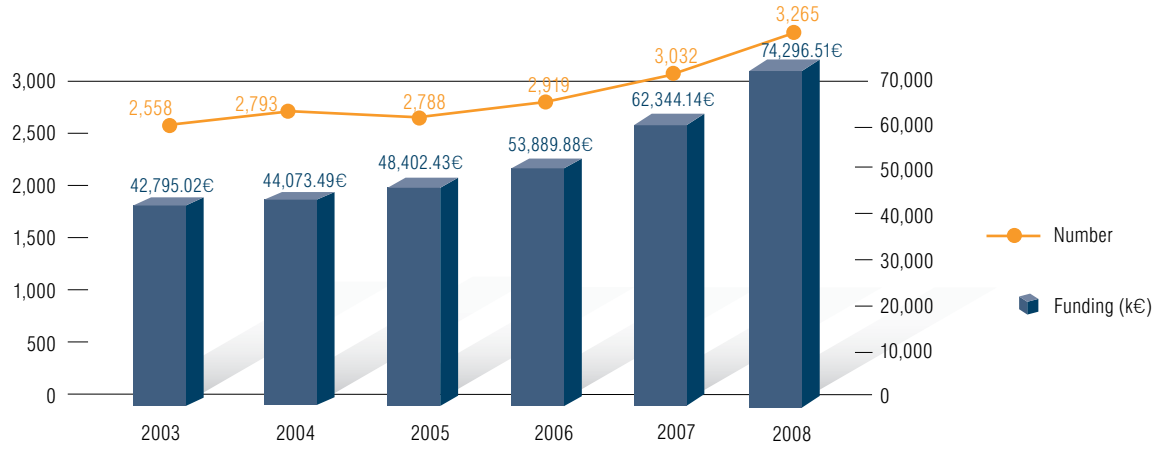
Number of contracts and agreements between the CSIC and companies and institutions in 2008 with their funding commitment. Breakdown by Autonomous Regions.

AUTONOMOUS REGION	Contracts and agreements signed in 2008		Contracts and agreements in effect in 2008	
	Number	Funding (€'000)	Number	Funding (€'000) (for 2008)
ANDALUSIA	236	9,764.49	492	12,628.88
ARAGON	59	1,620.07	121	2,223.74
ASTURIAS	37	3,041.71	70	2,050.87
BALEARIC ISLANDS	22	185.55	32	225.99
CANARY ISLANDS	9	651.77	18	273.60
CANTABRIA	1	25.00	1	46.55
CASTILE-LA MANCHA	11	235.16	18	493.87
CASTILE-LEON	11	481.40	43	824.84
CATALONIA	192	11,201.67	360	11,800.57
EXTREMADURA	3	430.66	3	118.13
GALICIA	23	793.28	61	2,801.33
MADRID	743	34,181.60	1,750	37,107.23
MURCIA	42	815.15	131	811.55
NAVARRE	0	0.00	5	309.96
BASQUE COUNTRY	0	0.00	1	19.66
VALENCIA	58	1,314.27	159	2,559.74
Total	**1,447**	**64,741.78**	**3,265**	**74,296.51**

Number of contracts and agreements between the CSIC and companies and institutions in 2008 with their funding commitment. Breakdown by type of contracting entity.

TYPE	Contracts and agreements signed in 2008		Contracts and agreements in effect in 2008	
	Number	Funding (€'000)	Number	Funding (€'000) (for 2008)
ASSOCIATION	45	1,199.61	71	1,406.35
TOWN/PROVINCIAL COUNCIL	41	468.51	68	579.02
AUTONOMOUS REGION	106	8,694.57	212	9,225.64
PRIVATE COMPANY	724	23,296.25	1,644	27,178.09
STATE-OWNED COMPANY	42	4,134.44	81	2,614.57
FOUNDATION	129	8,572.47	305	7,757.58
INTERNATIONAL	195	6,420.14	416	5,043.84
MINISTRY	33	5,532.67	96	16,145.24
PRO or UNIVERSITY	132	6,423.10	372	4,346.16
Overall total	**1,447**	**64,741.76**	**3,265**	**74,296.49**

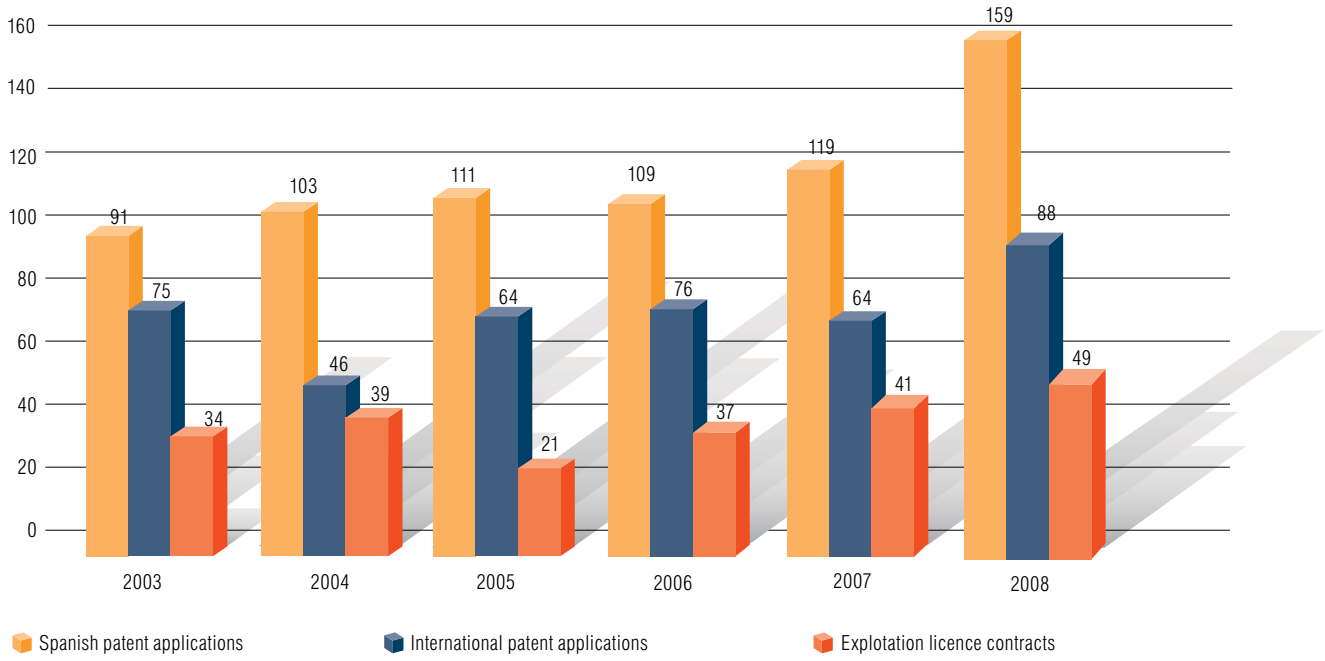
Growth over the period 2003 - 2008 of the number of contracts and agreements in effect between the CSIC and companies and institutions and the (annualised) funding committed in them.



Number of patent applications and licence contracts in 2007, broken down by scientific area.

AREA	Patent Applications		Licence Contracts
	Spanish	International PCT	
Biology and Biomedicine	37	22	14
Natural Resources	8	4	2
Agricultural Sciences	6	3	4
Physical Sciences and Technologies	30	18	8
Material Sciences and Technologies	28	16	4
Food Sciences and Technologies	16	7	8
Chemical Sciences and Technologies	34	18	9
Total	**159**	**88**	**49**

Growth in the number of Spanish and international PCT patent applications and licence contracts over the period 2003 – 2008.



7

Scientific Culture

The Deputy Vice-Presidency for Organisation and Scientific Culture reports to the Vice-presidency for Organisation and Institutional Affairs. Its purpose is to promote and coordinate activities relating to didactics and social communication of science. From the outset its main aim has been to engage scientific activity with society, through a policy of communication, information, and popularisation of the CSIC's cultural heritage and its growing scientific potential.

Image: "Intimate structure of a butterfly", Albert Masó Planas (Fotciencia08)

The Spanish National Research Council *(Consejo Superior de Investigaciones Científicas, CSIC)* has a long tradition of promoting scientific culture in society, bringing the research results produced by the institution to the public. This activity, which initially arose spontaneously on the initiative of certain researchers and centres, was bolstered by the creation of a Scientific Culture Area in the CSIC in 2004. This Area reports to the Vicepresidency for Organisation and Institutional Relations. In coordination with the institutional delegations and the research centres and institutes, it is responsible for carrying out two of the CSIC's functions: promoting the public understanding of science and collaborating on the updating the knowledge of science and technology among teachers outside of the universities. The Area's networking with researchers, centres and regional offices was strengthened in 2008 with the creation of an Assistant Vice-presidency for Organisation and Scientific Culture, in which the Area was included.

There are two main facets to the CSIC's activities to boost scientific literacy and the public understanding of science. Looking inward, it encourages the participation of researchers, centres and institutes in scientific outreach activities. Looking outward, it aims to raise society's awareness of the knowledge generated in the CSIC's centres and institutes and opening their doors to the public so citizens can see their work at first hand; with particular emphasis on young people, as they are where tomorrow's researchers will come from. This work raises the visibility of the knowledge produced by the institution, in both a national and international context.

Since the Scientific Culture Area was created the CSIC has increased its outreach activities exponentially, and it has explored new channels of social communication, thanks to the growing participation of the CSIC's researchers and centres. A summary of the activities of the CSIC's Scientific Culture Area is given below.

PUBLIC PARTICIPATION

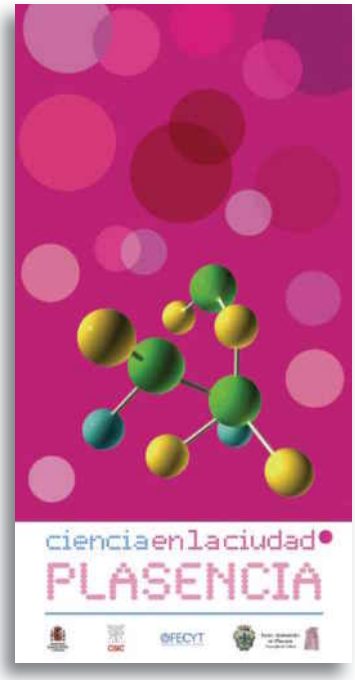
One of the CSIC's main lines of outreach activity in 2008 was directed towards encouraging public participation in science through a series of projects coordinated by the Scientific Culture Area.

Ciencia en la Ciudad

The Ciencia en la Ciudad (Science in the City) pilot project, run jointly with the *Fundación Española para la Ciencia y la Tecnología* (Spanish Foundation for Science and Technology, FECYT) between 2007 and 2008, aims to promote scientific

Outreach activities.
Project: Ciencia en la Ciudad

culture in medium-sized towns and cities through scientific outreach activities tied in with the municipal authorities' annual programme of events. The towns taking part in the experimental project were Andújar, Barbastro, Baza, Benavente, Calatayud, Cangas del Narcea, Miranda de Ebro, Plasencia and Valdepeñas. A "local scientific culture agent" was appointed in each town and given the task of running outreach activities. The pilot project, which was run from 2007 to 2008, enabled science to be included as a priority topic on the cultural agendas of the nine towns and cities, encouraging the participation in science in which the whole range of social agents (town halls, scientists, teachers, businesses, civic organisations, universities, the public, etc.) took part so as to help raise the public's scientific literacy. Around 200 activities were run during the pilot programme, aimed at a potential audience of 250,000 people. The activities took a variety of formats and covered a whole range of different areas of knowledge.



Ciencia en la Ciudad poster. Plasencia.


Ciencia en la Ciudad Baza (june 2008).

Ibercivis

Ibercivis is a public computing platform which enables members of the public to take part directly in scientific research in real time. The initiative is based on a network of volunteers' spare computing power to perform tasks on a research project at times when they are not using their computers. Ibercivis is a multidisciplinary project in which universities, centres and research organisations from all over Spain and from various different areas of knowledge are taking part. These include the *Instituto de Biocomputación y Física de Sistemas Complejos* at the University of Saragossa (BIFI), the Spanish National Research Council (CSIC), the Centro de *Investigaciones Energéticas, Medioambientales y Tecnológicas* (CIEMAT), the *Instituto de Aplicaciones de las Tecnologías de la Información* y de *las Comunicaciones Avanzadas* (ITACA) and RedIris. The initiative's predecessors include the SETI@home project, and aims to bring citizens closer to cutting edge research in Spain and enable them to take part in producing scientific knowledge. The project makes the computer an open window onto science, creating a new channel for a direct dialogue between researchers and society. At the time of its presentation to the public (at the CSIC on 20 June), there were three research projects underway, one on fusion, one on protein docking and another on magnetic systems. In late 2008 a further five projects were added. These were on nanolight, protein folding, conducting of nanoscopic systems, neurone networks and porous materials. In total, the CSIC lead four of the eight research projects participating in Ibercivis in 2008.

Web page. IBERCIVIS.

Cienciatk

Cienciatk is a CSIC information source that aims to disseminate scientific and technical activity and bring it closer to the public. This platform, which was created in 2008, offers the possibility of sharing and displaying science/technology-related video documentaries, photographs and sounds over the internet. Although its publicly accessible, it is intended strictly for research and education purposes. With a view to pursuing multidisciplinary goals, the topics and collections cover all fields of science. The collections on the platform come from various CSIC institutes, to which have been added materials submitted by individuals and other entities. The platform opens the CSIC up to the public as a whole, so it can see the institution's output and the public resources it generates. In 2008 Cienciatk included over 2,000 documents, 10,000 photographs and 260 sounds.

Rivas ecópolis

In 2008 the CSIC signed an agreement with the town council of Rivas Vaciamadrid (Madrid) to promote scientific culture in the context of the "Rivas Ecópolis" project, through which the CSIC offers expert advice on urban development incorporating the expanding use of sustainable energy, and supports the organisation of scientific outreach activities.

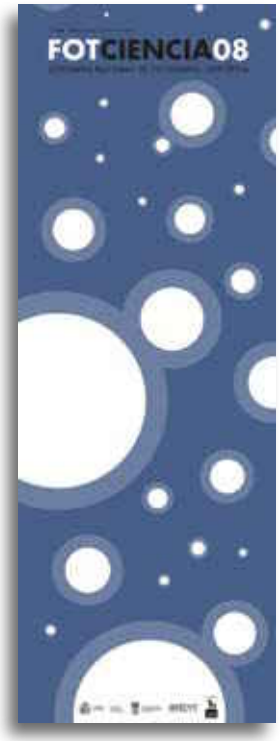
Rivas Ecópolis.

Fotciencia08

In 2008, for the third consecutive year, the CSIC and FECYT ran a national scientific photographic competition (FOTCIENCIA), which seeks to bring science close to citizens through outstanding scientific images. In 2008 a total of 660 photographs were presented by 315 participants in the macro and micro categories. The special prize was for Astronomy, timed to coincide with the 2009 International Astronomy Year, the year in which the exhibition will go on the road with 49 images selected by the judges.

Esculmetal08

Esculmetal is a sculpture competition run by the CSIC and organised by the *Centro Nacional de Investigaciones Metalúrgicas* (National Centre for Metallurgy Research, CENIM). The aim is to use sculpture to bring the public closer to science and technology. The aim is to improve people's under-



Fotciencia 08 poster.

standing of metals, their manufacture, applications, developments, the techniques for their conservation and recycling, and in short, using metal structures as a point of connection between artistic expression and disseminating the state of scientific knowledge. The 2008 edition beat the record for participation with more than 50 works by both new and established artists.

XXVIII Carrera de la Ciencia

More than 5,500 runners took part in the 28th edition of the international "science run" (*Carrera Internacional de la Ciencia*) organised by the CSIC. The participants included Martín Fiz, world marathon champion in 1995 and José María González, European 100 kilometre champion in 2006. The run, which was part of the official calendar of the International Association of Athletics Federations, took place on Sunday 19 October in the main streets of central Madrid.

Carrera de la Ciencia.

SCIENCE AND TECHNOLOGY WEEKS AND FAIRS

General and sector-specific fairs and science and technology weeks are some of the main outreach events in which the CSIC has traditionally taken part. Prior to the creation of the Scientific Culture Area in 2004 this activity took place in a spontaneous and decentralised way at the CSIC's various centres and institutes. Since 2005 the CSIC's centres and institutes have had the support of the Scientific Culture Area in the organisation, coordination and dissemination of

CSIC presence at Science and Technology Weeks and fairs

Science and Technology Fairs

Science and Technology Fairs

Madrid
Ibiza
Sevilla
Ciudad Real* Albacete*
Valdepeñas**
Murcia*
Zaragoza, Barbastro
Tenerife

*Held during the Science Week

* The towns and cities in the Ciencia en la Ciudad initiative took part in 2008

Others

Madrid (De Arte, Aula, Feria del Libro, CONAMA)
Barcelona (ESOF, Expoquimia)

Science and Technology Week

Andalucía: Sevilla, Andújar (Jaén), Granada, Baza (Granada)*
Aragón: Zaragoza, Calatayud
Asturias: Villaviciosa, Oviedo, Cangas del Narcea
Baleares: Mallorca
Canarias: Tenerife, Lanzarote
Cantabria: Santander
Castilla la Mancha: Ciudad Real, Albacete, Valdepeñas (Ciudad Real)
Castilla y León: Salamanca, Benavente, Miranda de Ebro
Cataluña: Barcelona, Lérida, Tarragona
Extremadura: Cáceres, Plasencia
Galicia: Vigo, Santiago de Compostela, Pontevedra
Madrid
Región de Murcia: Murcia
Navarra: Pamplona
Comunidad Valenciana: Valencia, Alicante

* The towns and cities in the Ciencia en la Ciudad initiative took part in 2008

their outreach activities. This scientific activity has also been boosted by the creation of scientific culture units at various CSIC regional offices. In 2008 the CSIC took part in the following science fairs and weeks:

DeArte (Madrid, January 2008)

In order to introduce science in spaces where it had previously not been present, for the second year running the CSIC and FECYT occupied a space at the DeArte fair, a trade fair for Spanish art galleries which is held annually in Madrid. The prizes for the FOTCIENCIA07 National Scientific Photography Competition were given out at the fair, and the winning photographs were put on display. The winners of the Esculmetal07 sculpture competition were also put on show.

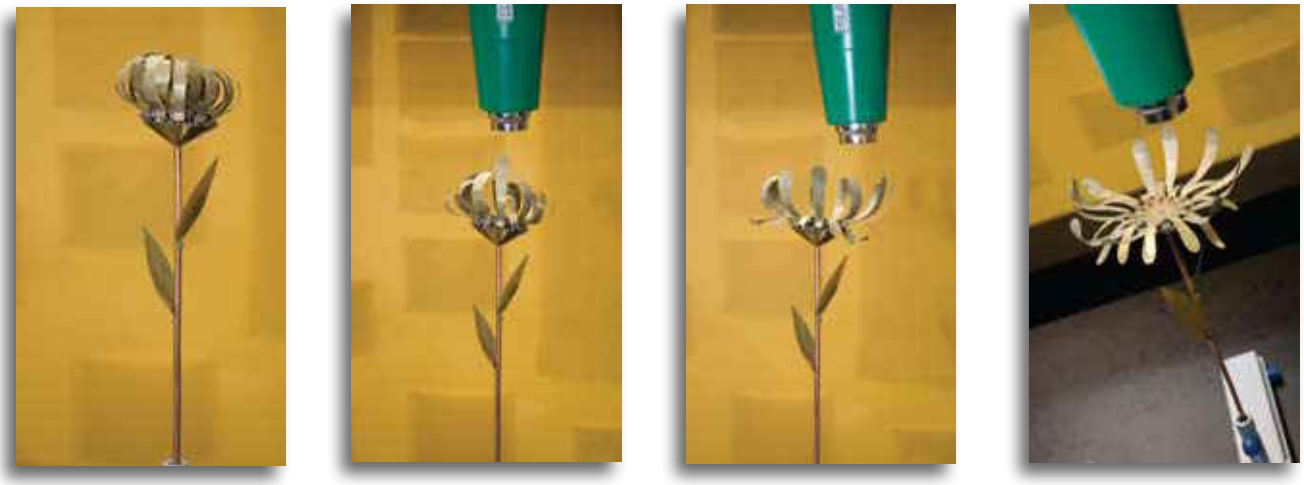
FOTCIENCIA07 in DeArte.

Science and Technology Fairs in Spain.

(Madrid, Seville, Ciudad Real, Albacete, Valdepeñas, Murcia, Saragossa, Ibiza)

The CSIC's centres and institutes took part in the various science and technology fairs held each year in various locations in Spain. In some regions these were timed to coincide with the science and technology week (*Semana de la Ciencia y la Tecnología*). The centres run scientific demonstration activities aimed at all audiences, and young people in particular. Of these fairs, the Madrid fair is the largest in terms of both numbers of visitors and participating entities. The central themes of the **IX Feria Madrid es Ciencia (9th Madrid is Science Fair)**, run from Thursday 24th to Sunday 27th April, were water and the planet Earth, to mark the 150th anniversary of Canal de Isabel II (Madrid's water company) and International Year of Planet Earth. The CSIC had a 500 m^2 stand in the centre of one of the two pavillions of the Madrid trade fair centre (IFEMA) set aside for the science fair. The *Centro de Astrobiología* (Astrobiology Centre), *Real Jardín Botánico* (Royal Botanical Garden) and the *Museo Nacional de Ciencias Naturales* (National Museum of Natural Sciences) also had their own stands. Fifteen CSIC centres took part, with more than 40 activities, which were presented by researchers, technicians and CSIC trainees. The stand was visited by around 20,000 people.

Madrid Es Ciencia Fair.



Fair Madrid Es Ciencia.

Aula

(Madrid, 2-6 April 2008)

CSIC took part in the *Aula* fair, the International Show for Students and Educational Offerings, with an institutional stand and talks aimed at secondary-school pupils.

Madrid Book Fair

(Madrid, 30 May to 15 June 2008)

A series of popular science lectures were organised during the Madrid Book Fair (*Feria del Libro de Madrid*) to present the latest new publications by the Scientific Culture Area's Publications Department (the "*Divulgación*" and "*Informes*" collections), and the new open access features, such as *Digital.CSIC* and the CSIC's electronic journal platform.

Book Fair 2008.

ESOF 2008

(Barcelona, 18-22 July 2008)

The CSIC took part in the 2008 European ESOF forum, a forum set up by Euroscience for debate and communication on science and technology aimed at scientists, young researchers, business people, politicians, popular science writers, students, teachers and the public at large, which has been held every two years since 2004. The CSIC's activities encompassed the scientific programme, the programme of scientific outreach activities open to the general public and an institutional presence in the form of a stand.

Expoquimia

(Barcelona, 20 to 24 October 2008)

The "Expoquimia" International Chemistry Show is an industry trade fair which is held every three years. It is the meeting place for scientists, business people, and specialist technicians who can use it to find solutions, products and innovations relating to all sectors of chemistry. The CSIC took part at the 15th edition with a stand, outreach activities and activities to publicise the technology the CSIC offers.

ESOF08-Barcelona.

Expoquimia Barcelona.

CONAMA

(Madrid, 1 to 5 December)

Along with the other public research organisations belonging to the Ministry of Science and Innovation, the CSIC took part at the Ninth National Environment Congress (*Congreso Nacional de Medio Ambiente*).

Science and Technology Week

(Andalusia, Aragon, Asturias, the Balearic Islands, the Canary Islands, Cantabria, Castile-La Mancha, Castile-León, Catalonia, Extremadura, Galicia, Madrid, the Murcia Region, Navarre, the Valencia Region, from 10 to 23 November 2009).

Promoted by the Ministry of Science and Innovation through the FECYT, the Science Week is the biggest public communication event held in Spain to bring scientific and technological knowledge to society by disseminating the results of research among the population. Most universities, public research organisations, and public and private entities related to science, research and technology in Spain take part.

In order to make the organisation's scientific activity better known, the CSIC took part in the scientific activities at its centres in 15 Autonomous Regions in 2008, offering the public the opportunity to take part in close to 250 dissemination and public communication of science. As a new feature, this year the cities in the Ciencia en la Ciudad pilot project also took part.

Sciencen and Technology on week.

Autonomus community	CSIC's Centres paticipants	JPA	CONF	EXP	TALL	ITIN	VID	OTHERS	CSIC's centres activities
ANDALUSIA	6	2	11	1	2	1	4	0	27
ARAGON	7	6	0	1	2	0	0	0	16
ASTURIAS	2	10	1	2	0	0	0	1	16
BALEARES	2	1	2	0	3	0	0	0	8
CANARIAS	2	1	6	2	0	0	0	0	11
CANTABRIA	1	1	0	0	0	0	0	1	3
CASTILE LA MANCHA	2	0	0	2	1	0	0	0	5
CASTILE LEON	1	1	3	0	0	0	0	1	6
CATALONIA	10	8	21	0	3	0	0	0	42
EXTREMADURA	0	0	1	1	3	0	10	1	16
GALICIA	4	1	1	2	3	0	0	0	11
MADRID	35	23	42	5	14	10	3	2	134
MURCIA	1	1	0	1	0	0	0	0	3
NAVARRE	1	1	0	0	0	0	0	0	2
VALENCIA	10	12	0	0	3	0	3	0	28
Total	**84**	**68**	**88**	**17**	**34**	**11**	**20**	**6**	**328**

JPA: Guided tours, CONF: conferences and round tables, EXP: Exhibitions, TALL: Workshops and courses.
ITIN: Scientific tours. VID: Scientific cinema sesions.

SCIENCE EDUCATION AND TEACHING

The CSIC runs and takes part in various educational programmes whose purpose is to encourage scientific vocations. Examples include the CSIC en la Escuela (CSIC in schools) programme, competitions and the ESTALMAT programme. At the same time, it runs and participates in training courses on the Public Communication of Science.

CSIC en la Escuela

The CSIC en la *Escuela* (CSIC in schools) programme, currently funded by the CSIC and *Fundación BBVA*, forms part of the Scientific Culture Area, began its work in 2000. It was inspired by the French national programme "*La Main a la Pâte*", and its aim is to encourage a joint effort by researchers and teachers to improve the quality of teaching in the early stages of education. To this end, it offers scientific training courses aimed at infants and primary school teachers. In 2008 the programme established a firm foothold in the regions where it is already underway and was extended to others. The CSIC en la *Escuela* is now present in Galicia, Asturias, La Rioja, Navarre, Madrid, Castile-León, Castile-La Mancha, Extremadura, Andalusia and Murcia. The estimated figure for number of establishments currently participating is 600, twice the number in 2007.

El CSIC en la escuela. Science and technology week.

In 2008 CSIC en la *Escuela* designed a space called *Ciencia en el Aula* (Science in the classroom) to facilitate an exchange of educational experience between teachers, while providing a source of information for anyone interested in joining the programme.

On 7 February 2008 *Fundación BBVA* and the CSIC held a scientific meeting entitled "*La Ciencia y los Niños*: *Un encuentro entre Investigadores y Maestros*" (Science and children: a meeting between researchers and teachers), at the premises of the *Fundación BBVA* in Madrid. It was attended by over 100 teachers from throughout Spain, and researchers and representatives from the CSIC and the *Fundación BBVA*, along with the participation of three schools belonging to the national CSIC en la *Escuela* programme.

The annual Archimedes Prize for research, which has been run since 2000, was awarded to 200 pupils taking part in the CSIC en la Escuela for their investigations in the classroom.

For the fourth year running, CSIC en la Escuela took part in the Madrid es Ciencia fair, taking the infant and primary school classrooms to the stand. Children from the Jorge Guillén and Rosalía de Castro schools, both in Madrid, talked to the audience about their investigations into magnetism, sound and optics, and the feeling of movement. Also during the Science week, pupils from the Colegio Rosalía de Castro school in Majadahonda carried out a variety of scientific experiments in the assembly hall of the CSIC's central campus.

Some of the other tools of the CSIC en la *Escuela* are the *Museo Virtual* and *Aula Virtual*. Created in 2000, the *Museo Virtual* (virtual museum) was redesigned in 2008 to give it a wider range of rooms and improve its structure, thus facilitating the work of access and dissemination to the public in general, and teachers in particular. In September 2008 the computer system of the Aula Virtual (virtual classroom), which hosts the programme's content, was upgraded. The aim of the *Aula Virtual* is to encourage contact between participants.

The CSIC en la *Escuela* programmes collection of popular science materials was expanded in 2008 with the following publications:

- Animated books: *El fotón de Feynman*, *Monerías animadas* and *Galope de un caballo*.
- *Historia de una mancha.*
- 2 leaflets: *Simulación de la profundidad: perspectiva en pintura. La sensación de movimiento and los juguetes ópticos.*
- *Taumatropo para construir los niños.*

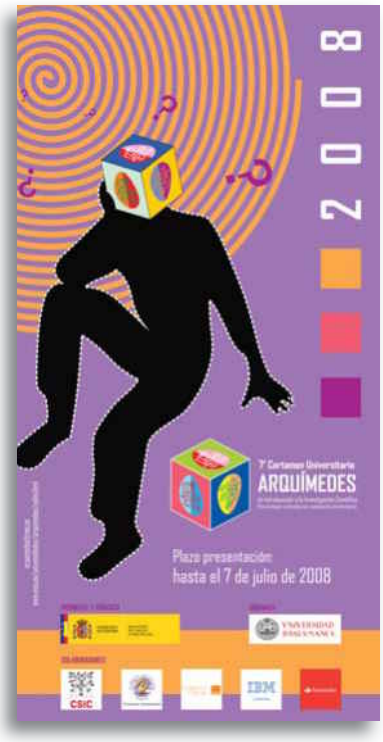
Competitions

The CSIC takes part in competitions with a view to encouraging public participation and a vocation for science:

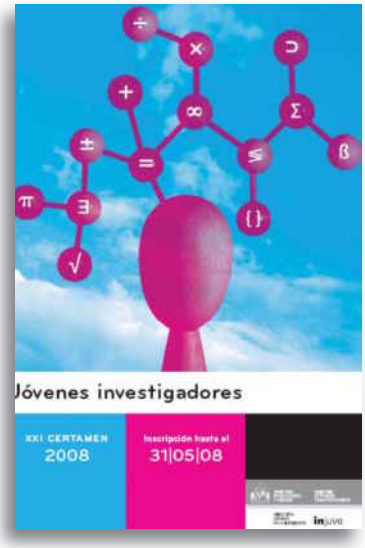
- **7th "Arquímedes" University Competition.** An introduction to scientific research organised by the Ministry of Education and Science in which original work by university students competes. In this edition, in which approximately 200 proposals were presented, the number of prizes was increased and a special "Earth Year" prize was given to coincide with the commemoration of International Year of Planet Earth. The CSIC offered the winners a stay at three of its centres.

- **XXI "Jóvenes Investigadores"** (Young Researchers). Competition organised by the Ministry of Education and Science, aimed at young people outside of university aged between 15 and 20, coordinated by teachers or heads of teaching establishments. Approximately 150 pieces of original work were submitted in the 2008 edition, including submissions by both groups and individuals. The CSIC offered 10 two-week stays at its centres to the winners.

- **9th edition of "Ciencia en Acción" (Science in Action).** The "*Ciencia en Acción*" programme is an initiative promoted by the CSIC, FECYT, the *Real Sociedad Española de Física* (Spanish Royal Society of Physics), the Real *Sociedad Matemática Española* (Spanish Royal Society of Mathematics) and the National Distance Education University (UNED). It is run by students, teachers, researchers and scientific popularisers, in any discipline. The primary objective is to motivate all participants to disseminate science by means of innovative solutions that are accessible and educational. 184 pieces of work were submitted to the ninth edition, of which 85 were selected.



Arquímedes 2008 poster.



Jóvenes Investigadores poster.

- **7th edition of Robolot. Robolot** is a competition organised by the high school IES *La Garrotxa*, in conjunction with *Olot* town council, the firm TAVIL S.A., ICE Catalonia Polytechnic University and ICE University of Gerona among others, to promote a spirit of technology research among young people. Over the course of two days, students at various high schools in Girona and university students from Catalonia met to compare how their robot models work. These robots are either trackers, which follow a white line drawn on a platform, or sumo wrestlers, which try to stay inside a circle. The CSIC gave prizes of a week at one of the institution's research centres to two students and a teacher.

- **49th International Mathematics Olympics (IMO).** Organised in Spain for the first time, IMO is aimed at young people around the world aged under 20 who are not at university. Each country can send up to 6 participants, chosen in each country's National Olympics. The 2008 edition, which was organised by the Ministry of Education, Social Policy and Sports, the *Real Sociedad de Matemáticas Española* (Spanish Royal Society of Mathematics), Madrid City Council and

the Madrid Regional Government, with the collaboration of other institutions such as the Madrid *Complutense* University, the National Distance Education University (UNED) and the CSIC, was held in Madrid from 10 to 22 July 2008.

ESTALMAT Programme

Motivated by the interest in promoting a vocation for science, during the 2007/2008 Academic Year the CSIC took part in the ESTALMAT Programme to stimulate mathematical talent. This is a project by the Real Academia de *Ciencias Exactas, Físicas y Naturales* (Royal Academy of Exact, Physical and Natural Sciences) for the early detection and stimulation of mathematical talent. The programme began in 1998 in the Madrid Region, and has since been extended to a further seven autonomous regions. The initiative aims to detect, guide and stimulate exceptional mathematical talent among 25 students aged 12-13 on a continuous basis through weekly tutoring of three hours every Saturday morning over a period of two years. Among other actions, the CSIC is collaborating by offering students a dynamic and attractive visit to its centres at the end of the course. In particular, on 31 May 2008, more than 40 young people were shown around the *Instituto de Estructura de la Materia* (Institute of the Structure of Matter) and the *Instituto de Química Orgánica General* (Institute of General Organic Chemistry) by the deputy director and director, respectively, together with other scientists and trainee researchers at the two centres.

Estalmat 08 Madrid.

Training Courses on the Public Communication of Science

In 2008, the CSIC's Scientific Culture Area continued running courses to train professionals in scientific outreach activities and the promotion of scientific literacy.

- **Training course for scientific culture agents in the Ciencia en la Ciudad pilot project.** The CSIC, in collaboration with the FECYT, organised a training course aimed at local scientific culture agents in the *Ciencia en la Ciudad* pilot project. The course, comprising 21 hours of teaching, aimed to provide agents with the basic tools they need in order to be able to plan and run dissemination activities in each of the cities the pilot project took place in. The course was held in Madrid on 29-31 January 2008.
- **Scientific outreach and communication: scientific culture.** Internal training course, aimed at CSIC personnel interested in the dissemination of science and management of scientific culture projects. 25 hours teaching. Given in Madrid, 23 to 27 June 2008.
- **Training and skills building course for Ibero-American scientific culture agents.** The CSIC took part in preparing teaching materials and tutorials for one of the six modules of the course organised by the *Organización de Estados Iberoamericanos* (OEI), *Fundación DICYT* and the *Instituto ECYT,* comprising 150 hours of teaching during the 2008/2009 academic year.

EXHIBITIONS

The following exhibitions were set up and put on shown in 2008:

- **Fotciencia07**

  (19 locations, January to December 2008)

  An exhibition of 50 images resulting from the selection of photographs presented in the second edition of the national scientific photography exhibition, run jointly by the CSIC and the FECYT in 2007. In 2008 the exhibition travelled to 19 locations: 17 in Spain and 2 in Argentina. The winning images were also put on show at the DeArte Fair in Madrid in January, in Seville in October, and in the Tetuán district of Madrid in November and December 2008.

Winner image. Fotciencia 07.

- **CO_2 and Climate Change**
  (Santander, October; Oviedo, November, and Saragossa, December 2008).

  This exhibition, run by the CSIC's *Instituto Nacional del Carbón* (National Coal Institute), explains the current scientific knowledge of the role of CO_2 in the earth's climate in layman's terms, and sets out the type of actions that need to be carried out in a sustainable way to mitigate CO_2 emissions from our homes, cars and energy producing systems.

- **Guadiamar. Ciencia, técnica y restauración**
  (Science, technology and restauration) (Seville, 1 February to 30 June 2008).

  Exhibition run by the CSIC's Doñana Biological Station and *Fundación CajaSol* to mark the tenth anniversary of the breaching of the Aznalcóllar mine tailings dam.

Guadiamar Exhibition.

- **El Universo para que lo descubras**
  (The universe for you to discover) (Valdepeñas, November 2008)

  In order to promote the 2009 International Astronomy Year, the CSIC has created a travelling exhibition of 35 images, bringing the universe, from the solar system to deep space, closer to the public. Along with the CSIC, numerous other entities took part (organised by the *Instituto de Andalucía de Astrofísica* and the Scientific Culture Area). The exhibition was opened in Valdepeñas, Ciudad Real, in November 2008, in the context of the *Ciencia en la Ciudad* pilot project and the Science Week.

Astronomy exhibition in Valdepeñas.

- **Esculmetal08**
  (Madrid, November 2008)

  The Esculmetal exhibition was the outcome of the sculpture competition run by the CSIC and organised by the *Centro Nacional de Investigaciones Metalúrgicas* (National Centre for Metallurgy Research, CENIM), with the aim of bringing science and technology closer to the public by means of sculpture. The exhibition was put on show in November 2008 in the gardens of the CENIM.

- **Pabellón del Sol**
  (Ciudad Real, December 2008)

  The **Pabellón del Sol** (Pavilion of the Sun) is an exhibition space conceived of by researchers at the *Instituto de Astrofísica de Andalucía* (Andalusia Astrophysics Institute, IAA) and the *Estación Experimental del Zaidín* (Zaidín Experimental Station, EEZ), both of which are Granada-based centres belonging to the CSIC. The pavilion is a scientific outreach activity whose aim is to generate curiosity about science among members of the public. It was therefore set up in Granada and Seville, the two cities it visited in 2006 and 2007, respectively, at central locations through which large numbers of people pass. In 2008 it was on show in Ciudad Real, Castile-La Mancha.

- **60 years of the journal Informes de la Construcción.** (Madrid, 16 December 2008 to 12 January 2009)

  This commemorative exhibition was organised by the *Instituto de Ciencias de la Construcción Eduardo Torroja* (Eduardo Torroja Construction Sciences Institute) as a homage to the professionals who have contributed to making progress in civil engineering, construction and architecture over the past 60 years. The exhibition aimed to disseminate the legacy of the journal in promoting innovation and progress in building among new generations.

PUBLICATIONS

In 2006 the Scientific Culture area began a collaboration with the Publications Department to edit and publish popular science books. The result was the **Divulgación** and **Informes** collections, the first issues of which came out in 2007. With these collections the CSIC fulfils one of its main objectives: to provide rigorous and accessible materials to a broad swathe of society, and bringing the public closer to the research performed at the CSIC. The topics covered by the collection try to answer the questions citizens have about current issues. Both collections are written in accessible language and each volume is edited by outstanding specialists in the subjects covered. The following books were published in 2008:

In the Divulgación collection:

07. *Invasiones biológicas*, edited by Montserrat Vilà, Fernando Valladares, Anna Traveset, Luis Santamaría and Pilar Castro.

08. Guadiamar, edited by Héctor Garrido.

In the Informes Collection:

02. *Aguas continentales*, edited by Damià Barceló.

Informes Collection.

Divulgacion Collection.

LECTURE SERIES

The CSIC continued its lecture series with with the *Museu de la Técnica de L'Empordà* de Figueres and the *Instituto Cervantes*. These lectures aimed at the general public, were intended to disseminate scientific research and technological and development. A series of lectures on women and science, organised by the CSIC and the Cartagena Polytechnic University, was also run in 2008.

COMMEMORATIONS

Commemorations are an opportunity to raise the profile and highlight the importance of historical events, research, topics, etc. which did not previously receive the attention they deserve. The aim is to use current events as an entry point for the dissemination of research into a given topic and to improve the public's knowledge and understanding. In 2008 the backdrop to the CSIC's activity was the celebration of the International Year of Planet Earth. In 2008 it also played an active role in preparing the commemorations of the 2009 Darwin Year and the International Year of Astronomy. One highlight was the CSIC's holding of the second national meeting on AIA-IYA2009 (24 and 25 September 2008), which was attended by around a hundred people involved and interested in encouraging the popular understanding of astronomy.

Also in 2008, the *Centro Nacional de Investigaciones Metalúrgicas* (National Centre for Metallurgic Research, CENIM) celebrated its 60th anniversary, with various activities taking place over the course of the year (scientific sessions, publications, exhibitions, etc.)

INSTITUTIONAL EVENTS

As well as preparing institutional and popular science materials, the Scientific Culture Area collaborates with the Protocol Department to organise and conduct institutional events.

- Event inaugurating the 60th anniversary of the CENIM. Madrid, 21 May 2008.
- Presentation of Ibercivis. Madrid, 20 June 2008.
- Signature ceremony for the cooperation agreement between the CSIC and the Rivas-Vaciamadrid Town Council to promote scientific culture in the context of the Rivas Ecópolis project. Rivas Vaciamadrid, 8 July 2008.

INTERNATIONAL ACTIVITIES

- **ESOF 2008.** Barcelona, 18-22 July 2008. ESOF is a forum set up by Euroscience for debate and communication on science and technology aimed at scientists, young researchers, business people, politicians, popular science writers, students, teachers and the public at large, which has been held every two years since 2004. The CSIC is actively involved in the scientific programme, through its outreach activities and its institutional presence.
- **Expoquimia 2008.** Barcelona, 20-24 October 2008. The CSIC took part in the 15th International Chemistry Show "Expoquimica", an industry trade fair which is held every three years. This is a meeting place for scientists, business people, and specialist technicians who can use it to find solutions, products and innovations relating to all sectors of chemistry.
- **World Conference on Marine Biodiversity.** Valencia, November 2008. This international conference, organised by the CSIC and the network of excellence of European marine research institutes, MarBEF, was held from 11-15 November in the *Ciudad de las Artes y las Ciencias*, in Valencia, and was attended by more than five hundred researchers from 45 countries.

World Conference on Marine Biodiversity.

- New Views of the Sky with SPITZER. The discoveries made using the SPITZER space telescope. Lecture given by Robert K. Wilson (Spitzer Project Manager, NASA) y Alberto Noriega-Crespo (Spitzer Science Centre, Senior Scientist, NASA), run by the CSIC on 9 December.

NATIONAL MUSEUM OF NATURAL SCIENCES

The *Museo Nacional de Ciencias Naturales* (National Museum of Natural Sciences; MNCN), which belongs to the CSIC, ran an extensive programme of exhibitions in 2008. These included nine temporary exhibitions and four travelling exhibitions, with the dual goal of disseminating scientific knowledge of cultural interest, and to raise awareness of the need to preserve and care for the environment, timed to mark the International Year of Planet Earth. Starting from the premise that knowledge is the first step towards achieving this goal, the MNCN included in its programme of exhibitions several shows such as *Animalatas*, a series of animal sculptures constructed out of recycled cans and tins, and *150 años de Ecología en España* (150 years of ecology in Spain), which summarised the history and personalities who have marked the 150 years of ecology in Spain, without forgetting current concerns about wildfires, loss of ecosystems, mass species extinctions, and protected spaces. Also, the *Meteoritos* (Meteorites) exhibition publicised the whole of the MNCN's valuable collection of meteorites, while *Fósiles y vivientes* (Fossils and living creatures) looked at the range of animal and plant species that coexisted with the dinosaurs millions of years ago. *El volcán y el vino* (wine and the volcano) illustrated the unusual features of the wine produced from vines grown in Lanzarote. The travelling exhibitions included *Olvidados por Noé* (forgotten by Noah), which looked at extinct mammals that inhabited the Iberian Peninsula before humans arrived, and *Pacífico Inédito* (The Pacific as never seen before), which travelled to Belgrade, Brussels and Utrecht, consisting of a collection of photographs of the peoples and landscapes visited by Spanish scientists during the *Expedición de la Comisión Científica al Pacífico* (Expedition of the Scientific Commission to the Pacific) which set out in 1862.

Olvidados por Noé exhibition.

As well as these exhibitions, the museum's Public Programmes Department organised an extensive range of activities to promote scientific culture, aimed at organised groups and individual members of the public. In 2008 a total of 1,551 workshops were organised, at which 38,775 pupils took part. The "*El Museo va a la escuela*" (The Museum goes to school) programme was set up during the year, in order to run activities and workshops directly in schools, and the 1st Scientific Conference for Schoolchildren at the Museum was run (along the same lines as scientific conferences run at research centres). Before the conference, 22 workshops were held at 9 schools in the Madrid Region, attended by around 700 pupils and 22 teachers.

Activities aimed at individuals (children, adults and families) were also run every weekend, Saturday, Sunday, public holiday, to mark special events and/or the holidays. These are a complement to the visit to the exhibitions, and allow visitors to take part in activities where they handle or observe items, bringing science close in a fun and enjoyable way in a social and cultural leisure context. These activities, which are set in the context of others, the Christmas and Easter workshops, the Summer Museum, the International Day of Museums and the *Noche en Blanco* ("Sleepless night" when museums stay open until the early hours of the morning) were enjoyed by around 6,000 people in 2008.

In 2008 the Museum continued publishing its quarterly journal, the *Periódico del MNCN*, which looks at a variety of topics relating to all the areas in which the Museum works, ranging from collecting tissues and DNA, the museum's paleontological collection, climate change, species extinctions and conservation, among others. The Periódico del MNCN also gives information about exhibitions, public programmes, conferences and seminars run during the year, and summaries describing the MNCN's historical progress. The Museum also gave momentum to the Anfioxus project, a popular science journal about evolution written jointly by researchers and secondary school students and teachers, which was published with financial support from FECYT.

ROYAL BOTANICAL GARDEN

In 2008 the CSIC's *Real Jardín Botánico* (Royal Botanical Garden) exceeded the figure of 450,000 visitors, consolidating its position as one of Madrid's best-loved science museums among both tourists and residents of the city. One of the most important events of the year was the reopening in October of the Villanueva Pavilion, after a year of refurbishment and upgrade work paid for by the CSIC and *Fundación Cajamadrid*. The new exhibition rooms were opened with the exhibition "*Ars Mechanicae*", organised by the C*entro de Estudios y Experimentación de Obras Públicas* (CEDEX). The Garden also organised a number of other exhibitions, such as that commemorating the International Year of the Potato, organised by INIA and set up in the Bonsai Greenhouse.

This year the RJB's scientific education and outreach programme received over 47,400 participants, of which 70% were school and university students. The most popular activities included guided tours, courses and workshops. This programme is being run in line with the commitment to scientific outreach and education for sustainability which the centre began in 2002 and which increases the range of activities it offers all audiences each year. Since 2008 this has been coordinated with the new Scientific Culture Unit. The result is an annual increase in the number of participants, which this year was 9.9% compared with the previous year.

In terms of collaboration with other educational establishments, the RJB took part in the third edition of the "*Rutas Científicas*" (Science Trails) territorial cooperation programme, which was the fruit of an agreement between the Ministry of Education and Science and the autonomous regions, and which aims to encourage secondary school pupils to consider a career in science. Another initiative in this vein was the collaboration with the 23rd edition of the *Ruta Quetzal-BBVA*, whose participants visited the Garden in June. Another significant collaboration is that established with the Jane Goodall Institute to organise "ecosafaris" in the Garden. The eminent primatologist herself visited the Garden to present the programme. One of the RJB's other cooperation activities with educational establishments was the organisation with the Goethe Institut of learning stations on Alexander von Humboldt in the grounds of the garden. Another significant activity for the Garden is its participation in the European "Key to Nature" project which has been underway since 2007, the aim of which is to aid the teaching and learning about European flora and fauna by means of digital tools.

The Garden's dissemination publications included the publication in December 2008 of a book entitled "*Mutis y la Real Expedición Botánica del Nuevo Reyno de Granada*" to commemorate the 200th anniversary of the death of the Spanish botanist and expeditionary Mutis, whose herbaria, manuscripts and drawings of the flora of the New Kingdom of Granada (today corresponding mainly to modern Colombia, Venezuela, Ecuador and Panama) form part of the Garden's collections. Two volumes of the Flora de *Mutis*, those corresponding to the Eupatorieae tribe of the Asteraceae and the Faboideae of the Fabaceae, were published that year. The first issues of the six-monthly popular scientific journal "*El diario del Jardín Botánico*", which was created to disseminate the research work of the centre and bring it to the attention of the public, and publicise other less well known facets of the life of the Garden, were produced in 2008.

The Garden plays an active role in Madrid's cultural life, taking part in PhotoEspaña 2008 international photography festival, the *Noche en Blanco* ("Sleepless night"), the Vivamérica Festival, and the Architecture Week organised by the *Colegio de Arquitectos de Madrid* (Madrid architects' professional association). The *Foro Permanente de la Sostenibilidad* (Permanent Sustainability Forum) held its meetings at the Royal Botanical Garden for the third year running. Organised by the Prime Minister's Economics Office and the CSIC, sponsored by the *Observatorio de la Sostenibilidad en España* (Sustainability Observatory in Spain), the forum aims to gather opinions about the economic, social and environ-

Workshop in Real Jardín Botánico.

mental aspects of development from civil society, and the scientific community in particular, as well as the most active groups in the field.

One of the Royal Botanical Garden's most important projects to disseminate its bibliographic/scientific heritage is the *Biblioteca Digital* (Digital library), which is now in its third year. In December 2008 more than 1,000,000 pages had been digitised, comprising almost 1,500 works. This year also saw the start of another project to disseminate the Garden's collections, namely the digitisation of the more than 7,000 drawings in the José Celestino Mutis collection, considered one of world's most important plant iconography collections.

As regards research, the Royal Botanical Garden has continued its work as a Major European Facility, a classification it shares with the National Museum of Natural Sciences. As part of the SYNTHESYS programme (Synthesis of Systematic Resources, under the Sixth Framework Programme) 17 researchers from 13 different countries working on short research projects, staying a total of 305 days. A "scientific presentations marathon" was begun in 2007 as an initiative to disseminate the research projects underway at the institution, and the second edition was held in June 2008, with the participation of 35 researchers from the centre. The year's main scientific publications in book format were volume XVIII of *Flora Iberica*, volume I of *Flora de Guinea Ecuatorial* and *Flora ibérica de Algas continentales. Carófitos* (Characeae). The journal Anales del *Jardín Botánico* passed the evaluation process run by the FECYT, and was included on the SCOPUS platform in 2008. In September 2008 the first official masters' degree in Biodiversity in Tropical Regions and its Conservation began. This is based in Ecuador and jointly organised by the CSIC, the Menéndez Pelayo International University and the Central University of Ecuador, and directed by a scientist from the centre, with the participation of researchers from the Royal Botanical Garden.

The Spanish node of the GBIF (Global Biological Information Facility), which is based at the Royal Botanical Garden, continued its programme of training users in 2008. This year it gave 12 courses on topics such as managing collection data and georeferencing. During the year the number of Spanish institutions taking part in GBIF increased to 47. These offer over 2,900,000 biodiversity records.

RESIDENCIA DE ESTUDIANTES

In 2008 the *Residencia de Estudiantes* continued its dual role as a place in which efforts are underway to recover the memory of the Silver Age of Spanish culture (1868-1936) and as a centre for prospective studies, currently addressing the close relationship between science, education and culture, and acting as a platform for its dissemination. This work was structured around its traditional areas of activity: the location, treatment and conservation of document collections regarding the Silver Age, whether located in Spain or abroad; developing technology projects, research and training, aimed at facilitating this work of recovering memory (the *Edad de Plata portal* www.edaddeplata.org stands out), and a fundamental task of disseminating these achievements through publications, and organising public events and exhibitions.

The many events held in 2008 included an extension to the commemoration of the centenary of the *Junta para Ampliación de Estudios e Investigaciones Científicas* (JAE), the predecessor of the CSIC, €organised by the Ministry of Science and Culture, through the CSIC, and the *Sociedad Estatal de Conmemoraciones Culturales* (State company for cultural commemorations, SECC)€, as a part of which the international congress called *II Congreso Internacional La JAE* en su centenario was held. The exhibtion *gallo. Interior de una revista. 1928* (gallo. Inside a journal), and one-day sessions dedicated to the 70th anniversary of the *Casa de España* in México or the 50th anniversary of the death in exile in Mexico of the composer Adolfo Salazar were among the other activities taking place during the year. Poetry readings, the programme of concerts, the seminars devoted to the Information Society (*Buscadores y la investigación en Humanidades y Lenguas y culturas hispánicas en Internet* ¬ –Search engines and research in the humanities and in Hispanic language and culture on the Internet) and activities dedicated to disseminating science, such as the *Encuentro con los Premios Nacionales de Investigación* (Meeting with the national research prize winners) or the lecture series *La electricidad y los hidrocarburos como base de la energía del futuro* (Electricity and hydrocarbons as the basis of the energy of the future), also continued. New publications in the year included new titles in the collection of Epistolarios de la *Edad de Plata* and two new audiobooks in the *Poesía en la Residencia collection* (devoted to the recent Cervantes prize winner Juan Gelman and to Ángel González), and a facsimile

version of the journal *Tierra Firme*, copublished by the SECC, the CSIC and the *Residencia de Estudiantes*.

Additionally, the *Residencia de Estudiantes* continued in its role as the meeting place in Madrid for over 4,000 researchers, scientists, intellectuals and creators from a wide variety of geographical backgrounds, and specialists in various disciplines, and a wide range of groups point of reference for the holding of formal and informal meetings, making it a centre for dialogue and an exchange of knowledge.

RESIDÈNCIA D'INVESTIGADORS

The CSIC-Generalitat de Cataluña (Catalan Regional Government) *Residència d'Investigadors*, ran a packed programme of scientific and cultural activity over the course of 2008: as well as remaining the usual venue for scientific meetings organised by the various research groups from the CSIC and Catalan universities (such as the international symposium on Synchrotron Radiation in Art and Archaeology (22-24 October) or *Ciencia, poder e ideología: usos sociales de la genética y de la salud pública durante el siglo XX* (Science, power and ideology: social uses of genetics and public health in the 20th century)(5 March) it also promoted a series of scientific/cultural activities with a view to maintaining its position as the meeting place for science and culture. Among these activities, the exhibitions Medicina, Guerra y Exilio (8-29 January), *Urbs Picturata. La ciutat en l'obra d'Antoni Vives Fierro* (2-8 June) and *La prensa libertaria de clandestinidad* (8 October). Series of screenings of films were also organised, such as *Tendencias del cine italiano del siglo XXI* (6-27 February), and lectures, such as *Segundo ciclo de conferencias y debates: Ciencia y Envejecimiento* (18 February - 3 March) and the series of debates *Las herramientas de prevención de residuos: los envases en Cataluña, propuestas de reducción* (21 October). The *Residencia d'Investigadors* also hosted the *V Concierto de primavera* (5th spring concert) (14 May), and significant institutional events, such as the signing of the new framework agreement between the CSIC and the Generalitat de Cataluña.

Metges catalans a l'exili exhibition.

INSTITUTIONAL COORDINATION

Strengthening the networking between the Scientific Culture Area and the CSIC's regional offices was a high priority objective in 2008. The outcome of this strategy of bolstering collaborative work was numerous outreach activities, which have reinforced and raised the visibility of the CSIC and awareness of it in the various autonomous regions.

A specific boost to this line of work was the creation of the *Casa de la Ciencia de Sevilla*, in **Andalusia**. Located in the Peru Pavilion, it is the CSIC's scientific outreach unit in the Andalusia region, the region with the second largest number of CSIC centres after Madrid. The experience in scientific outreach accumulated at centres in Andalusia continued in 2008, with the production and subsequent roadshows of exhibitions such as *Fotospectiva, Guadiamar, ciencia, técnica y restauración* (prepared at the Doñana Biological Station) and the *Pabellón del Sol* (produced by the *Instituto de Astrofísica de Andalucía* and the *Estación Experimental del Zaidín*), and participation by the CSIC's scientists in the Science and Technology Week and the Science Fair (in Seville and Granada). In 2008 dissemination work also continued with the publication of the popular science journal "*IAA, Información y Actualidad Astronómica*", the weekly radio podcast "*A través del Universo*" and collaboration with the newspaper "Granada Hoy" and the radio programme "*Hora Granada*" by Canal Sur Radio. The fourth season of the "Lucas Lara" lecture series was also organised. The Andalusia regional office also participated actively in the preparations for the 2009 International Astronomy Year.

