



GOBIERNO
DE ESPAÑA

MINISTERIO
DE CIENCIA, INNOVACIÓN
Y UNIVERSIDADES



CSIC
CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS

2023 ANNUAL REPORT

© Agencia Estatal Consejo Superior de Investigaciones Científicas

Date of edition: July 2024

e-NIPO: 155-24-176-9

Legal Deposit: M-18876-2024

Distributed under the terms of a Creative Commons Attribution 4.0 International licence



Publications Catalogue of the Spanish General State Administration:

<https://cpage.mpr.gob.es>

Coordination:

Technical Assistance and Coordination Unit (UCAT) / CSIC President's Office

Documentary sources:

BDC

conCIENCIA

GESPER

SCG

Corporate databases (DVP Knowledge Transfer)

ORION

Acceso 360/Brandwatch/own research tool

Images:

iStock

Pexels

Pixabay

Fotciencia 17, 18, 19 y 20

CSIC Communications Department

Front cover:

Figure with a face belonging to the Tartessos culture

Design and layout:

Dioni Martín

Translation:

Emma Clare Barraclough



CSIC

CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS

ANNUAL REPORT 2023

Letter from the President



ELOÍSA DEL PINO MATUTE
PRESIDENT OF THE CSIC

Spanish society should indeed be proud of the work that, throughout 2023, was carried out by almost 15,000 people who work at the CSIC, the largest public research organisation in the country and the third in Europe, attached to the Ministry of Science, Innovation and Universities. With this report, the CSIC wishes to give an account of this collective effort that is carried out in its 150 centres distributed throughout Spain's autonomous regions.

I must begin by highlighting some of the many scientific achievements framed within the 6,000 national and international projects obtained by CSIC researchers and published in 13,000 scientific papers. This year, our researchers have managed, for instance, to better understand the mechanisms involved in microbial resistance, the structure of the protein responsible for Huntington's disease, to identify the formation of mitochondrial DNA or genetic mutations that cause diseases such as cancer. They have participated in the development of a methodology to monitor the electrical activity of the brain after suffering a stroke and obtained a new anti-inflammatory drug that can replace corticosteroids. Technological progress, for example, in imaging devices or nanomaterials, is already being useful to detect viruses, diagnose diseases, administer drugs or monitor mortality attributed to heat.

With a *One Health* perspective, which relates the health of all living beings, a new vaccine against canine leishmaniasis has been developed, while an artificial protein capable of degrading plastics and combating environmental pollution has been designed. The prevention of zoonoses, the control of food composition and medicines used in animals, the cultivation of fish or the adverse effects of climate change on biodiversity, from Doñana to the deepest areas of the

oceans, are some of the topics addressed. The health of the extensive Spanish forests, the prevention and management of fires and droughts have also attracted the attention of several CSIC centres.

Interesting progress has been made in terms of food contamination, listeriosis, the impact of acrylamide on the body, the quality of different edible fats or the development of digital twins to study wine fermentation. We have worked on issues such as sustainability and crop improvement in the context of climate change and proposed new varieties of wheat, oats, olive trees or other crops with a better response to drought, rising temperatures or new pests.

The CSIC has contributed technology to the *Euclid* mission of the European Space Agency to study Jupiter, having participated in obtaining the sharpest images achieved so far in a very distant region, up to 10,000 million years, and in the discovery of new planets and the capture, through the space *James Webb* telescope (NASA), of the image of a new red supergiant star, *Quyllur*. We have also managed to explain certain characteristics of the expansion of the universe and get closer to the secrets of its gestation through the discovery of a unique planetary system.

The CSIC has numerous centres that work on critical materials. Progress has been made in devices that achieve green hydrogen with less iridium, a very scarce metal, and in understanding the operation of relatively novel materials that can be used for different purposes, including quantum computing or the development of chips that provide physical protection for equipment. It participates in the largest alliance of the Spanish automotive industry to promote electric cars, the recycling of materials and their use optimisation. Breakthrough in robotics and artificial

intelligence applied to the care of dependent people, to the performance of field tasks or in transport is another achievement within CSIC research areas.

Three news items that have attracted the most attention in 2023 have to do with archaeology: the finding of the first human representations of Tartessus (fifth century BC), the recovery of a female bacchante statue in Tusculum and the opening to the public of the ancient Egyptian tombs of Djehuty and Hery, after 22 excavation campaigns, and the exhibition of this Djehuty Project in the Luxor Museum. The CSIC has also digitised the Greek manuscripts of the Royal Library of the Monastery of San Lorenzo de El Escorial and, within the framework of the TeresIA project, is designing an information extraction methodology applying artificial intelligence and Natural Language Processing techniques. The presence of the gender issue in electoral campaigns and the impact of digitalisation on the wage gap have been analysed and, using *machine learning*, a model has been developed that identifies countries that live in peace, but are at risk of conflict.

The CSIC is a solidarity-based organisation and demonstrated this by sharing its advances in the development of the Covid-19 vaccine with the World Health Organisation. This year it has participated in the elaboration of the new WHO plan to deal with future influenza pandemics, has made 9,812 scientific advisory reports to public institutions and has begun to develop an Advisory Protocol in Emergencies and Catastrophes. The CSIC will be aligned with current social and environmental needs thanks to its First Sustainability Plan.

By 2023, 190 assets have been protected, of which 90 have been licensed, and 12 knowledge-based companies have been created. The new Science for Public Policy collection

and the CICERO programme presented to society research in the four areas chosen by the Government of Spain for the Spanish Presidency of the Council of the EU (health, food, energy and digitalisation). The CSIC has moved forward in its internationalisation goal by assuming the Vice-Presidency of Science Europe, reinforcing its network of internationalisation technicians and strengthening ties with the main European scientific institutions and with new partners on other continents.

Throughout the year, we have worked to further strengthen the scientific quality of the organisation with the MaX Programme aimed at supporting centres that show a commitment to achieving a SOMMA seal of excellence. The activity of the Connections and the PTIs was also reinforced; plans for Biomedicine, Social Sciences and Artificial Intelligence began to be drawn up and the Office for Large Infrastructures was established.

The retention of managerial, scientific and technical talent is a priority. The MOV-TEC, MOV-GES and IMOVE mobility programmes and the talent recruitment strategies in the Ramón y Cajal and Juan de la Cierva calls were reviewed. The work to attract young people to the organisation has been boosted with 400 scholarships for introduction to research, the recovery of the JAE-PRE programme and the formalisation of 543 predoctoral contracts.

In terms of scientific outreach, more than 13,000 activities have been carried out and ALUMNI CSIC has been strengthened to remind all those who have spent time at the CSIC that they have a meeting space.

Thanks to the support of the Ministries of Science, Innovation and Universities and the Treasury, a major milestone was achieved in 2023: the approval of the Management Contract

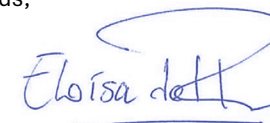
of the State Agency CSIC, which implies the incorporation of increased funding and staff for the next four years, as well as more management facilities within the framework of a modern management model based on objectives.

The Organisation had the honour of presenting the CSIC Gold Medal to the Nobel Laureate in Physics, Donna Strickland, an act with which the CSIC wished to recognise the task of its Committee for Women and Science in the celebration of its 20th anniversary. I would like to highlight the effort made by the organisation in 2023 to apply the Democratic Memory Law and thank the President of the Government, Pedro Sánchez, for his visit, who, together with the Minister of Science, Innovation and Universities, Diana Morant, met with several researchers to learn about their work on plastics, food and citizen science.

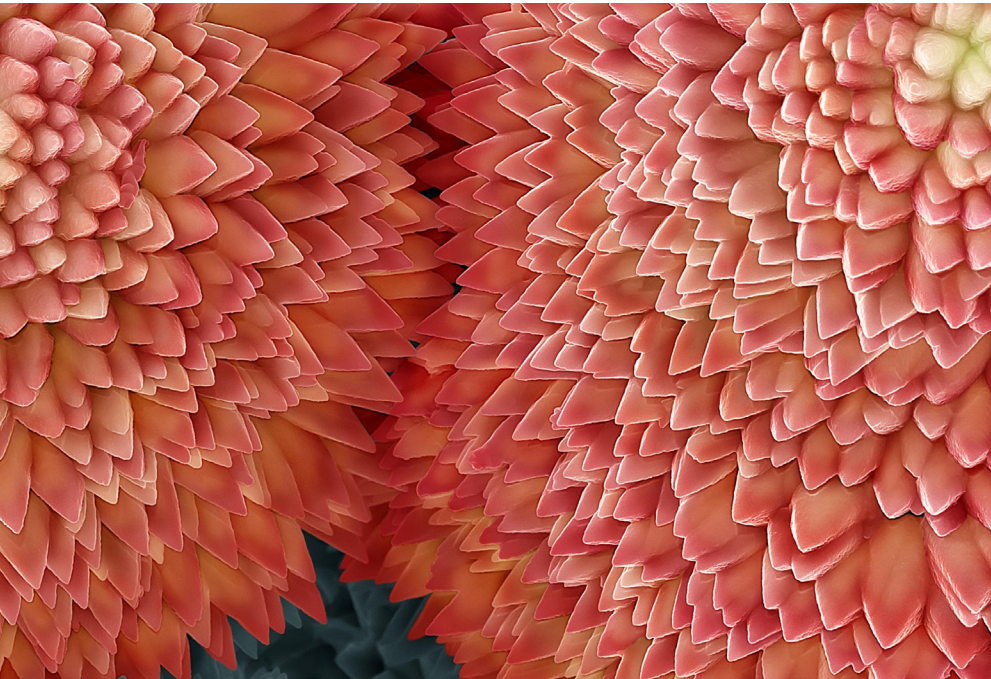
I would also like to congratulate all those many colleagues who have received national or international recognition for their scientific work and, on behalf of them, a special mention to the eight CSIC scientists who received the National Research Award, those who achieved ERC funding and the CSIC centres that achieved the SOMMA award of excellence.

Last of all, I would like to thank all the staff for their hard work and fondly remember all the colleagues who are no longer with us, in particular, María del Carmen Fernández Vázquez.

Warm regards,



Contents



Organisational Chart	13
Governing bodies and executive body	14
Collegiate support and advisory bodies	15
Institutional Representation of the CSIC in the Autonomous Regions and in the EU	17
Structure of the Scientific-Technical Areas	17



Staff and economic data	19
Research and research support structures	21
Institutional relations and scientific collaboration	23
Current national and international projects and actions	25
Scientific output	27
Excellence	29
Knowledge transfer	32
International projection	33
Training of research staff	35
Equality	36



Scientific-Technical Areas: data and milestones	39	Internationalisation	92
Collaboration structures: PTI and Connections	83	Large research infrastructures	97
Innovation and Transfer	88	Scientific-technical services	101
		Ethics in research	102

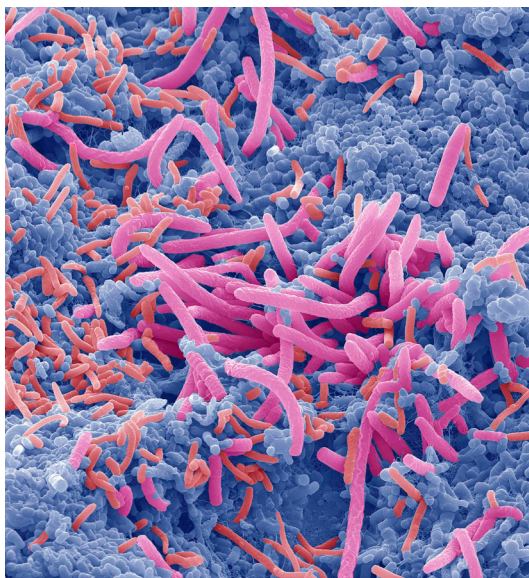


Science for public policy	104
Scientific culture and citizen science	106



CSIC IN THE MEDIA

Title: To be or not to be.
Author: Isabel María Sánchez Almazo.
Co-authors: Dolores Molina Fernández,
Concepción Hernández Castillo and Elisabeth Escamilla Roa.



According to a study by CSIC researchers, social interactions shape the composition of our microbiome.

[+]

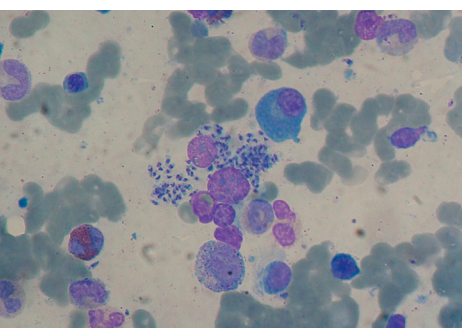


The CSIC participates in the largest Spanish automotive alliance to promote electric cars.

[+]

Superbugs, the silent pandemic.

[+]



CSIC and Zendal develop a new vaccine against canine leishmaniosis.

[+]



Pedro Sánchez meets with CSIC scientists to learn about their research in plastics, food and citizen science.

[+]



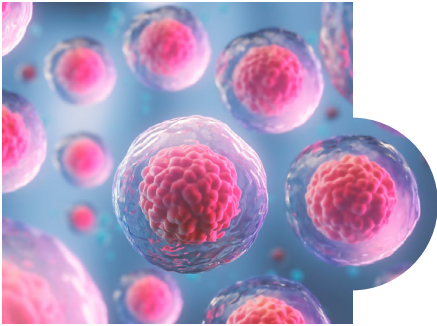
Doñana in a critical condition: more than half of its lakes have disappeared.

[+]



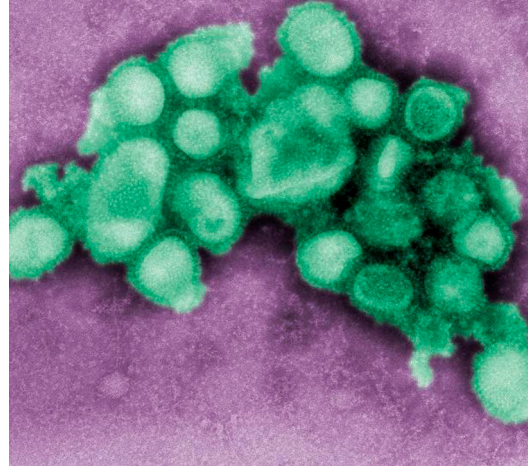
CSIC researchers find the first human representations of Tartessus.

[+]



Genetically modified stem cells to boost cancer immunotherapy.

[+]



The CSIC participates in the elaboration of the new WHO plan to deal with future influenza pandemics.

[+]



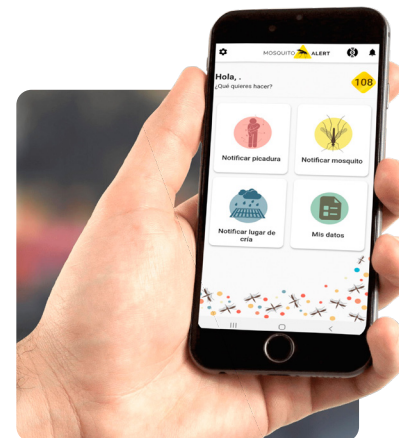
The CSIC presents a collection of reports to contribute to the development of policies based on scientific evidence.

[+]



Ambitious genomic sequencing of 800 primates reveals keys to identify the mutations that cause diseases such as cancer.

[+]



The Ministry of Health is committed to citizen science by integrating Mosquito Alert as a surveillance tool.

[+]



Experts say greenhouse emissions are at an all-time high and causing unprecedented global warming.

[+]



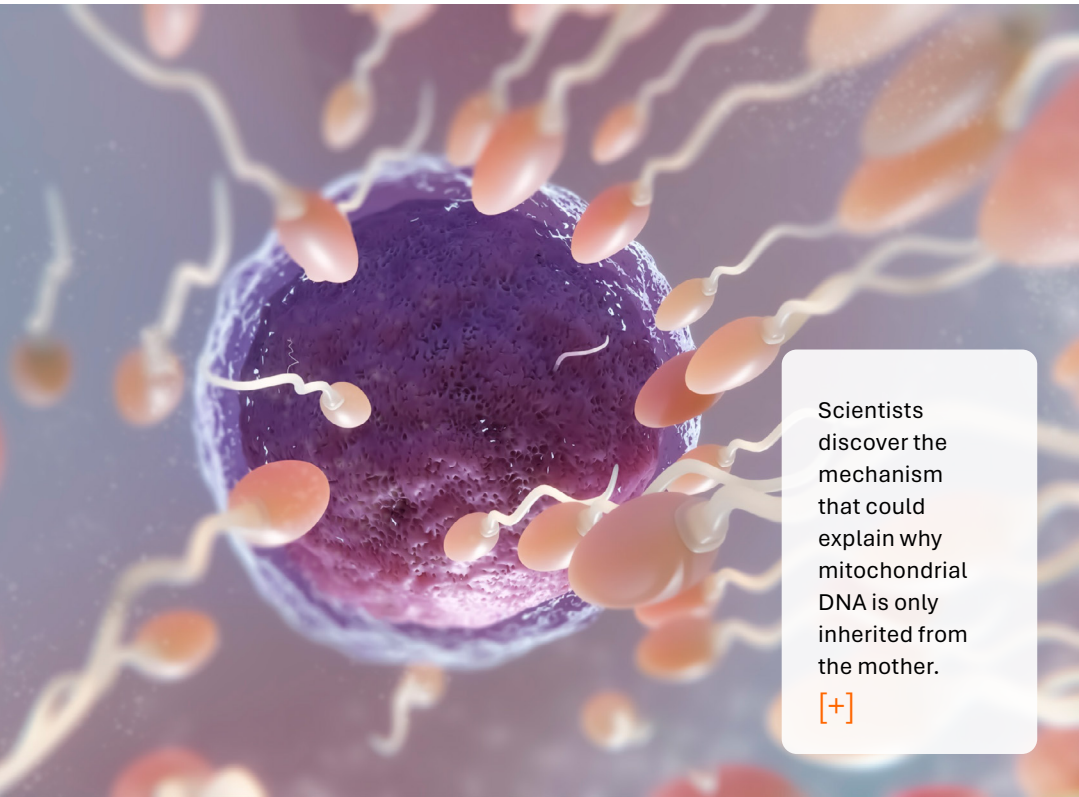
The CSIC shares its progress in the development of the covid-19 vaccine with the WHO so that it reaches developing countries.

[+]



Scientists have developed an artificial protein capable of filtering and degrading plastics.

[+]



Scientists discover the mechanism that could explain why mitochondrial DNA is only inherited from the mother.

[+]



A new application monitors mortality caused by heat in Spain.

[+]



The 2023 National Research Awards acknowledge the work of eight CSIC researchers.

[+]



The first images from the Euclid telescope delve into the dark universe.

[+]



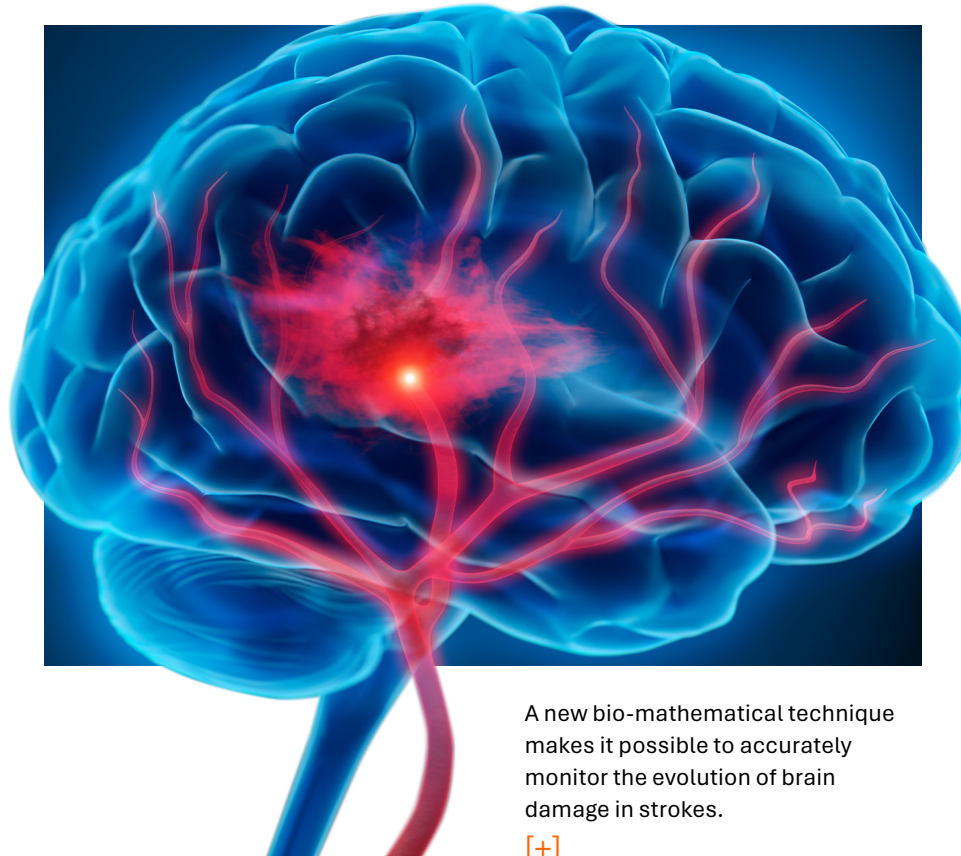
A new non-steroidal anti-inflammatory and immune regulator drug that can replace corticosteroids is developed.

[+]



CSIC and Bioinicia co-develop more sustainable cosmetic products composed only of bioactive ingredients.

[+]



A new bio-mathematical technique makes it possible to accurately monitor the evolution of brain damage in strokes.

[+]

FEATURING IN THE MEDIA

PRESS

16,724

TELEVISION / RADIO

2,185

DIGITAL MEDIA

107,004

SOCIAL NETWORKS

49,552

TOTAL FEATURES

175,465

CORPORATE ORGANISATION OF THE CSIC

Organisational Chart	13
Governing bodies and executive body	14
Collegiate support and advisory bodies	15
Institutional Representation of the CSIC in the Autonomous Regions and in the EU	17
Structure of the Scientific-Technical Areas	17

Organisational Chart



GOVERNING BOARD



PRESIDENCY

Eloísa del Pino Matute

WOMEN & SCIENCE COMMITTEE

MONITORING COMMITTEE

ETHICS COMMITTEE

SCIENTIFIC ADVISORY COMMITTEE



PRESIDENT'S OFFICE

Isabel Martínez Sierra

PRESIDENCY ADVISORY MEMBER

M^a Isabel Varela Nieto

DVP SCIENTIFIC CULTURE

M. Purificación Fernández Rodríguez

ICTS & ESFRI COMMITTEE



VICE-PRESIDENCY FOR SCIENTIFIC & TECHNICAL RESEARCH

José M^a Martell Berrocal

DPV FOR SCIENTIFIC PROGRAMMING

Jaime Juan Carvajal García-Valdecasas

DPV FOR SCIENTIFIC-TECHNICAL AREAS

Elena Cartea González

POST-GRADUATE & SPECIALISATION DEPT

Carmen Simón Mateo

SCIENTIFIC-TECHNICAL AREAS



VICE-PRESIDENCY FOR ORGANISATION AND INSTITUTIONAL RELATIONS

Carlos Closa Montero

DPV FOR INSTITUTIONAL RELATIONS

Ana Isabel Criado Contreras

DPV FOR ORGANISATION

Inés Galindo Jiménez

SCIENTIFIC INFORMATION RESOURCES UNIT

INSTITUTIONAL REPRESENTATION IN AUTONOMOUS REGIONS



VICE-PRESIDENCY FOR INTERNATIONAL RELATIONS

Francisco Javier Moreno Fuentes

DPV INTERNATIONALISATION AND COOPERATION

Isabel Díaz Carretero

INTERNATIONAL PROGRAMMES

COOPERATION & INTERNATIONAL RESOURCES

E.U. CSIC INSTITUTIONAL DELEGATION



VICE-PRESIDENCY FOR INNOVATION AND TRANSFER

(in progress)

Ana Castro Morera

COMMERCIAL STRATEGY AND INTERNATIONALISATION

INDUSTRIAL PROPERTY AND ENTREPRENEURSHIP SUPPORT



GENERAL SECRETARIAT

Ignacio Gutiérrez Llano

DSG FOR ECONOMIC PERFORMANCE

M. Esther Vaquero Redondo

DSG FOR HUMAN RESOURCES

Beatriz Esteban Añover

DSG FOR INFRASTRUCTURE & WORKS

M. Carmen González Peñalver

DSG FOR INFORMATION TECH

Mar Fernández Fernández

LEGAL DEPARTMENT

PRINCIPAL OFFICER

MANAGEMENT OFFICE

Governing bodies and executive body

PRESIDENCY

One-person **Governing** Board.

One-person **Executive** Board.

Article 11 of the Statute of the State Agency CSIC (RD 1730/2007, of December 21).

Their decisions take the form of circulars and resolutions and put an end to the administrative procedures. The President's Office carries out advisory and support functions.

CHAIR

ELOÍSA DEL PINO MATUTE

Appointed by agreement of the Council of Ministers on June 22, 2022 (Royal Decree 498/2022 of June 21. BOE No. 148, June 22, 2022).

GOVERNING BOARD

Collegiate **governing** body of the CSIC (Chapter II, sections one and two of the CSIC Statute) in charge of the approval of relevant matters such as the Agency's Strategic Plan, the preliminary draft budget, the annual accounts, the activities report and the creation of research institutes, among other functions.

PRESIDENCY

ELOÍSA DEL PINO MATUTE
President of the CSIC

DIRECTORS REPRESENTING DIFFERENT MINISTRIES

Ministry of Science, Innovation and Universities

GONZALO ARÉVALO NIETO
Director General of Research Planning (until 19/12/2023)

Ministry of Finance

JUAN JOSÉ HERRERA CAMPA
Director General of Staff Costs and Public Pensions

Ministry of the Presidency, Justice and Relations with the Parliament

M^a EUGENIA DE LA CERA
Director of the Minister's Cabinet (since 11/12/2023)

Ministry of Health

SILVIA CALZÓN FERNÁNDEZ
Secretary of State for Health (until 28/11/2023)

Ministry for Ecological Transition and Demographic Challenge

M^a JESÚS RODRÍGUEZ DE SANCHO
Director General of Biodiversity, Forests and Desertification

Ministry of Agriculture, Fisheries and Food

ISABEL BOMBAL DÍAZ
Director General of Rural Development, Innovation and Agri-Food Training

DIRECTORS OF RECOGNISED PRESTIGE IN THE FIELD OF SCIENTIFIC RESEARCH AND TECHNOLOGICAL DEVELOPMENT

AMPARO MORALED A MARTÍNEZ
Independent Director of Airbus Group SE, Caixabank SA, Vodafone Plc. and A.P. Moller-Maersk A/S.

MARGARITA DEL VAL LATORRE
OPI Research Scientist

FRANCISCO JAVIER LAFUENTE SANCHO
Chancellor of the Universitat Autònoma de Barcelona (since 5/10/2023)

MONTSERRAT TORNÉ i ESCASANY
OPI Research Scientist

DANIEL RAMÓN VIDAL
Biópolis, S.L.

DIRECTORS REPRESENTING THE MAJOR TRADE UNION ORGANISATIONS

CCOO

ALICIA DURÁN CARRERA
OPI Research Professor

UGT

FRANCISCO JAVIER SÁNCHEZ ESPAÑA
OPI Tenured Scientist

CSIF

RICARDO PEDRO MARTÍNEZ MURILLO
OPI Tenured Scientist

ACTING AS SECRETARY OF THE GC (non-member)

IGNACIO GUTIÉRREZ LLANO
General Secretary of the CSIC

The Monitoring Committee is constituted within the Governing Board (Art. 14 CSIC Statute) composed of the following members:

PRESIDENCY

MONTSERRAT TORNÉ i ESCASANY

MEMBERS

JUAN JOSÉ HERRERA CAMPA

GONZALO ARÉVALO NIETO
(until 19/12/2023)

ISABEL BOMBAL DÍAZ

ALICIA DURÁN CARRERA

2023. Renewal of members of the Governing Board, resignations: Rafael Oñate Molina (former Ministry of the Presidency, Relations with the Parliament and Democratic Memory) and Juan Romo Urroz (Chancellor of the Universidad Carlos III of Madrid).

Collegiate support and advisory bodies

SCIENTIFIC ADVISORY COMMITTEE

Collegiate body of **support to the Presidency and the Governing Board** (articles 7 and 15 of the CSIC Statute) responsible for advising on scientific and technological aspects.

PRESIDENCY

ELOÍSA DEL PINO MATUTE

SECRETARIAT

JAIME JUAN CARVAJAL
GARCÍA-VALDECASAS

MEMBERS

JOSE MARÍA MARTELL BERROCAL

CARLOS CLOSA MONTERO

FRANCISCO JAVIER MORENO FUENTES

ELENA CARTEA GONZÁLEZ

MEMBERS APPOINTED BY THE GOVERNING BOARD

ANTONIO ALCAMÍ

TERESA BUSTO DEL CASTILLO

JOAN FONT FÀBREGAS

EMMA HUERTAS CABILLA

LUIS M. LIZ-MARZÁN

ÁNGELA NIETO TOLEDANO

ESTEBAN RODRÍGUEZ SÁNCHEZ

ALBERTO SANFELIU CORTÉS

MONTSERRAT VILÀ PLANELLA

STEERING COMMITTEE

Internal collegiate body responsible for ensuring that the Organisation's direction and strategies are carried out in a coordinated manner among all its members, informing and being informed of those issues deemed appropriate.

President

ELOÍSA DEL PINO MATUTE

Vice-President of Scientific and Technical Research

JOSÉ MARÍA MARTELL BERROCAL

Vice-President of Organisation and Institutional Relations

CARLOS CLOSA MONTERO

Vice-President of International Relations

FRANCISCO JAVIER MORENO FUENTES

Vice-President of Innovation and Transfer

ANA CASTRO MORERA

Secretary-General

IGNACIO GUTIÉRREZ LLANO

Director of the President's Office

ISABEL M^a MARTÍNEZ SIERRA

Deputy Vice-President for Scientific Programming

JAIME JUAN CARVAJAL GARCÍA-
VALDECASAS

Deputy Vice-President for Scientific-Technical Areas

ELENA CARTEA GONZÁLEZ

Director of the Postgraduate and Specialisation Department

CARMEN SIMÓN MATEO

Deputy Vice-President for Institutional Relations

ANA ISABEL CRIADO CONTRERAS

Deputy Vice-President for Organisation

INÉS GALINDO JIMÉNEZ

Deputy Vice-President for Internationalisation and Cooperation

ISABEL DÍAZ CARRETERO

Deputy Vice-President for Scientific Culture

PURIFICACIÓN FERNÁNDEZ RODRÍGUEZ

Deputy Secretary General for Human Resources

BEATRIZ ESTEBAN AÑOVER

Deputy Secretary General for Economic Performance

M^a ESTHER VAQUERO REDONDO

Deputy Secretary General for Works and Infrastructure

M^a CARMEN GONZÁLEZ PEÑALVER

Deputy Secretary General for IT

MAR FERNÁNDEZ FERNÁNDEZ

Principal Officer

JUAN MANUEL RODRÍGUEZ QUINTANA

Director of the Management Office

AMOR SUÁREZ MUÑOZ

Advisory Member of the CSIC Presidency

M^a ISABEL VARELA NIETO

Advisory Member of the Legal Department

JOSÉ LOPEZ CALVO

ETHICS COMMITTEE

Collegiate **support body to the Presidency and the Governing Board** (articles 7 and 17 of the CSIC Statute) responsible for reflecting, issuing reports and formulating recommendations on research-related ethical and deontological principles.

PRESIDENCY

FRANCISCO JOSÉ AUSÍN DÍEZ

VICE-PRESIDENCY

CARME TORRAS GENÍS

MEMBERS

CARMEN ASCASO CIRIA

CARMEN AYUSO GARCÍA

MARÍA JOSÉ CAMARASA RIUS

JOSÉ VICENTE GARCÍA RAMOS

RODOLFO GUTIÉRREZ PALACIOS

JOSÉ JAVIER LUCAS LOZANO

ANANDA PASCUAL ASCASO

YOLANDA SANZ HERRANZ

MANUEL VILLORIA MENDIETA

ACTING AS SECRETARY
OF THE COMMITTEE
(non-member)

M^a LUISA SALAS GARCÍA

WOMEN AND SCIENCE COMMITTEE

Collegiate body of **support for the Presidency of the CSIC** in gender issues (Article 15.3 of the CSIC Statute) with the mission of promoting the equality of men and women in the development of the CSIC's research activity.

PRESIDENCY

ELOÍSA DEL PINO MATUTE

EXECUTIVE VICE-PRESIDENCY

CARMEN MAYORAL GASTÓN

MEMBERS

ELECTED BY SCIENTIFIC-TECHNICAL AREAS

CORE AREA SOCIETY

ANA MARÍA LÓPEZ SALA

REMEDIOS ZAFRA ALCARAZ

CORE AREA LIFE

TERESA SUÁREZ GONZÁLEZ

ESTHER GARCÉS PIERES

M^a ÁNGELES DEL POZO BAYÓN

CORE AREA MATERIA

NURIA CAMPILLO MARTÍN

ASCENSIÓN DEL OLMO OROZCO

SOLEDAD FARALDOS IZQUIERDO

MEMBERS OF CSIC-ASSOCIATED STAFF

PENÉLOPE GONZÁLEZ SAMPÉRIZ

FELIPE CRIADO BOADO

TERESA VALDÉS-SOLÍS IGLESIAS

ACTING AS SECRETARY OF THE CMYC
(non-member)

MARÍA CUESTA RUÍZ

COMMITTEE FOR THE COORDINATION AND RATIONALISATION OF ICTS* AND PARTICIPATION IN IEI*

A collegiate body responsible for organising, coordinating and prioritising in a specialised, objective and transparent way the research infrastructures in which, either directly or indirectly, the CSIC participates.

PRESIDENCY

MONTSERRAT TORNÉ I ESCASANY

VICE-PRESIDENCY

CARMEN GARCÍA GARCÍA
since 27/09/2023

MEMBERS

ON BEHALF OF:

Central Organisation of the CSIC

MÓNICA MARTÍN-LANUZA OLMEDA
(acting as Secretary)

M^a ÁNGELES LÓPEZ VÁZQUEZ
(acting as Vice-Secretary)

Environment and Earth Sciences

JOAQUÍN TINTORÉ SUBIRANA

Biology, Health and Food
JOSÉ MARÍA CARAZO GARCÍA

Physics and Engineering
MANUEL LOZANO FANTOBA
since 27/09/2023

Society
DIEGO RAMIRO FARIÑAS

Data Science and Artificial Intelligence
ISABEL CAMPOS PLASENCIA

* Unique Scientific and Technical Infrastructures.
European Research Infrastructures.

2023: Renewal of Committee members:
José Luis de Miguel Antón.

Institutional representation of the CSIC in the AR and the EU

Implemented through institutional representatives who, within their territorial scope, exercise coordination, representation, direction and management functions, as well as support for CSIC's research, training, education, scientific culture and visibility activities.

ANDALUCÍA

MARGARITA ISABEL PANEQUE SOSA

ARAGÓN

MARÍA JESÚS LÁZARO ELORRI

CANARIAS

MANUEL JULIO NOGALES HIDALGO

CANTABRIA

CELSO MARTÍNEZ RIVERO

CASTILLA-LA MANCHA

BEATRIZ MARÍA ARROYO LÓPEZ

CASTILLA Y LEÓN

MARÍA MAR SILES LUCAS

CATALUÑA

LUIS CALVO CALVO

COMUNIDAD DE MADRID

MARINA VILLEGAS GRACIA

COMUNITAT VALENCIANA

JUAN FUSTER VERDÚ

GALICIA

CARMEN GONZÁLEZ SOTELO

ILLES BALEARS

ANA M^a TRAVESET VILAGINES

LA RIOJA

JOSÉ MIGUEL MARTÍNEZ ZAPATER

PAÍS VASCO

DANIEL SÁNCHEZ PORTAL

PRINCIPADO DE ASTURIAS

MARÍA FERNÁNDEZ GARCÍA

REGIÓN DE MURCIA

CARLOS JAVIER GARCÍA IZQUIERDO

COMUNIDAD FORAL DE NAVARRA

ALEJANDRO RAMÓN TOLEDO-ARANA

INSTITUTIONAL DELEGATION OF THE CSIC WITH THE EUROPEAN UNION

ELENA DOMÍNGUEZ CAÑAS

2023. Renewal:

Rafael Mateo Soria (Castilla La-Mancha), Javier Rey Campos (Galicia), Francisco Javier Aizpurua Iriazabal (País Vasco).

Structure of the Scientific-Technical Areas

SOCIETY

COORDINATOR

ADA FERRER CARBONEL

DEPUTY COORD.

PILAR NIEVA DE LA PAZ

AREA COMMITTEE

5

MEMBERS

LIFE

COORDINATOR

JORDI PÉREZ TUR

DEPUTY COORD.

TERESA MORENO PÉREZ
ERNESTO IGARTUA ARREGUI
ABELARDO MARGOLLES BARROS

AREA COMMITTEE

21

MEMBERS

MATERIA

COORDINATOR

MARÍA SOLEDAD MARTÍN GONZÁLEZ

DEPUTY COORD.

FRANCISCO JAVIER GARCÍA LABIANO
JOSÉ JAVIER RAMASCO SUKIA

AREA COMMITTEE

10

MEMBERS

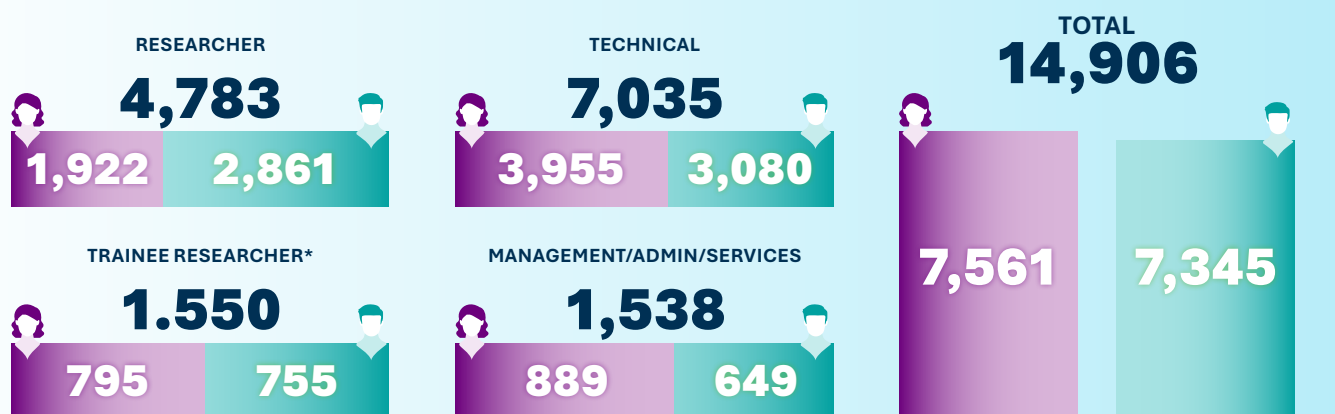
2023. Renewal of area coordinators, outgoing members: Elena Castro Martínez and Ignacio Montero Ruiz (AGS); M^a Isabel Medina Méndez, Blas Valero Garcés and Ángel Ruiz Mantecón (AGV).

CSIC 2023, A YEAR IN DATA

Staff and economic data	19
Research and research support structures	21
Institutional relations and scientific collaboration	23
Current national and international projects and actions	25
Scientific output	27
Excellence	29
Knowledge transfer	32
International projection	33
Training of research staff	35
Equality	36

Staff

FUNCTIONAL GROUPING



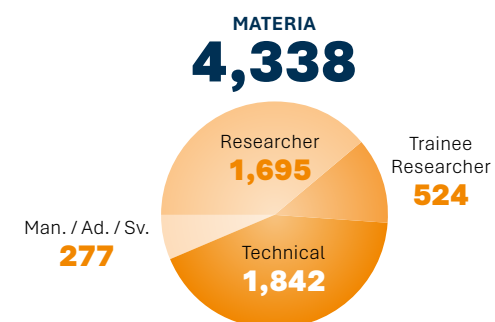
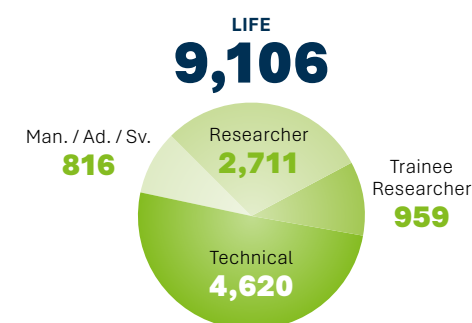
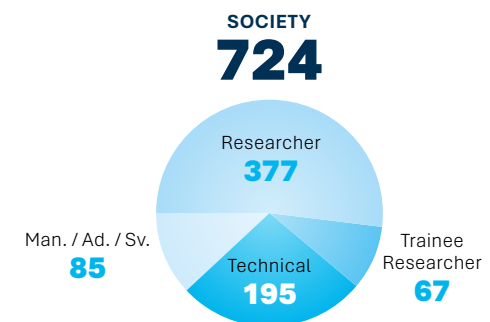
*Predoctoral.

GEOGRAPHICAL LOCATION

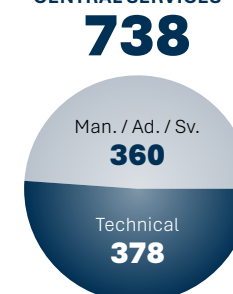
	RESEARCHER	TRAINEE RESEARCHER	TECHNICAL	MANAGEMENT/ADMIN/SERVICES	TOTAL
ANDALUCÍA	733	223	1,133	233	2,322
ARAGÓN	196	63	235	45	539
CANARIAS	53	13	94	21	181
CANTABRIA	65	21	96	17	199
CASTILLA Y LEÓN	68	47	123	36	274
CASTILLA-LA MANCHA	15	2	31	2	50
CATALUÑA	748	283	872	179	2,082
COMUNIDAD DE MADRID	1,962	540	2,943	763	6,208
COMUNIDAD FORAL DE NAVARRA	11	5	21	2	39
COMUNITAT VALENCIANA	409	236	633	78	1,356
EXTREMADURA	8	2	5	0	15
GALICIA	160	30	363	77	630
ILLES BALEARS	104	26	103	11	244
LA RIOJA	17	1	21	2	41
PAÍS VASCO	30	6	12	4	52
PRINCIPADO DE ASTURIAS	105	28	144	34	311
REGIÓN DE MURCIA	95	24	204	31	354
ROMA	4	0	2	3	9

Source: GESPER.

CORE AREA*



CENTRAL SERVICES**



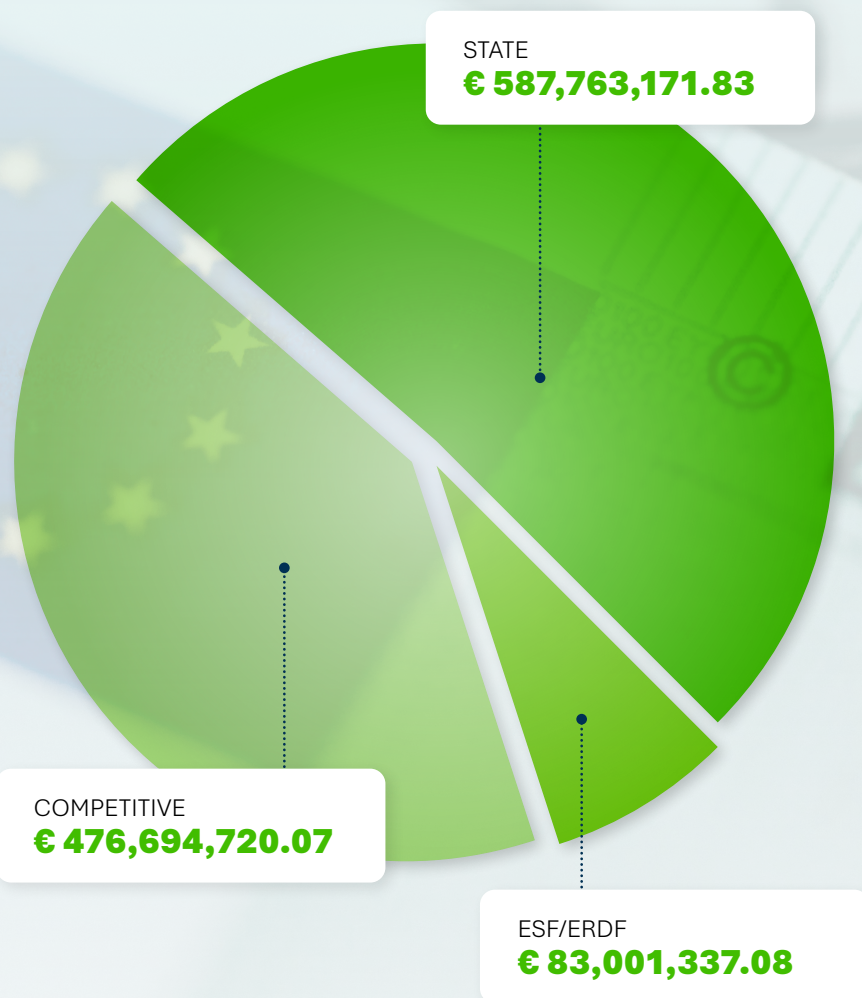
* The area assigned to research and research trainee staff is the staff area. Other staff members are assigned to the area of the ICU to which they are attached.

** Includes delegations/REBIS.

Economic data

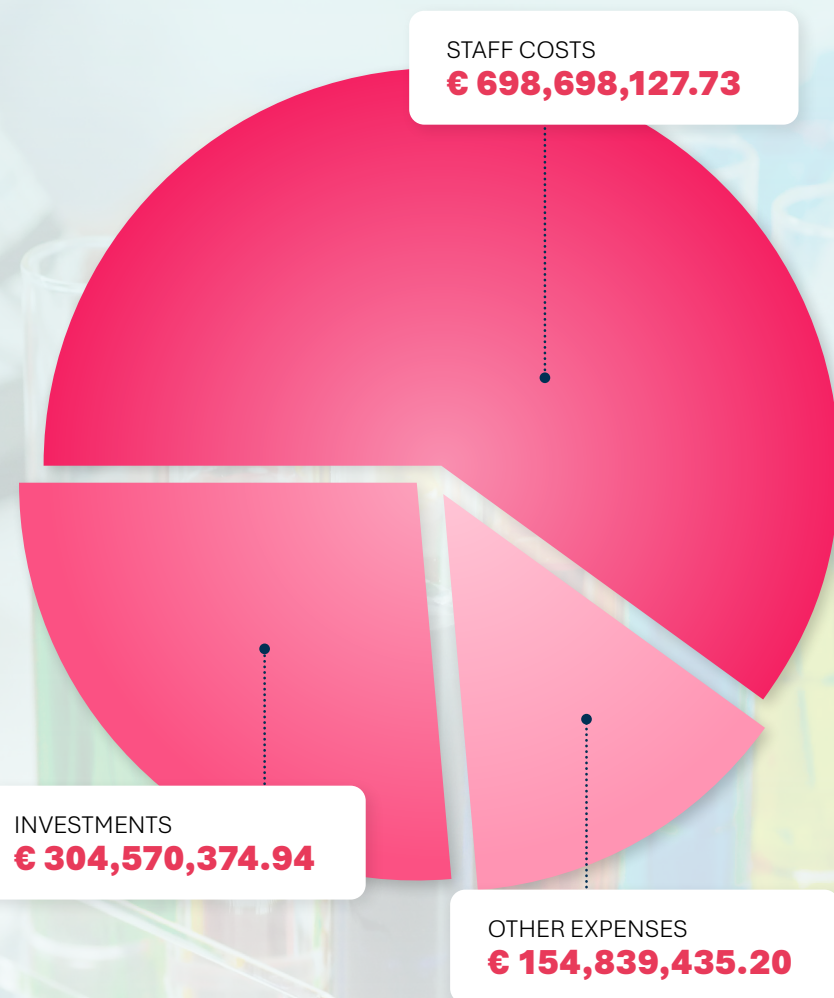
INCOME

€ 1,147,459,228.98



EXPENDITURE

€ 1,158,107,937.87



Research and research support structures

24

INTERDISCIPLINARY
THEMATIC
PLATFORMS

121

RESEARCH
INSTITUTES

2

ASSOCIATED

50

JOINT

69

OWN

4

SPECIALISED
TECHNICAL
UNITS

3

OWN

1

JOINT

10

CSIC
CONEXIONES

3

NATIONAL
CENTRES

INIA

IGME

IEO

12

TERRITORIAL
UNITS

9

OCEANOGRAPHIC
CENTRES

9

SERVICE
INTEGRATION
CENTRES

6

OWN

3

JOINT

10

INSTITUTIONAL
DELEGATIONS



CLICK ON EACH AUTONOMOUS REGION
TO SEE THE DETAILS

Institutional relations and scientific collaboration

1,027 CURRENT AGREEMENTS AND OTHER LEGAL INSTRUMENTS 2023

222

SIGNED AGREEMENTS*

35

EXTENDED AGREEMENTS

SCIENTIFIC COLLABORATION	66
R&D	60
TRAINING	37
EDUCATIONAL COOPERATION	19
SCIENTIFIC CULTURE	12
JOINT INSTITUTES	9
USE OF FACILITIES AND EQUIPMENT	8
EXPERT ADVICE	6
STAFF	2
MAJOR INFRASTRUCTURES	2
OTHER R&D STRUCTURES	1

52

JOINT RESEARCH INSTITUTES



The Mayor of Pamplona City Council, Cristina Ibarrola and the Vice-President of CSIC Organisation and Institutional Relations, Carlos Closa, on behalf of the co-owners of the Institute of Agrobiotechnology, signed a protocol for the transfer of a plot to accommodate the new headquarters of the institute.

* Noteworthy, among others, is the signing of the Agreement with the Generalitat de Catalunya for the joint implementation of the project "Monitoring, analysis and evaluation of fisheries and oceanographic data within the framework of the European Maritime, Fisheries and Aquaculture Fund".

119 CURRENT R&D&I UNITS ASSOCIATED WITH CSIC 2023

13

CREATED

34

RENEWED

68
EXTERNAL ENTITIES
(65% UNIVERSITIES)

ASSOCIATED WITH THE CSIC THROUGH
55
RESEARCH INSTITUTES

38 ENTITIES AND INSTITUTIONS COLLABORATE WITH THE CSIC THROUGH JOINT INSTITUTES

25

PUBLIC UNIVERSITIES

Highlighting, by number of institutes, the universities of Sevilla, Autónoma de Madrid and Politécnica de Valencia.

10

AUTONOMOUS GOVERNMENTS

participate in the funding, highlighting, by number of institutes, the Junta de Andalucía, the Generalitat de Catalunya and the Principado de Asturias.

3

OTHER

Consortium of the Museum of Natural Sciences Barcelona, Fundación Observatorio del Ebro and INTA.

IN 2023 **9** AGREEMENTS OF JOINT INSTITUTES HAVE BEEN SIGNED

- Centre of Astrobiology (CSIC-INTA).
- Centre for Molecular Biology (CSIC-UAM).
- Botanical Institute of Barcelona (CSIC-Ayto.Barcelona).
- Institute of Integrative Systems Biology (CSIC-UV).
- Institute of Vine and Wine Sciences (CSIC-Gob.Rioja-UR).
- Institute of Corpuscular Physics (CSIC-UV).
- Institute of Food Sciences (CSIC-UAM).
- Institute of Biomedical Research of Madrid (CSIC-UAM).
- Institute of Neuroscience (CSIC-UMH).

NATIONAL CENTRES

AS TECHNICAL REFERENCE AND SUPPORT SERVICES FOR PUBLIC POLICIES

9,812
REPORTS



1,163



Instituto Geológico
y Minero de España

196



8,453

Main recipients:

- Ministry for Ecological Transition and Demographic Challenge
- Ministry of Agriculture, Fisheries and Food

CSIC
PARTICIPATES IN

360

ENTITIES AND
BODIES 2023

FOUNDATIONS

56

CONSORTIA

14

COMPANIES + EIGs

9

ASSOCIATIONS

40

PUBLIC BODIES

21

ENTITIES WITHOUT LEGAL PERSONALITY

220

IN 2023
THERE HAVE BEEN

34

NEW ENTRIES

2

LOSSES



891

CSIC EXPERTS
PROVIDE ADVICE

Research projects, actions and funding programmes

5,055

CURRENT*
PROJECTS AND ACTIONS

**Including those approved and completed in 2023.*

TOTAL FUNDING

€ 1,058,814,692.27

ANNUITY 2023

€ 335,254,026.85

1,462

PROJECTS AND ACTIONS
APPROVED

TOTAL FUNDING

€ 264,987,512.83

ANNUITY 2023

€ 139,275,635.78

1,382

PROJECTS AND ACTIONS
COMPLETED

TOTAL FUNDING

€ 238,396,651.73

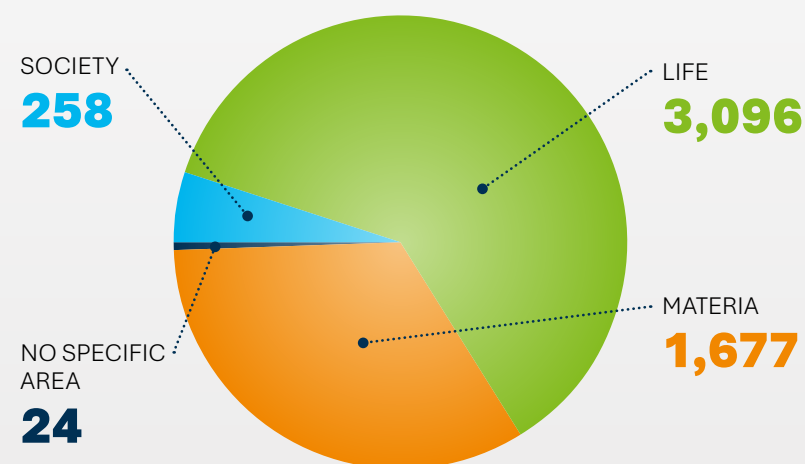
ANNUITY 2023

€ 15,113,162.60

DISTRIBUTION BY AUTONOMOUS REGION

ANDALUCÍA	777	COMUNITAT VALENCIANA	466
ARAGÓN	195	EXTREMADURA	9
CANARIAS	52	GALICIA	208
CANTABRIA	59	ILLES BALEARS	82
CASTILLA - LA MANCHA	15	LA RIOJA	25
CASTILLA Y LEÓN	103	PAÍS VASCO	26
CATALUÑA	680	PRINCIPADO ASTURIAS	124
COM. FORAL NAVARRA	22	REGIÓN DE MURCIA	134
COMUNIDAD DE MADRID	2,078		

DISTRIBUTION BY GLOBAL AREA*



**The assigned Core Area corresponds to that of the project.*

Research projects, actions and funding programmes

876 **CURRENTS***
PROJECTS

** Including those initiated and completed in 2023.*

TOTAL FUNDING
€ 415,756,190.53

242
PROJECTS
INITIATED

TOTAL FUNDING
€ 103,214,802.33

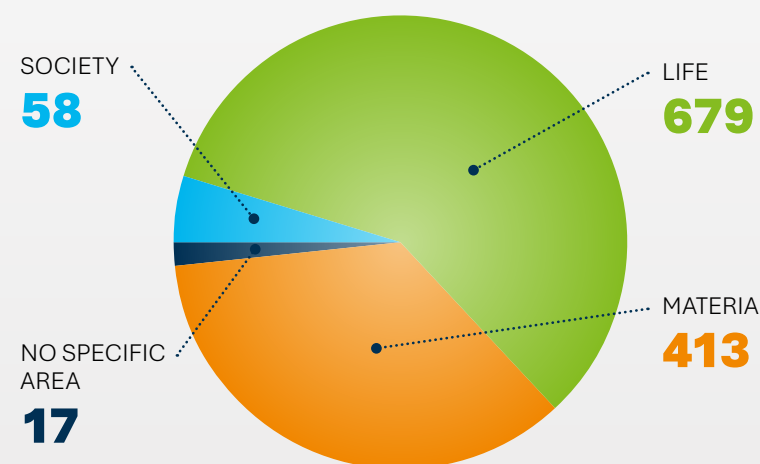
211
PROJECTS
COMPLETED

TOTAL FUNDING
€ 74,957,930.62

DISTRIBUTION BY AUTONOMOUS REGION

ANDALUCÍA	147	EXTREMADURA	1
ARAGÓN	55	GALICIA	42
CANARIAS	12	ILLES BALEARS	42
CANTABRIA	18	LA RIOJA	3
CASTILLA Y LEÓN	5	NAVARRA	2
CATALUÑA	260	PAÍS VASCO	11
COMUNIDAD DE MADRID	419	PRINCIPADO ASTURIAS	23
COMUNITAT VALENCIANA	99	REGIÓN DE MURCIA	28

DISTRIBUTION BY GLOBAL AREA



The data shown here reflects a thematic overlap in terms of area and autonomous community. Therefore, the sum of these will always be greater than the sum of the number of projects.

Scientific output

15,822

PUBLICATIONS

13,137

ARTICLES

138

BOOKS

21

BOOKS IN
WOS/SCOPUS

740

BOOK
CHAPTERS

397

BOOK CHAPTERS
IN WOS/SCOPUS

DISTRIBUTION BY CORE AREA

	PUBLICATIONS	ARTICLES	BOOKS	BOOKS IN WOS/SCOPUS	BOOK CHAPTERS	BOOK CHAPTERS IN WOS/SCOPUS
SOCIETY	1,022	530	53	4	252	57
Humanities and Social Sciences	1,022	530	53	4	252	57
LIFE	8,464	6,907	51	7	314	207
Biology and Biomedicine	2,587	1,991	4	1	73	53
Earth and Environment	3,294	2,868	21	2	96	54
Agricultural Sciences	1,827	1,462	13	2	75	55
Food Science and Technology	1,125	908	16	2	86	57
MATERIA	6,174	5,614	20	4	135	103
Physical Science and Technology, Mathematics, Robotics and Computing	2,997	2,830	11	1	30	20
Materials Science and Technology	1,813	1,634	5	1	56	45
Chemical Science and Technology	1,496	1,273	4	2	51	40
NO ASSIGNED AREA	229	139	13	4	40	27

In the data reflected here there is a thematic overlap at two levels, at the area level and at the category level. Accordingly, the sum of them will always be greater than the sum of the number of documents. To avoid artificially inflating the data, the totals are always made taking into account the total number of documents (avoiding overlaps between aggregates).

Source: GesBIB as of 11/06/2024.

CoARA

CSIC, after joining the Coalition for the Advancement of Research Evaluation (CoARA) in 2022, created a Committee in 2023 to address the implementation of the CoARA principles in its evaluation exercises.

Open access

- The level of deposit of CSIC's output in the multidisciplinary scientific repository of free access, DIGITAL.CSIC, reaches 74.26% completing the integration of the repositories of the [IEO](#) and the [INIA](#) therein.
- The integration of the IEO and IGME catalogues into the CSIC Virtual Library has been completed.

Evaluation and impact of CSIC scientific publication

- 600,000 + items of CSIC authorship have been uploaded to GesBIB.
- Implementation of the [synchronisation tool of the publications of each author with his ORCID profile](#) that allows identifying the CSIC as an organisation and the impact of its publications.

DISTRIBUTION BY AUTONOMOUS REGION

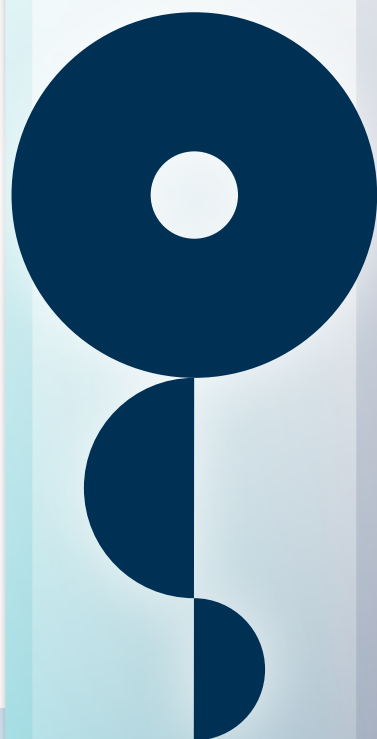
	PUBLICATIONS	ARTICLES	BOOKS	BOOKS IN WOS/ SCOPUS	BOOK CHAPTERS	BOOK CHAPTERS IN WOS/SCOPUS
Andalucía	3,128	2,627	21	5	106	70
Aragón	651	589	-	-	16	14
Canarias	155	119	1	-	7	7
Cantabria	283	265	-	-	1	1
Castilla - La Mancha	174	149	-	-	2	1
Castilla y León	388	294	-	-	7	6
Cataluña	2,966	2,545	16	1	95	47
Comunidad de Madrid	5,474	4,465	57	6	328	153
Comunidad Foral de Navarra	18	18	-	-	-	-
Comunitat Valenciana	1,619	1,372	6	2	76	52
Extremadura	39	21	3	-	8	1
Galicia	543	411	19	1	51	14
Illes Balears	373	342	1	-	5	3
La Rioja	80	74	1	-	2	1
País Vasco	262	245	-	-	1	1
Principado de Asturias	355	294	1	-	15	11
Región de Murcia	282	229	4	1	14	11
Roma	23	15	2	-	6	2
Unassigned	229	139	13	4	40	27

Source: GesBIB as of 11/06/2024.

Excellence

EXCELENCIA
SEVERO
OCHOA

13 CENTRES



EXCELENCIA
MARÍA
DE MAEZTU

4 CENTRES



ENVIRONMENTAL DIAGNOSIS
AND WATER STUDIES INSTITUTE



MATHEMATICAL
SCIENCES INSTITUTE



MATERIALS SCIENCE
INSTITUTE BARCELONA



MARINE SCIENCES
INSTITUTE



THEORETICAL PHYSICS
INSTITUTE



AGRIGENOMICS RESEARCH
CENTRE



BIOTECHNOLOGY AND
PLANT GENOMICS CENTRE

**Institute of
Space Sciences**

SPACE SCIENCES
INSTITUTE



ANDALUSIAN CENTRE OF
DEVELOPMENTAL BIOLOGY

6 NEW ACCREDITATIONS



INSTITUTO DE
TECNOLOGÍA
QUÍMICA

CHEMICAL TECHNOLOGY
INSTITUTE



CATALAN INSTITUTE OF NANOSCIENCE
AND NANOTECHNOLOGY



INSTITUTO DE
ASTROFÍSICA DE
ANDALUCÍA

ASTROPHYSICS
INSTITUTE OF ANDALUSIA



Severo Ochoa
CENTRO DE BIOLOGÍA MOLECULAR
CSIC UAM

MOLECULAR BIOLOGY
SEVERO OCHOA CENTRE



NEUROSCIENCE
INSTITUTE



AGROCHEMISTRY AND FOOD
TECHNOLOGY INSTITUTE

2 NEW ACCREDITATIONS



INTERDISCIPLINARY PHYSICS AND
COMPLEX SYSTEMS INSTITUTE



imedea
CSIC Universitat de Barcelona

MEDITERRANEAN INSTITUTE
OF ADVANCED STUDIES



ADVANCED GRANT

CONSOLIDATOR GRANT

SYNERGY GRANT



STARTING GRANT



The way to
excellence



Launch of the **MaX-CSIC Project** to promote scientific excellence within the Organisation by establishing a **continuous route of improvement for CSIC centres and institutes**.

ACTIONS:

1. Implementation of the pilot programme with the participation of six CSIC centres.

- Institute of Advanced Chemistry of Cataluña (IQAC).
- Institute of Physical and Information Technologies Leonardo Torres Quevedo (ITEFI).

After an evaluation process, all obtained the **accreditation ASPIRA-MaX-CSIC "Josefa Barba"** with an individual allocation of € 20,000. This recognition is where the path to excellence starts.

- Doñana Biological Station (EBD).
- Geological and Mining Institute of Spain (IGME).
- Milá and Fontanals Institution for Research in Humanities (IMF).
- Institute for Public Policy and Public Goods (IPP).

2. RyC-MaX talent attraction programme, aimed at attracting research staff who have ranked in the Ramón y Cajal call in the top positions in their area.

A total number of **13 grants** were awarded amounting to **€ 3,200,000** total.

3. The URICI support programme for increasing open publications by the CSIC research staff.

Premios Nacionales de Investigación



BIOLOGY

JOSÉ LÓPEZ BARNEO (IBIS)

HUMANITIES

FELIPE CRIADO BOADO (INCIPIT)

MEDICINE AND HEALTH SCIENCES

LUIS ENJUANES SÁNCHEZ (CNB)

NATURAL RESOURCES SCIENCES

JOSEP PEÑUELAS REIXACH (CREAF)

PHYSICAL, MATERIALS AND EARTH SCIENCES

ÁNGEL RUBIO SECADES (CFM)

TECHNOLOGY TRANSFER

JAVIER GARCÍA MARTÍNEZ (IBGM)

MATHEMATICS AND INFORMATION AND COMMUNICATION TECHNOLOGY

DIEGO CÓRDOBA GAZOLAZ (ICMAT)

NATIONAL RESEARCH AWARDS FOR YOUNG PEOPLE

ENGINEERING AND ARCHITECTURE

MIGUEL ÁNGEL MOMPEÁN GARCÍA (IQF)

HUMANITIES

IDOIA MURGA CASTRO (IH)

NATURAL RESOURCES SCIENCES

MARTA MARTÍNEZ SANZ (CIAL)

TECHNOLOGY TRANSFER

GONZALO MURILLO RODRÍGUEZ (IMB-CNM)

PREMIOS REI JAUME I

NEW TECHNOLOGIES

DANIEL MASPOCH COMAMALA (ICN2)

ENVIRONMENTAL PROTECTION

CARLOTA ESCUTIA DOTTI (IATC)

MEDICAL RESEARCH

GUILLERMINA LÓPEZ-BENDITO (IN)

Knowledge transfer

INDICATORS 2023

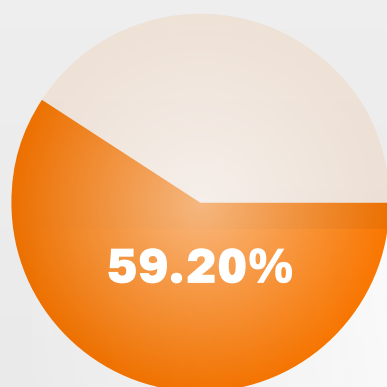
PROTECTION

PRIORITY PATENT APPLICATIONS

134

OTHER FORMS OF PROTECTION

56



190
TOTAL ASSETS
PROTECTED

PERCENTAGE OF PRIORITY
RIGHTS THAT ARE EXTENDED
WITH PCT APPLICATIONS TO
THE FOLLOWING YEAR

PORTFOLIO OF PATENT FAMILIES IN FORCE*

643

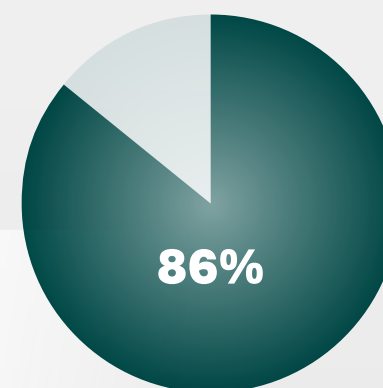
* Only patents and utility models.
Source: SICTI.

PROMOTION OF TECHNOLOGIES

ENTREPRENEURSHIP

KBCS (KNOWLEDGE-BASED COMPANIES)
CREATED IN THE YEAR

12



KBC SURVIVAL AT 5 YEARS

COLLABORATION

NEW CONTRACTS AND
AGREEMENTS SIGNED

1,935

CONTRACTED FUNDING
(IN THOUSANDS OF €)

41,410

LICENSED ASSETS

92

Source: BDC and own databases VATC.

CSIC's international projection in 2023

3rd
EUROPEAN
PUBLIC RESEARCH
ORGANISATION



SCIMAGO
INSTITUTIONS
RANKINGS

6th
WORLD PUBLIC
RESEARCH
ORGANISATION



SCIMAGO
INSTITUTIONS
RANKINGS



OWN AND CO-MANAGED
INTERNATIONALISATION
PROGRAMMES

212

CURRENT ACTIONS

71%

DEVELOPMENT
COOPERATION FUNDS

€2.48M

TOTAL INVESTMENT
IN ACRI GRANTS

OTHER EUROPEAN AND INTERNATIONAL INITIATIVES

73

PROJECTS STARTED IN 2023

€18.1M

H2020/HE

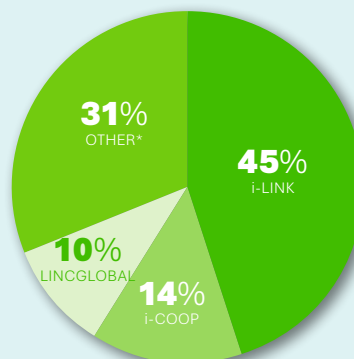
169

PROJECTS STARTED IN 2023

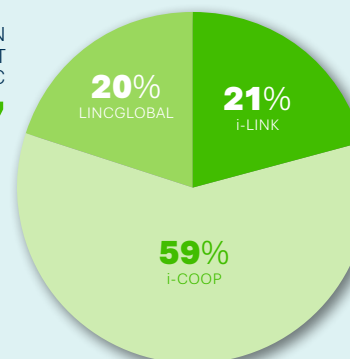
€85.08M

MOBILITY OWN CALLS

CSIC
STAFF STAYS
ABROAD
254



FOREIGN
STAYS AT
THE CSIC
207



PERCENTAGE OF
PUBLICATIONS
WITH INTERNATIONAL
COLLABORATION

50.11%

1,189

PROPOSALS SUBMITTED

657

CURRENT COLLABORATIVE PROJECTS

84

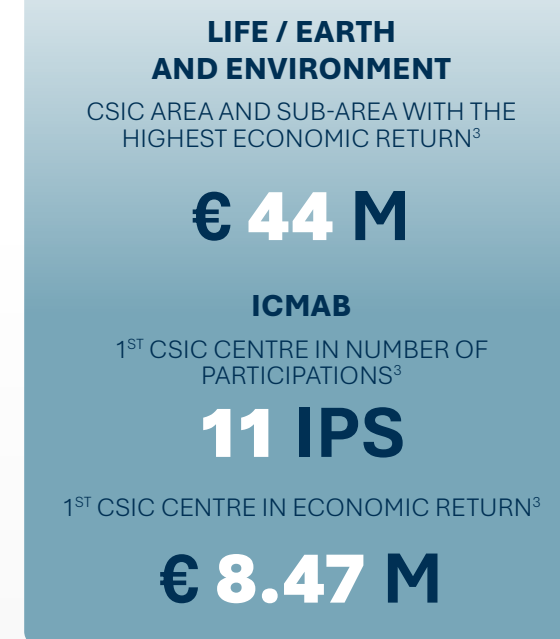
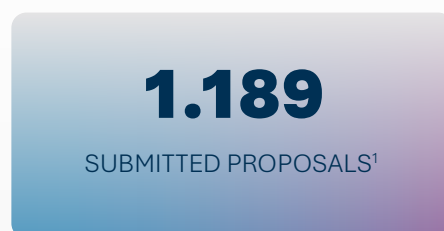
CURRENT MSCA IF

82

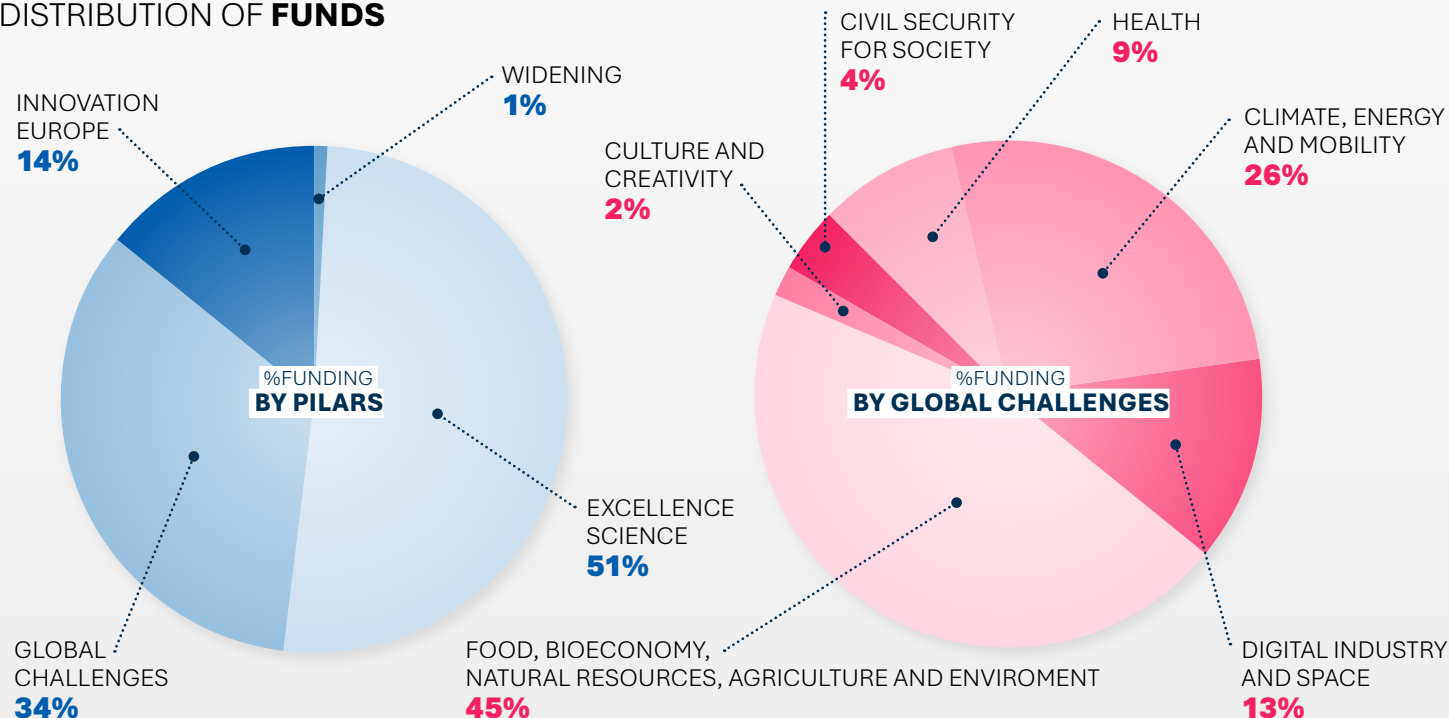
CURRENT INDIVIDUAL ERC

*Including INFRAS, LIA, IRP, BILATERAL and INTERCOONECTA stays.

RESULTS OF THE CSIC HORIZON EUROPE (HE) 2023 FRAMEWORK PROGRAMME



DISTRIBUTION OF FUNDS



CURRENT **INDIVIDUAL** ERC PROJECTS

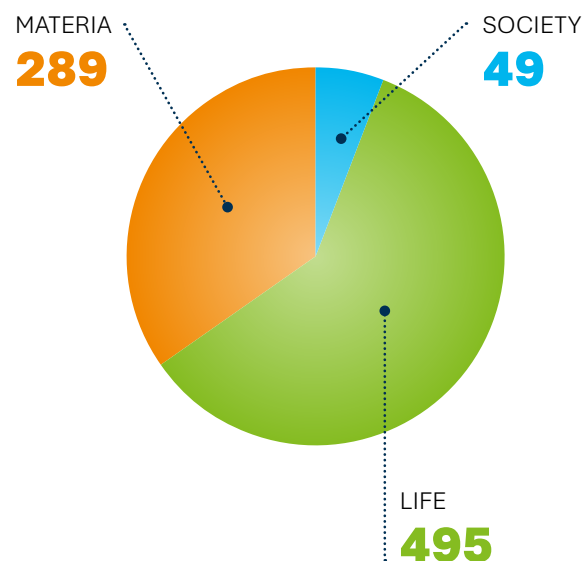


Source: (1) Funding and tenders Portal. (2) Corporative Database: DG projects. (3) Corporative Database: centres and people. (4) Dashboard EU.

Training of research staff

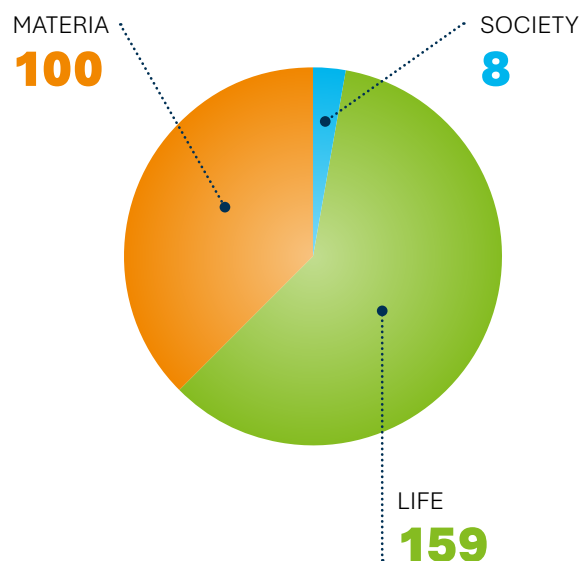
833

THESIS



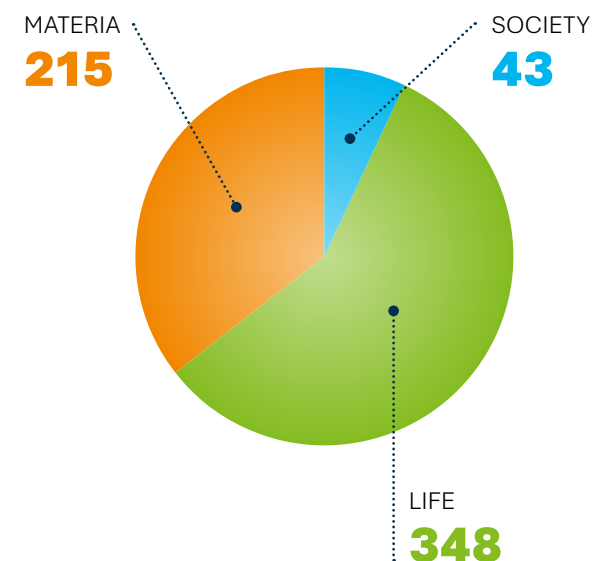
267

FINAL DEGREE PROJECT



606

MASTER'S FINAL PROJECT



543

PREDOCTORAL CONTRACTS

6

CSIC - UIMP MASTER'S DEGREES

43

HIGHLY SPECIALISED COURSES TAUGHT

15
SOCIETY

8
LIFE

20
MATERIA

50

**GRANTS TO FINANCE PREDOCTORAL
CONTRACTS RESUMING
THE JAE-PRE PROGRAMME**



401

SCHOLARSHIPS JAE INTRO*

57
SOCIETY

195
LIFE

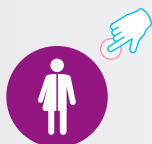
149
MATERIA

* Includes all the modalities "ICU, Severo Ochoa, María de Maeztu".

Equality

THE CSIC HAS **TWO INTERNAL BODIES** TO IMPLEMENT THE EQUALITY STRATEGY AND PROMOTE THE INCLUSION OF THE GENDER PERSPECTIVE AS A CROSS-CUTTING CATEGORY IN SCIENCE.

Comisión Delegada de Igualdad (CDI)



It diagnoses and proposes actions in the field of equality **that affect the entire CSIC staff.**



It studies the causes that hinder the entry and development of women's research careers at the CSIC and proposes actions to eliminate existing barriers.



Along with them, an extensive network of [Equality Committees \(CI\) of the ICU](#) fundamental to implement the III Equality Plan in the centres. A notable increase in the number of centres that have constituted their CI, 18 in 2023, reaching 60% of the total amount.

MILESTONES IN THE GENDER AND EQUALITY ACTIVITY



Award of the CSIC Gold Medal, its highest distinction, to the **Nobel Prize in Physics Donna Strickland** for her pioneering discoveries in optics and in the field of lasers.

Diana Morant, Minister of Science, Donna Strickland and Eloísa del Pino, CSIC President.



Gonzalo Arévalo (Gen. Dir. MICIU), Nuria Rius (Dir. IFIC), Eloísa del Pino (CSIC President) and Ignacio Gutiérrez (CSIC General Secretary).

Delivery of the **“CSIC Gender Equality Accreditation Badge”** to the Institute of Corpuscular Physics (IFIC), with Runner-up awards to the National Centre for Biotechnology (CNB) and the Theoretical Physics Institute (IFT).



Teresa Valdés-Solís, member of the CMyC. Commemoration of the 20th Anniversary of the CMyC of CSIC.

XX Anniversary of the Women and Science Committee of the CSIC with a special edition of the [Women Researchers Report \(IMI\) 2023](#) which concludes that, despite the fact that CSIC scientists carry out a research activity of the same magnitude, extension, impact and funding as their colleagues, the gender gap remains high and the scissor graph fails to show a trend of improvement. The glass ceiling index for 2023 stands at 1.42, which indicates a very slight variation compared to the previous year.

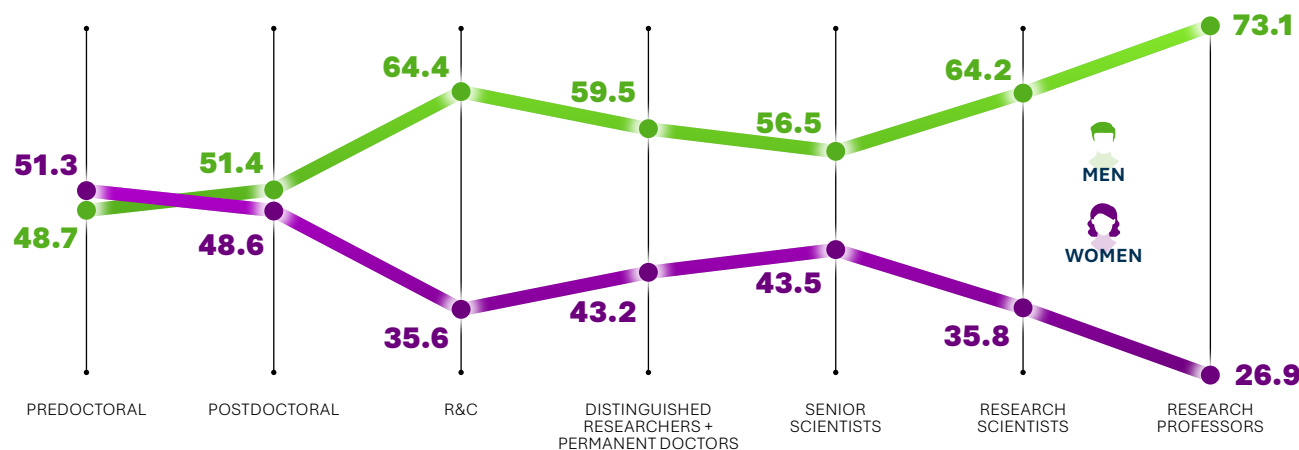


III Meeting of the Equality Committees of the CSIC.

February 11, 2023, the [International Day of Women and Girls in Science](#). This initiative promoted by UNESCO had [more than 180 activities and initiatives of CSIC disclosure](#).

III Meeting of Equality Committees of the CSIC at the Institute of Parasitology and Biomedicine "López-Neyra" of Granada. Relevant topics were discussed such as gender perspective training at the CSIC, reconciliation, LGBTQIA+ diversity, the gender dimension in research and sexual and gender-based harassment at the ICU.

Distribution of the research staff by sex in the categories or scales of the research career at the CSIC as of 31/12/2023.



Report on sex-based differences in internal promotion in the scientific categories at the CSIC carried out by the CSIC Institute of Policies and Public Goods. Main conclusions: There is no gender bias in the evaluation in the internal promotion processes, other variables such as organisational proximity or competitive pressure being the variables with the greatest impact on the generation of inequalities.

I Evaluation of the III Equality Plan (PI) between Women and Men at the CSIC in which their degree of achievement and fulfilment of objectives is reviewed. One of them, the implementation of a survey to find out the situation of people with disabilities at the CSIC, began in October 2023. Work on updating the Protocol on sexual and gender-based harassment also began in July 2023.

"Recommendations for the inclusion of gender in research content" Guidelines as support in the preparation of funding applications in both national and European calls, thus contributing to the objectives of the IIIPI (Axis 7) and the HRS4R strategy (Action 17) of the CSIC.

SCIENTIFIC AND TECHNICAL ACTIVITY

Scientific-Technical Areas: data and milestones 39

Collaboration structures: PTI and Connections 83

Innovation and Transfer 88

Internationalisation 92

Large research infrastructures 97

Scientific-technical services 101

Ethics in research 102

CORE AREA SOCIETY

HUMANITIES

SOCIAL SCIENCES

STAFF

RESEARCHER

377

159

218

TRAINEE RESEARCHER

67

37

30

TECHNICAL

195

115

80

MANAGEMENT/ADMIN/SERVICES

85

54

31

The area assigned to research and research trainee staff is the staff area. Other staff members are assigned to the area of the ICU to which they are attached.

TOTAL STAFF SOCIETY AREA

724

(4.85%)

15
RESEARCH
INSTITUTES

3
JOINT

12
OWN

81
RESEARCH GROUPS

NATIONAL PROJECTS AND ACTIONS

258
CURRENT*

TOTAL FUNDING
€ 17,788,027.37

INTERNATIONAL PROJECTS (EU PM, EU NON-PM AND INTERN)

58
CURRENT*

TOTAL FUNDING
€ 25,422,194.73

*Data that includes the number of signed and completed projects.

SCIENTIFIC OUTPUT



KNOWLEDGE TRANSFER



MILESTONES 2023

Humanities



Digitale Forschungsinfrastruktur für die Geistes- und Kulturwissenschaften



CSIC joins two of the largest scientific infrastructures: DARIAH and CLARIN

A wide representation of research staff from the Society Area has become part of CLARIN (*Common Language Resources and Technology Infrastructure*), a digital infrastructure that offers data, tools and services to sustain research based on linguistic resources, and DARIAH (*Digital Research Infrastructure for the Arts and Humanities*), designed to promote and support research and teaching aimed at arts and humanities, based on digital resources.

Exceptional finding in the archaeological excavations campaign 2023 in Tusculum (Italy)

EEHAR (Rome) researchers have recovered from the Roman baths of the Forum of Tusculum a female bacchante statue in an exceptional state of conservation and presenting most peculiar iconographic and stylistic details. It is a rare sculptural type of which only four other examples are known and which reproduces an uncommon model such as the **Aphrodite of Epidauros**. The Tusculum sculpture can be dated between the middle of the first century BC and the first half of the first century AD; it is the most representative find of the campaigns carried out by the EEHAR at the site since 1994.



Figurative reliefs found at the Casas del Turuñuelo site (Badajoz).