Pabellón del Sol. Ciudad Real.

The activities carried out by the CSIC regional office in **Catalonia** include the CSIC's participation in high visibility events such as Expoquimia and ESOF2008, of the *Día del Libro* (Day of the book). With a view to increasing the dissemination of the CSIC's scientific/cultural activities in Catalonia among the public, the Delegation managed the Collaboration Agreement between the CSIC and Barcelona City Council to participate in the science dissemination programme run at Barcelona's schools.

The regional office in **Aragon** organised participation of the region's centres and researchers in Expoquimia, the 9th *Madrid es Ciencia* fair, the 5th Saragossa Science Fair (in the Science Pavillion), and Aragón's *Semana de la Ciencia* (Science week). From September to October it ran a popular science programme called "*Explorando…*" (Exploring) as a part of the activities commemorating the International Year of Planet Earth. The aim was to raise awareness among 4th grade secondary students in Saragossa of the potential of Earth Sciences to improve our quality of life and safeguard the planet. In November it hosted the Fotciencia08 exhibition.

For its part the **Valencia** regional office introduced a new activity aimed at primary school children (aged 6-10): the programme entitled "*Ciencia a través del teatro*" (Science through the theatre), which was run in the months of November and December to coincide with the start of the Science Week in Valencia and Alicante. For the fourth consecutive year, the series of guided tours of the CSIC's institutes in Valencia, entitled "*Con Ciencia Sé*" (With science I know) was run. These visits are aimed at students in their final year of higher secondary education and vocational training, involving 55 secondary education establishments and attended by approximately 1,100 pupils. In addition to these activities, other activities included organising the series of science films (comprising the showing of a film followed by a round table discussion); the fourth edition of the series of public lectures on Science and society entitled "*Ciencia y Sociedad*"; the lecture series in schools "*Conferencias en IES de la Comunidad Valenciana*", coordinated by the Universitat de València, and science cafés aimed at specialist scientific journalists in the Valencia Region. As a new feature, in the 2008-2009 academic year a collaboration was begun with the *Instituto de Física Corpuscular* (a joint CSIC-Universtitat de València centre) on activities relating to the commissioning of the large hadron collider (LHC), located at the European Particle Physics Laboratory (CERN).

The CSIC's regional office in **Galicia** ran and participated in various public communication of science activities in 2008, including in particular the third edition of *Exper-i-Ciencia*, con-

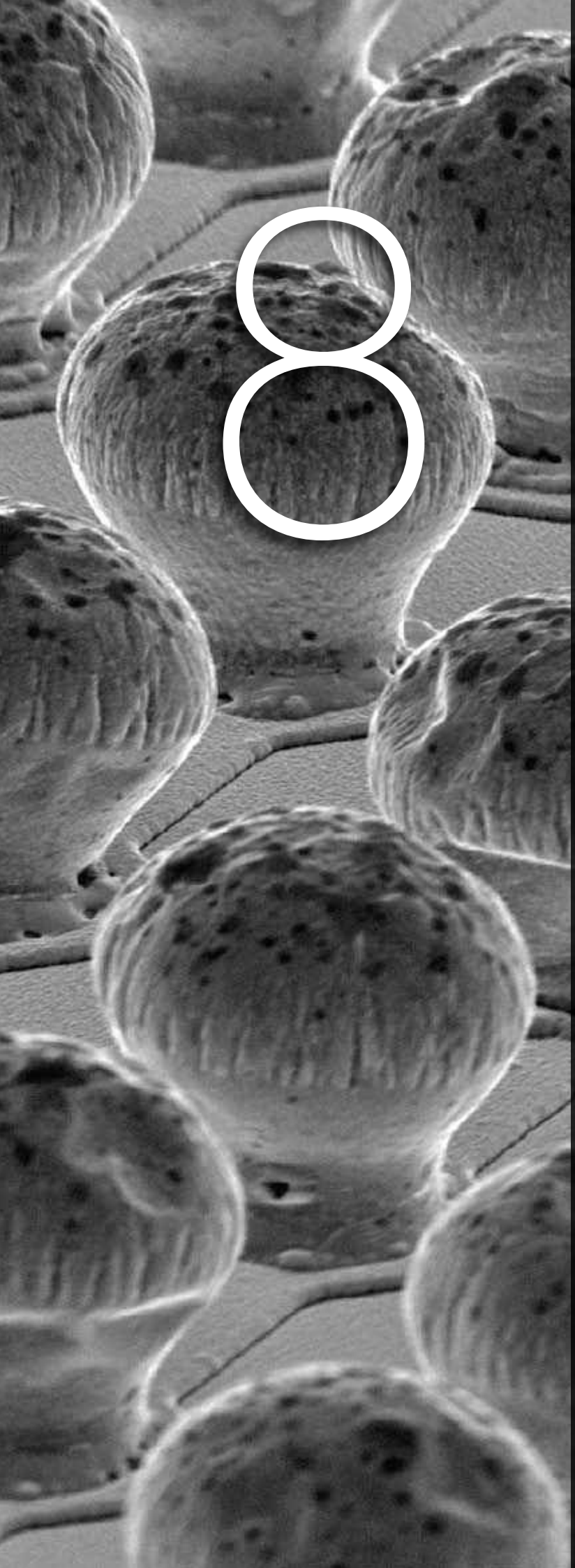
Book's day in Barcelona.

Outreach activity in Aragon.

sisting of meetings between CSIC researchers and secondary school children. Support was also given to the activities undertaken during the 2008 Science Week, and initiatives led by other centres, such as: the *Talleres de Investigación Agraria* (Agricultural reseerach workshops) at the Galicia Biology Mission, or the *Talleres de Ciencia Marina* (marine science workshops) in Bouzas (an actiivty singled out for a special mention by the Directorate-General for R&D at the *Xunta de Galicia* or Galician Regional Government) and the NEUSTON exhibition, at the *Instituto de Investigaciones Marinas*. The regional office's staff attended important popular science events such as ESOF 2008 in Barcelona, or the "*Xornadas A Ciencia e o Mundo Contemporáneo*" run by the Department of Education and Universities at the *Xunta de Galicia*, publicising the teaching resources the CSIC has on this topic. Also in the region, the *Instituto de Estudios Gallegos Padre Sarmiento* ran a number of programmes including the Programa Integral de *Actividades de Cultura Científica en Arqueología y Patrimonio* which comprised various activities (workshops, guided tours, open days, exhibitions and talks) aimed mainly at school children, and at the Science Fair the *Misión Biológica de Galicia* promoted legumes with "*Legumes, un alimento saludable*", combing an exhibition of legumes, a tasting of various traditional "*fabada*" (bean stew) recipes and showing audiovisual materials on legumes in nutrition along with practical activities in the laboratory.

In the **Canary Islands** a programme of guided tours was arranged to the *Instituto de Productos Naturales y Agrobiología* (Institute of Natural Products and Agrobiology, IPNA), an exhibition run with the title "*El cáncer: por qué se produce y cómo se combate*" (Cancer: what causes it and how it is fought), audiovisual activities and laboratory demonstrations on chemistry in everyday life, and a series of lectures on topics such as alternative crops on the islands, natural marine products, the chemical activation of natural plant defences and the effect of invasive plant species on island ecosystems. Additionally, the *Laboratorio de Geodinámica de Lanzarote* (Lanzarote Geodynamics Laboratory, LGL) scheduled two guided tours of the laboratory for teachers and students at the *Escuela de Ingenieros Técnicos en Topografía* at the University of Las Palmas and at the University of Cantabria, in March and June 2008, respectively.

For its part, the CSIC's Spanish School of History and Archaeology in **Rome** continued its work preparing and publishing the journal *Noticias eehar*, set up by the School's new team in 2006 and created collectively by research fellows, contract staff and researchers with the main aim of achieving a high degree of direct participation as is shown by the 40 contributors to the latest edition published. In January 2008 *Noticias eehar* 02 was published (32 pages) and in December *Noticias eehar* 03 (44 pages). The journal is open to both domestic and foreign researchers and is focused in particular young researchers who are receiving their training in Rome, and who come from the CSIC's own training programme or other national programmes. It has been designed to have sections covering a range of scientific areas and appealing to a variety of audiences. In its latest issue, the front cover presented the CSIC's current president and described the organisation's conversion into a State Agency. The section which was called *Página CSIC* (CSIC page) changed its name to *Cultura científica CSIC* (CSIC scientific culture) to give a voice to the general programme coordinated by this Area.



8 Publications Department

The aim of the Publications Department, as the CSIC's publisher, is to bring research, technological development, innovation and culture to the widest possible audience. To do so, each year it commercialises and distributes books and journals published by the CSIC.

Image: "The Alien's nest", by Enric Cabuina Casas. (Fotciencia 08)

The Publications Department reports to the Vice-Presidency for Organisation and Institutional Relations and carries out its publishing activity within the legal framework laid down by Royal Decree 118/2001, 9 February 2001, on the regulation of official publications (BOE 10-02-2001). Its publications programme is approved by the CSIC's Publications Commission and forms part of the General Plan for Official Publications managed by the Ministry of the Presidency of the Government, which is approved by the Council of Ministers.

Alongside its management, publication and distribution services, the department also runs a **Scientific Bookshop** which is located at Calle Duque de Medinaceli nº 6. Books and periodicals are sold directly through the department and the scientific bookshop.

A total of **124** titles were published in the 2008 publications programme. These were in the following subject areas:

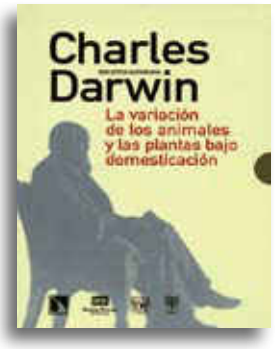
- Antropología / Anthropology
- Arqueología y Arte / Archaeology and Art
- Biología / Biology
- Ciencias de la Documentación / Science of Documentation
- Economía y Ciencias Sociales / Economics and Social
- Sciences
- Derecho / Law
- Estudios Árabes / Arabic Studies
- Estudios Bíblicos, hebreos y sefardíes / Biblical, Hebrew and Sephardic Studies
- Estudios Clásicos / Classical Studies
- Estudios Semíticos / Semitic Studies
- Filosofía / Philosophy
- Física / Physics
- Historia / History
- Historia de la Ciencia / History of Science
- Historia de América / History of America
- Ingeniería / Engineering
- Investigación Científica- Informes / Scientific Research-Reports
- Lingüística y Filología Españolas / Spanish Linguistics and Philology
- Medicina / Medicine
- Musicología / Musicology
- Química / Chemistry
- Zoología y Botánica / Zoology and Botany

The number of titles in the historical publications list stands at around **12,000**, of which **2,075** are available for sale from the catalogue.

There were **76** live collections in 2008 and 1 new collection was created in the American History area entitled "*Universos Americanos*". A new series was also launched to commemorate the bicentenary of the War of Independence, entitled "*1808-1814 Guerra y Revolución*", edited by Alberto Gil Novales and Jean René Aymes.

Increase in joint publications

Over the course of the year **25** joint publication agreements and **11** co-funding agreements with public institutions and private publishing houses were signed.



Charles Darwin


Guerra de Independencia


Literatura en Movimiento

There was an increase in the number of **periodical publications** published in 2008. Two new journals were added to the publishing plan, one in the natural resources area entitled **Collectanea Botanica**, published by the CSIC's Institute of Botany in Barcelona, and another in the humanities area, entitled *Arqueología de la Arquitectura*, published by the University of the Basque Country. The titles of our **34** journals are:

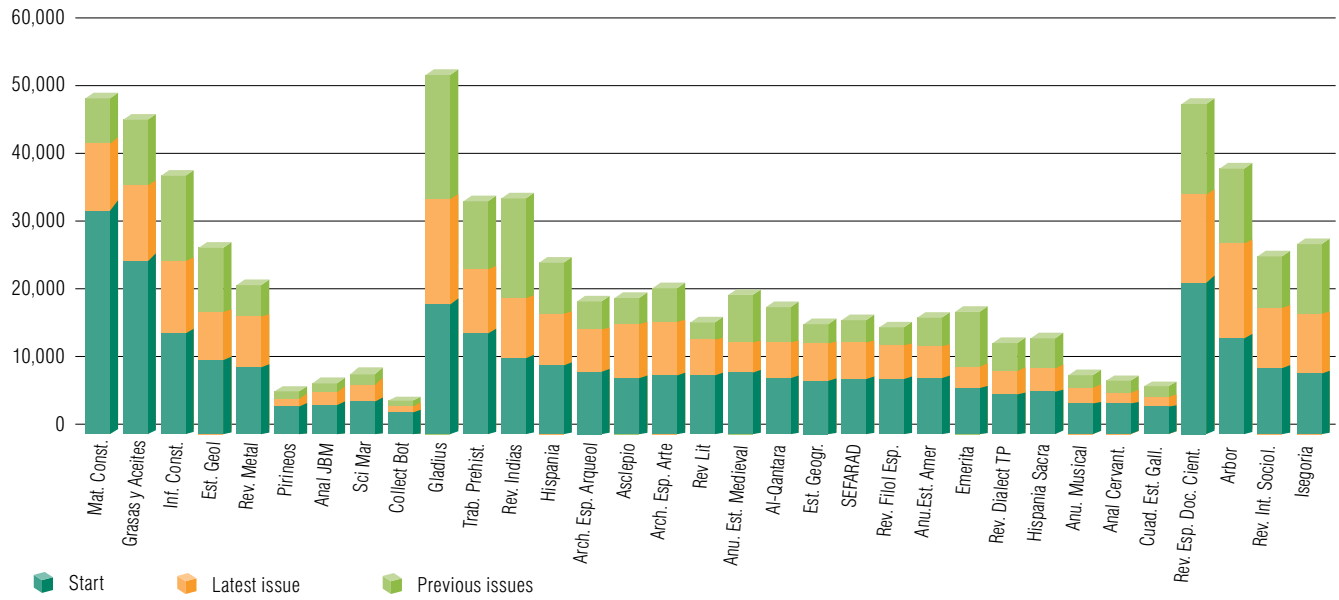
- Al-Qantara. Revista de Estudios Árabes
- Anales Cervantinos
- Anales del Jardín Botánico de Madrid
- Anuario de Estudios Americanos
- Anuario de Estudios Medievales
- Anuario Musical
- Arbor. Ciencia, pensamiento y cultura
- Archivo Español de Arqueología
- Archivo Español de Arte
- Arqueología de la Arquitectura
- Asclepio. Revista de Historia de la Medicina y de la Ciencia
- Collectanea Botanica
- Cuadernos de Estudios Gallegos
- Emérita. Revista de Lingüística y Filología
- Estudios Geográficos
- Estudios Geológicos
- Gladius. Estudios sobre armas antiguas, armamento y arte militar
- Grasas y Aceites
- Hispania Sacra
- Hispania. Revista Española de Historia
- Informes de la Construcción
- Isegoría. Revista de Filosofía Moral y Política
- Materiales de Construcción
- Pirineos. Revista de Ecología de Montaña
- RDTP. Revista de Dialectología y Tradiciones Populares
- Revista de Filología Española
- Revista de Indias
- Revista de Literatura
- Revista de Metalurgia
- Revista Española de Documentación Científica
- Revista Internacional de Sociología
- Scientia Marina. International Journal on Marine Sciences
- Sefarad. Revista de Estudios Hebraicos
- Trabajos de Prehistoria

Numerous activities were carried out in 2008 **to disseminate and promote these publications**, in particular:

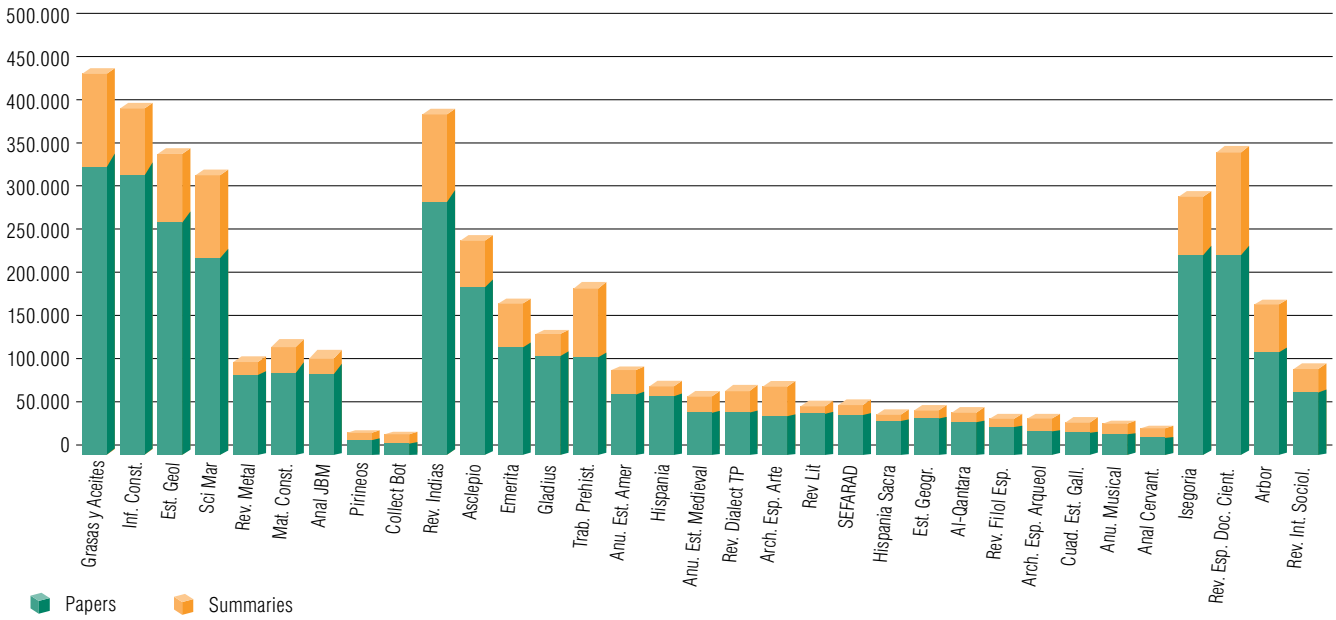
Raising the profile of the electronic platform for the journals published by the CSIC. http://revistas.csic.es/

Since the CSIC's electronic journal platform was created in 2007 the number of visits and downloads has increased steadily over 2008, as is shown by the data below:

Page visites: 707,100



Documents dowloads (gross): 4,431,596



Also, many of our periodical publications have been rated positively in terms of their editorial and scientific quality. The proof of this is the fact that a number of journals were included in the most prestigious international databases with impact index information in 2008: Arts and Humanities Citation Index, Social Science Citation Index y Science Citation Index, all of which are available on the Web of Science produced by Thomson Reuters. They are also in the publisher Elsevier's Scopus database.

Journals included SCOPUS in 2008 (Elsevier)

- Al-Qantara
- Anales del Jardín Botánico
- Arbor
- Archivo Español de Arte
- Hispania
- Informes de la Construcción
- Revista de Dialectología y Tradiciones Populares
- Revista de Indias
- Revista de Literatura
- Revista de documentación Científica
- Sefarad

Journals included in the ARTS AND HUMANITIES CITATION INDEX (Thomson Reuters) in 2008

- Anuario de Estudios Americanos
- Anuario de Estudios Medievales
- Archivo Español de Arqueología
- Asclepio
- Emérita
- Hispania Sacra
- Isegoría
- Trabajos de Prehistoria

Journals included in the SOCIAL SCIENCE CITATION INDEX (Thomson Reuters) in 2008

- Anuario de Estudios Medievales
- Revista Española de Documentación Científica
- Revista Internacional de Sociología
- Trabajos de Prehistoria

Journals included in the SCIENCE CITATION INDEX (Thomson Reuters)

- Estudios geológicos
- Informes de la Construcción

Awarding of National Publication Prizes

CSIC's publications department has received the **prize for the best collection for** *Flora Ibérica* (Iberian Flora) and the best **Catálogo Editorial 2007** (publications catalogue) from the Union of Spanish University Publishers (Unión de **Editoriales Universitarias Españolas**, UNE), as part of the *XI Premios Nacionales de Edición Universitaria* (XI National University Publishing Prizes). The panel comprised a variety of personalities from the worlds of culture and science, including the Director General for Books, Rogelio Blanco. It decided the winners in July and the prizes were awarded during LIBER 2008, Spain's biggest international publishing trade fair, which alternates between Madrid and Barcelona.

Handing over of prizes.

Belgrade Fair.

London Fair.

Participation in international book fairs

The CSIC was present at **11 book fairs**, in most cases it sent promotional material to raise the profile of the organisation's publications (Bogotá, Book Expo América, Buenos Aires, Puerto Rico, Chile, Guadalajara (Mexico) and Mexico DF). The CSIC also had a stand at the London and Frankfurt international book fairs, together with the *Federación del Gremio de Editores de España*. It also took part in the Belgrade International Book fair, where it was present on the EUNIC stand, together with the Goethe Institute, French Cultural Centre, British Council, Italian Cultural Institute and the Austrian Forum.

Participation in book fairs in Spain:

- Madrid Book Fair (30 May to 15 June)
- CSIC Scientific Book Week, Barcelona (21-25 April)
- Mini-book fair on Madrid (1-2 February)

Participation in Science Fairs:

The Scientific Culture Area and the Postgraduate Department participated jointly in AULA (2-5 April) and the *Madrid es Ciencia* (Madrid is Science) fair (24-27 April). On both occasions our modular stand was used to exhibit our numerous popular science publications.

Aula Fair.

Press advertising campaigns

Over the course of 2008 publicity was given to **24** new CSIC titles in the cultural supplements of the two largest-circulation Spanish newspapers El PAÍS *(Babelia)* and EL MUNDO *(El Cultural)*. An advertising campaign has also been launched in the prestigious journal of literary criticism *Revista de Libros*. With this campaign, **30** new publications have been advertised in the journal.

Also, on the international level, over the course of the year we continued placing advertisements for our publications collection in the guide to the London International Book Fair, of which 25,000 copies are distributed worldwide.

Book presentations

On 11 to 13 June five titles from the Scientific Culture Area's Divulgación and Informes collections were presented at the **Madrid Book Fair**. These were *Aguas Continentales*, *Doñana Diversidad y Ciencia*, *Claroscuro del Universo Guadiamar* and *Invasiones Biológicas*. The *Biblioteca del Próximo Oriente* collection, edited by Manuel Molina, was also presented. Luis Calvo and José Pardo Tomás presented the *Catálogo de los fondos de la Biblioteca Salvador del Instituto Botánico de Barcelona*.

The book *Rafael María de Labra: Cuba, Puerto Rico, Las Filipinas, Europa, y Marruecos en la España del sexenio durante la Restauración (1871-1918)* was presented at the **Residencia de Estudiantes** on 28 March. Miguel Ángel Puig-Samper, Alfredo Moreno and Elvira Ontañón took part in the event.

A CD from the Poetical Music collection *Música para el Corpus* was presented in the assembly room of the new seat of the **Human and Social Sciences Centre** on 20 June. Albert Recasens director of the musical production company Lauda Música and Mariano Lambea, an expert researcher in Musicology at the Milá y Fontanals Institution, were present at the event. Another CD from this same collection published in 2008, entitled *Oficio de Difuntos*, was presented at the **Presidency of the Madrid Regional Government** on 17 December.

Internet dissemination of books in digital format

During the year a contract was signed with the company E-Libro and a total of 125 works have been posted on its online platform in pdf format, with the authorisation of their authors.

Day of the Book, 23 April 2008

To mark the traditional celebration of the Day of the Book organised by the CSIC's Publications Department, an exhibition entitled ***Esto no es un Libro*** (This is not a book) was run at the new seat of the CSIC Human and Social Sciences Centre (C/ Albasanz 26). Two lectures were also given, the first by Jesús Marchamalo, the exhibition's organiser, and the second by Juana Molina Nortes, head of the Distribution Service, in which she gave an overview of the activities carried out by the unit to disseminate, promote and sell the CSIC's range of publications.

As regards distribution and marketing, in 2008 there was an increase of 6% in income from sales, not counting income from other items.

Income in 2007 (€)	Income in 2008 (€)
859,073	919,002

9

Library Network and Archives

The CSIC's Library Coordination Unit (Unidad de Coordinación de Bibliotecas, UCB) is under the aegis of the Vice-Presidency for Organisation and Institutional Relations and is responsible for coordination and development of the network of libraries and library services (both physical and digital), and for the management and supervision of the process of automating its bibliographical resources and archives, as well as managing the library's print and digital collections. Its primary objective is to modernise the CSIC's library services and obtain maximum value from its collections, so they are able to act as a complete and uniform scientific information system for the institution.

Image: "A trapped star: a bright light in the solitude", by Eduardo Martínez López (Fotciencia 08)

The libraries coordination unit has a staff of 21 at its four sites (Madrid, Barcelona, Seville and Valencia), and in 2008 it also had three temporary staff (INEM) and 2 mid-level qualified employees on the I3P programme. The CSIC's library network as a whole has a workforce of 216.

MAIN LINES OF ACTION

During 2008 work continued on achieving the objectives set in the 2006-2009 Strategic Plan. The evaluation of the operational objectives laid down by the plan yields a level of a completion of around 75%. The technical and professional goals are those which have seen a highest level of fulfilment, with those depending on institutional and/or structural changes the furthest from being achieved.

The basic strategic lines and objectives on which work has been carried out are:

- **Strategic line 1. Organisational model**

  Preparing the Regulations for the CSIC library network

- **Strategic line 2. Spaces, equipment and installations**

  Study and proposal for installation and equipment

- **Strategic line 3. Human resources**

  Creating uniform naming systems and levels in RPT libraries

  Increasing the number of new professionals in the libraries through a public offer of employment

  Increasing the workforce at the library coordination unit

- **Strategic line 4. Innovation and technology plan**

  Updating technological tools

  Integrating the CSIC's LDAP authentication/authorisation systems

  Upgrading the CSIC library network website and Intranet

- **Strategic line 5. Training**

  Design of training plans for end users

  Design of annual professional training plans

- **Strategic line 6. Management of the collection and resource accessibility**

  Consolidating/increasing investments in electronic resources

  Consolidating investments in monographs

  Increasing the use of the digital collection (e-journals, e-books, databases, etc.)

  Expanding the digital collection (new content+backfiles)

  Cancellation of duplicate paper journals

  Implementing the CSIC's institutional Repository (DIGITAL.CSIC)

  Increasing the visibility and use of the CIRBIC catalogue, CSIC virtual library, SFX navigation services.

- **Strategic line 7. Assets in CSIC libraries**

  Report on documentary assets. Conservation and preservation.

  Preparation of the digitisation plan for the CSIC libraries network

  Computerisation of library archives

- **Strategic line 8. Dissemination, visibility and institutional credibility of libraries**

  Institutional communication plan

  Articles, lectures

- **Strategic line 9. Evaluation and analysis systems**

  Internal and external evaluation mechanisms

ASPECTS OF COMPUTERISATION AND TECHNICAL PROCESSES IN THE NETWORK

The CSIC library network's collective catalogue, CIRBIC (*Catálogo Colectivo de la Red de Bibliotecas del CSIC*), is an essential source of information with which to locate bibliographic resources, whether in print or digital format, not only from among the CSIC's own libraries and staff, but also from external institutions, as is shown by the data on the server hosting the collective catalogue. According to these data the CIRBIC OPAC served 4,760,224 pages in 2008 in response to 1,768,466 queries, a significant number of which came from centres outside the CSIC (university libraries, the national library, other research bodies, etc.), confirming its place as one of Spain's most important catalogues of bibliographic information.

The level of computerisation now reached by the Network is described below:

Bibliographic Catalogue

(http://aleph.csic.es/F)

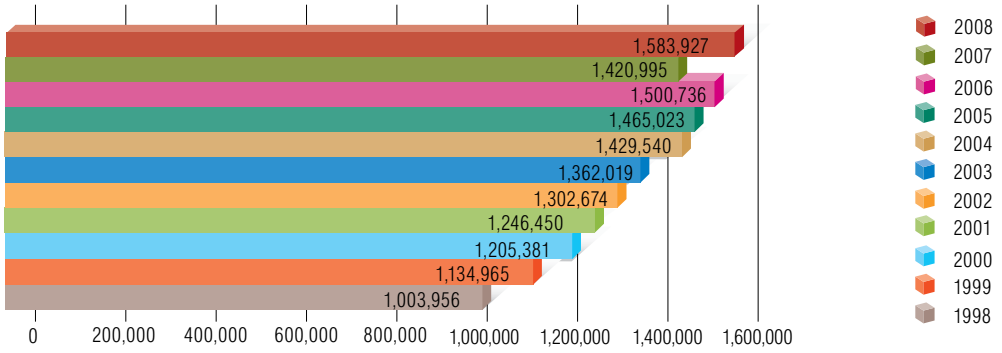
The data relating to tasks involved in the bibliographical maintenance of the catalogue in 2008 were as follows: 6,691 records deleted, 1,530 duplicate records removed, 309,857 records modified, 28,035 records created and almost 10,593 titles of papers and monographs corrected.

It is worth mentioning the *Syndetic Solutions* catalogue enrichment service, which offers images of book covers, summaries, indexes and notes on the authors for the titles that are available for consultation in the catalogue.

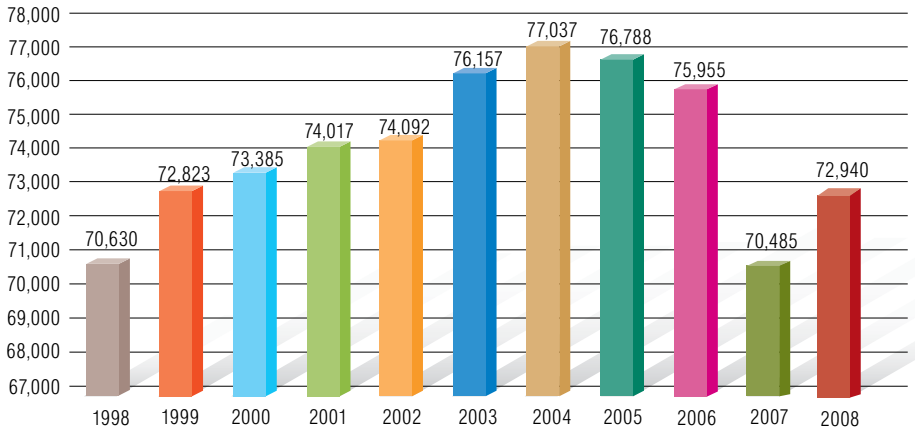
Annual growth of the CIRBIC catalogues

Catalogue	Number of records
CIRBIC-Books	**967,271** records corresponding to **1,583,927** items (increase of 17,091 records since 2007, equal to a 1.80% increase)
CIRBIC-Journals	**48,098 records** corresponding to **72,940 collections**
CIRBIC-Maps	**12,402 records** corresponding to **24,909 items** (increase of 606 records, equal to a 5.14% increase since 2007)
CIRBIC-Archives	**25,267 records** (increase of 2,264 records, representing 9.8% of the increase with respect to 2007)
CIRBIC-Authorities	**70,976 records**

Variation in number of books in CIRBIC 1998-2008



Variation in journal collections 1998-2008



Catalogue of electronic resources

(http://aleph.csic.es/F/?func=file&file_name=find-b&local_base=Electronicos).

Around 2,000 new titles of electronic books from publishers Elsevier, Springer, Wiley and Taylor & Francis were added to the catalogue. As regards electronic journals, updates are made annually to subscriptions with publishers. Also noteworthy is the inclusion of the electronic journals of the American Geophysical Union (AGU), the new "Arts & Science Complement" collection from JSTOR, and the extension to the CSIC as a whole of the licence to access new titles published by NPG (Nature).

Catalogue of Authorities

(http://aleph.csic.es/F/?func=file&file_name=find-b&local_base=MAD10)

The authorities catalogue received 45,937 visits in 2008, a 26.59% relative to the previous year. On 31 December 2008, the CSIC libraries network's catalogue of authorities included 70,976 records, of which 494 records were newly created and 1,105 were modified. The catalogue is a reference for many national library institutions.

Work to create authority records in this catalogue, standardising the entries for authors who are CSIC researchers, has been completed. During this period the Food Science and Technology, Chemical Science and Technology, Physical Sciences and Agricultural Sciences, were addressed, with a review of 752 names, out of which 54.78% have been standardised due to their having a publication in the bibliographical catalogue.

Archive Catalogue

(http://aleph.csic.es/F/?func=file&file_name=find-b&local_base=Archivos)

The 2008 query data for the Archive Catalogue showed there to have been 6,261 visits, an increase of 22,81 % on the previous year.

The main activities have been:

a) in the library's *Archivo del Duelo*, work describing individual audio and video recordings has been completed and the records on the series of other document sets have been prepared. These tasks complete the description of the more than 3,000 documents of which the collection is comprised.

b) links have been made between images and records in the José Royo Gómez photography collection held by the archive of the National Museum of Natural Sciences (*Archivo del Museo Nacional de Ciencias Naturales*). In 2008 around 1,500 images were linked. The total number will be around 5,000 when this work is completed. These photographs were taken by the scientist José Royo between 1914 and 1939 and represent an extremely valuable source for studies of Geology, History of Science, Ethnology, etc.

CIRBIC-Archivos	25,267 records (an increase of 9.8% from 2007)

Map Catalogue

(http://aleph.csic.es/F)

The data on the current status of the process of computerising the CIRBIC's cartographic materials are as follows:

CIRBIC-Mapas	12.402 registros que corresponden a 24.909 ejemplares

Record server: Bibliographic protocol Z39.50

As a record server using the Z39.50 protocol, the CIRBIC catalogue handled 159,467 queries in 2008, 20.55% fewer than in 2007. It served 269,892 records during the year, a drop of 56.92% on the previous year.

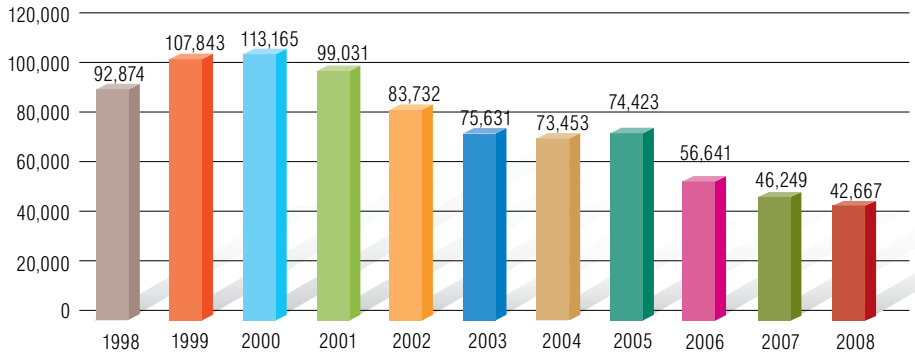
Changes in the Library Management system

In mid-2008 the work and processes necessary to update the version in use of the ALEPH 500 management system was carried out. This took place in two consecutive phases, the first of which consisted of migrating the data and tables in the customised application to ALEPH 500 v.16 version on the CSIC's Library Network environment. This was followed by migration to ALEPH 500 v.18, which is the CSIC's live version. The whole process was finished successfully in June 2008.

LIBRARY SERVICES

The interlibrary loans service, which manages several libraries in the network, carried out 42,667 transactions in 20078 including loans both inside and outside the network (7.75% fewer than in 2007). The gradual year-on-year decline observed is due to the large number of electronic resources available, to which must be added the specific situation of the Humanities and Social Sciences area's libraries in Madrid, which have suspended part of their IL services since spring 2006, while they merge their collections with the Tomás Navarro Tomás library. Of the total number of transactions, 36,765 were requests for photocopies and 5,902 for loans of originals.

Progress of transactions involving document retrieval 1998-2008

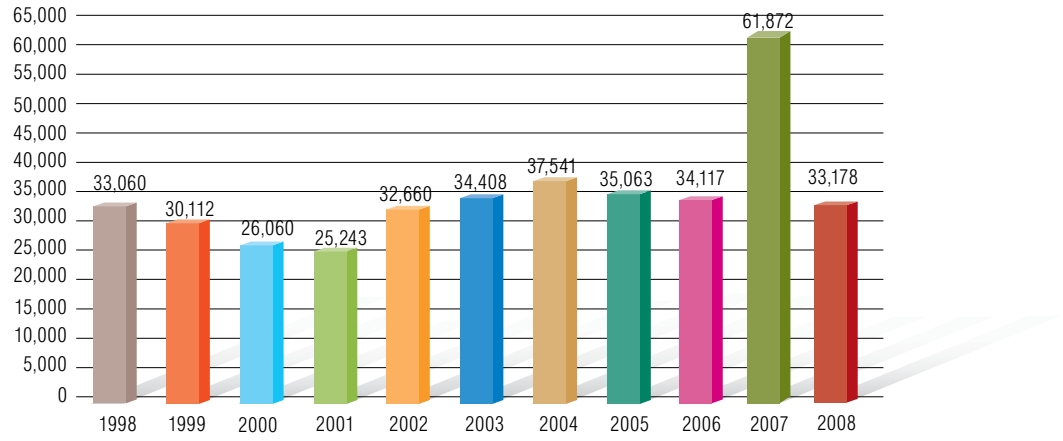


Personal Loan Service

The personal loans service handled by the ALEPH system registered 33,178 transactions, 5,403 more than in 2007, with 4,857 active readers. The average number of loans per user was 6.68, a rise of 16.2% on the number of loans the previous year.

One of the highlights regarding this service is that in 2008 the copy self-loan and self-return system, which uses RFID identification, came into operation at the Tomás Navarro Tomás library. This system is a pioneer in Spain and will progressively be introduced at other libraries in the network.

Variation in loan numbers



Information and reference services: The digital collection

The new information products incorporated in the CSIC's digital collection available for consultation in the Virtual Library in 2008 were the following:

A. Journals Platform:

In 2008 the CSIC's digital collection consisted of approximately 7,934 electronic titles, compared with 3,426 titles in the print collection. It should also be noted that, in addition to the electronic journals it subscribes to, the CSIC can offer its users access to approximately 4,237 free titles on the Internet through its Virtual Libraries. This means if offers a total of almost 12,171 electronic titles.

The 143 journals in the new Arts & Sciences Complement have been added to the 5 collections on the JSTOR to which the CSIC has subscribed to date.

Periodicals published by the AGU (American Geophysical Union), a scientific community delving into research into the earth, outer space, the oceans, the atmosphere, and the planets, have been added.

There were 2,535,120 downloads of the full text of issues in this collection of e-journals in 2008.

B. E-books:

The collection of e-books available for consultation grows every year. The works that are most widely consulted include the following: Current Protocols (Wiley), Elsevier Books Series, Elsevier Books Reference Works, Elsevier Books Reference Works and those available on E-Libro. At the moment the collection has around 190,000 entries. The number of full-text downloads was 60,917.

New electronic titles added in 2008 include some by Elsevier (Agrarian Sciences, Biology, Biochemistry and the Environment, series), Springer e-books (Physics and Astronomy, Biomedical Sciences, Chemistry and Materials Sciences series), and assorted titles by Wiley.

C. Reference Database Queries:

The 110 databases to which the CSIC has access can be consulted via the Virtual Library. Those for which no online

version is available are included in the Virtual Library by means of an IRIS database server. This manages a number of major databases such as Chemical Abstracts, *Bibliografía Nacional Española*, British National Bibliography, OEPM (Spanish and Latin American Patents and Trademarks), etc.

The total number of searches of all the databases the CSIC has available came to 1,807,33 in 2008.

The CSIC Virtual Library: SFX – MetaLib-PAPI

Work continued in 2008 on improving the tools, content and services that make up the CSIC's Virtual Library.

The virtual library is a unified point of access to all the electronic resources included in the CSIC's digital collection (databases, journals, electronic books, portals, catalogues, etc.) and offers researchers a wide range information management services, including: simultaneous searches, navigation between resources, access to full text editions, holdings in CSIC libraries, requests for photocopies and loans, record downloads, impact factors, etc.

The virtual library was used intensively in 2008, demonstrating that it is an extremely useful tool with which to access the digital resources the institution offers its researchers. It provides accesses to 261 resources, and has 1,326 registered users, who logged on 660,060 times and made 392,324 searches, 13% more than in 2007. The dynamic link server which allows transparent navigation between SFX services and resources received a total of 648,591 calls and a total number of 552,186 entries (clicks) to services (full text access, document retrieval, exporting citations, navigating to other information services, etc.), representing an increase of 15.8%.

Authentication services for remote access to information resources: PAPI System

A total of 5,400 users were registered on the Information Providers Access Point, PAPI (Punto de *Acceso a Proveedores de Información*) at the end of 2008. This represents an increase of just over 20% relative to 2007. The service handled a total of 10,179,650 sessions of access transactions to various scientific information products. The system's usage data can be consulted at http://csic.papi.rediris.es/links/stats/.

The project of integrating the CSIC's library network authentication systems with the organisation's institutional LDAP as far as possible continued in 2008. The aim is to simplify the use of keys with which to obtain services.

The first initiative to integrate the PAPI system with the new authentication models based on SHIBOLETH was also implemented.

WEB INFORMATION SERVER

In 2008 the library network information server (http://bibliotecas.csic.es/) has continued adding key news items on library-related issues, including activity both within the network and external to it, in order to act as a point of reference for CSIC libraries and users. Maintenance and updating of content has also been carried out, alongside a process of ensuring the uniformity of the presentations.

In order to enhance its role in publicising and disseminating the activities of the CSIC's library network, all the website's content has been translated into English.

The information on IntraRed about CSIC libraries (http://bibliotecas.csic.es/intrared/intranet.htm) has also been kept up-to-date. This is another important online information service which this unit provides to its internal community (CSIC libraries), constituting the digital archive which reports on the internal activity of the library network. In 2008 this data server underwent a significant upgrade and a process of standardisation.

This information service served a total of 1,025,518 pages, and had a total number of web 16,900,563 accesses and total number of 385,872 visits (sessions), slightly more than in the previous year.

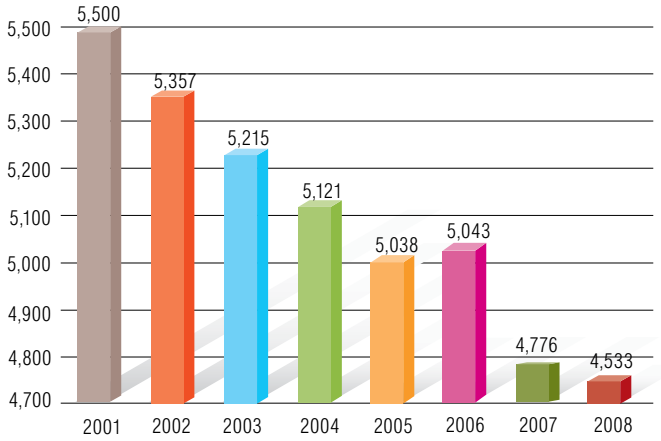
COLLECTION MANAGEMENT: LIBRARY ACQUISITIONS

In 2006 a total of 2008 subscriptions, for 3,426 print titles (91 more than in 2007), were included in the single call for tender, in which all the CSIC's libraries and those centres with subscriptions but no library (96 centres) took part. The total value came to €4,753,898 including VAT.

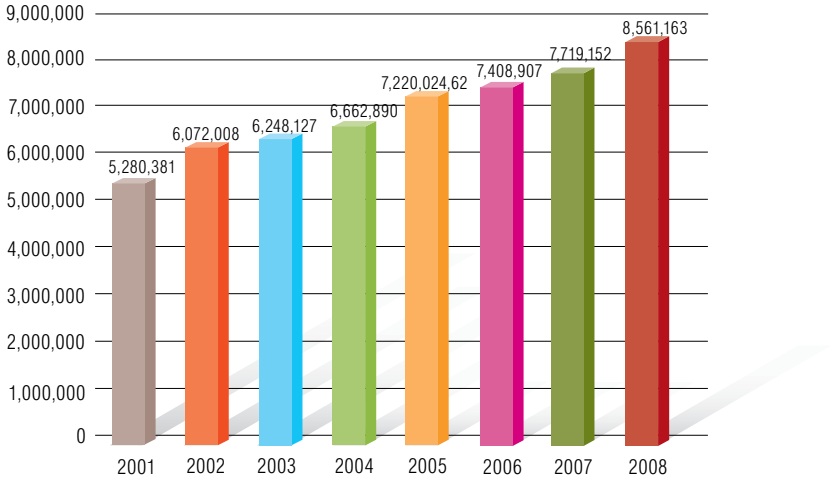
The CSIC invested a total of €8,561,163.40 (including VAT) in purchasing scientific information for its centres in a diverse range of formats and media (digital e-journal platforms, e-books, reference databases, etc.), which are accessible through its Library Network.

The spending on scientific information in 2008 (paper journals, online journals, and databases) rose by 0.8% compared to 2007. The increase in content in the digital collection with regard to 2007 was a significant factor. In the case of the purchase of monographs, spending came to €724,089, which is largely unchanged from that in 2007.

Variation in numbers of subscriptions 2001-2008



Variation in the cost of purchasing Scientific Information 2001-2008 (€)



TRAINING

In 2008, we organised 11 courses in collaboration with the training bureau, with a total of 162 students. These courses were the following:

1. The CSIC's institutional repository. Editions in Madrid, Barcelona and Seville
2. New version 18 of Aleph 500: functionalities and main changes. Editions in Madrid (3), Barcelona and Seville.
3. Scientific evaluation, indicators and databases. Given in Madrid.
4. Collection Management: negative selection process. Given in Madrid.

Additionally, 4 more courses have been organised on the CSIC's Institutional Repository, attended by 53 students, together with 8 online courses run in collaboration with the company Proquest, and attended by 20 students, about using the various databases CSIC has contracted with this company.

LIBRARY EXTENSION AND COOPERATION

Interlibrary cooperation has been maintained in a variety of ways, including the thematic documentation networks: REDIAL, DOCUMAT, and URBADOC; the collective catalogues to which the CSIC contributes records: *Catalogo de la Salud* C17 and REBIUN; the REBIUN working groups in which the CSIC takes part (collective catalogue and interlibrary loan); with the IGELU user group (Group of Ex Libris Users) and EXPANIA (ExLibris Spanish user group), presided by the CSIC.

In 2008 the Coordination Unit presided the Specialist Libraries Committee of the *Consejo de Cooperación Bibliotecaria* (Council for Library Cooperation), which had been created by law during the year and thus held its first plenum.

At international level the Library Coordination Unit represented the network on a variety of bodies: Library Advisory Board Springer (Barcelona April 2008); "8th SELL Meeting (South European Libraries Consortium; Trieste May 2008), European Library Advisory Board Elsevier (London, June 2008), EU-wide conference on science- and education-friendly copyright regulation in Europe (Berlin, November 2008); *Seminario Pensar en Español* (Think in Spanish Seminar) (OCU-AECI, Cartagena de Indias, September 2008).

Another of the year's highlights was the organisation of the 3rd Annual IGELU Meeting which was held by the CSIC in Madrid in September, and was attended by over 375 participants.

CHANGES IN THE STRUCTURE OF THE LIBRARY NETWORK

In 2008 a number of changes took place in the composition of the libraries which make up the network. These changes followed along the lines put forward in the 2006-2009 Strategic Plan, concerning the concentration and optimisation of services and resources. In 2008 the number of service points (libraries) making up the network came to 78.

The main changes in this respect were:

a) In 2008 the library coordination unit continued to collaborate closely on the Tomás Navarro Tomás library project at the CSIC's new human and social sciences centre.

   The library's management team and other CSIC groups continued the work necessary to finish the relocation of collections and the fitting out of the new facilities. The library opened its doors to internal users of the Human and Social Sciences Centre in the first quarter and to external users at the end of June.

b) Merger of the Optics and Mathematics Library in a single location. This operation has made it possible to combine the spaces and human resources, improving the ergonomics and efficient management of the 2 libraries at the M. Antonio Catalán Physics Centre.

c) It should also be noted that the library of the former Computing Technical Centre has been closed and the centre turned into the Assistant Sub-directorate General for Computing.

INSTITUTIONAL REPOSITORY: DIGITAL.CSIC

The DIGITAL.CSIC institutional repository (http://digital.csic.es) was publicly presented by the president of the CSIC at a press conference in 2008 and at the Madrid Book Fair. 2008 was the first year in the life of DIGITAL.CSIC and the results in terms of the amount of content are highly satisfactory. In a little under a year, DIGITAL.CSIC has positioned itself among the leading repositories in Spain.

Each month reports are prepared on the progress and growth of the repository, in terms of the volume of the document archive. The forecast for 2008 has already been surpassed, with a total of 7,476 documents being reached. It is also worth highlighting that at the **2nd edition of the Ranking Web of World Repositories**, DIGITAL.CSIC took 105th place, making it the 4th Spanish repository in this section.

A very significant training effort has been made, and work is underway to develop strategies to increase both the level of self-archiving of documents by authors and delegated archiving by libraries, with the creation of a new "delegated archiving service."

A multimedia presentation of Digital.CSIC has been produced, and new Digital.CSIC functionalities, such as a general statistics module (visits and downloads) and usage statistics on Digital.CSIC documents, have been implemented.

10

Communications Department

The CSIC's Communications Department, assigned to the President´s Office, is responsible for publicising the scientific work of the institution's researchers among the media, and it provides media support for the institution's activities and scientific popularisation efforts.

Image: "Epithelial constellation", by Francisco Muñoz Martínez (Fotciencia 08)

MEDIA RELATIONS

The department's main task is to implement the CSIC's communication strategy. The institution's main channels of external communication are basically the distribution of press releases and providing expert sources for journalists. One of the department's main aims is to boost the CSIC's visibility and that of its researchers through the media in order to contribute to making research better known in society.

In its role as a source of information the Communications department handles spontaneous requests from the national and international media, asking for the expert opinion of CSIC scientists on a wide variety of topics.

Within the range of internal communication functions which have visibility outside the organisation, the department provides an advisory function to the presidency and other governing bodies, manages relations between researchers and journalists, and serves as a communication vehicle for the institution's members. As a part of this line of work, the department provides media relations support to the Presidency of the institution and promotes the visibility of various institutional activities and popularisation efforts.

The CSIC's communication task in this regard is structured around two axes:

Firstly, the department prepares, along journalistic lines, information about the research and institutional activity of the CSIC's staff, whenever their work appears in scientific journals, they apply for patents, give presentations at congresses, or a new centre is opened.

Any information of special importance is given wider coverage, sometimes including the development of other multimedia content (videos, audio clips and computer graphics). News items of this type, which have more widespread societal interest, are also presented at press conferences.

The Communication department gives priority to the principles of professionalism in the production of press releases, emphasising quality in both the selection of topics and the drafting of press releases. This has enabled it to achieve a high level of credibility with the media, which consider the CSIC's communications department to be a reference source of information or opinions on news with scientific content.

Collaboration with masters courses in scientific journalism, which began in 2005, will help extend the CSIC's recognition among future generations of journalists and popular science writers.

In 2008 the department made a big improvement to the quality of its audiovisual content, with the incorporation of an audiovisual communicator and a professional quality video camera. Therefore, the department's ability to produce its own audiovisual material, both for the media and for internal communications, has grown notably. As a result of the audiovisual content generated, both digital media and the web sites of traditional media, have begun to view the CSIC a producer of scientific content of this type. This type of visibility on the Internet increases society's awareness of the CSIC exponentially.

The communication department has consolidated the agreement reached in 2005 with Cadena SER giving it a space in which the CSIC informs listeners about its scientific advances in programmes such as Ser Curiosos, Gran Vía, and A buenas horas.

PUBLISHED NEWS

Some of the news items with the biggest media impact in 2008 were reports on the start of a clinical trail of a vaccine to prevent AIDS patented by the CSIC. This initiative is set in the context of the department's support to the CSIC's global strategy to transfer knowledge to society, facilitate technology transfer through patenting by the institutions' researchers and to step up collaboration with other institutions and hospitals.

In this case, the department worked with the director of the study, the researcher Mariano Esteban, and ran a pioneering initiative to coordinate the information for volunteers and handle inscriptions of volunteers wishing to participate in the study via the CSIC's website.

Two news items concerning astrophysics received widespread coverage in the media: presentation of the first eucrite meteorite recovered in Spain, directed by Josep Maria Trigo, and the discovery of an exoplanet in the Leo constellation, directed by Ignasi Ribas. In both cases the communication department deployed a full audiovisual strategy, with the preparation of two videos to accompany the news item, thus ensuring its presence on the television news and other programmes, and websites.

In addition to these ad hoc topics, two more research projects, one looking at Neanderthals and another involving excavations in Egypt, were widely followed in the media in 2008. Communication of these two topics was coordinated by the department from the outset.

The Communications department was also involved in various aspects of the CSIC's Science Week activities, which achieved a strong impact in both the national and regional media. As well as press releases, the team prepared a special dossier and liaised with communications staff at other institutes to manage contacts with the media.

The department also paid particularly close attention to the research campaign at the Juan Carlos I arctic station in Antarctica, which is coordinated by the CSIC, and the First World Congress of Marine Biodiversity, jointly organised by the institution in Valencia. In both cases, which are included in the CSIC's Global Change axis, the complete communication strategy was designed, and in the second case, a press conference was run, videos made, an information dossier prepared, and the congress was attended by the media.

The department has also carried out various activities to mark the Biomedicine Seminar organised by the CSIC in Girona. A special press dossier was prepared for the event, including press releases and daily information on the progress of the seminar. Transport was also arranged for the journalists attending the press conference at the end of the seminar, and the subsequent interviews.

The Communication department's support to institutional activities was particularly significant in the case of the media coverage given to the president of the CSIC at the time of his appointment. Additionally, the department managed interviews with the media, organised a meeting with all the national media to review the first few months of management, and it coordinated and promoted interviews and opinion articles by the presidency on current scientific topics.

SPONTANEOUS REQUESTS

In 2008 the Communication department consolidated its position as a benchmark source of information for professionals in media circles on scientific and technical issues, with an annual average of 1,500 spontaneous requests from journalists seeking advice on science and technology topics. These figures again confirm the institution's position and, fundamentally, that of its staff as an expert voice for the journalism community in Spain, and, increasingly, in Latin America.

Climate change, the vaccine against AIDS, our understanding of the galaxy, the work of the Spanish scientific community in the Arctic or the state of Spanish R&D in the international context are some of the issues that have generated the biggest numbers of information requests from journalists.

In 2008 a database was set up to enable more detailed tracking of the resolution of contacts with journalists. The department currently has contact with over 500 journalists belonging to national and international media, including specialists in certain areas, in the database. The outcome of this relationship was that the Department gathered an average of 76 news items a day on CSIC related activities, 22% more than last year.

Over the course of 2008 the CSIC was mentioned 466 times on the ratio, 393 on television and 11,000 times in the press. These data represent a slight stagnation in radio and television appearances, motivated in part by the new media context, and confirm the increase in print media compared with 2007. The CSIC's presence on the web increased sharply, however. In

2008, it was mentioned on the Internet 16,000 times, 38% more than in 2007. The preparation of videos suitable for the internet played a role in this increase.

This media relations work is backed up by monitoring its results, which also enables a press diary with news about the CSIC published in newspapers, magazines, radio, TV and electronic press to be published daily on the CSIC's intranet and its public website. An archive is kept of this content, which can be accessed on the Intranet. The department also produces a monthly report on the CSIC's visibility in the media (El CSIC en los medios), which it also posts on the intranet.

An economic value is placed on the media exposure recorded by this monitoring work, set at current advertising rates. As in the case of the numbers of appearances, the value of the space and time captured by the CSIC in press, radio and television news continues on an upward trend. In 2008 its value was close to 60 million euros, 3.5 million euros more than the previous year.