“The first faces of tartessos” exhibition

In Casas del Turuñuelo (Guareña, Badajoz), research staff from the IAM brought to light the remains of five figurative reliefs of the fifth century BC, the first belonging to the Tartessian culture (VIII-IV centuries BC). The unusual thing is that the representations are human faces, two female figures adorned with outstanding earrings that represent typical pieces of Tartessian goldsmithing. This discovery represents a paradigm shift in the interpretation of the Tartessian culture, considered aniconic for representing divinity through sacred stones and animal or plant motifs. The exhibition, organised from the IAM in the Archaeological and Paleontological Museum of the Community of Madrid, received more than 70,000 visits. The site research team received the Medal of Extremadura.

Opening to the public of ancient egyptian tombs of Djehuty and Hery

After 22 excavation and restoration campaigns, the Djehuty Project celebrated the opening to the public of the Djehuty and Hery tombs, excavated in the rock of the Dra Abu el-Naga hill, on the western bank of Luxor, in the necropolis of ancient Thebes. Both monuments date from around 1500 BC and they are decorated in relief. Visitors can also see adobe chapels and tombs from earlier times, as well as the replica of the only funerary garden documented in Egypt to date. The event was attended by the Ambassador of Spain in Cairo, Álvaro Iranzo, the Deputy Minister of Antiquities, Mostafa Waziri, and the president of the CSIC, Eloísa del Pino.



Inside the Djehuty tomb.

Restoration of the walls of the Cerro de San Cristóbal and the Al-Mudayna (Almería)

The restoration works of the walls, included in the Heritage Red List due to the risk of disappearance, destruction or essential alteration of their value, have been undertaken, fundamentally, throughout 2023 and directed by architects from EEA.



Wall of San Cristóbal.

Finds in Castillejo de Monteagudo (Murcia)

Aulic residence built on a promontory, well known since its excavation began in 1924, it had not been sufficiently highlighted that it was part of an extensive agricultural estate that hosted rain-fed crops, orchards, gardens, bush areas, hunting and orchard areas, as well as remarkable hydraulic infrastructures. The archaeological investigations carried out in the irrigated plain have revealed part of the palatine area, structured around a large calvary

court yard presided over by a residential complex. These findings have been collected in an article published by EEA research staff.

"The Wolf King's pleasure estate. An Andalusí agricultural and palatine project (Murcia, 12th century)", Arts [Special Issue "Andalusí Architecture: Shapes, Meaning and Influences (Vol. 2)"], 12/4 (2023), 162).



Gender, age and linguistic variation

Research staff from **EEA** delves into the issue of the construction of different social identities through the use of marked linguistic features. Based on a corpus prepared during different fieldwork campaigns (2014-2021) in Ouezzane (a city in the northwest of Morocco), the role played by social factors such as gender and age in the linguistic variation of vernacular Arabic in the city has been quantitatively analysed and, from a qualitative perspective, it has been examined how the social meaning that speakers give to certain linguistic traits influences that variation. In this way, it has been possible to determine that the construction of the social identity reflected in the language of the speakers does not correspond exactly to the macrosocial factors analysed.

Linguistic Variation, Social Meaning and Covert Prestige in a Northern Moroccan Arabic Variety", Languages (Q1 magazine) 8/1 (2023), 89.

Project for the reactivation of the Pardo de Cela route promoted by the Mancomunidad de concellos da Mariña Lucense

The scientific-technical advice of the *Project for the Reactivation of the Pardo de Cela Route in the Mariña Lucense* (north of the province of Lugo) has been carried out by the members of the research group at **IEGPS** and it has focused on the transfer of information and on carrying out different control tasks to guarantee the scientific-technical excellence of the historical and informative, museographic, artistic, promotional and general design contents of different actions promoted by the Mancomunidad. In particular, the elaboration of the texts of the historical discourse of the *Interpretation Centre of the Mariscal Pardo de Cela* -interpretative space on the figure of the famous Galician marshal of the fifteenth century in the castle of the Castro de Ouro (Alfoz, Lugo)- and on the historical foundation of the layout of the *Pardo de Cela Route* in the Galician region of the Mariña Lucense.

The 14th ibero-american congress of science, technology and gender

Held at the **CCHS**, it has involved intense debates and reflections on gender equality in the scientific and technological field. The event brought together more than 200 people from 14 countries around the world and focused on addressing the challenges and opportunities faced by women in these disciplines. Organised by the **IFS** and the Asociación Red Transversal de Estudios de Género en Ciencias Humanas, Sociales y Jurídicas (GENET) (Transversal Network of Gender

Studies in Human, Social and Legal Sciences Association), with the support of the UNED and the OEI, its main objective was to break with traditional paradigms and concepts in scientific and technical studies. It also sought to offer solutions for a more inclusive and egalitarian system in the field of science and technology. The president of the CSIC opened the congress stressing on the Organisation's commitment to gender equality in science and technology.



Eloísa del Pino,
Eulalia Pérez
Sedeño and Txetxu
Ausin (IFS), Jorge
Sainz González and
Ricardo Mairal Usón.

Signing ceremony
(director of
the IEGPS,
president of the
Mancomunidad,
Mayor of Alfóz
and head of the
IEGPS team).



Concha Roldán Panadero, president of the Ibero-American Network of Philosophy

Within the framework of the 6th Ibero-American Congress of Philosophy held in Porto, the assembly of the Ibero-American Network of Philosophy unanimously elected a new Board of Directors headed by Concha Roldán (IFS), as current president of the Spanish Philosophy Network, with the mandate of consolidating the structure of the organisation itself and meeting its founding objectives, notably, the defence of philosophy in the educational systems of all Ibero-American countries and the promotion of philosophical thought in Spanish and Portuguese.



CSIC leads the analysis of the galleon San Giacomo di Galizia

Also known as "Santiago", the galleon sank in the Ribadeo estuary in 1597. The research, led by the **IH** and the **IEM**, has set out to discover what the life of its crew members was like. The results were reported in the journal *Heritage* and it has had a significant impact nationally and internationally.



Legacy of the exiled doctor Germán Somolinos to the Centre for Human and Social Sciences

The epistolary, photographic and documentary legacy of the renowned historian of medicine has been donated by his family to the CSIC, to the Tomás Navarro Tomás Library (BTNT) of the CCHS. The donation culminated a collaboration of months of study and preparation with the **IH** and the **BTNT** to recover the memory in Spain of this important figure. The collaboration has been reflected in a tribute act chaired by the president of the CSIC, Eloísa del Pino, an exhibition and a new website.

Exhibition "Al Bies: the artists and the design in the spanish avant-garde"

Curated by the **IH** and inaugurated at the National Museum of Decorative Arts, it has paid tribute to the women artists who left a significant mark on Spain in the first third of the twentieth century. The exhibition, through six thematic areas, discovers how the arts linked to adornment, decoration and intimate space reflected the social and cultural changes that allowed a fundamental advance in the situation of women.



Travelling exhibition "Slavery and the cultural legacy of Africa in the Caribbean"

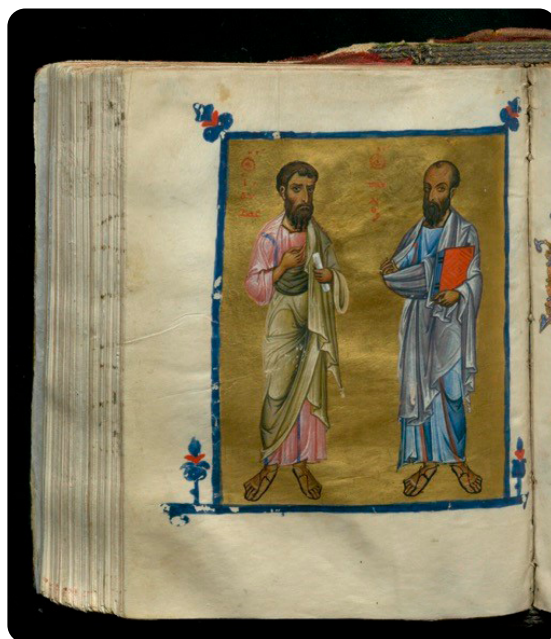
Curated by the **IH**, the exhibition has been presented in Puerto Rico, Autonomous Municipality of Juncos; in Madrid, CCHS; in Belgium, Embassy of Spain, and in Mexico, National Institute of Anthropology and History of Mexico City.

CSIC participates in an international project that explores ancient religious manuscripts from a new experimental perspective

The CSIC participates in the international project *Paratexts Seeking Understanding*, which will explore the paratexts or statements accompanying the main text of ancient and medieval religious manuscripts in the Jewish, Christian, Buddhist, Islamic and Samaritan traditions. The objective of analysing these paratextual elements, such as titles, annotations, glosses, illuminations, decorations, comments and other elements in the margins, is to understand how they affect the way people read, acquire knowledge and develop understanding. Within this project, the **ILC** will lead the sub-project *PARAHeB (Paratexts of the Hebrew Bible)* together with the UCM and the University of Münster. Research will focus on the role of paratextual elements and their impact on reading, understanding, interpreting and learning the Hebrew Bible.

Digitalisation of the greek manuscripts of the Royal Library of the Monastery of San Lorenzo de El Escorial

Within the framework of the TED2021-130178B-I00 project Digitalisation, Description and Online Access to the Greek manuscript collection of El Escorial (DIGITESC), the **ILC** has carried out the digitisation of the 580 manuscripts that make up the Greek collection of the Royal Monastery. One-sixth of the digitised manuscripts are already online and one-third have a file (<https://rbmecat.patrimonionacional.es>). The project has created a blog (<https://digitescgr.hypotheses.org>) to publicise some of the discoveries made, such as the identification of the handwriting of the Byzantine princess Anna Komnena (Q-II-13).



Greek manuscript of the Royal Library of the Monastery of El Escorial.



TeresIA Project

Portal of access to terminologies in Spanish and Artificial Intelligence services framed in the Strategic Project for the Economic Recovery and Transformation (PERTE) of the New Economy of Language. Led by the **ILL**, it will design an information extraction methodology applying artificial intelligence (AI) and Natural Language Processing (NLP) techniques to extract terms, display them in context, validate them, sanction them, transform them into data web formats and make them visible and retrievable in different environments, including the metasearch engine. TeresIA will create a corpus of scientific literature in Spanish.

Publication of a monograph and organisation of an exhibition on the phoenician-punic inscriptions of the cave-sanctuary of Es Culleram (Ibiza) on the 100th anniversary of its discovery

Published by José Á. Zamora (**ILC**) in the Archaeological Museum of Ibiza and Formentera (MAEF), it is the study of the exceptional texts of a religious nature found in the grotto, especially those inscribed on a bronze plaque found by chance at the entrance of the sacred place. As the monograph explains, the epigraphs were dedicated to the god Reshep-Melqart (at the end of the fifth century BC) and to Tinnit "mighty and Fortune" (at the beginning of the second century BC) with interesting implications for the religious history of the Western Mediterranean of the time.

Environmental and social dimension of the energy transition

European research project (*Horizon Europe 2023 CSA*) to strengthen Latin American and European research infrastructures around the challenge of the energy transition from a perspective that goes beyond the technological to include the environmental and social dimension. Made up of a partnership of 11 institutions, it is led by the Organisation of Ibero-American States and involves a CSIC team including three institutes in the Society Area (**IF**, **IH** and the **ILLA**, which undertakes the academic direction). The specific work packages of the CSIC in this project are aimed at producing a comparative study in the Ibero-American field, with an ethnographic emphasis, that addresses two essential dimensions for the correct fulfilment of the decarbonisation objectives imposed by the Paris Agreement: territorial justice and ecological reindustrialisation policies.



Social Sciences



The presentation of the project had a remarkable media impact.

A project for the reconstruction of Ukraine

Project led by the **INGENIO** for the “fair, green and participatory” recovery/reconstruction of Ukrainian cities whose presentation was attended by the Minister of Science, Innovation and Universities, Diana Morant, the Chancellor of the Universitat Politècnica de València, José E. Capilla, and the CSIC delegate in the Comunitat Valenciana, Juan Fuster. Four other researchers from **INGENIO** are also participating in the project.



Recognition to the DINA-ITC programme

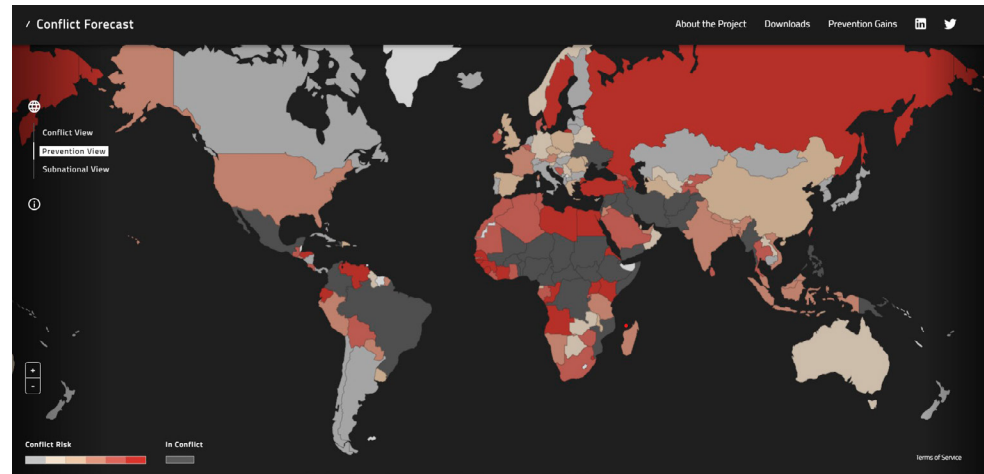
The European Commission selected the DINA-ITC programme, coordinated by the **INGENIO**, for its Repository of Good Practices, within the Knowledge Valorisation Platform, thus recognising its value as a great programme for the stimulation of the Spanish innovation system to promote the participation of the academic and research community in the processes of knowledge valorisation and generation of strategies for Knowledge Transfer and Exchange. Courses were taught throughout the Spanish geography, highlighting the one that took place at the Menéndez Pelayo International University.

Women underperform in competitive situations

Research staff of the **IAE** has published a study in *American Journal of Sociology* in which they use data from a series of laboratory experiments to conduct a comprehensive analysis of gender differences in performance caused by two different dimensions of competition: rivalry for resources and status ranking. It also examines two mechanisms behind such differences. The results indicate that, in the absence of any competitive dimension, the performance difference between men and women is not statistically significant at the usual levels. However, any competitive dimension leads to women performing statistically worse than men. These results are explained by the two mechanisms: (1) men's belief that they are better than women under competition and (2) women's adherence to a prescribed stereotype of not causing harm to others. This suggests that gender differences in competitive environments are influenced by the specific circumstances of the situation.

International SWIFT project leadership

The SWIFT project seeks to transform agri-food systems from a feminist approach, based on innovations led by women from 12 countries distributed throughout Europe and four others in Brazil and the United States. Coordinated by **INGENIO**, its general objective is to promote the transformation of agri-food systems towards agroecological models that promote a sustainable, balanced and inclusive development of rural areas in Europe. To do this, it is based on the deployment of innovations led by women farmers that promote an agricultural paradigm shift by promoting gender equality in rural areas from a feminist approach.



Machine learning to prevent conflicts

The **IAE**, in collaboration with the *Foreign, Commonwealth & Development Office (FCDO)*, has created a model that identifies countries that live in peace, but are at risk of conflict. This predictive model integrates *machine learning* with leading research in economics to contribute to the resolution of prediction problems in policies. The research developed makes it possible to identify early evidence of conflicts and, consequently, efficiently direct efforts and resources for their

prevention. The project seeks to support conflict-prevention policy decisions, together with a new policy evaluation procedure to analyse the *trade-offs* between the benefits of conflict prevention and the costs of acting on an erroneous prediction. This shows the importance of developing predictive methods and their potential for public policies and social welfare.

Digitalisation and the wage gap study

Conducted by research staff of **INGENIO** and published in the magazine *Industry & Innovation*. Based on data collected from various sources, such as surveys and regional statistics, 103 European regions were analysed. The study concludes that the digitalisation of society has increased the existing inequalities between the middle and the lower class in Europe and that, although in general inequality seems to decrease with increasing digital skills of the population, if analysed by specific groups, this decrease only occurs between the middle and upper classes. This study had a wide media impact.



Study on menstrual education in Spain



The research, led by research staff from **INGENIO**, had a major national and international media impact. The research, published in *BMC Women's Health*, reveals that more than half of the women surveyed say 'they did not know how to physically manage the first time they got their period'. The study analyses the information

received about menstruation, that desired and that with the greatest impact on how menstruation is lived. The result: menstrual education in Spain is still deficient. This study was intended to serve as a guideline for the creation of efficient legislative and social measures.

Analysing the social denial of people suffering from chronic pain

The IBC Research Group of the **IESA**, specialised in the social and gender dimension of health and specifically pain, provides an thorough explanation of the reasons why people suffering from some type of chronic pain are subjected to a process of social denial of their pain. They demonstrate how these people develop strategies with which they try to legitimise their situation and comply with a series of rules that may even be contradictory, how the social legitimacy of pain is always subject to an expiration date and how pain is a social phenomenon that is highly questioned due to its serious impact on productivity and the maintenance of daily activity. Pain

is a system disruptor that cannot be completely legitimised because it hinders the fulfilment of functional processes: roles that affect the economic system and the sexual division of labour (production and reproduction), and processes that maintain culture and consumption (traditions, leisure and free time). Through the experiences of people suffering from chronic pain, the existence of a series of relations of domination is shown that expel them from the social spaces they occupy and they cease to be useful. The results of the research confirm the complexity of pain, which should not only be analysed from a biomedical perspective, but also requires the analysis of its social dimension.

Advancing knowledge about homes and day centres for the elderly

The Networked Aging and Experimental Statistics Laboratory of the **IEGD** has analysed the evolution of homes and day centres for the elderly in Spain.

Regarding homes, the number grows very slightly compared to 2020, but there is a remarkable change in the size of them, since the centres with more than 100 places increase to the detriment of the small ones with less than 25 places. More than half of these new places are in larger centres, highlighting this trend in the Community of Madrid, followed by Galicia and Cataluña. Privately owned centres are still more than twice as large as public ones, but public ones have grown more.

In terms of day centres, it is the first time that statistical data are offered. The study analyses the day care services offered by residential centres or independently. It should be noted that this service is provided in small and medium-sized units, with fewer than 25 places (1,768 centres) and fewer than 49 places (1,313 centres), with a small number having more than 100 places (only 32 centres), and 57.9% of the centres being privately owned.



Promoting the interdisciplinary analysis of conflicts over land management and measures for the preservation of the environment

Current environmental problems are complex and must be addressed from a multidisciplinary approach that includes Social Sciences, Natural Sciences and Humanities to understand and mitigate the existing tensions in relation to wildlife and its management. An example is the longitudinal study of the human dimensions of wildlife reintroduction projects, which compares the attitudes and impacts perceived by different social actors before and after the reintroduction of a species of vital ecological and social importance such as the Iberian lynx in two Andalusian regions. The **IESA** has been a pioneer in this multidisciplinary vocation through its TRAMAS group formed by scientific and technical staff from different fields of knowledge: Sociology, Biology, Agronomy, Geography, Law, etc., with the ultimate objective of approaching the problems of conservation and biodiversity and its management in an integral way, developing shared solutions and conservation actions that allow improving the coexistence between humans and wildlife.



Gender equality in electoral campaigns

The **IPP** directs a research team dedicated to the study of gender inequalities in the political sphere in Spain that has published, with rigorous scientific evidence, that feminism and gender equality have gained a lot of relevance in electoral competition, marking both the political agenda and partisan debates. Public opinion on this issue is ambivalent: despite the fact that gender equality as a principle to which societies should aspire obtains majority support in Spanish society, there is much resistance among men to recognise gender inequalities in the field of job opportunities. The results of an experiment show the negative connotations associated with the concept of feminism in Spain, since only 31% of the population expresses sympathy and support for this cause.

This **IPP** team also participates in the European project *TWICEASGOOD. Twice as Hard, Half as Good? Women Candidates' Experience of Sexism on the Campaign Trail*, which theorises and studies the obstacles that women candidates have to overcome in electoral campaigns and in the political sphere more generally. In the ethnographies carried out in connection with several female candidates during the election campaign of the July 2023 elections, the motherhood and all the processes associated with it (such as reconciliation) appear as the most obvious obstacle. There are also other more subtle obstacles connected with the cultural baggage of society and its institutions, such as stereotypes, masculine and feminine identities and what is expected of them. All the candidates commented that while men have more progressive and longer political careers, women tend to have shorter and later careers (and being better prepared) than men. According to the candidates, the gender gap in the longevity of their careers is not due to a personal choice, but to the fact that the most responsible positions are still in the hands of men, and that they assume that women are less interested in retaining such positions. Many of these obstacles are unconscious and unintentional, but they continue to penalise the progression of women's political careers.

The growing role of the social dimension in measures to address the ecological and energy transition

To achieve the *net-zero* emission targets all types of CO₂ emissions must be eliminated, even in those sectors that prove difficult or impossible to approach. The European project of the Horizon Europe CaLBy2030 framework, led by the **INCAR**, has developed three pilot plants (one of them in an old coal-fired electric power plant in the process of transformation towards the use of biomass in La Pereda, Asturias). From the **IPP** this research is accompanied from the social standpoint, attempting to detect those factors that impact in a positive, but also negative way, on the social acceptance of the implementation of this technology.

The FOREWAY and FORCARBON projects, led by the **IPP**, investigate the viability and prospects of domestic forest carbon markets in Europe. The research focuses on the forest carbon absorption projects registered in the Spanish Carbon Footprint Registry and analyses the potential for sustainable carbon offsetting by studying the supply and demand of forest carbon certificates. To this end, two surveys have been developed aimed at studying the familiarity, perceptions and preferences of a number of Spanish organisations about the voluntary compensation of their carbon footprints through investments in forest expansion and restoration. This innovative

study contributes to a barely explored field of research whose results will allow to examine the institutional frameworks, financial mechanisms and the priorities, preferences and values of stakeholders in carbon offsetting mechanisms through the forestry sector. The **IPP** has also investigated the role of public auctions and their design as a tool for the expansion of renewable energy technologies in Europe, reaching a very considerable impact on the European Commission, citing its conclusions in several legislative documents and official communications between the European institutions and the member states.



Visibility of the growing social inequalities in the field of assisted reproduction

The **IPP**, within the framework of the IFGENE project (www.ifgene.eu), has detected in Spain an anomalous pattern of implementation of genetic tests in the field of assisted reproduction that does not exist in any other country. Almost half of all pre-implantation genetic screening tests in Europe are performed in Spain, being the only country in the world where genetic exome tests are routinely performed, combined with AI-based facial biometric tools, to match gamete donors and future parents. These tests do not always have the general support of the medical profession and continue to generate many controversies due to their questionable clinical relevance and/or their high cost. Assisted reproduction in Spain is mostly managed in private clinics, in many of which these tests have become routine techniques included in each *in vitro* fertilisation process or heterologous fertilisation with gamete donation. Its common practice raises issues of increasing social stratification in reproductive medicine to political actors and regulators, as well as opening up a reflection on the progressive dissemination of genetic tests to healthy people and the renewed interpretation of kinship relationships from a reductionist biological perspective.

CORE AREA LIFE

BIOLOGY AND BIOMEDICINE

EARTH AND ENVIRONMENT

AGRICULTURAL SCIENCES

FOOD SCIENCE AND TECHNOLOGY

STAFF

RESEARCHER

2,711

1,155

1,556

TRAINEE RESEARCHER

959

578

381

TECHNICAL

4,620

2,771

1,849

MANAGEMENT/ADMIN/SERVICES

816

437

379

The area assigned to research and research trainee staff is the staff area. Other staff members are assigned to the area of the ICU to which they are attached.

TOTAL STAFF LIFE AREA

9,106

(61.08%)

64
RESEARCH
INSTITUTES

1
ASSOCIATED

30
JOINT

33
OWN

1,221
RESEARCH GROUPS

NATIONAL PROJECTS AND ACTIONS

3,096
CURRENT*

TOTAL FUNDING
€ 642,120,616.97

INTERNATIONAL PROJECTS (EU PM, EU NON-PM AND INTERN)

679
CURRENT*

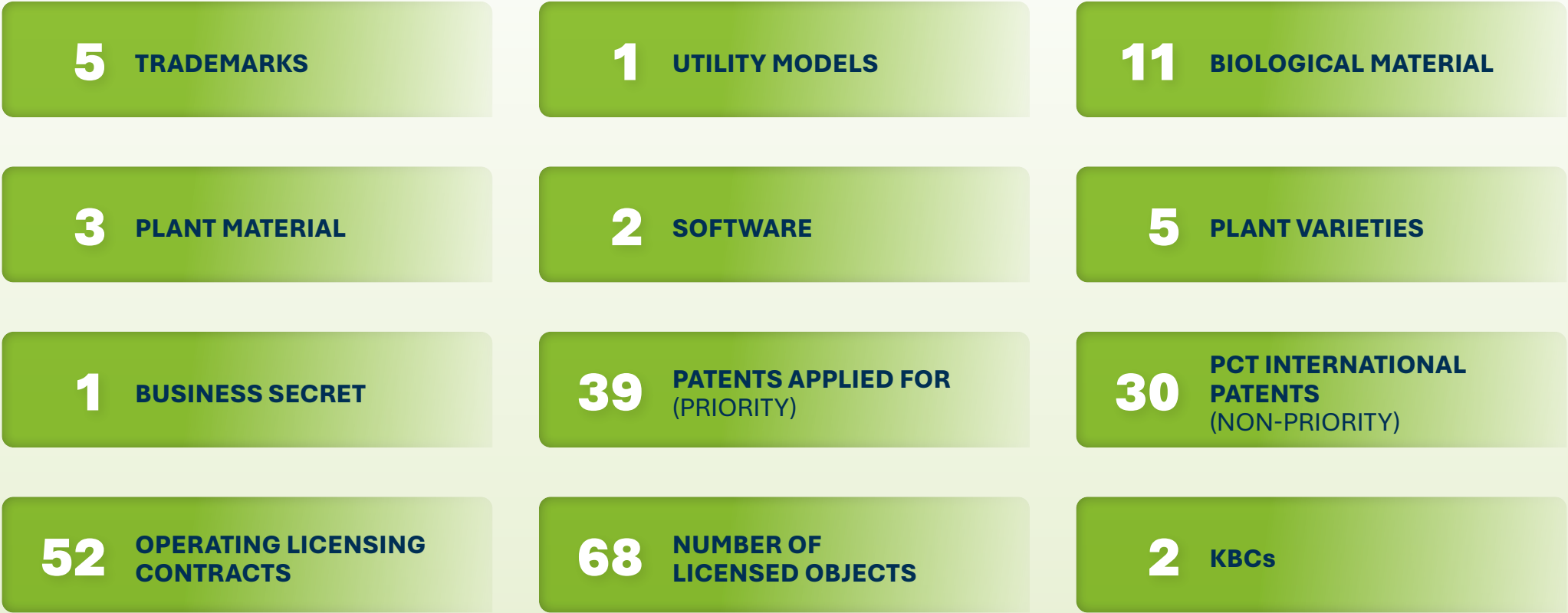
TOTAL FUNDING
€ 214,731,086.21

*Data that includes the number of signed and completed projects.

SCIENTIFIC OUTPUT



KNOWLEDGE TRANSFER



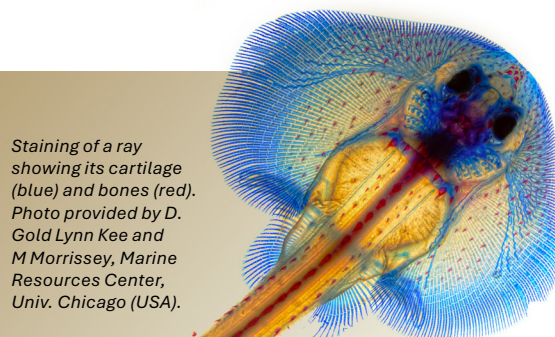
MILESTONES 2023

Biology and Biomedicine

BIOLOGY

Advances in knowledge about gene regulation in cell development

CABD has determined, through the study of the genetic regulation of the expression of a limited number of genes, that the ray's characteristic fin was due to a rearrangement of three-dimensional structures of its chromatin and they have described how an alteration in a particular gene was able to contribute to this fin. By studying the development and the genome of these animals, it was possible to hypothesise about the evolution of organisms and the effect of the genome duplications that occurred in ancestral organisms serving as an evolutionary engine. (*Nature* 616, 495-503 doi:10.1038/s41586-023-05868-1).



Staining of a ray showing its cartilage (blue) and bones (red). Photo provided by D. Gold Lynn Kee and M Morrissey, Marine Resources Center, Univ. Chicago (USA).

CABD researchers identified the Yap family of proteins to guarantee cell migration that is critical in the correct formation of organs (*Nature Communications*, 14(1), 2804 doi: 10.1038/s41467-023-38482-w).

IBF has identified how laminin, through the $\beta 4$ integrin, protects the cell from mechanical changes by preventing the entry of Yap into the nucleus (*Nature Materials*, 22, 1409-1420 doi: 10.1038/s41563-023-01657-3).

CABD has also shown how the recruitment of genes in an organ for functions other than those of the original organ fixes both organs from an evolutionary point of view (*Nature Communications*, 14(1), 5730 doi: 10.1038/s41467-023-41414-3).

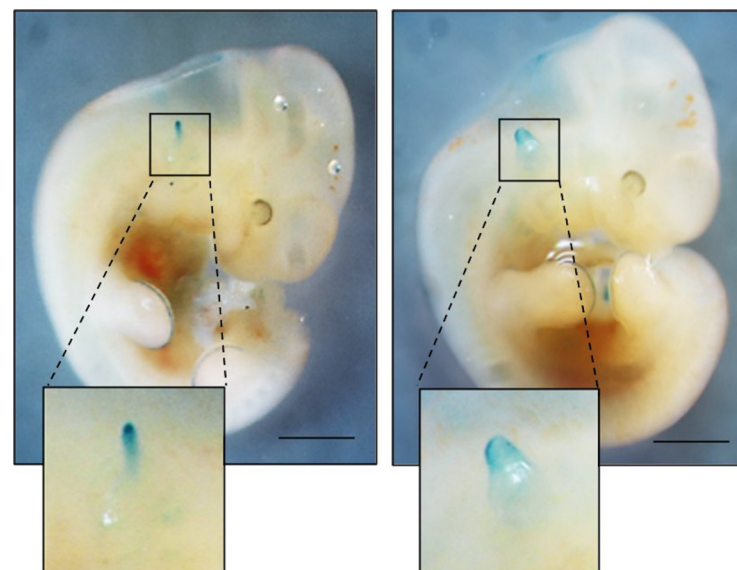
The **IIBM-SM** has shown how senescence, the process whereby cells stop dividing and go on to regulate the normal functioning of the organism, also plays a role during development. In fact, defects in the formation of the inner ear that are associated with hearing loss in the Branchio-Oto-Renal syndrome are shown to be due to an alteration of the normal embryonic senescence programme in this organ (*Development*, 150 (9): dev200903 doi: 10.1242/dev.200903).

Paternal mitochondria do not contain DNA

A group from **IIBB** has determined the mechanism whereby the DNA of the paternal mitochondria does not reach the zygote. In the sperm, the entry of the transcription factor TFAM into the mitochondria is blocked, which has the consequence that the mitochondria of the sperm lack DNA (*Nature Genetics*, 55, 1632-1639 doi: 10.1038/s41588-023-01505-9).

IBMB researchers have identified a novel non-canonical role for an intracellular vesicle-localised receptor, TNFR-Wergen; by forming a complex with FGFR-Breathless, it intervenes in the development of the trachea of *Drosophila* (*Nat Commun* 14, 5874 doi: 10.1038/s41467-023-41549-3).

The **IBV** has reported how the process of autophagy, a mechanism that cells use to eliminate molecules that need to be degraded, is important in the proliferative state of neural stem cells in a way that determines the proliferation/resting ratio of these cells. This is not only important in stem cell biology but also in neurodegenerative processes (*Nature Communications* 14, 7541 doi: 10.1038/s41467-023-43222-1).



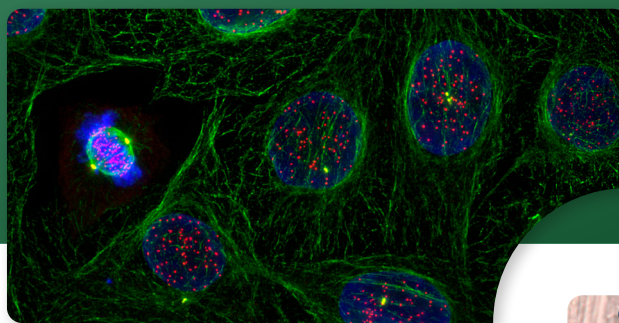
Normal (left) or mutant mouse embryo for the *Six1* gene. Animal model of BOR syndrome (right), showing the defective formation of the inner ear and the abnormal pattern of senescence (blue staining) in the mutant embryo.

Proposed mechanism that explains the generation of the first forms of life

How the molecules that formed the primordial cell were organised is the subject of work at **IBF**. This institute investigates how to make the basic pieces (amino acids, simple sugars, metabolites or nucleotides) join by themselves to form complex systems capable of maintaining themselves. The work proposes a close look at how these basic molecules could be joined by natural chemical processes, using intermediate substances as a bridge and cycles of reactions that help each other. They also consider how changes in the environment can promote the formation of organised structures capable of maintaining a dynamic and stable state, consuming energy from their environment. This process could explain how the first life forms capable of self-replication and self-maintenance emerged, a crucial step in the origin of life. (*Chemical Society, Reviews* 52(21), 7359-7388 doi: 10.1039/d3cs00594a).

Several important mechanisms described in cellular physiology from the transport of organelles to the control of oxygen in blood through correct protein folding

The **IBMB** has described a new mechanism of dynein regulation, a kind of cellular motor that transports molecules and organelles, based on a modification of the BICD2 adapter by phosphorylation (*Nat Commun* 14:1-20. doi:10.1038/s41467-023-38116-1).



Cells showing the microtubules (green) and the centrosomes (yellow) and how these separate during mitosis with the aim of separating the DNA (blue) among the daughter cells.

The proper folding of cellular proteins is a critical point in the development of their function. Frequently, the synthesis of proteins is associated with chaperones that facilitate proper folding. **CNB** has demonstrated the mode of action of one of these chaperones, DNAJA2, which is important to better understand the molecular mechanisms of protein folding (*Nature Communications*, 14, 5436 doi: 10.1038/s41467-023-41150-8).

A research group at **IBIS** has determined how the mitochondrial complex I, an important part of the cell energy core, is essential for the organ responsible for detecting a decrease in oxygen in the blood to perform its function, which is none other than increasing the respiratory rate and activating the heart to get enough oxygen to all parts of the body (*Nat Communications*, 14, 1172 doi: 10.1038/s41467-023-36894-2).

New progress in the dynamics, evolution and repair of the genome

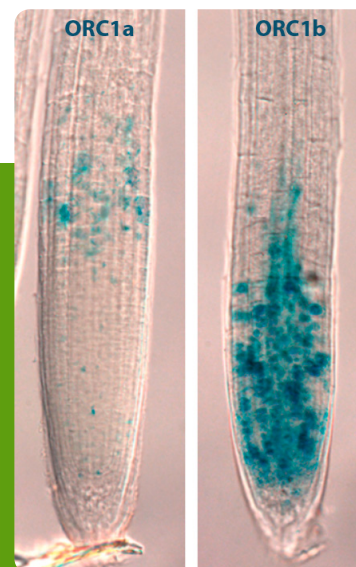
A group at **CABIMER** has demonstrated the significance in DNA damage repair processes of the distribution of parental histones among daughter chromatids (*Cell Rep* 42(3):112174 doi:10.1016/j.celrep.2023.112174).

At the **IBFG** they have studied the DNA repair process and demonstrated that a specific step that was believed to be a passive process, is molecularly controlled through the phosphatase activity

of Cdc14 on the Dna2 exonuclease (*Nat Commun* 14(1):2738 doi: 10.1038/s41467-023-38417-5).

CBM has shown how the duplication of the ORC1 genes produces proteins with different functions in the process of DNA replication, the duplicated gene acquiring a new function in the efficient deposition of chemical marks on histones (*Nature Communications*, 14(1), 1270, doi: 10.1038/s41467-023-37024-8).

Research staff at **CIB-MS** has revealed how the insertion of transposons into the genome is regulated, preventing alterations in the existing genes at the insertion region. Through the interaction between Ty1 and RNA polymerase III the cell directs the insertion of transposons avoiding the appearance of mutations (*Nature Communications*, 14, 1729 doi: 10.1038/s41467-023-37109-4).



Despite being almost identical, ORC1a and ORC1b are proteins from the root of the model plant *Arabidopsis* with different localisation and function in epigenetics and DNA replication, respectively.

A research group from **CABIMER** demonstrates the important role of the DICER protein in the elimination, in regions of the chromatin formed by a DNA:RNA double helix together with the displaced DNA molecule and known as R-loops, of these abnormal structures and the maintenance of the stability of the genome (*Molecular Cell*, 83:3707-3719 doi:10.1016/j.molcel.2023.09.021).

Aspects related to social preferences and the transmission of senses are revealed

IN researchers have described the existence of a group of neurons in the prefrontal cortex that are essential for determining preference when interacting with some congeners, linking it with social memory in mice. This finding may represent an important advance in the treatment of disorders such as separation anxiety or evasive personality (*Cell* 186, 4152-4171 doi: 10.1016/j.cell.2023.08.010).

Also, at **IN** they have shown how the sense of touch is transmitted between the two hemispheres. A double representation occurs between the two hemispheres so that the perception of continuity is allowed, without interruptions between the two sides of the body (*Science Advances* 9, eadi3728 doi: 10.1126/sciadv.adi3728).

Calcium and reactive oxygen species in the physiology of the nervous system

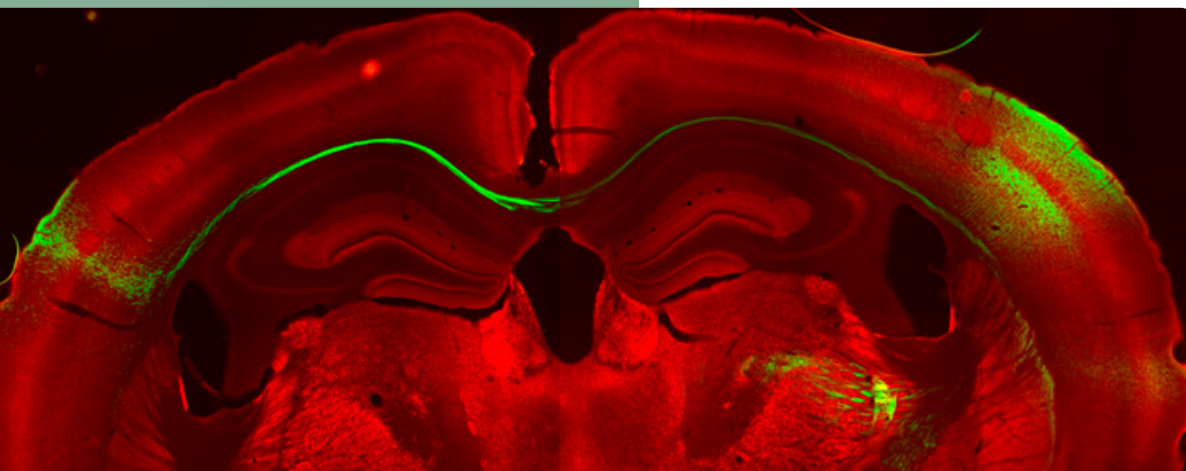
A research group at **IC** has determined the importance of calcium signalling in astrocytes to maintain balance in neural circuits and the potential application of this knowledge in the treatment of major depressive disorder (*Molecular Psychiatry*, 28, pages3856–3873 doi: 10.1038/s41380-023-02269-8).

IBFG researchers, working also with astrocytes, have shown how the regulated production and release of reactive oxygen species from astrocytes, which when produced in excess can be toxic, contributes to maintaining a correct neurotransmission process throughout life (*Nature Metabolism* 5, 1290-1302 doi: 10.1038/s42255-023-00835-6).

A new protective mechanism against ALS in experimental animal models connects inflammation and neurodegeneration

The blood-brain barrier separates the brain from the external environment and forms an exquisite control as to which molecules and cells are able to penetrate. The loss of this barrier for a number of reasons is associated with the onset of various diseases. This environment causes a self-regulation of the immune system. Research staff from **CABIMER** has collaborated in a study which identifies how the expression of pro-inflammatory genes is regulated depending on the phosphorylation state of the MOK protein and how inhibiting this protein in presymptomatic animal models of amyotrophic lateral sclerosis (ALS) prevents the onset of this disease (*PNAS* 120: e2302143120, doi: 10.1073/pnas.2302143120).

A section of a mouse brain marked with a stain showing how neurons from one hemisphere of the primary somatosensory cortex project to the other hemisphere.



When “where” is as important as “what”: the topology of neural transmission

Work by **IC** has developed a new methodology that manages to determine the topology of the transmission of a certain type of waves that occur in the hippocampus, the region of the brain involved in functions such as the generation of memories, which can potentially serve to improve learning and memory (*Nature Neuroscience* 26, 2171-2181 doi: 10.1038/s41593-023-01471-9).

Mechanisms related to resistance and response to treatment in cancer are unravelled

IBMCC-CIC scientists have determined resistance mechanisms associated with the blockade of the K-RAS oncoprotein that are generated as a function of the achieved levels of inhibition of the lung cancer target. K-RAS is the oncoprotein that is most frequently altered in human tumours and, above all, in those associated with low survival rates such as lung, colon and pancreas tumours. These results provide information on: (a) what types of resistance develop depending on the degree of target inhibition; (b) new ideas to counteract such resistance mechanisms (*J. Clin Inv* 133:e164413. doi: 10.1172/JCI164413). They have also participated in the discovery of new oncogenes (RRAS2, VAV1) and therapeutic targets (SOS1) with relevant roles in various human tumours (*Oncogene* 42:389-405. doi: 10.1038/s41388-022-02563-9; *Nat Commun* 14:5856. doi: 10.1038/s41467-023-41583-1). On the other hand, new epitranscriptomic mechanisms have been identified (based on the modification of various types of cellular ribonucleic acids) that have relevant roles in several tumour types and that are under the control of the epigenetic regulator called METTL1. Some of these mechanisms are also of therapeutic interest, since they directly influence the response of immunotherapeutic treatments currently used in clinical practice (*Mol Cancer* 22:119. doi: 10.1186/s12943-023-01809-8; *Oncogene* 42:3169-3181. doi: 10.1038/s41388-023-02825-0).

In the resistance to cancer treatment, both speed and size matter

A research group from **IBiS** has shown that by eliminating or limiting the function of the protein that contributes to DNA repair (TDP1), a different repair system is used that generates chromosomal rearrangements. This finding allows the design of therapies that combine topoisomerase 1 inhibitors with inhibitors against TDP1 as a way to eliminate quiescent, resting cancer cells that are usually resistant to chemotherapy (*Nature Communications* 14(1):6940 doi: 10.1038/s41467-023-42622-7).

A research team at **IBV** has shown that chemotherapy-resistant cells are smaller than those that are not resistant and this was related to a reorientation of the synthesis/degradation balance of cellular proteins, opening new alternatives to avoid the development of resistance in the treatment of tumours with chemotherapy (*Signal Transduction and Targeted Therapies*, 8, 256 doi: 10.1038/s41392-023-01500-w).

The vascular system as a therapeutic target in cancer

IIBM researchers have seen how certain forms of the gasdermin B (GSDMB) protein can protect against breast cancer. It so happens that some of these forms (called isoforms) have the ability to promote cell death, which would serve to control the population of cancer cells (*Cell Death and Differentiation*, 30, 1366-1381, doi: 10.1038/s41418-023-01143-and). The inhibition of angiogenesis in tumours is an alternative therapeutic route, being the inhibition of the generation of blood vessels that serve as support for tumours. A research group at **IPBLN** has established that the inhibition of the formation of blood vessel-like structures facilitates and promotes the anti-tumour effect of Avastin, a drug that reduces the formation of blood vessels in tumours (*Cell Death and Disease* 14, 135, doi: 10.1038/s41419-023-05666-7).

Scientists identify how BRCA2 prevents the appearance of breakpoints in cellular DNA

The deficiency of BRCA2, a protein involved in DNA repair and that is related to, among others, the appearance of breast cancer, causes replicative stress in human cells. At **CBM** they have shown how a part of the protein that binds to double-stranded DNA is necessary to prevent and repair/fill the gaps of single-stranded DNA, but not to limit the gaps induced by PARPi. Therefore, these findings suggest that nucleotide depletion and PARPi trigger these gaps through distinct mechanisms and that the N-terminal domain of BRCA2 prevents nucleotide depletion-induced single-stranded DNA gaps (*Nature Communications* 14, 446 doi: 10.1038/s41467-023-36149-0).

The onset of Burkitt's lymphoma is related to EBV infection

In about half of total human tumours MYC, an oncogenic transcription factor, is found to be deregulated. Virtually all Burkitt's (BL) lymphomas involve chromosomal translocations involving the MYC oncogene. Most endemic BL and a fraction of sporadic BL are associated with Epstein-Barr virus (EBV) infection. The currently accepted mechanism is that EBV is the causative agent of BL that induces MYC translocation. A group at **IBBTEC**

showed that the EBV receptor, which causes some BL, CR2, is regulated by MYC. They saw how by studying mice in which the MYC gene is deleted in a controlled way, CR2 is induced in primary B cells. This study allowed them to propose an alternative hypothesis in which MYC deregulation could be the first event leading to subsequent EBV infection (*Oncogene* 42:3358-3370. doi: 10.1038/s41388-023-02846-9).

Antimicrobial resistance: deciphering mechanisms and advancing solutions

A collaboration between the **IBMB** and the CIB-MS has made it possible to characterise the three-dimensional structure of the replication initiator protein bound to a protein required for the process. By characterising the replication process of the plasmids, the first steps are taken for the design of alternatives for the treatment of antibiotic resistance (*Nucleic Acids Research*, 51, 1458-1472 doi: 10.1093/nar/gkac1271).

CNB researchers have studied, through simulations, how the distribution of these plasmids can vary in different bacterial hosts and their impact on the evolution of antimicrobial resistance. They focus on the transfer of resistance in enteric bacteria and observe a preferential association of the plasmid pOXA-48 carrying resistance to certain antibiotics (carbapenemases) with *Klebsiella pneumoniae*, a widespread opportunistic pathogen, in the intestinal microbiota of patients (*PNAS* 120, e2314135120, 10.1073/pnas.2314135120).

A research group at **I2SysBio** has determined that the diversity of the bacterial capsule is the main factor that restricts the range of phage hosts; they have also shown how the types of depolymerase sequence are associated with the ability to infect specific capsular types in different phage families (*Cell Reports* 42: 112048 doi: 10.1016/j.celrep.2023.112048).

An **IBV** group has characterised a new life cycle control mechanism of one of the phage families with communication capacity. Phages have two life cycles: a lytic cycle, where the phage infects a bacterium and uses it to multiply and then kills it by making it explode (which is known as 'lysing') to release new viral particles; and another lysogenic cycle, where the phage infects a bacterium and inserts its DNA into it becoming quiescent, which allows its DNA to be copied and transmitted to the offspring when the bacterium duplicates (as in herpes viruses or hepatitis delta in humans). This group has demonstrated the existence of a new mechanism for controlling entry into the lytic phase of the phage (*Cell Host & Microbe* 31(12), 2023-2037.e8 doi: 10.1016/j.chom.2023.11.003).

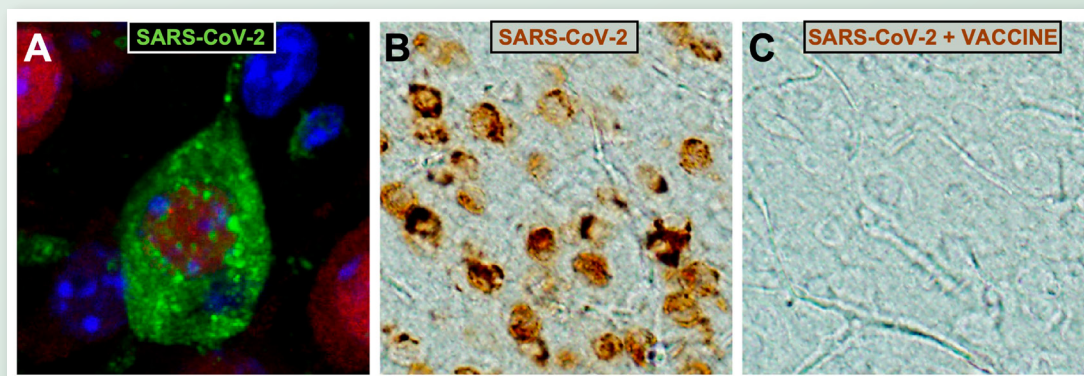
The **I2SysBio** has developed a comprehensive study of how polyclonal sera, those containing antibodies directed against various regions of a protein or against several viral proteins, target a non-enveloped viral capsid and help define both the immune domain and the escape at the population level. To do this, they obtained the complete antigenic profile, the map of protein regions recognised by the antibodies present in multiple human and mouse polyclonal sera. They observed a significant variation in the amplitude and strength of the neutralisation sites to which individual human polyclonal responses are directed, while in experimentally infected mice these are more homogeneous (*Nature Communications* 14, 6417 doi: 10.1038/s41467-023-42144-2).

Post-covid lessons: from the role of lipin-2 in controlling viral replication to brain damage caused by infection

IBGM scientists have seen how an interferon-regulated protein, called lipin-2, inhibits viral replication both *in vitro* and *in vivo*, and they have also described the mechanism by which this protein acts as inflammation regulator (*EMBO Rep* 24:e57238, doi: 10.15252/embr.202357238).

A group from **IBIS** has characterised the effects on the nervous system

of SARS-CoV-2 infection. Using a mouse model susceptible to SARS-CoV-2 coronavirus infection, they have demonstrated the ability of SARS-CoV-2 to infect different regions of the brain and produce brain damage, and how the CNB-CSIC vaccine provides full protection against this infection in the brain (*Nature Neuroscience* 26:226-238 doi: 10.1038/s41593-022-01242- and).



A) Neuron of the cerebral cortex infected with the coronavirus SARS-CoV-2 (viral particles in green).
B) Cortical neurons infected by SARS-CoV-2 (in brown).
C) Absence of infection in the same brain region of mice vaccinated with MVA-CoV2-S.

The yin and yang of inflammation: necessary but dangerous

An **IBGM** research group has concluded that complex II, a set of mitochondrial proteins involved in energy generation, also regulates the control of macrophage responses. They noted how by eliminating proteins from the complex, called *SdhA* and *SdhB*, the ability of these cells to launch a response mechanism in the presence of microorganisms was lost and they evidenced that both proteins were also essential for the production of signals that control inflammation to prevent the cellular response to an infection from ultimately damaging the organism itself (*iScience* 26(8):107473 doi:10.1016/j.isci.2023.107473).

Systemic vasculitis are pathologies characterised by inflammation of the blood vessels and that can cause serious damage, such as blindness and involvement at the renal, respiratory and central nervous system levels. Through a comprehensive analysis of the genome of more than 8,000 patients with eight different types of vasculitis and almost 30,000 healthy individuals, researchers from the **IPBLN** identified 16 regions of the genome involved in the risk of developing two or more of these diseases, thus demonstrating that the different vasculitis have common risk factors. A significant number of these genes encode proteins that are targets of drugs directed against other immune-mediated diseases, with all that this implies for the treatment of vasculitis (*Annals of Rheumatic Diseases* 82, 837-847 doi: 10.1136/ard-2022-223697).

OTHER

Developing computational biology tools to characterise the transcriptome, to improve the design of new drugs and for cryomicroscopy image analysis

Scientists from **I2SysBio** have developed a tool, SQANTI-SIM, to identify new transcripts, RNA molecules other than the one mostly produced from DNA for a specific gene. Based on data obtained with the most modern sequencing techniques, known as “single-stranded” or “third generation”, and through a manipulation that eliminates from the data precisely those molecules that are well established, this tool emulates scenarios involving non-annotated molecules, making it the first multi-omics simulation tool for the field of long-sequencing RNA sequencing (*Genome Biology* 24, 286 doi: 10.1186/s13059-023-03127-0).

A research team at **IBMB**, by applying computational biology techniques, has improved the development of the regions of antibodies that provide them with the necessary specificity against an external molecule that must be neutralised. They developed a computational strategy that allows the design of the variable regions of antibodies that are responsible for an antibody specifically recognising a target. By applying artificial intelligence and physics techniques, they have designed these proteins that do not exist in nature and, through structural biology, the part of biology that deals with the 3D structure of proteins, they demonstrate the accuracy of the models. This opens the door to designing antibodies on demand (*Nature Communications*, 14, 5939 doi: 10.1038/s41467-023-41717-5).

At the **CNB**, researchers have developed a technique for analysing structural biology images, specifically those obtained by the sophisticated technology known as cryoEM, which seeks to take advantage of the sensitivity of this technique to obtain information about the different structural conformations that a molecule can adopt, in a way that increases our ability to visualise and understand the complex interactions inside cells; this promises new possibilities for research in structural biology and the design of drugs (*Nature Communications*, 14, 154 doi: 10.1038/s41467-023-35791-and).

Study of the relationship between certain drugs and lipid metabolism

A group from **IN** which analyses how ranolazine, used to treat heart ailments, has managed to delay the appearance of tumours resistant to anti-melanoma treatment in mice, blocking the metabolism of fatty acids (*Nature Metabolism* 5, 1544 – 1562 doi: 10.1038/s42255-023-00861-4).

At the **IIBM** they have studied the effects of olanzapine, a drug widely used clinically as a second-generation antipsychotic, on lipid metabolism. They have mainly focused on studying the communication between the hypothalamus and the liver in male mice treated with this drug orally or intraperitoneally. The results showed that orally administered olanzapine induced

an accumulation of lipids in the liver; by contrast, when the same dose of the drug was administered intraperitoneally, no signs of hepatic steatosis were observed. Thanks to the application of molecular imaging techniques, it was evident that intraperitoneal treatment with olanzapine led to moderate oxidative stress and inflammation in the hypothalamus. In addition, experiments evidenced that said oxidative stress resulted in an activation of metabolic processes that signalled from the hypothalamus to the liver through the vagus nerve, thus increasing the expression of the regulatory genes of lipid synthesis (*REDOX Biology* 63:102741 doi:10.1016/j.redox.2023.102741).

Food science and technology

The importance of fighting listeriosis from different perspectives

The **CEBAS** and the **IIM** have published two novel studies on the presence of this pathogen in food and food industries that may contribute to designing strategies for its control.

CEBAS researchers have shown that the water disinfection treatments regularly used in the fresh processed produce industry do not always completely inactivate *L. monocytogenes* cells. These treatments can induce an intermediate state in which the bacteria are viable, but not cultivable, and through the washing water they can

contaminate plant products, representing a potential problem for human health (*Food Microbiology*, 109, 104155, 2023).

IIM has studied the role of *L. monocytogenes* biofilms in the persistence of the bacteria in the food processing environment, verifying that the properties of these biofilms are highly variable between strains, something that significantly affects the risk of food contamination. The study provides a new method for classifying the strains of *L. monocytogenes* according to the properties of their biofilms, a characteristic that conditions the potential risk of reaching the consumer (*Food Research International* 170, 112989, 2023).



Possible effects of disinfection treatments on the inactivation of *L. monocytogenes* in the process of industrial washing of fresh products (complete bacterial inactivation, viable, but not culturable bacteria, bacteria with the ability of infection).

Consortium of wine yeasts in the face of climate change

The **ICVV** has developed a procedure to limit the increasing alcohol content of wines associated with climate change. Taking advantage of the characteristics of different species of wine yeasts, a combination of two yeasts has been designed, *Saccharomyces cerevisiae* and *Metschnikowia pulcherrima*, which, under

optimised conditions, achieves reductions of about three degrees in the final alcoholic content of the wine. A remarkable advantage is that its industrial implementation does not depend on strict oxygenation control or the use of a particular strain of *S. cerevisiae* (*Food Microbiology* 115, 104344, 2023).

The transmission and persistence of bifidobacteria is linked to sex

IPLA has participated in a study coordinated by the University of Parma (Italy) on the dynamic changes that occur in the intestinal microbiome. The analysis reveals the host sex-related persistence of strains belonging to common, maternally inherited species, such as *Bifidobacterium bifidum* and *Bifidobacterium longum* subsp. *longum*. The study determines which bacterial enzymes related to the metabolism of host glycans can contribute to

more efficient colonisation in women, compared to men. This is the first study to identify an intestinal microbiome gene involved in sex-linked persistence in the gut and suggests a sex-specific host-microorganism co-evolution, which drives the selective persistence in females of key microbial taxa so that they can be transmitted vertically to the next generation (*Nature Communications* 14, 4220, 2023).

The human microbiome is shared between people from the moment we are born

The **IATA** has participated in an international macro-study led by the University of Trento (Italy) that reveals the fundamental role of social interactions in the transmission of some microorganisms that make up the human microbiome. More than 9,000 stool and saliva samples from participants of all ages, from birth to the elderly, were analysed in 20 countries and all continents, confirming the existence of both vertical (between generations) and horizontal (between people living in close contact) transmission. The first transmission of the intestinal microbiome occurs at birth and is very long-lasting; however, adults also acquire bacteria from one person to another, the transmission of the oral microbiome being markedly different from that of the intestinal microbiome. The study has been key to the advancement in the knowledge of the acquisition, persistence and modulation of the human microbiome and its potential effects on health (*Nature* 614, 125, 2023).



Picture of the experimental winery and the programme developed to apply the on-line control by applying "digital twins".

Experimental winery to promote the implementation of "digital twins" in the wine industry

At the **IATA** headquarters, an experimental winery has been inaugurated as a pilot plant that will allow, through "digital twins", to simulate and predict the wine fermentation process using mathematical models by installing sensors in tanks, so that the digital twin allows monitoring the processes, making predictions and real-time optimisation. This infrastructure, developed within the framework of the *The Dtwine Project* led by **IATA**, with the participation of **IIM**, the Ramón Bilbao winery and the technological SME **INCONEF**, aims to put the wine sector at the forefront in the use of digital technologies, to achieve a more sustainable production and respond to the new trends of consumption of wines with lower alcohol content and improved aromatic profiles.



Extra virgin olive oil (EVOO).

Extra virgin olive oil (EVOO) improves health in people with obesity and pre-diabetes

The **IG** has participated in a study whose results have shown that, just one month of consumption of EVOO rich in oleocanthal and oleacein, without the need to modify the amounts of oil ingested or introduce other changes in diet or physical exercise, was enough to induce metabolic improvements such as

weight loss, decrease in body mass index and basal glycemia, benefits that were not observed after the consumption of plain olive oil. In addition, it increased antioxidant defences in the blood and decreased parameters associated with oxidative stress and inflammation (*Clinical Nutrition* 42, 1389, 2023).

New method to classify edible oils and fats according to their nutritional quality

IG researchers have carried out a study that proposes a new scoring or classification system that evaluates the nutritional quality of edible oils and fats in order to help people make healthier choices and provide food producers with a valuable tool to select high-quality oils for their products, ensuring that they meet nutritional requirements. The study found that virgin olive oil took the first place with a score of 100, followed by flax oil and olive oils and olive pomace and, in addition, it was found that saturated fatty acids can predict the score and, therefore, the nutritional quality of the oils (*Nutrients* 15, 2127, 2023).



The IG classification aims to promote different healthy and nutritious food options for consumers.

Possible involvement of a component of milk fat in enhancing memory and preventing mild cognitive impairment during adulthood

The **CIAL** has led a clinical study of nutritional intervention in people over 65 years of age, either healthy or with a mild cognitive impairment, for which they received, for 14 weeks, a daily ration of milk with milk fat globule membrane (MFGM) or skimmed control milk (without MFGM). Those who consumed the preparation with MFGM showed improvements in episodic memory, the ability to remember recent events in their life, with special relevance in women versus men. The authors of this study note that any intervention in this regard should be initiated before the onset of clinical symptoms, as a preventive measure against cognitive impairment (*Journal of Functional Foods* 111, 105849, 2023).

The decrease in retronasal olfaction and taste perception in obesity are related to the biochemical composition and microbiota of saliva

CIAL scientists have investigated whether obese individuals perceive the taste of food differently from normal-weight individuals and the mechanisms involved. The results showed that obese participants perceived the tested sensory attributes less intensely than normal-weight individuals. They further established more than 100 significant correlations between the composition of the microbiota and biochemical parameters of saliva with the perceived flavour intensity, suggesting the existence of a mouth-brain axis that could contribute to the development or perpetuation of obesity, opening new and interesting research avenues (*Food Research International* 167, 2023, 112660).

What happens in the body with the acrylamide present in our favourite snacks?

A study by the **ICTAN** has evaluated the behaviour of acrylamide, a chemical substance that is formed during the preparation of certain snacks, in the digestive process. After analysing French fries and sweet potato, beet and carrot chips, sweet potato chips showed the highest acrylamide content and French fries, the lowest. However, after simulating digestion in the laboratory, it was shown that the bio-accessibility of acrylamide was lower in vegetable chips than in French fries. In addition, sweet potato chips fermented with infant microbiota released more acrylamide. The research concludes that, although acrylamide is present in certain foods, its availability to be absorbed by our body varies depending on the type of food and the activity of our intestinal bacteria. These factors should be considered for an accurate assessment of the risk associated with exposure to acrylamide through diet (*Food Research International* 164, 112409, 2023).



Different snacks that may contain acrylamide.

The therapeutic potential of wheat bran hydrolysate is discovered

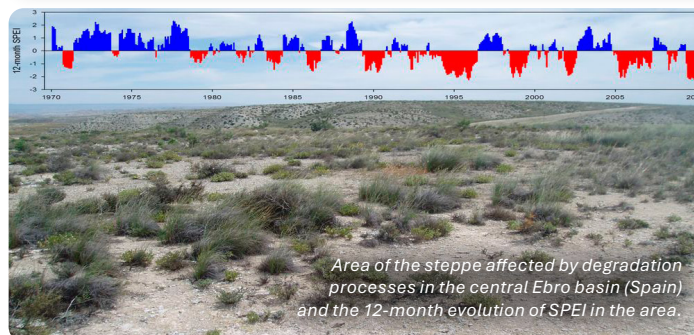
A research group from **ICTAN** has made a revolutionary discovery about the immunomodulatory and anti-cancer properties of wheat bran hydrolysate. This pioneering study, the first of its kind, explored the immunostimulant benefits of a wheat bran hydrolysate and a mousse enriched with this compound, examining its impact on mouse and human macrophages, both in their natural state and after being subjected to an *in vitro* digestion process. The research was extended to evaluate the effectiveness of the hydrolysate in inhibiting the proliferation of colorectal cancer cells *in vitro*. The surprising results of this study are attributed to the presence of soluble poly- and oligosaccharides, as well as soluble phenolic compounds in the hydrolysate, opening promising horizons for the prevention of colorectal cancer and highlighting the therapeutic potential of hydrolysed wheat bran (*International Journal of Molecular Science* 24, 7436, 2023).

Salvado de trigo.

Creation of the Spanish Society of Cryobiology (SECRIO)

Jointly promoted by **ICTAN** and **MBG**, this platform was created with the aim of uniting professionals interested in the field of cryobiology, covering both basic studies of biological or physicochemical processes related to low temperatures and the development of practical applications, including cryopreservation to preserve biological materials such as sperm, eggs, embryos, seeds, bacteria and proteins.

Agricultural sciences



Area of the steppe affected by degradation processes in the central Ebro basin (Spain) and the 12-month evolution of SPEI in the area.

Development of tools to investigate how the climate evolves and how it affects natural systems and agricultural production

A tool developed by **IPE** and **EEAD** to quantify the intensity of drought that has become part of the Google Earth Engine catalogue. It is the standardised precipitation and evapotranspiration index (SPEI) that serves to quantify the difference between the amount of precipitation accumulated in a given period and the atmospheric moisture demand.

EEAD has published and digitised a historical compendium of rainfall throughout Spain in the first half of the twentieth century that will allow studying the current and future evolution of the climate with a solid reference (*Earth System Science Data*, 15, 2547-2575, 2023).



In agricultural systems the choice of cropping systems and management practices has a key role in mitigating climate change.

How to reduce the emission of greenhouse gases caused by food production

Spain, through **INIA**, chaired in 2023 the Council of the Global Research Alliance on Greenhouse Gases (GRA), whose twelfth meeting was attended by representatives from more than 60 countries, and at an event held at the Student Residence in Madrid, climate change mitigation in the agroforestry sector was discussed at the regional and international levels.

INIA is responsible for a project on the first genetic evaluation to reduce methane emissions in dairy cattle. Based on its data and mathematical models, it is possible to identify those breeding animals whose offspring emit lower emissions during the digestion of food and are more efficient and sustainable.

EEAD researchers have compared several cultivation and irrigation management systems in the Ebro Valley proving that dual crops in a single year, incorporating legumes in the first harvest and corn in a second, using direct sowing, reduces GHG emissions with respect to the classic single-crop system, maintaining a good productivity (*Science of the Total Environment*, 857: 159458, 2023).

Can we improve water use efficiency in agriculture?

The **IBMCP** has patented a method to activate the drought resistance of plants by developing an "anti-drought drug". By using genetic engineering techniques, they have created a modified receptor of the plant hormone ABA that is activated by a mimetic molecule, with a greater effect than the natural one, with which plants could be treated as needed (*Science Advances* 9:10, 2023).

At the **CIDE**, they have managed to save 28% of the water used by the vineyards by mulching the soil with pruning wood (*Agricultural Water Management* 281:108247, 2023).

Controlling the spread of pests due to climate change

Epizootic haemorrhagic disease is a disease that does not affect humans, but with serious consequences for animal populations due to the absence of vaccines; it is transmitted by mosquitoes (*Culicoides spp.*), whose spreading range and period of action have increased due to climate change. **CISA** researchers have developed an animal model with mice for clinical studies and are working with vectors to build biosafety vaccines.

The bacterium *Xylella fastidiosa*, which is transmitted by the insect *Philaenus spumarius* L, is a devastating disease for many fruit trees. Changes in temperature cause some organisms to colonise areas that were previously off limits to them. **ICA** has developed dispersal models of this insect that predict when and where the eggs will hatch to help in the decision of when to take control measures (*Environmental Entomology* 52, 350-359, 2023).

Revolutionary treatments and new products with high added value

IBMCP has created a new generation of treatments to selectively inactivate plant genes, continuously and non-transgenically, through a single spray application. It contains an innocuous virus that releases very small RNA molecules (artificial microRNAs) designed in the laboratory to silence genes of interest on demand without modifying the plant genome, a non-transgenic method that favours implementation in the market. This technology, which is in the process of being patented, could be used to increase the productivity of crops, "vaccinate" them against viruses and improve their ability to adapt to environmental changes (*Nucleic Acids Research*, 51, 10719-10736, 2023).

A research group at **IRNAS** has identified the optimal variety of oats and the most suitable time of the year to sow them, in order to maximise the generation of antioxidant compounds and other high-value bio-products, such as p-coumaric acid and tricine. These compounds have an outstanding antioxidant activity, so they are highly valuable for the chemical, pharmaceutical, food, health and cosmetic industries (*International Journal of Biological Macromolecules* 242, 124811, 2023).

The variety and planting season have a significant impact on the antioxidant content in oats.



Phenomics and remote sensing, prediction through images

The **IDAB** has successfully predicted the quality characteristics of wheat, closely related to the nitrogen content of the grain, thanks to measurements obtained from multispectral ground, aerial or satellite images (*Information Processing in Agriculture*, 10, 504-522, 2023).

Following the reverse path, **CRAG** scientists have developed an artificial intelligence tool, GenoDrawing, which uses self-encoders and deep learning approaches to predict images of apples from genetic markers known as single nucleotide polymorphisms (*SNP*), which opens new perspectives for plant breeding.

A deeper understanding of DNA to understand genetic diversity

One consequence of the emergence of genomic data has been the likewise emergence of the pangenome concept, a set of genes present in the genomes of a taxonomic group or a species. However, the comparison of genomes between species is a process of great computational complexity, which frequently leads to inconsistencies due to the comparison criteria. **CBGP** research staff have established guidelines for choosing the most appropriate methods depending on the type of study (*Genome Biology*, 24, 250, 2023). Methods have been published by **EEAD** to locate the pangenes, genes that occupy the same position in the pangenomes, which will facilitate the exploration of the genetic diversity of the species (*Genome Biology*, 24, 223, 2023).

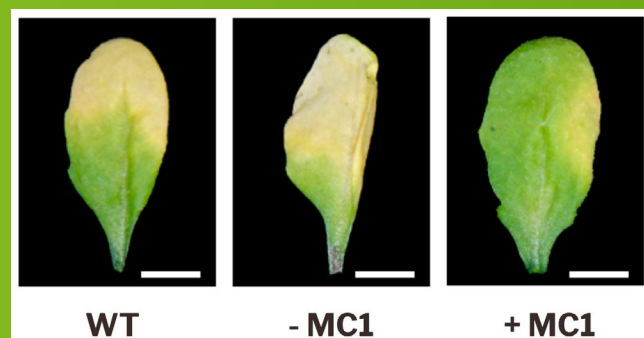
Jumping genes or transposons continue to provide evidence of their importance in controlling gene expression. These changes are fundamental in the responses of crops to different environmental and agricultural conditions. At **CRAG** they have proven that the movement of transposons gives rice a greater ability to adapt (*eLife*, 12:RP86324, 2023).

Origins of viticulture and differences between white and red grapes

CBGP participated in the largest genetic study of vines in which they sequenced 2,448 vine genomes collected by 23 scientific institutions in 16 countries of the Mediterranean basin and East Asia. The study has revealed that the domestication of the grape did not occur through a single process, yet a double one, occurring simultaneously in separate geographical areas more than 1,000 km apart (*Science*, 379, 892-901, 2023).

Do white grapes and red grapes taste the same? A research group at the **ICVV** has discovered that

white grape varieties originated from spontaneous mutations in red varieties that involved the loss of two essential elements for the synthesis of anthocyanins, the transcriptional regulatory factors MYBA1 and MYBA2. On the whole, the reduction in the content of anthocyanin pigments has important side effects on the composition of the grape by altering the internal microenvironment of the berry, which conditions not only the colour, but also the potential aroma and flavour of the grape and the wine, as well as the responsiveness to stress conditions, with useful implications for winemaking.



Leaves of the model plant *Arabidopsis thaliana* under normal ageing conditions (left), without the MC1 protein (centre), and in the presence of high amounts of MC1 (right).

Progress in agriculture, livestock and forestry science is based on a comprehensive knowledge of the molecular keys to the functioning of organisms

IBMCP scientists have discovered the mechanism of evolution of the DELLA protein, key for the adaptation of terrestrial plants, a true super-tool of evolution that transfers information from the environment to multiple plant processes (*Nature Plants* 9, 535–543, 2023). Environmental stresses cause damage to organisms and understanding the causes and effect of these damages is the first step to finding a remedy. A study by **IBVF** shows how the genes that affect the flowering of plants respond to saline conditions, present in many soils in Spain (*The Plant Cell*, 35, 298-317, 2023), and

the role of hydrogen sulphide in the regulation of essential biological processes in plants, such as photorespiration and nitrogen assimilation (*New Phytologist* 238, 1431-1445, 2023). At **CRAG** they have discovered a protein of plant origin capable of dissolving misfolded protein aggregates that usually appear in situations of prolonged stress, such as that caused by high temperatures, but that also act in the same way in humans with aggregates due to ageing and various amyloid and neurodegenerative diseases (*The Plant Cell*, 35, 3325-3344, 2023).

Understanding how plants function in the soil, an essential resource

The **INIA** has published an article on the relationships between soil microorganisms, which systematises the study of the complex microbial networks of Mediterranean ecosystems (*ISME Journal*, 17, 2135-2139, 2023). It has also organised the *European Soil Mission Week*, held at the CSIC headquarters.

A study by the University of Ghent with the participation of **MBG** has provided fundamental insights into aspects of the synthesis of the metabolites marneral and thatlianol, which are produced in very specific areas of roots, and that modulate their development and interaction with the soil microbiota under conditions of environmental stress (*Nature Plants* 9, 926-937, 2023).

Taking care of the forests of Europe's leading forestry nation

ICIFOR has developed a tool to support forest management after fires (*Science of the Total Environment* 855, 158858, 2023). Current fire restoration policies tend to focus on urgent short-term recovery, but without integrating the perspective of the effects of climate change on the evolution of the forest. A study directed by ICIFOR has constructed long-term models, based on data on the evolution of vegetation during 14 years after a fire for the four main species that form the mixed oak-pine forest mosaic of the area.

A study by **MBG** has revealed the damage caused by herbivorous insects on urban forests and the impacts of direct (chemical compounds) and indirect (attraction of natural enemies of herbivores, such as birds and ants) defences of trees, as well as the composition and diversity of tree species and abiotic factors associated with urbanisation. This information will allow the development of urban forests more resilient to global change agents (*Trends In Plant Science* 28, 139-141, 2023).

Healthy animals for healthy societies

CISA and **INIA** have worked on the West Nile virus in birds, which can cause outbreaks of encephalitis in humans and horses (*Front Cell Infect Microbiol.* 13, 1163467, 2023; *J Neuroinflammation*, 27, 217, 2023). In this work, it was discovered that treatment with dichloroacetate, a glycolysis inhibitor, reduces brain inflammation in mice infected with the virus, opening new therapeutic opportunities to combat the infection of this pathogen.

CSIC extended the license of **IDAB's** patent (a modified

strain of the vaccine of *Brucella*) worldwide to the company Brucella GreenVac SL. This strain is useful for preventing brucellosis, another zoonosis.

At **CISA**, where they are investigating the African swine fever virus, they have discovered (*PLoS Pathogens*, 30, e1011136, 2023) that the viral membrane protein pEP84R is a key component for virion assembly. This finding expands the understanding of the mechanisms underlying the formation of the infectious viral particle, opening opportunities for vaccine and antiviral research.

Aquaculture as an alternative for obtaining healthy, sustainable and high added-value seafood

IATS, in collaboration with IRTA and the additives company Lucta S.A., have shown how some of the negative effects associated with the reduction of fish oil levels in aquaculture feed can be mitigated with a supplement based on a combination of oleoresins from spicy spices (*Frontiers in Immunology*, 14, 1222173, 2023). Also in this line, the evolutionary convergence of other small freshwater organisms has been discovered, the gammarids and bdelloid rotifers, which have a superior nutritional profile due to their richness in omega-3 fatty acids, to act as alternative ingredients to flours and oils produced from industrial fishing inputs. Intensive production of marine

invertebrates, such as gammarids, can help to meet nutritional quality targets as feed ingredients (*Open Biology* 13, 230196).

In relation to how global warming affects fish crops, **BWI** has described the epigenetic changes, such as DNA methylation modifications at specific locations in the genome, that are affected in sea bass in response to changes in temperature. This study is a first step towards providing the fish farming sector with a set of epigenetic markers that can be used to analyse batches of larvae, determine the quality of their thermal environment and anticipate their performance as hatchlings and adults.

In-depth analysis

High-throughput analytical pyrolysis approaches have been designed by **ICA** to identify plastics in sample matrices dominated by natural organic matter, such as soils and peats (*Journal of Analytical and Applied Pyrolysis*, 175, 106159, 2023).

Fine detection of contaminants in solid and liquid samples was reviewed by **INIA**, providing an overview of the new applications of ultrasound-assisted extraction for the determination of organic pollutants, with special emphasis on methods that implement the principles of Green Analytical Chemistry to reduce environmental impact (*Trends in Analytical Chemistry*, 166, 117204, 2023).

ICIFOR researchers collaborated on a large-scale study presented on MZmine 3, a scalable mass spectrometry (MS) data analysis platform that

supports hybrid datasets from various instrumental configurations, including liquid and gas chromatography (LC and GC)-MS, ion mobility spectrometry (IMS)-MS and MS imaging. MS innovations and the rapid increase in the performance and sensitivity of MS instruments imply the need for adaptations and innovations in data processing tools (*Nature Biotechnology*, 41, 447-449, 2023).

The ability of in vivo microscopic analysis in organisms has been enhanced at **CBGP** with the arrival of the ERC-Consolidator DYNWALL project, which is equipped with a confocal spinning-disc microscope with light diffraction correction hardware. This equipment allows the analysis of high-speed dynamic processes in vivo (xyzt series) and the visualisation for a number of minutes of very low-expression proteins.

Making the most of every last drop. Circular bio-economy

At **IHSM**, in collaboration with the NGO Ayuda en Acción, they are developing bioplastics for food packaging from cocoa residues, a circular bio-economy project to help development and promote equality in Ecuador. Bio-plastics are generated from cocoa husk waste and are used to produce value-added cocoa wrappers produced by local women.

A scientific team from **IRNASA** has proven that the repeated application of mushroom residue-based amendments and their combination with powdered ophite, a rock of volcanic origin, can improve the quality of vineyard soils (*Environmental Research*, 221, 115339, 2023).

Earth and environment

Studying the environmental impact of pollutants

A study by **IIM** on *Dinophysis acuminata* blooms in the Rías Gallegas has revealed the significance of the scales of transient events and specificity, both of the species and the locations for their development, questioning the simple linear relationships between the blooming intensities and the recurrence of these events in the Galician Rias Baixas (*Harmful Algae*, 125, 102427).

A study directed by the **BWI** demonstrates, for the first time, how an underwater robot is able to learn the optimal trajectory to monitor the seabed and track species (*Science Robotics*, 8, 80).

Plastic waste is widespread in freshwater ecosystems around the world, as demonstrated by the study on plastic pollution where the **IDAEA** has participated using samples of surface waters from lakes and reservoirs, suggesting that these ecosystems play a key role in the cycle of plastic pollution (*Nature*, 619, 317-322).

IMEDEA has carried out a study in which they explain that the risk of exposure to plastic varies greatly between species and populations and between breeding and non-breeding seasons, identifying conservation and research priorities and highlighting that international collaboration is key to addressing the impacts of marine plastic on wide-ranging species (*Nature Communications*, 1, 14, 3665).

The soil contamination investigation conducted at the **IMIB** demonstrates that all post-fire soil erosion mitigation treatments justify their cost, provided they are applied at the right time and in the areas where they are needed (*Journal of Environmental Management*, 334, 117478).

A paper published by **IRNAS** indicates that the surface soils of urban and natural ecosystems maintain similar C concentrations that follow comparable negative relationships with temperature. Urban management strategies should take into account the soil microbiome to maintain soil C content and related ecosystem services (*Nature Climate Change* 13, 450-455).

The exposure of partridges to pesticides during the planting season is strongly determined by the presence of freshly planted fields within the animals' camping area during the previous three days, implying the need to incorporate ecological factors into the risk assessment, as shown by a study by the **IREC** in an agricultural area dominated by rain-fed cereal crops (*Environmental Science and Technology* 57, 14861-14870).

Biodiversity and animal behaviour

A study by **EEZA** indicates that replanting using species-rich mixtures of tree seedlings with greater phylogenetic and functional diversity accelerates the restoration of aerial biomass, canopy cover and leaf area index (*Science Advances*, 9, 37).

At **EBD** they have studied how the richness of land uses constitutes a determining factor of the taxonomic and functional richness of birds, and that this relationship is independent of habitat quality. This aspect shows that the management of biodiversity does not simply consist in the preservation of large areas of a given environment (*Nature Communications*, 14, 1320).

Environmental disturbances have a clear influence on biodiversity so functional

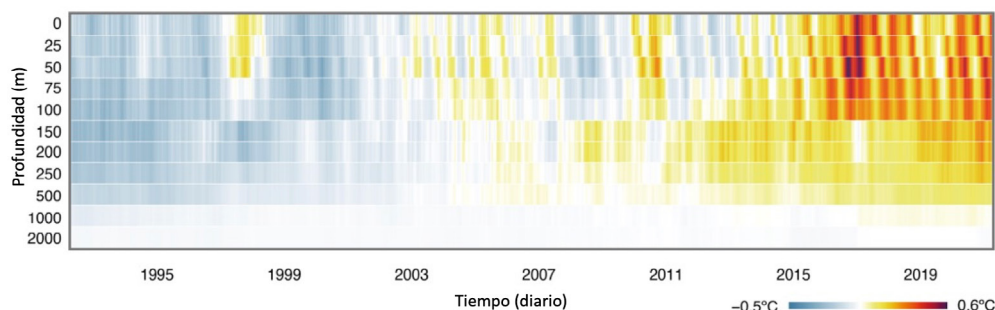
redundancy is a key component in the ability of ecosystems to mitigate such disturbances **CIDE** (*npj Biodiversity*, 2, 23).

IMIB scientists have analysed the influence of climate change on the biodiversity of Europe's wetlands, one of the most threatened ecosystems in the northern hemisphere. The work highlights the loss of biodiversity caused by climate change and environmental degradation in these highly threatened environments (*Global Change Biology* 29, 6756-6771).

An analysis of global marine heat wave patterns by the **MNCN** reveals that the exposure of biodiversity to the effects of marine heatwaves is greatest at depths of 50 to 250 m, suggesting that subsurface biodiversity could be at considerable risk (*Nature Climate Change*, 13, 1114-1121).

Studies on animal behaviour developed at **EEZA** have shown how sexual behaviour between individuals of the same sex is a common trend in non-human mammals, recorded so far in about 5% of species and 50% of families. The study suggests that this behaviour is an adaptation that has an important role in maintaining social relationships in both sexes and in mitigating conflicts, mainly between males (*Nature Communications*, 14, 5719).

IBB research staff have managed to understand the complete migratory route of the painted lady butterfly (*Vanessa cardui*) using a method that allows reliable predictions about the temporary habitats that migratory species need, which can help conservation efforts and studies on habitat changes due to factors such as climate change (*Proceedings of the National Academy of Sciences USA*, 120, e2218280120).



Record of the temperatures registered over the last 39 years at different depths.



Sexual behaviour between individuals of the same sex in primates has been observed in at least 51 species, from lemurs to apes.

Estudiando el impacto ambiental de contaminantes

Un estudio del **IIM** sobre los blooms de *Dinophysis acuminata* en las Rías Gallegas ha revelado la importancia de las escalas de eventos transitorios y la especificidad, tanto de las especies como de las localizaciones para su desarrollo, cuestionándose las relaciones lineales simples entre las intensidades de afloramiento y la recurrencia de estos eventos en las Rías Baixas gallegas (*Harmful Algae*, 125, 102427).

Un estudio liderado por el **ICM** demuestra, por primera vez, cómo un robot submarino es capaz de aprender la trayectoria óptima para monitorizar el fondo marino y realizar el seguimiento de especies (*Science Robotics*, 8, 80).

Los desechos plásticos están extendidos en los ecosistemas de agua dulce de todo el mundo, tal como demuestra el estudio de contaminación por plásticos donde el **IDAEA** ha participado a partir de muestras de aguas superficiales de lagos y embalses, lo que sugiere que estos ecosistemas desempeñan un papel clave en el ciclo de la contaminación plástica (*Nature*, 619, 317-322).

En el **IMEDEA** han realizado un trabajo en el que exponen que el riesgo de exposición al plástico varía enormemente entre especies y poblaciones y entre las temporadas de reproducción y no reproducción, identificando prioridades de conservación e investigación y destacando que la colaboración

internacional es clave para abordar los impactos del plástico marino en especies de amplio rango (*Nature Communications*, 1, 14, 3665).

La investigación de contaminación en suelos realizada en el **IMIB** demuestra que todos los tratamientos de mitigación de la erosión del suelo post-incendio justifican su coste, siempre que se apliquen en el momento adecuado y en las zonas donde son necesarios (*Journal of Environmental Management*, 334, 117478).

Una publicación del **IRNAS** indica que los suelos superficiales de los ecosistemas urbanos y naturales mantienen concentraciones de C similares que siguen relaciones negativas comparables con la temperatura. Las estrategias de gestión urbana deberían tener en cuenta el microbioma del suelo para mantener el C del suelo y los servicios ecosistémicos relacionados (*Nature Climate Change* 13, 450–455).

La exposición de las perdices a plaguicidas durante la época de siembra está fuertemente determinada por la presencia de campos recién sembrados dentro del área de campeo de los animales durante los tres días anteriores, manifestando la necesidad de incorporar los factores ecológicos a la evaluación de riesgos, tal como muestra un trabajo del **IREC** en una zona agrícola dominada por cultivos de cereal de secano (*Environmental Science and Technology* 57, 14861-14870).

Exploring geochemical studies

The core of Mars contains, in addition to iron, large amounts of sulphur and, in smaller amounts, oxygen, carbon and hydrogen. This has been detected for the first time by an international scientific group with staff from the **GEO3BCN** from the seismic waves travelling through the Martian core (*Proceedings of the National Academy of Sciences*, 120(18).

Work carried out by **IACT** presents a new hypothesis about the flow of oxidised elements between the surface reservoirs and the interior of the Earth. The interaction between sediment fluids and those of the hydrated mantle has made it possible to estimate a global oxidation rate of the mantle wedge of up to 3.5 cubic km per year (*Nature Geoscience*, 16, 268-275).

The origin of iron deposits rich in magnetite (apatite) is one of the most controversial issues in the geology of minerals. Research staff from **IGEO** suggest in their study carried out in El Lago (Chile) that these were derived from the crystallisation of Fe-P-rich melts, thus providing an insight into the formation of similar deposits in other places (*Nature Communications* 14, 8424).

An **ICMAN** investigation concludes that penguins play a fundamental role in the supply of recycled metals to the surface waters of the Southern Ocean. Accounting only the species of chinstrap penguin (*Pygoscelis antarctica*), the study estimates a contribution to Antarctic surface waters, based on guano, of 521 tons per year of recycled iron (*Nature Communications* 14, 1781).

Collecting guano samples from penguins in Antarctica.



Drivers, impacts and solutions for climate change

The results of a paper published by the **CEAB** show the importance of land-water connections in regulating CH₄ supply to running waters, which is vulnerable, not only for the purpose of directing human modifications, but also for various responses to climate change on Earth (*Nature* 621, 530-535).

The severe droughts recorded between the years 450-950 could have contributed to the instability of the Visigothic and Muslim reigns in the Iberian Peninsula, as shown by a study by **IAC** from pollen records of the Western Mediterranean to obtain information about the climatic conditions of the past, in times of the Muslim expansion (*Nature Communications*, 14, 5733).

The results of an **IPE** paper highlight the importance of when droughts occur and their interaction with vegetation phenology to project the impacts of climate change. The paper suggests that the greenness recovery capacity of vegetation depends on the time when the drought occurs (*Nature Climate Change* 13, 182-188).