IMAGE AND AWARENESS OF THE CSIC

As in previous editions, the Imagen y Conocimiento del CSIC, commissioned from the CSIC's Advanced Social Studies Institute (Instituto de Estudios Sociales Avanzados) reveals that the constant presence of the CSIC in the media has a positive impact on its recognition among the Spanish public and how they value it.

The survey, which is conducted every two years, last collected data in 2008. The study provides evidence of the upward trend in public awareness of the CSIC, which rose by two percentage points with regard to the survey conducted in 2006. This is the same rate of increase as seen between 2004 and 2006.

The CSIC's "brand recognition" has grown in parallel. Thus, whereas in 2006 recognition was situated at around 64%, the new survey reveals it has risen to 65.1%.

These data not only point to a sustained rise in the CSIC's visibility in society, but also consolidate the increase seen between 2006 and 2004, where recognition of the CSIC's brand went up from 42% to 63.7%. This qualitative change coincided with a shift in the institution's communications strategies which is still in effect and is constantly being updated.

As in the case of the 2006 survey, the CSIC's brand recognition among the Spanish population is ahead of that of other scientific brands mentioned in the survey: CIEMAT (16.6%), CNRS (12%), MIT (10%) the Max Planck Society (8.6%), among others.

The study found that the media remains the key factor in the Spanish public's awareness of the CSIC. In fact, three out of four of the people included in this survey, as in the previous one, said that they had heard about the CSIC from the press, radio, television or the Internet. A smaller percentage said that they had heard about the CSIC from friends or family, or through their work (13.6% and 11.6%, respectively).

Survey respondents' opinion about the relevance of the work the CSIC does continues to be positive. 90.9% considers the institution to be doing work that is important or very important. Likewise, the majority expressed their confidence in the institution and considered that it contributes to Science and Technology in Spain by performing high quality research. Indeed, 80.3 per cent consider the CSIC to be an ideal place for outstanding young people to pursue a career.

The CSIC's recent conversion into a state agency, a fact which was included on this latest survey, is viewed by most respondents as a positive step for the organisation to take in order to make its management quicker and more flexible. Only 10.7% of participants in the survey considered the change to be a bad thing.

Although the data show a sustained rise in awareness of the CSIC, Spaniards continue to perceive the institution as being relatively unknown to the public. As in the 2006 survey, a large percentage of respondents (67.7%) felt that the institution should run more public awareness and popular science activities, whereas half of them said that the results of the CSIC's activity were of limited practical benefit to society.

MULTIMEDIA AND AUDIOVISUAL CONTENT

The analysis of the survey findings from past years revealed the need to implement a new strategy to boost the CSIC's appearances on television, traditionally the mass media with the biggest impact, and the internet, where digital media are gaining momentum and positioning themselves as the future of media organisations.

For this reason, in 2007 the unit started taking steps to set up a structure that would enable it to develop its own audiovisual content. In 2008 the CSIC obtained the human and technical resources necessary to do so.

The initiative not only seeks to bolster the position of the communication department in the audiovisual media, but also to raise the CSIC's visibility on the internet. As was highlighted by the latest Image and Awareness survey, most Spaniards turn to the Internet to find information about science and technology, relying on it more than on tradition media for this kind of information.

To this end, in 2008 the Communication Department stepped up its collaboration with AlphaGalileo and SINC, two benchmark digital platforms for the dissemination of scientific information, which it periodically supplies with content relating to the CSIC's activity.

Also, as well as making a commitment to preparing multimedia content, the new structure has allowed audiovisual coverage to be given to other CSIC units so as to support the strategic axes set out by the presidency. Thus, the Communication Department has provided audiovisual support and supplied material to the Scientific Culture Area, in events such as the "Madrid es Ciencia" fair, or the Fociencia photography competition, and to Fundación CSIC, preparing various interviews with the CSIC's president, Rafael Rodrigo, and the coordinators and chairs of the various areas of the 2010-2013 Action Plan.

In the year that this new service has been operating within the department, more than 30 videos have been produced. The work has also enabled the creation of a catalogue of images for future pieces and contributed to updating the CSIC's historical archive, with images such as the inauguration of the International Astronomy Year, or the presentation of projects such as Ibercivis. The Communication Department is also collaborating with the CSIC's Cienciatk project.

Communication activity

	2004	2005	2006	2007	2008
News items prepared	129	232	277	221	220
Journalists questions answered.	561	722	918	1,559	1,401
News about the CSIC in the press and on radio and TV	5,316	8,023	9,177	10,762	11,737
Public awareness of the CSIC*	19.20%		21.30%		
CSIC brand recognition*	42%		63.70%		

* Surveys run by the IESA (CSIC)

Appearances in the news by scientific areas

Area	2004	2005	2006	2007	2008
Natural Resources	1,120	1,594	2,045	2,294	3,432
Humanities and Sci.	956	1,352	1,318	1,744	1,412
Biology and Biomedicine	976	988	1,226	1,540	2,151
Physical Sciences and Tech.	267	655	545	835	1,051
Agricultural Sciences	231	366	237	473	565
Materials Sciences and Tech.	87	204	178	292	300
Chemical Sci. and Tech.	357	179	319	541	503
Food Sci. and Tech.	120	136	438	458	491

Appearances in the news by regions

Region	2005	2006	2007	2008
Madrid*	2,427	2,479	3,386	3,622
Andalusia	1,215	1,367	2,144	2,069
Catalonia	752	982	1,448	1,804
Galicia	302	592	601	815
Valencia Region	232	380	435	654
Balearic Islands	146	141	362	393
Castile-Leon	105	102	161	281
Aragon	74	89	212	177
Murcia	18	68	61	75
Castile-La Mancha	40	58	119	147
Canary Islands	62	44	89	139
Cantabria	18	41	78	103
Asturias	38	33	181	145
Navarre	16	25	5	4
Basque Country	14	13	45	58
Extremadura	17	6	10	18
La Rioja	0	5	9	18

* News associated with central services is not counted

News about the CSIC included in...

	2005	2006	2007	2008
The press	7,476	8,375	9,812	10,869
Radio	291	495	540	466
Television	256	307	410	393
Online news	7,517	9,566	11,665	16,154
Average daily number of news items	43	51	62	76

Total space/time accumulated in...

	2005	2006	2007	2008
The press	5,110 complete pages	5,630 complete pages	5,971 complete pages	7,479 complete pages
Radio	21 hours	50 hours	50 hours	43 hours
Television	14 hours	18 hours	18 hours	17 hours

Economic valuation*

	2005	2006	2007	2008
The press	30,620,457€	34,014,602€	39,946,710€	50,064,017€
Radio	2,437,341€	8,345,589€	9,582,027€	8,107,739€
Television	5,228,349€	8,525,991€	10,359,393€	5,390,464€
Total	**38,286,147€**	**50,886,192€**	**59,888,130€**	**63,562,220€**

*Value of space/time captured by the CSIC in the news, at the advertising rates prevailing in each media.

11

Committe on Women and Science

The Presidential Advisory Committee on Women and Science began its activity on 16 December 2003 after having existed as an informal working group since May 2001, although it began operating regularly in mid 2004.

Image: "Pollen doesn't beat about the bush", by Juan Manuel Losada Rodriguez (Fotciencia 08)

WOMEN AND SCIENCE COMMITTEE REPORT 2008

In 2008 the Spanish National Research Council (CSIC) changed its status to become a State Agency. The members of the Women and Science Committee (referred to here by its Spanish initials, CMYC) were also reappointed. Elections were held in four of the CSIC's eight areas of knowledge and the four posts appointed by the presidency have also been renewed, two of them currently being held by men.

The CMYC has focused its activity this year on implementing the Gender Equality Plan for Scientific Careers in the CSIC State Agency, approved by the Governing Board on 26 September 2007. Both the pdf version of this plan and the history and composition of the Committee can be seen online on the CSIC's website:

http://www.csic.es/mujerCiencia.do

Since its creation in 2002, the CMYC has promoted the collection and publication of statistics on scientific personnel disaggregated by sex, in line with the recommendations of the "Women and Science" Unit of the European Commission. It has also monitored the impact of the measures set out in the Gender Equity Horizontal Action, contained in the CSIC's 2006-2009 Action Plan, and which were based on the standards defined by the European Commission. Implementing this horizontal action has brought progress towards equal opportunities between men and women. In 2005 the Ministerial Order from the Presidency (published in the State Official Gazette on 8 March 2005) which, among other measures aimed at promoting equality, establishes the mixed composition of personnel selection bodies in national government and public organisations and companies that depend on it. This order was highly significant as the panels making recruitment and promotion decisions in the CSIC were largely male-dominated prior to 2003, and since 2005 the CSIC's governing bodies have taken the need for balanced representation into account. One of the activities of the CMYC is to ensure that these panels comply with this principle.

Today the political and social landscape in Spain has changed greatly: we now have a Ministry of Equality, with the Organic Law on the Effective Equality of Women and Men (LOIEMH 3/2007, 22 March 2007) and the 2008-2011 Strategic Plan on Equal Opportunities, envisaged by article 17 of the Organic Law, has been approved. One of the guiding principles included in the Strategic Plan is scientific and technological innovation, given its role as one of the main drivers of social change. This section states that "*it is essential to achieve gender parity at all levels of activity in science and technology*." The CMYC continues working towards these goals, and it should be noted that in the CSIC we are getting close to the recommended minimum of 25% of women in the highest ranks of the research workforce, as established by the Lisbon Strategy as a goal for 2010. Figure 1 shows the distribution of the CSIC's research personnel in 2008; this chart, which might be referred to as a "scissor diagram", is a reminder that although we are on the right track, there is still a long way to go.

The progression of the research workforce by grade and sex, represented in figure 2, shows in absolute numbers the increase in the number of men and women on each of the three scales of research career at the CSIC between 2001 and 2008.

In 2008 the CMYC took part in seminars and conferences, publicising the activities taking place in the CSIC to promote gender equity. In July 2008 the 10th International Interdisciplinary congress on Women "Women's Worlds" 2008 (WW08), organised by the Madrid Complutense University, was held in Madrid, with the motto "Equality: no utopia". This congress is the most important international forum to be devoted to analysing the situation of women and for promoting sustained progress towards equal rights and opportunities. It was attended by over 4,000 people from 100 countries. The CSIC's Women and Science Committee took part in the congress, where it organised a seminar in the thematic area of science and technology, in collaboration with the Women and Science Unit at the Ministry of Education and Science (UMYC in its Spanish initials) and the Association of Women Researchers and Technologists (*Asociación de Mujeres Investigadoras y Tecnólogas, AMIT*). The seminar dealt with the topic of perspectives on technology and gender construction. Forty talks were given and over eighty people attended.

Figure 1.- Percentage distribution of men and women in the CSIC's research staff on various levels of the research career in December 2008 (scissor diagram).

CSIC's researchers by gender

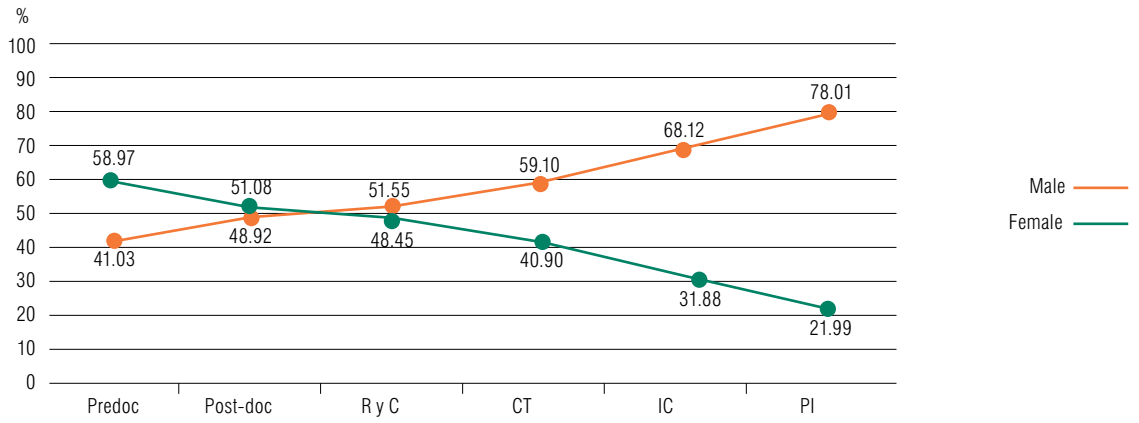
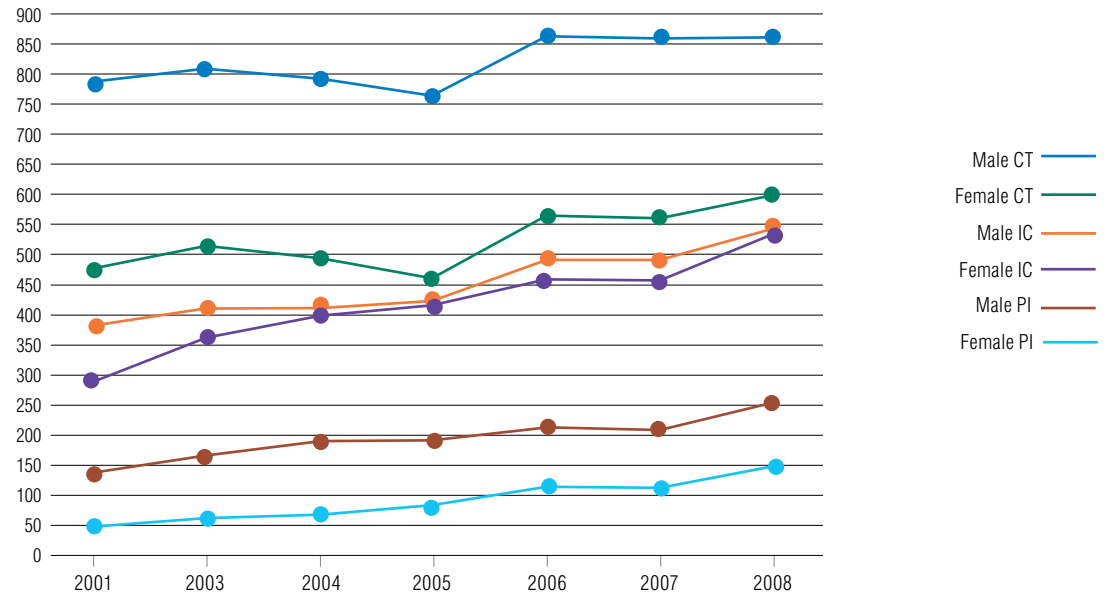


Figure 2.- Progression of the research workforce by sex on the CSIC's three permanent staff grades between 2001 and 2008.

Progression of the CSIC's researchers by gender and permanent staff grade.



08

Spanish National Research Council

Scientific-technical Areas

GOBIERNO DE ESPAÑA
MINISTERIO DE CIENCIA E INNOVACIÓN
CSIC

Table of contents

AREA 1

Humanities and Social Sciences

Coordinator: Javier Moscoso

INTRODUCTION

The CSIC's Human and Social Sciences indicators for the year 2008, which are shown here, confirm the process of modernisation which is underway in the area as a whole. This process, as defined in the area's Strategic Plan for 2006-2009, is a prerequisite for the area's adaptation to the new conditions and conventions prevailing in scientific activity at the start of the 21st century.

Little by little, the area's institutes and research groups are steadily reaching a stage where they are valued as competent and professional partners in an international context, while at the same time the area's internal dynamics are improving, as are the interrelations between the area's centres and their scientific output. Moreover, this is all taking place in a competitive and changing environment which is struggling to adapt to new conditions and dynamics.

According to data from the Sub-directorate General for Human Resources, the area employed 1057 people in 2008, of whom 587 were scientists. Of these 587 scientists, 305 were permanent staff members of the CSIC.

The area's staff were spread across its 17 Research institutes, distributed widely throughout Spain, and present in seven Autonomous Regions. Outside of Spain the area also runs the School of History and Archaeology in Rome. Of the area's centres, six are social sciences institutes (three of which are in Madrid and three in other cities) and eleven are humanities institutes (four in Madrid and the rest elsewhere). These are located in Madrid (7), Barcelona (2), Santiago de Compostela (1), Saragossa (1), Granada (1), Seville (1), Cordoba (1), Extremadura (2) and Rome (1). The latter is currently the only CSIC centre outside Spain.

Although 2008 saw the gradual recognition of the depth and severity of the crisis, the area was still able to benefit from an offer of employment with the creation of 18 new tenured scientist positions, to which were added 23 JAE-predoctoral grants, 23 JAE-postdoctoral grants and 30 I3P technician positions.

The Area's 2006-2009 Strategic Plan, currently in force, was developed as a tool with which to reorient the Human and Social Sciences area in the context of the CSIC's conversion into a state agency, and was therefore a vehicle for its reorganisation. This brought the Humanities and Social Sciences into line with the CSIC's main mission (producing and transferring research results in order to create a knowledge and innovation-based society) and the foundations were laid for the area's new mission: namely to produce, through scientific research, rigorous knowledge about social reality in order to explain (where possible) or interpret (otherwise) its mechanisms of production and reproduction, in the past and present, and thus contribute to the active transformation of society and the development of social well-being through an absolute increase in self-awareness and reflexiveness, through the generation of content, critiques and values, and by defining the specific horizons of application and revaluation.

The area is currently immersed in an intensive process of aligning its activities with those of the CSIC as a whole: Its productivity is rising, bringing it up to levels that are similar to those of other CSIC areas, and attitudes and procedures typical of advanced scientific communities and institutions are becoming more widespread amongst its staff. The proposals set out in the 2006-2009 Strategic Plan sought to actively consolidate this process by promoting a change in the area's working culture, primarily in order to promote excellence, increase the number of publications certified in accordance with international standards, rejuvenate its human resources, internationalise the activity of its institutes, and enhance the social relevance of its research by increasing the activities and capacities for knowledge transfer from the area to its environment.

SUMMARY OF ACTIVITY IN 2008

The area's figures for its scientific output in 2008 are evidence of the process underway, a total of 1569 scientific documents having been produced in the year. This includes 237 articles in journals listed in the Science Citation Index (182 in 2007), 456 articles in other journals (497 in 2007), 577 book chapters (560 in 2006), 85 books and monographs, and 46 doctoral theses presented (37 in 2007). 15.56% of total output (1523) therefore corresponds to ISI publications, which implies a growth of three percentage points in relation to the same data for 2007, where, out of the total of 1487 documents, 12.23% complied with ISI quality criteria. In the 2002 this percentage was 7.58% (99 documents from a total of 1305).

Although the trend is very positive, these figures show that the area still has considerable growth potential in terms of ISI publications. Also, it should be noted that a significant share of this production is included in the CSIC's ISI journals, a trend which needs to be corrected as, once the titles have established themselves and guaranteed an adequate flow of original submissions for publication, the CSIC's journals need to provide a general service to the Spanish (and international) R&D system and not simply be the vehicle of preference for publication by the CSIC's own staff. This increase in publications in ISI journals, alongside the drop in the production of books, reveals the consolidation of a change in the Area's publishing patterns, which has been apparent since 2004.

The area's staff and institutes organised 428 post-graduate and specialist courses (compared with 300 in 2007, thus continuing the sustained year-on-year increase in this kind of activity which has been underway now for several years). The area has also had a strong presence in Scientific Culture activities.

In total the area's Institutes attracted 16,913,000€ of external funding, twice the amount obtained in 2007 and a very sharp rise compared to the 10,153,000€ obtained in 2006). Part of this increase is explained by the funding obtained by the IPP and IESA, which each contributed 2,500,000€.

An excellent indicator of the Area's ability to attract funding is the increase in the amounts received under calls for research project proposals run by the National Plan. The Area's Institutes obtained 2,898,000€ from these sources in 2008, 5.74% of the total awarded through the call as a whole. Given that the area's Institutes as a whole were responsible for fewer than 3.20% of applications, it shows that the CSIC's Humanities and Social Sciences area overall has achieved an excellent success rate, almost doubling the amount received through the call in 2007.

While the Area's most important event in 2007 was the creation of the new Human and Social Sciences Centre (*Centro de Ciencias Humanas y Sociales, CCHS*) and the relocation of the Area's seven Madrid-based institutes to the new building, the most important event in 2008 was the preparation and evaluation of the Lines and Centres Strategic Plan which, once approved, will be in effect from 2010 to 2013.

Preparation of the new strategic plan involved all the Area's staff and allowed the Institutes and Centres to group their researchers into lines, configured as dynamic and cross-cutting research structures. The CSIC's Humanities and Social Sciences Area proposed the creation of 42 research lines distributed across 11 centres. One of these centres, the CCHS in Madrid, is home to 7 of the Area's Institutes: the *Instituto de Historia* (Institute of History, IH), the *Instituto de Filosofía* (Institute of Philosophy, IFS), the *Instituto de Lengua, Literatura y Antropología* (Institute of Language, Literature and Anthropology, ILLA), the *Instituto de Lenguas y Culturas del Mediterráneo y Oriente Próximo* (Institute of the Languages and Cultures of the Mediterranean and Near East, ILC), the *Instituto de Economía, Geografía y Demografía* (Institute of Economics, Geography and Demographics, IEGD), the *Instituto de Políticas y Bienes Públicos* (Institute of Public Policies and Goods, IPP), and the Instituto de Estudios *Documentales sobre Ciencia y Tecnología* (Institute of Documentary Studies on Science and Technology, IEDCyT).

The CCHS encompasses 66 research groups, together with a large network of horizontal research support and service units, and research laboratories, including among others, the Laboratory of Archaeometry of Ceramics and Glass, the Archaeometallurgy Laboratory, Archaebotany Laboratory, Laboratory of Archaeology of the Landscape and Remote

sensing, Scientific Computing Unit, Geographical Information Systems Unit, Expectroradiometry and Environmental Remote Sensing Laboratory, Statistics Unit, Phonetics Laboratory, Cybermetrics Laboratory and Bibliometrics Laboratory.

The Tomás Navarro Tomás Library (TNT), which has been created by combining and reorganising eight different libraries that existed previously, also deserves a mention. It has been designed to provide services both on-site and remotely via electronic media for distributed access. It is subdivided into three sections: reference, series and thematic collections. It has a million volumes, 11,000 journals, 700,000 monographs, and currently occupies 21 km of shelves.

The activity report for this year should also mention that the Area has stepped up its international relations activities.

This has included an agreement between the CSIC and the Max Planck Society, already mentioned in the 2007 annual report, which has been ratified by the presidents of the two organisations, for the creation of a joint research unit called: *Convivencia: representations, knowledge and identities* (500-1600 AD); whose scientific project will deal with: "a formative period of the European world with its cultural and religious heterogeneity from a multidisciplinary perspective. The encounters and exchanges between Jewish, Christian and Islamic communities and elites constitute an historical laboratory of great significance for understanding interaction and transformation processes of cultures in the millennium between the decline of the Roman Empire and the beginning of the early modern period."

This new unit will be based at the CCHS in Madrid. The structure of cooperation and functioning envisaged provides for the recruitment by international competition of two group heads, who will be responsible for organising two cooperative research groups by recruiting postdocs, predocs and other collaborators.

This dynamic as a whole reflects a summary of the total activity of the Humanities and Social Sciences Area in 2008. Overall, it demonstrates the wealth and plurality of the actions promoted by the Area, and also shows its capacity for renewal and modernisation, ideally situating it to achieve the goals of scientific progress, innovation and production of value that the CSIC as a public research body encourages, contributing to this project the social dimension, basis of reflection and critical perspective that is part and parcel of the humanities and social sciences and defines is specificity within current knowledge.

SELECTION OF HIGHLIGHTS

The IEGD was awarded the 2nd Caja Madrid Social Research Prize for its research project entitled: *"Población mayor, Calidad de Vida y redes de apoyo: demanda y prestación de cuidados en el seno familiar"* (The ageing population, quality of life and support networks: care demand and provision in the family) The research group comprises Fermina Rojo Pérez (Coordinator/CCHS) Gloria Fernández-Mayoralas Fernández (*Centro de Ciencias Humanas y Sociales, CSIC*); Karim Ahmed Mohamed (*Centro de Ciencias Humanas y Sociales, CSIC*); Mª Eugenia Prieto Flores (*Escuela Nacional de Sanidad, ISCIII*); Pablo Martínez Martín (Alzheimer Project Research Unit Fundación CIEN-Fundación Reina Sofía, ISCIII); Maria Joao Bettencourt Pereira-Forjaz (*Escuela Nacional de Sanidad, ISCIII*); Mª Concepción Delgado Sanz (Doctor in the Preventive Medicine and Public Health Department, Móstoles University Hospital, Madrid); and José Manuel Rojo Abuín (Statistical Analysis Unit, *Centro de Ciencias Humanas y Sociales, CSIC*).

Awarding of an European Research Council (ERC) Advanced Grant to Dr Maribel Fierro (Arabic Studies). East in West Research Line (PE 2010-13). Project title: "Knowledge, heresy and political culture in the Islamic West. Eighth-Fifteenth Centuries" Value of grant: 1,000,000 euros

Researchers at the Institute of History obtained significant funding in 2008. For example, the project entitled "Origins and spread of agriculture in the south-western Mediterranean region" (AGRIWESTMED), led by Leonor Peña Chocarro, a researcher on a Ramón y Cajal contract, obtained funding of €1,545,169 through an ERC Advanced Grant from the European Research Council in the IDEAS programme of the European Union's 7th Framework programme. 23 researchers from a variety of Spanish institutions, namely the CSIC, the Universities of the Basque Country, Lérida, Barcelona, Las Palmas de Gran Canaria, and Cantabria, took part, along with with researchers from elsewhere in Europe, namely the University of Cambridge, the National Institute of Agricultural Botany (Cambridge) and the Universities of the Algarve (Portugal) and Cologne (Germany).

In December 2008 the first renewal of the CSIC (ILC)-Montserrat Abbey. The first four-year period of the agreement was completed successfully, and has borne numerous fruits: publication of 4 volumes from the *Orientalia Montserratensia* collection, running of postgraduate courses at the CCHS and Montserrat Abbey, etc. Renewal of the agreement means stability for the future work of restoring and publishing papyruses in the *Roca-Puig collection*, which is being carried out by ILC researchers.

Awarding of "*Proyecto Intramural Espacial (PIE) De Sophia" a "Hokmah: fuentes clásicas en el judaísmo*" (Classical sources in Judaism), in conjunction with the Rome School (Ricardo Olmos Romera - Mª Teresa Ortega Monasterio). The outcome of this was the first Hispano-Italian Seminar on Judaic studies, which was held in Rome on 4-5 December 2008. This represents a step forward in future collaborative philology work with the Rome school.

Holding of "SECOND INTERNATIONAL CONGRESS ON EASTERN CHRISTIANITY: MANUSCRIPTS, SCRIBES AND CONTEXT". Madrid, 10-11 April 2008, organised by the Management and Study of Written Heritage Research Group.

Exhibition at the National Library: "*Lecturas de Bizancio: el legado escrito de Grecia en España*" (Readings of Byzantium: the written legacy of Greece in Spain) (17 - 21 September 2008). Organiser: Inmaculada Pérez Martín, scientific researcher at the ILC. The exhibition was organised to coincide with the 7th International colloquium on Greek paleography, held in Madrid, and to whose scientific committee the researcher organising the exhibition belongs

IV season of the Syrian middle-Euphrates archaeological project. Excavations at Tall Qabr Abu al-'Atiq. The fourth campaign of the Syrian middle-Euphrates archaeological project took place in July 2008. Its main aim was to perform a number of test digs in Tall Qabr Abu al-'Atiq, a site on the

left bank of the Euphrates, at the head of the Halabiya gorge, in Deir ez-Zor (Syria). Given its geographical situation, and following the prospecting work carried out during previous campaigns, the settlement looks to be a key location in which to study the process of changing control over the territory of the middle Euphrates valley between the early 3rd century and 2nd century BCE. The test digs performed during the 2008 survey confirmed the site's historical importance. Firstly, part of what was probably an administrative building destroyed by a severe fire was exposed. This contained a significant set of ceramic beakers and jars, typical of the Assyrian empire in the 3rd century BCE. Although Assyrian occupation was limited to the upper part of the site (which was perhaps a outpost of the empire), the archaeological work in the "lower city", particularly the excavation of two rooms of a large building, made it possible to establish that it had been occupied over a thousand years earlier, in the early bronze age, circa 2600-2450 BCE.

Instituto de Gestión de la Innovación y del Conocimiento (INGENIO) provided support to the design and evaluation of Science and Innovation Policies of the regional governments of the Balearic Islands, Castile-La Mancha, the Valencia Region and Galicia through formal collaboration agreements, and also took part in the evaluation of the "Innovation China UK" (ICUK) programme, a collaboration and knowledge transfer programme which initially involved 5 British universities and 20 higher education establishments in the People's Republic of China.

A team led by Pablo Campos, a researcher at the *Instituto de Políticas y Bienes Públicos* (IPP) and director of the Environmental Economics Group (GEA), in which various universities and CSIC Institutes are taking part, has been awarded the project "*Valoración de la renta y el capital de los montes de Andalucía"* (Valuation of income and capital in the Andalusia heaths and forests) (RECAMAN), through a public call for tender. The project has a budget of almost 9 million euros from the Junta de Andalucía (Andalusia Regional Government), and is due to be run over a period of 5 years.

Also in the context of the IPP a cooperation agreement was signed between the Quilmes National University in Argentina, and the *Centro de Ciencias Humanas y Sociales* to run an institutional cooperation programme on training and joint research in the social and political studies area between researchers at the *Instituto de Estudios Sociales de la Ciencia y la Tecnología*, led by Pablo Kreimer, and at the *Instituto de Políticas y Bienes Públicos* (IPP) led by Luis Sanz. This four-year project has funding of 82,000 euros for the first year from the Spanish Agency of International Cooperation and Development (*Agencia Española de Cooperación Internacional y Desarrollo, AECID*).

Over the course of 2008, the *Instituto de Historia* and its researchers promoted a series of scientific activities, including in particular:

- The *International Polyphonic History Seminar*, organised as a homage to Professor Peter Burke by members of the Science, Politics and Empire research group, in collaboration with the *Instituto de Filosofía*, held on 21-22 January.
- Organisation of the *International Congress* "*Francisco Arango y la invención de la Cuba azucarera*" (Francisco Arango and invention of Cuba as a sugar producer), organised by the Caribbean and Atlantic World Comparative Studies Research Group, held on 11 and 12 June, with the participation of top North American, Brazilian, British, German, Czech, Brazilian, Cuban and Spanish researchers.
- Holding of the *Art in Times of War Colloquium* in the context of the 14th International Seminar on the History of Art, organised from 11 to 14 November by the History of Art, the Image and Artistic Heritage research group.
- International seminars *Rethinking social change: approaches to Iron Age and Roman dominion*, and *Europa y las estepas. Arqueología e Historia* (Europe and the steppes. Archaeology and History), organised by the Social Structure and Territory-Archaeology of the Landscape and Social and Economic Prehistory research groups on 22 and 29 September.
- Seminar entitled *Vida y cultura. Reflexiones ego-históricas* (Life and culture. Ego-historical reflections) organised by the director of the *Instituto de Historia*'s office between January and June 2008. Historians taking part included Felipe Fernández-Armesto, José Angel García de Cortázar, Julio Aróstegui, Arturo Ruiz Rodríguez, Angel Viñas, and Juan Antonio Ramírez.

AWARDS AND RECOGNITIONS

Jesus Sebastián Audina, from IEDCYT, was appointed an EU expert and member of the committee of exports to draft the new "Science Act."

Dr Isabel Gómez Caridad ws appointed Member of the Advisory Council (CSP) of the *Observatoire de Sciences et Techniques* (OST), France.

LINES OF RESEARCH

- Archaeology and Social Processes
- Change, variation and cognition in Language
- Concepts and Values
- Cultural history of knowledge. Discourses, practices, representations.
- Discourse Analysis
- Heritage, Memory and Identity
- Justice: Memory, Narration and Culture
- Literature, Image and Cultural History
- Visual Culture
- Archaeology and Architecture of the City
- Archaeology of political spaces
- Archaeology of Territory: Production and Society
- Archaeology of Territory: Production and Society
- Heritage, History and Identity. Galicia from the Middle Ages to Present Times.
- Interdisciplinary Research on Cultural Heritage
- Historical and Social Studies on Medicine and Science
- Social and cultural dynamics: trans-disciplinary perspectives
- Around Empires and Colonies: Atlantic Societies and Cultures
- East in West: Challenging Borders

Graeco-Latin and Biblical Origins in European Culture
International Studies
Jews and Muslims in Mediterranean Social Networks: Sources and Contexts
Line of American Studies: Population, citizenship and policy
Social History of Power
Societies and Cultures in the Ancient Near East: Analysis of the Sources
Studies on al-Andalus and Classical Islam
Atlantic Societies Research: a World under Construction
Social Actors, Representations & Political Practices
Sources for the Study of Cultural Relations between the Near East and the Mediterranean West: Development of Technology Tools for their Recovery, Cataloguing, Treatment and Interpretation.
The Mediterranean area: Space of interchange and power relations
Urban spaces: knowledge, cultural practices and heritage
Agricultural Economics and Rural Development
Citizens, institutions and policies in contemporray democracies
Cultures of Science and Technology
Environmental Economics
Generation and analysis of geospatial information for environmental assessment and management
Measurement, Analysis, Design and Evaluation of the Systems and Policies of Research and Innovation
Rural Geography: theoretical transitions and methodological alternatives
Socio-Demographic Changes in a Global World
Sustainable Territorial Development
Economic Analysis
Relationship between politics and society: social change, social problems and public policy
Innovation Studies

AREA 2
Biology and Biomedicine

Coordinator: Paola Bovolenta

Image: "Jump", by María Rives (Yayusa). Fotciencia 07

INTRODUCTION

Biology and Biomedicine are studied at several of the CSIC's institutes and centres, some of which are joint centres run in conjunction with universities and bodies belonging to the governments of Spain's Autonomous Regions. The area has 23 active centres, with a workforce of 2,228 including all categories of staff, of which 981 are public servants or employed on permanent contracts. More than 447 CSIC researchers, on all three of the organisation's scales (research professor, scientific researcher and tenured scientist), carry out research work at the Area's centres. They are joined by more than 270 university lecturers working at the mixed centres, together covering virtually all areas of biology. The Area encompasses a set of methodologies and lines of research that are at the forefront of biology research worldwide. These range from the study of the molecular basis of cancer and the immune response, to neurobiology, the genetics of development, biology and biotechnology of plants and micro-organisms, molecular endocrinology, structural biology and virology. Imaging techniques, mass spectrometry, proteomics, genomics, X-ray diffraction, are all techniques in use at the area's centres and are part of the underpinnings of the competitiveness of the various research groups.

SUMMARY OF ACTIVITIES IN 2008

In 2008 a total of 701 research projects were conducted (248 under the Ministry of Science and Innovation's National Plan and 32 under EU calls for proposals). In this regard, the Area's researchers have obtained a significant proportion of the funding available through competitive calls for proposals in the National Fundamental Biology Programmes, and Ministry of Education and Science (MEC) Biomedicine and Biotechnology Programmes. The Area has also obtained funding for projects through the EU's 7th European Framework Programme. Centres and researchers in the Area have taken part in the Carlos III Health Institute Cooperative Research Thematic Networks (*Redes Temáticas de Investigación Cooperativa del Instituto de Salud Carlos III*), either as nodes in the network of centres or as research teams within the networks of groups. Other key areas of activity include participation in the CIBER Programme run by the Carlos III Health Institute (*Instituto de Salud Carlos III*), and a strong presence on the MEC's CONSOLIDER programme, were CSIC groups are active in all the CONSOLIDER lines of research in biology and biomedicine.

The Area has obtained over 2 million euros to fund activities to complement research (scientific literacy, etc.)

The Area's centres and researchers are undertaking an increasing amount of high impact research disseminated in key international forums, including both SCI publications with an impact index of more than 10 (Nature group, Cell Press group, Science, PNAS, EMBO J., Genes Dev., etc.) and workshops (EMBO workshops, Gordon Conferences, ESF Conferences; etc.). In 2008 significant contributions were made to this area by the various disciplines and lines of research, which have generated, *inter alia*, 1,709 SCI publications, together with 229 non-SCI publications and book chapters, and a total of 56 patents. 216 doctoral theses were also completed and presented. A number of researchers in the Area have been awarded prizes or been elected members of national or international academies.

This section summarises some of the most important and highest impact scientific achievements by the Area's researchers during the year. In many cases these led to papers being published in high profile scientific journals.

SELECTION OF HIGHLIGHTS

In the field of Molecular Oncology, researchers at the Severo Ochoa Molecular Biology Centre (*Centro de Biología Molecular Severo Ochoa*, CBMSO) working with researchers from the National Oncological Research Centre (*Centro Nacional de Investigaciones Oncológicas*, CNIO), the MD Anderson Cancer Center and the University of Chicago, have found that the microARN miR-203 gene could be used as the basis for new therapies against leukemias caused by the activity of the proto-oncogene BCR-ABL, including chronic myeloid leukemia, which accounts for 9% of new cases, and acute lymphoblastic leukemia, one of the most frequent malignant illnesses in childhood. The research suggests that deactivation of microARN miR-203 causes these leukemias to develop and raises the possibility of two new therapeutic options as potential alternatives to current chemotherapy, which presents various problems of resistance. Also, IBMCC researchers, in collaboration with researchers from CNIO, have demonstrated that the Cadherin 1 CDH1 protein is essential for correct embryonic development. Cells not expressing this protein presented chromosomal abnormalities, indicating that CDH1 is essential to the regulation of chromosome stability, and could therefore act as a tumour suppressor. Also, a multi-centre study directed by IBMCC researchers described the results of clinical trials on a new combination of drugs to treat multiple myeloma, a disease characterised by the accumulation of plasma cells, which are the cells that produce antibodies. This phase 3 study, based on a large number of patients with multiple myeloma from various countries, determined that the new combination substantially improves the response to treatment, increasing the life expectancy of patients with newly diagnosed myeloma.

In the Molecular and Cellular Physiopathology field, researchers from the IIBB in collaboration with researchers from the UBF have demonstrated mitochondrial cholesterol to have a role in chemotherapy resistance in hepatocellular carcinomas, opening up the possibility of new therapeutic strategies for the treatment of malignant hepatoma. Also, a collaboration between researchers at the IBV and CIB has led to the definition of new mechanisms of pathogenesis in Lafora disease. The researchers have defined the regulatory role of the laforin-malin protein complex on the R5 regulatory subunit of a key enzyme in controlling glycogen synthesis. These findings make it possible to explain why the mutations in laforin and malin which cause Lafora disease induce an accumulation of a glycogen analogue in patients with the disease. Also in this field, researchers at the CABD have characterised a new variant of the cytosolic thioredoxin reductase enzyme which is mainly expressed in Leydig cells in the testicle and is therefore regulated by both oestrogens and androgens, the two sex hormones. Surprisingly, over-expression of this protein causes morphological and motility changes in these cells, which could be relevant in pathological states such as cancer and metastasis.

In the field of **Cell Biology**, researchers at IBBTECC have provided new insights into the mechanisms of action of the signalling pathway of ERK kinases, demonstrating that ERK dimers are essential for the activation of cytoplasmic but not nuclear substrates. By contrast, nuclear substrates are associated with ERK monomers. Interference with the formation of ERK dimers is sufficient to reduce cell proliferation, transformation and tumour formation. Other work in this field, carried out as a collaboration between researchers at the IBV and IBBTECC, has shown that the interaction of the proto-oncogene c-Fos with filaments of lamina A represents an inhibition mechanism of AP-1 transcriptional activity, which is reversibly controlled by mitogenic stimuli via ERK1/2. Moreover, they found that ERK1/2 also interacts with lamina A, acting as a molecular switch to allow the rapid release of c-Fos joined to this filamentous protein of the nuclear envelope, with the consequent activation of AP-1. In parallel, researchers at the CABD demonstrated that basic signalling elements of the JAK/STAT pathway are highly polarised in epithelial tissues and that this polarisation is conserved in both *Drosophila* and vertebrates. In particular, STAT transcription factor is concentrated in the cell's apical membrane. This polarisation depends on the PAR3 protein, and is important for efficient signal transmission. Finally, researchers at the CMBSO demonstrated that the pattern of morphogenesis followed by epithelial cells depends on their ability to polarise efficiently, and this process depends in turn on the interaction between the cells and the extracellular matrix that surrounds them.

The presence of the glycoprotein laminin in the extracellular matrix induces rapid and effective cell polarisation, and epithelial morphogenesis without programmed cell death. By contrast, its absence slows cell polarisation and induces the programmed cell death of the central cells to form the lumen, which ensures the formation of the central lumen in the case of delay or lack of polarity.

In the **Immunology** field, researchers at the CMSO have described a new intracellular protein transport route to the T lymphocyte cell membrane. This route's function is essential for the correct interaction between the T lymphocyte and the antigen presenting cell and for subsequent lymphocyte activation to take place. The study also revealed the similarity between this route and that responsible for directional protein transport to the apical surface of the polarised epithelial cells, underlining their possible conservation despite clear differences between the T lymphocytes and the epithelial cells.

In the **Structural Biology** field, researchers at the IBMB, in collaboration with groups at the University of Aarhus (Denmark) and the Barcelona Autonomous University, have elucidated the structural determinants of thrombin-activatable fibrinolysis inhibitor (TAFI), one of the key enzymes in coagulation and fibrinolysis. TAFI is a funelin-type metalo carboxypeptidase, which unlike other members of the family, has a very short half-life once activated. Structural studies of TAFI have made it possible to obtain a detailed view of the enzyme and the structural determinants of its instability. They have also revealed a second region of potential union with inhibitors, as well as the active centre. The structure of TAFI completes the structure of all the enzymes in the coagulation cascade, as it was the last to be solved. In parallel, researchers at the IBV have determined the crystal structure of the complex formed by the PII signalling protein and one of its key targets, the acetylglutamate kinase enzyme, thereby explaining why the PII protein releases this enzyme from feed-back inhibition by arginine and activates the accumulation of nitrogen as arginine.

In **Plant Biology**, researchers in the CSIC-IRTA consortium have demonstrated a new homeostatic regulation mechanism in isoprenoid-type biosynthetic enzymes in *Arabidopsis*. In parallel, researchers at IBMCP have described for the first time a molecular connection between signalling by abscisic acid, a key hormone in plants' response to water stress, and SWI-type chromatin remodelling complexes. Moreover, researchers at the same institute have identified two genes able to endow plants with cold stress resistance. The application of these genes in biotechnology, and that of their counterparts in other organisms, have been patented, and they are being used to create new higher performance plant varieties. Finally, researchers at the IBFV have contributed to our understanding of metabolism of S and C in plants, centring on the antioxidant role of cisteine and in the biosynthesis of starch.

In the field of **Developmental Biology**, researchers at the IBMB have elucidated new mechanisms controlling *Drosophila* tracheal formation by identifying the molecular mechanisms enabling cell intercalation during the formation of these structures. Moreover, researchers at the IN have demonstrated the involvement of direct transcriptional mechanisms in controlling neuron migration, with the identification of a new post-mitotic function for a transcription factor classically related to the specification of neural progenitors. Researchers at the same institute have also discovered a new function of the PDZ Canoe/AF-6 protein as a key regulator of asymmetric cell division. Finally, researchers at the IC have demonstrated that the signalling pathway mediated by the Sonic hedgehog protein plays a key role in correct optic nerve formation in mammals, by means of a cell autonomous and cell non-autonomous mechanism.

In **Neurobiology and Neuroscience**, researchers at the IC have described the existence of endocannabinoid-mediated communication between neurons and astrocytes. This new signalling pathway in the nervous system is based on the presence of functional cannabinoid receptors in astrocytes, which following activation by endocannabinoids from neurons, are able to release glutamate, which, in turn acts as a feedback signal to neurons. These findings show that astrocytes are cannabinoids' cellular targets, which identifies them as new cell elements that are possibly involved in physiological addiction-related processes. This has also revealed new physiological mechanisms demonstrating the active participation of astrocytes in the functioning of the nervous system. Also, at the Seville Biomedicine Institute (*Instituto de Biomedicina de Sevilla*, IBIS) aiming to determine the functions of the glial cell derived neurotrophic factor (GDNF) have shown that its inactivation in adult mice triggers the cell death of catecholaminergic neurons, in particular those of the locus coeruleus and substantia nigra, two areas

of the brain which are particularly affected in patients with Parkinson's disease. Elsewhere in the field, researchers at the IN have also elucidated part of the neuronal basis for the brain's tactile responses, demonstrating that neurons in the cerebral cortex are able to adjust their sensitivity precisely in proportion to compensate for variations in sensory stimuli. The nature of messages coded by neurons in the main thalamic relay nucleus, which sends tactile information to the cortex, has been determined. The different neurons participate equally in the coding of the stimulus, but each one transmits a different type of information or different message.

In the field of **Genomics** an international team in which researchers from IBBTEC are taking part has shown that the Mre11 dimers coordinate the union of the ends of the DNA and the processing by nucleases during repairs to double chain DNA breaks. In other work, researchers at the IMB have shown that activation of replication origins during the S phase generates multiple copies of short DNA molecules. These overabundant molecules have features of replication intermediaries and derive from the nucleosome-free region which surrounds the active promoter transcription start site. This discovery changes the currently accepted model in which each fragment of the genome replicates itself just once per cell cycle. It therefore opens up new paths of research into the regulation of replication in animal cells. Finally, researchers at the CBMSO have demonstrated that the p56 protein induced by phage ø29 avoids damage in the replication of viral DNA which would trigger activity of uracil-DNA glycosylase, which eliminates the residues of uracil incorporated in the DNA.

In **Microbiology**, researchers at the IMB have shown that the protein Pxl1 of the fission yeast *Schizosaccharomyces pombe*, a homologue of the Paxillin protein in animal cells, interacts and down-regulates GTPase Rho1, forms part of the actomyosin ring, essential during the cytokinesis process in this yeast, and participates in the formation and contraction of this structure. Another team at the same institute has demonstrated that dynamics of the septin rings that control formation of yeasts and hyphae in *Candida albicans* are different each of the processes. After induction of filament growth, the rings are converted into a specific state of the hypha which is necessary in order to inhibit hyphal cell separation.

In the **Virology** field, researchers at the CNB, in collaboration with EuroVacc, have developed a vaccine for HIV/AIDS which induces protection against simian immunodeficiency virus and a high immune response against HIV antigens in humans. This prototype vaccine has begun its first clinical trials for use against HIV/AIDS in Spain, with the participation of 30 healthy volunteers in the Gregorio Marañón Hospital in Madrid and the Clínic Hospital in Barcelona. Also at the CNB the first recombinant vaccine has been developed to protect against Severe Acute Respiratory Syndrome (SARS). Researchers at the CBMSO have described the anti-viral action of a compound (lauryl gallate) which is effective against infections caused by DNA and RNA viruses. This could constitute a broad-spectrum anti-viral drug for use against illnesses of veterinary and clinical interest. The application of this product for the treatment of African swine fever has been patented.

As regards **new technologies and services**, it is worth mentioning that a cooperation agreement has been signed by the CSIC and the University of Alcalá de Henares to set up the Cajal Institute on the university's campus. Moreover, through the National Biotechnology Centre (*Centro Nacional de Biotecnología*), the CSIC is taking part as a full partner of the European repository of functional genomic mouse lines, EMMA (European Mouse Mutant Archive), which is funded by the EU's 7th framework programme. The repository's aim is the cryopreservation and distribution of genetically modified mouse lines of interest in biomedicine. Also, the CIB has implemented new macromolecular electronic microscopy techniques for the determination of the three-dimensional structure of proteins, which has been applied to various proteins with a significant impact on the field. The installation of the Vertebrate Functional Genomic Platform was launched at the CABD, enabling genome-level studies to be carried out on zebra fish and Xenopus. This initiative has been run with the support of the CISC, the *Junta de Andalucía* (Andalusian Regional Government) and the MICINN (Ministry of Science and Innovation). "Integromics", a spin-off firm from the National Biotechnology Centre-CSIC and the University of Málaga, also deserves a mention, having earned the *European Product Innovation of the Year award*, given by the consultancy Frost & Sullivan in Berlin. The award highlights Integromics' exceptional innovation capacity and penetration in the global market, which is the outcome of its close ties with the world of research.

PRIZES AND AWARDS

Carlos Belmonte, from the IN, received the 2008 "Gregorio Marañón" National Medicine Prize.

María Domínguez Castellano, from the IN, was awarded the IX Francisco Cobos Prize.

Crisanto Gutiérrez, from the CMBSO, was awarded the Fundación *Carmen y Severo Ochoa* Molecular Biology Prize and was appointed a Corresponding Academician at the Cadiz Royal Academy of Medicine and Surgery (*Real Academia de Medicina y Cirugía de Cadiz*).

Santiago Rodríguez de Córdoba, from the CIB, received the Basic Research Prize from the Fundación Renal "*Iñigo Álvarez de Toledo"* and was appointed a member of the "Henry Kunkel Society".

José Luis García López, from the CIB, was awarded the Aliter-Merk National Biotechnology Prize.

Oscar Marin Parra, from the IN, was given the *Banco Sabadell* Prize for Biomedical Research, in Barcelona.

Alfonos Araque and Gertrudis Perea were awarded the Basic Research Prize by Fundación Pfizer.

Sabine Hilfiker, from the IBPLN, received the *Federación Española de Parkinson* Prize.

Flora de Pablo, from the CIB, became a member of the Russian Academy of Nature and Society (Armenian Branch).

Luis Enjuanes became a member of the *Real Academia de Ciencias Exactas, Físicas y Naturales* (Royal Academy of Exact, Physical and Natural Sciences).

Gabriella Morreale de Escobar was made an honorary member of the European Society of Endocrinology.

Margarita Salas, from the CMBSO, was named Marchioness of Canero by His Majesty King Juan Carlos, for her valuable contribution to scientific research in the field of Molecular Biology.

Salomé Prat from the CNB and **Nuria Verdaguer** from the IBMB became members of the European Molecular Biology Organisation (EMBO).

Luisa María Lois from the CSIC-IRTA consortium and **Jesús María Salvador** from the CNB received a Starting Grant from the ERC.

LINES OF RESEARCH
Structural Biology and Biophysics
Molecular and Cellular Biology of Cancer
Developmental Biology
Molecular and Cellular Biology of Plants
Molecular and Cellular Biology of Model Organisms
Microbiology, Parasitology and Virology
Immunology
Neurobiology and Neurosciences
Molecular and Cellular Bases of Pathophysiology
Genome function and dynamics
Cellular signalling
Biotechnology and Bioremediation
Pharmacology and Biochemical Therapy
Metabolism and Bioenergetics
Functional Genomics and Computational Biology

INSTRUMENTAL TECHNIQUES
Image analysis
Antibody production
Culture of microorganisms, animal, vegetable and tissue cells
Chromatography and electrophoresis
Spectroscopy
Development of animal models by genetic manipulation (knockouts, knockins, transgenics)
Optical, confocal, electronic, scanning and PCR tunnel effect microscopy
DNA and protein sequencing
X-ray Diffraction
Analysis of expression using matrices (arrays) of cDNA
Mass spectrometry applied to proteomics
Nuclear Magnetic Resonance
Proteomics and Metabolomics

AREA 3
Natural Resources

Coordinator: Rafael Zardoya San Sebastián

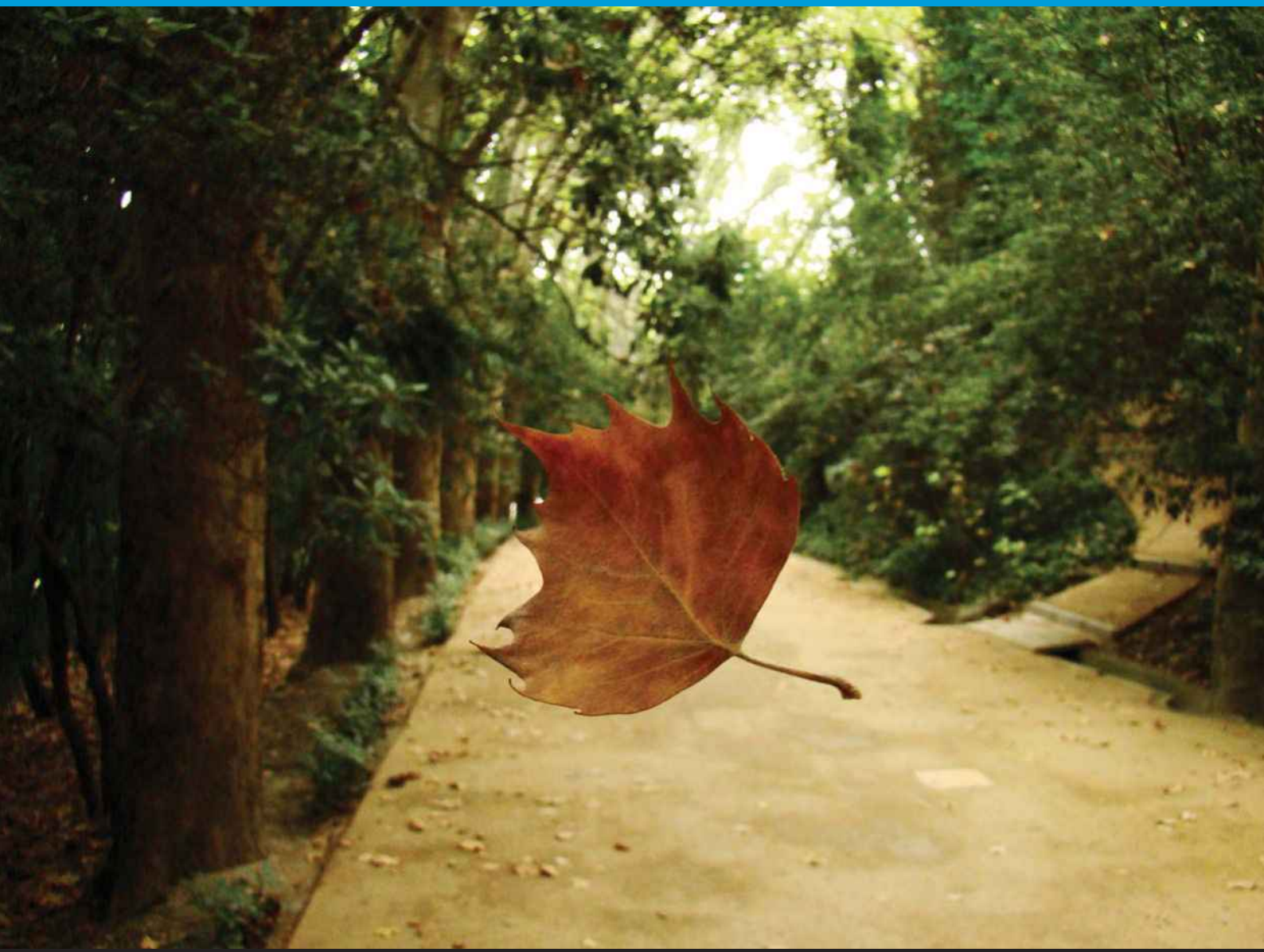


Image: "Autumn", by Pablo Illasque Serrano. Fotciencia 07

INTRODUCTION

The study of nature, its structure and functioning, is one of the CSIC's scientific priorities. Specifically, the Natural Resources Area is responsible for addressing the huge task of describing the natural diversity that surrounds us, and for deepening our understanding of natural processes. Taking an interdisciplinary approach not only makes it possible to contribute to improving our understanding of how the planet functions but can also offer solutions to the perturbing effects of human activity on the environment. Thus, there is a special obligation to society to put the effects of global change on the atmosphere, lithosphere and biosphere into context.

The area comprises three research sub-areas: Biology of organisms and terrestrial systems; Sciences of the earth and atmosphere; and Marine sciences and aquaculture. There is also a transversal axis which encompasses all the interdisciplinary activities linked to research into global change.