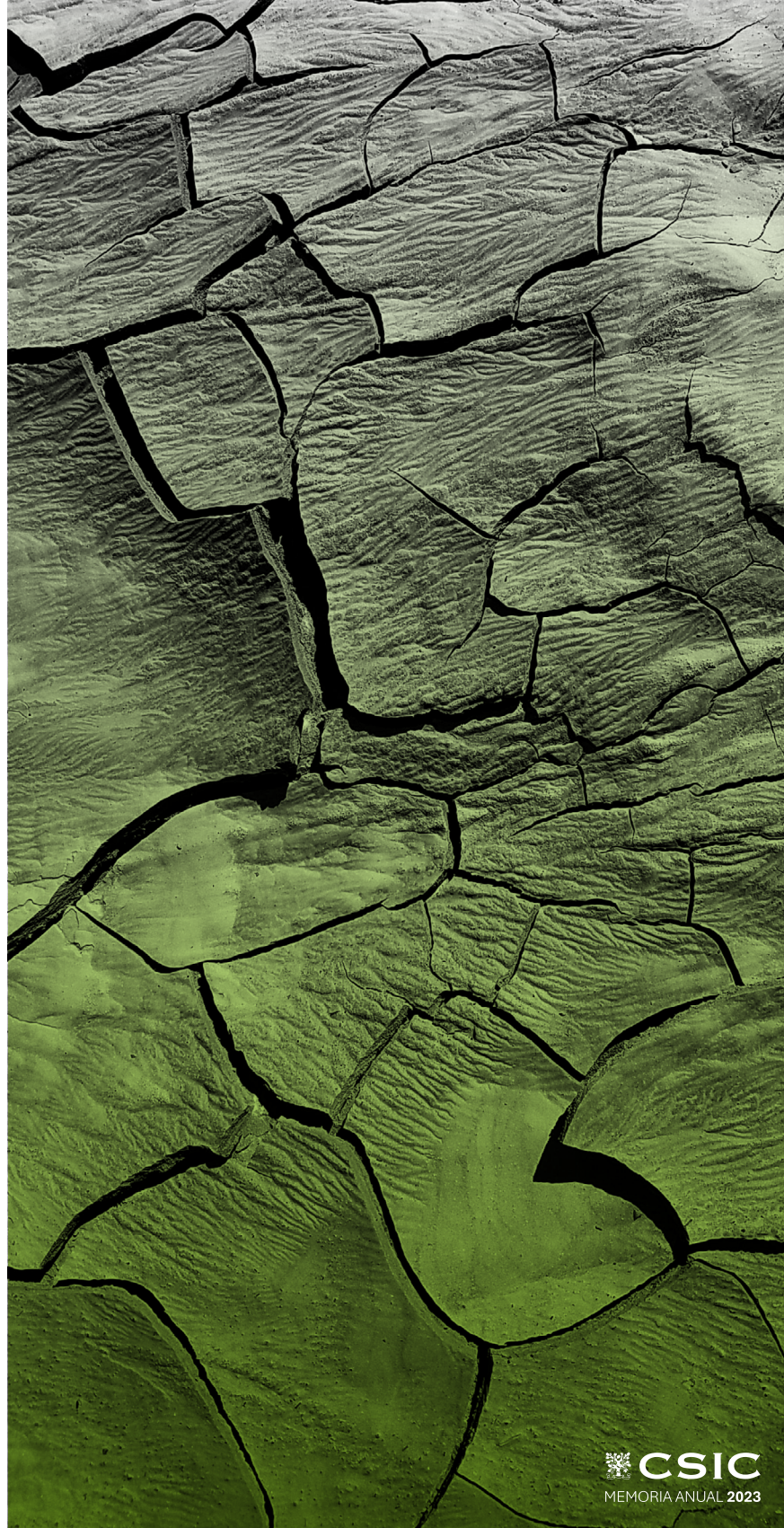
CEAB researchers have explained how with climate change, leading us to warmer winters in the future, the presence of adult vector mosquito activity could become the norm. These findings expose the need for continued surveillance efforts, especially during winter, to monitor the behaviour of *A. albopictus* and analyse how this species adapts to climate change (*The Lancet Regional Health - Europe*, 32, e729-e731).

The melting of the Greenland ice sheet in response to anthropogenic global warming poses a serious threat in terms of global sea level rise. A research group at **IGEO** shows a GMT threshold between 1.7°C and 2.3°C above pre-industrial levels for an abrupt loss of the ice sheet (*Nature* 622, 528-536).

The **OE** has studied the historical evolution (1980-2013) of the flows in the Pyrenees, using observed time series of uninfluenced gauging stations and two models (SASER and SWAT). The comparison helps to detect and analyse changes in flow rates and their trends (*Journal of Hydrology: Regional Studies*, 46, 101322).

An international study led by the **ICM** shows that marine microbes articulate and disarticulate due to environmental factors such as temperature (*Microbiome* 11, 83), and considers their key role in maintaining the health of our oceans, as they are responsible for processes such as nutrient recycling or the decomposition of pollutants.

A publication by **IGME** on mountain lakes of the Pyrenees to assess the regional response of especially vulnerable areas to current global change, shows that the overall temperature increase is especially evident after 1950, coinciding with the fluxes of total organic carbon and detrital sediments (*Scientific Reports* 13, doi: 10.1038/s41598-023-35233-1).



The evolutionary process and genomics

The ancestors of the underground beetles (between six and 30 million years of evolution) underwent many genomic changes that would later make it easier for them to live in caves, and the increase in genetic diversity allowed their adaptation to caves, as demonstrated in a paper published by **IBE** (*Nature Communications*, 14, 3842). Also provided is a new insight into the genetic information of primates that could reveal key data about the most unknown parts of the human genome, its role in health and its role in our evolution. The study has generated and compared the genomes of 239 primate species and 202 mammalian species, revealing that there are hundreds of thousands of non-coding regulatory sequences, derived from recent evolutionary adaptations, that are conserved exclusively in primates and humans (*Nature* 625, 735-742).

A study by **MNCN** and **IMEDEA** has examined data on existing and extinct species from islands and paleoislands over the past 23 million years to determine whether these evolutionary "singularities" were more threatened, and have found that both dwarf and giant species suffered a greater risk of extinction. The insular conditions generated these species and protected them, at least until humans acquired the ability to cross oceans (*Science*, 379, 1054-1058).

A study carried out at **RJB** and **CIDE** reinforces the hypothesis that the ability of lichens to detect changes in ecosystems long before species loss occurs can serve as an early warning in ecosystem transformations in the face of human-caused disturbances (*Journal of Ecology*, 112(1): 200-216).

The **IPE** explains that the effect of phylogeny largely determines the mycorrhizal types, but the environment plays an important role in their global distribution. They further observe that not only climatic but also soil factors (previously dismissed), especially soil texture, play a relevant role in explaining the distribution of these mycorrhizal traits (*Ecology Letters*, 26, 1862-1876).



Eremophila bignoniiflora Benth (F. Muell), an Australian species belonging to the Myoporeae tribe, Scrophulariaceae family. © John H. Chau.

A scientific group led by the **EBD** has researched how changes in land use, illegal hunting and rainfall affect the abundance of Maasai giraffes in Tanzania, showing that effective enforcement of the law protecting giraffes from illegal hunting is the best way to keep their populations healthy and thriving (*Global Change Biology* 29(23), 6693-6712).

RJB scientists have used state-of-the-art genomic tools to obtain DNA sequences of hundreds of genes from the cell nucleus and the chloroplast in representative species of Scrophulariaceae, to observe that the origin of the family is linked to the ancient supercontinent of Gondwana and to a time that coincided with the extinction of more than 75% of the species that inhabited the Earth (*New Phytologist*, 240: 1601-1615).



Community of epiphytic lichens studied on an oak tree.

CORE AREA MATERIA

MATERIALS SCIENCE AND TECHNOLOGY

PHYSICAL SCIENCE AND TECHNOLOGY, MATHEMATICS, ROBOTICS AND COMPUTING

CHEMICAL SCIENCE AND TECHNOLOGY

STAFF

RESEARCHER

1,695

608

1,087

TRAINEE RESEARCHER

524

180

344

TECHNICAL

1,842

829

1,013

MANAGEMENT/ADMIN/SERVICES

277

169

108

The area assigned to research and research trainee staff is the staff area. Other staff members are assigned to the area of the ICU to which they are attached.

TOTAL STAFF MATERIA AREA

4,338

(29.10%)

42

RESEARCH
INSTITUTES

1
ASSOCIATED

17
JOINT

24
OWN

469

RESEARCH GROUPS

NATIONAL PROJECTS AND ACTIONS

1,677
CURRENT*

TOTAL FUNDING
€ 348,345,830.20

INTERNATIONAL PROJECTS (EU PM, EU NON-PM AND INTERN)

413
CURRENT*

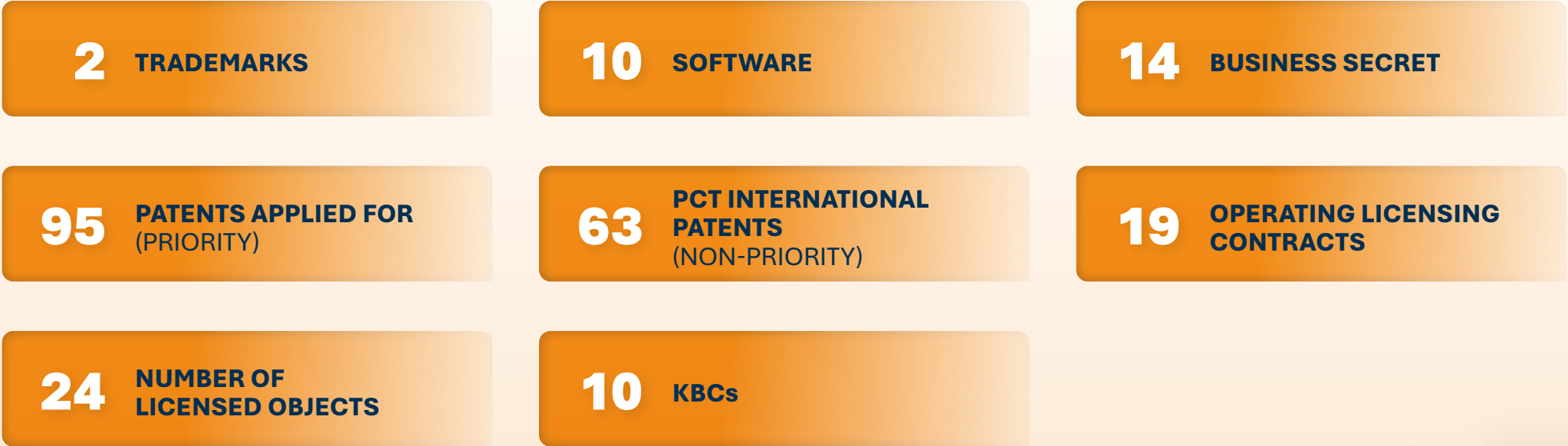
TOTAL FUNDING
€ 173,370,495.30

*Data that includes the number of signed and completed projects.

SCIENTIFIC OUTPUT



KNOWLEDGE TRANSFER



MILESTONES 2023



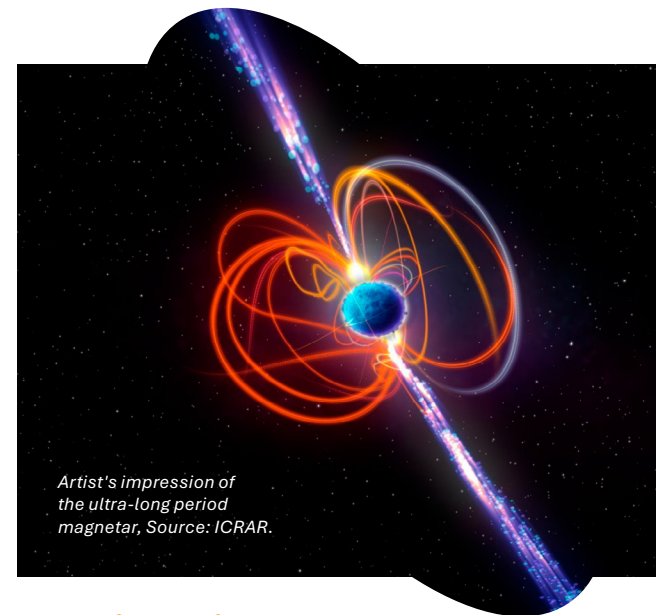
Six planets discovered thanks to their synchronised orbits

An international team of astronomers that has research staff from the **IAA** has discovered a fascinating family of six planets orbiting a Sun-like star, known as HD 110067. What makes this system so special is that the planets are in a tight gravitational formation called resonance, a phenomenon that is not often observed. These resonant systems are extremely valuable to astronomers because they provide information about the formation and evolution of planetary systems. This discovery is the result of the collaboration of several researchers and the use of observations from the CARMENES instrument and data from the Cheops mission (ESA). (*Nature* 623: 932-937, 2023).

Neptune captured by the James Webb Space Telescope's near-infraRed camera. Source: NASA, ESA, CSA and STSCI.

CSIC technology on board the space mission to study Jupiter

The Juice mission of the European Space Agency (ESA) was launched in April 2023 with the aim of making detailed observations of Jupiter and three of its largest moons: Europa, Callisto and Ganymede. In fact, it will become established in orbit around the latter after an eight-year journey. The mission seeks to explore the possibilities of life on the Jovian moons and collect data on the origin of Jupiter. Juice is equipped with ten high-precision components, two of which, the Janus spectral camera and Gala laser altimeter, have been developed by the **IAA**. Specifically, Gala must send an infrared beam towards the surface of Ganymede and deduce from the time it takes to detect its reflection the topography of the Jovian satellite. For its correct operation, its electronic subsystems must be equipped with fast response diodes and with high resistance to the aforementioned radiation. These electronic components have been developed in the **IMB-CNM**, which has designed and produced them in its Cleanroom, for Alter Technologies. With Juice, there are already three active Solar System exploration missions that incorporate silicon carbide devices manufactured at the IMB-CNM. It should be noted that these diodes have been the first Spanish device incorporated into the catalogue of preferred components of the European Space Agency (ESA Preferred Part List).



Artist's impression of the ultra-long period magnetar, Source: ICRAR.

An enigmatic stellar object that challenges the physics of neutron stars has been discovered

An international group including **ICE**, led by Curtin University and the International Centre for Radio Astronomy Research (ICRAR), has discovered a new type of stellar object that, according to astronomers, “challenges our understanding of the physics of neutron stars” (a neutron star is what is left when a massive supergiant star runs out of fuel, collapses and explodes as a supernova).

This new source of radio waves has been named GPM J183910 and is located 15,000 light-years from Earth, in the constellation Scutum (*Nature*, 619: 487-490, 2023).

New images from the James Webb telescope show that gas-phase organic chemistry is activated by ultraviolet radiation

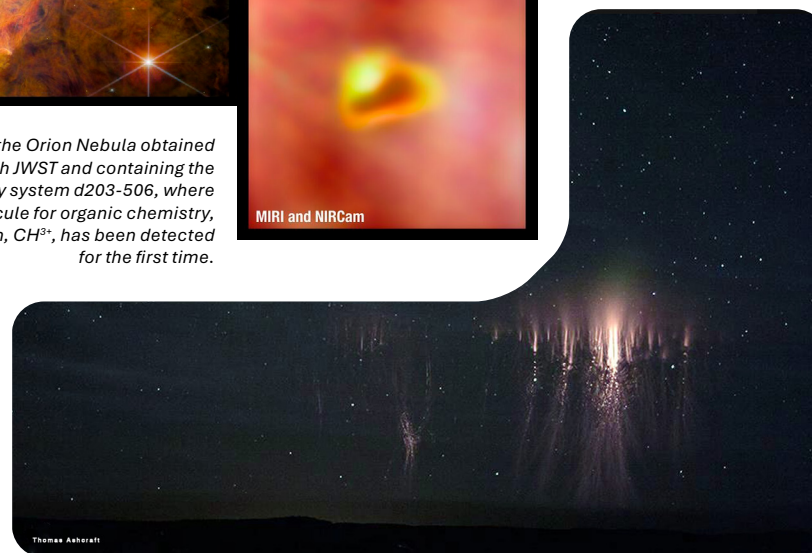
Forty years ago, it was proposed that gas-phase organic chemistry in the interstellar medium was initiated by the methyl cation CH_3^+ , but so far it has not been observed outside the Solar System. Meanwhile, alternative routes involving processes on grain surfaces have been invoked. This paper shows observations from the James Webb Space Telescope (JWST) with the first detection in space of CH_3^+ , specifically, a protoplanetary disc in the Orion star-forming region. It is shown that gas-phase organic chemistry is activated thanks to ultraviolet irradiation that affects this protoplanetary system. Research staff from IFF are the founders and core-team of the JWST ERS PDRsALL programme that makes these observations (*Nature* 621: 56-59, 2023).



A ghost (greenish flash) on a goblin.

Understanding the origin of 'ghosts', a type of transient luminous event that occurs in the atmosphere

In the mesosphere, a region of the atmosphere that was thought to be devoid of electrical activity, there are gigantic brief luminous flashes whose discovery, just three decades ago, surprised the scientific community. Given their elusive nature they received names extracted from *A Midsummer Night's Dream* (Shakespeare), as goblins or elves. Related to storm lightning, but located tens of kilometres above the clouds, among them are the ghosts (GHOSTs, from Greenish Optical emission from Sprite Tops), greenish flashes whose origin was attributed to oxygen. Research staff from IAA have made the first spectroscopic study of these events in which ghosts are associated with metals such as iron or nickel, which had never been included in optical models of mesospheric flashes (*Nature Comm.* 14: 7810, 2023).



The universe around us is not expanding as fast as we thought

Thanks to the data obtained from a supernova magnified in four images, a group led by researchers from the University of Minnesota, including a researcher from IFCA (CSIC-UC), has used a pioneering technique to measure the expansion rate of the Universe. These measurements open

up an ancient debate that could help the scientific community to more accurately determine the age of the Universe and to better understand the cosmos (*Science* 380: 6649, 2023), (*The Astrophysical Journal* 948: 93, 2023).

The stellar wind that is generated in the atmosphere of the CW Leo star found in 'bubbles' of material

A study led by research staff from the IFF has discovered that the stellar wind that is generated in the atmosphere of the star CW Leo, which is located about 400 light-years from the Solar System, occurs in kinds of "bubbles" of material, mainly dust grains and molecular gas. These bubbles expand until they form a circumstellar envelope. The observations carried out confirm

the theoretical studies that pointed out that this stellar wind does not take place symmetrically over the entire surface. The finding, which is published in the journal *Nature*, not only reveals new information about the most well-known and studied carbon star, but could anticipate how the Sun will behave in a few billion years (*Nature* 617: 7962, 2023).

Cosmic dance: discovery of a unique planetary system that could reveal the secrets of planetary gestation

A scientific team, with leadership from the **IAA**, has discovered a unique planetary system. Named TOI-2096, it is composed of a super-Earth and a mini-Neptune, orbiting a cold and nearby star in a synchronised dance and that could serve as a Rosetta stone to understand how planetary gestation works. The system was identified by NASA's Transiting Exoplanet Survey Satellite (TESS) mission, a space mission that searches for planets around nearby bright stars. The planets TOI-2096 b (super-Earth) and TOI-2096 c (mini-Neptune) were observed with an international network of ground-based telescopes, thus allowing their confirmation and characterisation. The two planets were in resonant orbits, i.e. for every two orbits of TOI-2096 b, TOI-2096 c performs one. This configuration is very particular and due to it the planets interact strongly gravitationally, which allows us to obtain their masses accurately.

Artistic vision of a new planetary system composed of a super-Earth and a mini-Neptune.



A double helix structure has been found in the blazar jets that requires an update of the theoretical models

Blazars are the most powerful continuous radiation sources in the universe. Like all other active galaxies, they show a structure formed by a central supermassive black hole surrounded by a disc of matter that feeds it; they are among that 10% of active galaxies that have a jet of matter emerging from both poles at very high speed. The orientation of the blazars allows you to see the jet almost from the front. Now, a group of researchers headed by **IAA** has observed the jet of the galaxy 3C 279 with an unprecedented angular resolution (detail capacity) and has found helical filaments with a double helix structure that requires an update of the theoretical models used so far (*Nature Astronomy* 7: 1359-1367, 2023).

High resolution image of the relativistic jet in blazar 3C 279 obtained with RadioAstron. The image reveals a complex structure within the jet with several light-year-scale filaments forming a helix-like structure.

Drugs that are activated by light could fight cancer

Research staff of the **IQAC** have developed photosensitive drugs, which are activated by light and remain inactive in the dark, which could be used in more effective cancer therapies without side effects. These drugs, photosensitive molecules, can be activated with external light in a reversible way, thus achieving a much more localised and controlled effect. In this way, photopharmacology (light-controlled drugs) paves the way to highly specific therapies (*J. Med. Chem.* 66: 1909, 2023).

Laia Josa Culleré, author of the study at the Institute of Advanced Chemistry of Cataluña.



A study reveals the structure of the protein responsible for Huntington's disease

A group with the participation of research staff from **IQAC** has revealed the structure of the protein responsible for Huntington's disease, a serious neurodegenerative pathology characterised by progressive movement and cognitive function disorder. The results of the study smooths the path towards a better understanding of the disease, as they provide new clues about the Huntington role in the formation of toxic protein aggregates in the brains of these patients (*Nature Structural & Molecular Biology* 30: 309, 2023).



Ramon Crehuet, IQAC researcher modelling the structure of the protein responsible for Huntington's disease.

Creating tailor-made materials: an organic-metallic framework (MOF) with eight rare earth elements of different sizes

The work carried out by **ICMAB** research staff demonstrates the synthesis of multimetallic structures incorporating two, four, six or eight different rare earth ions of different sizes and in almost equimolar amounts and without compositional segregation. The work is a facilitating method for the preparation of new materials with tuned properties (*Adv. Funct. Materials* 33: 2307369, 2023).

A new non-steroidal anti-inflammatory drug and immune regulator could replace corticosteroids

A multidisciplinary team of the **CSIC** (**ITQ**, **IIM**, **CIB**, **CISA**, **I3M**) has developed a new anti-inflammatory drug with exceptional properties. The anti-inflammatory compound called **AG5** is able to inhibit the cytokine storm associated with severe inflammation while preserving innate immunity. **AG5** has been developed as a synthetic andrographolide derivative, which is highly absorbable and presents low toxicity. It was demonstrated with human monocyte-derived dendritic cells generated in vitro that **AG5** preserves the innate immune response, minimises the inflammatory response in a mouse model

of lung injury induced by an antigen of bacterial origin and shows high in vivo anti-inflammatory efficacy in a COVID19 mouse model. **AG5** launches a new class of anti-inflammatory drugs since, unlike NSAIDs, **AG5** is able to inhibit the cytokine storm just like dexamethasone, but unlike corticosteroids it adequately preserves innate immunity. This is critical in the early stages of any infection, but particularly in SARS-CoV-2 infections. In addition, **AG5** showed an interesting antiviral activity against SARS-CoV-2 in humanised mice (*Biomedicine & Pharmacotherapy* 169: 115882, 2023).

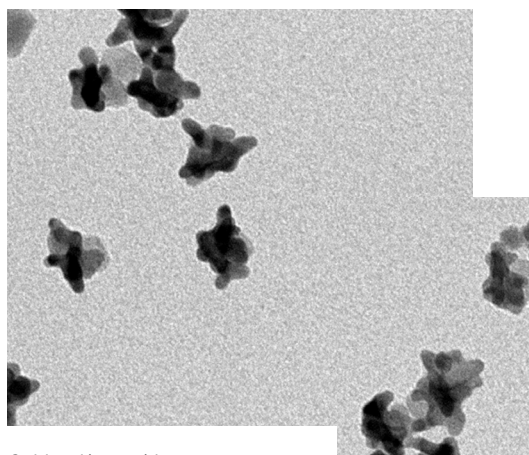
Therapeutic nanodevice: a revolution in enzyme therapies against cancer through the selective activation of pro-drugs

A research group from **INMA** and from the **ORT-Uruguay** University has worked on the development of an innovative solution to revolutionise the approach to enzyme therapies against cancer. They have created a therapeutic nanodevice that combines magnetic nanoparticles with enzymes in order to selectively activate the production of a toxic (chemotherapeutic) drug from a harmless pro-drug, only inside the tumour and without affecting healthy cells. The selected enzyme remains "dormant" until it is activated by an alternating magnetic field applied to the tumour. This magnetic field transforms the magnetic nanoparticles also embedded in the nanotransporter into

nanoheaters, raising the temperature of the nanotransporter and activating the enzyme to initiate the death of cancer cells. When the magnetic field ceases, the temperature drops and the enzyme becomes inactive again. The researchers have validated the effectiveness and remote activation capacity of this treatment using pancreatic cancer models both in cell cultures (in vitro) and in mouse tumour models (in vivo). This innovative therapeutic strategy holds the promise of significantly reducing the side effects associated with the use of traditional systemic chemotherapy (*ACS Nano* 17: 12358-12373, 2023).

X-rays used to monitor the temperature of nanoparticles in tumour cells

Scientific staff of the **ICMM** has developed a technique for direct measurement of the temperature of nanoparticles inside human tumour cells through X-rays, which could lead to more precise and less toxic therapies for the treatment of cancer using the hyperthermia technique, which seeks to cure tumours by increasing their temperature. Hyperthermia usually accompanies radio and chemotherapy in the clinical treatment of cancer. Its application using heat-generating nanoparticles (in the billionth of a metre range) offers multiple advantages, although temperature measurement on that scale (known as nanothermometry) represents a great challenge. The challenge is to achieve nano thermometers that are sensitive and robust in the biological environment and that are operational in a wide temperature range (*Adv. Healthcare Mater.* 12: 23018632301863, 2023).

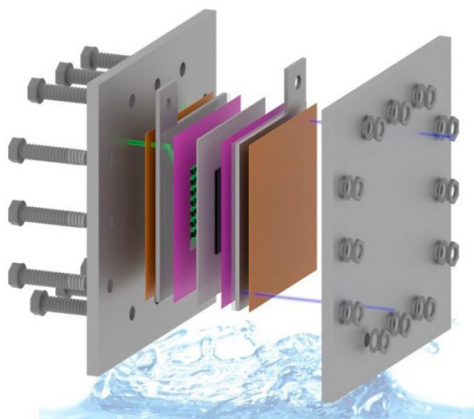


Gold and iron oxide nanoparticles - ICMM-CSIC.

Scientists have developed an artificial protein capable of filtering and degrading plastics

A group of scientists from the **ICP**, BSC-CNS and UCM has developed artificial proteins that can degrade PET microplastics, a very common plastic in packaging and bottles, and reduce them to their essential components. This would allow their decomposition or recycling, which is crucial given that about 400 million tons of plastics are produced every year in the world, contributing to climate change and causing serious ecological

problems. PET breaks down over time forming microplastics, aggravating environmental problems. The developed proteins are based on a strawberry anemone defence protein (*Actinia fragacea*) to which a new function was added by computational design. This new function consists of three amino acids that act like scissors capable of cutting small PET particles (*Nature Catalysis* 6: 1174-1185, 2023).



Electrolysis device.
Dmitry Galyamin (ICP/CSIC).

A material capable of generating green hydrogen with 10 times less iridium is achieved

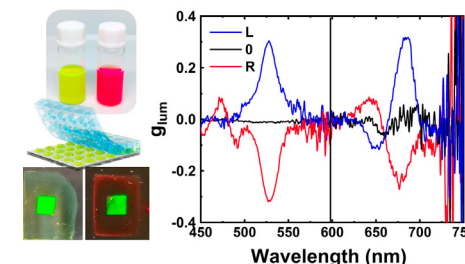
ICP and **ICMM** researchers participate in an international study that has achieved a compound capable of generating green hydrogen using 10 times less iridium, an ultra-scarce and very expensive transition metal. Green hydrogen is obtained by electrolysis of water using renewable energies, and it is

expected to facilitate the transition to a decarbonised society. To achieve this hydrogen, electrolyzers are needed, such as the so-called PEM (Proton Exchange Membrane) electrolyzers, which work very well, are efficient, but are very expensive due to the materials they use. One of those materials is iridium, which is not only expensive, but is one of the most scarce and poorly distributed materials.

For this reason, this research staff has designed a metal oxide material, a compound (catalyst) with 10 times less iridium compared to the one used commercially (from 2 mg/cm² they have gone to 0.2 mg/cm²) and having the same performance (*Adv. Energy Mater.* 13: 22041692204169, 2023).

Advances in photoluminescence: the magic of 2D Perovskite nanocrystals

Researchers from **ICMAB** have established a general and scalable approach to produce chiral photoluminescence from arbitrary nanoemitters assembled on 2D chiral metasurfaces. Fabrication using nanoimprint lithography employs elastomeric moulds engraved with chiral motifs covering millimetre areas that are used to model two types of colloidal perovskite nanocrystal inks (*Adv. Materials* 35: 2210477, 2023).



Samples of nanocrystal metasurfaces and their optical properties.

Scientists from ITQ and UPV discover a method for generating metallic nanoparticles for use as catalysts

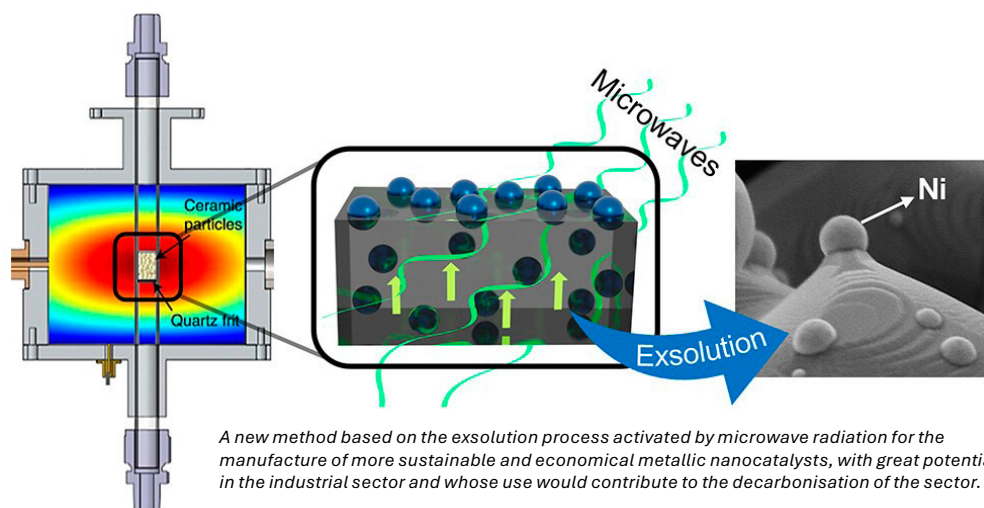
Research staff of the **ITQ** (CSIC-UPV) has developed a more sustainable and economical method than those currently used to obtain metallic nanocatalysts with great potential in the industrial sector and whose use would contribute to the decarbonisation of the sector. It is based on the exsolution process activated by microwave radiation. Exsolution is a method of generating metallic nanoparticles on the surface of ceramic materials. In the presence of high temperatures and reductive atmospheres (usually hydrogen), metal atoms of the material's own structure migrate to its surface forming there metal nanoparticles anchored to the surface. This anchorage significantly increases the strength and stability of these nanoparticles, which has a positive impact on the effectiveness of these catalysts (*ACS Nano*, 17: 23955-23964, 2023).

The most porous zeolite known has been created

Research staff from **ICMM** and **INMA** has created the most porous stable zeolite known so far, a new silica zeolite called ZEO-3. Zeolites are microporous silicates with a wide variety of applications as catalysts, adsorbents and cation exchangers. The ZEO-3 zeolite has two peculiar features: extra-large pores in all three dimensions and that it is formed by calcination of a one-dimensional chain silicate in a topotactic condensation (which means that it was made without changes in this chain). Until now, two-dimensional to three-dimensional topotactic condensations were known, that is, a material that was a sheet and that, by a similar mechanism, was condensed to give a zeolite, but never from one- to three-dimensional. This zeolite can be applied to remove and recover volatile organic compounds from a gas stream that may even contain water (decontamination), and could become useful in catalysis or in drug delivery (*Science* 379: 283-287, 2023).

A new finding advances our understanding of the dynamics of phase transitions

An international study with the participation of the **IFF** has characterised for the first time, from the experimental and theoretical point of view, the formation of Ising-type domains (the fundamental and most popular types of order, both in theoretical and experimental condensed matter physics) in materials that have a continuous phase transition. This work opens up new fields of study in physics and chemistry. It not only improves our understanding of the dynamics of phase transitions, but also opens new avenues of exploration to phenomena as disparate as the evolution of the early Universe, electrical polarisation and magnetisation in materials. Now we take them to the lab and map them on a piece of solid state material. Since the emergence of the Kibble-Zurek Mechanism, condensed matter laboratories have become testbeds for theories that would work at the cosmological level (*Nature Phys.* 19: 1495-1501, 2023).



A new method based on the exsolution process activated by microwave radiation for the manufacture of more sustainable and economical metallic nanocatalysts, with great potential in the industrial sector and whose use would contribute to the decarbonisation of the sector.

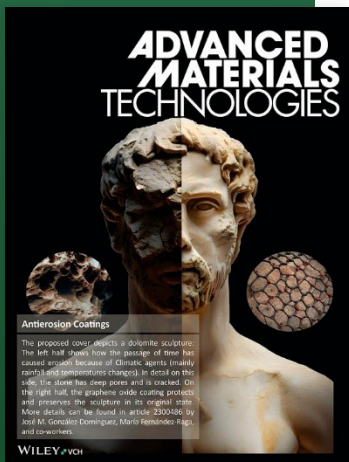


Three-dimensional model of the new zeolite obtained with extra-large pores.

Study of the effectiveness of graphene oxide as an anti-erosion coating for the conservation of ornamental and heritage dolomites

Erosive agents, such as rain, extreme temperatures and chemical and biological agents, threaten our stone heritage and gradually wear down buildings, sculptures and other monuments found all over the world. Limestone and dolomite have been widely used throughout history, given their easy extraction and working features. However, these properties make them particularly vulnerable to erosive agents. Given the shortage of effective and durable agents to prevent the deterioration of ornamental and heritage stones, **ICB** research staff has demonstrated the feasibility of graphene oxide (GO) as a protective coating for monumental dolomites. The results show that the GO deposited on stone surfaces creates a highly protective and durable barrier without altering the aesthetic qualities (*Adv. Materials Technol.* 8: 2300486, 2023).

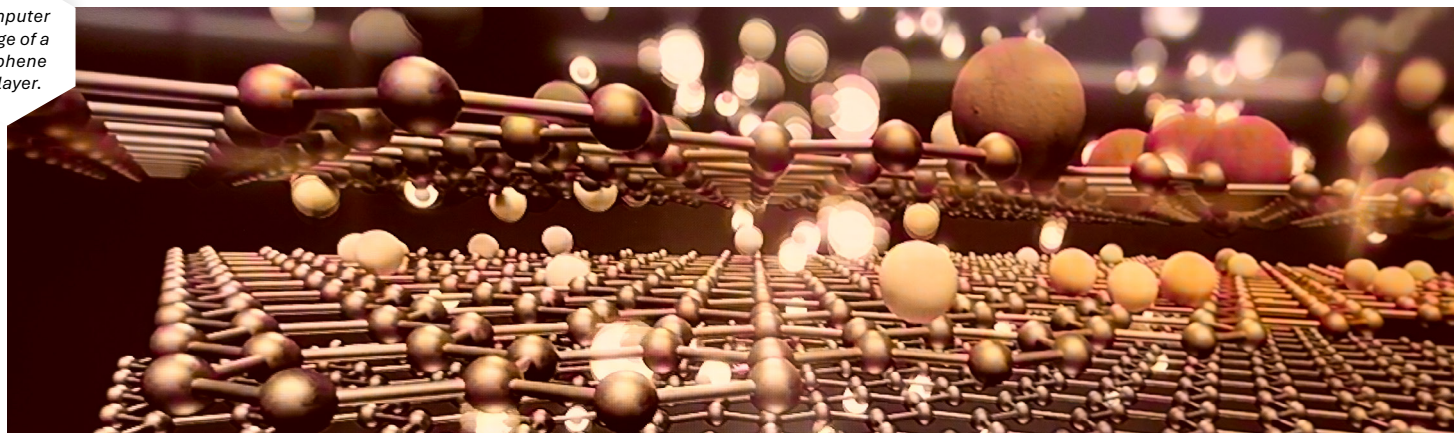
The cover shows a dolomite sculpture, where the left half shows how the passage of time has caused erosion due to climatic agents (mainly rain and temperature changes). On the right half, the layer of graphene oxide protects and preserves the sculpture in its original state.



A new theory explains superconductivity in rotated graphene tri-layers

A study led by research staff from **IEM** and **ICMM** manages to explain the essential aspects of superconductivity (the ability of certain materials to conduct electric current without energy loss) in rotated graphene tri-layers, which are achieved by rotating three graphene layers using a very precise angle. The results lay the foundation for understanding how certain unconventional superconductors work, which are still beyond the understanding of the scientific community. Superconductivity is a common phenomenon in metals such as mercury, lithium or titanium when subjected to low temperatures. Now a theoretical construction is proposed that includes an unconventional mechanism of superconductivity, based on the electron-electron interaction itself, dominant in carbon materials such as graphene. The proposed idea is ground-breaking for these carbon materials, and leads to a superconductivity with a special nature, called Ising-type in similar two-dimensional systems (*Nature Commun.* 14: 2746, 2023).

Computer image of a graphene tri-layer.



New breakthrough in quantum computing: a semiconductor qubit in a superconducting circuit is achieved

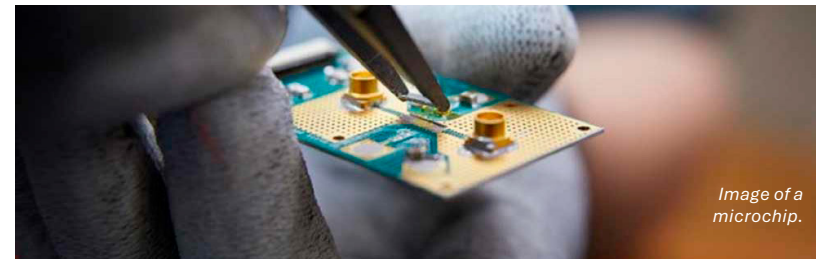


Image of a microchip.

International research with the participation of the **ICMM** has achieved a new hybrid architecture of semiconductor and superconducting quantum bits (qubits), which is considered a crucial step in the advancement of quantum computing as it combines the benefits of superconducting and semiconductor materials. This is the first time that these systems have been achieved in a controlled way using a quantum dot system and has great potential for new quantum computer prototypes. Current quantum computing presents a great challenge: to demonstrate a fault-tolerant quantum computer (the so-called

quantum decoherence). For this, one of the possible solutions is the correction of errors by means of a massive scaling that needs, at least, several tens of thousands of qubits. However, the most advanced quantum computers today, based on superconducting circuits such as those developed by Google or IBM, are still very far from achieving this. A possible solution could be to use semiconductors to achieve this scaling, since they use circuits similar to those of traditional electronics, but they are still much less advanced than superconductors (*Nature Phys.* 19: 1110–1115, 2023).

A study manages to reproduce a theoretical model using artificial quantum systems

Research carried out with the participation of research staff from the **CINN** has made it possible to experimentally show in a quantum simulator the existence of new magnetic phases of matter. In particular, it has been possible to observe long-range ferromagnetic order in a quantum spin system. The results, which could have

applications in metrology or quantum computing, show that the fundamental characteristics of this theoretical model can be implemented and measured in artificial quantum systems and could allow the observation of other phenomena difficult to calculate numerically (*Nature* 616: 691-695, 2023).

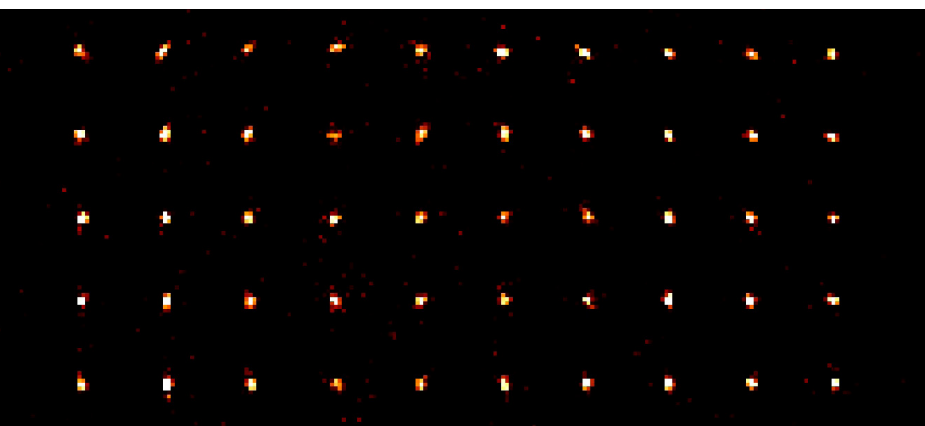


Image taken from the CINN-CSIC website.

An assumption about "quantum harmonies" is demonstrated

A conference entitled "Fourier Multipliers on Group Algebras", held in 2019 at the Université de Franche-Comté, Mikael de la Salle (École Normale Supérieure de Lyon) addressed the assumption of the existence of certain transformations that extended the excellent properties of singular integrals to other contexts that have origins in quantum mechanics. The conjecture connects with the singular operators, which has allowed the team at **ICMAT**, directed by J. Parcet, to prove Mikael de la Salle's assumption. This results in criteria for the dimensioning of Schur multipliers, of great relevance in group theory, functional analysis, harmonic analysis, etc. (*Ann. of Math.* 198: 1229, 2023).

The extreme cooling of glaciers probably caused the depopulation of hominins in Europe at the beginning of the pleistocene

Researchers from **IDAEA** address a fundamental issue of the history of the genus *Homo*: how and why did hominids spread throughout history? This work presents analyses of marine and terrestrial indicators from a deep-sea control in the Portuguese margin that show the presence of a strong climatic variability, on a millenary scale, during a glacial period of ~1,154 to ~1,123 My, which culminated in a terminal stage cooling comparable to that of the most extreme events of the last 400,000 years. Climate model simulations reveal a drastic decrease in habitat suitability for these early hominins around the Mediterranean during the terminal stage, suggesting that these extreme conditions led to the depopulation of Europe, which perhaps lasted for several successive glacial-interglacial cycles (*Science* 381: 693-699, 2023).

Free initiative to teach future mathematicians in a fun way

The **ICMAT** (CSIC-UCM-UAM-UC3M) holds for the second year the "*Pequeño Instituto de Matemáticas*" ("Little Mathematics Institute") to teach secondary and high school students advanced mathematics in a different and fun way. The project receives about 150 students (35-40% girls) from the Community of Madrid every Friday.

CSIC research staff participates in a study that shows that emissions of various ocean compounds cool the climate, but do not compensate for warming

Research staff from **IQF** with the participation of **IAA** shows that a series of compounds emitted by the ocean, the short-lived natural halogens, exert an indirect cooling effect on the Earth's climate. This mechanism, which arises from complex chemical reactions that modify the energy balance in

the atmosphere, has been amplified since the beginning of the industrial era as a result of human emissions that, in turn, have increased oceanic halogen emissions. The work shows that this effect does not compensate for the global warming induced by human action since the pre-industrial

era, although it should be included in climate models to more accurately reproduce the observed increase in global temperature and improve projections of future scenarios (*Nature* 618L: 967-973, 2023).

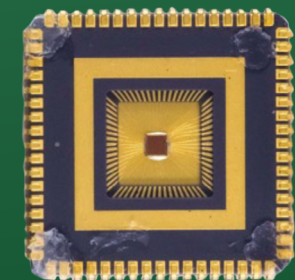
Breakthrough in quantum computing: topological light to connect quantum bits more robustly

Matter can be classified into three phases - solid, liquid and gaseous - according to how the atoms that make up the materials are stacked or move. This classification is based on local properties, i.e., by looking at a small portion of the system it is possible to distinguish the phase of matter. However, there are materials, known as topological materials, for which it is necessary to “look” at the entire material to identify the phase. Recent advances make enable the use of these materials to also protect the propagation of light in them. A study led by **IFF** proposes using these topological photonic materials to build, among other applications, quantum computer chips being more resistant to imperfections (*Sci. Adv.* 9: eadf8257, 2023).

Artistic recreation of topological light being used to connect quantum bits (Image: Jorge Munnshe for NCYT of Amazings).

A nanochip has been developed to protect electronic devices from cyber-attacks

Scientists from **IMSE, CNM** (CSIC-US) have designed a microelectronic chip for the generation of unique digital keys and random numbers that increase the security of electronic devices; it can be used to generate high-security ephemeral cryptographic passwords and, therefore, can protect against cyber-attacks. In addition, it allows to protect the confidentiality of digital data through encryption techniques and to ensure that messages are authentic. The chip is a result of the Spirs (Secure Platform For ICT Systems Rooted at the Silicon Manufacturing Process) project, funded by the European Commission with five million euros. The chip increases the security of electronic systems, especially those with limited memory or power consumption resources, such as the so-called Internet of Things (home devices) and portable devices (*wearables*) with restrictions on size and weight. When attached to an electronic system, the chip provides it with a set of protection mechanisms at the physical level (hardware) and this increases immunity to attacks based on malicious *software*, also known as *malware*.



Chip developed within the Spirs project.

Csic has designed integrated circuits that are key to understanding the climatology on Mars

After completing 250 suns of operation, the magazine *Nature Geoscience* publishes the first data collected by the MEDA (Mars Environmental Dynamics Analyser) instrument on board the NASA's Perseverance rover, in charge of collecting data at the Jezero crater to characterise the physical processes in the lowest layer of the Martian atmosphere. The instrument includes various sensors that take meteorological measurements, including wind speed and direction, temperature and humidity, as well as the amount and size of dust particles in the Martian atmosphere. Thanks to this, it is possible to study the meteorology

in the Jezero crater, demonstrating the great variability of phenomena existing in the Martian atmosphere, the day/night temperature cycles, heat flows, and dust cycles and how dust particles interact with radiation. These results have been obtained by an international team led by the **CAB** (CSIC-INTA), and MEDA contributes two integrated circuits designed in the **IMSE, CNM** (CSIC-US). These circuits represent the result of a decade of study of the effects of space radiation on electronic circuits and the characterisation of manufacturing technology at the low temperatures existing on Mars (*Nat. Geoscience* 16:19, 2023).



Artistic recreation of the Perseverance Rover/NASA.

Healthcare robotics and artificial intelligence for dependent people

IRII (CSIC-UPC) has developed CARESSER, an innovative framework that actively learns robotic assistive behaviour by leveraging the therapist's knowledge and expertise and their demonstrations. This hybrid approach allows rapid and autonomous learning of personalised policies for each patient. Two studies of users in a daily care centre showed that the CARESSER-equipped robot kept the patients' performance stable for more sessions than the therapist and adapted to the therapist's preferences. CARESSER can facilitate new AI approaches that learn from human interactions (*User Modeling and User-Adapted Interaction 33: 441-496, 2023*).

An example of a cognitive exercise session in which a robot makes use of the data collected by a human therapist, to assist a patient in a personalised way while performing a cognitive exercise.



A vineyard in the Rías Baixas testing a project to introduce robotics in agriculture.

Harvesting with robots and drones

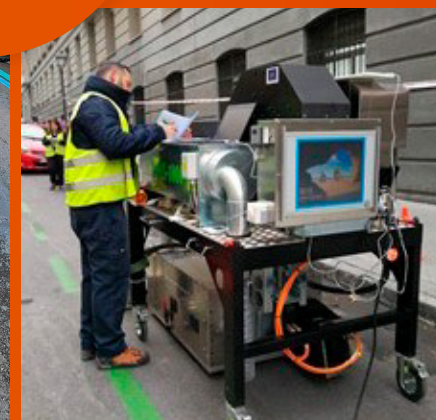
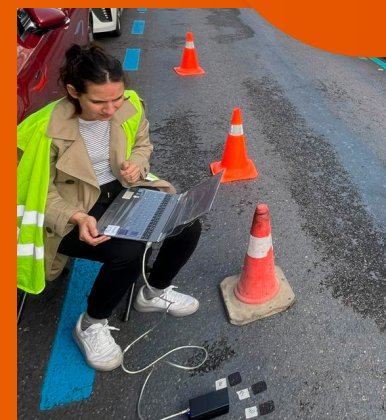
CAR (CSIC-UPM) has tested how a robot system complements and supports the work being carried out by grape harvesters at the key time of the year for the winery. The demonstration of its correct operation in a real environment is the first step to continue advancing in this three-year project. The verification has been carried out with the support of drones that have provided real-time aerial images on the health condition of the plots and clusters.

In situ measurement of photocatalytic efficiency on a street in Madrid with the device developed (left). In situ measurement of the emission of nanoparticles under friction, by functionalised pavements (right).

CSIC develops devices to evaluate the effectiveness and durability of photocatalytic pavements in situ

The IETcc has developed and patented a portable device, slightly larger than a mobile phone, for the rapid on-site measurement of photocatalytic efficiency. The measurement is based on the semi-quantitative colour change of specific probes. This device allows quick, simple, non-destructive, economical and very visual on-site measurements and is being used to determine the effectiveness and durability of the

photocatalytic pavements that are being laid in the city of Madrid on a demo scale. A system has also been designed to establish the potential of nanofunctionalised materials to emit nano and micro particles by friction. This device, which allows the measurement in situ and in laboratory samples, has also been used for the real-scale measurement of pavements.



Collaboration structures: PTI and Connections

+ 30 structures to join efforts in solving global challenges, through the participation of CSIC research groups from all disciplines, companies and public and private organisations.



1st PTI-Conexiones collaboration conference held at the CSIC headquarters in Madrid.

In 2023, the **1st PTI and Conexiones Collaboration Conference** was held to discuss how to promote collaboration between companies, administrations and social agents and the **2nd Conexiones and PTIs Reflection and Strategic Perspective Conference**.

INTERDISCIPLINARY THEMATIC PLATFORMS (PTIs)

Formed by research groups from different CSIC centres and open to the participation of companies, administration, other institutions and social agents.

24 Active platforms classified into four thematic areas:

ENERGY AND INDUSTRY **DIGITALISATION AND FUTURE SOCIETY**
HEALTH AND ENVIRONMENT **EARTH AND OCEANS SYSTEM**

Creation of two new PTI+

PTI+CLIMA



Inclusion of the [SPEI drought index in the Google Earth Engine public catalogue](#) and in the [World Bank database](#) allowing to visualise the evolution of the average drought conditions in each country through a viewer and download data from different geographical areas.

PTI+ OCEANOS SOSTENIBLES (SUSTAINABLE OCEANS)



An agreement has been signed with the ICTS SOCIB and the AZTI Foundation for the development of a Marine Spatial Data Infrastructure (IDEMar) and the comprehensive assessment of marine ecosystem services in the national territory; active collaboration with the PTI TELEDECT for the provision of satellite products and algorithms derived from remote sensing.



The **European funds of the Recovery, Transformation and Resilience Mechanism (PRTR)** have made it possible, since 2021, to **execute 120 million euros through five Extended PTIs (PTI+)**: QTEP+, SUSPLAST+, TRANSENER+, SALUD GLOBAL+ and NEURO-AGING+.

ENERGY AND INDUSTRY



PTI+ SUSPLAST

Development of a new coating for metal food packaging, alternative to [bisphenol-a resins](#).



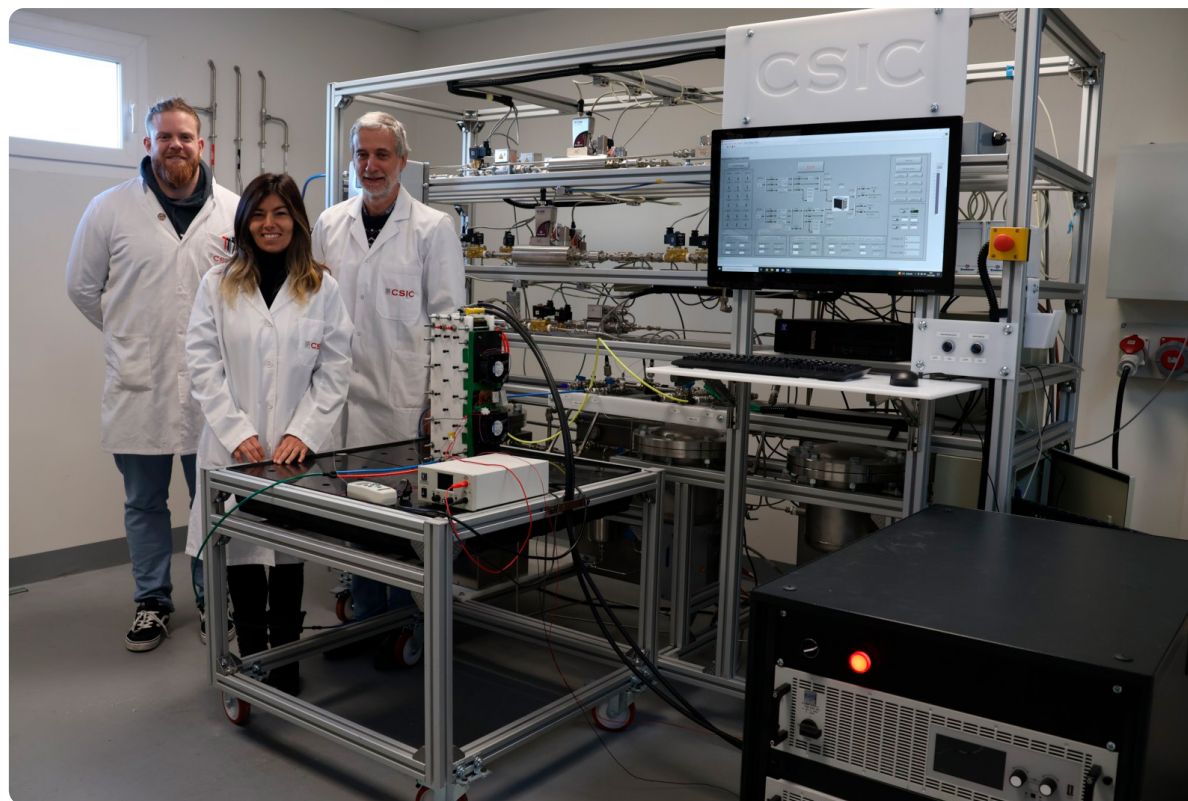
PTI+ QTEP

Participation in the European consortium for the development of pilot plants for [quantum technologies "Qu-Pilot"](#). Agreement signed with the BSC (Barcelona Supercomputing Center) for CSIC's participation in "Quantum Spain".



PTI TRANSENER

Study on the combination of a wind turbine and a vanadium redox flow [battery for electric vehicle charging](#). Development of one of the largest test benches for hydrogen cells in the country. Start-up of the [CSIC-ALBA Joint Laboratory](#).



PTI+ TRANSENER.



PTI FAB3D

Organisation and holding of the first 3D printing contest "Metal Art 3D" together with the UCM.



PTI SOSECOCIR

[Exploit4InnoMat](#) Project for the establishment of a European open innovation network of test benches and pilot lines for near-zero energy consumption building cladding materials (nZEB). Collaboration with the Spanish Construction Technology Platform (**PTEC**).

DIGITALISATION AND THE FUTURE SOCIETY



PTI+ CIENCIA DIGITAL (DIGITAL SCIENCE)

Emergence of the European project [“SIESTA”](#) (*Secure Interactive Environments for SensiTive data Analytics*) to develop reliable cloud computing environments within the EOSC environment.



PTI MOBILITY 2030

Funding obtained within the framework of the calls of the PERTE-VEC (strategic plan for the electric and connected vehicle) after the launch of the *Future: Fast Forward* initiative and through the [INVECRO Project](#). Participation in the organisation and celebration of the 1st Spanish Congress of Research in Mobility and in [“Mobility City”](#).

PTI MOBILITY.



PTI ES-CIENCIA

Coordination of the [“TeresiA”](#) project to generate a meta-search engine for access to terminologies in Spanish of pan-Hispanic scope, registered in the National Strategy of Artificial Intelligence, within the National Plan of Language Technologies and in the PERTE Nueva Economía de la Lengua .



PTI MEDHIS

Initiated two projects oriented to the ecological transition and digital transition on the theme "Deciphering Qur'anic" and "DIGITESC".



PTI PAIS

Start-up of the services pilot project of the Spanish node of the European infrastructure [E-RIHS](#), and boosting involvement in [ARCHE](#), European Alliance for Research in Cultural Heritage.



PTI ALCINDER

Consortium created within the framework of the Supra-Autonomous Operational Group AGRIROVENAT.

HEALTH AND ENVIRONMENT



PTI+ SALUD GLOBAL

[SARS-CoV-2 virus: Antivirals against the virus; Cross-sectional study of the virus in saliva and air samples in Spain](#), its analysis in [wastewater and the detection of mPox together with SARS-CoV-2](#) in Spanish **nightclubs**.



PTI+ NEUROAGING



PTI AGROFOR

Operational Group "BIODIF" together with the CELLBITEC Foundation created within the framework of the CAP Strategic Plan 2023-2027.



PTI HORIZONTE VERDE

A technological support contract has been signed with CEPISA for the "[Study on the potential of new crops as a source of biofuels in Spain](#)".



PTI AGRIAMBIO

Definition of efficiency indicators for biodiversity and ecosystem services associated with the CAP and contribution to the creation of new measurement protocols for these indicators; "[FARM](#)" [project](#) for the study of factors that influence the generational change and the choice of a productive model.



FOOD ALLERGY



PTI ECOBIODIV

Natural Heritage Project, in collaboration with the PTI Global Health and the National Parks Network: installation of four [phenocams](#) which are part of an international network for monitoring the effect of climate change on forests and pastures.

THE EARTH AND OCEANS SYSTEM



PTI TELEDETECT

Creation of "[NetOPS](#)", a Spanish collaboration network between research groups from the oceanic and terrestrial scientific communities on the use and applications of optical proximity detection. An ambitious PETRI-MED project has been launched to monitor marine microbial biodiversity from space.



PTI POLAR CSIC



PTI SOILBIO

"MARVIC" project, to develop monitoring and verification systems of carbon and greenhouse gases in agricultural soils, in which IAS and EEAD participate.



PTI SOLXYL

International Conference on *Xylella fastidiosa* held at the CSIC headquarters, Madrid.

CONEXIONES CSIC (CSIC-HUBS)

Conexiones (Connections: a scientific-technical collaboration network) seek to establish a link between research staff from different centres, sharing information, knowledge and joint activities that include the exchange of personnel.

10 Active Conexiones

- Launch of the **first call for grants for the creation of Conexiones-CSIC** to stimulate the collaboration of its research groups, favouring the scientific integration of the three National Centres.

Other existing Conexiones (5):



Conexión LIFE (LifeHub)



Conexión ARTIFICIAL INTELLIGENCE (AIHUB)



Conexión ARCHAEOLOGY



Conexión NANOMEDICINA



Conexión CANCER

Creation of five new Conexiones-CSIC

During 2024 and 2025 they will focus their action on the formulation and coordination of programmes, projects, proposals and other joint activities focused on the following **thematic areas**:



Genome

Knowing the genome of organisms is a **scientific challenge** in areas such as health, food safety and biodiversity conservation. The connection will encourage collaboration between groups researching the organisation, dynamics and function of genomes to contribute to their understanding.



Computational Biology and Bioinformatics

CBB is a **cross-disciplinary, multidisciplinary** discipline capable of answering a large number of scientific questions. The establishment of this collaborative network will allow greater interaction between researchers from different areas and access to a large number of resources available in this field.



Geosciences for a Sustainable Planet

Studying and taking care of planet Earth is key to addressing the **future sustainability** of our society. The network seeks to respond to the challenge from a global and planetary perspective by promoting new synergies in the field of geosciences.



Wheat

Wheat is a **strategic crop**. The mission of the connection is to implement scientific and technical research on this crop to meet future challenges in the context of climate change and population growth in the 21st century.



Photocatalysis

Important environmental, energy and medical challenges can be addressed through the use of photocatalytic technologies. The network seeks to overcome existing barriers to their application and maximise their **impact on society and industry**.



CONEXIÓN CANCER Scientific staff of the CSIC discuss the latest oncological advances at the 2nd Congress of the Conexión-Cancer Network.

Innovation and Transfer

CSIC COLLABORATION WITH COMPANIES

+1.800 **CONTRACTS SIGNED**

IN PARTICULAR:

Manufacture of electrolyzers for the production of hydrogen at an industrial level

R&D contract with the company H2B2.

Development of fuel cell electro-catalysts from industrial waste

Patent license agreement with REPSOL, and R&D contract for the development of fuel cell electro-catalysts from industrial waste.

Genetic improvement of rice varieties aimed at the diabetic population

R&D contract with the co-op of rice seed producers COPSEMAR for the genetic improvement of elite rice varieties Thai-Indica and Spain-Japonica for the purpose of obtaining low glycemic index rice, bio-enrichment and productivity.

Study of the antidiabetic effect of olive pomace oil

R&D contract with the interprofessional olive pomace oil company ORIVA to study the antidiabetic effect of olive pomace oil.

Launch of the Mosquito Alert Platform

Citizen science platform to investigate and control disease-transmitting mosquitoes (tiger and yellow fever, Zika, Dengue and Chikungunya vectors). Promoted through the **contract with the Ministry of Health** for the development of entomological surveillance tools for implementation in Spain.



Covid-19 vaccine prototype licensed to WHO so it may reach developing countries

A licensing agreement with the public health organisation Medicines Patent Pool (MPP), supported by the United Nations and supervised by the WHO, will enable this technology, based on the vaccinia MVA virus as a vector and with 100% proven effectiveness in animal models, to reach poor countries.

CREATION OF **12** NEW KNOWLEDGE-BASED COMPANIES (KBCs)



IN PARTICULAR:

LabsinLove



A CSIC KBC that develops new boron-rich compounds for their application as drugs for a promising radiotherapy against cancer, more selective and with fewer side effects than traditional radiotherapy, called *Boron Neutron Capture Therapy* (BNCT).

New Materials from Cleaning Biogas (NMFCB)



A CSIC KBC that develops new materials from urban and industrial waste to eliminate substances that pollute biomethane, renewable biogas that is an ecological alternative to natural gas of fossil origin. It aims to achieve several objectives: to reduce greenhouse gas emissions, contribute to the circular economy and provide energy from renewable sources for various uses.





CSIC open lab



STRENGTHENING PUBLIC-PRIVATE COLLABORATION

CSIC PROGRAMME
COCREA

*We promote solutions
to global challenges*

Topics: **Antimicrobial Resistance**  and **Clean Energy** 

33 COMPANIES (**21**  AND **12** ) HAVE PRESENTED **51** CHALLENGES
(**31**  AND **20** )

150 CSIC **RESEARCHERS**
HAVE PRESENTED SOLUTIONS TO THE CHALLENGES (**78**  AND **72** )

10 CSIC-COMPANY PROJECTS SELECTED

CSIC emprende

PROMOTING ENTREPRENEURSHIP

ACTIVA-T

*Transformation of research
results in companies*

EBTON
CSIC

33 KBC PROJECTS SUBMITTED
4 WINNERS

IMPULSA-T

*Active promotion of high-
potential KBC (Knowledge-Based
Company) projects*



30 EXPRESSIONS OF INTEREST
SUBMITTED
10 PROJECTS SELECTED

CSIC living lab

BOOSTING THE TRANSFER TO THE PUBLIC SECTOR

*Promotion of the Public Purchase of Innovation
by responding to the needs of public administrations*

CSIC TECHNOLOGIES
OFFERED

30

ENTITIES
INVOLVED

38

OPPORTUNITIES
DISSEMINATED

15

DATA RELATED TO THE PROMOTION OF CPI
(PUBLIC PROCUREMENT OF INNOVATION) AND OTHER PUBLIC SECTOR ISSUES

CSIC cátedras empresa

SUPPORT FOR A SCIENCE OF EXCELLENCE

*Support to CSIC research lines to promote science
of excellence and its dissemination to society*



RARE
DISEASES

CONSERVATION
OF SPECIES



CLIMATE

BREAST
CANCER



ARCHAEOLOGY

5 PROJECTS AND RESEARCH LINES SUPPORTED BY COMPANIES AND FOUNDATIONS



Ana Castro Morera (VIT) presenting CONVERGE at the CSIC auditorium.

1ST EDITION OF THE CSIC TRANSFER AND ENTREPRENEURSHIP AWARDS

This strategic action aims to recognise and give visibility to the transfer and entrepreneurship activity carried out by the research staff at the CSIC centres and institutes.

The prizes will be awarded in four areas:

- Technology transfer
- Knowledge transfer
- Entrepreneurship
- Transfer trajectory of the centre/institute.

Modalities 1, 2 and 3 include two categories, general and novel.

FOUR SCIENTIFIC SOLUTIONS TO TODAY'S MAJOR CHALLENGES RECEIVE AWARDS

The **CSIC EBTon Programme**, an initiative whose objective is to catalyse the creation of new knowledge-based companies using CSIC technology, has awarded four projects:

- **CPS**, for the detection of organic pollutants in the water over time, allowing thorough monitoring.
- **VANAFLOW**, manufacturing of redox flow batteries optimised for large-scale energy storage.
- **RECOPPS**, recovery process of critical raw materials in the copper industry.
- **PHAGE-PHI**, integrated specific bacteriophage detection system based on the use of improved Phi29 polymerase variants.

Each award entails an allocation of 20,000 euros.



NEW PROCEDURE THAT REGULATES CSIC'S STAKE IN THE SHARE CAPITAL OF KNOWLEDGE-BASED COMPANIES (KBC)

This new specific procedure, established by resolution of the organisation's Presidency, regulates, through an agile and guarantee-based process, the organisation's decision-making in terms of its participation in the share capital of CSIC knowledge-based companies.

Phage-Phi proposes a contamination detection system in fermentation processes in the food industry.



Initiative to publicise the CSIC's potential by inviting relevant personalities from companies, foundations, public administrations and the media to its research centres

178
PARTICIPANTS



COMPANIES

57



PUBLIC
ADMINISTRATIONS

45



MEDIA

19



CSIC
RESEARCHERS

57



2nd Workshop Cicerón: **"THE FUTURE OF THE MEDITERRANEAN DIET IN THE CONTEXT OF CLIMATE CHANGE"** held in Madrid. It was attended by CSIC staff (Management team and research staff from 9 institutes); CSIC General Foundation; representatives of 8 relevant companies in the sector (Mercadona, Pascual, Matarromera, Coca-Cola, European Foundation for Innovation, PONS IP, Soria Natural, Academia Madrileña Gastronomía), and political representatives from 4 autonomous regions (Com. Madrid, MAEC, MAP AND MITECO).

THE YEAR 2023 HAVE FEATURED:

8 WORKSHOPS

IN MADRID (3),
VALENCIA, SEVILLA,
OVIEDO, BARCELONA
AND ZARAGOZA



4 THEMATIC AREAS



ENERGY



FOOD



HEALTH



DIGITISATION



4th Workshop Cicerón: **"DIGITALISATION"** held in Sevilla. Attended by CSIC staff (Management team and CSIC staff (Management team and research staff from 6 institutes); CSIC General Foundation; representatives of 6 relevant companies in the sector (CTA, Acerca Slutipons, Alter Technology, IOVI, Hispasec Sistemas, Airbus); representatives of 4 public entities and 3 media representatives.

Internationalisation

Scientific collaboration at the international level it is an indispensable pillar to cope with the global challenges of our society. CSIC's main goal, in harmony with its mission to position itself as a leading organisation in the European context, is to strengthen its competitiveness globally, with a proactive approach to identify and establish strategic alliances, weaving a wide network of collaborations with renowned foreign and international academic and research entities.

This **commitment to internationalisation** is based on:

- Encouraging the international **mobility** of research staff.
- Actively participating in European and international **calls** in order to have access to financial resources and collaboration opportunities.
- Strengthening the **institutional representation** in international forums and platforms.
- Improving the instruments and mechanisms that facilitate scientific **cooperation** with countries receiving Official Development Assistance (ODA).

Meetings to discuss the future of science in Europe

■ **Two meetings** have been held in the context of the **G6** of science:

The first in Ringberg, Germany, organised by the Max-Planck, with the participation of representatives of the scientific policy of Germany, Spain, France and Italy.

The second was in Brussels, where the G6 presidents held meetings with prominent personalities, including Maria Leptin, President of the European Research Council (ERC) and Christian Ehler, Member of the European Parliament.



G6 presidents together with heads from the scientific policy of Germany, Spain, France and Italy met at Ringberg Castle (Germany).



The presidents of the G6 at the entrance of the European Parliament on November 8, 2023. From left to right: Antoine Petit (CNRS), Otmar Wiestler (Helmholtz), Maria Chiara Carozza (CNR), Eloisa del Pino (CSIC) and Patrick Cramer (Max-Planck). Absent: Martina Brockmeier (Leibniz).

■ Participation of the President of the CSIC in the Quest for Digital Equity panel of the **Science and Technology in Society Forum Annual Meeting 2023** in Kyoto (Japan).

■ Participation of the Vice-President of International Relations in the **Global Research Council** in The Hague (Netherlands), an organisation composed of the heads of science and engineering funding agencies from all over the world, dedicated to promoting data exchange and improving practices to establish high-quality collaboration between funding agencies from around the world.

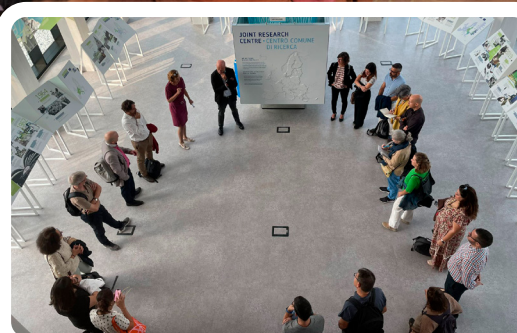


Organisation of the 15th High Level Workshop and Satellite Event

This event of great relevance for North-South collaboration was organised in Madrid with every success, and addressed **international cooperation in research and innovation**, reflecting on the present and future needs of political tools that promote reciprocity and equity. This exercise can be summarised in four fundamental aspects:

- Challenges related to reciprocity and equitable multilateralism in scientific collaboration.
- Safeguarding academic freedom, scientific integrity and equal treatment.
- Exploring scientific collaboration instruments, including funding, mobility and reciprocity.
- The crucial role of global scientific networks in achieving positive social change.

15th HLW co-organised by Science Europe and the CSIC on international research collaboration between European, African and Latin American scientific organisations.



CSIC strengthens its relations with the Joint Research Centre



The JRC is the scientific service of the European Commission that provides independent knowledge to support the development of innovative and responsible European Union policies that respond to societal challenges. The CSIC, the main JRC partner in Spain, seeks to strengthen collaboration in areas of common interest and work together on the role of science in the design of public policies within the framework of the Spanish Presidency of the European Council in the second half of 2023. Since January, the Vice-President of International Relations has been part of the Governing Board of the JRC. The JRC visited Madrid in March with the aim of strengthening strategic relationships and research collaborations with key partners in the political and scientific community. In October a team of researchers from the CSIC visited the facilities of the JRC-ISPRA.



CSIC's participation in the organisation of COP28

The CSIC, in collaboration with EIT FOOD and other international participants, organised and participated in COP28, a webinar dedicated to **strengthening sustainable nutrition** until the year 2050. This event emphasised the importance of collaboration between science and the various stakeholders involved in the search for solutions to the nutritional challenges of the future.

The CSIC, among the four public research organisations in the EU with the best achievements in Horizon Europe

The CSIC, together with the French CNRS and the two German associations, Fraunhofer and Max-Planck, is among the four public research EU organisations with the best achievements in Horizon Europe. It stands out for its participation in the **Marie Skłodowska-Curie (MSCA)** programmes and in the **cluster 6 collaborative projects** (Food, bioeconomy, natural resources, agriculture and environment).

Thanks to the success in the MSCA programme and the vast experience in the ERC (having directed more than 100 projects) and in projects of the Call for Research Infrastructures, **the CSIC consolidates itself as the main Spanish entity in the execution of projects of the Pillar I of Horizon Europe**. This achievement reflects its excellence and extensive experience in scientific research.

Coordination of **52** international research projects and participation in others supported by european and international funds

4th

CSIC RANKS
IN TOTAL
ECONOMIC RETURN

2nd

CSIC RANKS
IN NUMBER OF
TOTAL SHARES

CNRS (FRANCE)

€ 516 M

FRAUNHOFER (GERMANY)

€ 281 M

MAX-PLANCK (GERMANY)

€ 216 M

CSIC (SPAIN)

€ 215 M

KATHOLIEKE UNIVERSITEIT LEUVEN (BELGIUM)

€ 212 M

CNRS (FRANCE)

744

CSIC (SPAIN)

444

FRAUNHOFER (GERMANY)

420

KATHOLIEKE UNIVERSITEIT LEUVEN (BELGIUM)

339

CNR (ITALY)

323

- The CSIC emphasises the relevance of the European calls for scientific research in Spain, as evidenced by its participation in the **"Open Europe"** programme from Radio 5. Access to the full content of the programme:





The CSIC joins this association that brings together leading universities and research organisations to promote clean hydrogen research in Europe. Led by the Institute of Chemical Technology, with the participation of 10 other institutes, it will facilitate access to resources and financing opportunities, strengthening Spain's visibility in the international arena.



Signing of 74 international agreements

Of particular note are the bilateral staff exchange agreements with CONICET, the Slovak Academy of Sciences (SAS), the Czech Academy of Sciences (CAS), the Monterrey Institute of Technology and Higher Studies (TEC) and the membership of DISCONTOOLS, EVOLTREE and SYNCELL.

Signing of a cooperation agreement with the diplomatic school

The CSIC signs an agreement with the Diplomatic School of the Ministry of Foreign Affairs, European Union and Cooperation for collaboration in the field of education and training of staff of both organisations, as well as specialists in foreign policy, international relations, scientific diplomacy, international law and international economic relations. The agreement also includes the promotion of exchange between the institutions to broaden professional prospects. This protocol seeks to enhance CSIC's role in the Spanish **scientific diplomacy** and strengthen the promotion of Spanish scientific knowledge abroad.



Eloísa del Pino, President of the CSIC, and Luis Manuel Cuesta Cívís, Undersecretary of Foreign Affairs, European Union and Cooperation, during the signing of the collaboration agreement.

Vice-Presidency of Science Europe

The Vice-President of International Relations of the CSIC, Francisco Javier Moreno, has been elected **vice-President of Science Europe** at the General Assembly of the association held in Madrid in November 2023.

Creation of the CSIC-Welcome International Talent (CSIC-WIT) office

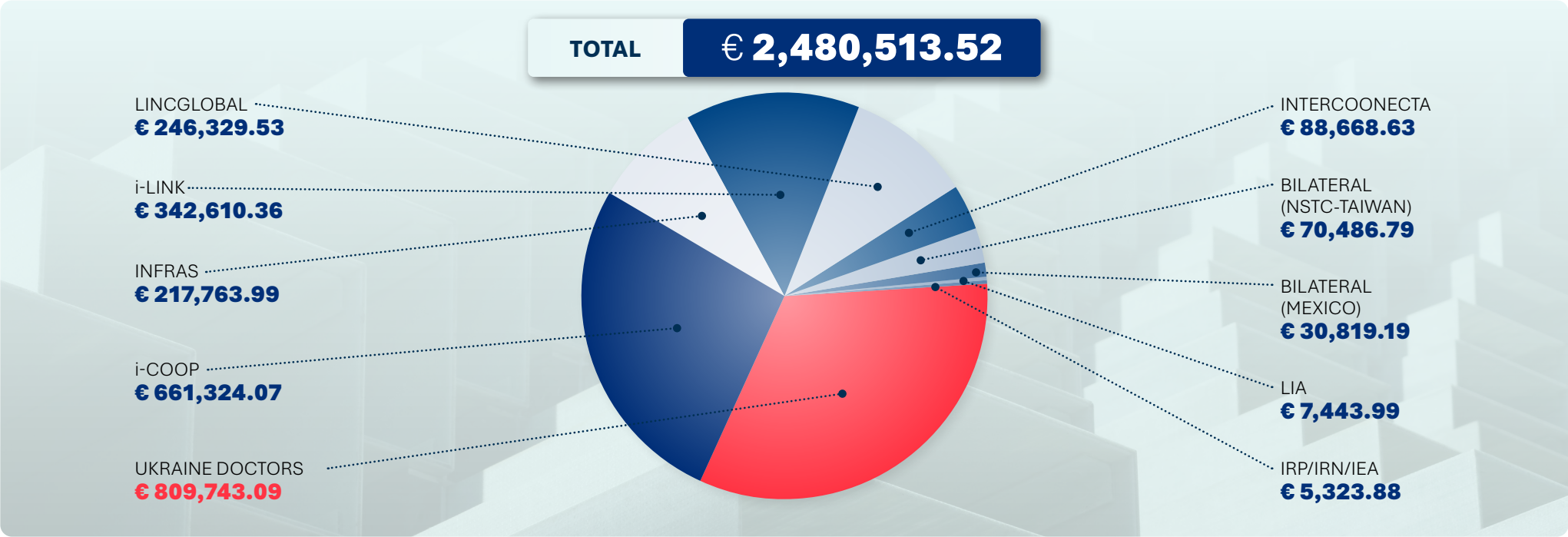
The CSIC-WIT, a technical office dedicated to facilitating the incorporation of international talent to the CSIC, provides professional support and advice to research personnel who join from abroad, whether Spanish or from another country, hired statutorily or on research stays. Contact with the CSIC through wit@csic.es.

Active engagement with the European Research Area (ERA)

The CSIC is actively committed to the development of the ERA. With the participation of **389 researchers in international groups**, CSIC contributes to defining the next actions for the period 2024-2027 in key areas such as research careers, mobility, gender equality and open science.

Cooperation and internationalisation resources

FUNDS INVESTED AND DISTRIBUTION BY COOPERATION AND INTERNATIONALISATION PROGRAMMES IN 2023



354 CURRENT **COLLABORATIONS** FUNDED WITH THE COOPERATION BUDGET AND THE CSIC'S OWN RESOURCES FOR INTERNATIONALISATION IN 2023



Major National Research Infrastructures

UNIQUE SCIENTIFIC AND TECHNICAL INFRASTRUCTURES (ICTS)

NEWS 2023



Launching of the ship
Odón de Buen.



Oceanographic vessels

Launch of the new ship Odón de Buen, the largest and most advanced of the Spanish oceanographic fleet that will be able to operate in all oceans, including the polar regions.



Spanish Antarctic Bases

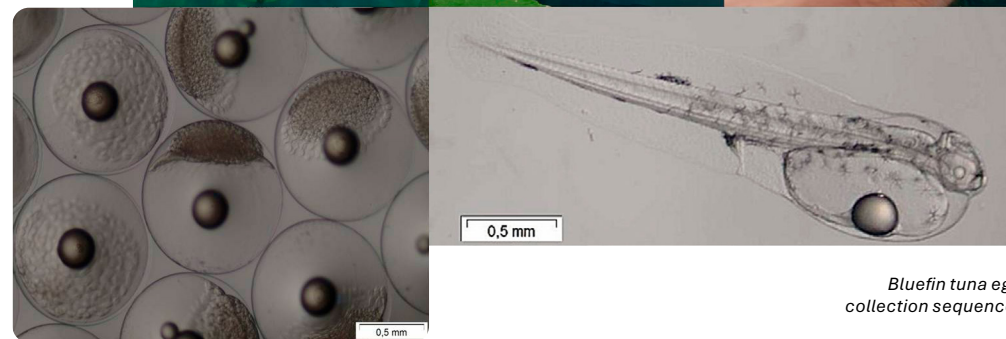


Coastal Observation System of the Balearic Islands (SOCIB)

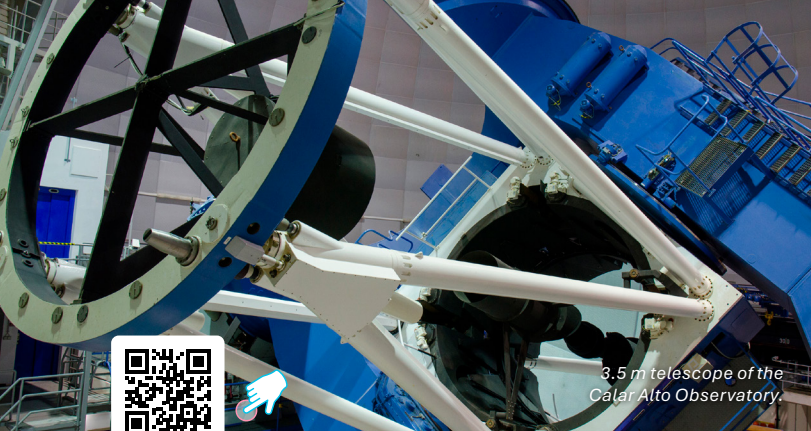


Bluefin Tuna Farming Infrastructure (ICAR)

For the first time worldwide, the reproduction of tuna kept in captivity in a land-based facility has been achieved. Oceanographic Centre of Murcia (IEO-CSIC).



Bluefin tuna egg
collection sequence.



3.5 m telescope of the Calar Alto Observatory.

Astronomical Observatory of Calar Alto (CAHA)

The CARMENES instrument increases the number of known exoplanets in the solar neighbourhood. The data provided by the 20,000 observations made have made possible the **discovery of 59 exoplanets**, a dozen of them potentially habitable.



Environmental monitoring in a temporary lagoon in the Doñana Biological Reserve (ICTS-RBD).

Doñana Biological Reserve (RBD)

Installation of 6600 Multi-Parameter Probes for monitoring the water quality of the permanent lagoons of Doñana.

OTHER MAJOR INFRASTRUCTURES



Electronic Cryomicroscopy Service of the CNB (CRIOMECCORR)

Routine establishment of **all the techniques related to electron cryomicroscopy** (single particle cryomicroscopy, electron cryotomography, correlative cryomicroscopy and electron cryodiffraction), **one of the few places in the world where this is possible.**



High Biological Safety Laboratory of the Animal Health Research Centre (CISA)

Funding of the proposal entitled "Mating in disease-transmitting mosquitoes: new opportunities for the control of zoonoses and other vector-borne diseases", within the ATRAE Programme to encourage the incorporation of leading international research personnel in their area.



National Accelerator Centre (CNA)

Implementation of **Spain's first pulsed neutron source: HISPANoS** (*Hispanis Neutron Source*), an epithermal and fast neutron source possessing a broad spectrum of experimental capabilities in various fields.



Integrated Infrastructure for the Production and Characterisation of Nanomaterials, Biomaterials and Systems in Biomedicine (NANBIOSIS)

The European Commission awarded the project (*EIC Transition Nano4Rare*) to complete the pre-clinical studies of the new nanomedicine for the **treatment of rare Fabry disease** and so that clinical phase I can be initiated.



Integrated Micro and Nano-Manufacturing Cleanroom (MICRONANOFABS)

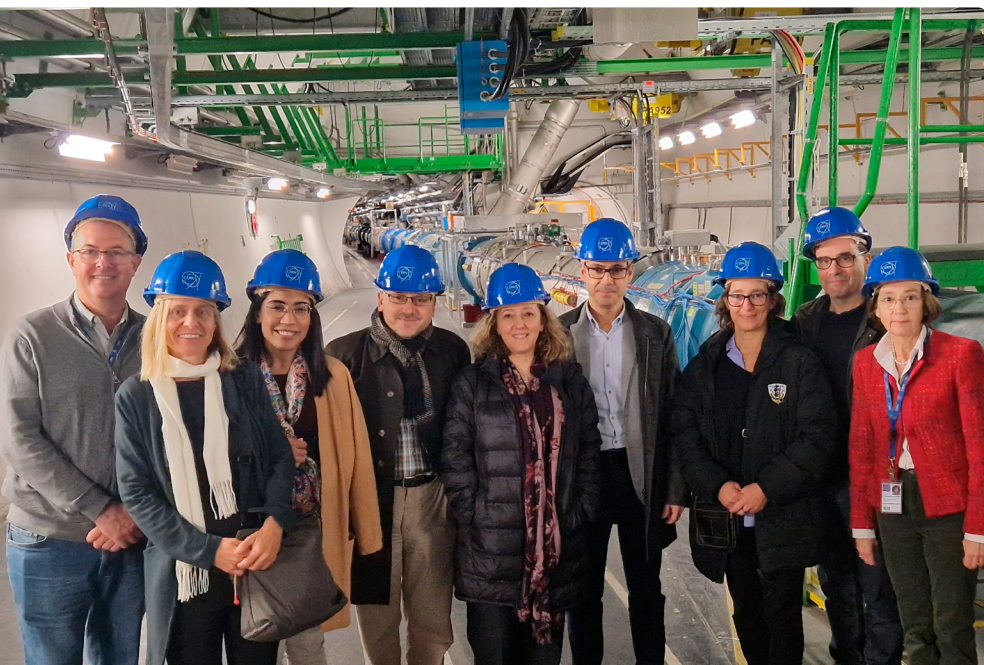
ISO9001 quality certification for the processes involved in the design, development and production of microelectronic devices.



Manuel Rico Nuclear Magnetic Resonance Laboratory (LMR)

Installation of the **new solid state NMR spectrometer** configured to study biomolecules hitherto unapproachable by conventional techniques, such as molecular condensates. This is the second team in the world in its category.

Major International Infrastructures



CSIC's management team visits the CERN facilities.

CERN (European Organisation for Nuclear Research)

Boosting of **CSIC's participation at CERN with €5.8M of funds from the Recovery and Resilience Mechanism** and other sources. CSIC management staff visited the CERN facilities, where they met with CSIC teams participating in five experiments, including the LHC, thus consolidating Spain's support to the CSIC scientific community at CERN. This collaboration strengthens Spain's institutional connection and international visibility.

CSIC PARTICIPATION IN ESFRI (European Strategy Forum on Research Infrastructures) INITIATIVES

The scientific and technological complexity and the very high investments required by Large Research Infrastructures (GII) are addressed in a framework of international collaboration whose strategy and development is defined at the European forum *European Strategy Forum on Research Infrastructures* (ESFRI). **The CSIC**

formally participates in 25 GII of the ESFRI European forum with different levels of development/concreteness/maturity. The *ESFRI Projects* are GII in the preparation phase that enter the Roadmap to point out the strategic importance they represent for the European Research Area, while the *ESFRI Landmarks* are already implemented GII.

WHAT'S NEW IN 2023

■ The CSIC, founding partner of the **EST Foundation, European Solar Telescope**, made up of nine research institutions from seven European countries.

■ **Spain's accession to:**

1. **Eurobioimaging-ERIC**
2. **EPOS-ERIC**, whose national node is coordinated by CSIC.
3. **CLARIN, DARIAH**: The CSIC is integrated into two of the largest European scientific infrastructures in Humanities and Social Sciences.



■ **CSIC's accession to:**

1. **OPERAS**
2. **EBRAINS**





EOSC (European Open Science Cloud)

The objective of developing the *FAIR and Data Services Web* to enhance access, reproducibility and the digital transformation of science in Europe builds on existing data services and infrastructures, currently supported by the European Commission, the member States and the various communities that deal with knowledge generation.