The Biology of organisms and terrestrial systems sub-area includes the following lines: Social and reproductive ethology; Plant-animal interactions; Biology and ecology of populations; Biodiversity; Biosystematics; Iberian flora and fauna; Vertebrate biology and physiology; Morphological and functional evolution of insects; Molecular phylogeny; Phylogenomics and molecular evolution; Species conservation; Palaeobiology and palaeontology.

The Sciences of the earth and atmosphere sub-area includes the following lines: Dynamics of the lithosphere; Geodesy; Stable light isotopes; Mineral synthesis and reactivity; Mineral deposits; Crystallography; Natural hazards; Environmental geology and chemistry; Sedimentary basins; Desertification; Erosion; Soil, water and atmospheric contamination.

The Marine sciences and aquaculture sub-area includes the following lines: Physical, chemical and biological oceanography; Marine biodiversity; Aquatic ecology; Marine microbiology; Biogeochemical cycles and flows; Dynamics of marine populations; Pathology of marine species; Physiology and molecular biology of fish.

Research in the Natural Resources area takes place at 20 institutes which specifically belong to the area, together with 7 institutes shared with other areas (Agricultural Sciences, Food Science and Technology, and Chemical Science and Technologies). Most of these institutes are centres belonging to the CSIC. However, seven are joint institutes run in conjunction with universities, and in some cases, associated with the governments of Spain's autonomous regions (in the case of Catalonia and the Valencia Region) or city councils (Barcelona). The area also manages the research carried out by various singular facilities, including oceanographic research vessels, such as the BIO Hespérides and the BIO Sarmiento de Gamboa, the Juan Carlos I Antarctic Station, and the field stations at Reserva Biológica de Doñana (Doñana Biological Reserve) and the Faro de Cap Ses Salines, together with major scientific collections such as that of the Real Jardín Botánico (Royal Botanical Garden) or the Museo Nacional de Ciencias Naturales (National Natural Science Museum).

SUMMARY OF ACTIVITY IN 2008

In 2008 the research activity of the Natural Resources Area grew with respect to previous years. In 2008 a total of 540 projects were granted, representing more than 120 million euros of external finance for the Natural Resources Area. Funding came mainly from the Ministry of Science and Innovation (MICINN) National Plan, but the area also led or took part in European projects funded by the 7th Framework Programme and Consolider projects.

For example, the project "Expedición de circunnavegación Malaspina 2010: Cambio Global y Exploración del Océano Global" (Malaspina 2010 circumnavigation expedition: global change and exploration of the global ocean), lead researcher Carlos M. Duarte at the Instituto Mediterráneo de Estudios Avanzados (Mediterranean Institute for Advanced Studies), obtained funding from the 2008 call for proposals under the Consolider-Ingenio 2006-2010 programme. The project's objectives are: a) to produce a consistent high resolution inventory of the impact of global change on the ocean ecosystem and to explore its biodiversity, particularly in the deep ocean; b) to create, based on extensive participation by the Spanish oceanographic scientific community, leadership and cooperation platforms, thereby combating the fragmentation and loss of the community's relevance at present; c) training a new generation of young researchers with a global perspective on the functioning of marine ecosystems; and d) celebrating the 200th anniversary of the birth of Charles Darwin (1809-2009, this year being declared International Biodiversity Year) and the death of Alejandro Malaspina (1810), who led the first Spanish scientific expedition to circumnavigate the globe.

Another Consolider project awarded in 2008 is "MONTES, Los montes españoles y el cambio global: amenazas y oportunidades" (Spanish heath and forest and global change: threats and opportunities). This is led by the Centro de Estudios Avanzados de Blanes-CREAF (Josep Peñuelas) with the participation of the Estación Biológica de Doñana (Montserrat Vilá), the Instituto de Diagnóstico Ambiental y Estudios del Agua (Francesc Gallart) and the Instituto de Recursos Naturales (Fernando Valladares). The MONTES project focuses on three of the environmental services which are provided by terrestrial ecosystems: (1) they fix CO_2, which depends a lot on the ecosystem's plant species and the environmental conditions; (2) they control certain aspects of the water cycle, such as plant transpiration, run-off and recharging of aquifers; and (3) they provide services thanks to their biodiversity. The programme's overall aim consists of determining how to integrate the management (including the non-management) of forest and heath effectively in strategies of adaptation and mitigation of global change.

At the Instituto Mediterráneo de Estudios Avanzados, researcher Joaquín Tintoré led the initiative to set up a new singular scientific or technical facility, the Balearic Islands Coastal Observation System (Sistema de Observación Costero de Illes Balears, SOCIB), under the Consolider-Ingenio 2006-2010 Programme. The SOCIB offers research and management of the marine environment an innovative perspective, as it will provide continuous interactive access to information on coastal waters. The SOCIB is defined as a multiplatform infrastructure for observation of the coastal medium which will be used to provide support and bolster research and technology development activities in the coastal environment. The operation of SOCIB will be based on combining data from various real-time sampling systems (satellites, buoys, oceanographic surveys, specially chartered boats, remote sensors) which will provide information about various aspects of the marine ecosystem (physical, chemical, biological and geological) and assimilate and interpret them by means of numerical operational models. Its development implies sustained functioning over time.

Moreover, the researcher Silvia G. Acinas from the Instituto de Ciencias del Mar is coordinating "prokaryotas" as part of the TARA OCEANS (2008-2012) international project, a global circumnavigation which will last for three years beginning in September 2009. The project proposes a study of marine life on a planet-wide scale. Its main objective is to analyse the diversity and dynamics of marine organisms. The aim is to describe these ecosystems in order to determine how they will be able to adapt to climate change.

The significant funding received by the Area has translated into a total of 1,343 scientific articles published in journals registered in the Science Citation Index (SCI). There is also

significant output in non-SCI journals, books and book chapters, totalling more than 650 publications. 86 doctoral theses were completed in 2008, giving an idea of the considerable training capacity of the Natural Resources Area. Also, almost 10 million euros were obtained for activities relating to scientific popularisation. Along these lines, the Natural Resources Area has produced numerous news items in the media, which gives an idea of the significant impact on society topics relating to the study and conservation of nature can have. One of the high points of 2008 was the travelling exhibition "Planeta Tierra" (Planet Earth), for which the scientific organiser was Ana Crespo Blanc, from the Instituto Andaluz de Ciencias de la Tierra (Andalusia Earth Sciences Institute). This was the key event in the International Planet Earth year, and addressed ten priority topics: subterranean waster, geological risks, the Earth and health, climate, resources, mega-cities, the Earth's depths, the oceans, soils, and the Earth and life.

Marquee of the "Planeta Tierra" exhibition at the Madrid Science Week (April 2008 IFEMA).

Another of the area's important popular science activities was the "NEUSTON: Diálogo Ciencia y Cultura" (Science and culture dialogue) project in which researchers from the Instituto de Investigaciones Marinas (Marine Research Institute) and artists took part. The results of this interaction between science and art were presented on a stand at the "Euroscience Open Forum 2008" in Barcelona. A book on the Vigo estuary's ecosystem entitled La Ría de Vigo: Una aproximación integral al ecosistema marino de la Ría de Vigo was published. This brought together work by 46 Galician researchers, including seven from the Instituto de Investigaciones Marinas. Its aim was to set out the main points of our current understanding of the Vigo estuary from a scientific and didactic point of view.

In terms of teaching activities, through an academic alliance in 2008 the CSIC and the Menéndez Pelayo University defined the programme of an official masters and doctoral programme. The following studies will be run in the area: Masters degree in Global Change, coordinated by Carlos M. Duarte from the Instituto Mediterráneo de Estudios Avanzados; Masters degree in Crystallography and Crystallisation, coordinated by Juan Manuel García Ruiz and Fermín Otalora from the Instituto Andaluz de Ciencias de la Tierra; Masters degree in Biodiversity in Tropical Regions and Managing their Conservation, coordinated by Jesús Muñoz from the Real Jardín Botánico and which will be run in Ecuador.

Implementation of the CSIC's 2006-2009 Action Plan continued during 2008. Under this plan, the positions corresponding to the public offer of employment were assigned, including some in addition to those initially envisaged, and the resources available for infrastructure. Work also continued towards longer term goals, involving the creation, closure and merger of institutes in the Area. Thus, the Instituto de Recursos Naturales de Salamanca (IRNASA), the Estación Experimental del Zaidín (EEZ) and the Centro de Edafología y Biología Aplicada del Segura (CEBAS) ceased to belong to the Area in 2008. At the same time, researchers who were at various institutes in Granada have been concentrated at the Instituto Andaluz de Ciencias de la Tierra (IACT). Finally, after a lengthy gestation, in 2008 two new institutes were created at the Natural Resources Area, these were the Instituto de Biología Evolutiva (Institute of Evolutionary Biology, IBE), a joint centre run with the Pompeu Fabra University, and the Instituto de Diagnóstico Ambiental y Estudios del Agua (Institute of Environmental Diagnostics and Water Studies, IDÆA).

The initial ideas about the Instituto de Biología Evolutiva arose in 2005, during the preparation of the CSIC's 2006-2009 Ac-

tion Plan. In November 2006 the CSIC's Vice-president for Organisation and Institutional Relations, Rafael Rodrigo, and the Deputy Vice-chancellor for Research at the UPF, Ferran Sanz, signed a protocol of intentions for the creation of a joint CSIC-UPF research centre, focusing on evolutionary biology topics. In May 2007 a working group coordinated the preparation of a scientific project. With a report and suggestions from the Area Commission and an external panel, the working group prepared a new version of the project, which was approved by the CSIC's Scientific Advisory Committee in March 2008 and by the Consell de Govern y Consell Social of the UPF later that same month. On 6 July 2008, the President of the CSIC, Rafael Rodrigo, and the vice-chancellor of the UPF, Josep Joan Moreso, signed the agreement to create the Instituto de Biología Evolutiva. This agreement was approved by the CSIC's Executive Council on 24 July 2008 following a favourable report by the Ministry of Science and Innovation (MICINN). The Instituto de Biología Evolutiva comprises 15 staff researchers and two working groups, which are organised into four programmes: Functional evolution in insects, Animal phylogeny and systematics, Computational comparative genomics and Population genetics. The scientific project, however, envisages the creation of new programmes in the future, around topics relating to theoretical biology and the biology of complex systems, experimental evolution, behavioural evolution, and a specific science and society programme.

The Instituto de Diagnóstico Ambiental y Estudios del Agua (Institute of Environmental Diagnostics and Water Studies) was created in 2008, implementing a decision taken by the CSIC's Governing Board 29 July 2007. The purpose of this institute is to study natural and anthropogenic changes in ecosystems, primarily those of which the toxicity for humans and other organisms may increase, by means of chemical and geochemical techniques. The Institute works on improving air and water quality, it collaborates on resolving serious environmental accidents, identifying environmental problems and studying climate and global change. It brings together researchers from the Instituto de Química y Estudios Ambientales (IIQAB), Instituto de Ciencias de la Tierra 'Jaume Almera' (ICTJA) and the Instituto de Biología Molecular de Barcelona (IBMB). At present the Institute has 31 staff researchers, organised into two departments: the Department of Environmental Chemistry and the Department of Geosciences. The first of these two departments belongs to the Chemical Science and Technologies Area. The second belongs to the Natural Resources Area. Both have as their aim the study of the origin, transport and evolution of natural (organic and inorganic, respectively) and anthropogenic impacts on the environment.

Current seat of the new Instituto de Biología (CSIC-UPF) in Barcelona: the Centro Mediterráneo de Investigaciones Marinas y Ambientales (CMIMA), on the right, and the Parc de Recerca Biomèdica de Barcelona (PRBB), on the left.

View of the "Josep Pascual Vila" building at the Research and Development Centre at which the Instituto de Diagnóstico Ambiental y Estudios del Agua (IDÆA) is located.

SELECTION OF HIGHLIGHTS

Among the area's numerous scientific activities in 2008, the following stand out for their international impact and importance:

Eloy Revilla, a researcher at the Estación Biológica de Doñana (Doñana Biological Station) participated in the development of a unifying theory explaining how and why living beings move. The series of articles published in 2008 laid the foundations of the "Ecology of Movement", a new scientific discipline within biology. By modelling different types of movement (searching, foraging, dispersal and migration) in different species, the basic components of movement have been determined: the internal goal of the individual who moves, related to the biological effectiveness (survival, reproduction); the capacity for motion (by oneself or using other organisms) and the capacity to navigate, or the extent to which the organism can decide where it is going. As well as being involved in the theoretical development of the model, Eloy Revilla took part in applying it to the Iberian lynx, an animal whose population is under threat. References: Nathan et al. 2008. A movement ecology paradigm for unifying organismal movement research. Proceedings of the National Academy of Sciences USA 105: 19052-19059. Holyoak et al. 2008. Trends and missing parts in the study of movement ecology. Proceedings of the National Academy of Sciences USA 105: 19060-19065. Revilla and Wiegand. 2008. Individual movement behavior, matrix heterogeneity, and the dynamics of spatially structured populations. Proceedings of the National Academy of Sciences USA 105: 19120-19125.

Iberian lynx, one of the species on which the study of a unifying theory explaining how and why creatures move was based (Photo: HGarrido/ EBD-CSIC).

Fabrizio Sergio and Fernando Hiraldo, researchers at the Estación Biológica de Doñana (Doñana Biological Station), together with a team from the University of California (Davis, USA) undertook an extensive review of the role of top-level predators in various ecosystems and their use as a focus species in biodiversity conservation strategies and programmes. The conclusions of the study were that predators offer an effective tool in conservation programmes as "flagship species" (for example for educational programmes or to raise funds) and as "indicator species" (indicating the quality of the ecosystem) but that they need to be used as "umbrella species" (indirect protector) for the ecosystem with caution, based on an in-depth knowledge of their role in the community and the functioning of the system. Reference: Sergio et al. 2008. Top Predators as Conservation Tools: Ecological Rationale, Assumptions, and Efficacy. Annual Review of Ecology Evolution and Systematics 39: 1-19.

Montserrat Vilà, a researcher at the Estación Biológica de Doñana, collaborated on a major European project with 19 partners from 15 countries on the presence and impact of invasive species in Europe (DAISI. Delivering Alien Invasive Species Inventory for Europe). One of the papers coming out of this project concluded that the European habitats most affected by the presence of invasive species are humanised habits in coastal and river areas. Moreover, the pattern of invasion is highly consistent across regions, with the upshot that the risk of invasion can be predicted with a high degree of certainty based on the type of habitat. This finding opens up promising avenues for identifying zones with a high risk of invasion. Reference: Chytry et al. 2008. Habitat invasions by alien plants: a quantitative comparison among Mediterranean, subcontinental and oceanic regions of Europe. Journal of Applied Ecology 45: 448-458.

Elena Angulo, a researcher at the Estación Biológica de Doñana and Ben Gilna, a researcher at the University of Hull, in a comment and note published in Nature Biotechnology and Nature, respectively, draw attention to the lack of inter-

national regulations governing the release of self-dispersing genetically modified organisms, whose development is currently booming. The aims of these releases, which are carried in order to manage and control wild species, and the diseases they carry, may clash in different countries, giving rise to serious conflicts if the organisms released cross borders. The researchers indicate a number of platforms and agreements which may serve as a basis on which to arrive at an international agreement on these practices. References: Angulo and Gilna. 2008. International law should govern release of GM mosquitoes. Nature 454: 158-158. Angulo and Gilna. 2008. When biotech crosses borders. Nature Biotechnology 26: 277-282.

Cristina Armas and Francisco I. Pugnaire from the Estación Experimental de Zonas Áridas coauthored a review showing the importance of including facilitation in the organisation and composition of plant communities according to environment gradients and their importance for the coexistence and maintenance of species diversity. They highlight that the evolutionary responses of plants to facilitation are a rarely analysed aspect but nevertheless of great importance when developing new tools effective in the restoration of ecosystems and to understand the response of species and communities to vectors of global change. Reference: Brooker et al. 2008. Facilitation in plant communities: the past, the present and the future. J. Ecology 96: 18-34.

Juan J. Soler and his colleagues at the Estación Experimental de Zonas Áridas have demonstrated the existence of a symbiotic association between the hoopoe and bacteria living in its uropygial gland, conferring significant antimicrobial properties to its secretions, which protect its eggs against pathogens, among other possible functions. These types of associations are known in several taxons of invertebrates, arthropods, and non-arthropods, and this will be the first example in vertebrates. Reference: Soler et al. 2008. Symbiotic association between hoopoes and antibiotic-producing bacteria that live in their uropygial gland. Functional Ecology 22: 864-871.

Hoopoe in its nest with a clutch of eggs and catheter (bottom left) to study the bacteria that live in the uropygial gland.

Fernando Valladares, a researcher at the Instituto de Recursos Naturales coauthored a review analysing various factors affecting shade tolerance among plants. This is an important trait in understanding the dynamics of plant communities and for predicting the response of ecosystems to climate change, raised CO_2 levels and the appearance of invasive species. Moreover, it has been observed that plants demonstrate a high degree of phenotype plasticity in morphological traits associated with light capture optimisation. Reference: Valladares and Ninemets. 2008. Shade tolerance, a key plant trait of complex nature and consequences. Annual Review of Ecology, Systematics and Evolution 39: 237-257.

Enrique Navarro, a researcher at the Instituto Pirenaico de Ecología took part in one of the first articles devoted to unravelling the various toxic mechanisms in nanomaterials. In particular the toxicity of silver nanoparticles in relation to algal photosynthesis in an aquatic medium was measured. Reference: Navarro et al. 2008. Toxicity of Silver Nanoparticles to Chlamydomonas reinhardtii. Environmental Science & Technology 42(23): 8959-8964.

Jesús Gómez-Zurita and Ignacio Ribera, researchers at the Instituto de Biología Evolutiva (CSIC-UPF), took part in a study demonstrating the stability in evolutionary terms of a highly specific aquatic medium in the tropics: the water that accumulates at the base of the leaves of certain bromeliads. These natural water tanks sustain a considerable amount of biodiversity, from algae through to aquatic fly larvae and small amphibians. In the case of this well known association it only remained to be shown if it was a matter of an opportunistic use of a rare aquatic habitat in the tropics or if it was stable over time. The phylogenetic analysis and molecular dating of a type of aquatic beetle adapted to this environment showed that its association goes back as far as the appearance of this type of plant in the fossil record. Reference: Balke et al.

2008. Ancient associations of aquatic beetles and tank bromeliads in the Neotropical forest canopy. Proceedings of the National Academy of Sciences, USA 105(17): 6356-6361.

Tropical bromeliad containing an unusual reservoir of water used as a habitat by aquatic beetles (Photo: Jorge Rivas).

Antonio Rosas and Jan van der Made, researchers at the Museo Nacional de Ciencias Naturales are collaborating with researchers from the IPHES (Tarragona) in studying the Sima del Elefante deposits in the Sierra de Atapuerca. As a result of years of research and field work, they have found the oldest human remains in Europe, going back 1.2 million years. This is the oldest evidence of human colonisation at the extreme west of the large Eurasian land mass. This discovery and the study are of international significance, earning them a place on the cover of the journal Nature. Carbonell et al. 2008. The first hominin of Europe. Nature. 452: 465-469.

Yolanda Fernández-Jalvo, a researcher at the Museo Nacional de Ciencias Naturales was co-author of a study showing that the Neanderthals who lived in the Gorham and Vanguard caves of Gibraltar ate marine animals. In the Vanguard cave, at levels dating back over 42,000 years, three occupations have appeared with fossils of seal bones (Monachus monachus) showing marks where the skin and meat has been removed and the bones broken to obtain the marrow. A fourth, more recent and shorter duration, occupation also took place in Vanguard, and remains of mussels (Mytilus galloprovincialis) collected from a nearby estuary were found. These activities were complemented by the occasional utilisation of cetaceans (bottlenose dolphins: Tursiops truncatus), possibly beached on the shore, sea birds, and the hunting of terrestrial mammals. In Gorham's cave, at levels dated around 28,000 years ago, a recent epoch for these groups of humans which indicates their persistence and possibly, the last presence of Neanderthals known before their extinction. Reference: Stringer et al. 2008. Neanderthal exploitation of marine mammals in Gibraltar. Proceedings of the National Academy of Sciences USA 105:14319-14324.

Position and view of Gorham and Vanguard caves, Gibraltar.

Ignacio Doadrio and José Luis García-Garitagoitia, researchers at the Museo Nacional de Ciencias Naturales, took part in a study analysing the mitochondrial DNA of ancient remains of brown bears. The study showed that brown bears on the Iberian peninsula have had a constant genetic flow with Europe, and that the current genetic characteristics are due to this flow and various bottle necks which have arisen over time. The current situation of the brown bear on the Iberian peninsula is somewhat unusual, and it will in fact be the first time in history that it has been isolated. Conservation strategies for the species need to change in the light of these findings. Reference: Valdiosera et al. 2008. Surprising migration and population size dynamics in ancient Iberian brown bears (Ursus arctos) Proceedings of the National Academy of Sciences USA 105: 5123-5128.

David Nogues-Bravo and Miguel Araujo, researchers at the Museo Nacional de Ciencias Naturales used altitude gradients of plant species richness, simulations and a bibliographical review of over 500 articles to show that the lack of unifying theory of patterns of species richness and its causes is a consequence of the different spatial scales used in the debate on patterns of richness. At the same time, the anthropic impact on ecosystems prevents an understanding of the biological mechanisms determining the distribution of biological diversity. The collaboration of the Herbario JACA and access to its collection, which has been built up over several decades by the Instituto Pirenaico de Ecología. Reference: Nogués Bravo et al. 2008. Scale effects and human impact on the elevational species richness gradients. Nature, 453: 216-U8.

Patrick Fitze, a researcher at the Museo Nacional de Ciencias Naturales studied, together with Jean-François Le Galliard from CNRS, sexual selection in the common lizard, Lacerta vivipara. Manipulating the sex ratio of the adults in twelve experimental populations has enabled quantification of the intensity of sexual selection by investigating the relationship between reproductive success and body size. The results indicate that positive and directional sexual selection of body size among males is stronger in populations skewed towards females and that the effect of sexual selection on the size of females is weaker. These findings suggest that the cost of reproduction rather than the proportion of the sexes (operational sex ratio) correctly predict the strength of sexual selection. Reference: Fitze and Le Galliard. 2008. Operational sex ratio, sexual conflict, and the intensity of sexual selection. Ecology Letters, 11:1-8.

Isabel Sanmartín, a researcher at the Real Jardín Botánico co-authored a paper in which a Bayesian approach was taken to the dispersal-vicariance, taking phylogenetic uncertainty into account, and allowing a more precise analysis of the biogeographical history of the lineages. If there is more than one optimal solution for a node on the tree, integrating the previous tree distribution enables preference for a smaller group of solutions to be found. Reference: Nylander et al. 2008. Accounting for phylogenetic uncertainty in biogeography: A Bayesian approach to dispersal-vicariance analysis of the thrushes (Aves: Turdus) Systematic Biology 57: 257-268.

Antonio Acosta-Vigil, a researcher at the Instituto Andaluz de Ciencias de la Tierra co-authored a paper studying the diffusion of alkalis in granitic liquids and concluded that in addition to the local diffusion described by Fick's law, there is a field diffusion directed by chemical potential gradients which also includes components with which the alkali couples (for example, aluminium). Field diffusion recalls a positive ionic current and results in rates of effective transport three orders of magnitude faster than in the case of simple local diffusion. Reference: Morgan et al. 2008. Diffusive equilibration between hydrous metaluminous-peraluminous haplogranite liquid couples at 200 MPa (H^2O), and alkali transport in granitic liquids. Contributions to Mineralogy and Petrology, 155: 257–269

Jesús Carrera, a researcher at the Instituto de Diagnóstico Ambiental y Estudios del Agua took part in a paper defining a Lagrangian statistical model to describe and predict transort in highly heterogeneous velocity fields with complex spatial organisations. Reference: Le Borgne et al. 2008. Lagrangian statistical model for transport in highly heterogeneous velocity fields. Physical review letters 101: 090601.

The research group led by Xavier Querol from the Instituto de Diagnóstico Ambiental y Estudios del Agua took part, together with the group led by Jordi Sunyer from the Institut Municipal d'Investigació Mèdica, in a study on the effects of interaction between dust from the Sahara desert and pollution produced by mankind. The study concluded that on days when there is Saharan dust in Barcelona mortality rises due to the coarse particles. Referencia: Perez y col. 2008. Coarse particles from Saharan dust and daily mortality. Epidemiology 19: 800-807.

The research group led by Xavier Querol from the Instituto de Diagnóstico Ambiental y Estudios del Agua has published

the results of measuring pollution in four urban locations, one suburban location, two rural locations and two with a rural backdrop, each with different levels of industrial impact, in the metropolitan area of the city of Mexico. A strong impact from emissions associated with main roads was observed. High levels of nitrates were measured in the rural sites. In urban sites typically anthropogenic elements were found (As, Cr, Zn, Cu, Pb, Sn, Sb, Ba, among others). The presence of light lanthanoids and cerium in the city centre may be due to vehicles' catalytic converters. Lanthanum measurements suggest a powerful effect of sources of fuel oil combustion relative to refinery emissions. References: Querol y col. 2008. PM speciation and sources in México during the MILAGRO-2006 Campaign. Atmospheric Chemistry and Physics 8, 111-128; Moreno y col. 2008. Lanthanoid Geochemistry of Urban Atmospheric Particulate Matter. Environmental Science and Technology 42, 6502-6650.

Carlos Ayora and Jesœs Carrera, researchers at the Instituto de Diagnóstico Ambiental y Estudios del Agua have shown how caustic magnesium mixed with wood chips used as an inert matrix enable the elimination of Zn and Mn from water and avoid the loss of reactivity or permeability due to the build up of precipitates in the columns. Reference: Tobias et al. 2008. Improved passive treatment of high Zn and Mn concentrations using caustic magnesia (MgO): particle size effects. Environmental science & technology 2008;42(24): 9370-9377.

Eugenia Martí, a researcher at the Centro de Estudios Avanzados de Blanes was co-author of a paper in which the zones of hydrological retention and accumulation extending the residence time of organic carbon during downstream river transport, as geophysical opportunities for microorganisms, allowing them to develop either as sticky biofilms or aggregates in suspension and metabolise organic carbon to generate energy and grow. Reference: Batín et al. 2008. Biophysical controls on organic carbon fluxes in fluvial networks. Nature Geosciences. 1: 95-100.

Enric Sala, a researcher at the Centro de Estudios Avanzados de Blanes took part in a study showing that fishing catches in the Gulf of California are positively related to the local abundance of mangroves which serve as the breeding grounds for many commercial species. The paper describes the services provided by the mangrove and its social benefits, and quantifies the economic cost of its destruction. Reference: Aburto-Oropeza et al. 2008. Proceedings of the National Academy of Sciences USA 105: 10456-10459.

Bernat hereu, Mikel Zabala and Enric Sala, researchers at the Centro de Estudios Avanzados de Blanes have published a paper centring on the Mediterranean sea's sub-littoral community. An experiment was performed in which the densities of the main consumers of benthic algae (fish and sea urchins) were manipulated in 100 m^2 areas of a marine reserve and the progress of algae groupings were monitored over two and a half years. The majority of the algae have a marked annual cycle with peaks in the spring/summer. Sea urchins reduce the abundance of most algal species but herbivorous fish do not. The presence of predator fish inhibits the effect of sea urchins. Reference: Hereu et al. 2008. Multiple controls of community structure and dynamics in a sublittoral marine environment. Ecology 89: 3423-3435.

Josep Peñuelas, a researcher at the Centro de Estudios Avanzados de Blanes-CREAF in collaboration with Ulo Niinemets at the University of Estonia, published a review analysing the introduction of exotic species in gardening and urban landscaping as a result of global warning. These practices get around dispersal by seeds and environmental stress, causing an increase in biological invasions, high emissions of volatile organic compounds and an increase in CO_2 fixing in waste water. None of these global effects is envisaged in global change scenarios and so it is necessary to estimate them quantitatively given growing urbanisation. Reference: Niinemets and Penuelas. 2008. Gardening and urban landscaping: Significant players in global change. Trends in Plant Science 13: 60-65.

Adriana Vergés, a researcher at the Centro de Estudios Avanzados de Blanes co-authored a paper in which the susceptibility of each sex of the red algae Asparagopsis armata to being eaten by the sea hare, Aplysia parvula, at

three stages of its life cycle. The differences at each stage in nutrient contents and halogenated secondary metabolites were highly sex dependent. Male gametophytes presented the highest nutrients content and lowest content of secondary metabolites. Female gametophytes presented the highest levels of secondary metabolytes. Food selection by the sea hare was consistent with the differences in algae quality and defences, the haploid male gametophytes being the most frequently consumed. This preference by the sea hare corresponds to the change observed in the field, with a female bias at the end of the reproductive season. Reference: Vergés et al. 2008. Sex and life-history stage alter herbivore responses to a chemically defended red alga. Ecology 89: 1334-1343.

Caption: Adult sea hare, Aplysia parvula next to red algae, Asparagopsis armata.

A group of researchers at the Instituto de Ciencias Marinas led by Carlos Pedrós-Alió, together with Antoni Fernandez-Guerra, a researcher at the Centro de Estudios Avanzados de Blanes undertook an analysis of the genome of Polaribacter sp. MED152, an abundant micro-organism in the sea. The results suggest that the micro-organism can stick to surfaces and break down food to obtain carbon, nutrients and energy. However, once the substrate has been exhausted, it can live freely in low carbon environments, and survive using proteorhodopsin, a protein, to capture light and generate energy. Gonzalez et al. 2008. Genome analysis of the proteorhodopsin-containing marine bacterium Polaribacter sp MED152 (Flavobacteria). Proceedings of the National Academy of Sciences USA 105: 8724-8729.

Caption: Culture in Petri dish of Polaribacter sp MED152, an abundant micro-organism in the sea, which is able to capture light with proteorhodopsin.

Ramón Massana and Carlos Pedrós-Alió, researchers the Instituto de Ciencias del Mar published a paper reviewing the use of molecular techniques to discover and describe marine eukaryotic microbes, particularly the smallest of them, which are difficult to culture and observe morphologically. The analysis of samples from the surface of the ocean, the most accessible and best known ocean region, reveals a large diversity of eukaryotes, with many new species. This forces a rethink of biodiversity inventories and the functioning of the marine ecosystem. Reference: Massana and Pedrós-Alió. 2008. Unveiling new microbial eukaryotes in the surface ocean Current Opinion in Microbiology 11: 213-218.

Carlos M. Duarte, a researcher at the Instituto Mediterráneo de Estudios Avanzados took part in a review paper proposing the use of analytical techniques and existing statistical methods for simple tests and quantitative inferences making it possible to understand the real existence of changes of regime and ecological thresholds predicted at the theoretical level. Reference: Andersen et al. 2008. Ecological Thresholds and Regime Shifts: Approaches to Identification. Trends in Ecology and Evolution 24: 49-57.

Alejandro F. Rozenfeld and Carlos M. Duarte, researchers at the Instituto Mediterráneo de Estudios Avanzados co-authored a paper in which network theory was applied to determine the genetic structure of a metapopulational system using microsatellite data from populations threatened by the marine plant Posidonia oceanica over its range of distribution. Applying network theory is novel and makes it possible to characterise the hierarchised populational structure and to detect populations acting as critical nodes for gene flow or sustaining a meta-populational system. Reference: Rozenfeld et al. 2008. Network analysis identifies weak and strong links in a metapopulation system. Proceedings of the National Academy of Sciences of the USA 105: 18824-18829.

Raquel Vaquer-Sunyer and Carlos M. Duarte, researchers at the Instituto Mediterráneo de Estudios Avanzados carried out a study analysing hypoxia thresholds through a range of benthic marine organisms. Due to the growing eutrophication and global warming, it may be expected that hypoxia and its harmful effects on marine life will increase in coastal waters in the near future. The paper showed that the hypoxia thresholds vary according to organisms, and the conventional definition of waters with 2 mg O_2/litre as hyopoxic is below empirical lethal and sub-lethal thresholds of O_2, which implies an underestimate of the coastal ecosystems affected by hypoxia. Reference: Vaquer-Sunyer and Duarte. 2008. Thresholds of hypoxia for marine biodiversity. Proceedings of the National Academy of Sciences 105: 15452-15457.

PRIZES AND AWARDS

Miguel Delibes de Castro. Estación Biológica de Doñana.
Naider Action and Commitment Prize 2008 from publishers Editorial Naider. For his action and commitment in relation to sustainability and the fight against climate change.

Carles Vilà. Estación Biológica de Doñana.
Corresponding Academician of the Catalan Veterinary Sciences Academy. For his human, scientific and professional merits.

Jordi Figuerola, Adolfo García-Sastre, Juan Ortín, Pilar Pérez-Breña, Agustín Portela; Gustavo del Real, Ramón C. Soriguer. Estación Biológica de Doñana.
Science in Action Prize, "Scientific Popularisation. Print" category, awarded by the CSIC, FECyT, the Real Sociedad Española de Física, Real Sociedad Matemática Española and the UNED.
For the publication (2006) "La gripe aviaria: ¿Una nueva amenaza pandémica?" (Avian flu. A new pandemic threat?) 62 pp. Colección Divulgación. Consejo Superior de Investigaciones Científicas, Madrid.

Estación Biológica de Doñana.
II Prize for Excellence in Occupational Hazard Prevention "Ramón Tobar Illade" from the CSIC. For the Doñana Biological Station's work on preventing occupational hazards.

Francisco I. Pugnaire. Estación experimental de Zonas Áridas.
Elected Vice-president of the European Ecological Federation.

Carlos M. Duarte. Instituto Mediterráneo de Estudios Avanzados.
Took office as President of the American Society of Limnology and Oceanography.

Carlos M. Duarte. Instituto Mediterráneo de Estudios Avanzados.
Augusto González Linares 2008 Prize from the University of Cantabria and the Environment Department of the Cantabrian Regional Government, for his important contribution to advancing and promoting research in the marine sciences, sciences of sustainability and global change.

Andrés Maldonado López. Instituto Andaluz de Ciencias de la Tierra.
Appointment as a numerary academician of the Academia de Ciencias Naturales de Granada (Academy of Natural Sciences of Granada).

Ana Crespo Blanc. Instituto Andaluz de Ciencias de la Tierra.
Appointment as President of the Sociedad Geológica de España (Spanish Geological Society).

Josep Peñuelas i Reixach. Centro de Estudios Avanzados de Blanes-CREAF.
"Medi Ambient 2008" prize from the Institut d'Estudis Catalans i Obra Social Caixa de Sabadell.
Enric Sala. Centro de Estudios Avanzados de Blanes.
Young Global Leader, World Economic Forum, Davos.

Enric Sala. Centro de Estudios Avanzados de Blanes.
Blue Ocean Institute Award.

LINES OF RESEARCH
Biodiversity. Systematics, biogeography and evolution
Biology and physiology of organisms
Population ecology, communities and evolution
Ecosystems and macroecology
Structure and dynamics of the solid Earth
External Geodynamics
Oceanography and coastal systems
Aquaculture
Conservation and management of natural resources
Environment and environmental impacts

AREA 4
Agricultural Sciences

Coordinator: M. Carmen Hermosin Gaviño

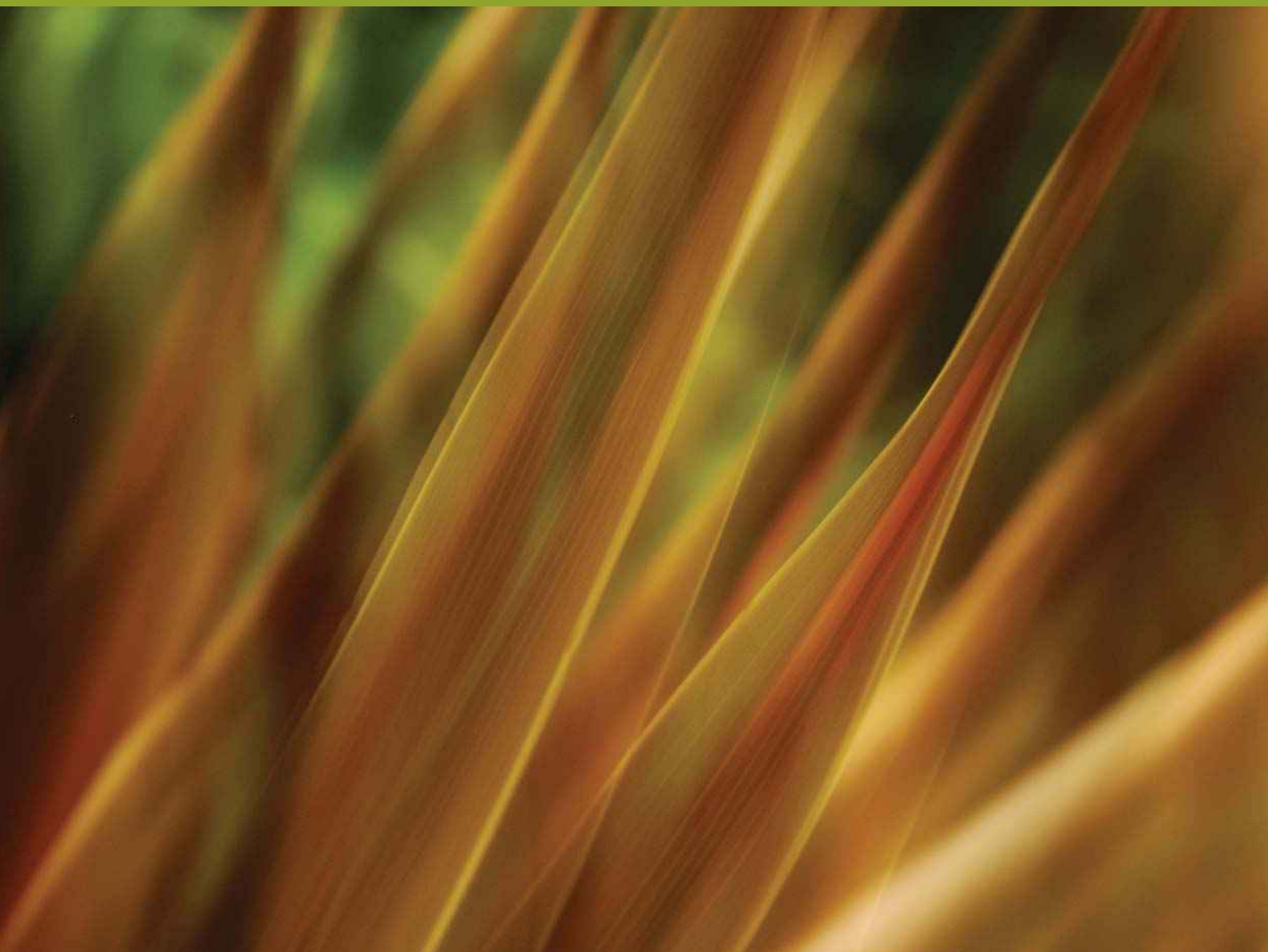


Image: "Photosynthesis", by Cristina Motilla Mulas. Fotciencia 07

INTRODUCTION

In 2008 the Agricultural Sciences Area was made up of 12 institutes distributed across Spain. These are the Instituto de Investigaciones Agrobiológicas de Galicia (Galicia Agrobiological Research Institute, IIAG) the Misión Biológica de Galicia (Galicia Biology Mission, MBG) in Galicia, the Instituto de Recursos Naturales y Agrobiología de Salamanca (Salamanca Institute of Natural Resources and Agrobiology, IRNASA) and the Instituto de Agrobiologia de Montaña (Mountain Agrobiology Instititute, IGM) a joint centre with the University of León, in Castilla-León (formerly the Leon EAE), the Instituto de Agrobiotecnología (Agrobiotechnology Institute, IdAB) in Navarre as a joint centre with the Navarre Public University and the Navarre Regional Government, the Estación Experimental de Aula Dei (Aula Dei Experimental Station, EEAD) in Aragón, the Instituto de Ciencias Agrarias (Agricultural Sciences Institute, ICA) in Madrid, the Centro de Edafología y Biología Aplicada del Segura (Segura Soil Science and Applied Biology Centre, CEBAS) in Murcia and the Estación Experimental del Zaidín (Zaidín Experimental Station, EEZ), and the Estación Experimental de La Mayora (La Mayora Experimental Station, EELM) (a future joint centre with the University of Málaga, called the IHSM) and the Instituto de Agricultura Sostenible (Institute of Sustainable Agriculture, IAS), Instituto de Recursos Naturales y Agrobiología (Institute of Agrobiology and Natural Resourcse, IRNAS) and the Instituto en Formación de Nutrición Animal (Animal Nutrition Training Institute), in Andalusia. The Area's agricultural research groups also carry out work at centres belonging to other scientific areas: Centro de Investigaciones Biológicas (Centre for Biological Research, CIB), Instituto de Biología Molecular y Celular de Plantas (Institute of Plant Molecular and Cellular Biology, IBMCP) in the Valencia Region and the Instituto de Productos Naturales y Agrobiología (Institute of Agrobiology and Natural Products, IPNA) in the Canary Islands. Some researchers belonging to the Agricultural Sciences area are also located at other institutes Instituto de Recursos Naturales (IRN), and the Instituto del Frío (IF) in Madrid. It is also worth noting that a new joint centre, the Instituto de la Ciencias de la Vid y del Vino (Institute of Vine and Wine Sciences), run by the CSIC, the University of Logroño and the Government of La Rioja has been set up, which this Area shares with the Food Technology Area.

The Agricultural Science Area's most important asset is undoubtedly the Area's personnel working at its centres. These comprise 326 staff researchers, 196 contract researchers, 335 research fellows, supported by more than 900 auxiliary, technical and administrative staff.

The researchers of the CSIC's Agricultural Sciences area perform a wide range of research, ranging from the most basic research through to applied research, with a view to continuing the area's contribution, as in previous years, to be European knowledge-Based Bio-Economy (EKBBE), by addressing research lines that lead to the production of healthy foods and products for industrial uses, whether of plant or animal origin. The area also undertakes research to ensure that the whole production process is sustainable, avoiding the environmental impact that agricultural farming activities may have. Its research is also applicable to the management of man-made ecosystems (either agricultural or green spaces for leisure uses), and natural systems (woods, meadows, aquatic systems, etc.). Raising the efficiency of production systems, and making sustained use of resources that derive from this research can enhance economic returns and so contribute to maintaining populations in rural areas.

As regards the future of agriculture in Spain, the farming industry must take scientific on board knowledge as a means of adding value to mere production. In particular, this scientific knowledge relates to that from molecular biology and biotechnology, which will undoubtedly enable Spain to be a producer of high-quality foods and a producer and marketer of services.

The production of low value-added foodstuffs is moving towards low-wage world regions, although it should not be forgotten that a large share of the human race still goes hungry. The challenges of adverse climatology and climate change for agriculture must be tackled by science, which should take them as an opportunity to address new aspects of agricultural production. For this reason current research in the area is contributing to creating the know-how and production technology necessary to tackle these new challenges.

Water has become a scarce and strategically vital resource at national and global level. In order to make more efficient use of water a national irrigation plan is being undertaken, which will lead to the modernisation of the irrigation of around a million hectares. The huge investment necessary needs to go hand in hand with scientific and technological progress, and this is an area in which the CSIC is playing a very active role. Its activities in this field include studying water reuse and the optimisation of irrigation management and programming systems, which will release water resources for use in other sectors (households, landscaping, sports, etc.) in which the CSIC's Agricultural Sciences Area is also involved (EEAD, IAS, IRNAS, CEBAS).

Soil is a natural resource which is not renewable in the short term. It has to be conserved and protected both against contamination by chemical products reaching it from various anthropic activities, and from its degradation by erosion, which is also the result of human activity, combined with adverse climatology. In relation to soil contamination and degradation, the Agricultural Sciences Area is addressing the basic physical, chemical and biological processes, from the molecular scale up to the scale of the field, in order to implement technologies which allow: (1) the prevention of contamination and the decontamination of soils and their recuperation for appropriate uses; (2) the controlled incorporation in soils of organic wastes produced by society, which we have to dispose of in a rational, economic, and environmentally friendly way; (3) foreseeing and preventing the possible consequences of global change in terms of soil degradation; (4) replanting degraded areas, with the help of organic wastes and beneficial use of rhizospheric microorganisms. The purpose of this research is therefore to collaborate on the protection and conservation soils, so as to ensure that they maintain their natural fertility and productivity in line with the functions they have to perform (CEBAS, EEAD, EEZ, ICA, IIAG, IRNAS, IRNASA).

Society today demands forms of arable and stock farming that are safe, healthy, sustainable and have the minimum possible impact on ecosystems. Farmers, for their part, demand that their productivity and income will not be reduced. The CSIC is contributing to meeting these social demands through knowledge of: (1) plants' and animals' real nutrient needs, and the mechanisms for their transport and absorption, and of their impact on product quality; (2) how certain soil microorganisms promote plant nutrition and plants' ability to withstand stresses; (3) how to carry out integrated control over pests, illnesses and diseases and zoonosis (diseases that may be transmitted from animals to humans), with the knowledge and biotechnological tools available; and, (4) achieving substantial advances by means of what we know as "Plant biotechnology", using all the tools deriving from the "-omics", so as to increase our basic knowledge (IIAG, IRNASA, IRNAS, IGM, IdAB, EEAD, ICA, IAS, CEBAS, CIB, EEZ, IFNA, IPNA, IBMCP).

In the forestry industry, the CSIC's research is still weak overall, but it is at the forefront in certain disciplines such as propagation, genetic transformation, primarily in relation to disease resistance and the clean utilisation of vegetable plant biomass in the paper industry (IIAG, MBG, IRNAS).

A considerable number of developing countries (in the Middle East, North Africa or Latin America) share Spain's problems relating to the scarcity of water, the conservation of agricultural ecosystems, the struggle against adverse environmental factors, etc. The CSIC's Agricultural Sciences Area is collaborating closely with them both on joint projects and training of personnel, and this activity is due to be stepped up in the future. This scientific cooperation may open up an important route for cultural and economic penetration (by Spanish firms in the agricultural industry) in these emerging economy countries.

As the foregoing shows, the research being undertaken in the area is strongly goal oriented, seeking to solve society's real problems by means of scientific solutions based on a knowledge of fundamental processes. This conception of research as a response to social needs is encouraging the emphasis of research to be placed on the production of quality foodstuffs, suited to the specific needs of industry and the preservation of the environment, which in conjunction with the need to deepen our understanding of basic processes, will lead to closer collaboration with the Food Technology, Natural Resources and Biology and Biomedicine Areas.

SUMMARY OF ACTIVITIES IN 2008

The basic activity of the Agricultural Sciences Area has been to carry out the projects run by its centres and research groups, and to publish and transfer their results. Tables 1 and 2 summarise the Agricultural Sciences Area's activity in 2008. This comprised 302 research projects, funded either through competitive calls for proposals or contracts with public or private entities. The total funding obtained through competitive calls came to 17 million euros, with over 3 million coming from agreements with companies and public bodies.

Table 1 lists the projects and funds awarded by regional governments. These are almost twice those under the National Plan, while those from the European Union are at relatively low levels, given the limited range of topics and funds the FP7 has offered for Agricultural Areas in the first few years. It is also worth noting that the level of funding through agreements and contracts, particularly with the private sector, is coming ever closer to that from the National Plan.

Table 2 summarises the specific results this scientific and technical activity has produced, which includes 725 papers in SCI journals and 24 new patents.

Table 1. Research funds and projects awarded in 2008

	CEBAS	EEAD	EELM	EEZ	IAS	ICA	IDAB	IGM	IIAG	IRNAS	IRNASA	MBG	Total
Research projects													
National Plan	8	1	0	0	4	2	3	1	9	6	6	6	46
Funding (€ thousands)	947.00	11.50	0.00	0.00	107.50	203.90	523.10	145.20	958.30	180.90	384.00	328.50	3,790
Other national sources	6	7	0	0	8	7	0	1	1	9	12	1	52
Funding (€ thousands)	894.00	212.10	0.00	0.00	166.40	64.50	0.00	30.00	30.00	292.60	131.00	30.00	1,851
EU	1	2	0	2	0	0	1	1	0	1	0	0	8
Funding (€ thousands)	64.00	2.60	0.00	90.00	0.00	0.00	45.00	213.00	0.00	77.80	0.00	0.00	492
Other international sources	3	4	5	0	0	0	0	0	0	2	0	0	14
Funding (€ thousands)	33.00	47.40	61.40	0.00	0.00	0.00	0.00	0.00	0.00	24.40	0.00	0.00	166
Autonomous Regions	18	9	2	10	5	0	3	1	7	14	4	5	78
Funding (€ thousands)	1.065.00	157.80	471.10	2.512.40	1.565.00	0.00	431.30	9.70	577.80	451.20	45.00	210.80	7,497
Public contract research	2	3	1	3	1	5	0	0	1	4	1	0	21
Funding (€ thousands)	93.00	47.00	25.00	425.20	16.20	152.10	0.00	0.00	0.00	95.20	12.00	0.00	866
Private contract research	24	11	5	4	14	5	2	4	2	8	2	0	81
Funding (€ thousands)	454.00	111.20	63.40	78.50	860.60	285.70	221.00	126.60	44.60	76.00	23.00	0.00	2,345
Foundations	0	0	1	0	0	0	0	0	0	0	0	1	2
Funding (€ thousands)	0.00	0.00	15.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.00	30
Total Projects													302
Total Funding													**17,037**

Table 2.- Scientific Output in 2008

	CEBAS	EEAD	EELM	EEZ	IAS	ICA	IDAB	IGM	IIAG	IRNAS	IRNASA	MBG	Total
Scientific output													
SCI-SSCI-AHCI Papers	153	59	23	114	87	47	25	14	18	104	48	33	725
Non-SCI-SSCI-AHCI Papers	2	11	11	19	26	12	1	9	6	9	5	21	132
Books	2	3	1	2	2	2	0	0	0	7	2	2	23
Book chapters	12	17	1	19	11	5	2	0	5	22	17	5	116
Other monographs	0	0	0	2	0	0	0	0	0	0	0	1	3
Communications at national conferences	27	11	11	35	18	3	9	3	3	20	3	9	152
Posters at national conferences	28	12	12	29	29	7	7	0	7	15	14	9	169
Communications at international conferences	44	19	17	42	24	30	6	2	4	27	14	1	230
Posters at international conferences	41	40	23	68	39	30	16	5	15	64	27	12	380
Theses	9	5	2	14	7	4	2	2	1	7	8	2	63
Postgraduate courses	38	18	0	55	22	21	0	4	8	21	13	5	205
Patents	0	1	1	0	6	2	0	0	0	0	0	14	24
Total													**2,222**

From all the Area's activity, we would highlight the following as being of particular interest:

Agricultural Area Technology Transfer Network

During 2008 the Agricultural Sciences Area's Technology Transfer Office, which is staffed by three honours graduates located at CEBAS, EEZ and EEAD, set up a series of coordinated visits to the area's various institutes in order to obtain a more detailed understanding of the research groups' technology transfer needs. In each case the visit was preceded by a questionnaire. This document will be made available at some point in 2009. The three technology transfer office staff have shared out the area's institutes between them so as to be able to offer immediate support and protect our research (patent applications or plant varieties), and to formalise research contracts with private businesses. When the Agricultural Sciences Area's Technology Transfer Office is fully up and running, it will undoubtedly bring about clear improvements in technology transfer for the agricultural sciences in the near future.

Spin-offs/technology-based companies

The Area had a total of 7 technology-based spin-off companies in 2008, set up to use the results of research in agricultural science. Two of them are at CEBAS (Bioprodin and Microgaia Biotech), three at EEZ (Bioliberis, Micovitro and Allergenome), one at IdAB (BioCarbohydratos Technologies), one at EELM (Savia Biotech) and another at IAS (Agrosys).

Important Scientific Meetings

- The IIAG, through the group led by A.Ballester, hosted the Red de Genómica y Diversidad Genética Forestal (Forestry Genetic Diversity and Genomics Network, GEN²FOR), which is funded by the Ministry of Science and Innovation (MICINN) and in which 15 Spanish research groups took part.

- From 9 to 11 October 2008, researchers at the EEZ's Redox Regulation and Biotic and Abiotic Stress Response group organised an international meeting on the current

state of plant biomass production for food and energy as part of the workshops promoted by the Andalusia International University (UNIA), with the participation of 19 speakers from Europe and America.

Outreach

- Through the agricultural sciences area, with the sponsorship of Syngenta, the CSIC organised a seminar on sustainable water management and plant health products (Jornadas de Gestión Sostenible del Agua y los Fitosanitarios), with the participation of Prof. Elías Federes of the IAS as a speaker and moderator and Prof. M. Carmen Hermosin of IRNAS, together with 4 other speakers from the CHE, the INIA, and the UPM. The event brought together around 50 participants, including managers from regional governments, water authorities, farmers' associations, plant health product manufacturers, etc. and it was opened by the vice-president of the CSIC and closed by the councillor for agriculture at the Aragon Regional Goverment.

- To mark the "Semana de la Ciencia y Tecnología 2008" (2008 Science and Technology Week) the Estación Experimental del Zaidín (Zaidín Experimental Station) and the Instituto de Astrofísica de Andalucía (Andalusia Astrophysics Institute)

Rosa Menéndez, Fernando Arguillé (centre) and Elías Ferreres during the inauguration.

From left to right the speakers at the event: José Luis Alonso, Manuela Omedas, Emilio Gil, Elias Fereras and Carmen Hermosín.

scheduled a joint series of talks which were held on 18-21 November. This series of talks/round tables, given the title "Noches de Ciencia 2" (Science Nights 2), was dedicated to Time, looked at from a diverse range of perspectives, such as chronobiology and ageing, Physical time versus psychological time, measurement of time and time's arrow. The series of talks attracted over 1000 people.

- Presentation of the Melonomics at the CEBAS-CSIC, with the participation of the Murcia Region's councillor for Universities, Enterprise and Research, and the Director of Genoma España.

- Practically all the Area's institutes have run open days ("Días de Puertas Abiertas"), most of them during the science week ("Semana de la Ciencia"). The Area also took part in science week with stands, workshops, and popular science materials such as CDs and DVDs, depending on the research being undertaken.

- Popular Science Lectures for Young People were put on at most institutes, underlining our commitment to young people and the science of the future.

- Another highlight was the multimedia exhibition entitled "Pabellon del Sol" (Pavilion of the sun), which was designed by the EEZ and the Instituto Astrofisica de Andalucia. The exhibition looked at the biological, cultural, and astronomical aspects of the sun. Exhibited in Granada in 2006 it won the Science in Action prize and a travelling edition has been produced which was shown in Seville in 2007 and Ciudad Real in 2008. Smaller versions have also been taken to various schools and colleges in Andalusia, where it was accompanied by duos of astronomers and biologists. Numerous entities from all over Spain have requested the exhibition, which has received the constant support of the CSIC's Scientific Culture Area.

Significant projects

- Several researchers from the Agricultural Sciences Area, from three of its institutes (IBMCP, EELM and CEBAS) took part in the "MELONOMICS" project to develop genomic tools in cucurbitaceae, including sequencing of the melon genome, and applying the results to improving crops. This project was funded by Genoma España and 12 entities took part (Semillas Fitó SA and Syngenta Seeds SA, Roche Diagnostics S.L., Savia Biotech S.A., Sistemas Genómicos S.L., Centre de Regulació Genómica SL., CRAG, COMAV-UPV, UAL, IMIDRA, UPM). The groups from the CSIC's Agricultural Sciences area have an important role in this project from the scientific point of view, and bring in income to their institutes through the project.

- Projects to consolidate Groups of Excellence, presented to the Murcia Regional Government. Three CEBAS-CSIC groups with the Board of Education have been classed as Groups of Excellence, with funding of 900,000 euros.

- Management agreement between the Ministry of the Environment and the CSIC for medium-long-term monitoring of potential environmental risks of insect-resistant transgenic crops (maize and cotton). Coordinator: Pedro Castañera Domínguez.

- "Oleagen" project (Genoma España) in which the CSIC is participating with two centres, the IAS (Prof. A. Martin) and the CIB (Prof.Cesar Llaves). The aim is to create the genetic bases and molecular markers of the different varieties of olive, in order to improve and lower the cost of their exploitation and commercialisation.

- Project entitled "Development of ultra-sensitive detection methods and plant nano-vaccines for the Fungi Fusarium spp. using nanotechnological devices" (Portugal-Spain Capacitation Program in Nanoscience and Nanotechnology. IP.- M. Carmen Risueño).

SELECTION OF HIGHLIGHTS

Main Scientific Achievements

Obtaining sheep's milk with a high CLA (conjugated linoleic acid) content with a high value as a nutraceutical: This milk is produced by complementing the animals' diet with a variety of vegetable oils, and of considerable potential value to the agrofoods industry. As well as being reported in three high impact SCI publications, it was widely reported in the media.

The Journal of Environmental Monitoring dedicated the cover of the November 2008 issue to the study performed in the plant-soil relations group at the EEZ's environmental protection department.

The use of multi-techniques combining traditional biochemical methods with molecular biology techniques, together with certain methodological improvements, may represent an important tool with which to expand our understanding of the role of microbial diversity in contaminated soils. (**Vivas, A., Moreno, B., del Val, C., Macci, C., Masciandaro, G., Benitez, E**. 2008. Metabolic and bacterial diversity in soils historically contaminated by heavy metals and hydrocarbons. Journal of Environmental Monitoring, 10: 1287-1296).

Publication of a paper entitled **Which future for weed science?** Weed Research 48: 297-301 de Fernandez-Quintanilla C., Quadranti M., Kudsk P., & Barberi P. 2008. This paper was commissioned by the journal as an "Insight Paper", and analyses the current situations and outlook of weed science, within the framework of a complete renewal of agriculture, and has served to establish the reference topics on which to focus research in this discipline at a European level. This paper is being used as a baseline document for the action plan that is being carried out by the European Weed Research Society (EWRS). It is also anticipated that it will be used as a reference document in the planning of research programmes for individual groups, both in Europe and elsewhere.

PRIZES AND RECOGNITION

Prize for the best paper published in the journal of the Real Academia Galega de Ciencias, in the 2007 volume (appearing in 2008) entitled "Respuesta de plantas de álamo a elevadas concentraciones de plomo" (Response of poplars to high lead concentrations) by **Couselo Bandín JL, Corredoira Castro E**. researchers at the IIAG.

Murcia Region, prize for aid to promoting research results transfer, 1st prize awarded to **Miguel A. Aranda Regules** (CEBAS-CSIC).

Appointment of **Carlos Garcia Izquierdo**, a research professor at CEBAS, as an academician of the Real Academia de las Ciencias de la Región de Murcia (Murcia Region Royal Academy of Sciences). The title of his lecture when taking possession was: Enmiendas Orgánicas de Suelos Basadas en Residuos (Organic Waste-Based Soil Conditioners).

The innovation inherent in GLOMYGEL® (a commercial product based on a CSIC patent exploited by the spin-off CSIC-Mycovitro S.L.) was recognised in January 2008 with the Technology innovation prize from the Ministry of the Environment, Rural and Marine Affairs' Fundación Biodiversidad, in conjunction with the Sociedad Española de Agricultura Ecológica (Spanish society of ecological agriculture).

This prize was handed over by the Minister for the Environment, Cristina Narbona, to the CSIC personnel responsible for the innovation, Custodia Cano Romero and Alberto Bago Pastor.

This prize was handed over by the Minister for the Environment, Cristina Narbona, to the CSIC personnel who invented the innovation, **Custodia Cano Romero and Alberto Bago Pastor**.

Appointment of **Prof. Pedro Castañeda**, from the CIB, as Director General of the INIA under the Ministry of Science and Innovation (MCINN).

Prof. Antonio Bello: Ecological Food and Biodiversity Prize 2008 awarded by the Ministry of the Environment, Rural and Marine Affairs' Fundación Biodiversidad, as a person whose professional personal life has stood out for the support given to the ecological foods industry and his research work related to the industry.

Dr Raquel Campos Herrera: Extraordinary Doctoral Thesis Prize with a European Mention 2008 from the Faculty of Biological Sciences at the UCM. "Los nematodos entomopatógenos de La Rioja y sus bacterias simbiontes" (Entomopathogenic nematodes of La Rioja and their symbiont bacteria). Supervisor: **Dr. Carmen Gutiérrez Martín**

LICENSED PATENTS

The Agricultural Sciences Area continues increasing the number of patents applied for and registered, which in 2008 (including the record of new plant varieties), came to 24. Here we highlight only the one patent already registered and licensed to a business:

- **Patent 2 177 465: "**Tratamiento postcosecha de frutas y hortalizas mediante pulsos de irradiación ultravioleta" (Post-harvest treatment of fruit and vegetables by means of ultraviolet radiation pulses). This processing is used to obtained grape juice enriched in stilbenes (mainly resveratrol) and to use the by products resulting from the process in the foods industry. Company: Actafarma.

RESEARCH DISCIPLINES IN THE AREA

Water in agriculture
Contamination of soils and soil recuperation
Soil conservation, quality and organic matter
Beneficial plant-microorganism interactions
Plant nutrition
Photosynthesis
Forestry and fruit growing
Genetic improvement
Environmental stresses
Fitopatología: virus, hongos y nematodos
Phytopathology: viruses, fungi and nematodes
Stock rearing

Water in agriculture

Evapotranspiration; Controlled under-irrigation. Irrigation systems and their programming. Agronomic techniques for the optimisation of water use. Water conservation and soil handling. Management of collective irrigation. Urban water uses.

Contamination of soils and soil recuperation

Dynamics of pesticides and pollutants in the soil-water plant system: physical, chemical and biological processes on the molecular, laboratory and field scale, and strategies for minimising their adverse effects. Effects of contaminants on soil properties. Recuperation of contaminated soils by physical/chemical methods (addition of wastes, natural, modified or synthetic absorbent minerals) and biological methods (microorganisms and plants). Bioavailability of contaminants and their effects on living creatures.

Soil conservation, quality and organic matter

Organic soil correctives treated using composting or vermicomposting techniques. Strategies against soil degradation and desertification. Carbon sequestration in soil. Biopesticide capacity of organic correctives. Diagnosis and modelling of sustainability of soils according to their use. Microorganisms in the recuperation and conservation of soils. Controlling water erosion processes and their consequences.

Beneficial plant-microorganism interactions

Ecology of beneficial rhizosphere organisms. Mechanisms of interaction between beneficial microorganisms and plants. Physiology of nodulated plants, mycorrhizal plants colonised by endophytic fungi. Stress-tolerance mechanisms in symbiotic plants. Biochemistry and molecular biology of beneficial microorganisms.

Plant nutrition

Optimising the efficiency of the use of water and nutrients. Absorbtion, transport and translocation of nutrients and similar compounds. Fruit quality and cell biology under nutritional stress. Nutrient cycles. Methods of correcting shortages and metal homeostasis. Remote stress detection.

Photosynthesis

Genomics and proteomics of the chloroplast and its stress response. Oxidative stress in the chloroplast. Redox regulation by thioredoxin in plants. Regulation of photosynthetic metabolism of carbon and nitrogen in response to the environment. Biosynthesis of fructans. Carbohydrate metabolism. Biotechnological improvement of starch production.

Forestry and fruit growing

Characterisation of phytogenetic resources. New varieties of cherimoya, almond, apricot and peach trees. New rootstocks for Prunus. Biology of reproduction. Pollen-pystyl interaction. Allergenic properties of pollen. Propagation systems, organogenesis and somatic embryogenesis. Genetic transformation

Genetic improvement

Characterisation of phytogenetic resources. New cultivars of horticultural and widely cultivated plants. Development of molecular markers, and genomic, transcriptomic and metabolomic platforms. Generation of special plant-based materials: RILs, NILs, double haploids, transformants, collections of mutants. Increased nutritional quality of foodstuffs. Plants from which to obtain beneficial products for health and specific products for industry. Pest and disease resistance. Tolerance of adverse environmental conditions. Efficient transformation and gamete embryogenesis techniques.

Environmental stress

Plant responses to biotic stress (virus, bacteria, fungi, etc.) and abiotic stress (heat, salt and oxidative stress, photoinhibition, toxicity from heavy metals, etc.) Redox signalling. Obtaining stress-tolerant plants. Membrane transporters. ROS and RNS (reactive species of oxygen and nitrogen). Differential proteomics (control plant vs stressed plant) of leaves and organelles under plant stress. Climate Change.

.

Phytopathology: viruses, fungi and nematodes

Diagnosis, epidemiology and control of viral diseases. Plant virus invasion and transmission mechanisms. Search for natural and transgenic resistance to viral diseases and analysis of the modes of action. Biology, ecology and integrated control of populations of phytopathogenic fungi. Characterisation and diagnosis of phytopathogenic nematodes and obtaining of resistant varieties.

Agricultural entomology and weed science

Digestive physiology of arthropods and feeding behaviour of viral-vector insects. Biopesticides based on microorganisms and compounds of botanical origin. Physical methods of controlling insect pests and the viruses they transmit. Characterisation of plant-insect resistance and detection and handling of insecticide resistance. Ecology of weeds. Application of remote sensing and GPS to precision agriculture. Decision-support systems to enable reduced herbicide use.

Stock rearing

Infectious and parasitic diseases of stock species. Immunity, vaccine development and diagnostic tests. Nutrient metabolism and energy. Nutritional needs and mechanisms of action of specific compounds. Nutritional value and metabolism in ruminants. Relationship between nutrition and product quality (meat and milk).

AREA 5

Physical Sciences and Technologies

Coordinator: Jesús Eugenio Marco de Lucas

Image: "Wind farm", by Regina de Lucas Andrés. Fotciencia 07

INTRODUCTION

The fundamental mission of the CSIC's Physical Science and Technology Area is the advancement of science by addressing new challenges, ranging from the basic approach provided by models and theories in physics and mathematics, through to the experimental and technological perspective where it serves as a complement to engineering.

The area is configured as a network of centres with a well-defined focus whose lines of research are at the cutting edge nationally and highly significant internationally. It covers the whole spectrum from basic research to technological applications. It is able to draw upon the support of scientific facilities, experimental laboratories and computing centres, and complementary centres to tackle scientific challenges at the global level in the area, as well as take part in multidisciplinary projects. It is able to attract scientists and technical staff of a high international standing and provide them with an ideal context in which to take on the scientific challenges of the 21st century, in which physics, mathematics and engineering continue to play a very important role.

The area consists of over 20 centres and institutes located in seven autonomous regions, including ten joint institutes run in conjunction with universities and other institutions, at which a total of almost 2000 people work, of whom more than 500 are staff researchers, and almost two thirds of these, CSIC employees. The centres also form part of a total of 20 associated units, run in conjunction with 14 universities and one hospital in seven different autonomous regions (as shown on the accompanying map).

The area's annual scientific production exceeds **1500 publications in ISI journals**, to which should be added another 500 contributions a year in other journals, conference proceedings and book chapters. As an indication of the active participation in outstanding international collaborations, the contribution of CSIC researchers from the area to the two most widely cited scientific papers of all those published with the participation of national institutions in 2008 could be mentioned. Similarly, if we look at the CSIC alone, this happens in 6 out of every 10 publications in 2008 most widely cited so far, confirming the importance of the area within the CSIC in terms of high impact contributions: of the 100 most cited papers published over the period 2006-2009, 45 involved researchers from the area.

The area's researchers are active in almost **400 projects and other research actions**, with a typical duration of between one and three years, and a budget for execution of close to 60 million euros, of which 80% comes from outside funding. In the 2008 National R&D Plan's call for proposals, more than 60 approved projects were presented by the area's centres, with overall funding of more than €25 million.

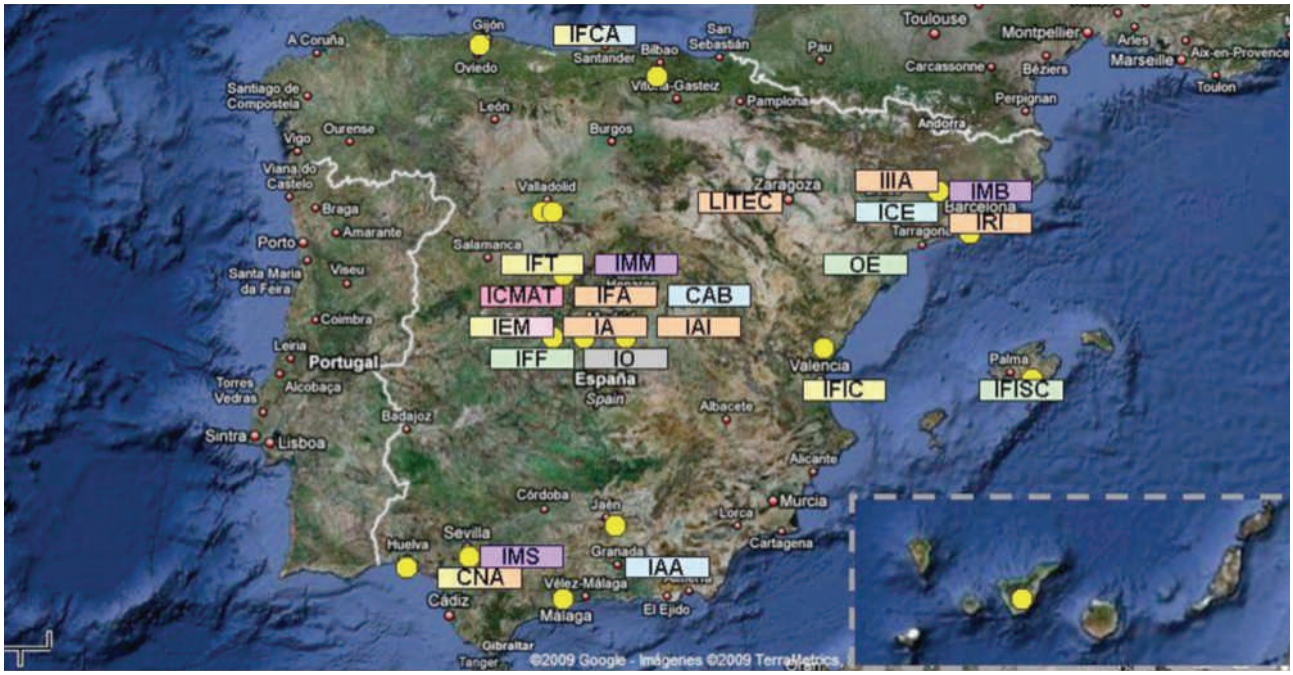
Also, an average of **80 doctoral theses a year** are submitted under the supervision of researchers from these centres.

The area's various lines of research can be grouped into the following thematic areas:

LINES OF RESEARCH

- Astrophysics and Space Sciences (ASTRO)
- Particle Physics, Astroparticles and Nuclear Physics (FPAN)
- Atomic and Molecular Physics (MOL)
- Optics (OPT)
- Complex Systems and Statistical Physics (QFISES)
- Mathematics (MATH)
- Physical Technologies (TEC)
- Nanoscience and Nanotechnology (NANO)
- Integrated Micro and Nano Systems (MICRO)
- Computing Sciences and Technologies (ICT)

The table below lists the centres and their thematic areas. The map shows the location of each centre and of the various associated units (circles):



CAB	Centro de Astrobiología (Joint, with INTA)	ASTRO	IMB	Instituto de Microelectrónica de Barcelona	NANO/ MICRO
IAA	Instituto de Astrofísica de Andalucía	ASTRO	IMM	Instituto de Microelectrónica de Madrid	NANO
ICE	Instituto de Ciencias del Espacio (Joint, with IECC)	ASTRO	IMS	Instituto de Microelectrónica de Sevilla	MICRO
ICMAT	Instituto de Ciencias Matemáticas (Joint, with CSIC-UAM-UC3-UCM)	MATH	IO	Instituto de Óptica	OPT/NANO
IEM	Instituto de Estructura de la Materia	MOL/ FPANQFISES/ ASTRO/OPT	IRII	Instituto de Robótica e Informática Industrial (Joint, with UPC)	TEC/ICT
IFCA	Instituto de Física de Cantabria (Joint, with UC)	ASTRO/ FPAN/ICT QFISES	LITEC	Laboratorio de Investigación en Tecnologías de la Combustión (Joint, with UZ, DGA)	TEC
IFIC	Instituto de Física Corpuscular (Joint, with UV)	FPAN	IA	Instituto de Acústica	TEC
IFISC	Instituto de Física Interdisciplinar y Sistemas Complejos (Joint, with UIB)	QFISES	IFA	Instituto de Física Aplicada	TEC/OPT/ ICT
IFTE	Instituto de Física Teórica (Joint, with UAM)	FPAN/ QFISES	IAI	Instituto de Automática Industrial	TEC/ICT
IIIA	Instituto de Inteligencia Artificial	ICT	OE	Observatorio del Ebro	ASTRO/ RRNN
IFF	Instituto de Física Fundamental	MOL/ QFISES	CNA	Centro Nacional de Aceleradores	FPAN/TEC

It is also worth mentioning that the IAA manages Calar Alto, an internationally operated and jointly owned (Spain/German) singular facility, and that the CNM-IMB manages the white room at the Centro Nacional de Microelectrónica (National Microelectronics Centre), which is a national singular facility.

SELECTION OF HIGHLIGHTS

Completion of construction and initial tuning of the ATLAS and CMS experiments at the LHC particle accelerator at CERN: first injection of particles and official opening.

In October 2008 the European Particle Physics Laboratory, CERN, officially opened its new particle accelerator, the new Large Hadron Collider (LHC) after an initial injection of protons into the accelerator in early September. A subsequent serious fault prevented data collection from the expected collisions at energies of over 10,000 GeV (more than 10,000 times the mass of a proton) from being started.

Participation of researchers from the Instituto de Física Corpuscular (Institute of Particle Physics, IFIC) in the ATLAS detector and from the Instituto de Física de Cantabria (Cantabria Physics Institute, IFCA) in the CMS detector, the two emblematic experiments that will be run on CERN's Large Hadron Collider began in 1997. When LHC comes into operation in 2009, both detectors will be ready: In the case of ATLAS the IFIC contributed, together with other Spanish groups from the IFAE and the UAM, to the "Tiled Calorimeter" and the "Silicon Central Tracker". In this latter case researchers from the CNM-IMB collaborated on the development of the sensors; for its part. The IFCA is collaborating with CIEMAT and another group at the UAM on the "Alignment System", whose requirements have led to the development of new semitransparent amorphous silicon sensors, the technology of which is now being utilised.

The participation in the main channels of analysis has also been highly satisfactory, thanks to the prior experience on other hadron colliders, and in particular, the Fermilab Tevatron, which continued producing top quality results in 2008. The search for the Higgs boson at the LHC, the mass of which is at least 115 GeV based the previous results from the LEP accelerator at CERN (to which CSIC researchers also made a significant contribution), will be restricted by the latest results of the Tevatron, which suggest a mass of less than 155 GeV. Also, theoretical and phenomenological physicists at the IFCA, IFIC and the Instituto de Física Teórica (Institute of Theoretical Physics, IFT), are working on models such as the so-called supersymmetry, which also offer a possible explanation of the existence of dark matter in the universe.

In parallel, both the IFCA and IFIC have developed high capacity computing centres to enable the data produced by these experiments to be stored and analysed. In 2008 close to 1 Petabyte (over a 1000 Terabytes) of information was transferred over the network, corresponding to test data and simulations of the preparations of the different analyses: more than half a million jobs of this kind have been processed.

Photo of the official opening of the LHC

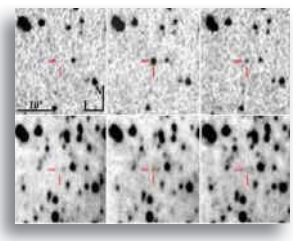
View of the final assembly of the CMS detector

New instruments and observation of new phenomena in the Universe:

Researchers at the Instituto de Astrofísica de Andalucía (Andalusia Astrophysics Institute, IAA), Instituo de Física de Cantabria (Cantabria Phisical Institute IFCA), Instituto de Ciencias del Espacio (Institute of Space Science, ICE), Instituto de Estructura de la Materia (Institute of the Structure of Matter, IEM), and the Centro de Astrobiología (Astrobiology Centre, CAB) contributed a number of significant findings in relation to the observation of space in 2008:

- Scientists at the IAA observed a unique object in the Milky Way, very possibly a neutron star, which over the course of three days, underwent forty eruptions visible in the optical range and then disappeared. This could constitute a missing link in this family of objects.
- The data obtained about three stars similar to the Sun by the CoRoT satellite will make it possible to determine their age, evolution and internal dynamics. This is confirmation that it is possible to obtain measurements of this kind, which is a fundamental step in future space missions.
- An international team led by researchers at the IEM has completed a study of star formation in the central region of luminous infrared galaxies using the facilities of the Gemini-south eight metre telescope, belonging to the United States National Observatory. The importance of the study lies in the fact that the majority of the stars existing in the universe today formed in galaxies of this type during the age of galaxy formation around six to ten billion years ago.
- The death of a remote star has been observed with the naked eye, thanks to its orientation: the intense glow of GRB080319B seems to have been due to the fact that jets of material emanating from the star pointed directly towards our planet. Several scientists from the Instituto de Astrofísica de Andalucía (Andalusia Institute of Astrophysics, IAA-CSIC) were involved in the discovery, which was published in the journal Nature.
- The Rosetta space probe approached the 2867 Steins asteroid, 360 million kilometres from the Earth, a historic milestone in European space exploration. This was Rosetta's first scientific target. The probe's final destination is an orbit around a comet in 2014, where it will release a module that will land on the comet's surface. This will allow a closer study of primitive bodies in the solar system and so tell us more about its history.
- Scientists at the CSIC observed how the supermassive black hole at the centre of our galaxy grinds up the matter around it: intense flashes have been detected coming from SgrA*, the supermassive black hole at the centre of the milky way, situated at a distance of 26,000 light years from Earth. The flashes reveal the existence of clouds of gas that are torn apart as they spin near to the black hole.
- In late 2008 the assembly, integration and verification of the OSIRIS instrument on the Canary Islands large telescope, to which researchers from CSIC centres contributed, was completed. This is the first instrument due to come into operation on the 10m GTC telescope at the Roque de los Muchachos Observatory. OSIRIS has been coupled to the telescope since December 2008 and has begun its test phase, which is still underway.
- Work has continued at the CAB on developing instruments for planetary exploration: REMS (environmental analysis instrument that NASA will include on MSL, the next mission to Mars, planned for 2011); SOLID, version number 3, which incorporates a biosensor with over 200 antibodies per microarray; RAMAN-LIBS (ExoMars mission, European Space Agency); MIRI telescope simulator for JWST; operation of the OMC on the INTEGRAL mission and calibration software for ALMA, among others.

Still image from video representing the explosion of GRB080319B.



Flashes in the new source discovered in the Galaxy.

REMS system.

OSIRIS instrument team.

Robots able to interact with people

Researchers at the Instituto de Robótica e Informática Industrial (Institute of Robotics and Industrial Computing, IRI) are working on the design and development of a network of cooperative robots able to interact in an urban environment with people on tasks such as assistance, guidance, surveillance or transporting goods. This initiative is part of the European URUS project, coordinated by the IRI, and is receiving support from the National R&D and Innovation Plan. As well as robots, the development architecture integrates intelligent sensors, such as video cameras, and devices such as mobile phones and PDAs. The main challenge is to achieve coordinated navigation by the robots, and efficient interaction with people. An experimental scenario called the Barcelona Robot Lab was inaugurated in November 2008 at the UPC campus in Barcelona.

PACO-PLUS project robot.

Prototype in the ESBIRRO project.

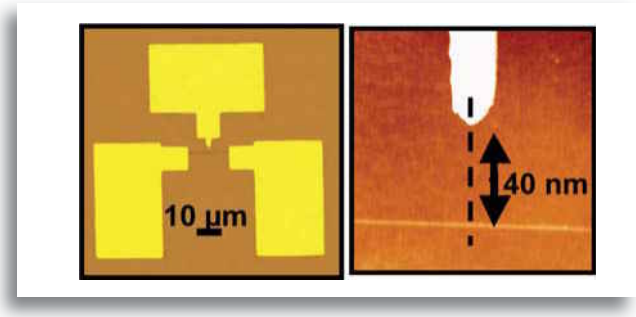
Another European project in which IRI researchers are taking part, called PACO-PLUS, has as its objective the design of a robot able to develop categories of perception, behaviour and cognition in a measurable way and communicate and share them with people and other artificial agents.

As part of the European ESBiRRo (Enhanced Sensory Biped Rehabilitation Robot) project, the Instituto de Automática Industrial (Institute of Industrial Automation, IAI) is developing a control structure, together with biomimetic recovery strategies, to enable bipedal robots to walk in a stable way. The project aims to apply these paradigms to design and construct an autonomous walking biped and to improve a robotic exoskeleton for gait.

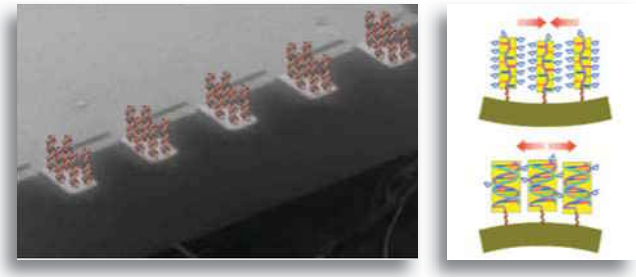
Nanometric scale structures

Researchers at the Instituto de Microelectrónica de Madrid (Madrid Institute of Microelectronics, IMM) have developed transistors based on silicon nanothreads with a channel width of 4 nanometres. This is the smallest channel width achieved using top-down nanolithography using atomic force microscopy (AFM). The result, with high potential for the development of biological and chemical sensors, due to its compatibility with integrated circuit technology, was highlighted in the journal Nature Materials. Also at the IMM, a new method based on water confinement on a nanometric scale has been developed for ultrasensitive DNA detection: the limits achievable improve those used to date by two orders of magnitude, and also enable detection of individual error sequences. The results have been published in Nature Nanotechnology.

Researchers at the IEM analysed metal nanostructures that possess unusual optical properties making them excellent candidates as nanoantenna for visible light. Through a novel design based on nanoparticle trimers, it has been shown that the fluorescence of a molecule situated at nanometric distances may be notably intensified. This finding will make it possible to increase the signal from weakly fluorescent molecules of biological interest, even from other similar processes such as the emission of quantum dots, which are of interest in nanophotonics.



Schematic diagram of transistors based on silicon nanothreads.



Graphic of the ultrasensitive DNA detection method.

Optics and photonics

Researchers at the Instituto de Óptica (Institute of Optics, IO) have demonstrated, theoretically and experimentally, the possibility of creating a virtually ideal medium for long distance transmission, with simultaneous transparency in space and the spectral domain (20 km x 20 nm), by establishing a **an ultralong cavity laser in optical fibre**. This transparent medium permits the transmission of high intensity signals, which makes it ideal for the study and exploitation of multifrequency non-linear effects.

Scientists at the Instituto de Física Interdisciplinar y Sistemas Complejos (Institute of Complex Systems and Interdisciplinary Physics, IFISC) have studied the dynamics of semiconductor ring lasers, which are opto-electronic devices of considerable interest for future applications in optical circuits. Their unusual geometry enables two opposite modes of propagation to exist. Under the right conditions emissions are unidirectional and the direction can be switched in tenths of a nanosecond by applying small pulses. This opens up a new scenario for the production of logic gates and optical memories.

PRIZES AND AWARDS

José María Benlloch, a scientific researcher at the IFIC, was awarded the King Jaime I Prize, in the New Technologies Category, for the application of knowledge of particle physics to medicine, highlighting the development of a portable camera for use in the operating theatre, with a resolution ten times higher than that of commercially available cameras.

José Bernabeu, a professor at the Universitat de València, who also conducts research at the IFIC, was awarded the King Jaime I research prize in the Basic Research category. His research work has focused mainly on elementary particle physics. He managed the National High Energy Physics Plan, and was coordinator of the High Energy Committee of the European Physical Society. Since 2005 he has been a member of the European Committee of Experts on Astroparticles and the Scientific Committee of the Underground Laboratory at Modane (France). He is currently coordinator of the project for the Gran Instalación de Investigación en Física Médica (Medical Physics Research Large Facility, IFIMED).

Susana Marcos (IO), was elected a Fellow of the Optical Society of America, for her "contributions to visual optics, in particular in the areas of optics of photoreceptors and ocular defects and advances in basic knowledge of optical properties of the eye, with important ophthalmic applications."

Pedro Meseguer (IIIA) was elected a Fellow of the ECCAI (European Association of Artificial Intelligence).

Xavier Barcons (IFCA), was appointed as European representative on "ALMA Board" by the Council of the European Organisation for Astronomical Research in the Southern Hemisphere. He was appointed by the European Space Agency (ESA) as a member of the group that evaluated, together with NASA (USA) and JAXA (Japón), the feasibility of studying a single space mission as a large X-ray observatory for the coming years. Also appointed, European Chair of the "Science Definition Team" at IXO.

Manuel Lozano (IMB), awarded the Silver Medal at the International Inventions Show in Geneva for the invention of a "Digital system for performing stereotactic biopsies".

Vicente Muñoz Velásquez (ICMAT), was appointed Editor-in-Chief of the EMS Newsletter, published by the European Mathematical Society.

AREA 6

Materials Sciences and Technology

Coordinator: Ceferino López

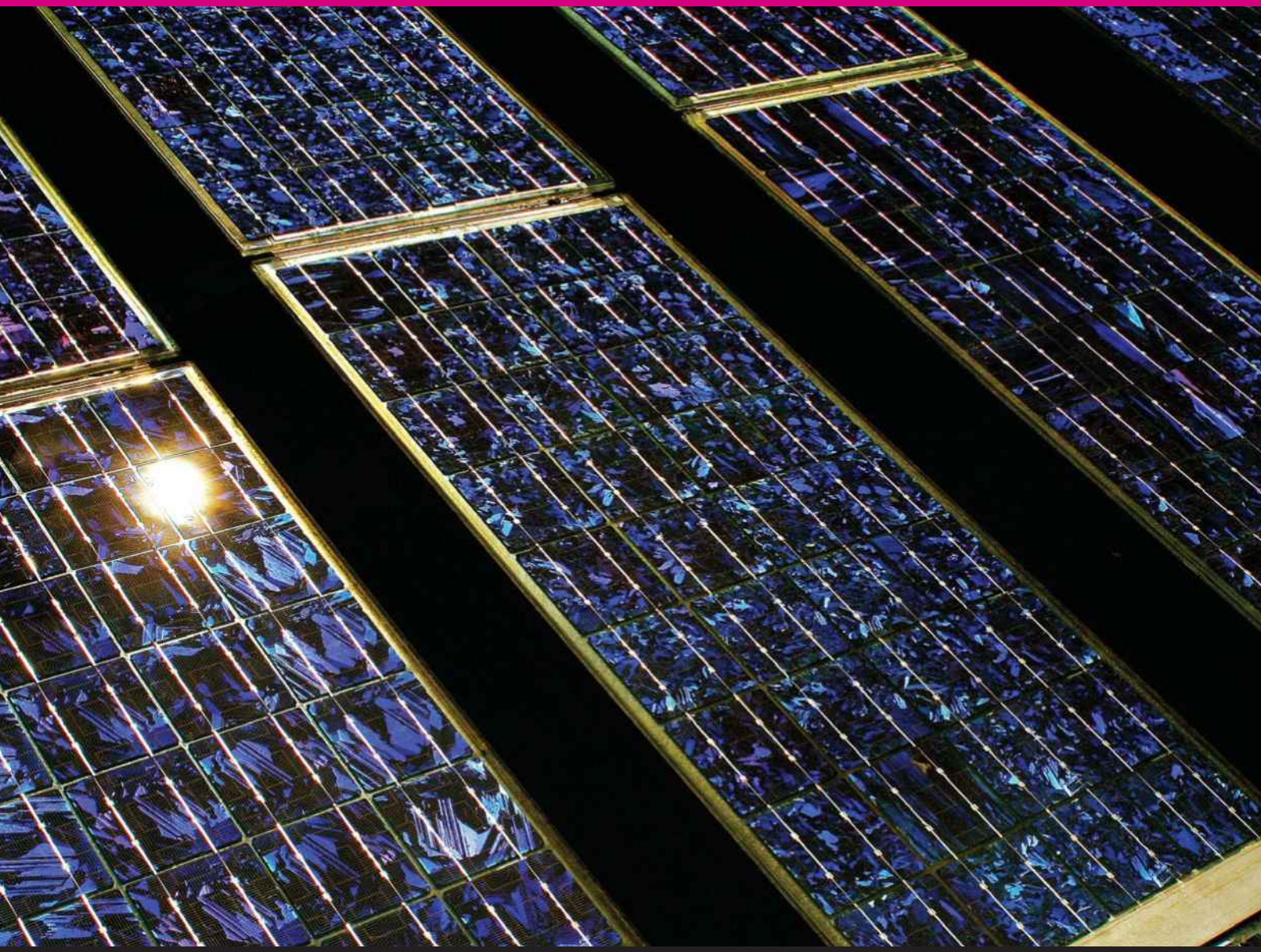


Image: "Photovoltaic ingots", by Antonio Abellán Fernandez. Fotciencia 07

INTRODUCTION

The Materials Sciences and Technologies Area comprises eleven institutes. In 2008 a new Nanomaterials and Nanotechnology Research Centres (Centro de Investigación Nanomateriales y Nanotecnología, CINN), a joint centre wiht the University of Oviedo and the Asturias Regional Government, was created in Asturias. The Area also includes the Instituto de Ciencia de Materiales de Madrid (Madrid Institute of Materials Science, ICMM), the Instituto de Ciencia de Materiales de Barcelona (Barcelona Institute of Materials Science, ICMAB), the Instituto de Ciencia de Materiales de Sevilla (Seville Institute of Materials Science, ICMS), the Instituto de Ciencia de Materiales de Aragón (Aragón Institute of Materials Science, ICMA), the Centro de Física de Materiales (Materials Physics Centre, CFM) and the Centro de Investigación de Nanociencia y Nanotecnología de Barcelona (Barcelona Centre for Nanoscience and Nanotechnology Research, CIN2). The latter four are joint units run in conjunction with the Universities of Seville, Saragossa and the Basque Country, and the Institut Català de Nanotecnologia, respectively. The Area also has four thematic institutes. These are the Centro Nacional de Investigaciones Metalúrgicas (National Centre for Metallurgic Research, CENIM), the Instituto de Cerámica y Vidrio (Ceramics and Glass Institute, ICV), the Instituto de Ciencias de la Construcción Eduardo Torroja Eduardo (Torroja Construction Sciences Institute, ICETT) and the Instituto de Ciencia y Tecnología de Polímeros (Institute for Polymer Science and Technology, ICTP).

The Materials Science and Technology Area performs both basic and applied research. The Area's scientific output this year was considerable, with more than 1,500 papers published in journals included in the ISI-Thompson Insitute's Web of Knowledge and over 120 in other journals. The 1,560 papers published represent an increase of more than 5% on the previous year. The journals in which the Area published its work included some of the biggest circulation titles in all the areas.

As regards applied research, 336 projects were run (contracts) with businesses, bringing in income of more than 10 million euros. This gives an idea of how active the area is in terms of collaborations with business. This has also been reflected in its patents, the most important of which are mentioned below.

These activities are just an example of the diversity of the area's projects, and although some of the most interesting milestones are mentioned below, each centre's own annual reports give a more detailed description of its activities.

During this period the centres made a very significant effort to prepare the Strategic Plan for the period 2010-2013.

LINES OF RESEARCH

The Area's scientific/technical activity may be subdivided into various research lines, classified in two main groups.

1) VERTICAL LINES

This lines are oriented towards materials with particular properties or for specific functions.

Functional and multifunctional materials. (Photonic, magnetic, hybrid, thin films and coatings)

Functional materials are found in a wide variety of applications and it is anticipated that there will be ever increasing demand for these new materials from industry which needs materials with optimised functions or which have multiple functionalities.

Some of the materials likely to have the greatest impact on modern society are:

a) Health-related materials: Biomaterials, materials that release medication, are used in treatments or biosensors. Diagnosis.

Along these lines are various types of material with a wide variety of different functions, although all of them aim at bringing improvements in health. These are very diverse materials and their functionalities and the manner in which they are obtained is also highly varied.

b) Energy-related materials: Renewable Energy Sources (RES) Efficient energy conversion, the Environment. Purification.

Energy and the environment are acquiring priority interest in both strategic and scientific terms and for this reason the CSIC, and the Materials Science and Technology Area in particular, is focusing a lot of attention on the topic. In the energy generation field, particular emphasis is being placed on solar photovoltaic energy, although other methods should not be overlooked. A key area for energy transformation is that of fuel cells (transforming system) and hydrogen storage systems.

Structural materials for sectors of high industrial interest

This section includes the research effort being made to develop widely used structural materials. These are under constant development, as the lack of in-depth basic research would result in areas in which the country is a world leader (carbon fibre composites for the aeronautical industry, new high performance steels, ceramic floorings and facings, etc.) lose their privileged position.

Materials and engineering for construction

Work is underway on the development of new materials for the construction industry (cements, concretes, glasses, bricks, floorings, coatings, etc.) and in the search for new more efficient, safer and environmentally friendly construction solutions.

2) CROSS-CUTTING LINES

This area encompasses the research effort in the development of versatile techniques allowing a variety of problems to be tackled or which are of intrinsic interest due to their use as a tool in other lines.

Design, modelling and simulation of materials

This line is devoted to understanding and predicting new fundamental physico-chemical phenomena in materials science, oriented towards the design of new materials, properties, functionalities and manufacturing methods. This is a common effort in the majority of Institutes in the Materials Science and Technology Area.

New synthesis and processing methods

This line encompasses research into new methods of materials synthesis, particularly with a view to improving the properties of materials and optimising processes. To this end, methods are being used based on fine chemistry, solution

combustion, forming under extreme conditions (in the case of metals), etc. Research is also being continued on forming and consolidation methods permitting materials to be obtained in shapes ranging from thin layers to bulk materials with a highly controlled and defined microstructure.

Properties of materials on the nanometric scale

Materials with a significant structure on the nanometric scale present unique properties and behaviours which arouse scientific and technological interest. It is necessary to characterise these unique properties on the nanometric scale in order to explain them. This requires the fine tuning of new methods of characterisation or the development of new working methodologies.

3) OTHER ACTIVITIES

Large facilities for the study and characterisation of materials. (Synchrotron and neutron radiation)

Part of the extension of facilities in the SPline (BM 25A) line at the ESRF is the study of the technical feasibility of installing an XMCD (X-ray Magnetic Circular Dichroism) in the Spanish x-ray absorption line.

Studying, understanding, preserving and restoring historical and cultural heritage

This section includes basic research activities to develop an in-depth understanding of historical scientific/technological processing methods, studying the composition and microstructure of the materials used or phenomena of deterioration (and its prevention) such as corrosion and methods of restoration.

INFRASTRUCTURE

In 2008 the resources envisaged in the Strategic Plan for 2006-09 were assigned to the Area. In conjunction with the centre's own funds this has enabled the following equipment to be purchased:

1) Physical measurements platform based on magnetic field and temperature (ICMAB).

2) Surface Plasmon Resonance (ICMAB).

3) Proximity Microscopy System (ICMAB).

4) Paramagnetic Resonance Spectrometry (ICMA).

5) Close-field optical microscope coupled to a Raman spectrometer (ICMA).

6) Variable angle spectroscopic elipsometer (ICMS).

7) Dispersive x-ray energy analyser for FESEM electronic microscope (ICMS).

8) High precision 4 circle X-ray diffractometer (2+2). (ICMM).

9) Confocal Raman microspectroscopy system (ICTP).

10) Solid-state low field nuclear magnetic resonance (NMR) spectrometer (ICTP)

11) Modular shear rheometer (ICTP).

12) Differential swept TA Q-2000 calorimeter (ICTP).

13) X-ray diffractometer (IETcc).

14) X-ray fluorescence spectrometer (IETcc).

15) 1000 KN unversal test machine (IETcc).

16) High temperature microwave oven (ICV).

17) 2 x-ray dust diffractometers one with a rapid detector and the other with a low angle coupling (ICV).

18) ATD-TG system coupled to an FTIR spectrophotometer (ICV).

19) Atomic force microscope (CENIM).

20) Electrochemical swept microscope (CENIM).

21) BÄHR DIL 805 A/D Quenching and Deformation Dilatometer (CENIM).

Together with a large variety of small pieces of equipment and maintaining, where not raising, the high technical level of the infrastructure at the area's centres.

SUMMARY OF ACTIVITY IN 2008

The area has a high level of scientific and technological output. The area is active in basic research projects (in the framework of regional, national and European programmes) with applied research, in direct collaboration with companies or in close contact with them. Some of the figures relating to this activity are given below.

Scientific output.

The majority of the Area's institutes have a large volume scientific output. In 2008, the number of SCI publications with a high impact rating and number of citations came to 1,560. This represents an increase of 5% on 2007, and was in addition to 13 books and 72 book chapters, and 122 publications in journals of a more popular nature.

National research projects and projects with the Autonomous Regions.

Almost all the Area's researchers take part in the MEC's National Materials Programme, although they also participate in other national programmes. The Area's researchers are actively involved in 93 projects, with funding of €15,150m, to which is added a further €14,539m from other national funds. The area's institutes are also closely integrated with the Autonomous Regions in which they are located. In 2008 a total of 28 research projects were run, with funding of €1.5m.

Some of the Area's centres also take part in other large national projects, such as CENIT, CONSOLIDER or singular strategic projects:

CONSOLIDER INGENIO:

- Coordination of the Consolider project "FUNCOAT". Surface functionalisation of materials. The participating centres belonging to the area are the ICMM and ICMA, ICMS.
- Participation of three ICMM groups in the NanoLight.es project.

Singular Strategic Projects: Participation (ICMA) in the "SOFCMETAL" project which deals with the technological optimisation of metal-based SOFC fuel cells for household applications.

European research projects

The Area's researchers are in involved in various ways in numerous projects funded by the EU's Framework Programmes.

Some examples of those begun during the year are:

- Nanotechnology for Market (NANO4M). CINN.
- Bottom-up Resolution of Functional Enantiomers from Self-Organised Monolayers (RESOLVE). ICMAB
- Efficient Environmental - Friendly Electro-Ceramic Coating Technology and Synthesis (EFECTS). ICMAB.
- Actinide recycling by Separation and Transmutation (ACSEP). ICMAB.
- ENgineered SELF-organised Multicomponent structures with novel controllaBLe Electromagnetic functionalities (ENSEMBLE). ICMA.
- Functional Liquid Crystal Dendrimers: Synthesis of New Materials: Resource for New Applications (DENDREAMERS). ICMA.
- Magnetic nanoparticles combined with submicron bubbles for oncologing imaging (NANOMAGDYE). ICMM.

Links with industry.

There is a concern with the issue of transferring technology to industry in all the Area's institutes: ceramics, metals, plastics, construction industries and others. At present almost all the Area's institutes are carrying out activities with national or multinational companies. In 2008 the area obtained 21 patents and has signed 336 contracts with national and multinational companies. This brings in €10m for the Area's institutes, with additional funding of €3,5m from a further 16 public contracts. The area is in first place in the CSIC in terms of income from the private sector.

Training of doctors and specialists.

Training at post-doctoral and specialist level is a common activity of all the materials area's institutes. With 79 new doctors, there has been an increase in this figure of 9% compared with 2007. Many of the specialists and doctors trained go on directly to work in businesses, which is one of the best ways in which the CSIC can repay society for the economic and human effort that makes our existence possible.

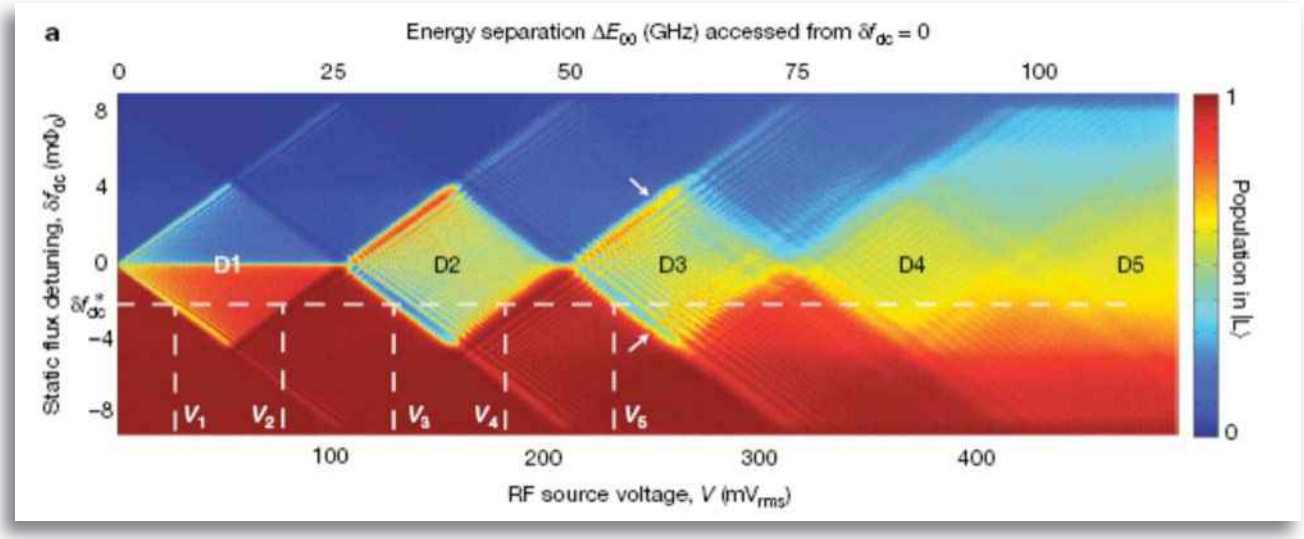
Additionally, 392 courses and seminars were run. It is also worth highlighting that the area's institutes train many students from other countries in Europe, Latin America and elsewhere.

SELECTION OF SCIENTIFIC HIGHLIGHTS

Over the course of 2008 numerous important milestones have been achieved in the area. We will mention only a selection of them here, based on their importance and how representative they are of the work at the centres:

Amplitude spectroscopy of a solid-state artificial atom. D.M. Berns, M.S. Rudner, S.O. Valenzuela, K.K. Berggren, W.D. Oliver, L.S. Levitov, and T.P. Orlando. Nature 455, 51 (2008).

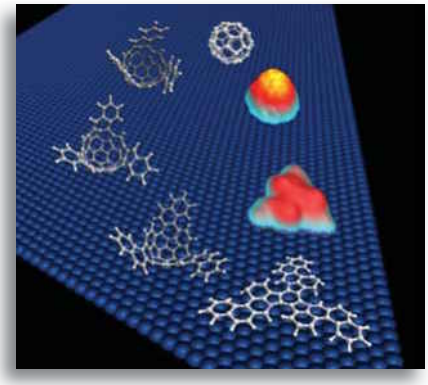
The structure of energy levels in a quantum system, which plays an essential role in its behaviour, is manifested as discrete lines in its absorption and emission spectra. Frequencey spectroscopy is commonly used for this purpose, in which a harmonic field is synthesised until it resonates with the system under investigation. This powerful technique is not practical when the frequencies involved are hundreds of gigaherz. A complementary technique is presented here –amplitude spectroscopy– in which a harmonic field sweeps the crossovers avoided between the levels of an artificial atom and fixed frequency, by varying the field amplitude.



Amplitude spectroscopy rhombuses.

Fullerenes from aromatic precursors by surface-catalysed cyclodehydrogenation, Otero, G; Biddau, G; Sánchez-Sánchez, C; Caillard, R; López, MF; Rogero, C; Palomares, FJ; Cabello, N; Basanta, MA; Ortega, J; Méndez, J; Echavarren, AM; Pérez, R; Gómez-Lor, B; Martín-Gago, JA . Nature 454, 865 (2008).

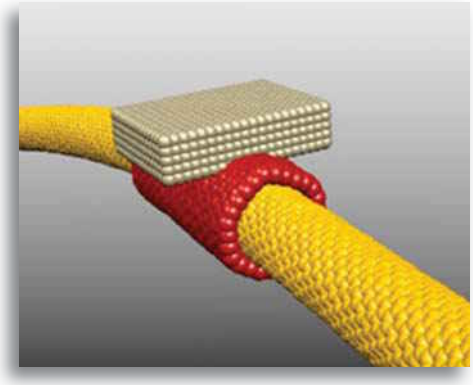
This paper suggests a highly efficient way of synthesising fullerenes using a surface catalysis process. Traditional synthesis methods are hard to control. However, this new mechanism allows control over both the size of the fullerenes and introduction of heteroatoms at specific positions in their structure.



"Closing" molecules on surfaces.

Subnanometer motion of cargoes driven by thermal gradients along carbon nanotubes; **A. Barreiro, R. Rurali, E.R. Hernández, J. Moser, T. Pichler, L. Forro and A. Bachtold. Science, 320 (5877), (2008), pp. 775-778.**

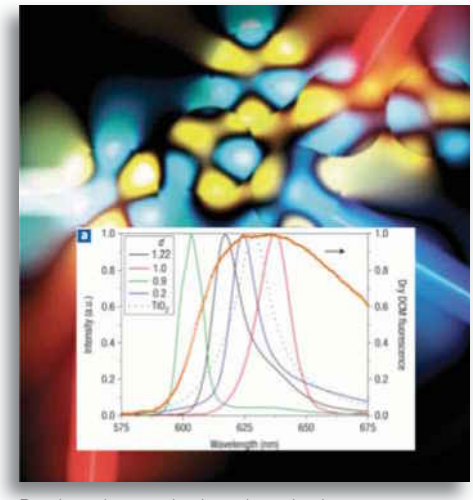
By injecting a large current (electrical rupture technique) the possibility of the selective evaporation of an outer layer of carbon nanotubes has been demonstrated. Although it was known that the technique would enable removal of the outer layers of multiple wall tube, it is shown here that these can be protected by evaporating a gold plate. This innovation makes it possible to slide the "load" along the nanotube using an AFM tip, which is not possible in systems not processed with the electrical rupture technique.



Model of a nanotube loaded with a slideable gold plate.

Resonance-driven random lasing, **Gottardo, S; Sapienza, R; García PD; Blanco, A; Wiersma, DS; López, C. Nat. Photonics 2, 429-432 (2008).**

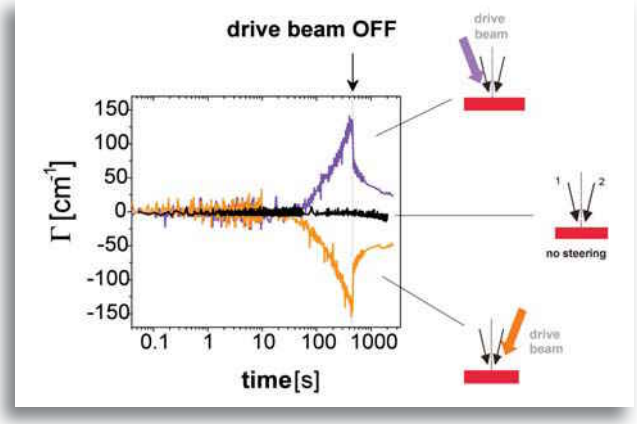
Unlike what happens with photonic crystals, in which order is necessary, new photonic structures have recently been made which take advantage of disorder to access new functionalities. These new structures have been called "photonic glasses" and consist of randomly self-assembling monodispersed colloids. This novel property has been termed "resonant random lasing" and opens up new avenues to the economically feasible large scale production of coherent light sources.



Randome laser action in a photonic glass.

Optical gain by a simple photoisomerization process, **Gallego-Gómez, F; Del Monte, F; Meerholz, K. Nat. Mater. 7, 490-497 (2008).**

Up until now it has been considered that among holographic materials only photorefractive materials (which combine electrical/optical and photo-conducting properties) showed a non-local response to a light pattern, leading to a shift in the phase of the photo-induced hologram which is manifest in the amplification of one of the beams involved (optical gain). Nevertheless, the non-local nature of holograms recorded by simple chromophore photoisomerisation in a (non-photoconductor and centrosymmetric) non-photoreactive material is shown here. The surprising non-local response of these holograms has led to certain traditionally held ideas to be reviewed.



Demonstration of novel method of controlling optical gain referred to as gain steering.

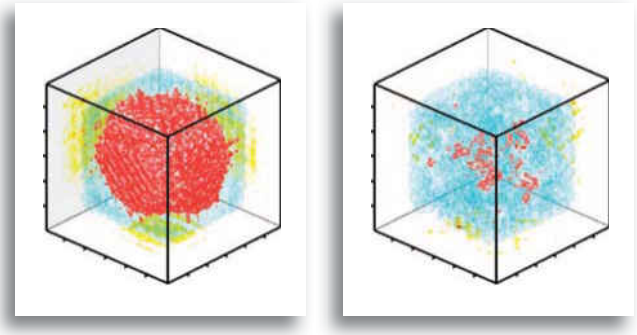
Anderson localization of light – A little disorder is just right, López, C. Nat. Physics 4, 755-756 (2008).

The transition from Bloch mode lasing to localisation lasing in photonic crystals in which a medium with gain has been embedded may be caused by the addition of disorder. In an almost perfect crystal lasing tends to occur in Bloch modes close to the edge of the prohibited medium. These states are extended throughout the whole crystal. When the crystal presents a certain degree of disorder, the increase in light dispersion in the defects closes the interval and extinguishes these modes. In this situation lasing by localised Anderson states occurs. These are further into the interval and do not extend throughout the crystal but, as their name suggests, are located around defects. The strangest thing, however, is that the amount of disorder necessary for this regime to appear has to be just right – not too much, not too little.

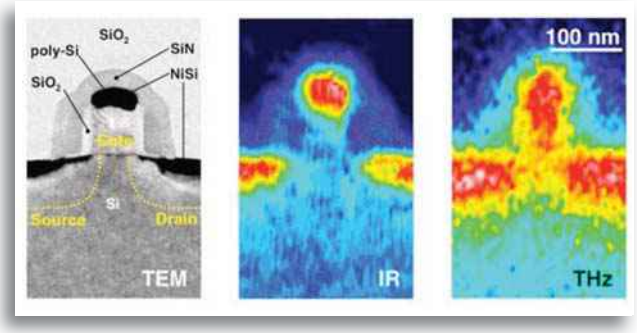
Terahertz near-field nanoscopy of mobile carriers in single semiconductor nanodevices, Huber AJ, Keilmann F, Wittborn J, Aizpurua J, and Hillenbrand R. Nano Letters 8, 3766 (2008).

The nanophotonics team at the San Sebastián Materials Physics Centre predicted the extreme concentration of long-wave radiation on the THz wave range at the end of the tip of a scanning microscope. Guided by this prediction, the nano-GUNE-MPIB team, led by Rainer Hillenbrand, carried out an experiment with a 2.5 THz beam of light incident on the tip of a close field microscope developed in their laboratory. The team managed to obtain the first images in the THz range with a resolution of 40 nm. In collaboration with Infineon technologies AG, this new microscopic technique was applied to the characterisation of the various zones of a 65 nm transistor which had been inspected previously with a transmission electronic microscope (TEM).

Photoconducting Bragg Mirrors based on TiO2 Nanoparticle Multilayers. M.E.Calvo, S.Colodrero, C.Rojas, J.A.Anta, M.Ocaña, H.Míguez. Advanced Functional Materials, 18 (2008) 2707-2715. Front cover.



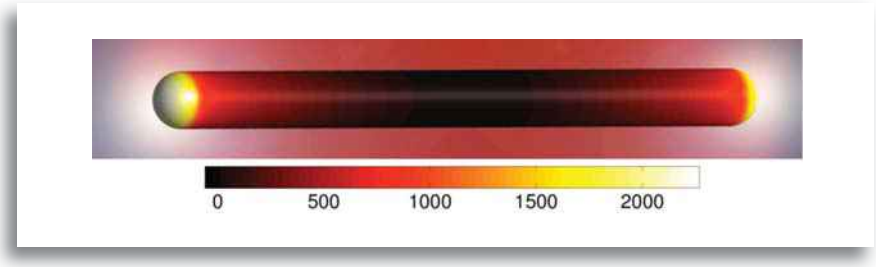
Bloch and localised laser modes.