The CSIC, one of the four founding members of the association, is currently an **entrusted member** in charge of national coordination, assuming the role of making the Spanish community visible in the different activities of EOSC. An outstanding activity was held, namely, a *Tripartite Event* organised at the Blas Cabrera Institute; it was attended by 70 representatives of entities that carry out or finance research, data infrastructure providers, research infrastructures and other stakeholders.

In the centre of the image, Isabel Díaz, deputy vice-president for Internationalisation and Cooperation of the CSIC, and Inmaculada Figueroa, deputy assistant director general for Internationalisation of Science and Innovation of the Ministry of Science, Innovation and Universities, hosting the event.

The CSIC is linked to 25 ESFRIS (in alphabetical order):

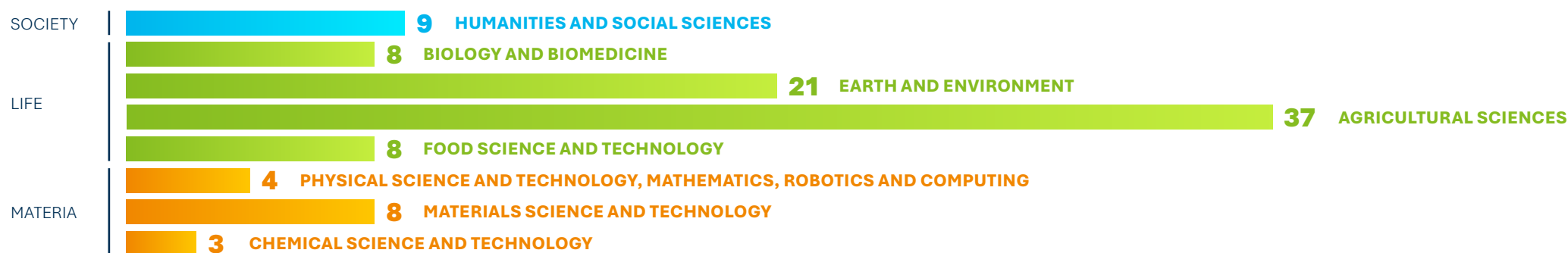
1. **ACTRIS** (Aerosols, Clouds and Trace gases Research Infrastructure): <https://www.actris.eu/>.
2. **CLARIN** (Common Language Resources and Technology Infrastructure): <https://www.clarin.eu/> • <https://www.clariah.es/es/home>.
3. **CTA** (Cherenkov Telescope Array): <https://www.cta-observatory.org/>.
4. **DARIAH** (Digital Research Infrastructure for the Arts and Humanities): <https://www.dariah.eu/>.
5. **DISSCO** (Distributed System of Scientific Collections): <https://www.dissco.eu/> • <https://dissco-spain.es/> (The CSIC coordinates the national node).
6. **E-RIHS** (European Research Infrastructure for Heritage Science): <https://www.e-rihs.eu/> • <http://www.e-rihs.es/> (The CSIC coordinates the national node).
7. **EBRAINS** (European Brain ReseArch INfrastructureS): <https://www.ebrains.eu/> • <https://neurotec.upm.es/ebrains/>.
8. **ELIXIR** (A distributed infrastructure for life-science information): <https://elixir-europe.org/>.
9. **ELT** (Extremely Large Telescope): <https://elt.eso.org/>.
10. **EPOS** (European Plate Observing System): <https://www.epos-eu.org/> (The CSIC coordinates the national node).
11. **ESRF-EBS** (European Synchrotron Radiation Facility Extremely Brilliant Source): <https://www.esrf.fr/> • <https://www.esrf.fr/UsersAndScience/Experiments/CRG/BM25>.
12. **EST** (European Solar Telescope): <https://www.est-east.eu/>.
13. **ET** (Einstein Telescope): <https://www.et-gw.eu/>.
14. **EURO-ARGO** (European contribution to the international Argo Programme): <https://www.euro-argo.eu/> • <https://www.oceanografia.es/argo/>.
15. **EUROBIOIMAGING** (European Research Infrastructure for Imaging Technologies in Biological and Biomedical Sciences): <https://www.eurobioimaging.eu/>.
16. **FAIR** (Facility for Antiproton and Ion Research): <https://fair-center.de/>.
17. **HL-LHC** (High-Luminosity Large Hadron Collider): <https://home.cern/science/accelerators/high-luminosity-lhc>.
18. **IBISBA** (Industrial Biotechnology): <https://ibisba.eu/> (The CSIC coordinates the national node).
19. **ELTER** (Integrated European Long-Term Ecosystem): <https://www.elter-ri.eu/>.
20. **ILL** (Institut Max von Laue - Paul Langevin): <https://www.ill.eu/>.
21. **INSTRUCT** (Integrated Structural Biology Infrastructure): <https://instruct-eric.org/> (The CSIC coordinates the national node).
22. **KM3NeT 2.0** (The KM3 Neutrino Telescope 2.0): <https://www.km3net.org/>.
23. **EU-OPENSOURCE** (European Infrastructure of Open Screening Platforms for Chemical Biology): <https://www.eu-openscreen.eu/index.html> • <https://www.es-openscreen.com/>.
24. **OPERAS** (Open scholarly communication in the European Research Area for Social Sciences and Humanities): <https://operas-eu.org/>.
25. **SKA** (Square Kilometre Array): <https://www.skao.int/> (The CSIC coordinates the national node).

Scientific-Technical Services

The wide range of scientific equipment and instrumentation available at the CSIC research centres and institutes is made available to the scientific community and the industrial and business sector, through the [scientific-technical services](#) that offer a number of services, with their associated variants, establishing their technical characteristics and economic conditions. **70 Services have external quality recognition (ISO standards and GLP certificates).** What's new in 2023:

98 NEW SERVICES added to the scientific-technical services.

DISTRIBUTION BY CORE AREA AND SCIENTIFIC-TECHNICAL SUB-AREA:



381 NEW FEATURES incorporated into the CSIC catalogue.

DISTRIBUTION ACCORDING TO THE TYPE OF SERVICE TO WHICH THEY ARE ATTACHED:

BIOLOGICAL ANALYSIS AND METHODS	83	MANUFACTURING AND PROCESSING	2
PHYSICAL ANALYSIS AND METHODS	85	ICTS AND SPECIFIC-UNIQUE LABS AND LARGE PROJECTS	14
CHEMICAL ANALYSIS AND METHODS	78	MICROSCOPY, MICROANALYSIS AND IMAGING	11
TECHNICAL ASSISTANCE AND LOGISTICAL SUPPORT AND OTHER SERVICES	18	SAMPLING, SAMPLE PREPARATION, TREATMENT AND PRESERVATION	8
CONSULTING AND QUALITY AND SAFETY AND DISSEMINATION	7	PILOT PLANTS AND EXPERIMENTAL FARMS	9
DOCUMENTATION, LIBRARIES AND COLLECTIONS	6	PROTEOMICS, GENOMICS AND METABOLOMICS	33
PRINT AND DIGITAL PUBLISHING, DESIGN AND IMAGE PROCESSING	1	ICT, COMPUTATIONAL AND MATHEMATICAL AND CARTOGRAPHIC ANALYSIS	26

Initiated an **analysis process of the scientific-technical services** (30% institutes involved) with the aim of optimising their use and increasing visibility to a potentially interested public.

Ethics and scientific integrity

ETHICAL EVALUATION OF RESEARCH

APPLICATIONS RECEIVED

531

798 EVALUATIONS

217 ANIMAL EXPERIMENTATION PROJECTS

314 PROJECTS WITH BIOETHICAL AND/OR BIOSAFETY IMPLICATIONS

523 EVALUATIONS OF RESEARCH ACTIVITIES:

138 WITH THE PARTICIPATION OF HUMAN BEINGS, THEIR SAMPLES AND DATA

199 WITH GMOs

186 WITH BIOLOGICAL RISK AGENTS

58 EVALUATIONS OF STATISTICAL METHODS AND CALCULATIONS

CONFLICTS OF SCIENTIFIC INTEGRITY

MANAGEMENT OF

11

CONFLICTS

SCIENCE FOR SOCIETY

Science for public policy **104**

Scientific culture and citizen science **106**

Title: Entre dos azules (Between two blues).
Author: Shira Murciano Soriano.

Science for public policy

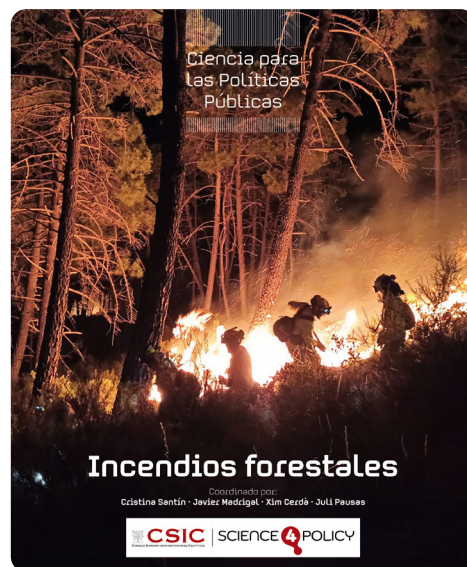
Launch of a **collection of reports** to contribute to the development of evidence-based policy



Eight thematic reports have been prepared that present solid scientific evidence around a scientific and social problem. The knowledge generated at CSIC centres and institutes is transformed into contributions open to a non-specialised public and provides information that can support political decision-making.



This first report serves as a framework for the collection and addresses the institutionalisation of scientific advice and society's role.



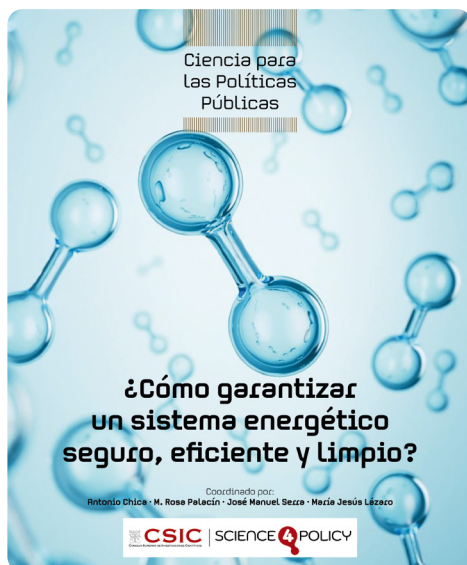
Aimed at administrations and society in general, it explains basic concepts, lists its main impacts on ecosystems and society, and breaks down some of the lines of the organisation's most outstanding research for the sustainable management of landscapes prone to burning.



It explains basic concepts about the growing resistance of bacteria to antibiotics by listing the main impacts on ecosystems and breaking down some of the organisation's most outstanding research lines on the behaviour of multidrug-resistant bacteria and the most innovative treatments.



It analyses the environmental and health problem posed by microplastics and strategies to reduce pollution. It addresses the research carried out at the CSIC to provide solutions to this problem, from chemical strategies for a circular economy, to biotechnological processes and approaches or the contribution to the regulation and certification of more sustainable polymeric materials.



It analyses the drawbacks, challenges and possibilities of the current energy system, and delves into the research lines developed at the organisation to promote a new paradigm that facilitates the energy transition towards a model free of harmful emissions.



It explains the current food crisis with the factors that have caused it and its consequences. It presents the impact that food production originates on the planet, and vice versa, the influence of a changing planet on food supply, and points out some of the most outstanding lines of innovation of the organisation to solve the challenges that arise.



It addresses the challenge of establishing responsible nutrition and food consumption globally, working to reduce the risk of malnutrition, aggravated by environmental and geopolitical crises, and, therefore, the inflation and food shortages that they cause. It includes some of CSIC's most outstanding innovation lines to solve present and future challenges.



Not only does it discuss basic concepts about droughts, but also outlines their impact on agriculture, ecosystems and society, and presents the CSIC's most outstanding research lines to manage the water availability shortage.

Scientific culture and Citizen science

+13,000

SCIENCE OUTREACH INITIATIVES CARRIED OUT BY CSIC INSTITUTES, CENTRES AND INSTITUTIONAL DELEGATIONS:

10,000 FACE-TO-FACE WITH **+1,300,000** ATTENDEES:

1,880 LECTURES
+ 1,500 GUIDED TOURS
+ 4,000 WORKSHOPS
101 SELF-CREATED CONTESTS
158 EXHIBITIONS

3,040 NON-ATTENDANCE INITIATIVES:

+800 VIDEOS
18 MOBILE APPLICATIONS
+ 200 SCIENCE WEBSITES AND BLOGS



- 1st edition of the **CSIC Awards for Dissemination and Citizen Science** in which the *Oceánicas* Project of the Spanish Institute of Oceanography and the Scientific School Calendar of the Mountain Livestock Institute were awarded.

- Opening to the public, with guided tours, of the **Colina de los Chopos Observatory** at the Physics Centre Miguel A. Catalán.

- Access to CSIC's documentary heritage. The portal of digitised heritage collections of the CSIC libraries and archives, **SIMURG**, has incorporated 23 digitisation projects. The collection amounts to **63,511 digitised and accessible documents in the public domain**, featuring in particular the launch of the *Espacio Cajal* (Cajal Space).



Opening ceremony of the Observatory.

- Celebration of the **2nd Conference on Scientific Culture and Citizen Science** at the CSIC Campus in Madrid that gathered 160 people from various institutes.

- Award for the Best didactic work *Oceánicas: pioneras de la oceanografía 2* (*Oceanicas: pioneers of oceanography 2*) to the CSIC Publishing House awarded by Editoriales Universitarias Españolas (UNE).

- Presentation of the **first** own book for children and young people. *Oler. Aromas, esencias, olores y pestilencias* (*Smell. Aromas, essences, stench and pestilences*).

Presentation of *Oler. Aromas, esencias, olores y pestilencias*, new collection *Mentes Curiosas, Curiosas Mentes*.



ESSENTIAL OUTREACH EVENTS

Meeting prior to the screening of "20,000 species of bees" at the CSIC entrance.

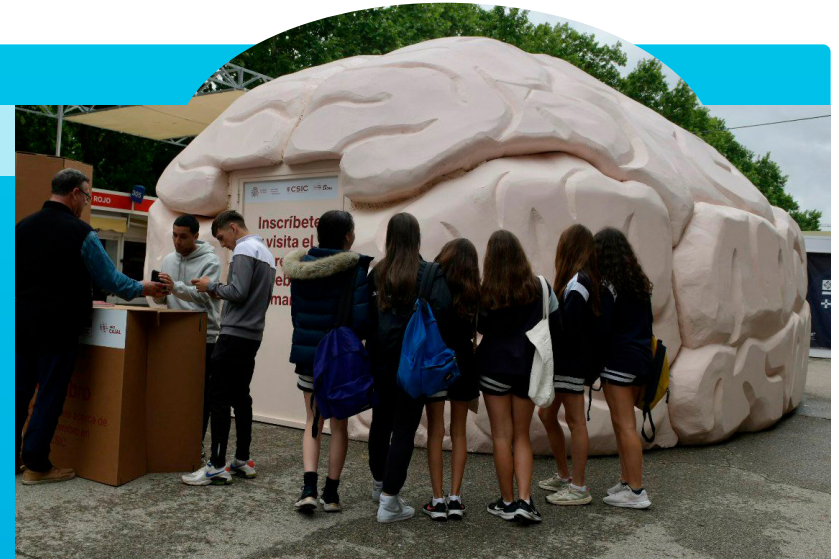


2nd edition of CSIC and Cinema at the CSIC Campus in Madrid. The sessions were introduced by specialised CSIC staff from a scientific perspective.
+ 1,500 attendees.

Celebration of the **European Night of Researchers 2023** with **+ 150** face-to-face and on-line activities.

Science Week 2023:
400 activities organised by 70 research centres in 13 autonomous regions.

Participation of six CSIC institutes in the **MADRID IS SCIENCE Fair**.



Commemorating the Cajal Year the CSIC brings science and a **great immersive brain** to the **Madrid Book Fair** that received **+ 14,000 visits**.

LARGE DISSEMINATION SPACES

Royal Botanical Garden

Presentation of first adapted sensory itinerary, easy to read. The garden through the senses is designed so that any visitor, regardless of their cognitive abilities, can visit its most emblematic spaces.

International Course of Botanical Nomenclature



Oval pond. Terrace of the bonsai trees.

National Museum of Natural Sciences

Reception of the Cajal Legacy, which has become part of the archive, deposited, awaiting a future Cajal Museum.

Digitisation and unification of Natural History collections. Proposal of a roadmap, together with 72 other museums and herbariums around the world, as a tool to face the climate crisis and the loss of biodiversity. Altogether, they guard +1,100 million objects (only 16% of the information is available electronically and 0.2% has genetic information). *Science* 379 (6638), 1192-1194 2023.



Commemoration of the bicentenary of the birth of Alfred Russel Wallace with the exhibition *Biogeography and Evolution* to publicise his legacy, claiming him as one of the leading scientists of the nineteenth century; never before had an exhibition of this magnitude in Europe been organised.



475 guided tours and 87 workshops for primary school students and family audiences.

Geomining Museum

- **Music in the Museum.** Participation in the CSIC X+ activity *Christmas on the air* in which **Tulsa, María Rodés** and **Bronquio** gathered at the Geomining Museum to tell, sing and play their Christmas.



House of Science of Valencia

- **Participation in the Mediterranean Night of Female Researchers-MEDNIGHT 2023.** 5,000 people participated in this great outreach event. In Valencia, the main event was held at Tinglado 2 of the Port thanks to the collaboration of the European Midnight project, with the participation of the CSIC Delegation in the Comunitat Valenciana and the health research foundations Fisabio and INCLIVA.

- **Publicising research to combat 'superbugs'.** Within the framework of the Cicerón programme, the CSIC research staff in the Comunitat Valenciana made their work known to about thirty participants, including representatives of the Valencian public administration, companies such as Microsoft or Pfizer and the media.

House of Science of Sevilla

- **A crucial year for the dissemination of Space.** Presentation of the **World Space Week**, framed within the Space Forum, with a guided tour of the Exhibition GAIA: millions of eyes for 1800 million stars and presentation of the **magazine CSIC Investigates: Space, Towards the understanding of the laws of the universe.**



- **Promoting social inclusion.** Within the **Programme We Are Social** visits were received from entities that work with minors at risk of exclusion or protected by the Junta de Andalucía, gathering people with functional diversity, migrants, refugees and people with mental health problems or addictions, among others, reaching more than a thousand people, free of charge and with personalised attention.

Researchers Residence, Barcelona

- **Researchers' Residence. 25 years at the service of science and society.** On the occasion of the anniversary, the dialogue *Yesterday, today and tomorrow in scientific research*, took place with Dr. Joan Gómez Pallarès, General Director of Research and president of the Consortium, and with the participation of Dr. Andreu Mas-Colell (BIST) and Dr. Marina Villegas (CSIC).
- **Hosting of activities of the City and Science Biennial** that promotes culture, research and science with citizen participation.

Student Residence, Madrid

- **A year marked by centennial celebrations.** Its programming featured physics, due to the centenary of the historic conference on the theories of relativity that **Einstein** taught at the Residence in 1923, and neuroscience, on the occasion of the **Cajal Year**, as well as the centenary of the **Revista de Occidente** and of the death of **Joaquín Sorolla**.



UNIQUE PROJECTS



- The **Science City Project** is already present in 60 locations. With the organisation of **289 activities** and attended by **+ 80,500 people**.

The "Science takes us to the street" event held in Ubrique (Cádiz).

- 8th edition of the lecture series What do we know about? 47 conferences** took place aimed at the general public and students in ten cities, with 2,800 attendees and 59,600 on-line reproductions.

Competitions and contests

- Inauguration of the **exhibition FOTCIENCIA19** that travelled inside and outside Spain and the setting up of **FOTCIENCIA20** with 500 proposals submitted.
- New edition of the **Scientific short story contest Inspiraciencia**, with 341 stories received.



Award of 24 prizes of the Inspiraciencia contest in Oviedo.

- 10th International Prize for Scientific and Nature Illustration Ilustraciencia** with a special category Cajal Year.

II CONCURSO EN REDES SOCIALES

#MicropoemasCSIC2
@CSICdivulga



- 2nd edition of the poetry and science competition #MicropoemasCSIC2** which received 130 proposals.

EDUCATION AND DIDACTICS OF SCIENCE

The CSIC at School

As many as **12 courses** of scientific training were given to around **500 teachers**.

6 "Autonomous Scientific Meetings were held between children, teachers and researchers of the CSIC".



Science in the Neighbourhood

7th edition of Science in the Neighbourhood, the project that reached:

9,700
STUDENTS

The **Science in the Neighbourhood Fair eFair** brought together at the CSIC Madrid Campus:

+800
STUDENTS

Network of collaboration and exchange of personal and professional experiences around science and innovation.



YOU WERE,
YOU WILL BE,
YOU ARE CSIC.

739

**NEW
MEMBERS
IN 2023**

+50%

WOMEN

+50%

**BETWEEN
THE AGES OF
26 AND 55**

IF YOU HAVE BEEN PART OF THE CSIC AT ANY TIME, JOIN THE NETWORK,

!!! BECOME CSIC ALUMNI !!!



ANNEXES

Research institutes / National centres

ACRONYMS	NAME	OWNERSHIP	ADDRESS	P.C.	MUNICIPALITY	PROVINCE	TELEPHONE	WEB	E-MAIL
CAB	Astrobiology Centre	Joint	Ctra. de Ajalvir, Km. 4	28850	Torrejón de Ardoz	Madrid	91 520 64 33	http://www.cab.inta-csic.es	direccion.cab@csic.es
CABD	Andalusian Centre for Developmental Biology	Joint	Ctra. De Utrera Km.1	41013	Sevilla	Sevilla	954 97 79 11	http://www.cabd.es	direccion.cabd@csic.es
CABIMER	Andalusian Centre of Molecular Biology and Regenerative Medicine	Joint	Avda. Américo Vespucio, S/N. Isla de la Cartuja	41092	Sevilla	Sevilla	954 46 80 04	http://www.cabimer.es	direccion.cabimer@csic.es
CAR	Centre for Automation and Robotics	Joint	Ctra. de Campo Real Km 0,200 La Poveda	28500	Arganda del Rey	Madrid	91 871 19 00	https://www.car.upm-csic.es	direccion.car@csic.es
CBM	Severo Ochoa Molecular Biology Centre	Joint	C/ Nicolás Cabrera, 1 Campus Cantoblanco UAM	28049	Madrid	Madrid	91 196 44 01	http://www.cbm.csic.es	direccion.cbm@csic.es
CEAB	Centre for Advanced Studies in Blanes	Own	C/ D'accés a la Cala St. Francesc, 14	17300	Blanes	Girona	972 33 61 01/02	http://www.ceab.csic.es/	direccion.ceab@csic.es
CEBAS	Centre for Edaphology and Applied Biology of the Segura Region	Own	Campus Universitario de Espinardo	30100	Murcia	Murcia	968 39 62 00	http://www.cebas.csic.es/	direccion.cebas@csic.es
CENIM	National Metallurgical Research Centre	Own	Avda. Gregorio del Amo Num.8	28040	Madrid	Madrid	91 553 89 00	http://www.cenim.csic.es/	direccion.cenim@csic.es
CFM	Materials Physics Centre	Joint	Pº Manuel de Lardizabal, 5	20018	Donostia-San Sebastián	Guipúzcoa	943 01 87 86	http://cfm.ehu.es/	direccion.cfm@csic.es
CIAL	Food Science Research Institute	Joint	C/ Nicolás Cabrera, 9. Campus de Cantoblanco	28049	Madrid	Madrid	91 001 79 00	http://www.cial.uam-csic.es/	direccion.cial@csic.es
CIB	Margarita Salas Biological Research Centre	Own	C/ Ramiro de Maeztu, 9	28040	Madrid	Madrid	91 837 31 12	http://www.cib.csic.es/	direccion.cib@csic.es
CIDE	Desertification Research Centre	Joint	Ctra. Moncada - Naquera, Km. 4,5	46113	Moncada	Valencia / València	96 342 41 62	http://www.uv.es/cide/	direccion.cide@csic.es
CINC	Cajal International Neuroscience Centre	Own			Alcalá de Henares	Madrid		https://www.cinc.csic.es/es/	
CINN	Nanomaterials and Nanotechnology Research Centre	Joint	Avda. de la Vega 4-6. El Entrego	33940	San Martín del Rey Aurelio	Asturias	985 73 36 44	https://cinn.es	direccion.cinn@csic.es
CNB	National Biotechnology Centre	Own	C/ Darwin, 3. Campus Cantoblanco UAM	28049	Madrid	Madrid	91 585 45 00	http://www.cnb.csic.es/	direccion.cnb@csic.es
CRAG	Agrigenomics Research Centre	Associated	Campus de la Universidad Autònoma de Barcelona. C/ de La Vall Moronta, Edifici Crag.	8193	Cerdanyola del Vallès	Barcelona	93 400 61 00/02	https://www.cragenomica.es	direccion.crag@csic.es
CREAF	Centre for Ecological Research and Forestry Applications	Joint	Edificio C Campus Universidad Autònoma de Barcelona (Bellaterra)	8193	Cerdanyola del Vallès	Barcelona	93 581 13 12	https://www.creaf.es	direccion.creaf@csic.es
EBD	Doñana Biological Station	Own	Avda. Américo Vespucio Nº 26. Isla de La Cartuja	41092	Sevilla	Sevilla	954 23 23 40/95 446 67 00	http://www.ebd.csic.es/	direccion.ebd@csic.es
EEA	School of Arab Studies	Own	Cuesta del Chapiz, 22	18010	Granada	Granada	958 22 22 90/34 59	http://www.eea.csic.es/	direccion.eea@csic.es
EEAD	Aula Dei Experimental Station	Own	Avda. Montañana, 1005	50059	Zaragoza	Zaragoza	976 71 61 00	http://www.eead.csic.es/	direccion.eead@csic.es

ACRONYMS	NAME	OWNERSHIP	ADDRESS	P.C.	MUNICIPALITY	PROVINCE	TELEPHONE	WEB	E-MAIL
EEHAR	Spanish School of History and Archaeology	Own	Vía di Santa Eufemia, 13	187	Roma	No Consta	+00 (39) 06 68 10 00 01	http://www.eehar.csic.es	direccion.eehar@csic.es
EEZ	Zaidín Experimental Station	Own	C/ Profesor Albareda, 1	18008	Granada	Granada	958 18 16 00	http://www.eez.csic.es/	direccion.eez@csic.es
EEZA	Experimental Station of Arid Zones	Own	Ctra. de Sacramento S/N	4120	La Cañada de San Urbano	Almería	950 28 10 45	http://www.eeza.csic.es/	direccion.eeza@csic.es
GEO3BCN	Geosciences Barcelona	Own	C/ Luis Sole i Sabaris, S/N	8028	Barcelona	Barcelona	93 409 54 10	https://geo3bcn.csic.es	direccion.geo3bcn@csic.es
I2SYSBIO	Institute of Integrative Systems Biology	Joint	C/ Catedrático José Beltrán, 2	46980	Paterna	Valencia / València	963 544 810 / 963 544 782	https://www.uv.es/	direccion.i2sysbio@csic.es
I3M	Institute of Instrumentation for Molecular Imaging	Joint	Camino de Vera S/N Edificio 8B Acceso N, 1ª Planta	46022	Valencia	Valencia / València	96 387 99 07	https://www.i3m.upv.es	direccion.i3m@csic.es
IAA	Institute of Astrophysics of Andalusia	Own	Glorieta de la Astronomía S/N	18008	Granada	Granada	958 12 13 11	http://www.iaa.csic.es	direccion.iaa@csic.es
IACT	Andalusian Institute of Earth Sciences	Joint	Avenida de Las Palmeras Nº 4	18100	Armillá	Granada	958 23 00 00	https://www.iact.ugr-csic.es/	direccion.iact@csic.es
IAE	Institute of Economic Analysis	Own	Campus Universidad Autónoma de Barcelona (Bellaterra)	8193	Cerdanyola del Vallès	Barcelona	93 580 66 12	http://www.iae.csic.es/	direccion.iae@csic.es
IAM	Institute of Archaeology-Merida	Joint	Plaza de España, 15	6800	Mérida	Badajoz	924 31 56 61	http://www.iam.csic.es	direccion.iam@csic.es
IAS	Institute of Sustainable Agriculture	Own	Alameda del Obispo, S/N	14004	Córdoba	Córdoba	957 49 92 00/01 02	http://www.ias.csic.es/	direccion.ias@csic.es
IATA	Institute of Agrochemistry and Food Technology	Own	Avda. Catedrático Agustín Escardino Benlloch, 7	46980	Paterna	Valencia / València	96 390 00 22	http://www.iata.csic.es/	direccion.iata@csic.es
IATS	Institute of Aquaculture Torre de la Sal	Own	C/ Torre de la Sal, S/N	12595	Cabanes	Castellón / Castelló de La Plana	964 31 95 00	http://www.iats.csic.es/	direccion.iats@csic.es
IBB	Botanical Institute of Barcelona	Joint	Passeig Migdia, S/N. Parque de Montjuic	8038	Barcelona	Barcelona	93 289 06 11	https://www.ibb.csic.es/es/	direccion.ibb@csic.es
IBBTEC	Institute of Biomedicine and Biotechnology of Cantabria	Joint	C/Albert Einstein, 22. Parque Científico y Tecnológico de Cantabria	39011	Santander	Cantabria	942 20 39 30	https://web.unican.es/ibbttec/es-es	direccion.ibbttec@csic.es
IBE	Institute of Evolutionary Biology	Joint	Passeig Marítim de la Barceloneta, 37	8003	Barcelona	Barcelona	93 230 95 07	http://www.ibe.upf-csic.es	direccion.ibe@csic.es
IBF	Biophysics Institute	Joint	Parque Científico de la Upv/ Ehu, Barrio de Sarriena S/N	48940	Leioa	Vizcaya	94 601 26 25	http://biofisika.org	direccion.ibf@csic.es
IBFG	Institute of Functional Biology and Genomics	Joint	Zacarias González, 2	37007	Salamanca	Salamanca	923 29 49 00	http://ibfg.usal-csic.es	direccion.ibfg@csic.es
IBGM	Institute of Molecular Biology and Genetics	Joint	C/ Sanz y Fores, S/N	47003	Valladolid	Valladolid	983 18 48 01	http://www.ibgm.med.uva.es/	direccion.ibgm@csic.es
IBIS	Seville Institute of Biomedicine	Joint	Avda. Manuel Siurot S/N Campus del Hospital Universitario Virgen del Rocío	41013	Sevilla	Sevilla	95 592 30 00	http://www.ibis-sevilla.es	direccion.ibis@csic.es
IBMB	Barcelona Institute of Molecular Biology	Own	C/ Baldiri Reixac, 4	8028	Barcelona	Barcelona	93 403 46 68	http://www.ibmb.csic.es/	direccion.ibmb@csic.es
IBMCC	Institute of Molecular and Cellular Biology of Cancer of Salamanca	Joint	Campus Miguel de Unamuno	37007	Salamanca	Salamanca	923 29 47 20	http://www.cicancer.org/	direccion.ibmcc@csic.es

ACRONYMS	NAME	OWNERSHIP	ADDRESS	P.C.	MUNICIPALITY	PROVINCE	TELEPHONE	WEB	E-MAIL
IBMCP	Primo Yufera Institute of Molecular and Cellular Biology of Plants	Joint	Ingeniero Fausto Elio, S/N. UPV-Ciudad Politécnica de la Innovación	46022	Valencia	Valencia / València	96 387 78 56	http://www.ibmcp.csic.es	direccion.ibmcp@csic.es
IBV	Institute of Biomedicine of Valencia	Own	C/ Jaime Roig, 11	46010	Valencia	Valencia / València	96 339 17 60	http://www.ibv.csic.es	direccion.ibv@csic.es
IBVF	Institute of Plant Biochemistry and Photosynthesis	Joint	Avda. Américo Vespucio, S/N. Isla de La Cartuja	41092	Sevilla	Sevilla	95 448 95 06	https://www.ibvf.us-csic.es	direccion.ibvf@csic.es
IC	Cajal Institute	Own	Avda. Doctor Arce, 37	28002	Madrid	Madrid	91 585 47 49/50	http://www.cajal.csic.es/	direccion.ic@csic.es
ICA	Institute of Agricultural Sciences	Own	C/ Serrano, 115 Bis	28006	Madrid	Madrid	91 745 25 00	http://www.ica.csic.es/	direccion.ica@csic.es
ICB	Institute of Carbochemistry	Own	C/ Miguel Luesma Castan, 4	50015	Zaragoza	Zaragoza	976 73 39 77	http://www.icb.csic.es/	direccion.icb@csic.es
ICE	Institute of Space Sciences	Own	Carrer de Can Magrans S/N, Campus Universidad Autónoma de Barcelona (Bellaterra)	8193	Cerdanyola del Vallès	Barcelona	93 737 97 88	http://www.ice.csic.es	direccion.ice@csic.es
ICM	Institute of Marine Sciences	Own	Passeig Marítim, 37-49	8003	Barcelona	Barcelona	93 230 95 00	https://www.icm.csic.es/es	direccion.icm@csic.es
ICMAB	Materials Science Institute of Barcelona	Own	Campus Universidad Autónoma de Barcelona (Bellaterra)	8193	Cerdanyola del Vallès	Barcelona	93 580 18 53	http://www.icmab.csic.es	direccion.icmab@csic.es
ICMAN	Andalusian Institute of Marine Sciences	Own	Campus Río San Pedro	11519	Puerto Real	Cádiz	956 83 26 12	http://www.icman.csic.es/	direccion.icman@csic.es
ICMAT	Institute of Mathematical Sciences	Joint	C/ Nicolás Cabrera, 13-15 Campus Cantoblanco UAM	28049	Madrid	Madrid	91 29 99 704	http://www.icmat.es	direccion.icmat@csic.es
ICMM	Materials Science Institute of Madrid	Own	C/ Sor Juana Inés de la Cruz, 3. Campus Cantoblanco UAM	28049	Madrid	Madrid	91 334 90 00	http://www.icmm.csic.es/	direccion.icmm@csic.es
ICMS	Materials Science Institute of Seville	Joint	Avda. Américo Vespucio, S/N. Isla de La Cartuja	41092	Sevilla	Sevilla	95 448 95 27	http://www.icms.us-csic.es	direccion.icms@csic.es
ICN2	Centre for Research in Nanoscience and Nanotechnology	Associated	Campus Universidad Autónoma de Barcelona (Bellaterra)	8193	Cerdanyola del Vallès	Barcelona	93 737 26 49	https://icn2.cat/en/	
ICP	Institute of Catalysis and Petrochemistry	Own	C/ Marie Curie, 2 Campus de Cantoblanco	28049	Madrid	Madrid	91 585 48 00	https://icp.csic.es	direccion.icp@csic.es
ICTAN	Institute of Food Science and Technology and Nutrition	Own	C/ José Antonio Novais, 10	28040	Madrid	Madrid	91 549 23 00	http://www.ictan.csic.es	direccion.ictan@csic.es
ICTP	Institute of Polymer Science and Technology	Own	C/ Juan de la Cierva, 3	28006	Madrid	Madrid	91 562 29 00	http://www.ictp.csic.es/	direccion.ictp@csic.es
ICV	Institute of Ceramics and Glass	Own	C/ Kelsen, 5. Campus de Cantoblanco	28049	Madrid	Madrid	91 735 58 40	https://www.icv.csic.es	direccion.icv@csic.es
ICVV	Institute of Vine and Wine Science	Joint	Apdo. Postal Nº 1.042. 26080 Logroño. Finca La Grajera. Ctra. de Burgos Km. 6 (Lo-20, Salida 13)	26007	Logroño	Rioja (La)	941 89 49 80	https://www.icvv.es	direccion.icvv@csic.es
IDAB	Institute of Agrobiotechnology	Joint	Avda. de Pamplona, 123 Mutilva	31192	Aranguren	Navarra	948 16 80 00	https://www.idab.csic.es/	direccion.idab@csic.es
IDAIA	Institute for Environmental Diagnostics and Water Studies	Own	C/ Jorge Girona Salgado, 18-26	8034	Barcelona	Barcelona	93 400 61 00	http://www.idaea.csic.es	direccion.idaea@csic.es

ACRONYMS	NAME	OWNERSHIP	ADDRESS	P.C.	MUNICIPALITY	PROVINCE	TELEPHONE	WEB	E-MAIL
IEGD	Institute of Economics, Geography and Demography	Own	C/ Albasanz, 26-28. 3ª Modulo F	28037	Madrid	Madrid	91 602 23 00	http://www.iegd.csic.es/	direccion.iegd@csic.es
IEGPS	Institute of Galician Studies Padre Sarmiento	Joint	Rua de San Roque, 2	15704	Santiago de Compostela	Coruña (A)	981 54 02 20/23	http://www.iegps.csic.es/	direccion.iegps@csic.es
IEM	Institute for the Structure of Matter	Own	C/ Serrano, 113bis, 119, 121 y 123	28006	Madrid	Madrid	91 561 68 00	http://www.iem.csic.es	direccion.iem@csic.es
IEO	Spanish Institute of Oceanography	Own	C/ del Corazón de María, 8	28002	Madrid	Madrid	913421100	https://www.ieo.es/es/	director@ieo.csic.es
COAC-IEO	A Coruna Oceanographic Centre	Own	Pº Marítimo Alcalde Francisco Vázquez, 10	15001	Coruña (A)	Coruña (A)	981 21 81 51	https://www.ieo.es/es/web/coruna/	ieo.coruna@ieo.csic.es
COB-IEO	Balearic Islands Oceanographic Centre	Own	Muelle de Poniente, S/N.	7015	Palma de Mallorca	Balears (Illes)	971 133 720	http://www.ieo.es/baleares	cob@ieo.csic.es
COC-IEO	Canary Island Oceanographic Centre	Own	La Farola del Mar 22, Dársena Pesquera 1. Parcela 8	38180	Santa Cruz de Tenerife	Sta. Cruz de Tenerife	922 549 400	https://www.ieo.es/es/web/canarias/	ieo.canarias@ieo.csic.es
COCAD-IEO	Cadiz Oceanographic Centre	Own	Puerto Pesquero, Muelle de Levante, S/N.	11006	Cádiz	Cádiz	956 294 189	https://www.ieo.es/es/web/cadiz/	contacto.cadiz@ieo.es
COG-IEO	Gijon Oceanographic Centre	Own	Avda. Príncipe de Asturias, 70 Bis	33212	Gijón	Asturias	985 309 780	http://www.ieo.es/gijon	ieogijon@ieo.csic.es
COMA-IEO	Malaga Oceanographic Centre	Own	Puerto Pesquero, S/N.	29640	Fuengirola	Málaga	95 2197124	http://www.ieo.es/malaga	ieomalaga@ieo.csic.es
COMU-IEO	Murcia Oceanographic Centre	Own	Varadero, 1. Lo Pagan	30740	San Pedro del Pinatar	Murcia	968 179 410	http://www.ieo.es/murcia	comurcia@ieo.es
COST-IEO	Santander Oceanographic Centre	Own	Promontorio de San Martín S/N.	39080	Santander	Cantabria	942 291 716	http://www.ieo.es/santander	ieosantander@ieo.csic.es
COV-IEO	Vigo Oceanographic Centre	Own	Subida a Radio Faro, 50-52	36390	Vigo	Pontevedra	986 492 111	http://www.ieo.es/vigo	ieo.vigo@ieo.csic.es
IESA	Institute of Advanced Social Studies	Own	Pz. Campo Santo de los Mártires, 7	14004	Córdoba	Córdoba	957 76 06 25/27	http://www.iesa.csic.es	direccion.iesa@csic.es
IETCC	Eduardo Torroja Institute of Construction Sciences	Own	C/ Serrano Galvache, 4	28033	Madrid	Madrid	91 302 04 40	http://www.ietcc.csic.es/	direccion.ietcc@csic.es
IFCA	Physics Institute of Cantabria	Joint	Edificio Juan Jordá. Avda. de los Castros S/N	39005	Santander	Cantabria	942 20 14 59	https://ifca.unican.es	direccion.ifca@csic.es
IFF	Institute of Fundamental Physics	Own	C/ Serrano, 113bis y 123	28006	Madrid	Madrid	91 561 68 00/ 590 16 19	http://www.iff.csic.es/	direccion.iff@csic.es
IFIC	Institute of Corpuscular Physics	Joint	C/ Catedrático José Beltrán Martínez, 2	46980	Paterna	Valencia / València	96 354 34 73	http://ific.uv.es/	direccion.ific@csic.es
IFISC	Institute of Interdisciplinary Physics and Complex Systems	Joint	Campus Universitat Illes Balears	7122	Palma de Mallorca	Balears (Illes)	971 17 32 90	http://ifisc.uib-csic.es	direccion.ifisc@csic.es
IFS	Institute of Philosophy	Own	C/ Albasanz, 26-28. 3ª Modulo C	28037	Madrid	Madrid	91 602 23 00	https://ifs.csic.es/es	direccion.ifs@csic.es
IFT	Institute of Theoretical Physics	Joint	C/ Nicolás Cabrera, 13-15 Campus Cantoblanco UAM	28049	Madrid	Madrid	91 299 98 00/02	http://www.ift.uam-csic.es	direccion.ift@csic.es
IG	Institute of Fat	Own	Universidad Pablo de Olavide Edificio 46 Ctra. de Utrera Km 1	41013	Sevilla	Sevilla	954 61 15 50	https://www.ig.csic.es/es/	direccion.ig@csic.es
IGEO	Institute of Geosciences	Joint	C/ Severo Ochoa 7, 4ª Planta	28040	Madrid	Madrid	91 394 48 13	http://www.igeo.ucm-csic.es/	direccion.igeo@csic.es