Zones of a transistor with differing carrier concentrations.

Resonant plasmonic and vibrational coupling in a tailored nanoantenna for infrared detection, Neubrech F, Pucci A, Cornelius TW, Karim S, Garcia-Etxarri A, and Aizpurua J, Physical Review Letters 101, 157403 (2008).

Researchers with experience in molecular spectroscopy have managed to increase the signal of molecular vibrations around three orders of magnitude using metal particles which increase the local magnetic field. The paper, published in the journal Physical Review Letters (Phys. Rev. Lett. 101, 157403, 2008), and abstracted in Nature Nanotechnology (24 October 2008) describes how increases of over 5 orders of magnitude were obtained thanks to the action of a gold nanoantenna. The nanoantenna is covered with a layer of octadecanothiol, a long chain of molecules, and then the whole sample is exposed to infrarred light, which excites the gold plasmonic excitations resonantly.



Increased intensity of the local infrarred electromagnetic field in a gold nanoantenna

Formation of dispersive hybrid bands at an organic-metal interface, Gonzalez-Lakunza N, Fernández-Torrente I, Franke KJ, Lorente N, Arnau A, and Pascual JI, Physical Review Letters 100, 156805 (2008).

This paper demonstrates the existence of hybrid bands at the interface between the monolayer formed by the TTF-TCNQ donor-acceptor complex and the surface of Au(111). This study combines tunnel spectroscopy measurements (STS) and calculations based on density function theory (DFT), by means of which it is shown that the bands in the interface originate in a complex hybridisation between metal states and molecular states.

Guiding and focusing of electromagnetic fields with wedge plasmon polaritons, E. Moreno, S.G. Rodrigo, S.I. Bozhevolnyi, L. Martín-Moreno, F.J. García-Vidal. Phys. Rev. Lett., 100, 023901 (2008).

Optical circuits are structures which may have important applications in microtechnology and nanotechnology. However, the biggest challenge is how to guide and confine light. This study shows that it is possible to design structures smaller than the wavelength which are able to confine the electromagnetic field.

PRIZES AND AWARDS

NOMAD - Nanoscale Magnetization Dynamics. European Research Council; Ref. ERC-StG-203329 ;2008-2013, Pietro GAMBARDELLA.

SM-DNA-repair - New single-molecule techniques and their application in the study of DNA break repair European Research Council ; Ref. ERC-StG-206117 ; 2008-2013; Fernando MORENO.

"VI premio CIADE al emprendedor Universitario" (6th CIADE university entrepreneur prize) The NANOATE project was awarded the Madrid Science Park's Best Project Award. The project is led by **Miriam Jaafar Ruiz-Castellanos and Ruy Sanz González (ICMM)** José Vicente Pérez (URJC) and Jens Jensen (Univ. Uppsala). The prize consisted of 6 months free accommodation at the Madrid Science Park (Parque Científico de Madrid) business incubator. The prize was handed over on 29 October 2008.

2008 Prize (medal) from the Academia de Ciencias de Cuba (Cuban Academy of Sciences) awarded to Eduardo Ruiz-Hitzky and Pilar Aranda Gallego (along with Eduardo Lázaro Pérez Cappe, Yodalgis Mosqueda Laffita, Mario Pomares Alfonso, Ricardo Martínez Sánchez and José Arana Varela), for the paper "Obtención, caracterización y aplicación de un nuevo material híbrido LiNi0,8Co0,2O2/PANI, para almacenamiento de energía" (Obtaining, characterising and applying LiNi0,8Co0,2O2/PANI, a new hybrid material for energy storage). The prize was handed over on 28 March 2009 at a ceremony held in the La Habana capitol, in the presence of the Minister for Science, Technology and the Environment and the president of the Academia de Ciencias de Cuba.

Prize (Diploma) from Havana University for the best article in natural and exact sciences published 2008, awarded to P. Aranda, E. Ruiz- Hitzky (E. Pérez-Cappe, Y. Mosqueda , R. Martinez, C.R. Millán, O. Sánchez, J.A. Varela, A. Hortencia , E. Souza, P. Aranda, E. Ruiz- Hitzky), "Preparation and properties as positive electrodes of PANI-LiNi0.8Co0.2O2 nanocomposites" J. Mater. Chem. 18, 3965-3971 (2008). Prize awarded on 19 February 2009.

First prize in the 2nd edition of the BSH-UZ prizes for innovation in business (2008), in the research groups mode, for the paper: Recubrimientos para materiales compuestos aptos para encimeras de inducción (Composite material coatings suitable for induction hobs). Group: Fran J. Ester, Fernando Planas, Daniel Sola, José I. Peña.

Homage to Prof. Carles Miravitlles; A homage to Prof. Carles Miravitlles Torras, in recognition of his work during his 21 years as Director of the Instituto de Ciencia de Materiales de Barcelona (ICMAB-CSIC) was held at the ICMAB on 14 November.

60th Anniversary of the Centro Nacional de Investigaciones Metalúrgicas A series of events were held between 23 and 27 November to commemorate the 60th anniversary of the National metallurgy research centre, CENIM.

60th anniversary exhibition. Reports and presentation at the IETcc.

L'Oréal-Unesco research fund "Por las mujeres en la Ciencia" (For women in Science) granted to Mª José Calderón Prieto (ICMM), comprising €20,000 to promote research work in the Materials Science field. The grant was awarded on 13 November by Cristina Garmendia, Minister for Science and Innovation.

L'Oréal-Unesco research fund "Por las mujeres en la Ciencia" (For women in Science) granted to Ana Mª Fernández (IETCC), comprising 20,000 to promote research work in the Materials Science field. The grant was awarded on 13 November by Cristina Garmendia, Minister for Science and Innovation.

PATENTS

- **Filing of the patent "Solar to electric energy conversion device based on a light absorbing electrode coupled to a one-dimensional photonic crystal"**. Authors: S.Colodrero and H.Míguez. US provisional patent 61/046212. Country of priority: USA. Priority date: Abril 2008. Holder: Nanologica AB-CSIC. Company exploiting the patent: Nanologica AB.

- The patent entitled **"Dispositivo de hipertermia y su utilización con nanopartículas"** (Hyperhtermic device and its use in nanoparticles), developed by M.A. Muñoz Marquez, E.Guerrero García, A. Fernández Camacho, application no. 200702084, country of priority: Spain, priority date: 26/Jul/2007, holder: CSIC. International extension PCT/ES2007/02084. ICMS, was licensed to Midatech Andalucía S.L.

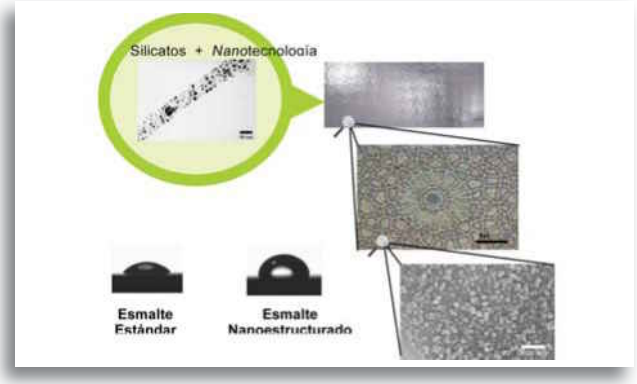
- **"Sistema metalorgánico útil para la encapsulación y liberación de compuestos de interés, procedimiento de obtención y sus aplicaciones"** (Useful metalorganic system for encapsulation and release of compounds of interest, procedure for obtaining it and its applications). Inventors: D. Maspoch, I. Imaz, D. Ruiz-Molina. Patent number: P200801230. Operational.

- **"Desarrollo de membranas híbridas con alta conductividad iónica para PEMFC"** (Development of hybrid membranes with high ionic conductivity for PEMFC). Patent: "Membrana híbrida orgánico-inorgánico de intercambio iónico, su preparación y utilización en dispositivos electroquímicos." (Hybrid organic/inorganic ion exchange membrane, its preparation and use in electrochemical devices). P200701781. PCT extension, with application no.: PCT/ES2008/070127 (ICV).

- The **Instituto de Cerámica y Vidrio** (Ceramics and Glass Institute) took part in the development and implementation of new technologies to produce security pigments for paper money. The processes are currently in use by the Spanish national mint, **Fabrica Nacional de la Moneda y Timbre-Real Casa de la Moneda**. In the PCT patent application ES2008070602 12/11/2008 (an extension of the existing Spanish patent), members of the ICV-CSIC appear as co-inventors.

- **"Procedimiento para la dispersión de nanopartículas en seco y la obtención de estructuras jerárquicas y recubrimientos"** (Procedures for dry dispersal of nanoparticles and obtaining of hierarchical and coated structures). Record number: Patent no.ES200802177 on 08/07/2008. ICV.

- Silicon nitride materials have been obtained with a structure gradient (FGM, functionally graded materials) in a single step by sinterising with the aid of pressure and pulsed current (SPS, spark plasma sintering), thus acheiving materials that show a linear variation of 100% on the parameter representing microstructure. A patent has been submitted incorporating this development (P200802812) ICV.



- **"Procedimiento de obtención de esmalte cerámico con brillo metálico y su aplicación en pavimentos cerámicos"** (Procedure for obtaining ceramic enamel with metallic gloss and its application to ceramic floorings). Record number: PCT ES2008070107 on 29/05/08. ICV-ICMM. Licensed and in use by the companies TOLSA and KERAFRIT.

- **"Paneles cerámicos laminados tipo sándwich de gran formato, ligeros y autoportantes, su procedimiento de fabricación en continuo y aplicaciones"** (Large format, light, self-supporting ceramic sandwich type sheets, the process for their continuous manufacture and applications). Record no.: PCT/ ES 2008/ 000244, 14 April 2008. Holder: ROCLANO, S.L. The authors include a member of ICV.

- **"Máquina de absorción de bromuro de litio-agua de doble efecto"** (Dual effect lithium bromide/water absorption machine). Application no.: P200803461. Holder: CSIC. IETcc.

AREA 7

Food Sciences and Technology

Coordinators:
Carmen Peláez Martínez, Rosina López-Alonso Fandiño

Image; "Geometric daydream" by Álvaro Gonzalez Gómez. Fotciencia 07

INTRODUCTION

The Food Sciences and Technology Area has a staff of 728, of which 413 have civil servant status. Of these, approximately 240 are on the permanent scientific staff grade. The Area has six institutes, the Instituto del Frío (Institute of Refrigeration, IF) and the Instituto de Fermentaciones Industriales (Industrial Fermentations Institute, IFI), both of which are in Madrid, the Instituto de la Grasa (Fats Institute, IG) in Seville, the Instituto de Agroquímica y Tecnología de Alimentos (Agrochemicals and Food Technology Institute, IATA) in Valencia, the Instituto de Productos Lácteos (Dairy Products Institute, IPLA) in Villaviciosa, and the recently created Instituto de Ciencias de la Vid y el Vino (Viticulture and Viniculture Institute, ICVV) in Logroño. It also has two departments at institutes belonging to other Areas, namely the Food Technology Department at the Instituto de Investigaciones Marinas de Vigo (Vigo Marine Research Institute, IIM) and the Food Science and Technology Department at the Centro de Edafología y Biología Aplicada del Segura (Segura Pedology and Applied Biology Centre, CEBAS), in Murcia. It is envisaged that the Instituto de Investigación en Ciencias de la Alimentación (Food Science Research Institute, CIAL) and the Instituto de Tecnología de Alimentos y Nutrición (Food and Nutrition Technology Institute, ICTAN), created in 2007, will be fully operational in 2010. The researchers currently working at the IF and IFI will be relocated to these institutes. The Area also has 8 associated units, which are the outcome of its ongoing collaboration with university departments.

The Food Science and Technology Area conducts both basic and applied research and a share of its results are being transferred to businesses in the foods industry. One of the Area's lines of research is its work to elucidate the **implications of nutrition on human health**, in order to improve health and prevent the appearance of certain nutrition-related diseases. Numerous groups in the Area are working on the development of functional foods and ingredients, paying particular attention to the scientific basis of the health claims made for these foods. This topic is being addressed with a multidisciplinary focus through collaborations between the Area's groups and researchers from other CSIC Areas, Universities and Hospitals. It is worth highlighting the effort being made to study the relationship between nutrition, individuals' responses and health impacts. The Area also places considerable emphasis on the topics of **food quality and safety**. Work is underway to develop methods for the evaluation and control of foodstuffs in order to reduce risks and ensure their quality. Thus, for example, new analytical methods are being developed in this line for the control of food security, and new hypoallergenic ingredients are being developed. Also, markers to ensure food quality and authenticity have been identified. Consumer demand for fresh or minimally processed foods, the need to improve the efficiency of industrial processes and to minimise wastes from the food industry, are driving lines of research into **new food production and conservation technologies** and new processes to **utilise** by-products. Finally, **biotechnology** also occupies an important position in the Area's research, both as regards the modification and selection of microorganisms of nutritional interest and their application in the development of products and processes, and in the field of the biotechnology of edible plants.

The financial resources obtained by researchers at the Area come both from projects under the National Plan and from contracts with business. There has been a sharp rise in the latter, which reflects the Area's dual focus on basic research and research directed towards industrial applications. The ability of the Area's researchers to innovate and provide answers to the needs of industry is shown by the increase in the number of Spanish patent filings, which rose by 31% compared to the previous year. The Area is responsible for 10% of the patents registered by the CSIC. It is also responsible for 8% of the international patents registered by the CSIC. Scientific output in 2008 was reflected in 625 publications in journals included in the SCI, which represents an increase of 16% with respect to 2007. Moreover, the results of this research were presented at 448 international conferences and 233 national conferences. Teaching activity is also an important facet of the work of the Area's researchers, as demonstrated by their participation in 178 postgraduate courses and the supervision of 47 doctoral theses.

SUMMARY OF ACTIVITY IN 2008

This year saw the creation of the new **Instituto de Ciencias de la Vid y el Vino** (Institute of Viticulture and Viniculture, ICVV) through an agreement signed by the CSIC, the University of La Rioja and the Regional Government of La Rioja on 18 February 2008. This agreement established that a new temporary location be set aside for the CSIC's researchers at the University of La Rioja pending the construction of the future seat of the ICVV. The institute has been created with a view to generating new know-how and technologies relating to viticulture and oenology which will serve as the basis for technological development and innovation in the wine and grape industry. In November 2008 a collaboration agreement was signed between the Asturias Regional Government, the CSIC and the University of Oviedo for the development of the **Centro Nacional de Competencia Tecnológica de la Leche** (National Milk Competency Centre, CNCT-Leche). The centre, which is currently at the initial stages of development, aims to acquire critical mass in the specialisation and become a national and international point of reference for research into milk and dairy products.

As regards research involving international collaborations, the Area has four new European projects underway. Researchers at the IPLA took part in two projects in the food safety field, addressing aspects relating to controlling biogenic amines in traditional foods **(BIAMFOOD)** and controlling intestinal pathogens **(LACTOBODY)**. Researchers at the IIM took part in the **CAFE** project, the aim of which is to develop methods and tools contributing to integrated and optimal management of food industry processes. Another project involving IATA researchers has also been started, with the primary aim of developing new packaging materials which avoid, reduce and detect the deterioration of fresh foods **(NAFISPACK)**. The various different Institutes in the Area are taking part in the Consolider Programme of the INGENIO2010 action: **Carnisenusa** "Productos cárnicos para el siglo XXI: Seguros, nutritivos y saludables" (Meat products for the 21st century: safe, nutritional and healthy); **MALTA** "Materia a alta presión" (High pressure matter) both with the participation of researchers at the IF, and **Fún-C-Food** "Nuevos ingredientes de alimentos funcionales para mejorar la salud" (New functional food ingredients to enhance health) coordinated by CEBAS, with broad participation of research groups from the various institutes in the Area.

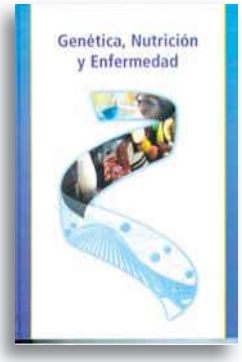
As regards **knowledge transfer**, the Area's researchers are taking part in two of the fourteen CENIT projects approved under the 2008 call for proposals. Specifically, they are participating in **PRONAOS** "Investigación científica dirigida al desarrollo de una nueva generación de alimentos para el control de peso y prevención de la obesidad" (Scientific research aimed at developing a new generation of foods for weight control and obesity prevention) coordinated by Puleva Biotech, S.A. and **DEMÉTER** "Estrategias y métodos vitícolas y enológicos frente al cambio climático. Aplicación de nuevas tecnologías que mejoren la eficiencia de los procesos resultantes" (Viticultural and oenological strategies and methods to respond to climate change. Application of new technologies improving the efficiency of the resulting processes) coordinated by the firm Miguel Torres, S.A. Some of the products developed previously by the Area's researchers have been commercialised in 2008, or are the object of studies in humans with a view to their commercialisation in the short-to-medium term. Thus, a **food-origin antihypertensive product**, transferred in previ-

In February 2008 the Instituto Mixto de Ciencias de la Vid y el Vino was created with an agreement between the CSIC, University of La Rioja and the Regional Government of La Rioja.

ous years by researchers at the IFI, has been tested by the licensee company in an intervention study with a view to the commercialisation of the functional product. The manufacture and commercialisation of **surimi** made from the giant squid (Dosidicus gigas) based on two methods developed at the IF has begun. A whitebait analogue produced as a result of research at the same Institute was also launched on the market in 2008. Commercialisation has also begun of various plant-based products, including a grape extract with a standardised resveratrol content called **Revidox**, developed by researchers at CEBAS. Another important activity of the Area's researchers is its active participation in defining the strategic agendas of the various European, national and regional platforms.

The Area's researchers also participated actively in **information and scientific outreach** activities, including various events, lectures and open days organised during the 8th Science Week. The Area took part in the "IX Feria de Madrid es Ciencia" (9th Madrid is Science Fair) where it set up a stand and conducted experiments relating to the composition and functionality of foods, and at the International Health Fair (FISALUD). The Area also organised 3 international conferences: "Arsenic in the Environment", "International Cereal Chemistry" and "Innovative applications of non-thermal technologies in food: technology, safety, health and consumer acceptability". As regards activities run within the framework agreement **GENUTREN** (Genetics– Nutrition - Disease), in which the Madrid Regional Government's department of public health, the CSIC and the Madrid Complutense University took part, activities included the presentation of a book entitled "Genética, Nutrición y Enfermedad" (Genetics, Nutrition, Disease) describing a group of researchers' experience in genetics, eating habits and health status. For its novelty, the **NEUSTON**: un Diálogo entre Ciencia y Cultura project (Dialogue between Science and Culture) also stands out. This project brought together artists and researchers from the Instituto de Investigaciones Marinas (IIM). The results of this interaction took various artistic forms, which were presented at Euroscience Open Forum 2008.

Manufacture of surimi from the giant squid (Dosidicus gigas) in Paita (Perú), where the largest quantities of this cephalopod are caught.



Book on Genetics, Nutrition and Disease written as part of GENUTREN.

NEUSTON project at the European Science Open Forum.

SELECTION OF HIGHLIGHTS

Modification of fatty acid profile of sheep's milk to make it healthier by including short-chain omega 3 fatty acids

Researchers at the IF together with a researcher from IRTA have managed to modify the fatty acid profile of the fat of sheep's make to make it healthier, reducing saturated acid content and increasing polyunsaturated fats, including omega-3 an conjugated linolenic acid (CLA), without increasing the content of potentially harmful trans acids. This was achieved by supplementing the sheep's diet with extruded flax seeds. This technique multiplied the milk's CLA content threefold and linolenic acid fivefold, increasing milk yields without decreasing the fat and protein content of the milk. A licence and exploitation contract has been signed with LODYN S.L.

The fatty acid profile of sheep's milk has been modified by supplementing the sheep's diet.

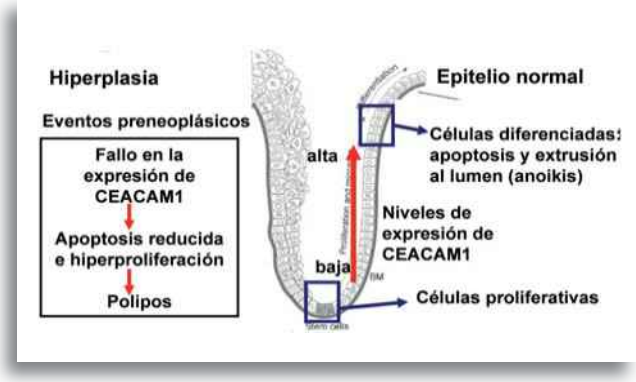
Wine yeast strains that yield wines with high glycerol content

Researchers from IATA in collaboration with the winery Bodegas Murviedro SA, have patented two yeast strains (BMV58 and BMV60), selected from natural wine fermentations in the Valencia Region. The wines obtained from these yeasts are characterised by their high glycerol concentrations, without their increasing the acetic acid content or modifying the wine's pH, as well as enhancing the production of certain secondary aromas. Although glycerol does not have a direct impact on the aromatic properties of the wine, it contributes to its flavour and final body by providing sweetness, thus being used as an indicator of wine quality. These yeasts also stand out for their high suitability for use in wine fermentations and their ability to grow at low temperatures (10ºC). Both strains have been tested in production at Murviedo's wineries. The BMV58 strain has been used to produce reds and BMV60 to produce whites and rosés, both with considerable success.

Researchers from IATA, members of Bodegas Murviedro S.A., and representatives of Agrovin, after signing the contract to licence yeast strains offering a high concentration of glycerol in wines.

Foods rich in polyphenols, such as aronia juice, induce the expression of tumour suppressor genes in colon cancer cells

Researchers at CEBAS have applied multiple gene expression using microarrays to study possible cellular mechanisms involved in the ability of certain red fruits, such as aronia, which are very rich in phenolic compounds (anthocyanins, flavinols, etc.), to inhibit the growth of tumour cells in the human colon. Based on laboratory models representing gastroduodenal digestion, and human cancer epithelial tissue, this study shows that a proportion of the phenolic compounds, along with some derivatives formed during digestion, remain intact in digested aronia juice, and that this mixture maintains its ability to inhibit the growth of colon cancer cells. The molecular study showed that this inhibiting effect is associated with a blocking of the mitotic cycle and the regulation of the expression of various genes involved in the cell cycle and signalling. A key factor is the induction of the CEACAM1 tumour suppressor. Expression of this suppressor is reduced in the initial stages of the development of colorectal cancer and it plays an important role in proliferation and apoptosis of the intestinal epithelium. Preventing or delaying the onset of colorectal cancer by consuming particular foods that can have protective effects is a fundamental strategy in combating the incidence of the disease.



Schematic of normal events (right) or pre-neoplastic events (left) occurring in the human colon epithelium.

Procedure for the obtaining of wines from the Albariño grape variety with a high aromatic content using an ecotypical yeast

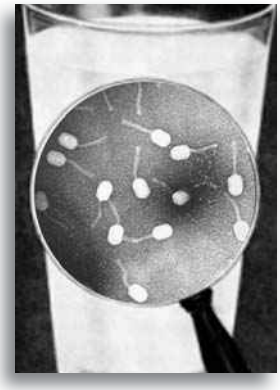
Researchers at the IFI, in collaboration with researchers from the Misión Biológica de Galicia, have studied the effect of an ecotypical yeast on the sensorial quality of Albariño wines produced by the Terras Gauda winery. Using molecular monitoring techniques it has been confirmed that a strain of Saccharomyces cerevisiae referred to as TG-CSIC, isolated at the winery, prevails over the indigenous microbiota and produces wines with an enhanced varietal aromatic character, thereby contributing positively to the development of fermentation kinetics. The firm Biópolis, S.L., a spin off from the CSIC, will be responsible for producing and supplying the yeast. Industrial exploitation will be carried out through a patent owned jointly by the CSIC and Terras Gauda.

Strain of Saccharomyces cerevisiae TG-CSIC photographed using Nomarski differential interference contrast optical microscopy.

Detection of bacteriophages which infect Lactobacillus delbrueckii using quantitative real time PCR

Contamination by bacteriophages is a serious problem in the manufacture of fermented dairy products, leading to significant economic losses. The availability of a mechanism for the rapid detection of phages would be represent a big step forward towards preventing the problem, and therefore, ensure production that complied with all the relevant quality indicators. Researchers at the IPLA have designed a technique for detecting traces in milk, in particular, of bacteriophages destroying the Lactobacillus delbrueckii species used in industrial dairy fermentations, using QRT-PCR. The technique enables decisions to be made, such as redirecting the contaminated milk towards processes in which Lb. delbrueckii, which is sensitive to the phages detected, is not involved, or to trigger inactivation treatments, such as disin-

fecting the production plant. The main advantages of the technique are its rapidity, specificity, simplicity and sensitivity. The patent was licenced to the company Corporación Alimentaria Peñasanta S.A.



Contamination by bacteriophages is a serious problem in fermented dairy product manufacturing.

Minimising the adverse environmental impact of fishing activities

Researchers at the IIM have carried out work to provide support to European community actions to implement policies for Europe's fishing fleet to prevent bycatches and eliminate discards in the near future. With this aim, integrated waste management and efficient on-board and land-based processing measures have been developed, with a view to recycling and reusing wastes and discards produced by the fishing industry, including discards and by-catches. The proposed approach has been validated on a pre-industrial scale by the design and construction of prototypes. Processes for the utilisation of components or by products of fishing or fish processing, such as gelatines, hyalonuronan, chondroitin sulphate, shark liver oil, waste compacting and discards have been suggested.

Multipurpose pilot plant for the recycling and utilisation of components and by products of fishing and fish processing.

Edible olive pomace oil with a high concentration of triterpenic acids

Olive pomace oil, a byproduct of olive oil manufacture, contains large quantities of interesting bioactive and functional compounds, including triterpenic acids, in particular. The usual procedure by which edible pomace oil is obtained involves drying the olive pressings (pomace), extracting the oil with a solvent, and alkaline refining in which the free fatty acids and triterpenic acids are eliminated in the form of a soap through a reaction with caustic soda. Researchers at the IG have patented a procedure whereby the oil is not obtained directly by centrifuging, without drying the pomace, rather than using solvents. They have also developed a new physical refining process, based on neutralisation of the free fatty acids, which are more volatile than the triterpenic acids, by successive distillation at high temperature in a vacuum. This enables an edible oil to be produced which naturally has a high concentration of triterpenic acids.

Partial view of the olive pomace oil production plant yielding oil with a high concentration of triterpenic acids.

PRIZES AND AWARDS

The prizes and awards received by the Area's researchers in 2008 included:

2008 International Hippocrates Prize for Medical Research into Human Nutrition, awarded to Dr **Daniel Ramón** (IATA).

Fundación García Cabrerizo 2008 Medal of Honour for the Promotion of Invention awarded to Dr **Daniel Ramón** (IATA).

Fundación Harold Perten Prize awarded to Dr **Cristina Molina** and Dr. Concepción Collar (IATA).

Asociación Española de Municipios del Olivo 2008 Scientific Prize awarded to Dr **Francisco J.G. Muriana** (IG).

Fundación del Real e Ilustre Colegio de Médicos de Sevilla Scientific Prize 2008 on the topic of "Nutrition and Health" awarded to Drs **A. Ortega, L.M. Varela. S. López, B. Bermúdez, Y.M. Pacheco, R. Abia, F.J.G. Muriana** (IG).

Extraordinary Doctorate Prizes awarded to:

Ana Belén Flórez García for her doctoral thesis on antibiotic resistance in lactic acid bacteria, supervised by Dr Baltasar Mayo Pérez and Dr Abelardo Margolles (IPLA).

Borja Sánchez García for his doctoral thesis on tolerance of bifidobacteria to gastrointestinal stress factors. Proteomic and physiological study, supervised by Abelardo Margolles and Clara González de los Reyes-Gavilán (IPLA)

María Rodríguez Fernández for her doctoral thesis on modelling and identification of bioprocesses, supervised by Dr Julio R. Banga (IIM).

Isabel Sánchez Alonso for her doctoral thesis studying the inclusion of dietary fibre in restructured fish products, supervised by Dr Javier Borderías Juárez (IF).

LINES OF RESEARCH IN THE AREA

- Advanced analytical methods for the characterisation and analysis of food quality, safety and traceability.
- Physical, chemical and biochemical basis of quality.
- Modelling and development of traditional processes and new processes. Development of new technologies for food production and preservation.
- Development of new active products and packaging.
- Biotechnology of edible plants and micro-organisms of nutritional interest.
- Production of functional foods and ingredients.
- Bioavailability, metabolism and the risk/benefit ratio of food components.
- Nutrigenomics

AREA 8

Chemical Science and Technologies

Coordinator: Rafael Moliner Alvarez

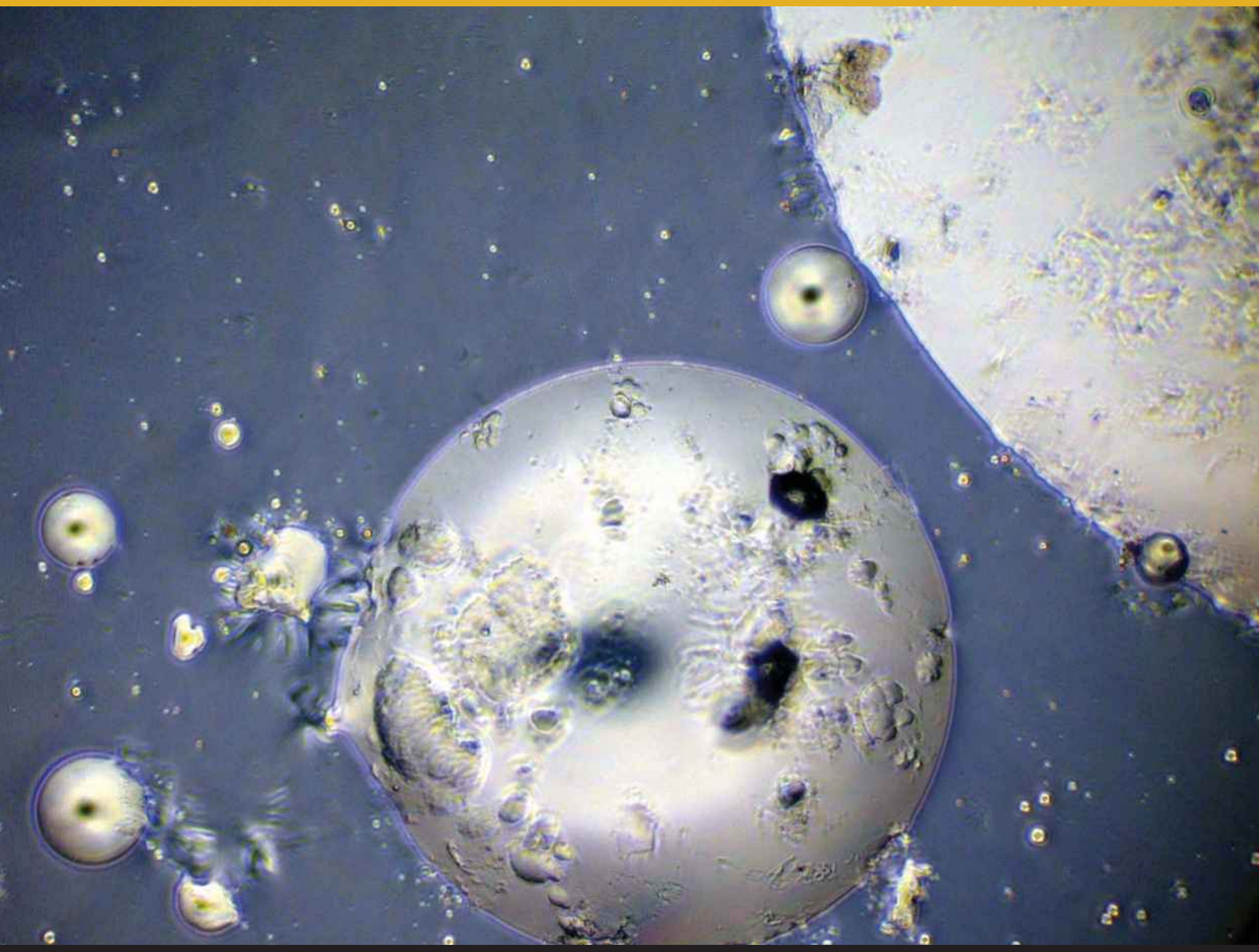


Image: "The planet adipocyte", by Amaia Rodriguez Murueta-Goyena. Fotciencia 07

INTRODUCTION

The Chemical Science and Technologies Area comprises 4 centres and 12 institutes, of which 3 are joint institutes run in conjunction with universities. The Area works in all the most important areas of chemistry, and competitive research is conducted on a variety of themes at the interface between chemistry and other fields and disciplines including biology, medicine, the environment, materials and physics. Chemical synthesis, with its ability to produce new molecules, plays an important role in the Area, and is a field in which intensive and highly competitive work is being carried out. New methods of asymmetric synthesis are being developed, the reactivity of functional groups and their transformations are being studied, and combinatorial chemistry is being used to increase productivity and obtain new compounds. Organometallic chemistry and its application to homogeneous catalytic processes, such as hydrogenation, hydroformylation and polymerisation, is another of the Area's essential fields of research.

Obtaining an in-depth understanding of the phenomena of molecular recognition in biological systems, the use of spectroscopic methods to analyse biomolecules, and the design and synthesis of new bioactive molecules with therapeutic applications, are some of the lines of research being carried out in the chemistry area, in close collaboration with the biology and medicine areas. There is no doubt that in the near future, as research in genomics and proteomics begins to produce new therapeutic targets, studies in biological chemistry will take on increasing importance.

The area's concern with environmental issues is clear from the lines of research being pursued by various groups in order to detect, prevent, eliminate or minimise pollution at source. For instance, analytic methods are being developed both for the control of emissions to the air, water and soil from various anthropogenic activities, and to detect contaminants in biological substrates. The uptake of xenobiotics at higher levels in the trophic pyramid is also being studied, without overlooking their impact on human health, with special emphasis on foodstuffs as the main route by which pollutants enter the human body. Also, various absorbents are being developed to eliminate atmospheric and waste water pollutants, and studies are underway on more environmentally friendly alternative manufacturing processes.

Catalysis continues to play a central role in a range of topics from research and development of catalysts for processes in petrochemicals and refining, the use of molecular sieves as catalysts, systems for reducing pollutant levels from car exhausts and other combustion processes, through to catalytic processes for the synthesis of fine chemicals. Biocatalysis, which uses enzymatic systems for various applications, is also making an important contribution in this field. One important area of research is work at the interface between catalysis and energy on fuel cells, a clean alternative to combustion engines, in which groups working on catalysis, energy and materials chemistry are taking part.

The production of energy from fossil fuels, wastes and biomass are being studied by groups working on lines such as the development of new combustion processes based on fluidised beds, reducing polluting emissions, improving catalytic processes, etc. Their activity is very high level and they have a high profile in Europe, where they take part in a many European projects. In particular, research is underway on new processes to reduce CO_2 emissions from existing facilities, and on new technologies for CO_2 capture and storage. Research in this field was stepped up considerably in 2008, with important new contracts and research agreements with electricity generating companies and capital goods manufacturers from Spain and elsewhere in Europe.

Progress continues to be made in physical chemistry on the development and innovation of applied methodologies with which to investigate the structure, properties and interactions of atomic, molecular, supramolecular and condensed phase systems. Within the Area there is also a strong presence in lines of research into the interface with materials. Thus, the new materials developed include new magnetic and superconducting materials, controlled porosity compounds, inorganic plastics and nano-structured materials such as carbon nanotubes and liquid crystals, liposomes and macromolecular systems based on proteins, polymers and tensioactive materials.

In 2008 the Instituto de Investigaciones Químicas y Ambientales de Barcelona "Josep Pascual Vila" (IIQAB) was split to create two new institutes:

- Instituto para el Diagnóstico Ambiental y Estudio del Agua (Institute for Environmental Diagnosis and Water Studies). IDAEA
- Instituto de Química Avanzada de Cataluña (Catalonia Institute of Advanced Chemistry). IQAC

From the INCAR nanostructured materials research group the Centro de Investigación de Nanomateriales y Nanotecnología (Nanomaterials and Nanotechnology Research Centre, CINN) was created. This is assigned to the Materials Sciences and Technologies Area (CSIC, Asturias Regional Government and University of Oviedo), and it has prepared its own strategic plan.

Over the period 2010-2013 it is also envisaged that another new Institute comprising sections belonging to the Chemistry Area of the Instituto de Ciencia de Materiales de Aragón (Aragón Institute of Materials Science) will be created: the Instituto de Síntesis Química y Catálisis Homogénea (Institute of Chemical Synthesis and Homogeneous Catalysis, ISQCH). It is envisaged that this institute will be operational in 2010, so it has prepared its own strategic plan, replacing that of the ICMA.

Finally, at its own request, the Laboratorio de investigación en tecnología de la construcción (LITEC) has been transferred to Area 5.

SUMMARY OF ACTIVITIES IN 2008

The Area's scientific output continues to be of high quality, with a high proportion of the area's papers being published in prestigious international journals. A total of 1063 papers were published in high prestige journals included in the SCI in 2008, equivalent to an average of three publications per researcher a year. The area's ability to design practical solutions that respond to society's needs is reflected in the number of patents it holds, which in 2008 totalled 41, making it one of the areas with the biggest contribution to the CSIC's total number of patents. Training is also a key aspect of the Area's research activity, and in 2008 a total of 70 doctoral theses were finalised.

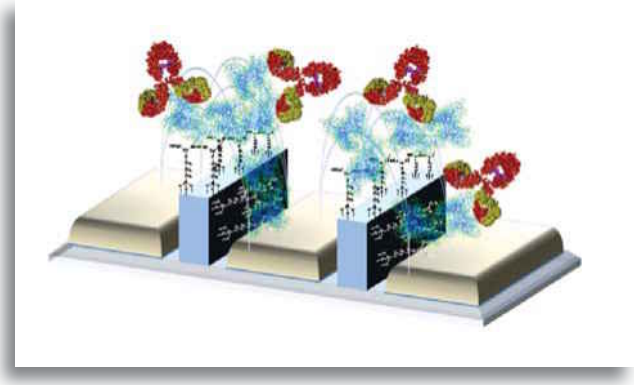
The area's scientific activity was intensive and highly varied in 2008, making it impossible to list here more than a few of its achievements in the year. By way of example, some of the most important results include.

SCIENTIFIC MILESTONES

The most significant scientific milestones and patents and/or publications they have led to are listed below.

New impedimetric immunosensor device

Researchers at the IQAC have developed an impedimetric immunosensor device based on a new design of interdigitated electrodes, on which a specific reactor has been immobilised in a covalent manner. The transducer developed by the CNM incorporates isolating barriers between the electrodes, which substantially improves the signal from the device. The new interdigitated electrode design may be used for the development of immunosensors with uses in clinical diagnosis, food security or the environment. The results obtained have led to a patent and have been published in two high impact international journals.



Patent

Bratov, C. Domínguez, N. Abramova, J. Ramón, F. Sanchez-Baeza and M.-P. Marco. Biosensor Impedimétrico y Sus Aplicaciones (Impedimetric biosensor and its applications). Filed on 9 May 2007 at the Oficina Española de Patentes y Marcas (Spanish patents and trademarks office). Application no.: 200701253.

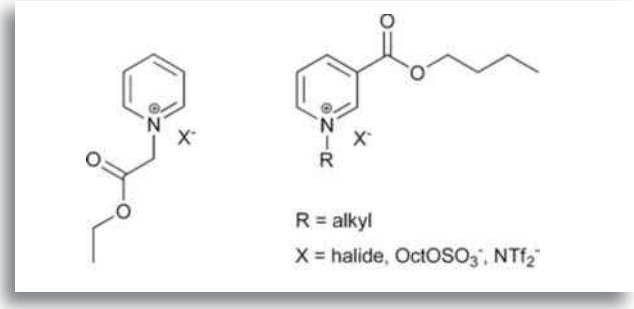
Publications

Andrey Bratov, Javier Ramón-Azcón, Natalia Abramova, Angel Merlos, Francisco Sánchez-Baeza, Maria-Pilar Marco and Carlos Domínguez. Three-dimensional interdigitated electrode array as a transducer for label-free biosensors. Biosens. Bioelectron, 24(4),729-735, 2008.

Andrey Bratov, Natalia Abramova, Javier Ramón-Azcón, Angel Merlos, Francisco Sánchez-Baeza, Maria-Pilar Marco and Carlos Domínguez. Characterisation of the interdigitated electrode array with tantalum silicide electrodes separated by insulating barriers. Electrochem. Commun., 10, 1621-1624, 2008.

New ionic liquids

New, highly biodegradable, ionic liquids derived from pyridine and nicotinic acid have been designed and synthesised. The interest of these compounds lies in the fact that their use as new reaction media may represent a valuable solution to both the problem of atmospheric emissions of conventional organic solvents and the recycling of catalysts.

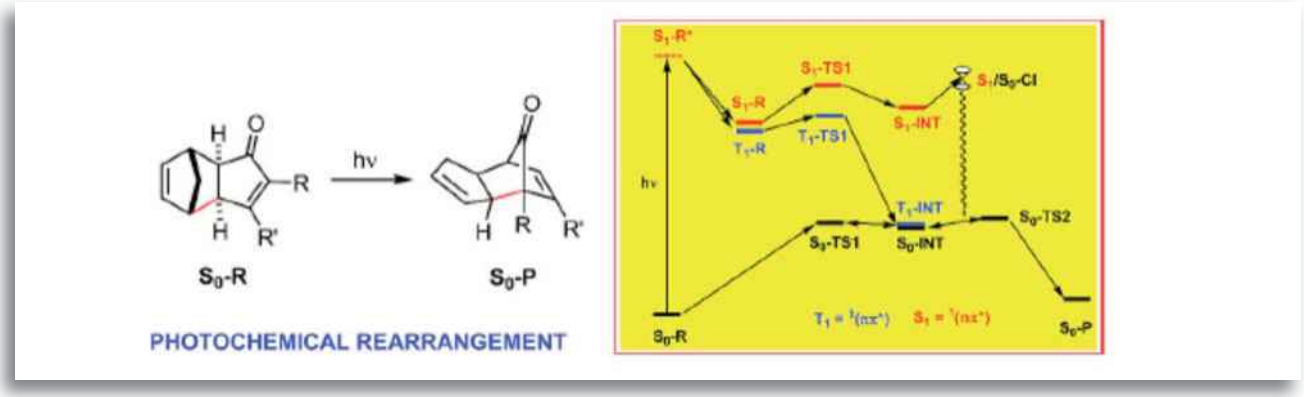


Publications

Jitendra R. Harjani, Robert D. Singer, M. Teresa Garcia, Peter J. Scammells. The design and synthesis of biodegradable pyridinium ionic liquids. Green Chem., 10, 436–438, 2008.

New photoreactions with synthetic interest

The mechanism of the photochemical transposition of tricyclic[5.2.1.02,6] deca-4,8-dien-3-ones to tricyclic[5.2.1.02,6] deca-3-,8-dien-10-ones, a new enone photoreaction of great synthetic interest, has been elucidated by means of theoretical CASPT2/CASSCF calculations and experiments sensitising and quenching the triplet. It has been shown that the reaction product forms through the 3(□□*) state.

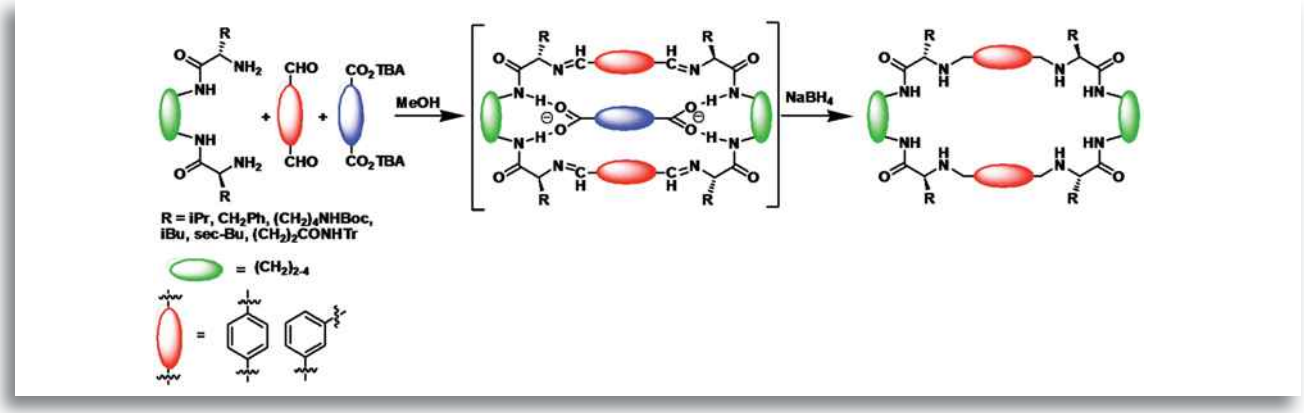


Publications

S. Olivella, A. Solé, A. Lledó, Y. Ji, X. Verdaguer, R. Suau, A. Riera. Theoretical and Experimental Studies on the Mechanism of Norbornadiene Pauson-Khand Cycloadducts Photorearangement. Is there a Pathway on the Ecited Singlet Potential Energy Surface?. J. Am. Chem. Soc. ,130, 16898-16907, 2008.

New approach to the synthesis of Pseudopeptidic Macrocycles

Pseudopeptic macrocycles are very important compounds in biological chemistry. In this paper we have prepared them by means of a supramolecular approach, using anionic templates and a multicomponent reducing amination reaction. Thus, 14 structurally different derivatives have been synthesised, with excellent performance, given the difficulty of the process. In representative cases, the intermediate supramolecular compelxes have been characterised with different techniques (1H NMR, ROESY, ESI-TOF MS, UV-CD, MM), which has allowed us to correlate the effectiveness of the process with the structural preorganisation induced by the template. Our work demonstrates the applicability of supramolecular concepts to real problems of synthesis.

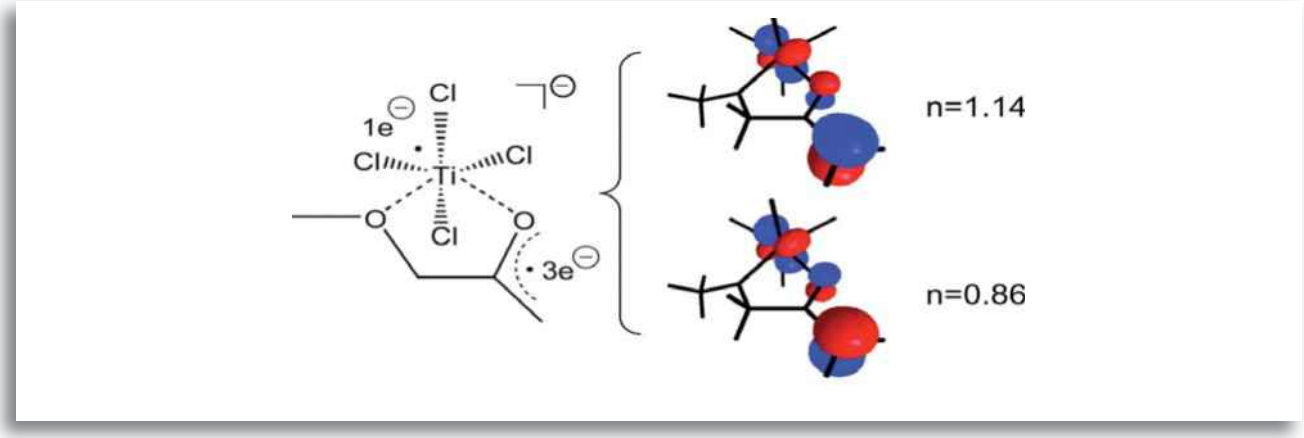


Publications:

I. Alfonso, M. Bolte, M. Bru, M. I. Burguete, S. V. Luis, J. Rubio. Supramolecular Control for the Modular Synthesis of Pseudopeptidic Macrocycles through an Anion-Templated Reaction. J. Am. Chem. Soc., 130, 6137-6144, 2008.

Identification of a biradical intermediate in an enolation process

The formation of a biradical intermediate in the enolation process catalysed by titanium tetrachloride has been characterised experimentally and theoretically. This biradical is formed through a process of valence tautomerism and may be of fundamental importance in understanding the mechanism of enolation catalysed by transition metals.



Publications

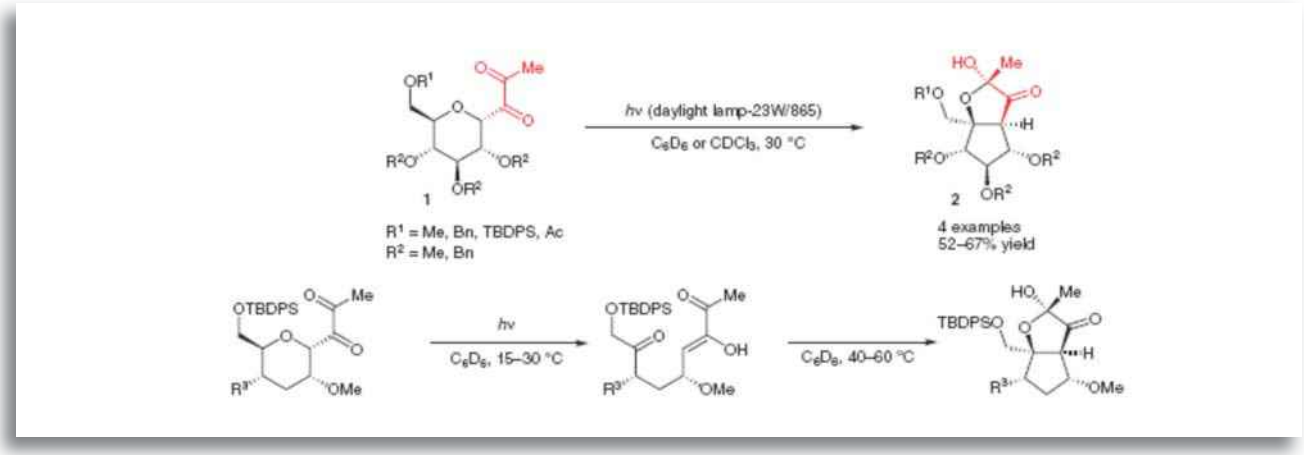
I. de P. R. Moreira, J. M. Bofill, J. M. Anglada, J. G. Solsona, J. Nebot, P. Romea, and F. Urpí, "Unconventional Biradical Character of Titanium Enolates". J. Am. Chem. Soc. ,130, 3242-3243, 2008.

Discovery of a family of human cytomegalovirus inhibitors with a novel structure

Researchers at the IQM have designed and synthesised a family of human cytomegalovirus (HCMV) inhibitors with a novel structure that differs from that of inhibitors of this virus described to date. These compounds act by means of a novel action mechanism different from that of compounds currently in clinical use for the treatments caused by this virus. Infection by human cytomegalovirus is a serious problem (it causes serious and often fatal pathologies) in immunodepressed patients (e.g. patients who have undergone transplants, patients infected with the AIDS virus, etc.) and are the main cause of congenital deformities in new borns. The findings of this research were published in J. Med. Chem. 2008, 51, 5823.

A new Photochemical Regrouping is Identified

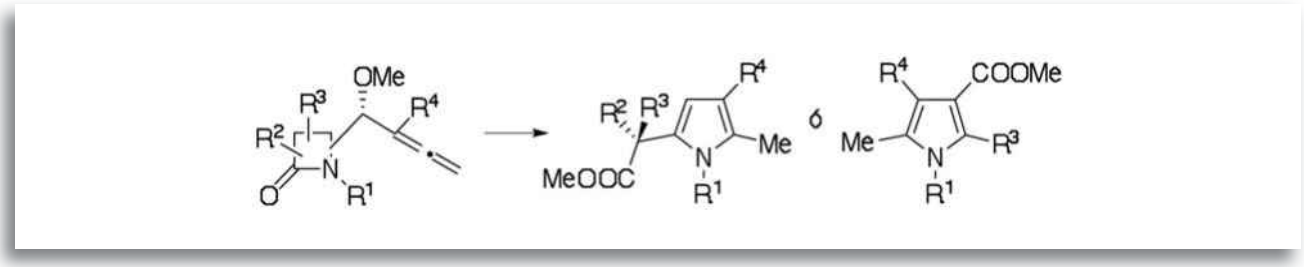
Researchers at the IPNA have described a new photochemical regrouping



Publication
Ang. Chem. Int. Ed. 2008, 47, 8917.

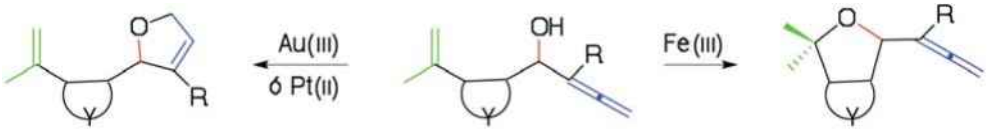
New process for the direct regioselective synthesis of polysubstituted pyrroles

A joint study by researchers at the IQOG and the UCM has led to a new tandem process permitting the direct regioselective synthesis of polysubstituted pyrroles from (α-alkoxyalenyl)-β-lactamases without the need to use transition metals as catalysts. This reaction may be explained by means of an unprecedented domino effect, which implies, in the first instance, the opening of the 2-azetidinone ring, followed by aminoacylation with the alenic group and aromatization of the ring formed. The research was published in Chem. Eur. J. 2008, 14, 637-643 and has been recognised as an important achievement in synthesis by V. Snieckius (Synfacts 2008, 241-241).



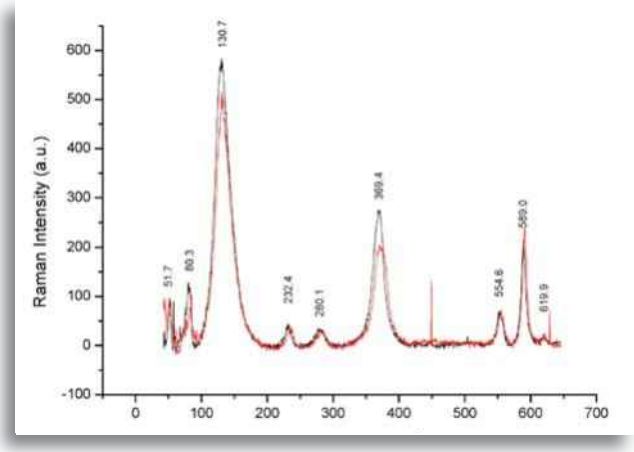
Chemodivergent discrimination between reactive centres

Researchers at the IQOG and the UCM have studied chemodifferentiation in oxycyclation reactions between alkene and allene groups of a single substrate, observing that this may be controlled by the right choice of catalyst. It has been demonstrated that catalysts such as iron trichloride and noble metal salts (Au and Pt) are able to discriminate in a chemodivergent way between both reactive centres. The findings were published as a communication in Chem. Eur. J. 2008, 14, 7756-7759.



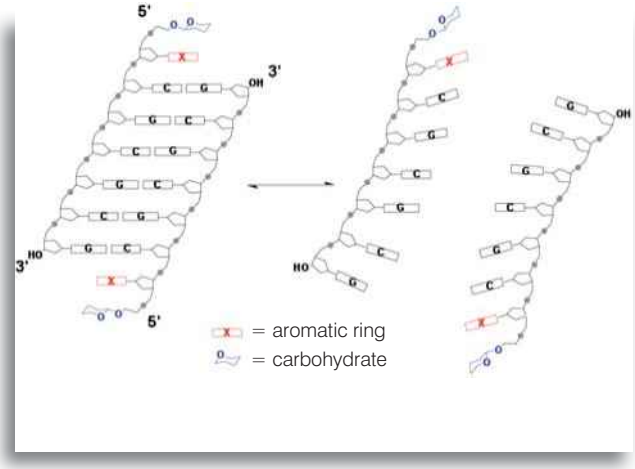
Spectroscopic studies of a previously unknown Zn-Zn grouping

Researchers at the IIQ, in collaboration with other groups at the Universities of Oxford and Karlsruhe, have studied the vibrational spectra (infrarred and Raman) of the first organometal complexes with a Zn-Zn bon which were prepared at the IIQ. The IR and Raman spectra of polycrystalline dizinkocene samples (h^5-C_5Me_5)2Zn2, and its isotopically marked homologue (h^5-$C_5Me_5)_2{}^{68}Zn_2$, and mononuclear zinkozene (h^5-C_5Me_5)(h^1-C_5Me_5)Zn and the experiments made it possible to assign bands associated with the zinc-zinc bond (mainly those in the 370 cm^{-1} and 230 cm^{-1} range), which were previously unknown.



Experimental measurement of a carbohydrate-aromatic interaction using a DNA model system

Researchers at the IIQ have designed and prepared a model DNA system with which they have been able to quantify in water the significant carbohydrate/aromatic stacking interaction, demonstrating that it is enthalpically driven via unconventional CH-p hydrogen links. The results of the research were published in Chem. Eur. J. 2008, 14, 7828, and mentioned in an article in News & Views, Nature Chem. Biol. 2008, 4(10), 586.

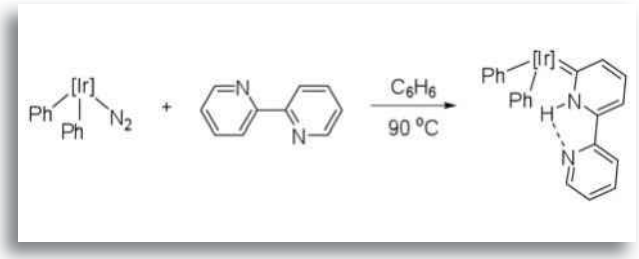


Publications:

J. Phys Chem a. 2008, 116, 10516

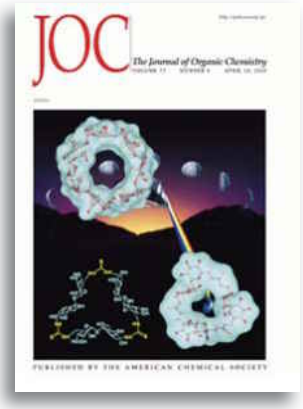
New mode of coordination of bipyridine and phenantroline as N-heterocyclic monodentate carbene

The IIQ's Organometallic chemistry and homogeneous catalysis group has discovered a new mode of coordination of traditionally bidentate ligands in iridium(III) compounds. Compounds in question are 2,2'-bipyridine and 1,10'-phenantroline with N-heterocyclic monodentate carbene ligands. The discovery was published in Angew. Chem. Int. Ed. 2008, 47, 4380, and opens up new possibilities in the chemistry of these versatile ligands, and leading to compounds with interesting luminescent properties.



Synthesis, structural determination and characterisation of inclusion properties of Trehalose-based Cyclodextrine analogues (Cyclotrehalanes)

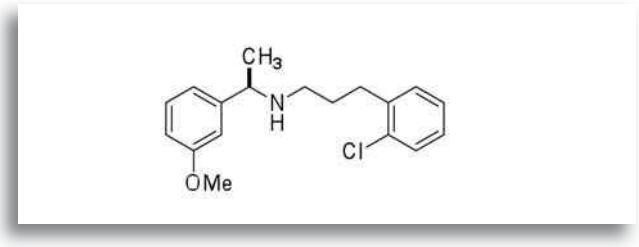
The molecular inclusion of Cyclodextrins (CDs) has historically provided valuable information about the interaction of hosts with the face of their constituent units facing inwards, leaving the opposite face concealed ( ). Researchers at the IIQ designed a new family of inverted cyclic oligosaccharides based on trehalose (cyclotrehalanes, CTs) in order to illuminate the hidden face of CDs. This work was shown on the cover of issue nº 8, volume 73 of The Journal of Organic Chemistry (2008).



Front cover nº 8 of The Journal of Organic Chemistry, vol 73, 2008, pag 2967-2979.

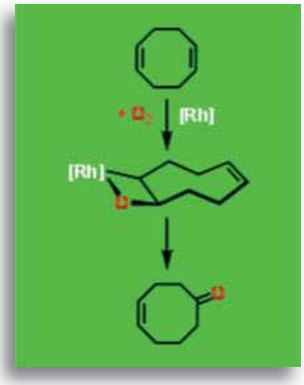
Enantioselective synthesis of compounds with calcimimetic activity

Researchers at the IIQ have developed a highly efficient synthetic enantioselective approach with which to access new calcium receptor agonists. These compounds are of particular interest as they enabled the development of the first effective drug against hyperparathyroidism, which came on the market in 2004. The usual treatment for this condition was the surgical extirpation of one or more dysfunctional glands. The work was reported in a paper published in the Journal of Organic Chemistry 2008, 73, 745-748 and was highlighted in the journal Synfacts (2008, 553).



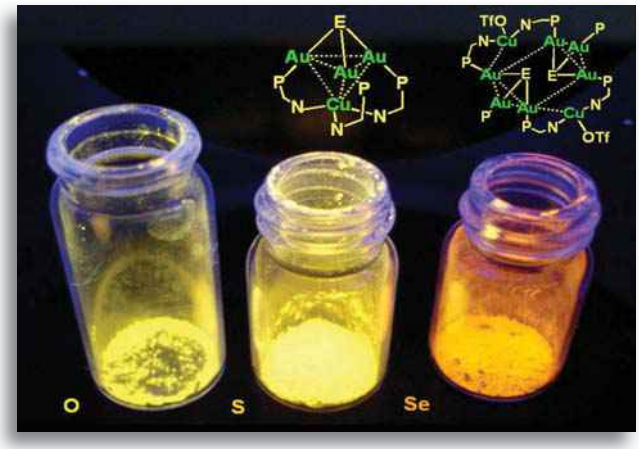
Development of new environmentally friendly catalysts for selective transformations

Researchers at the ICMA have developed new environmentally friendly catalysts for selective transformations. Oxygen may be used as a reagent for the direct oxidation of alkenes to ketones (in particular from 1,5-ciclooctadiene to cyclooctanone) in the presence of certain rhodium catalysts. This is a clean, environmentally friendly process with considerable potential.



Highly luminescent chalkogenide clusters of gold(I)-silver(I) and gold(I)-copper(I)

Researchers at the ICMA have developed trinuclear complexes of the type $[E(AuL)_3]BF_4$, where E is a chalkogenide (O, S, Se) and L represents a heterofunctional ligand, such as PPh_2Py or $PPh_2CH_2CH_2Py$, react with copper or silver to produce $[E(AuL)_3M]^{2+}$ complexes which demonstrate previously undescribed situations with metallophilic interactions, and which are highly luminescent.



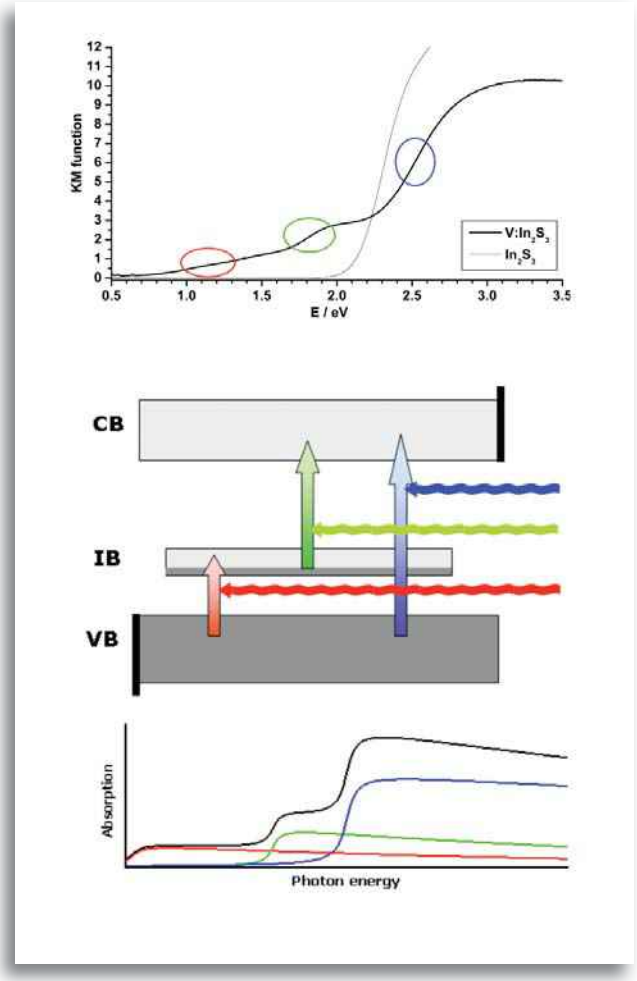
Publications:

Chalcogenide centred gold complexes. Gimeno, M. C.; Laguna, A. Chem. Soc. Rev. 2008, 37, 1952-1966.

New photovoltaic materials

Using rational design researchers at the ICP have obtained the first intermediate band material which, through successive photon absorption, may make it possible to exploit a broader range of solar spectrum in photovoltaic and photocatalytic applications. Published in R. Lucena et al., Chem. Mater. 20 (2008) 5125, following prediction of its electron structure in P. Palacios et al. Phys. Rev. Lett. 101 (2008) 046403.

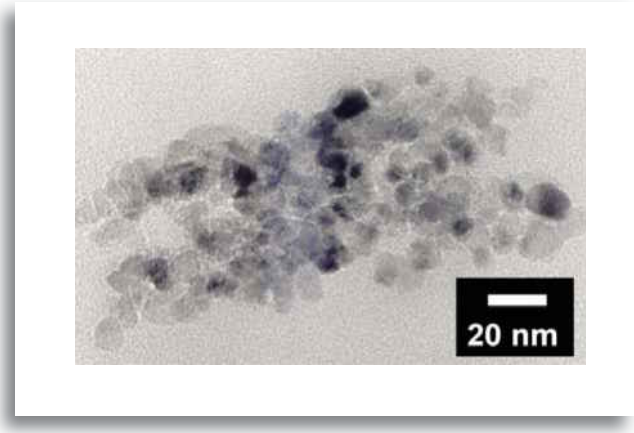
The findings, obtained as part of an integrated European project (FULLSPECTRUM) and a Consolider project (GENESIS-FV), form the basis of a patent application and a European project in the second phase of evaluation.



UV-Vis-NIR spectrum of $V_{0.2}In_{1.8}S_3$ and schematic of process with 2 photons.

Polymer based nanocompounds in industrial packaging applications

Researchers at the ICP have prepared polymer-based nanocompounds for use in biomedical applications and in the food packaging industry, which include TiO_2 to give them biocide activity. The study looked at the interface of interaction between the two components of the system and demonstrated by TEM and spectroscopic measurements that the synthesis method developed allows the transfer of charges (holes) produced in titanium dioxide following excitation of the whole with UV light via this interface. This eliminates the need for proximity between the microorganism and the UV light absorbing agent, and gives the whole surface of the system, which is mostly organic, biocide properties. This permits the elimination of numerous microorganisms more efficiently than many of the best biocides currently available.



Publication

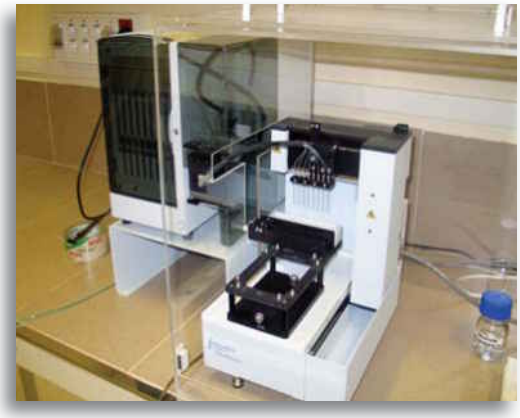
M.L. Cerrada, C. Serrano, M. Sánchez-Chaves, F. Fernández-Martín, A. de Andrés, R. J. Jiménez Riobóo, A. Kubacka, M. Ferrer, M. Fernández-García Self-sterilized EVOH-TiO2 Nanocomposites: Interface Effects on Biocidal. **Properties. Adv. Funct. Mater.** (2008) 18, 1949-1960

Development of prototype installations for CO_2 capture

Researchers at the ICB have made significant progress in the development of new technologies using fossil fuels to produce H_2 with CO_2 capture. Image below shows a prototype syngas combustion facility with 10kW solid oxygen transporters developed in the ICB. At present, within the European ECLAIR project, direct coal combustion is being developed with solid oxygen transporters and is being scaled up to 1MW.

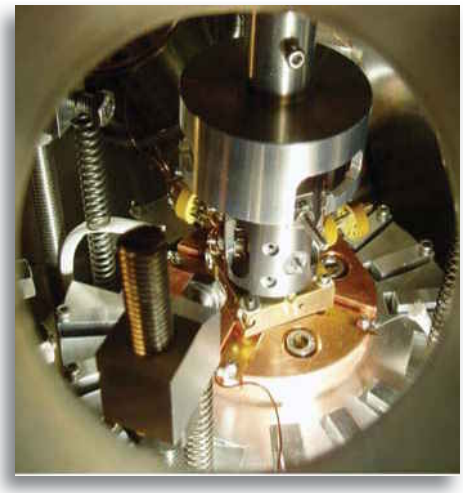
Automated crystallisation platform installation

The IQFR automated crystallisation platform offers the CSIC's researchers the tools they need to start the process of searching for the crystallisation conditions of a sample of purified protein. Once crystallised it can be resolved structurally by means of X-ray diffraction. This ultra-fast system for searching for crystallisation conditions of macromolecules makes it possible to test a large number of variables affecting crystallinity at low cost and in an almost routine way.

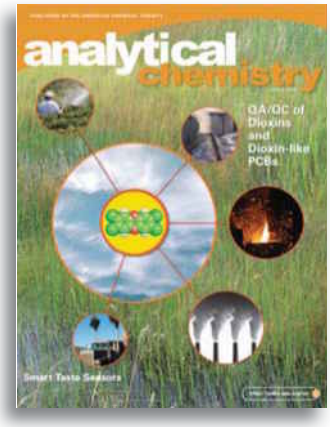


Commissioning of the ultra-high vacuum STM microscope

An ultra-high vacuum tunnel effect microscope built entirely by the surface analysis group and Mössbauer has been brought into operation at the IQFR. After obtaining atomic resolution, the group is working on characterisation of the growth of palladium in ruthenium to understand its affinity for hydrogen. The Instituto de Química Física Rocasolano has joined the select club of groups that have built UHV-STM microscopes from scratch in Spain.



Analysis of dioxins



The journal Analytical Chemistry invited Bert van Bavel from the University of Orebro (Sweden) and Esteban Abad from IDÆA to publish a compilation article in the features section devoted to the most significant methodological aspects of the analysis of polychlorinated dibenzofurans and dibenzo-p-dioxins. They were asked to pay special attention to the methods available to guarantee the reliability of the results. The manuscript reviewed the state of the art in the analysis of these compounds and was based on over 15 years' experience organising and taking part in international inter-laboratory exercises.

Summary of the work published in:
van Bavel, B. and Abad, E. 2008. Experiences of more than 15 years of worldwide QA/QC on the ppt level; Dioxins and dioxin-like PCBs analysis of environmental samples. Anal. Chem. 11, 3957-3964

Determination of the composition of organochloride pollutants in the water and air of the Atlantic ocean

Researchers at the IDAEA took samples of air and water from on board RV Polarstern during an oceanographic survey from Bremerhaven, Germany, to Cape Town, South Africa which took place from October to November 2005. Clear latitudinal trends were detected, with minimum concentrations of Σ_{27}PCB in air (~10 pg m-^{3}) in the South Atlantic and the highest levels (~1000 pg m-3) west of the coast of West Africa. The concentrations of Σ_{ICES}PCBs were 3.7 at 220 pg m-3 in air and 0.071 at 1.7 pg L^{-1} in water (dissolved phase). The comparison with the concentrations available since the 1990s show a minimal change in the atmospheric concentrations in the remote ocean. The comparison of the partial pressure in the gas phase shows a significant temperature dependence for all the PCBs in the South Atlantic, indicating a coupling between air and water. By contrast, no temperature dependence was observed in the case of atmospheric PCBs in the North Atlantic, where concentrations were controlled by processes of advection of polluted air masses.

Summary of the work published in:
R. Gioia, L. Nizzetto, R. Lohmann , J. Dachs, C. Temme and K.C. Jones. Polychlorinated biphenyls (PCBs) in air and seawater of the Atlantic Ocean: Sources, trends and processes. Environmental Science Technology 42, 1416-1422 (2).

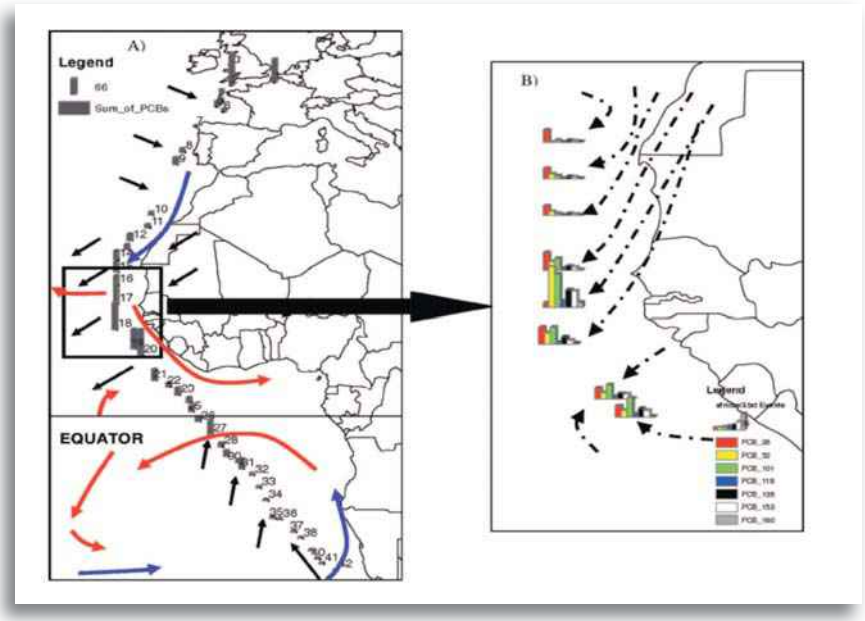
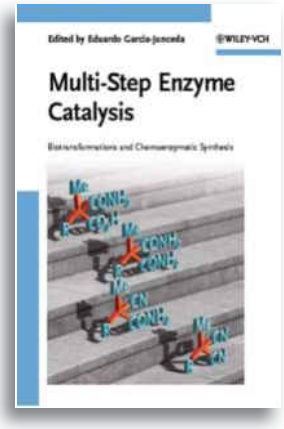


Figure 1:
A) Position of atmospheric samples and dominant air masses. The black bars indicate concentrations of Σ_{ICES} PCBs in air during the transection.
B) Detailed figure of the western region of Africa showing the PCB cogeners and courses of air masses.

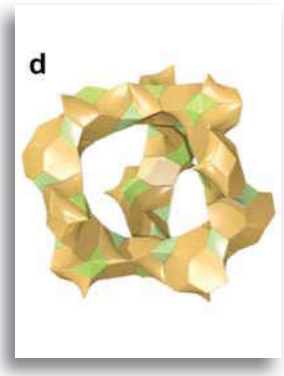
Enzyme-based catalysis

Researchers at the IQOG have published a book in which they deal with one of the most characteristic aspects of enzymes as biocatalysts, namely their capacity to work sequentially under similar conditions to carry out complex chemical transformations. The book brings together some of the main aspects of this broad field of research, from the simplest systems in which a single enzyme combines with non-enzymatic catalytic steps, through to more complex systems in which natural or biosynthetic routes are created or even complete cells are modified to be used as authentic synthetic factories. The book is mainly aimed at organic chemists, biochemists, biotechnologists, and researchers in the pharmaceuticals and fine chemicals industry.



The first mesoporous chiral zeolite

Zeolites are microporous crystalline solids of great interest from the scientific and technological point of view as they have channels and cavities in the interior of their structure which permit a wide variety of applications, depending on their distribution and size. Researchers at the ITQ have synthesised the ITQ-37 zeolite, which is the first mesoporous chiral zeolite with extralarge channels delimited by rings of 30 members. It has the lowest grid density known (10.3 atoms T per 1000 $Å^3$) and the highest micropore volume known 0.38 cm^3/g and a surface area of 900 m^2/g in a purely silicious form. Among many other applications, these characteristics would permit chiral reactions between large molecules.



PRIZES AND DISTINCTIONS

Real Academia de Medicina y Cirugía de Sevilla prize for scientific publications in 2008. Paper: **"A role for tachykinins in the regulation of human sperm motility"** C.G. Ravina, M. Seda, F.M. Pinto, A. Orea, M. Fernández-Sánchez, C.O. Pintado and M.L. Candenas. **Human Reproduction 22, 1617-1625, 2007**.

"Jose Antonio García Domínguez" prize awarded by the Sociedad Española de Cromatografía y Técnicas Afines to the second best oral communication presented at the 12ª Jornadas de Análisis Instrumental (12 Seminar of Instrumental Analysis) in Barcelona. **Carme Bosch, Joan O. Grimalt, Pilar Fernández.**

Prize from the Sociedad Española de Espectrometría de Masas to the third best paper presented at the 12ª Jornadas de Análisis Instrumental in Barcelona. **Paula Guerra, Ethel Eljarrat, Damià Barceló.**

Prize for the best presentation at the Simposio Medi Ambiente y Calidad de Vida. In the V Encuentro de Jovenes Investigadores de los PPCC (5th meeting for young PPCC researchers). **Belen Martrat, Joan O. Grimalt.**

2008 Research Prize from the Real Academia de Doctores de España awarded to doctoral thesis "Catalizadores para la reducción selectiva catalítica de NO" (Catalysts for the selective catalytic reduction of NO) by Dr Alicia Boyano Larriba at the Instituto de Carboquímica (CSIC).

2nd Prize at the VII Certamen Universitario Arquímedes introductionto scientific research, organised by the Ministry of Science and Innovation, awarded to the paper "Nuevos electrocatalizadores de platino para pilas de combustible de electrolito polimérico" (New platinum electrocatalysts for polymer electrolyte fuel cells) by María Herrando at the ICB (CSIC).

1st Prize in the madri+d 2008 awards to the best patents. The winning patent was: "Nueva enzima para la obtención de oligosacáridos prebióticos" (New enzyme with which to obtain prebiotic oligosaccharides). The panel highlighted the importance of the invention in the field of food science and technology. In particular, for having developed a process by which to produce an enzyme able to synthesise prebiotic oligosaccharides from simple sugars. The patent was prepared in collaboration by **Dr Francisco J. Plou Gasca** (Instituto de Catálisis y Petroleoquímica, CSIC) and **Dr María Fernández Lobato** (Centro de Biología Molecular, UAM-CSIC).

Senior Research Prize from the Federación Iberoamericana de Sociedades de Catálisis, FSOCAT 2008. **Dr. José Luis García Fierro.**

"Miguel Catalán" Senior Research Prize 2008 from the Comunidad de Madrid (Madrid Regional Government). Dr. **José Luis García Fierro**.

Dr Luis Oro del ICMA was appointed president of the European Association for Chemistry and Molecular Sciences (EuCheMS) in October 2008.

Dr Avelino Corma Canós Gabor A. Somorjai Prize for Creative Research in Catalysis.

Dr Miguel Ángel Miranda Alonso, Real Sociedad Española de Química Prize in Chemisty.

Dr Avelino Corma Canos appointed Doctor Honoris Causa by the UNED.

Dr Avelino Corma Canos appointed Doctor Honoris Causa by the Technischen Universität München.

Dr Avelino Corma Canos, appointed Doctor Honoris Causa by the University of Valencia.

Dr Avelino Corma Canos, appointed Doctor Honoris Causa by the Jaime I University.

Dr Ángeles Gómez Borrego. Organic Petrology Award 2008, granted by the International Organic Petrology and Coal committee. The award recognises important contributions in organic petrology and coal mid-way thorugh her career.

Dr Conchi Ovín Ania.- Löreal-Unesco 2008 Research Fund Prize. "For women in science" programme 2008/2009.

Dr Marta Sevilla Solís. San Alberto Magno prize 2008 for the best research report, by the Ilustre Colegio de Químicos de Asturias y León.

PARTICULARLY SIGNIFICANT PROJECTS, CONTRACTS AND AGREEMENTS

The "Autoagregación de Tensioactivos, Materiales nanoestructurados y Nanoingeniería de superficies" group (directed by Dr Conxita Solans) joined the **"Centro de Investigaciones Biomédicas en Red" (CIBER)**.

Consolider-ingenio project **"The spanish ion channel initiative (sici)"** to conduct research into molecular, structural and cell biology, physiopathology, pharmacology and therapy of ion channels (researcher: Dr Àngel Messeguer).

The research group led by Profesor Angel Messeguer, at the Instituto de Química Avanzada de Cataluña, in collaboration with that led by Prof. Enrique Párez-Payá, at the Centro de Investigaciones Príncipe Felipe in Valencia, has identified head of series candidates for apoptosis inhibitors with powerful in vitro and in vivo activity. The results gave rise to the licensing of a patent and the launch of a **joint pharmaceuticals development project for specific clinical applications** with the firm **Laboratorios Salvat, S.A.**

Consolider-ingenio 2010: molecular nanoscience. Lead researcher: Eugenio Coronado Miralles. Researchers from the ICP: Dr Marisela Vélez. The CONSOLIDER team, comprising organic and inorganic chemists, molecular biologists, biophysicists and experimental and theoretical physicists of condensed matter, aims to design, synthesise and characterise molecules and supramolecular materials and nanoparticles with electronic, magnetic or biological functionalities, and in the development of advanced instrumentation in the field.

Cenit project: "Investigación científica dirigida al desarrollo de una nueva generación de alimentos para el control de peso y prevención de la obesidad" (Scientific research aimed at developing a new generation of foods for weight control and obesity prevention). Acronym: **PRONAOS.** Company: Neocodex. Lead researcher: Dr Bernardo Herradón from the IQOG.

Contract with the King Saud University, Saudi Arabia: "Natural Gas Clean Up and Hydrocarbon Conversions". The contract is for a period of two years, starting on 15 December 2008 and running until 15 December 2010, with funding of 830,000 euros. Supervisor: Jose Luis Garcia Flerro from the ICP

NANO-HOST project: "Homogeneous Supported Catalyst Technologies: the sustainable approach to highly-selective, fine chemicals production". **Funding body**: FP7-215193. Seventh Framework Programme EU. PI: ICMA- J.M. Fraile Dolado.

CIBER Project: "Enfermedades respiratorias" (Respiratory diseases). Margarita Menendez. IQFR- Instituto Carlos III.

Agreement between the CSIC, HUNOSA and ENDESA for the "Desarrollo conjunto de tecnologías de carbonatación-calcinación para captura de CO_2 en post-combustión y construcción de una planta piloto en la central térmica de la Pereda" (Joint development of carbonation-calcination technologies for post-combustion CO_2 capture and construction of a pilot plant at the Pereda thermal power station). Principal researcher: **J C Abanades.**

"Control y tratamiento avanzado para la valorización energética de gas de cok siderúrgico", Advanced control and treatment of energy use of steel coking gas. Funding body: **PCTI-Asturias, Strategic Projects, Ref: PEST08-03.** Lead researcher: **J. Ángel Menéndez, Ana Arenillas.**

"Analisis, desarrollo e implementación de soluciones ecoeficientes para la valorización de residuos (ZeroRes)" (Analysis, development and implementation of environmentally friendly solutions for the utilisation of wastes). Funding body: **PCTI-ASTURIAS PEST08-07 (Strategic Projects)**. Participating institutions: **Arcelor Mittal / INCAR / University of Oviedo/Other (6 SMEs from the Asturias region)**. Lead researcher: **Susana Pertierra (coord.)/Dr Miguel Montes, Dr Mª Antonia Díez.**

"CO_2 para la obtención de gas de síntesis por reformado de metano asistido con microondas, SYNCO$_2$", (CO_2 for the obtaining of syngas by microwave assisted methane reforming). Funding body: **CDTI. CENIT project: SOT-CO_2 New sustainable industrial uses of CO_2. INGENIO 2010. CEN-2008-1027**. Lead researcher: **J. Ángel Menéndez, Ana Arenillas.**

ITQ collaboration agreement with **Fundación Ramón Areces.**

08

Spanish National
Research Council

Scientific activity of Centres and Institutes

GOBIERNO DE ESPAÑA
MINISTERIO DE CIENCIA E INNOVACIÓN
CSIC

	EEA	EEHA	EEHAR	IAE	IAM	IEDCYT	IEGD	IEGPS	IEIOP	IESA	IFS	IH	IHCD	ILC	ILLA	IMF	INGENIO	IPP
RESEARCH PROJECTS																		
National Plan	1	2	1	0	1	1	4	2	3	3	4	12	2	3	5	2	0	4
Funding (thousands of €)	73,30	19,00	40.000,00	0,00	60,00	73,00	594,00	25,00	97,00	123,00	206,00	550,00	34,60	307,00	227,00	89,00	0,00	248,00
National (other)	1	0	1	1	0	2	4	1	2	2	9	13	0	6	6	1	1	16
Funding (thousands of €)	30,00	0,00	22.000,00	49,80	0,00	77,00	232,00	17,50	32,00	480,00	141,00	178,00	0,00	131,00	322,00	10,00	30,00	489,00
EU	0	0	0	2	0	1	1	1	0	0	1	1	0	2	1	0	1	2
Funding (thousands of €)	0,00	0,00	0,00	197,60	0,00	50,00	151,00	33,80	0,00	0,00	208,00	1.545,00	0,00	1.719,00	45,00	0,00	26,00	155,00
International (other)	0	0	1	0	0	0	0	1	0	0		0	0	0	0	0	1	0
Funding (thousands of €)	0,00	0,00	27.000,00	0,00	0,00	0,00	0,00	102,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	11,00	0,00
Regional Governments	0	9	0	0	1	0	1	2	0	2	2	4	0	0	1	1	2	0
Funding (thousands of €)	0,00	216,30	0,00	0,00	23,00	0,00	70,00	99,20	0,00	16,70	50,00	200,00	0,00	0,00	30,00	7,50	29,00	0,00
Research by contract (public)	3	1	2	0	0	0	12	9	1	18	2	6	0	1	3	0	4	11
Funding (thousands of €)	128,40	38,00	61.692,00	0,00	0,00	0,00	492,00	60,00	14,00	2.516,10	0,00	194,00	0,00	35,00	15,00	0,00	126,00	2.523,00
Research by contract (private)	1	1	0	0	0	0	0	1	0	1	0	3	0	2	2	0	3	0
Funding (thousands of €)	45,00	19,00	0,00	0,00	0,00	0,00	0,00	21,50	0,00	97,40	0,00	48,00	0,00	0,00	5,00	0,00	60,00	0,00
Foundations	0	1	0	0	0	2	0	1	0	0	1	1	0	2	4	1	3	1
Funding (thousands of €)	0,00	1,70	0,00	0,00	0,00	61,00	0,00	16,80	0,00	0,00	0,00	61,00	0,00	65,00	134,00	18,00	107,00	81,00
SCIENTIFIC PRODUCTION																		
Articles in SCI-SSCI-AHCI	1	3	6	22	3	21	30	9	0	11	13	48	7	9	22	7	14	11
Articles in non SCI-SSCI-AHCI	9	13	22	8	20	12	29	25	10	27	58	85	25	22	45	29	7	10
Books	6	5	2	2	4	1	13	12	9	9	15	31	11	12	19	13	2	2
Book chapters	23	13	4	7	13	0	34	37	27	18	43	167	12	51	49	41	6	32
Other monographies	1	1	5	0	2	7	8	0	4	13	6	22	0	7	3	1	0	5
National confer. - communic.	4	5	3	10	9	7	33	18	7	39	35	80	12	25	40	12	2	12
National conferences - posters	0	0	0	0	0	2	7	1	0	0	1	4	1	0	1	0	0	0
Inter. confer. - communic.	13	20	17	62	26	15	56	37	6	33	57	170	13	54	50	55	22	23
Inter. confer. - posters	0	0	0	0	0	6	6	13	0	0	0	11	0	0	0	5	0	1
Thesis	2	2	0	5	0	2	4	1	1	1	2	9	4	2	1	3	2	5
Courses for post-graduate	6	5	7	11	1	21	27	12	2	40	40	76	9	38	72	18	24	19
Patents	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SCIENCE OUTREACH																		
National Plan	0	0	0	0	3	1	1	0	0	0	2	4	0	2	2	1	0	1
Funding (thousands of €)	0,00	0,00	0,00	0,00	9,70	10,00	12,00	0,00	0,00	0,00	10,00	32,00	0,00	12,00	15,00	4,00	0,00	140,00
National (other)	0	0	1	0	0	1	3	2	0	0	6	5	0	7	6		0	1
Funding (thousands of €)	0,00	0,00	0,00	0,00	0,00	4,00	11,00	18,00	0,00	0,00	7,00	18,00	0,00	16,00	12,00	0,00	0,00	6,00
EU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Funding (thousands of €)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
International (other)	0	0	0	0	0	0	1	0	0	0	1	1	1	0	0	0	0	1
Funding (thousands of €)	0,00	0,00	0,00	0,00	0,00	0,00	35,40	0,00	0,00	0,00	0,90	22,00	3,00	0,00	0,00	0,00	0,00	14,00
Regional Governments	0	0	0	0	3	0	1	4	0	0	1	3	1	1	0	1	0	1
Funding (thousands of €)	0,00	0,00	0,00	0,00	5,80	0,00	5,00	37,50	0,00	0,00	0,50	34,00	9,00	7,00	0,00	3,00	0,00	10,00
Exposiciones	5	2	0	0	0	0	5	6	0	0	0	0	1	0	0	5	0	0
CDs y DVDs	0	2	0	0	0	0	0	5	1	0	0	0	0	0	0	1	0	0
Open doors days	0	0	1	0	0	0	0	1	0	1	0	0	4	0	0	0	0	0
Conferences, round tables	29	10	10	0	5	14	44	60	10	35	59	0	10	0	0	29	22	15
Scientific routes	0	0	8	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0
Workshops	1	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0
Scientific and Techno. Fairs	0	2	0	0	0	0	1	0	1	0	0	0	0	0	0	1	0	0
Science Week	0	5	0	0	0	3	1	2	1	1	11	6	0	1	1	0	0	0
OTHER ACTIVITIES AND FUNDING																		
National Plan	0	0	1	2	0	0	3	0	0	0	1	2	1	1	0	0	0	1
Funding (thousands of €)	0,00	0,00	9.000,00	30,00	0,00	0,00	32,00	0,00	0,00	0,00	6,00	18,00	15,00	0,00	90,00	0,00	0,00	38,00
National (other)	0	0	2	2	0	0	5	0	0	0	0	3	1	0	0	0	0	0
Funding (thousands of €)	0,00	0,00	39.000,00	7,00	0,00	0,00	37,20	0,00	0,00	0,00	0,00	0,00	2,00	0,00	96,50	0,00	0,00	0,00
EU	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Funding (thousands of €)	0,00	0,00	0,00	115,80	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
International (other)	0	0	0	0	0	0	6	0	0	0	0	3	0	1	1	0	0	0
Funding (thousands of €)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	27,00	0,00	0,00	0,00	0,00	0,00	0,00
Regional Governments	0	0	0	0	0	0	3	0	0	0	0	5	0	0	0	0	0	0
Funding (thousands of €)	0,00	0,00	0,00	0,00	0,00	0,00	4,00	0,00	0,00	0,00	0,00	39,50	0,00	0,00	0,00	0,00	0,00	0,00

	CABD	CABIMER	CBM	CIB	CIC	CNB	CRAG	IBBTEC	IBGM	IBIS	IBMB	IBMCC	IBMCP	IBMEV	IBV	IBVF	IC	IIB	IIBB	IMB	IN	IPBLN	UBF
RESEARCH PROJECTS																							
National Plan	1	10	35	36	3	24	3	12	4	11	10	8	12	0	6	4	10	19	8	5	23	1	3
Funding (thousands of €)	127,00	58.639,00	8.098,00	6.882,00	355,00	1.905,00	545,30	2.106,10	455,00	1.596,40	1.931,00	2.543,00	2.388,00	0,00	1.072,00	542,70	856,20	2.997,30	1.010,00	890,40	4.978,30	12,00	595,00
National (other)	4	3	13	10	1	17	2	3	3	20	9	1	1	0	8	5	6	15	17	1	1	9	3
Funding (thousands of €)	87,00	214,40	634,00	424,00	30,00	888,00	152,00	160,00	259,00	259,40	475,00	10,00	101,00	0,00	994,00	489,40	264,90	724,40	1.573,00	30,00	3,00	438,10	302,50
EU	0	0	4	3	1	8	3	0	0	0	0	0	1	0	1	0	3	0	3	0	4	0	1
Funding (thousands of €)	0,00	0,00	1.695,00	1.102,00	70,00	4.169,00	1.535,00	0,00	0,00	0,00	0,00	0,00	71,00	0,00	45,00	0,00	1.162,40	0,00	907,00	0,00	581,20	0,00	217,50
International (other)	1	0	0	4	0	2	0	0	0	0	0	0	3	0	0	0	0	1	2	0	0	0	0
Funding (thousands of €)	0,00	0,00	0,00	217,00	0,00	87,00	0,00	0,00	0,00	0,00	0,00	0,00	300,00	0,00	0,00	0,00	0,00	10,00	15,00	0,00	0,00	0,00	0,00
Regional Governments	3	8	7	3	1	4	0	0	13	32	0	30	4	0	3	13	0	1	1	7	18	12	5
Funding (thousands of €)	764,40	958,50	202,00	112,00	28,00	128,00	0,00	80,00	457,00	2.873,40	0,00	1.101,00	73,00	0,00	42,00	865,80	6,00	25,00	166,00	234,80	633,00	755,60	403,50
Research by contract (public)	0	1	0	5	0	0	0	1	2	0	0	0	0	0	0	0	0	1	0	0	2	0	0
Funding (thousands of €)	0,00	65,90	0,00	1.310,00	0,00	0,00	0,00	15,70	234,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	23,50	0,00	0,00	2,60	0,00	0,00
Research by contract (private)	2	2	1	7	1	0	0	0	1	0	0	7	1	0	0	2	1	4	0	0	4	4	0
Funding (thousands of €)	25,60	57,00	12,00	162,00	15,00	0,00	0,00	0,00	48,00	0,00	0,00	332,00	25,00	0,00	0,00	490,00	200,00	179,70	0,00	0,00	163,00	196,50	0,00
Foundations	0	3	1	12	1	3	0	0	0	0	0	9	0	0	1	0	4	0	4	0	4	0	0
Funding (thousands of €)	0,00	188,50	131,00	589,00	80,00	203,00	0,00	0,00	0,00	0,00	0,00	306,00	0,00	0,00	55,00	0,00	599,00	0,00	151,00	0,00	1.007,70	0,00	0,00
SCIENTIFIC PRODUCTION																							
Articles in SCI-SSCI-AHCI	39	34	206	178	30	196	24	23	51	129	49	150	64	0	78	28	69	113	60	23	67	65	33
Articles in non SCI-SSCI-AHCI	2	1	5	3	5	12	1	5	0	12	0	6	12	0	2	0	2	8	3	0	3	4	0
Books	1	0	5	0	0	1	3	0	0	2	0	0	0	0	0	1	0	1	0	0	2	0	0
Book chapters	4	3	22	6	4	11	3	4	3	11	2	0	11	0	4	10	2	6	4	3	4	0	2
Other monographies	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0
National confer. - communic.	3	18	49	180	9	10	17	12	23	22	12	0	0	0	10	8	17	20	29	3	0	37	11
National conferences - posters	3	3	42	0	17	0	14	8	0	45	11	0	0	0	24	16	14	22	13	14	0	29	5
Inter. confer. - communic.	18	26	66	85	13	15	21	18	15	10	18	0	0	0	16	10	33	34	16	5	0	26	16
Inter. confer. - posters	23	7	90	0	8	0	11	14	0	15	19	0	0	0	15	33	16	38	30	16	0	28	43
Thesis	8	0	38	13	5	16	3	2	6	10	12	13	14	0	6	10	8	13	11	3	12	8	5
Courses for post-graduate	0	2	66	0	0	123	3	12	6	34	14	32	32	0	4	10	22	41	20	1	1	17	1
Patents	1	2	12	18	0	0	0	0	0	3	1	5	0	0	0	3	0	6	0	0	0	4	1
SCIENCE OUTREACH																							
National Plan	0	0	0	0	2	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Funding (thousands of €)	0,00	0,00	0,00	0,00	24,00	36,00	2,00	0,00	0,00	0,00	0,00	15,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	30,00
National (other)	0	0	1	0	1	0	0	2	0	0	1	1	0	0	0	0	0	0	0	0	0	0	2
Funding (thousands of €)	0,00	0,00	0,60	0,00	6,00	0,00	0,00	6,00	0,00	0,00	2,40	49,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	12,00
EU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Funding (thousands of €)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
International (other)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Funding (thousands of €)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Regional Governments	1	0	0	0	2	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	3
Funding (thousands of €)	1,40	0,00	0,00	0,00	11,00	15,00	0,00	11,00	2,00	0,00	0,00	10,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	17,00
Exposiciones	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0
CDs y DVDs	0	0	2	0	0	2	0	0	0	0	0	1	0	0	0	0	0	0	2	0	0	0	1
Open doors days	0	1	2	0	0	7	0	0	0	0	0	46	1	0	12	16	0	1	4	0	1	0	0
Conferences, round tables	1	25	113	0	1	1	0	12	0	18	7	48	31	0	30	1	12	6	15	0	17	23	4
Scientific routes	0	0	0	0	0	4	0	0	0	0	0	0	7	0	0	0	0	0	1	0	0	0	0
Workshops	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	32
Scientific and Techno. Fairs	0	2	3	0	0	1	0	0	0	1	0	0	1	0	0	1	0	1	0	0	0	0	1
Science Week		1	1	2	0	1	0	0	0	0	2	9	1	0	1	1	0	1	3	0	1	0	0
OTHER ACTIVITIES AND FUNDING																							
National Plan	0	1	0	0	1	0	3	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Funding (thousands of €)	0,00	12,00	0,00	0,00	2,50	0,00	34,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	190,00	0,00	0,00	0,00	0,00
National (other)	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Funding (thousands of €)	0,00	0,00	89,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	215,00	0,00	671,00	0,00	0,00
EU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Funding (thousands of €)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
International (other)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Funding (thousands of €)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Regional Governments	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0
Funding (thousands of €)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	45,00	10,00	0,00

	CEAB	CIDE	CMIMA	EBD	EEZA	IACT	IATS	IBB	ICM	ICMAN	ICTJA	IGE	IIM	IMEDEA	IPE	IREC	IRN	MNCN	RJB	UTM
RESEARCH PROJECTS																				
National Plan	18	0	0	3	1	10	1	4	11	17	33	4	21	12	0	0	3	0	3	2
Funding (thousands of €)	2.233,00	0,00	0,00	95,50	63,40	373,70	194,70	84.000,00	696,00	534,90	1.611,00	538,00	920,70	4.965,00	0,00	0,00	490,40	0,00	497,30	91,00
National (other)	5	0	0	9	0	12	2	0	10	1	6	3	9	9	0	0	6	0	5	3
Funding (thousands of €)	314,00	0,00	0,00	454,50	0,00	79,60	48,00	0,00	615,00	1,40	161,00	28,00	185,30	305,10	0,00	0,00	230,40	0,00	850,00	248,00
EU	7	0	0	3	0	1	0	0	3	10	8	0	12	0	0	0	0	0	0	0
Funding (thousands of €)	1.409,00	0,00	0,00	737,50	0,00	0,00	0,00	0,00	599,00	238,50	596,00	0,00	748,30	0,00	0,00	0,00	0,00	0,00	0,00	0,00
International (other)	5	0	0	0	0	0	0	0	6	0	0	1	0	0	0	0	0	0	0	0
Funding (thousands of €)	231,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	135,00	0,00	0,00	4,70	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Regional Govemments	8	2	0	8	0	13	2	0	4	7	5	11	42	5	0	0	0	0	1	1
Funding (thousands of €)	1.531,00	20,60	0,00	2.598,30	0,00	1.121,80	14,60	0,00	237,00	407,00	53,00	110,70	938,40	65,00	0,00	0,00	0,00	0,00	40,30	6,00
Research by contract (public)	5	0	0	11	1	1	1	0	5	28	15	5	0	0	0	0	2	0	0	0
Funding (thousands of €)	241,00	0,00	0,00	1.445,10	275,00	14,00	71,50	0,00	676,00	1.437,00	588,00	76,50	0,00	0,00	0,00	0,00	310,00	0,00	0,00	0,00
Research by contract (private)	8	0	0	2	1	0	5	0	1	0	23	9	19	0	0	0	0	0	0	1
Funding (thousands of €)	157,00	0,00	0,00	775,90	60,00	0,00	91,30	0,00	100,00	0,00	777,00	129,80	526,20	0,00	0,00	0,00	0,00	0,00	0,00	953,00
Foundations	3	0	0	2	0	0	0	1	0	0	1	0	0	0	0	0	1	0	1	0
Funding (thousands of €)	797,00	0,00	0,00	58,60	0,00	0,00	0,00	0,00	0,00	0,00	78,00	0,00	0,00	0,00	0,00	0,00	4,00	0,00	130,00	0,00
SCIENTIFIC PRODUCTION																				
Articles in SCI-SSCI-AHCI	106	20	0	170	54	81	36	9	176	51	125	60	126	149	60	0	58	0	49	13
Articles in non SCI-SSCI-AHCI	17	2	0	22	15	29	8	6	34	0	34	62	12	54	16	0	11	0	27	1
Books	1	0	0	2	1	1	0	0	7	5	1	8	1	5	2	0	4	0	4	0
Book chapters	18	11	0	23	8	12	1	2	10	16	9	34	19	5	42	0	33	0	27	0
Other monographies	7	0	0	0	0	0	0	0	13	0	0	12	0	6	0	0	3	0	1	0
National confer. - communic.	18	7	0	20	13	14	2	2	32	0	16	48	31	48	13	0	8	0	3	0
National conferences - posters	1	7	0	7	4	16	4	2	3	0	24	22	25	24	8	0	7	0	0	0
Inter. confer. - communic.	23	33	0	55	29	46	13	3	109	46	82	50	32	49	27	0	28	0	26	28
Inter. confer. - posters	8	12	0	42	19	30	10	3	53	36	127	20	49	37	9	0	24	0	24	1
Thesis	4	1	0	4	2	4	2	3	8	4	7	9	12	4	5	0	6	0	11	0
Courses for post-graduate	22	8	0	10	17	21	5	1	25	50	19	27	92	18	3	0	17	0	13	2
Patents	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
SCIENCE OUTREACH																				
National Plan	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	2	1
Funding (thousands of €)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	15,00	0,00	0,00	0,00	0,00	0,00	24,00	10,00
National (other)	0	0	0	6	0	0	0	0	1		0	0	0	1	0	0	0	0	0	1
Funding (thousands of €)	0,00	0,00	0,00	583,50	0,00	0,00	0,00	0,00	6,00		0,00	0,00	0,00	34,00	0,00	0,00	0,00	0,00	0,00	6,00
EU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Funding (thousands of €)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
International (other)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Funding (thousands of €)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Regional Governments	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	2	0
Funding (thousands of €)	0,00	0,00	0,00	175,00	0,00	0,00	0,00	0,00	17,00	0,00	0,00	0,00	14,00	0,00	0,00	0,00	0,00	0,00	74,00	0,00
Exposiciones	0	0	0	2	0	2	0	2	1	0	0	4	1	0	0	0	0	0	6	0
CDs y DVDs	0	0	0	0	1	1	0	0	2	5	0	0	0	0	0	0	0	0	2	0
Open doors days	1	0	0	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	21	0
Conferences, round tables	26	0	0	35	5	8	0	1	57	4	0	46	1		13	0	11	0	18	5
Scientific routes	0	0	0	0	0	1	0	0	0	0	0	9	0	0	0	0	0	0	2	0
Workshops	1	0	0	1	0	9	0	0	5	0	0	1	6	0	1	0	0	0	2	0
Scientific and Techno. Fairs	0	0	0	1	0	0	0	0	2	0	0	0	0	1	2	0	0	0	1	0
Science Week	1	0	0	2	0	2	0	0	1	0	0	7	3	1	1	0	0	0	1	1
OTHER ACTIVITIES AND FUNDING																				
National Plan	0	0	0	0	4	0	0	0	0		0	0	0	0	0	0	0	0	0	0
Funding (thousands of €)	0,00	0,00	0,00	0,00	117,50	0,00	0,00	0,00	9,00		0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
National (other)	0	1	0	5	0	0	0	0	0	2	0	1	0	8	0	0	0	0	0	0
Funding (thousands of €)	0,00	30,00	0,00	355,90	0,00	0,00	0,00	0,00	0,00	12,00	0,00	10.000,00	0,00	8,80	0,00	0,00	0,00	0,00	0,00	0,00
EU	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0
Funding (thousands of €)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00		0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
International (other)	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Funding (thousands of €)	0,00	11,10	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Regional Governments	0	0	0	2	1	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0
Funding (thousands of €)	0,00	0,00	0,00	3,60	3,10	0,00	0,00	0,00	0,00	6,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

	CEBAS	EEAD	EELM	EEZ	IAS	ICA	IDAB	IGM	IIAG	IRNAS	IRNASA	MBG
RESEARCH PROJECTS												
National Plan	8	1	0	0	4	2	3	1	9	6	6	6
Funding (thousands of €)	947,00	11,50	0,00	0,00	107,50	203,90	523,10	145,20	958,30	180,90	384,00	328,50
National (other)	6	7	0	0	8	7	0	1	1	9	12	1
Funding (thousands of €)	894,00	212,10	0,00	0,00	166,40	64,50	0,00	30,00	30,00	292,60	131,00	30,00
EU	1	2	0	2	0	0	1	1	0	1	0	0
Funding (thousands of €)	64,00	2,60	0,00	90,00	0,00	0,00	45,00	213,00	0,00	77,80	0,00	0,00
International (other)	3	4	5	0	0	0	0	0	0	2	0	0
Funding (thousands of €)	33,00	47,40	61,40	0,00	0,00	0,00	0,00	0,00	0,00	24,40	0,00	0,00
Regional Govemments	18	9	2	10	5	0	3	1	7	14	4	5
Funding (thousands of €)	1.065,00	157,80	471,10	2.512,40	1.565,00	0,00	431,30	9,70	577,80	451,20	45,00	210,80
Research by contract (public)	2	3	1	3	1	5	0	0	1	4	1	0
Funding (thousands of €)	93,00	47,00	25,00	425,20	16,20	152,10	0,00	0,00	0,00	95,20	12,00	0,00
Research by contract (private)	24	11	5	4	14	5	2	4	2	8	2	0
Funding (thousands of €)	454,00	111,20	63,40	78,50	860,60	285,70	221,00	126,60	44,60	76,00	23,00	0,00
Foundations	0	0	1	0	0	0	0	0	0	0	0	1
Funding (thousands of €)	0,00	0,00	15,10	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	15,00
SCIENTIFIC PRODUCTION												
Articles in SCI-SSCI-AHCI	153	59	23	114	87	47	25	14	18	104	48	33
Articles in non SCI-SSCI-AHCI	2	11	11	19	26	12	1	9	6	9	5	21
Books	2	3	1	2	2	2	0	0	0	7	2	2
Book chapters	12	17	1	19	11	5	2	0	5	22	17	5
Other monographies	0	0	0	2	0	0	0	0	0	0	0	1
National confer. - communic.	27	11	11	35	18	3	9	3	3	20	3	9
National conferences - posters	28	12	12	29	29	7	7	0	7	15	14	9
Inter. confer. - communic.	44	19	17	42	24	30	6	2	4	27	14	1
Inter. confer. - posters	41	40	23	68	39	30	16	5	15	64	27	12
Thesis	9	5	2	14	7	4	2	2	1	7	8	2
Courses for post-graduate	38	18	0	55	22	21	0	4	8	21	13	5
Patents	0	1	1	0	6	2	0	0	0	0	0	14
SCIENCE OUTREACH												
National Plan	0	0	0	1	0	0	0	0	0	0	0	0
Funding (thousands of €)	0,00	0,00	0,00	6,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
National (other)	0	0	0	0	0	0	0	1	0	0	1	1
Funding (thousands of €)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	6,00	0,00	0,00	12,00	5,00
EU	0	0	0	1	0	0	0	0	0	0	0	0
Funding (thousands of €)	0,00	0,00	0,00	8,60	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
International (other)	0	0	0	0	0	0	0	0	0	0	1	0
Funding (thousands of €)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	6,00	0,00
Regional Governments	6	0	0	0	0	0	0	0	0	0	0	1
Funding (thousands of €)	16,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	9,00
Exposiciones	0	0	0	1	1	0	0	0	1	0	0	0
CDs y DVDs	0	0	0	1	0	7	0	0	0	0	12	0
Open doors days	2	0	0	0	0	0	0	5	0	0	1	0
Conferences, round tables	30	0	14	36	13	3	0	11	2	0	16	11
Scientific routes	0	0	0	3	0	0	0	0	0	0	0	0
Workshops	4	0	0	0	3	1	0	0	0	0	0	0
Scientific and Techno. Fairs	0	0	0	1	0	0	0	1	0	0	0	0
Science Week	1	0	0	1	1	1	1	0	0	0	0	0
OTHER ACTIVITIES AND FUNDING												
National Plan	0	0	0	0	0	0	0	0	1	2	0	0
Funding (thousands of €)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	41,00	0,00	0,00
National (other)	0	5	2	16	17	0	0	0	2	1	0	0
Funding (thousands of €)	0,00	45,00	48,80	390,90	113,20	0,00	0,00	0,00	5,00	0,00	0,00	0,00
EU	0	0	0	0	0	0	0	0	4	0	0	0
Funding (thousands of €)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
International (other)	0	0	0	1	0	0	0	0	2	0	0	0
Funding (thousands of €)	0,00	0,00	0,00	2,00	0,00	0,00	0,00	0,00	34,40	0,00	0,00	0,00
Regional Governments	4	0	6	22	9	0	0	0	2	0	0	0
Funding (thousands of €)	17,00	0,00	46,90	1.016,10	60,00	0,00	0,00	0,00	63,20	0,00	0,00	0,00

	CAB	CETEF	CFMAC	CNA	CNM	IA	IAA	IAG	IAI	ICE	ICMAT	IEM	IFA	IFCA	IFF	IFIC	IFISC	IFTE	IIIA	IMB-CNM	IMM-CNM	IMS-CNM	IO	IRII	LITEC	OE
RESEARCH PROJECTS																										
National Plan	6	0	0	0	0	3	10	1	8	10	2	9	5	7	0	13	3	2	4	15	2	4	1	3	5	1
Funding (thousands of €)	8.190,80	0,00	0,00	0,00	0,00	204,00	2.227,00	26,00	1.415,00	1.471,80	254,30	627,80	195,00	1.212,20	0,00	3.436,00	10,90	90,00	418,60	992,00	397,60	528,00	36,00	317,20	307,30	18,00
National (other)	1	0	0	1	0	1	9	1	0	1	7	5	3	2	1	9	2	2	2	3	6	0	1	2	1	0
Funding (thousands of €)	40,00	0,00	0,00	30,00	0,00	24,00	173,50	9,50	0,00	11,50	228,60	145,00	165,90	799,00	30,00	1.406,00	30,00	90,00	146,40	143,00	480,50	0,00	7,60	60,00	70,80	0,00
EU	0	0	0	1	0	0	1	0	1	1	2	2	0	3	0	4	1	1	1	4	1	1	1	0	2	0
Funding (thousands of €)	0,00	0,00	0,00	401,10	0,00	0,00	234,20	0,00	692,00	80,00	480,00	547,10	0,00	876,40	0,00	1.095,00	0,00	30,00	350,00	2.250,00	546,30	316,00	388,00	0,00	393,00	0,00
International (other)	0	0	0	1	0	0	0	1	0	2	3	0	0	0	1	11	0	0	0	0	0	0	1	0	0	1
Funding (thousands of €)	0,00	0,00	0,00	6,00	0,00	0,00	0,00	90,00	0,00	145,30	0,00	0,00	0,00	0,00	14,10	57,00	0,00	0,00	0,00	0,00	0,00	0,00	2,70	0,00	0,00	0,60
Regional Governments	0	0	0	3	0	0	22	0	0	1	2	0	2	2	0	10	0	0	0	1	0	0	0	1	2	2
Funding (thousands of €)	0,00	0,00	0,00	356,70	0,00	0,00	2.046,50	0,00	0,00	5,00	58,20	0,00	280,10	10,00	0,00	331,00	0,00	0,00	0,00	205,00	0,00	0,00	0,00	98,20	69,60	8,40
Research by contract (public)	0	0	0	2	0	0	3	0	0	0	0	3	2	3	0	0	0	0	1	34	0	2	3	2	3	2
Funding (thousands of €)	0,00	0,00	0,00	42,00	0,00	0,00	55,20	0,00	0,00	0,00	0,00	86,80	71,10	31,60	0,00	0,00	0,00	0,00	25,90	658,00	0,00	455,00	28,30	175,40	48,30	38,20
Research by contract (private)	0	0	0	2	0	16	0	0	20	0	0	1	10	0	0	0	0	0	1	31	0	1	3	2	3	1
Funding (thousands of €)	0,00	0,00	0,00	104,50	0,00	363,00	0,00	0,00	1.325,00	0,00	0,00	50,00	155,70	0,00	0,00	0,00	0,00	0,00	38,80	725,00	0,00	80,00	120,70	86,30	262,00	223,00
Foundations	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0
Funding (thousands of €)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	12,00	0,00	0,00	0,00	0,00	71,10	0,00
SCIENTIFIC PRODUCTION																										
Articles in SCI-SSCI-AHCI	153	0	0	17	0	10	150	12	40	111	63	171	31	104	63	280	42	72	17	110	48	9	67	13	21	8
Articles in non SCI-SSCI-AHCI	58	0	0	5	0	4	143	5	14	41	8	9	21	2	7	43	11	9	6	3	2	5	8	0	0	4
Books	4	0	0	0	0	0	1	2	4	2	0	0	0	2	0	0	0	0	12	0	0	0	0	2	1	0
Book chapters	17	0	0	0	0	7	1	11	19	2	9	32	12	0	3	0	4	0	33	2	1	0	0	0	1	0
Other monographies	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
National confer. - communic.	23	0	0	5	0	0	16	0	17	13	9	16	12	0	4	0	6	15	1	5	8	12	2	4	4	2
National conferences - posters	18	0	0	0	0	0	2	0	0	2	1	15	1	0	0	0	15	0	0	5	4	0	0	0	2	0
Inter. confer. - communic.	73	0	0	28	0	33	43	21	52	39	40	110	23	26	33	27	54	17	39	69	27	33	61	19	10	14
Inter. confer. - posters	40	0	0	10	0	2	22	7	0	11	2	50	15	5	11	0	21	0	2	45	35	0	31	0	1	6
Thesis	0	0	0	1	0	3	5	0	3	3	1	5	2	3	1	13	0	5	8	9	1	1	6	0	2	0
Courses for post-graduate	6	0	0	1	0	7	7	9	12	3	17	13	21	15	1	0	8	14	19	14	2	0	9	0	12	2
Patents	1	0	0	0	0	3	0	0	2	0	0	0	1	0	0	0	1	0	0	2	7	0	2	0	0	0
SCIENCE OUTREACH																										
National Plan	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	2	0	3	0	0	0	0	0	0	0	0
Funding (thousands of €)	0,00	0,00	0,00	0,00	0,00	0,00	52,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	22,00	0,00	31,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
National (other)	0	0	0	0	0	0	0	1	0	0	0	1	0	2	1	5	0	4	0	0	0	0	0	0	0	2
Funding (thousands of €)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,00	0,00	0,00	0,00	2,00	0,00	21,20	42,00	17,00	0,00	20,30	0,00	0,00	0,00	0,00	0,00	0,00	0,00	11,30
EU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0
Funding (thousands of €)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
International (other)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Funding (thousands of €)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Regional Governments	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Funding (thousands of €)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	18.000,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	12,30
Exposiciones	3	0	0	0	0	0	0	0	1	0	0	0	0	1	2	0	0	0	0	1	0	0	0	1	1	1
CDs y DVDs	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1	0	0
Open doors days	2	0	0	20	0	0	0	3	3	0	0	1	0	10	0	0	1	0	1	1	0	0	1	1	2	1
Conferences, round tables	84	0	0	15	0	0	14	4	3	6	15	8	5	5	13	0	8	53	5	0	3	0	12	16	0	7
Scientific routes	10	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0
Workshops	0	0	0	2	0	0	0	1	0	0	0	0	0	4	16	0	0	5	1	0	0	0	0	2	0	1
Scientific and Techno. Fairs	3	0	0	1	0	0	0	1	1	0	1	0	0	1	1	0	2	0	3	1	0	0	0	1	1	1
Science Week	1	0	0	1	0	0	5	1	1	1	4	8	2	1	1	0	1	0	1	1	1	0	1	2	1	2
OTHER ACTIVITIES AND FUNDING																										
National Plan	0	0	0	0	0	2	0	0	6	0	0	0	0	0	0	3	2	0	2	1	0	1	1	1	0	0
Funding (thousands of €)	0,00	0,00	0,00	0,00	0,00	13,00	0,00	0,00	23,00	0,00	0,00	0,00	0,00	0,00	0,00	47,00	82,00	0,00	10,40	559,50	0,00	7,00	10,00	8,80	0,00	0,00
National (other)	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1	0	0	0	9
Funding (thousands of €)	1.969,20	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,50	0,00	2,00	0,00	0,00	0,00	0,00	1,00	0,00	0,00	0,00	487,20
EU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Funding (thousands of €)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
International (other)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Funding (thousands of €)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Regional Governments	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	4	0	0	0	0	0	0	1	2	0
Funding (thousands of €)	0,00	0,00	0,00	0,00	0,00	13,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	9,00	242,30	0,00	0,00	0,00	0,00	0,00	0,00	5,00	61,70	0,00

	CENIM	CFM	CIN2	ICMA	ICMAB	ICMM	ICMS	ICTP	ICV	IETCC
RESEARCH PROJECTS										
National Plan	9	2	14	20	3	8	6	1	7	23
Funding (thousands of €)	682,00	42,00	712,00	2.847,00	183,00	1.600,00	1.028,00	25,00	192,60	1.366,10
National (other)	12	6	18	7	17	2	1	4	4	0
Funding (thousands of €)	625,00	171,00	1.446,00	812,00	1.210,00	560,00	32,00	160,00	189,90	0,00
EU	2	1	14	4	3	1	1	1	1	4
Funding (thousands of €)	274,00	323,00	1.627,00	677,00	901,00	300,00	14,00	690,00	0,00	346,80
International (other)	0	0	3	0	5	0	0	1	1	0
Funding (thousands of €)	0,00	0,00	20,00	0,00	57,00	0,00	0,00	13,00	11,50	0,00
Regional Govemments	0	2	4	8	3	4	5	1	1	0
Funding (thousands of €)	0,00	14,00	252,00	281,00	76,00	60,00	781,30	29,00	13,00	0,00
Research by contract (public)	7	0	0	4	0	2	1	0	0	2
Funding (thousands of €)	26,00	0,00	0,00	652,00	0,00	100,00	7,20	0,00	0,00	2.734,30
Research by contract (private)	71	0	5	6	9	3	8	9	28	197
Funding (thousands of €)	516,00	0,00	190,00	263,00	790,00	125,00	826,50	513,00	681,60	6.138,90
Foundations	0	0	1	0	0	0	0	0	0	0
Funding (thousands of €)	0,00	0,00	220,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
SCIENTIFIC PRODUCTION										
Articles in SCI-SSCI-AHCI	98	115	154	281	185	356	84	98	84	69
Articles in non SCI-SSCI-AHCI	15	5	10	22	6	16	4	13	12	19
Books	0	0	0	1	2	0	1	0	1	8
Book chapters	5	3	7	7	1	12	9	13	2	13
Other monographies	23	0	1	0	23	0	0	0	17	0
National confer. - communic.	28	1	32	30	38	38	9	29	39	48
National conferences - posters	29	0	5	41	44	58	10	17	27	0
Inter. confer. - communic.	47	45	82	60	151	129	43	47	39	78
Inter. confer. - posters	27	35	21	98	100	143	34	40	49	0
Thesis	9	1	6	14	10	11	4	12	6	6
Courses for post-graduate	20	140	13	75	23	27	3	2	77	12
Patents	4	0	2	4	8	0	1	0	1	1
SCIENCE OUTREACH										
National Plan	0	1	0	2	2		0	0	0	0
Funding (thousands of €)	0,00	12,00	0,00	26,00	14,00	0,00	0,00	0,00	0,00	0,00
National (other)	3	0	0	0	3	0	0	0	3	0
Funding (thousands of €)	16,60	0,00	0,00	0,00	8,00	0,00	0,00	0,00	0,00	0,00
EU	0	0	0	0	0		0	0	3	0
Funding (thousands of €)	0,00	0,00	0,00	0,00	0,00		0,00	0,00	0,00	0,00
International (other)	0	0	0	0	1	0	0	0	0	0
Funding (thousands of €)	0,00	0,00	0,00	0,00	14,00	0,00	0,00	0,00	0,00	0,00
Regional Governments	0	0	0	2	1	1	0	0	0	0
Funding (thousands of €)	0,00	0,00	0,00	42,00	6,00	0,60	0,00	0,00	0,00	0,00
Exposiciones	5	0	2	1	2	0	0	0	0	5
CDs y DVDs	0	0	1	1	1	0	0	0	0	1
Open doors days	0	1	0	7	1	2	1	0	1	2
Conferences, round tables	0	5	15	29	128	0	3	10	10	69
Scientific routes	0	0	0	0	0	0	0	0	0	5
Workshops	1	43	8	0	2	1	0	0	0	4
Scientific and Techno. Fairs	0	0	0	3	3	0	1	0	0	3
Science Week	2	2	0	1	1	1	1	0	1	2
OTHER ACTIVITIES AND FUNDING										
National Plan	0	0	0	0	2	0	0	0	0	1
Funding (thousands of €)	0,00	0,00	0,00	0,00	8,00	0,00	0,00	0,00	0,00	4,40
National (other)	0	19	0	1	0	0	2	0	0	0
Funding (thousands of €)	0,00	0,00	0,00	543,00	0,00	0,00	60,00	0,00	0,00	0,00
EU	0	0	0	0	0	0	0	0	0	0
Funding (thousands of €)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
International (other)	0	0	0	0	0	0	0	0	0	0
Funding (thousands of €)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Regional Governments	0	0	0	25	0	0	8	0	0	0
Funding (thousands of €)	0,00	0,00	0,00	414,00	0,00	0,00	99,40	0,00	0,00	0,00

	IATA	ICTAN	ICVV	IF	IFI	IG	IPLA
RESEARCH PROJECTS							
National Plan	6	0	2	43	2	2	2
Funding (thousands of €)	660,00	0,00	420,00	2.613,00	27,30	79,50	30,00
National (other)	2	0	5	0	5	4	2
Funding (thousands of €)	56,00	0,00	96,70	0,00	215,10	60,00	60,00
EU	1	0	0	5	1	0	5
Funding (thousands of €)	421,00	0,00	0,00	1.308,00	187,20	0,00	691,50
International (other)	0	0	0	0	2	0	0
Funding (thousands of €)	0,00	0,00	0,00	0,00	17,00	0,00	0,00
Regional Govemments	9	0	9	4	1	7	4
Funding (thousands of €)	147,00	0,00	132,30	194,00	27,50	769,50	410,10
Research by contract (public)	2	0	3	4	4	0	1
Funding (thousands of €)	30,00	0,00	678,50	35,00	7,50	0,00	30,20
Research by contract (private)	25	0	0	56	22	17	2
Funding (thousands of €)	603,00	0,00	0,00	2.160,00	336,90	248,70	69,20
Foundations	0	0	1	0	0	1	0
Funding (thousands of €)	0,00	0,00	2,50	0,00	0,00	390,00	0,00
SCIENTIFIC PRODUCTION							
Articles in SCI-SSCI-AHCI	126	0	33	127	114	111	30
Articles in non SCI-SSCI-AHCI	4	0	5	46	21	12	11
Books	2	0	0	1	0	0	1
Book chapters	27	0	4	34	13	10	7
Other monographies	0	0	10	3	0	0	0
National confer. - communic.	23	0	12	24	14	8	1
National conferences - posters	24	0	36	29	23	17	13
Inter. confer. - communic.	44	0	8	49	32	12	1
Inter. confer. - posters	75	0	17	40	76	26	6
Thesis	13	0	2	7	6	9	3
Courses for post-graduate	24	0	25	38	33	39	2
Patents	6	0	0	2	1	6	2
SCIENCE OUTREACH							
National Plan	0	0	0	0	0	0	0
Funding (thousands of €)	0,00	0,00	0,00	0,00	0,00	0,00	0,00
National (other)	0	0	0	7	0	0	0
Funding (thousands of €)	0,00	0,00	0,00	6,00	0,00	0,00	0,00
EU	0	0	0	0	0	0	0
Funding (thousands of €)	0,00	0,00	0,00	0,00	0,00	0,00	0,00
International (other)	0	0	0	0	0	0	0
Funding (thousands of €)	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Regional Governments	0	0	0	0	0	0	0
Funding (thousands of €)	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Exposiciones	0	0	0	0	0	0	0
CDs y DVDs	1	0	0	0	0	0	0
Open doors days	0	0	0	3	3	0	0
Conferences, round tables	0	0	24	37	0	0	3
Scientific routes	4	0	0	0	0	0	0
Workshops	0	0	17	0	0	0	1
Scientific and Techno. Fairs	0	0	0	2	0	0	0
Science Week	20	0	0	1	1	0	1
OTHER ACTIVITIES AND FUNDING							
National Plan	0	0	0	1	0	0	0
Funding (thousands of €)	0,00	0,00	0,00	12,00	0,00	0,00	0,00
National (other)	0	0	0	1	0	0	0
Funding (thousands of €)	0,00	0,00	0,00	6,00	0,00	0,00	0,00
EU	0	0	0	0	0	0	0
Funding (thousands of €)	0,00	0,00	0,00	0,00	0,00	0,00	0,00
International (other)	0	0	0	0	0	0	0
Funding (thousands of €)	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Regional Governments	0	0	0	1	0	0	0
Funding (thousands of €)	0,00	0,00	0,00	12,00	0,00	0,00	0,00

	ICB	ICP	IDAEA	IIQ	INCAR	IPNA	IQAC	IQFR	IQM	IQOG	ITQ
RESEARCH PROJECTS											
National Plan	0	6	35	0	14	9	8	6	1	2	2
Funding (thousands of €)	0,00	314,60	1.350,00	0,00	1.509,00	448,30	1.070,00	963,20	205,00	494,00	154,00
National (other)	4	7	1	4	0	7	7	4	6	7	7
Funding (thousands of €)	98,90	261,10	1,10	320,10	0,00	154,00	448,00	188,40	377,00	926,30	126,00
EU	2	0	25	1	0	0	1	1	0	0	1
Funding (thousands of €)	501,60	0,00	685,00	129,90	0,00	0,00	260,00	291,50	0,00	0,00	142,00
International (other)	0	4	7	1	10	0	0		0	1	0
Funding (thousands of €)	0,00	5,00	53,00	15,00	459,00	0,00	0,00	0,00	0,00	57,80	0,00
Regional Governments	9	0	9	3	13	1	3		1	1	9
Funding (thousands of €)	250,70	0,00	160,00	743,30	1.256,00	14,00	289,00		17,00	32,00	249,00
Research by contract (public)	3	1	31	0	0	1	0	0	1	0	0
Funding (thousands of €)	36,80	65,00	1.100,00	0,00	0,00	27,00	0,00	0,00	10,00	0,00	0,00
Research by contract (private)	14	20	27	0	23	1	11	2	3	2	19
Funding (thousands of €)	535,10	1.829,70	1.090,00	0,00	1.949,00	18,00	712,00	103,00	238,00	270,00	2.126,00
Foundations	1	0	0	0	0	3	2	0	0	0	1
Funding (thousands of €)	4,80	0,00	0,00	0,00	0,00	37,60	0,60	0,00	0,00	0,00	150,00
SCIENTIFIC PRODUCTION											
Articles in SCI-SSCI-AHCI	50	156	162	45	91	50	118	127	90	82	92
Articles in non SCI-SSCI-AHCI	4	22	32	2	5	5	20	10	0	6	3
Books	0	2	4	0	1	5	0	2	1	1	2
Book chapters	0	6	15	2	6	2	2	10	3	11	3
Other monographies	0	1	0	0	0	1	0	0	0	1	0
National confer. - communic.	6	8	5	12	11	15	15	21	6	9	17
National conferences - posters	15	2	2	15	3	17	6	30	0	17	10
Inter. confer. - communic.	21	47	4	14	38	15	70	38	4	6	54
Inter. confer. - posters	37	61	5	28	51	12	44	49	13	23	38
Thesis	4	12	10	5	3	7	10	1	5	10	3
Courses for post-graduate	7	33	17	4	2	2	13	36	5	15	29
Patents	3	17	1	3	0	0	1	3	3	1	9
SCIENCE OUTREACH											
National Plan	0	0	0	0	2	0	0	1	0	0	0
Funding (thousands of €)	0,00	0,00	0,00	0,00	55,00	0,00	0,00	20,00	0,00	0,00	0,00
National (other)	0	4	0	0	0	0	0	34	1	0	0
Funding (thousands of €)	0,00	4.500,00	0,00	0,00	0,00	0,00	0,00	383,70	0,50	0,00	0,00
EU	0	0	0	0	0	0	0	0	0	0	0
Funding (thousands of €)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
International (other)	0	0	0	0	0	0	0	0	0	0	0
Funding (thousands of €)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Regional Governments	0	0	0	0	1	0	0	1	0	0	0
Funding (thousands of €)	0,00	0,00	0,00	0,00	11,00	0,00	0,00	5,00	0,00	0,00	0,00
Exposiciones	1	0	0	0	1	1	0	0	0	0	0
CDs y DVDs	0	0	0	0	1	0	0	1	0	0	0
Open doors days	6	3	1	12	0	12	0	0	1	4	6
Conferences, round tables	5	1	50	0	2	7	39	0	4	12	20
Scientific routes	0	0	0	0	0	2	0	0	0	0	0
Workshops	0	0	0	0	0	0	0	2	1	1	1
Scientific and Techno. Fairs	2	2	1	1	0	0	0	0	1	1	1
Science Week	1	2	10	1	1	4	1	4	1	3	2
OTHER ACTIVITIES AND FUNDING											
National Plan	2	0	0	0	0	1	0	0	0	0	0
Funding (thousands of €)	18,90	0,00	0,00	0,00	0,00	5,10	0,00	0,00	0,00	0,00	0,00
National (other)	1	0	0	0	0	0	0	10	0	3	0
Funding (thousands of €)	6,00	0,00	0,00	0,00	0,00	0,00	0,00	7,00	0,00	8,90	0,00
EU	0	0	0	0	0	0	0	0	0	0	0
Funding (thousands of €)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
International (other)	0	0	0	0	0	0	0	0	0	0	0
Funding (thousands of €)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Regional Governments	2	0	0	1	1	0	0	0	0	0	0
Funding (thousands of €)	41,40	0,00	0,00	107,40	4,00	0,00	0,00	0,00	0,00	0,00	0,00

08

Spanish National Research Council

Directory

GOBIERNO DE ESPAÑA
MINISTERIO DE CIENCIA E INNOVACIÓN
CSIC

INSTITUTE	ADDRESS	TEL /FAX
CSIC-ORGANIZATION CENTRAL http://www.csic.es/	Serrano 117 28006 MADRID	91 568 14 00 91 411 30 77
DEPARTMENT OF POSTGRADUATE AND SPECIALIZED STUDIES DPYE http://www.postgrado.csic.es/index.html	Serrano nº 113 28006 MADRID	91 585 5131 91 563 09 47
PUBLICATIONS DEPARTMENT http://www.publicaciones.csic.es:8080/CSIC/inicio.html	Vitruvio, 8 28006 MADRID	91 5159670 91 5614851
TECHNOLOGY TRANSFER OFFICE OTT http://www.ott.csic.es/index.html	Serrano, 142 28006 MADRID	91 585 53 01 91 585 51 96
LIBRARY COORDINATION UNIT CBIC http://bibliotecas.csic.es/red/unidad.html	Joaquín Costa, 22, 3ª planta 28002 MADRID	91 568 16 63 91 568 16 81
CENTRO ANDALUZ DE BIOLOGIA MOLECULAR Y MEDICINA REGENERATIVA CABIMER http://www.cabimer.es	AMERICO VESPUCIO S/N. ISLA DE LA CARTUJA 41092 SEVILLA	954.46.80.04 954.46.16.64
CENTRO ANDALUZ DE BIOLOGIA DEL DESARROLLO CABD http://www.upo.es/CABD/	CARRETERA DE UTRERA KM.1 41013 SEVILLA	954/97.79.11 - 97.75.66 - 34.86.72 954/34.93.76
CENTRO DE BIOLOGIA MOLECULAR SEVERO OCHOA CBM http://www2.cbm.uam.es/	NICOLAS CABRERA, 1 28049 MADRID	91-196.44.01 91-196.44.20
CENTRO DE CIENCIAS MEDIOAMBIENTALES CCMA http://www.ccma.csic.es/	SERRANO, 115 BIS 28006 MADRID	91-745.25.00-562.50.20 91-564.08.00
CENTRO DE ASTROBIOLOGIA CAB http://www.cab.inta.es/	CARRETERA DE AJALVIR, KM. 4 28850 TORREJON DE ARDOZ (MADRID)	91-520.64.26/64.58/64.23 91-520.64.24
CENTRO DE CIENCIAS HUMANAS Y SOCIALES CCHS http://www.cchs.csic.es/	ALBASANZ, 26-28 PLANTA BAJA 28037 MADRID	91-602.23.00 91-602.29.71
CENTRO DE FISICA DE MATERIALES CFM http://ufm.ehu.es	Pº MANUEL DE LARDIZABAL, 3 20018 SAN SEBASTIAN	94-301.59.64 94-301.56.00
CENTRO DE EDAFOLOGIA Y BIOLOGIA APLICADA DEL SEGURA CEBAS http://www.cebas.csic.es/	CAMPUS UNIVERSITARIO DE ESPINARDO 30100 ESPINARDO (MURCIA)	968-39.62.00-85-84 968-39.62.13
CENTRO DE ESTUDIOS AVANZADOS DE BLANES CEAB http://www.ceab.csic.es/	CAMINO DE SANTA BARBARA 17300 BLANES (GERONA)	972-33.61.01/33.61.02 972-33.78.06
CENTRO DE FISICA MIGUEL A. CATALAN CFMAC http://www.cfmac.csic.es/	SERRANO, 121 28006 MADRID	91-561.68.00 91-564.55.57
CENTRO DE INVESTIGACIONES BIOLOGICAS CIB http://www.cib.csic.es/	RAMIRO DE MAEZTU, 9 28040 MADRID	91-837.31.12 91-536.04.32

INSTITUTE	ADDRESS	TEL /FAX
CENTRO DE INVESTIGACION CARDIOVASCULAR CIC http://www.csic-iccc.org	AVD. S. ANTONI M. CLARET, 167 08025 BARCELONA	93-556.59.00 93-556.55.59
CENTRO DE INVESTIGACIONES CIENTIFICAS ISLA DE LA CARTUJA CICIC http://www.cartuja.csic.es/	AMERICO VESPUCIO S/N. ISLA DE LA CARTUJA 41092 SEVILLA	95-448.95.01 95-446.01.65
CENTRO DE INVESTIGACIONES SOBRE DESERTIFICACION CIDE http://www.uv.es/cide/	CAMI DE LA MARJAL, S/N 46470 ALBAL (VALENCIA)	96-122.05.40 96-127.09.67
CENTRO DE INVESTIGACION Y DESARROLLO PASCUAL VILA CID http://www.cid.csic.es/	JORGE GIRONA SALGADO, 18-26 08034 BARCELONA	93-400.61.00/400.61.02 93-204.59.04
CENTRO DE INVESTIGACION DE NANOMATERIALES Y NANOTECNOLOGIA CINN	FRANCISCO PINTADO FE, 26 33011 OVIEDO	985-11.90.90
CENTRO MEDITERRANEO DE INVESTIGACIONES MARINAS Y AMBIENTALES CMIMA http://www.cmima.csic.es/	PASSEIG MARITIM, 37-49 08003 BARCELONA	93-230.95.00 93-230.95.55
CENTRO NACIONAL DE ACELERADORES CNA http://www.centro.us.es/cna/	TOMAS ALBA EDISON, 7. ISLA DE CARTUJA 41092 SEVILLA	95-446.05.53 95-446.01.45
CENTRO NACIONAL DE BIOTECNOLOGIA CNB http://www.cnb.csic.es/	C/ DARWIN, 3. CANTOBLANCO 28049 MADRID	91-585.45.00 91-585.45.06
CENTRO NACIONAL DE INVESTIGACIONES METALURGICAS CENIM http://www.cenim.csic.es/	AVDA.GREGORIO DEL AMO S/N 28040 MADRID	91-553.89.00 91-534.74.25
CENTRO NACIONAL DE MICROELECTRONICA CNM http://www.cnm.es/	CAMPUS UNIVERSIDAD AUTONOMA 08193 BELLATERRA (BARCELONA)	93-594.77.00 93-580.14.96
CENTRO DE QUIMICA ORGANICA LORA TAMAYO CENQUIOR http://www.cenquior.csic.es/	JUAN DE LA CIERVA, 3 28006 MADRID	91-562.29.00 91-564.48.53
CENTRO DE TECNOLOGIAS FISICAS L. TORRES QUEVEDO CETEF http://www.cetef.csic.es/	SERRANO, 144 28006 MADRID	91-561.88.06/561.13.04 91-411.76.51
CENTRO DE INVESTIGACION EN NANOCIENCIA Y NANOTECNOLOGIA CIN2	CAMPUS UAB -EDIFICI Q - 2ª PLANTA 08193 BELLATERRA (BARCELONA)	93-581.49.69 93-586.80.20
ESCUELA ESPAÑOLA DE HISTORIA Y ARQUEOLOGIA EEHAR http://www.csic.it	VIA DI TORRE ARGENTINA, 18 00186 ROMA (ITALIA)	390668.10.00.21/68.10.00.23 390668.30.90.47
ESCUELA DE ESTUDIOS ARABES EEA http://www.eea.csic.es/	CUESTA DEL CHAPIZ, 22 18010 GRANADA	958-22.22.90/22.34.59 958-22.47.54
ESCUELA DE ESTUDIOS HISPANO-AMERICANOS EEHA http://www.eeha.csic.es/	ALFONSO XII, 16 41002 SEVILLA	95-450.11.20- 450.09.52 95-422.43.31
ESTACION BIOLOGICA DE DOÑANA EBD http://www.ebd.csic.es/	AVDA. MARIA LUISA S/N. PABELLON PERU 41013 SEVILLA	954-23.23.40/23.23.48 95-462.11.25

INSTITUTE	ADDRESS	TEL /FAX
ESTACION EXPERIMENTAL AULA DEI EEAD http://www.eead.csic.es/	CARRETERA MONTAÑANA, 177 50016 ZARAGOZA	976-71.61.00 976-71.61.45
ESTACION EXPERIMENTAL DEL ZAIDIN EEZ http://www.eez.csic.es/	PROFESOR ALBAREDA, 1 18008 GRANADA	958-18.16.00/18.16.03 958-12.96.00
ESTACION EXPERIMENTAL LA MAYORA EELM http://www.eelm.csic.es/	ALGARROBO-COSTA (MALAGA) 29750 MALAGA	95-255.26.56 95-255.26.77
ESTACION EXPERIMENTAL DE ZONAS ARIDAS EEZA http://www.eeza.csic.es/	GENERAL SEGURA, 1 04001 ALMERIA	950-28.10.45 950-27.71.00
INSTITUCION MILA Y FONTANALS IMF http://www.imf.csic.es/	EGIPCIACAS, 15 08001 BARCELONA	93-442.34.89 93-443.00.71
INSTITUTO DE FISICA FUNDAMENTAL IFF http://www.imaff.cfmac.csic.es/	SERRANO, 113BIS Y 123 28006 MADRID	91-561.68.00/590.16.19 91-585.48.94
INSTITUTO DE LENGUA, LITERATURA Y ANTROPOLOGIA ILLA http://www.ile.csic.es/	ALBASANZ, 26-28 - 1ª PLANTA 28037 MADRID	91-602.23.00 91-304.57.10
INSTITUTO DE ACUICULTURA TORRE DE LA SAL IATS http://www.iats.csic.es/	12595 TORRE DE LA SAL (CASTELLON)	964-31.95.00 964-31.95.09
INSTITUTO DE ACUSTICA IA http://www.ia.csic.es/	SERRANO, 144 28006 MADRID	91-561.88.06/561.13.04 91-411.76.51
INSTITUTO DE AGRICULTURA SOSTENIBLE IAS http://www.ias.csic.es/	ALAMEDA DEL OBISPO, S/N 14004 CORDOBA	957-49.92.00;01-02 957-49.92.52
INSTITUTO DE AGROQUIMICA Y TECNOLOGIA DE ALIMENTOS IATA http://www.iata.csic.es/	POLIGONO LA COMA S/N 46980 PATERNA (VALENCIA)	96-390.00.22 96-363.63.01
INSTITUTO DE ANALISIS ECONOMICO IAE http://www.iae.csic.es/	CAMPUS UNIVERSIDAD AUTONOMA 08193 BELLATERRA (BARCELONA)	93-580.66.12 93-580.14.52
INSTITUTO ANDALUZ DE CIENCIAS DE LA TIERRA IACT http://www.iact.csic.es	FAC. CIENCIAS. AVDA. FUENTENUEVA S/N 18002 GRANADA	958-24.31.58/24.30.02 958-24.33.84
INSTITUTO DE ARQUEOLOGIA IAM http://www.iam.csic.es	PL. ESPAÑA, 15 06800 MERIDA (BADAJOZ)	924-31.56.61 924-31.56.53
INSTITUTO DE ASTROFISICA DE ANDALUCIA IAA http://www.iaa.es/	CAMINO BAJO DE HUETOR, 50 18008 GRANADA	958-12.13.11 958-81.45.30
INSTITUTO DE ASTRONOMIA Y GEODESIA IAG http://www.iag.csic.es/	UNIVERSIDAD COMPLUTENSE(FAC.MATEMATICAS) 28040 MADRID	91-394.45.85/394.45.86 91-394.46.15
INSTITUTO DE AUTOMATICA INDUSTRIAL IAI http://www.iai.csic.es/	KM. 22,800 CTRA. MADRID-VALENCIA 28500 ARGANDA DEL REY (MADRID)	91-871.19.00 91-871.70.50

INSTITUTE	ADDRESS	TEL /FAX
INSTITUTO DE BIOLOGIA MOL. Y CEL. DEL CANCER DE SALAMANCA IBMCC http://www.cicancer.org/	CAMPUS MIGUEL DE UNAMUNO 37007 SALAMANCA	923-29.47.20 923-29.47.43
INSTITUTO DE BIOLOGIA MOL. Y CEL. DE PLANTAS PRIMO YUFERA IBMCP http://www.ibmcp.upv.es/	CAMPUS UNIV.POLITEC.AVD.LOS NARANJOS S/N 46022 VALENCIA	96-387.78.50-51-52/387.77.30 96-387.78.59
INSTITUTO DE BIOLOGIA EVOLUTIVA IBE	PASSEIG MARITIM DE LA BARCELONETA, 37 08003 BARCELONA	93/230.96.36 93/204.95.55
INSTITUTO DE BIOLOGIA MOLECULAR DE BARCELONA IBMB http://www.ibmb.csic.es/	BALDIRI REIXAC, 10 08028 BARCELONA	93-4003.46.68 93-403.49.79
INSTITUTO DE BIOLOGIA MOLECULAR ELADIO VIÑUELA IBMEV http://www2.cbm.uam.es/	NICOLAS CABRERA, 1. CAMPUS DE CANTOBLANCO 28049 MADRID	91-497.50.70 / 91-497.47.99
INSTITUTO DE BIOLOGIA Y GENETICA MOLECULAR IBGM http://www.ibgm.med.uva.es/	SANZ Y FORES, S/N 47003 VALLADOLID	983-18.48.01 983-18.48.00
INSTITUTO DE BIOMEDICINA Y BIOTECNOLOGIA DE CANTABRIA IBBTEC	CARDENAL HERRERA ORIA, S/N 39011 SANTANDER	942/20.19.85-64 942/20.19.03
INSTITUTO DE BIOMEDICINA DE SEVILLA IBIS	HOSPITAL UNIVERSITARIO VIRGEN DEL ROCIO 41003 SEVILLA	95/501.28.19
INSTITUTO DE BIOMEDICINA DE VALENCIA IBV http://www.ibv.csic.es	JAIME ROIG, 11 46010 VALENCIA	96-339.17.60 96-369.08.00
INSTITUTO DE BIOQUIMICA VEGETAL Y FOTOSINTESIS IBVF http://www.ibvf.cartuja.csic.es/	AMERICO VESPUCIO S/N. ISLA DE LA CARTUJA 41092 SEVILLA	95-448.95.06 95-446.00.65
INSTITUTO BOTANICO DE BARCELONA IBB http://www.institutbotanic.bcn.es/	PASSEIG MIGDIA, S/N. PARQUE DE MONJUIC 08038 BARCELONA	93-289 06 11 93- 289 06 14
INSTITUTO CAJAL IC http://www.cajal.csic.es/	DOCTOR ARCE, 37 28002 MADRID	91-585.47.50/585.47.49 91-585.47.54
INSTITUTO DE CARBOQUIMICA ICB http://www.icb.csic.es/	MIGUEL LUESMA CASTAN, 4 50015 ZARAGOZA	976-73.39.77 976-73.33.18
INSTITUTO DE CATALISIS Y PETROLEOQUIMICA ICP http://www.icp.csic.es/	CSIC. CAMPUS DE CANTOBLANCO 28049 MADRID	91-585.48.00/585.47.80 91-585.47.60
INSTITUTO DE CERAMICA Y VIDRIO ICV http://www.icv.csic.es/	CSIC. CAMPUS DE CANTOBLANCO 28049 MADRID	91-735.58.40 91-735.58.43
INSTITUTO DE CIENCIA DE MATERIALES DE ARAGON ICMA http://icma.csic.unizar.es/	FAC. FISICAS PL. SAN FRANCISCO S/N 50009 ZARAGOZA	976-76.12.31/76.10.00 976-76.24.53
INSTITUTO DE CIENCIA DE MATERIALES DE BARCELONA ICMAB http://www.icmab.es/	CAMPUS UNIVERSIDAD AUTONOMA 08193 BELLATERRA (BARCELONA)	93-580.18.53 93-580.57.29

INSTITUTE	ADDRESS	TEL /FAX
INSTITUTO DE CIENCIA DE MATERIALES DE MADRID ICMM http://www.icmm.csic.es/	CSIC. CAMPUS DE CANTOBLANCO 28049 MADRID	91-334.90.00 91-372.06.23
INSTITUTO DE CIENCIA DE MATERIALES DE SEVILLA ICMS http://www.icmse.cartuja.csic.es/	AMERICO VESPUCIO S/N. ISLA DE LA CARTUJA 41092 SEVILLA	95-448 95 27 95-446 06 65
INSTITUTO DE CIENCIA Y TECNOLOGIA DE ALIMENTOS Y NUTRICION ICTAN	JOSE ANTONIO NOVAIS, 10 28040 MADRID	91-549.23.00 91-549.36.27
INSTITUTO DE CIENCIA Y TECNOLOGIA DE POLIMEROS ICTP http://www.ictp.csic.es/	JUAN DE LA CIERVA, 3 28006 MADRID	91-562.29.00 91-564.48.53
INSTITUTO DE CIENCIAS AGRARIAS ICA http://www.ccma.csic.es/	SERRANO, 115 BIS 28006 MADRID	91-745.25.00-562.50.20 91-564.08.00
INSTITUTO DE CIENCIAS DE LA CONSTRUCCION EDUARDO TORROJA IETCC http://www.ietcc.csic.es/	SERRANO GALVACHE, 4 28033 MADRID	91-302.04.40 91-302.07.00
INSTITUTO DE CIENCIAS DE LA VID Y DEL VINO ICVV http://www.icvv.es/	C/ MADRE DE DIOS, 51 26006 LOGROÑO (LA RIOJA)	941-29.96.98 - 941-29.96.71 941-29.97.21
INSTITUTO DE CIENCIAS DEL ESPACIO ICE http://www.ice.csic.es	TORRE C5-PARES. CAMPUS UAB 08193 BELLATERRA (BARCELONA)	93-581.43.52 93-581.43.63
INSTITUTO DE CIENCIAS DEL MAR ICM http://www.icm.csic.es/	PASSEIG MARITIM, 37-49 08003 BARCELONA	93-230.95.00 93-230.95.55
INSTITUTO DE CIENCIAS MARINAS DE ANDALUCIA ICMAN http://www.icman.csic.es/	AVD. REPUBLICA SAHARAUI, S/N 11510 PUERTO REAL (CADIZ)	956-83.26.12 956-83.47.01
INSTITUTO DE CIENCIAS MATEMATICAS ICMAT http://www.icmat.es	SERRANO, 123 28006 MADRID	91-561.68.00 EXT. 3118 91-585.48.94
INSTITUTO DE CIENCIAS DE LA TIERRA JAUME ALMERA ICTJA http://www.ija.csic.es/	LUIS SOLE I SABARIS, S/N 08028 BARCELONA	93-409.54.10 93-411.00.12
INSTITUTO DE AGROBIOTECNOLOGIA IDAB http://www.agrobiotecnologia.com/es	CARRETERA DE MUTILVA BAJA, S/N 31192 MUTILVA BAJA (NAVARRA)	948-16.80.00 948-23.21.91
INSTITUTO DE GANADERIA DE MONTAÑA IGM http://www.eae.csic.es/	FCA.MARZANAS.CTRA. LEON-VEGA DE INFANZ. 24346 GRULLEROS (LEON)	987-31.70.64/31.71.56 987-31.71.61
INSTITUTO DE LA GRASA IG http://www.ig.csic.es	AVDA. PADRE GARCIA TEJERO, 4 41012 SEVILLA	95-461.15.50/469.25.16 95-429.89.24
INSTITUTO DE POLITICAS Y BIENES PUBLICOS IPP http://www.iesam.csic.es/	ALBASANZ, 26-28, 3ª MODULO D 28037 MADRID	91-6022300 91-375.77.41

INSTITUTE	ADDRESS	TEL /FAX
INSTITUTO DE DIAGNOSTICO AMBIENTAL Y ESTUDIOS DEL AGUA IDAEA	JORGE GIRONA SALGADO, 18-26 08034 BARCELONA	93-400.61.00/400.61.02 93-204.59.04
INSTITUTO DE ECONOMIA, GEOGRAFIA Y DEMOGRAFIA IEGD http://www.ieg.csic.es/	ALBASANZ, 26-28. 3ª MODULO F 28037 MADRID	91-6022300 91-3045710
INSTITUTO DE ESTUDIOS ISLAMICOS Y DEL ORIENTE PROXIMO IEIOP http://www.ieiop.com/	C/ DE LOS DIPUTADOS, 19-21. ALJAFERIA 50004 ZARAGOZA	976/40.47.22 976/40.47.25
INSTITUTO DE ESTRUCTURA DE LA MATERIA IEM http://www.iem.cfmac.csic.es/	SERRANO, 113BIS, 119, 121 Y 123 28006 MADRID	91-561.68.00 91-564.55.57
INSTITUTO DE ESTUDIOS DOCUMENTALES SOBRE CIENCIA Y TECNOLOGIA IEDCYT http://www.cindoc.csic.es/	C/ ALBASANZ, 26-28 28037 MADRID	91-6022300 91-3045710
INSTITUTO DE ESTUDIOS GALLEGOS PADRE SARMIENTO IEGPS http://www.iegps.csic.es/	RUA DE SAN ROQUE, 2 15704 SANTIAGO COMPOSTELA (A CORUÑA)	981-54.02.20 - 23 981-54.02.25
INSTITUTO DE ESTUDIOS SOCIALES AVANZADOS IESA http://www.iesa.csic.es/	CAMPO SANTO DE LOS MARTIRES, 7 14004 CORDOBA	957-76.06.25/76.06.27 957-76.01.53
INSTITUTO DE FARMACOLOGIA Y TOXICOLOGIA IFT http://www.ift.csic.es/	UNIVERSIDAD COMPLUTENSE (FAC. MEDICINA) 28040 MADRID	91-394.14.69/394.14.72 91-394.14.70
INSTITUTO DE FERMENTACIONES INDUSTRIALES IFI http://www.ifi.csic.es/	JUAN DE LA CIERVA, 3 28006 MADRID	91-562.29.00 91-564.48.53
INSTITUTO DE FILOSOFIA IFS http://www.ifs.csic.es/	C/ ALBASANZ, 26-28. 3ª MODULO C 28037 MADRID	91-6022300 91-3045710
INSTITUTO DE FISICA INTERDISCIPLINAR Y SISTEMAS COMPLEJOS IFISC http://ifisc.uib.es/	CAMPUS UNIVERSITAT ILLES BALEARS 07122 PALMA DE MALLORCA	971-17.32.90 971-17.32.48
INSTITUTO DE FISICA APLICADA IFA http://www.ifa.csic.es/	SERRANO, 144 28006 MADRID	91-561.88.06/561.13.04 91-411.76.51
INSTITUTO DE FISICA CORPUSCULAR IFIC http://ific.uv.es/	POLIGONO LA COMA S/N 46980 PATERNA (VALENCIA)	96-35434.73 96-354.34.88
INSTITUTO DE FISICA DE CANTABRIA IFCA http://www.ifca.unican.es/	EDIFICIO JUAN JORDA. UNIV. CANTABRIA 39005 SANTANDER	942-20.14.59 942-20.09.35
INSTITUTO DE FISICA TEORICA IFTE http://gesalerico.ft.uam.es	FACULTAD DE CIENCIAS. UNIV. AUTONOMA 28049 MADRID	91-497.39.97 - 497.85.43 91-497.85.57
INSTITUTO DEL FRIO IF http://www.if.csic.es/	JOSE ANTONIO NOVAIS, 10 28040 MADRID	91-544.56.07/549.23.00 91-549.36.27

INSTITUTE	ADDRESS	TEL /FAX
INSTITUTO DE GEOLOGIA ECONOMICA IGE http://www.ige.csic.es/	UNIVERSIDAD COMPLUTENSE (FAC.GEOLOGICAS) 28040 MADRID	91-544.03.79/394.48.13 91-394.48.08
INSTITUTO DE GESTION DE LA INNOVACION Y DEL CONOCIMIENTO INGENIO http://www.ingenio.upv.es/	CIUDAD POLITECNICA INNOVACION ED.8E 46022 VALENCIA	96-387.70.48 96-387.79.91
INSTITUTO DE HISTORIA IH http://www.ih.csic.es/	ALBASANZ, 26-28 - 2ª PLANTA 28037 MADRID	91-602.23.00 91-304.57.10
INSTITUTO DE HISTORIA DE LA MEDICINA Y DE LA CIENCIA LOPEZ PIÑERO IHMC http://www.uv.es/~fresquet/TEXTOS	PALACIO DE CERVERO. PLZ. CISNEROS, 4 46003 VALENCIA	96-392.62.29 96-391.96.91
INSTITUTO DE INVESTIGACIONES AGROBIOLOGICAS DE GALICIA IIAG http://www.iiag.csic.es/	AVDA. DE VIGO S/N 15706 SANTIAGO COMPOSTELA (A CORUÑA)	981-59.09.58/59.09.62 981-59.25.04
INSTITUTO DE INVESTIGACIONES BIOMEDICAS ALBERTO SOLS IIB http://www.iib.uam.es/	ARTURO DUPERIER, 4 28029 MADRID	91585.44.00/585.43.95/585.43.94 91-585.44.01
INSTITUTO DE INVESTIGACIONES BIOMEDICAS DE BARCELONA IIBB http://www.iibb.csic.es/	ROSELLON, 161. 6 Y 7 PLANTA 08036 BARCELONA	93-363.83.00/05 93-363.83.01
INSTITUTO DE INVESTIGACION EN RECURSOS CINEGETICOS IREC http://www.uclm.es/irec/	RONDA DE TOLEDO, S/N 13005 CIUDAD REAL	926-29.54.50 926-29.54.51
INSTITUTO DE INVESTIGACION EN INTELIGENCIA ARTIFICIAL IIIA http://www.iiia.csic.es/	CAMPUS UNIVERSIDAD AUTONOMA 08193 BELLATERRA (BARCELONA)	93-580.95.70 93/580.96.61
INSTITUTO DE INVESTIGACIONES MARINAS IIM http://www.iim.csic.es/	EDUARDO CABELLO, 6 36208 VIGO (PONTEVEDRA)	986-23.19.30 986-29.27.62
INSTITUTO DE INVESTIGACIONES QUIMICAS IIQ http://www.iiq.cartuja.csic.es	AMERICO VESPUCIO S/N. ISLA DE LA CARTUJA 41092 SEVILLA	95-448.95.53 95-446.05.65
INSTITUTO DE INVESTIGACION EN CIENCIAS DE ALIMENTACION CIAL	JUAN DE LA CIERVA, 3 28006 MADRID	91-562.29.00 91-564.48.53
INSTITUTO DE LENGUAS Y CULTURAS DEL MEDITERRANEO Y ORIENTE PROXIMO ILC http://www.filol.csic.es/	ALBASANZ, 26-28 - 1ª PLANTA 28037 MADRID	91-602.23.00 91-304.57.10
INSTITUTO MEDITERRANEO DE ESTUDIOS AVANZADOS IMEDEA http://www.imedea.uib.es/	MIQUEL MARQUES, Nº 21 07190 ESPORLES (MALLORCA)	971-61.17.14 971-61.17.61
INSTITUTO DE MICROBIOLOGIA BIOQUIMICA IMB http://imb.usal.es/	EDIF.DEPARTAMENTAL AVD. CAMPO CHARRO S/N 37007 SALAMANCA	923-29.44.62 923-22.48.76
INSTITUTO DE MICROELECTRONICA DE BARCELONA IMB-CNM http://www.imb-cnm.csic.es	CAMPUS UNIVERSIDAD AUTONOMA 08193 BELLATERRA (BARCELONA)	93-594.77.00 93-580.14.96

INSTITUTE	ADDRESS	TEL /FAX
INSTITUTO DE MICROELECTRONICA DE MADRID IMM-CNM http://www.imm-cnm.csic.es/	ISAAC NEWTON, 8. TRES CANTOS 28760 MADRID	91-806.07.00 91-806.07.01
INSTITUTO DE MICROELECTRONICA DE SEVILLA IMS-CNM http://www.imse.cnm.es/	AMERICO VESPUCIO, S/N. ISLA DE LA CARTUJA 41092 SEVILLA	95-446.66.01 95-446.66.69
INSTITUTO NACIONAL DEL CARBON INCAR http://www.incar.csic.es/	LA CORREDORIA, S/N 33011 OVIEDO	98-511.90.90 98-529.76.62
INSTITUTO DE NEUROCIENCIAS IN http://in.umh.es/	CTRA. DE VALENCIA N-332, KM. 87 03550 SAN JUAN (ALICANTE)	96-523.37.00 96-591.95.61
INSTITUTO DE OPTICA DAZA DE VALDES IO http://www.io.cfmac.csic.es/	SERRANO, 121 28006 MADRID	91-561.68.00 91-564.55.57
INSTITUTO DE PARASITOLOGIA Y BIOMEDICINA LOPEZ NEYRA IPBLN	AVD. DEL CONOCIMIENTO, S/N 18100 ARMILLA (GRANADA)	958-18.16.21/28/26 958-18.16.32 http://www.ipb.csic.es/
INSTITUTO PIRENAICO DE ECOLOGIA IPE http://www.ipe.csic.es/	AVD. MONTAÑANA, S/N 50016 ZARAGOZA	976-71.60.34-22 976-71.60.19
INSTITUTO DE PRODUCTOS NATURALES Y AGROBIOLOGIA IPNA http://www.ipna.csic.es/	AVD. ASTROF. F. SANCHEZ, 3 38205 LA LAGUNA (TENERIFE)	922-25.21.44/25.32.48 922-26.01.35
INSTITUTO DE PRODUCTOS LACTEOS DE ASTURIAS IPLA http://www.ipla.csic.es/	CTRA. DE INFIESTO, S/N 33300 VILLAVICIOSA (ASTURIAS)	98-589.21.31/589.22.33 98-589.22.33
INSTITUTO DE QUIMICA AVANZADA DE CATALUÑA IQAC	JORGE GIRONA SALGADO, 18-26 08034 BARCELONA	93-400.61.00/400.61.02 93-204.59.04
INSTITUTO DE QUIMICA FISICA ROCASOLANO IQFR http://www.iqfr.csic.es/	SERRANO, 119 28006 MADRID	91-561.94.00;585.52.47/49 91-564.24.31
INSTITUTO DE QUIMICA MEDICA IQM http://www.iqm.csic.es/	JUAN DE LA CIERVA, 3 28006 MADRID	91-562.29.00 91-564.48.53
INSTITUTO DE QUIMICA ORGANICA GENERAL IQOG http://www.iqo.csic.es/	JUAN DE LA CIERVA, 3 28006 MADRID	91-562.29.00 91-564.48.53
INSTITUTO DE RECURSOS NATURALES Y AGROBIOLOGIA DE SALAMANCA IRNASA http://www.irnasa.csic.es/	CORDEL DE MERINAS, 42-54 37008 SALAMANCA	923-21.96.06 923-21.96.09
INSTITUTO DE RECURSOS NATURALES Y AGROBIOLOGIA SEVILLA IRNAS http://www.irnase.csic.es/	AVDA. REINA MERCEDES, 10 41012 SEVILLA	954-62.47.11 954-62.40.02
INSTITUTO DE RECURSOS NATURALES IRN http://www.ccma.csic.es/	SERRANO, 115 BIS 28006 MADRID	91-745.25.00-562.50.20 91-564.08.00

INSTITUTE	ADDRESS	TEL /FAX
INSTITUTO DE ROBOTICA E INFORMATICA INDUSTRIAL IRII http://www-iri.upc.es	LLORENS I ARTIGUES, 4-6, 2º - EDIFICIO U 08028 BARCELONA	93-401.57.51 93-401.57.50
INSTITUTO DE TECNOLOGIA QUIMICA ITQ http://www.upv.es/itq/	CAMPUS UNIV.POLITEC.AVD.LOS NARANJOS S/N 46022 VALENCIA	96-387.78.01/387.78.00 96-387.78.09
LABORATORIO DE INVESTIGACION EN TECNOLOGIA DE LA COMBUSTION LITEC http://www.litec.csic.es/	MARIA DE LUNA, 10 50018 ZARAGOZA	976-71.63.03 976-71.64.56
MISION BIOLOGICA DE GALICIA MBG http://www.mbg.csic.es/	PALACIO DE SALCEDO. CARBALLEIRA, 8 36143 SALCEDO (PONTEVEDRA)	986-85.48.00 986-84.13.62
MUSEO NACIONAL DE CIENCIAS NATURALES MNCN http://www.mncn.csic.es/	JOSE GUTIERREZ ABASCAL, 2 28006 MADRID	91-561.86.00/411.13.28 91-564.50.78
OBSERVATORIO DE FISICA COSMICA DEL EBRO OE http://www.obsebre.es	HORTA ALTA, 38 43520 ROQUETES (TARRAGONA)	977-50.05.11 977-50-46-60
REAL JARDIN BOTANICO RJB http://www.rjb.csic.es/	PLAZA DE MURILLO, 2 28014 MADRID	91-420.30.17 91-420.01.57
UNIDAD DE BIOFISICA UBF http://www.ehu.es/biofisica	FACULTAD DE CIENCIAS. BARRIO SARRIENA S/N 48940 LEIOA (BILBAO)	94-601.26.25 94-601.33.60
UNIDAD DE TECNOLOGIA MARINA UTM http://www.utm.csic.es	PASSEIG MARITIM, 37-49 08003 BARCELONA	93-230.95.00 93-230.95.55
RESIDENCIA DE ESTUDIANTES RESMA http://www.residencia.csic.es/	PINAR, 21 28006 MADRID	91-561.32.00 91-563.81.27
RESIDENCIA DE INVESTIGADORES (CSIC-GENERALITAT) RESCA http://www.resa.es	HOSPITAL, 64 08001 BARCELONA	93-443.86.10 93-442.82.02
RESIDENCIA DE SEVILLA RESAN	ALFONSO XII, 18 41002 SEVILLA	95-450.09.53 954-422.43.31

CSIC DELEGATIONS

DELEGATION IN BRUSSELS
RUE TRÔNE, 62 - 1050 BRUSELAS (BELGICA)
Tel. 32-2-2892562 • Fax 32 2 2892565

DELEGATION IN ANDALUSIA
ALFONSO XII, 16 - 41002 SEVILLA
Tel. 95-450.11.20 • Fax 95-422.43.31
http://www.d-andalucia.csic.es/

DELEGATION IN ARAGON
PLZ. EMILIO ALFARO, 2-3 - 50003 ZARAGOZA
Tel. 976-46.96.08 • Fax 976-46.96.09
http://www.dicar.csic.es/

DELEGATION IN THE CANARY ISLANDS
AVD. ASTROF. F. SANCHEZ, 3
38205 LA LAGUNA (TENERIFE)
Tel. 922-25.17.28 • 25.21.44 • Fax 922-26.01.35

DELEGATION IN CASTILE-LEON
JESUS RIVERO MENESES, 2 - 47014 VALLADOLID
Tel. 983-37.84.22 • Fax 983-34.50.16
http://www.dicyl.csic.es/

DELEGATION IN CATALONIA
EGIPCIACAS,15 - 08001 BARCELONA
Tel. 93-442.65.76/442.91.23 • Fax 93-442.74.24
http://www.dicat.csic.es

DELEGATION IN GALICIA
RUA DO FRANCO, 2
15701 SANTIAGO COMPOSTELA (A CORUÑA)
Tel. 981-55.27.88 • Fax 981-58.20.49
http://www.delegacion.galicia.csic.es/

DELEGATION IN MADRID
SERRANO,113 - 28006 MADRID
Tel. 91-585.53.44 • Fax 91-585.52.97
http://www.dicm.csic.es/principal.htm

DELEGATION IN ROME
VIA DI TORRE ARGENTINA, 18 00186
ROMA (ITALIA)
Tel. 390668.10.00.21/23/24/ • Fax 390668.30.90.47
http://www.csic.it/

DELEGATION IN VALENCIA
CRONISTA CARRERES, Nº 11-2º C
46003 VALENCIA
Tel. 96-362.27.57 • Fax 96-339.20.25
http://www.dicv.csic.es/

GOBIERNO
DE ESPAÑA

MINISTERIO
DE CIENCIA
E INNOVACIÓN

CSIC