ACRONYMS	NAME	OWNERSHIP	ADDRESS	P.C.	MUNICIPALITY	PROVINCE	TELEPHONE	WEB	E-MAIL
IGM	Institute of Mountain Livestock	Joint	Ctra. León-Vega de Infanzones (Finca Marzanas-Grulleros)	24346	Vega de Infanzones	León	987 31 70 64 / 71 56	http://www.igm.ule-csic.es/	direccion.igm@csic.es
IGME	Geological and Mining Institute of Spain	Own	C/ Ríos Rosas, 23	28003	Madrid	Madrid	913495700	http://www.igme.es/	direccion.igme@csic.es
	Almería Territorial Unit		Ctra. de Sacramento, s/n La Cañada de San Urbano	4120	Almería	Almería	950 281 045		almeria@igme.es
	Córdoba-Peñarroya Territorial Unit		Ctra. Estación, s/n Polígono LA PAPELERA	14200	Peñarroya	Córdoba	957 562 511		litoteca@igme.es
	Granada Territorial Unit		Urb. Alcázar del Genil, 4 Edif. Zulema, Bajo y 1ºC	18006	Granada	Granada	958 183 143		granada@igme.es
	Las Palmas de Gran Canaria Territorial Unit		C/ Alonso Alvarado, 43 - 2ºA	35003	Las Palmas de Gran Canaria	Las Palmas de Gran Canaria	928 366 575 - 928 381 046		canarias@igme.es
	León Territorial Unit		Parque Científico de León Avda. Real, 1. Edificio 1	24006	León	León	987 262 171 - 987 262 182		leon@igme.es
	Murcia Territorial Unit		Avda. Miguel de Cervantes, 45 – 5º A Edificio Expo Murcia	30009	Murcia	Murcia	968 245 012		murcia@igme.es
	Oviedo Territorial Unit		C/ Matemático Pedrayes, 25	33005	Oviedo	Oviedo	985 258 611 - 985 258 656		oviedo@igme.es
	Palma de Mallorca Territorial Unit		Administración Periférica del Estado Carrer de Felicià Fuster, 7	7006	Palma de Mallorca	Palma de Mallorca	971 467 020 - 971 460 011		mallorca@igme.es
	Salamanca Territorial Unit		Plaza de la Constitución, 1 - Planta 3ª	37001	Salamanca	Salamanca	923 265 009		salamanca@igme.es
	Seville Territorial Unit		Subdelegación de Gobierno Pza. de España - Torre Norte	41013	Sevilla	Sevilla	954 236 611 - 954 236 677		sevilla@igme.es
	Valencia Territorial Unit		C/ Cirilo Amorós, 42 – Entreplanta	46004	Valencia	Valencia	963 943 474		valencia@igme.es
	Territorial Unit Zaragoza		Residencia CSIC Campus Aula Dei Av. Montañana 1005	50059	Zaragoza	Zaragoza	976 555 153 - 976 555 282		zaragoza@igme.es
IH	Institute of History	Own	C/ Albasanz, 26-28 - 2ª Planta	28037	Madrid	Madrid	91 602 23 00	https://ih.csic.es/es	direccion.ih@csic.es
IHSM	Institute of Subtropical and Mediterranean Horticulture La Mayora	Joint	Algarrobo-Costa	29750	Algarrobo	Málaga	95 254 89 90	http://www.ihsm.uma-csic.es/	direccion.ihsm@csic.es
IIBB	Biomedical Research Institute of Barcelona	Own	C/ Rosellón, 161. 6 y 7 Planta	8036	Barcelona	Barcelona	93 363 83 00/25	http://www.iibb.csic.es	direccion.iibb@csic.es
IIBM	Alberto Sols Biomedical Research Institute	Joint	C/ Arturo Duperier, 4	28029	Madrid	Madrid	91 585 44 00/43 95/94	http://www.iib.csic.es	direccion.iibm@csic.es
IIIA	Artificial Intelligence Research Institute	Own	Campus Universidad Autónoma de Barcelona (Bellaterra)	8193	Cerdanyola del Vallès	Barcelona	93 580 95 70	http://www.iiia.csic.es/	direccion.iiia@csic.es
IIM	Marine Research Institute	Own	C/ Eduardo Cabello, 6	36208	Vigo	Pontevedra	986 23 19 30	http://www.iim.csic.es/	direccion.iim@csic.es
IIQ	Institute for Chemical Research	Joint	Avda. Américo Vespucio, 49. Isla de La Cartuja	41092	Sevilla	Sevilla	95 448 95 53	http://www.iiq.csic.es	direccion.iiq@csic.es

ACRONYMS	NAME	OWNERSHIP	ADDRESS	P.C.	MUNICIPALITY	PROVINCE	TELEPHONE	WEB	E-MAIL
ILC	Institute for Languages and Cultures of the Mediterranean and the Near East	Own	C/ Albasanz, 26-28 - 1ª Planta	28037	Madrid	Madrid	91 602 23 00	https://ilc.csic.es/es	direccion.ilc@csic.es
ILLA	Institute of Language, Literature and Anthropology	Own	C/ Albasanz, 26-28 - 1ª Planta	28037	Madrid	Madrid	91 602 23 00	https://illa.csic.es/es	direccion.illa@csic.es
IMB-CNM	Barcelona Institute of Microelectronics	Own	Campus Universidad Autónoma de Barcelona (Bellaterra)	8193	Cerdanyola del Vallès	Barcelona	93 594 77 00	http://www.imb-cnm.csic.es	direccion.imb-cnm@csic.es
IMEDEA	Mediterranean Institute for Advanced Studies	Joint	C/ Miquel Marqués, Nº 21	7190	Esportles	Balears (Illes)	971 61 18 18	http://www.imedeaiuib-csic.es	direccion.imedeaiuib@csic.es
IMF	Mila y Fontanals Humanities Research Institution	Own	C/ Egipcíacas, 15	8001	Barcelona	Barcelona	93 442 34 89	http://www.imf.csic.es/	direccion.imf@csic.es
IMIB	Joint Institute for Biodiversity Research	Joint	C/ Gonzalo Gutiérrez Quirós 1	33600	Mieres	Asturias	985 10 30 00	https://www.uniovi.es/IMIB/	direccion.imib@csic.es
IMN-CNM	Institute of Micro and Nanotechnology	Own	C/ Isaac Newton, 8	28760	Tres Cantos	Madrid	91 806 07 00	http://www.imn-cnm.csic.es	direccion.imn-cnm@csic.es
IMSE,CNM	Seville Microelectronics Institute	Joint	Avda. Américo Vespucio, Nº 28. Isla de La Cartuja	41092	Sevilla	Sevilla	95 446 66 66	http://www.imse-cnm.csic.es	direccion.imse-cnm@csic.es
IN	Institute of Neurosciences	Joint	Avda. D. Santiago Ramón y Cajal S/N	3550	Sant Joan D'Alacant	Alicante / Alacant	96 523 37 00	https://in.umh-csic.es/es/	direccion.in@csic.es
INCAR	Institute for Carbon Science and Technology	Own	C/ Francisco Pintado Fe, 26	33011	Oviedo	Asturias	98 511 90 90	http://www.incar.csic.es/	direccion.incar@csic.es
INCIPIIT	Institute for Heritage Sciences	Own	Avda. de Vigo S/N	15705	Santiago de Compostela	Coruña (A)	981 590 962	www.incipit.csic.es	direccion.incipit@csic.es
INGENIO	Institute for Innovation and Knowledge Management	Joint	Campus Upv. Camino de Vera S/N Edificio 8E	46022	Valencia	Valencia / València	96 387 70 48	http://www.ingenio.upv.es/	direccion.ingenio@csic.es
INIA	National Institute of Agricultural and Food Research and Technology	Own	Ctra. de La Coruña, Km 7,5	28040	Madrid	Madrid	913473900	http://www.inia.es/	direccion.inia.csic.es
CBGP-INIA	Plant Biotechnology and Genomics Centre	Joint	Parque Científico y Tecnológico, UPM Campus de Montegancedo, Ctra. M-40, Km 38	28233	Pozuelo de Alarcón	Madrid	913364539	https://www.cbgp.upm.es	direccion.cbgp@upm.es
CISA-INIA	Animal Health Research Centre	Own	Carretera Algete-El Casar de Talamanca, Km. 8,1	28130	Valdeolmos	Madrid	916 20 23 00	https://www.inia.es/	seccifor@inia.es
ICIFOR-INIA	Institute of Forestry Sciences	Own	Ctra. de La Coruña Km. 7	28040	Madrid	Madrid	91 347 6780	https://www.inia.es/	
INMA	Institute of Nanoscience and Materials of Aragon	Joint	Facultad de Ciencias. C/Pedro Cerbuna, 12	50009	Zaragoza	Zaragoza	976 76 28 61	https://inma.unizar-csic.es/	direccion.inma@csic.es
IO	Daza de Valdes Optics Institute	Own	C/ Serrano, 121	28006	Madrid	Madrid	91 561 68 00	http://www.io.csic.es	direccion.io@csic.es
IPBLN	Lopez Neyra Institute of Parasitology and Biomedicine	Own	Avd. del Conocimiento, S/N	18100	Armillá	Granada	958 18 16 21/28/26	https://www.ipb.csic.es/	direccion.ipbln@csic.es
IPE	Pyrenean Institute of Ecology	Own	Avd. Montañana, S/N	50016	Zaragoza	Zaragoza	976 36 93 93	http://www.ipe.csic.es/	direccion.ipe@csic.es
IPLA	Institute of Dairy Products of Asturias	Own	Pº Río Linares S/N	33300	Villaviciosa	Asturias	98 589 21 31	http://www.ipla.csic.es/	direccion.ipla@csic.es
IPNA	Institute of Natural Products and Agrobiology	Own	Avda. Astrofísico Francisco Sánchez, 3	38205	San Cristóbal de La Laguna	Sta. Cruz de Tenerife	922 25 21 44/32 48	http://www.ipna.csic.es/	direccion.ipna@csic.es

ACRONYMS	NAME	OWNERSHIP	ADDRESS	P.C.	MUNICIPALITY	PROVINCE	TELEPHONE	WEB	E-MAIL
IPP	Institute of Public Goods and Policies	Own	C/ Albasanz, 26-28, 3ª Modulo D	28037	Madrid	Madrid	91 602 23 00	https://ipp.csic.es/es	direccion.ipp@csic.es
IQAC	Institute of Advanced Chemistry of Catalonia	Own	C/ Jorge Girona Salgado, 18-26	8034	Barcelona	Barcelona	93 400 61 00/02	http://www.iqac.csic.es	direccion.iqac@csic.es
IQFR	Institute of Physical Chemistry Rocasolano	Own	C/ Serrano, 119	28006	Madrid	Madrid	91 561 94 00 / 91 585 52 47/49	http://www.iqfr.csic.es/	direccion.iqfr@csic.es
IQM	Institute of Medicinal Chemistry	Own	C/ Juan de la Cierva, 3	28006	Madrid	Madrid	91 562 29 00	http://www.iqm.csic.es/	direccion.iqm@csic.es
IQOG	Institute of General Organic Chemistry	Own	C/ Juan de la Cierva, 3	28006	Madrid	Madrid	91 562 29 00	http://www.iqog.csic.es	direccion.iqog@csic.es
IREC	Hunting Resources Research Institute	Joint	Ronda de Toledo, S/N	13005	Ciudad Real	Ciudad Real	926 29 54 50	https://www.irec.es	direccion.irec@csic.es
IRII	Institute of Robotics and Industrial Informatics	Joint	C/ Llorens i Artigues, 4-6, 2º - Edificio U	8028	Barcelona	Barcelona	93 401 57 51	https://www.iri.upc.edu	direccion.iri@csic.es
IRNAS	Institute of Natural Resources and Agrobiology of Seville	Own	Avda. Reina Mercedes, 10	41012	Sevilla	Sevilla	95 462 47 11	https://www.irnas.csic.es	direccion.irnas@csic.es
IRNASA	Institute for Natural Resources and Agrobiology of Salamanca	Own	C/ Cordel de Merinas, 42-54	37008	Salamanca	Salamanca	923 21 96 06	http://www.irnasa.csic.es/	direccion.irnasa@csic.es
ISQCH	Institute of Chemical Synthesis and Homogeneous Catalysis	Joint	Facultad de Ciencias. C/ Pedro Cerbuna, 12. 50009 Zaragoza	50009	Zaragoza	Zaragoza	976 76 12 31/10 00	http://www.isqch.unizar-csic.es	direccion.isqch@csic.es
ITEFI	Leonardo Torres Quevedo Institute of Physical and Information Technologies	Own	C/ Serrano, 144	28006	Madrid	Madrid	91 561 88 06	http://www.itefi.csic.es/es	direccion.itefi@csic.es
ITQ	Institute of Chemical Technology	Joint	Campus Upv. Avda. de Los Naranjos S/N. Edificio 6c	46022	Valencia	Valencia / València	96 387 78 00	http://itq.upv-csic.es/	direccion.itq@csic.es
MBG	Biological Mission of Galicia	Own	Palacio de Salcedo. Carballeira, 8 (Salcedo)	36143	Pontevedra	Pontevedra	986 85 48 00	http://www.mbg.csic.es/	direccion.mbg@csic.es
MNCN	National Museum of Natural Sciences	Own	C/ José Gutiérrez Abascal, 2	28006	Madrid	Madrid	91 411 13 28	http://www.mncn.csic.es/	direccion.mncn@csic.es
OE	Ebro Observatory	Joint	C/ Horta Alta, 38	43520	Roquetes	Tarragona	977 50 05 11	http://www.obsebre.es	direccion.oe@csic.es
RJB	Royal Botanical Garden	Own	Plaza de Murillo, 2	28014	Madrid	Madrid	91 420 30 17	http://www.rjb.csic.es/	direccion.rjb@csic.es

Service Integration Centres

ACRONYMS	NAME	OWNERSHIP	ADDRESS	P.C.	MUNICIPALITY	PROVINCE	TELEPHONE	WEB	E-MAIL
CCHS	Centre for Human and Social Sciences	Own	C/ Albasanz, 26-28 Planta Baja	28037	Madrid	Madrid	91 602 23 00	http://www.cchs.csic.es/	direccion.cchs@csic.es
CENQUIOR	Lora Tamayo Organic Chemistry Centre	Own	C/ Juan de La Cierva, 3	28006	Madrid	Madrid	91 562 29 00	http://www.cenquior.csic.es/	direccion.cenquior@csic.es
CEQMA	Aragon Chemistry and Materials Centre	Joint	Facultad de Ciencias. C/ Pedro Cerbuna, 12. 50009 Zaragoza		Zaragoza	Zaragoza	976 76 12 31 / 10 00		direccion.ceqma@csic.es
CFMAC	Miguel A. Catalan Physics Centre	Own	C/ Serrano, 121	28006	Madrid	Madrid	91 561 68 00	http://www.cfmac.csic.es/	direccion.cfmac@csic.es
CFTMAT	Centre for Theoretical Physics and Mathematics	Joint	C/ Nicolás Cabrera 13-15 - Campus Cantoblanco UAM	28049	Madrid	Madrid		https://www.ift.uam-csic.es/	direccion.cftmat@csic.es
CI2A	Alcala Interdisciplinary Research Centre	Propio			Alcalá de Henares	Madrid			
CICCARTUJA	Isla de La Cartuja Scientific Research Centre	Joint	Avda. Américo Vespucio, S/N. Isla de La Cartuja	41092	Sevilla	Sevilla	954 48 95 01	http://www.ciccartuja.es/	direccion.cicic@csic.es
CID	Centre for Research and Development Pascual Vila	Own	C/ Jorge Girona Salgado, 18-26	8034	Barcelona	Barcelona	93 400 61 00	http://www.cid.csic.es/	direccion.cid@csic.es
CMIMA	Mediterranean Marine and Environmental Research Centre	Own	Passeig Maritim, 37-49	8003	Barcelona	Barcelona	93 230 95 00	http://www.cmima.csic.es/	icmdir@icm.csic.es

Specialised Technical Units

ACRONYMS	NAME	OWNERSHIP	ADDRESS	P.C.	MUNICIPALITY	PROVINCE	TELEPHONE	WEB	E-MAIL
CNA	National Accelerator Centre	Joint	C/ Tomás Alba Edison, 7 Isla de Cartuja	41092	Sevilla	Sevilla	954 46 05 53	http://www.centro.us.es/cna	direccion.cna@csic.es
CRF	Centre for Plant Genetic Resources and Sustainable Agriculture	Own	Autovía A-II, Km 36 Finca La Canaleja	28800	Alcalá de Henares	Madrid	918819261	https://www.inia.es/	seccrf@inia.es
REBIS	Seville Researcher Residence and Library	Own	C/ Alfonso Xii, 16	41002	Sevilla	Sevilla	954690110	https://www.rebis.csic.es	gerencia.rebis@csic.es
UTM	Marine Technology Unit	Own	Passeig Maritim, 37-49	8003	Barcelona	Barcelona	93 230 95 00	http://www.utm.csic.es	direccion.utm@csic.es

Distribution by autonomous region



ANDALUCÍA

INSTITUTES: **11** Own **9** Joint

DELEGATION **1** | SERVICES INTEGRATION CENTRES **1** | SPECIALISED TECHNICAL UNITS **2** | IEO OCEANOGRAPHICS CENTRES **2** | IGME TERRITORIAL UNITS **4**

ACRONYM	NAME	TYPE	OWNER.
CABD	Andalusian Centre for Developmental Biology	Research Institute	Joint
CABIMER	Andalusian Centre of Molecular Biology and Regenerative Medicine	Research Institute	Joint
EBD	Doñana Biological Station	Research Institute	Own
EEA	School of Arab Studies	Research Institute	Own
EEZ	Zaidín Experimental Station	Research Institute	Own
EEZA	Experimental Station of Arid Zones	Research Institute	Own
IAA	Institute of Astrophysics of Andalusia	Research Institute	Own
IACT	Andalusian Institute of Earth Sciences	Research Institute	Joint
IAS	Institute of Sustainable Agriculture	Research Institute	Own
IBIS	Seville Institute of Biomedicine	Research Institute	Joint
IBVF	Institute of Plant Biochemistry and Photosynthesis	Research Institute	Joint
ICMAN	Andalusian Institute of Marine Sciences	Research Institute	Own
ICMS	Materials Science Institute of Seville	Research Institute	Joint
IESA	Institute of Advanced Social Studies	Research Institute	Own
IG	Institute of Fat	Research Institute	Own
IHSM	Institute of Subtropical and Mediterranean Horticulture La Mayora	Research Institute	Joint

ACRONYM	NAME	TYPE	OWNER.
IIQ	Institute for Chemical Research	Research Institute	Joint
IMSE, CNM	Seville Microelectronics Institute	Research Institute	Joint
IPBLN	Lopez Neyra Institute of Parasitology and Biomedicine	Research Institute	Own
IRNAS	Institute of Natural Resources and Agrobiology of Seville	Research Institute	Own
CICCARTUJA	Isla de La Cartuja Scientific Research Centre	Service Integration Centre	Joint
CNA	National Accelerator Centre	Specialised Technical Unit	Joint
REBIS	Seville Researcher Residence and Library	Specialised Technical Unit	Own
DELEG.	CSIC Institutional Delegation in Andalusia	Delegation	Own
COCAD	Cadiz Oceanographic Centre-IEO	IEO Oceanographic Centre	Own
COMA	Malaga Oceanographic Centre-IEO	IEO Oceanographic Centre	Own
	IGME Territorial Unit-Sevilla	IGME Territorial Unit	Own
	IGME Territorial Unit-Peñarroya-Córdoba	IGME Territorial Unit	Own
	IGME Territorial Unit- Almería	IGME Territorial Unit	Own
	IGME Territorial Unit-Granada	IGME Territorial Unit	Own



ARAGÓN

INSTITUTES: **3** Own **2** Joint

DELEGATION **1** | SERVICE INTEGRATION CENTRES **1** | IGME TERRITORIAL UNITS **1**

ACRONYM	NAME	TYPE	OWNER.
EEAD	Aula Dei Experimental Station	Research Institute	Own
ICB	Institute of Carbochemistry	Research Institute	Own
INMA	Institute of Nanoscience and Materials of Aragon	Research Institute	Joint
IPE	Pyrenean Institute of Ecology	Research Institute	Own

ACRONYM	NAME	TYPE	OWNER.
ISQCH	Institute of Chemical Synthesis and Homogeneous Catalysis	Research Institute	Joint
CEQMA	Aragon Chemistry and Materials Centre	Service Integration Centre	Joint
DELEG.	CSIC Institutional Delegation in Aragón	Delegation	Own
	IGME Territorial Unit-Zaragoza	IGME Territorial Unit	Own



ASTURIAS

INSTITUTES: **2** Own **2** Joint

DELEGATION **1** | IEO OCEANOGRAPHIC CENTRES **1** | IGME TERRITORIAL UNITS **1**

ACRONYM	NAME	TYPE	OWNER.
CINN	Nanomaterials and Nanotechnology Research Centre	Research Institute	Joint
IMIB	Joint Institute for Biodiversity Research	Research Institute	Joint
INCAR	Institute for Carbon Science and Technology	Research Institute	Own

ACRONYM	NAME	TYPE	OWNER.
IPLA	Institute of Dairy Products of Asturias	Research Institute	Own
DELEG.	CSIC Institutional Delegation in P. Asturias	Delegation	Own
COG	Gijon Oceanographic Centre-IEO	IEO Oceanographic Centre	Own
	IGME Territorial Unit-Oviedo	IGME Territorial Unit	Own



BALEARES

INSTITUTES: **2** Joint

IEO OCEANOGRAPHIC CENTRES **1** | IGME TERRITORIAL UNITS **1**

ACRONYM	NAME	TYPE	OWNER.
IFISC	Institute of Interdisciplinary Physics and Complex Systems	Research Institute	Joint
IMEDEA	Mediterranean Institute for Advanced Studies	Research Institute	Joint

ACRONYM	NAME	TYPE	OWNER.
COB	Balearic Islands Oceanographic Centre-IEO	IEO Oceanographic Centre	Own
	IGME Territorial Unit-Palma de Mallorca	IGME Territorial Unit	Own



CANARIAS

INSTITUTES: **1** Own

DELEGATION **1** | IEO OCEANOGRAPHIC CENTRES **1** | IGME TERRITORIAL UNITS **1**

ACRONYM	NAME	TYPE	OWNER.
IPNA	Institute of Natural Products and Agrobiology	Research Institute	Own
DELEG.	CSIC Institutional Delegation in Canarias	Delegation	Own

ACRONYM	NAME	TYPE	OWNER.
COC	Canary Island Oceanographic Centre-IEO	IEO Oceanographic Centre	Own
	IGME Territorial Unit-Las Palmas de Gran Canaria	IGME Territorial Unit	Own



CANTABRIA

INSTITUTES: **2** Joint

IEO OCEANOGRAPHIC CENTRES **1**

ACRONYM	NAME	TYPE	OWNER.
IBBTEC	Institute of Biomedicine and Biotechnology of Cantabria	Research Institute	Own
IFCA	Physics Institute of Cantabria	Research Institute	Own

ACRONYM	NAME	TYPE	OWNER.
COST	Santander Oceanographic Centre-IEO	IEO Oceanographic Centre	Own



CASTILLA- LA MANCHA

INSTITUTES: **1** Joint

ACRONYM	NAME	TYPE	OWNER.
IREC	Hunting Resources Research Institute	Research Institute	Joint



CASTILLA Y LEÓN

INSTITUTES: **1** Own **4** Joint

DELEGATION **1** | IGME TERRITORIAL UNITS **2**

ACRONYM	NAME	TYPE	OWNER.
IBFG	Institute of Functional Biology and Genomics	Research Institute	Joint
IBGM	Institute of Molecular Biology and Genetics	Research Institute	Joint
IBMCC	Institute of Molecular and Cellular Biology of Cancer of Salamanca	Research Institute	Joint
IGM	Institute of Mountain Livestock	Research Institute	Joint

ACRONYM	NAME	TYPE	OWNER.
IRNASA	Institute for Natural Resources and Agrobiology of Salamanca	Research Institute	Own
DELEG.	CSIC Institutional Delegation in Castilla y León	Delegation	Own
	IGME Territorial Unit-Salamanca	IGME Territorial Unit	Own
	IGME Territorial Unit-León	IGME Territorial Unit	Own



CATALUÑA

INSTITUTES: **13** Own **5** Joint **2** Associated

DELEGATION **1** | SERVICE INTEGRATION CENTRES **2** | SPECIALISED TECHNICAL UNITS **1**

ACRONYM	NAME	TYPE	OWNER.
CEAB	Centre for Advanced Studies in Blanes	Research Institute	Own
CRAG	AgriGenomics Research Centre	Associated Institute	Joint
CREAF	Centre for Ecological Research and Forestry Applications	Research Institute	Joint
GEO3BCN	Geosciences Barcelona	Research Institute	Own
IAE	Institute of Economic Analysis	Research Institute	Own
IBB	Botanical Institute of Barcelona	Research Institute	Joint
IBE	Institute of Evolutionary Biology	Research Institute	Joint
IBMB	Barcelona Institute of Molecular Biology	Research Institute	Own
ICE	Institute of Space Sciences	Research Institute	Own
ICM	Institute of Marine Sciences	Research Institute	Own
ICMAB	Materials Science Institute of Barcelona	Research Institute	Own
ICN2	Centre for Research in Nanoscience and Nanotechnology	Associated Institute	Joint

ACRONYM	NAME	TYPE	OWNER.
IDAEA	Institute for Environmental Diagnostics and Water Studies	Research Institute	Own
IIBB	Biomedical Research Institute of Barcelona	Research Institute	Own
IIIA	Artificial Intelligence Research Institute	Research Institute	Own
IMB-CNM	Barcelona Institute of Microelectronics	Research Institute	Own
IMF	Mila y Fontanals Humanities Research Institution	Research Institute	Own
IQAC	Institute of Advanced Chemistry of Catalonia	Research Institute	Own
IRII	Institute of Robotics and Industrial Informatics	Research Institute	Joint
OE	Ebro Observatory	Research Institute	Joint
UTM	Marine Technology Unit	Specialised Technical Unit	Own
CID	Centre for Research and Development Pascual Vila	Service Integration Centre	Own
CMIMA	Mediterranean Marine and Environmental Research Centre	Service Integration Centre	Own
DELEG.	CSIC Institutional Delegation in Cataluña	Delegation	Own



C. VALENCIANA

INSTITUTES: **3** Own **8** Joint

DELEGATION **1** | IGME TERRITORIAL UNITS **1**

ACRONYM	NAME	TYPE	OWNER.
CIDE	Desertification Research Centre	Research Institute	Joint
I2SYSBIO	Institute of Integrative Systems Biology	Research Institute	Joint
I3M	Institute of Instrumentation for Molecular Imaging	Research Institute	Joint
IATA	Institute of Agrochemistry and Food Technology	Research Institute	Own
IATS	Institute of Aquaculture Torre de la Sal	Research Institute	Own
IBMCP	Primo Yufra Institute of Molecular and Cellular Biology of Plants	Research Institute	Joint

ACRONYM	NAME	TYPE	OWNER.
IBV	Institute of Biomedicine of Valencia	Research Institute	Own
IFIC	Institute of Corpuscular Physics	Research Institute	Joint
IN	Institute of Neurosciences	Research Institute	Joint
INGENIO	Institute for Innovation and Knowledge Management	Research Institute	Joint
ITQ	Institute of Chemical Technology	Research Institute	Joint
DELEG.	CSIC Institutional Delegation in C. Valenciana	Delegation	Own
	IGME Territorial Unit-Valencia	IGME Territorial Unit	Own



EXTREMADURA

INSTITUTES: **1** Joint

ACRONYM	NAME	TYPE	OWNER.
IAM	Institute of Archaeology-Merida	Research Institute	Joint



GALICIA

INSTITUTES: **3** Own **1** Joint

DELEGATION **1** | IEO OCEANOGRAPHIC CENTRES **2**

ACRONYM	NAME	TYPE	OWNER.
IEGPS	Institute of Galician Studies Padre Sarmiento	Research Institute	Joint
IIM	Marine Research Institute	Research Institute	Own
INCIPIT	Institute for Heritage Sciences	Research Institute	Own
MBG	Biological Mission of Galicia	Research Institute	Own

ACRONYM	NAME	TYPE	OWNER.
DELEG.	CSIC Institutional Delegation in Galicia	Delegation	Own
COAC	A Coruna Oceanographic Centre-IEO	IEO Oceanographic Centre	Own
COV	Vigo Oceanographic Centre-IEO	IEO Oceanographic Centre	Own



COMUNIDAD DE MADRID

INSTITUTES: **30** Own **9** Joint | NATIONAL CENTRES **3**

DELEGATION **1** | SERVICE INTEGRATION CENTRES **5** | SPECIALISED TECHNICAL UNITS **1**

ACRONYM	NAME	TYPE	OWNER.
CAB	Astrobiology Centre	Research Institute	Joint
CAR	Centre for Automation and Robotics	Research Institute	Joint
CBGP	Plant Biotechnology and Genomics Centre	Research Institute	Joint
CBM	Severo Ochoa Molecular Biology Centre	Research Institute	Joint
CENIM	National Metallurgical Research Centre	Research Institute	Own
CIAL	Food Science Research Institute	Research Institute	Joint
CIB	Margarita Salas Biological Research Centre	Research Institute	Own
CINC	Cajal International Neuroscience Centre	Research Institute	Own
CISA	Animal Health Research Centre	Research Institute	Own
CNB	National Biotechnology Centre	Research Institute	Own
IC	Cajal Institute	Research Institute	Own
ICA	Institute of Agricultural Sciences	Research Institute	Own
ICIFOR	Institute of Forestry Sciences	Research Institute	Own
ICMAT	Institute of Mathematical Sciences	Research Institute	Joint
ICMM	Materials Science Institute of Madrid	Research Institute	Own
ICP	Institute of Catalysis and Petrochemistry	Research Institute	Own
ICTAN	Institute of Food Science and Technology and Nutrition	Research Institute	Own
ICTP	Institute of Polymer Science and Technology	Research Institute	Own
ICV	Institute of Ceramics and Glass	Research Institute	Own
IEGD	Institute of Economics, Geography and Demography	Research Institute	Own
IEM	Institute for the Structure of Matter	Research Institute	Own
IEO	Spanish Institute of Oceanography	National Centre	Own
IETCC	Eduardo Torroja Institute of Construction Sciences	Research Institute	Own
IFF	Institute of Fundamental Physics	Research Institute	Own
IFS	Institute of Philosophy	Research Institute	Own
IFT	Institute of Theoretical Physics	Research Institute	Joint

ACRONYM	NAME	TYPE	OWNER.
IGEO	Institute of Geosciences	Research Institute	Joint
IGME	Geological and Mining Institute of Spain	National Centre	Own
IH	Institute of History	Research Institute	Own
IIBM	Alberto Sols Biomedical Research Institute	Research Institute	Joint
ILC	Institute for Languages and Cultures of the Mediterranean and the Near East	Research Institute	Own
ILLA	Institute of Language, Literature and Anthropology	Research Institute	Own
IMN-CNM	Institute of Micro and Nanotechnology	Research Institute	Own
INIA	National Institute of Agricultural and Food Research and Technology	National Centre	Own
IO	Daza de Valdes Optics Institute	Research Institute	Own
IPP	Institute of Public Goods and Policies	Research Institute	Own
IQF	Instituto de Química Física Blas Cabrera	Research Institute	Own
IQM	Institute of Medicinal Chemistry	Research Institute	Own
IQOG	Institute of General Organic Chemistry	Research Institute	Own
ITEFI	Leonardo Torres Quevedo Institute of Physical and Information Technologies	Research Institute	Own
MNCN	National Museum of Natural Sciences	Research Institute	Own
RJB	Royal Botanical Garden	Research Institute	Own
CCHS	Centre for Human and Social Sciences	Service Integration Centre	Own
CENQUIOR	Lora Tamayo Organic Chemistry Centre	Service Integration Centre	Own
CFMAC	Miguel A. Catalan Physics Centre	Service Integration Centre	Own
CFTMAT	Centre for Theoretical Physics and Mathematics	Service Integration Centre	Joint
CI2A	Alcala Interdisciplinary Research Centre	Service Integration Centre	Own
CRF	Centre for Plant Genetic Resources and Sustainable Agriculture	Specialised Technical Unit	Own
DELEG.	CSIC Institutional Delegation in C. Madrid	Delegation	Own



MURCIA

INSTITUTES: **1** Own

IEO OCEANOGRAPHIC CENTRES **1** | IGME TERRITORIAL UNITS **1**

ACRONYM	NAME	TYPE	OWNER.
CEBAS	Centre for Edaphology and Applied Biology of the Segura Region	Research Institute	Own
COMU	Murcia Oceanographic Centre-IEO	IEO Oceanographic Centre	Own

ACRONYM	NAME	TYPE	OWNER.
	IGME Territorial Unit-Murcia	IGME Territorial Unit	Own



NAVARRA

INSTITUTES: **1** Joint

ACRONYM	NAME	TYPE	OWNER.
IDAB	Institute of Agrobiotechnology	Research Institute	Joint



P. VASCO

INSTITUTES: **2** Joint

ACRONYM	NAME	TYPE	OWNER.
CFM	Materials Physics Centre	Research Institute	Joint

ACRONYM	NAME	TYPE	OWNER.
IBF	Biophysics Institute	Research Institute	Joint



LA RIOJA

INSTITUTES: **1** Joint

ACRONYM	NAME	TYPE	OWNER.
ICVV	Institute of Vine and Wine Science	Research Institute	Joint



ROMA

INSTITUTES: **1** Own

ACRONYM	NAME	TYPE	OWNER.
EEHAR	Spanish School of History and Archaeology	Research Institute	Own



BRUSELAS

DELEGATION **1**

ACRONYM	NAME	TYPE	OWNER.
DELEG.	CSIC Institutional Delegation with the European Union	Delegation	Own

Training of Research Staff

	THESIS			FINAL DEGREE PROJECT (TFG)			MASTER'S FINAL PROJECT (TFM)		
	M	W	TOTAL	M	W	TOTAL	M	W	TOTAL
	DOCTORAL STUDENTS			STUDENTS					
SOCIETY	20	29	49	5	3	8	15	28	43
LIFE	203	292	495	51	108	159	119	229	348
MATERIA	173	116	289	49	51	100	132	83	215
TOTAL	396	437	833	105	162	267	266	340	606
	RESEARCH STAFF MANAGING								
SOCIETY	26	16	42	7	1	8	13	13	26
LIFE	340	240	580	67	122	189	170	198	368
MATERIA	229	128	357	69	60	129	124	107	231
TOTAL*	595	384	979	143	183	326	307	318	625

*There may be research staff who have directed more than one thesis and theses that have been co-directed by more than one researcher.

401

SCHOLARSHIPS JAE INTRO*

	H	M	TOTAL
SOCIETY	21	36	57
LIFE	70	125	195
MATERIA	92	57	149

*Includes all the modalities "ICU, Severo Ochoa, María de Maeztu".

Source: ConCIENCIA. Data obtained on **17/04/2024**.

Staff distribution by Core Area and functional grouping*

	RESEARCHER			TRAINEE RESEARCHER			TECHNICAL			MANAGEMENT / ADMIN / SERVICES			TOTAL		
	M	W	TOTAL	M	W	TOTAL	M	W	TOTAL	M	W	TOTAL	M	W	TOTAL
SOCIETY	218	159	377	30	37	67	80	115	195	31	54	85	359	365	724
LIFE	1,556	1,155	2,711	381	578	959	1,849	2,771	4,620	379	437	816	4,165	4,941	9,106
MATERIA	1,087	608	1,695	344	180	524	1,013	829	1,842	108	169	277	2,552	1,786	4,338
CENTRA SERVICES*	-	-	-	-	-	-	138	240	378	131	229	360	269	469	738
TOTAL	2,861	1,922	4,783	755	795	1,550	3,080	3,955	7,035	649	889	1,538	7,345	7,561	14,906

*Includes delegations/REBIS.

The area assigned to research staff and trainee researchers is the staff area. The rest are assigned to the area of the ICU to which they are attached.

Staff distribution geographical location and functional grouping*

	RESEARCHER			TRAINEE RESEARCHER			TECHNICAL			MANAGEMENT / ADMIN/ SERVICES			TOTAL		
	M	W	TOTAL	M	W	TOTAL	M	W	TOTAL	M	W	TOTAL	M	W	TOTAL
Andalucía	466	267	733	102	121	223	542	591	1,133	118	115	233	1,228	1,094	2,322
Aragón	115	81	196	38	25	63	114	121	235	14	31	45	281	258	539
Principado de Asturias	51	54	105	18	10	28	46	98	144	15	19	34	130	181	311
Illes Balears	59	45	104	14	12	26	36	67	103	4	7	11	113	131	244
Canarias	33	20	53	4	9	13	43	51	94	11	10	21	91	90	181
Cantabria	40	25	65	13	8	21	43	53	96	9	8	17	105	94	199
Castilla-La Mancha	11	4	15	2	-	2	9	22	31	2	-	2	24	26	50
Castilla y León	44	24	68	12	35	47	47	76	123	16	20	36	119	155	274
Cataluña	454	294	748	129	154	283	414	458	872	76	103	179	1,073	1,009	2,082
Extremadura	6	2	8		2	2	3	2	5	-	-	0	9	6	15
Galicia	91	69	160	12	18	30	119	244	363	37	40	77	259	371	630
La Rioja	8	9	17	1		1	8	13	21	1	1	2	18	23	41
Comunidad de Madrid	1,150	812	1,962	272	268	540	1,266	1,677	2,943	286	477	763	2,974	3,234	6,208
Región de Murcia	52	43	95	13	11	24	94	110	204	20	11	31	179	175	354
Comunidad Foral de Navarra	6	5	11	2	3	5	3	18	21	2	-	2	13	26	39
País Vasco	23	7	30	5	1	6	8	4	12	2	2	4	38	14	52
Comunitat Valenciana	251	158	409	118	118	236	285	348	633	34	44	78	688	668	1,356
Roma	1	3	4	-	-	-	-	2	2	2	1	3	3	6	9
TOTAL	2,861	1,922	4,783	755	795	1,550	3,080	3,955	7,035	649	889	1,538	7,345	7,561	14,906

Source: GESPER

Current national scientific activity 2023*

CURRENT PROJECTS AND ACTIONS IN 2023

	EXTERNAL		
	NUMBER OF PROJECTS/ACTIONS	TOTAL FUNDING (€)	ANNUITY 2023 (€)
SOCIETY	169	10,919,666.28	3,188,214.85
LIFE	2,277	474,662,585.66	169,856,642.78
MATERIA	1,202	234,759,452.73	84,775,181.45
NO SPECIFIC AREA	3	351,967.24	336,967.24
TOTAL	3,651	720,693,672	258,157,006

+

	INTERNAL		
	NUMBER OF PROJECTS/ACTIONS	TOTAL FUNDING (€)	ANNUITY 2023 (€)
	89	6,868,361.09	2,746,263.83
	819	167,458,031.31	49,232,471.45
	475	113,586,377.47	14,532,382.16
	21	50,208,250.49	10,585,903.09
	1,404	338,121,020.36	77,097,020.53

* Data that includes the number of projects and actions approved and completed in the year.

PROJECTS AND ACTIONS APPROVED IN 2023

	EXTERNAL		
	NUMBER OF PROJECTS/ACTIONS	TOTAL FUNDING (€)	ANNUITY 2023 (€)
SOCIETY	41	2,584,848.32	926,429.50
LIFE	617	129,525,566.53	54,365,961.26
MATERIA	301	63,188,578.68	32,684,823.46
NO SPECIFIC AREA	2	336,967.24	336,967.24
TOTAL	961	195,635,960.77	88,314,181.46

+

	INTERNAL		
	NUMBER OF PROJECTS/ACTIONS	TOTAL FUNDING (€)	ANNUITY 2023 (€)
	28	3,151,179.74	2,118,715.21
	313	42,634,089.94	33,350,045.35
	156	15,016,610.44	8,522,857.79
	4	8,549,671.94	6,969,835.97
	561	69,351,552.06	50,961,454.32

PROJECTS AND ACTIONS COMPLETED IN 2023

	EXTERNAL		
	NUMBER OF PROJECTS/ACTIONS	TOTAL FUNDING (€)	ANNUITY 2023 (€)
SOCIETY	33	2,029,667.87	135,917.32
LIFE	384	69,631,201.89	4,170,149.90
MATERIA	226	33,225,249.31	2,032,922.94
NO SPECIFIC AREA	3	351,967.24	336,967.24
TOTAL	646	105,238,086.31	6,675,957.40

+

	INTERNAL		
	NUMBER OF PROJECTS/ACTIONS	TOTAL FUNDING (€)	ANNUITY 2023 (€)
	49	1,994,791.98	48,329.20
	454	92,936,956.51	6,975,683.12
	233	38,226,816.93	1,413,192.88
	-	-	-
	736	133,158,565.42	8,437,205.20

Source: BDC: the Core Area assigned corresponds to that of the project.

CURRENT PROJECTS, ACCORDING TO CORE AREA	EXTERNAL FUNDING		
	NUMBER OF PROJECTS	TOTAL FUNDING (€)	ANNUITY 2023 (€)
SOCIETY	159	10,734,866.28	3,077,064.85
LIFE	2,211	471,733,985.28	168,330,486.15
MATERIA	1165	233,886,692.14	84,343,281.45
NO SPECIFIC AREA	1	81,967.24	81,967.24
TOTAL	3,536	716,437,510.94	255,832,799.69

CURRENT PROJECTS, ACCORDING TO R&D PROGRAMMES	EXTERNAL FUNDING		
	NUMBER OF PROJECTS	TOTAL FUNDING (€)	ANNUITY 2023 (€)
NATIONAL PLAN	2,674	550,989,451.86	194,231,958.22
CCAA	677	111,341,926.53	34,482,709.30
FIS	22	4,133,401.48	2,023,325.59
OTHER	163	49,972,731.07	25,094,806.58
TOTAL	3,536	716,437,510.94	255,832,799.69

CURRENT ACTIONS, ACCORDING TO CORE AREA	EXTERNAL FUNDING		
	NUMBER OF SPECIAL ACTIONS	TOTAL FUNDING (€)	ANNUITY 2023 (€)
SOCIETY	10	184,800.00	111,150.00
LIFE	66	2,928,600.38	1,526,156.63
MATERIA	37	872,760.59	431,900.00
NO SPECIFIC AREA	2	270,000.00	255,000.00
TOTAL	115	4,256,160.97	2,324,206.63

Source: BDC: the Core Area assigned corresponds to that of the project.

Current international scientific activity 2023

CURRENT PROJECTS* IN 2023

	EU FRAMEWORK PROGRAMME		EU NON-FRAMEWORK PROGRAMME		INTERNATIONAL	
	NUMBER OF PROJECTS	TOTAL FUNDING (€)	NUMBER OF PROJECTS	TOTAL FUNDING (€)	NUMBER OF PROJECTS	TOTAL FUNDING (€)
SOCIETY	33	25,925,846.20	3	371,969.67	8	960,863.45
LIFE	321	165,194,105.81	45	28,821,551.91	91	13,184,298.30
MATERIA	295	159,653,234.38	35	14,342,716.32	36	6,291,004.08
CENTRAL SERVICES	8	951,586.41	1	59,014.00	-	-
TOTAL	657	351,724,772.80	84	43,595,251.90	135	20,436,165.83

* Data that includes the number of projects started and completed in the year.

PROJECTS INITIATED IN 2023

	EU FRAMEWORK PROGRAMME		EU NON-FRAMEWORK PROGRAMME		INTERNATIONAL	
	NUMBER OF PROJECTS	TOTAL FUNDING (€)	NUMBER OF PROJECTS	TOTAL FUNDING (€)	NUMBER OF PROJECTS	TOTAL FUNDING (€)
SOCIEDAD	7	3,971,436.00	-	-	2	83,584.89
VIDA	73	43,679,096.59	19	7,331,294.88	30	3,569,561.76
MATERIA	86	37,135,521.95	15	6,080,052.33	6	1,034,990.93
CENTRAL SERVICES	3	290,067.00	1	39,196.00	-	-
TOTAL	169	85,076,121.54	35	13,450,543.21	38	4,688,137.58

PROJECTS COMPLETED IN 2023

	EU FRAMEWORK PROGRAMME		EU NON-FRAMEWORK PROGRAMME		INTERNATIONAL	
	NUMBER OF PROJECTS	TOTAL FUNDING (€)	NUMBER OF PROJECTS	TOTAL FUNDING (€)	NUMBER OF PROJECTS	TOTAL FUNDING (€)
SOCIEDAD	7	3,755,658.64	1	77,285.37	3	590,780.48
VIDA	76	23,787,135.74	23	8,450,715.32	17	1,140,982.53
MATERIA	61	31,513,425.51	10	1,854,005.75	10	2,484,941.00
CENTRAL SERVICES	2	33,288.16	1	1,269,712.12	-	-
TOTAL	146	59,089,508.05	35	11,651,718.56	30	4,216,704.01

CURRENT PROJECTS IN 2023
BY PROGRAMME UNDER EU R&I
FRAMEWORK PROGRAMMES, OTHER EU
AND INTERNATIONAL PROGRAMMES

		EU R&I FRAMEWORK PROGRAMMES			OTHER EU AND INTERNATIONAL PROGRAMMES		
		H2020	HORIZON EUROPE	TOTAL FRAMEWORK PROGRAMMES	EU NON-FRAMEWORK PROGRAMME*	INTERNATIONAL	TOTAL OPEI
CURRENT*	Number of Projects	354	303	657	84	135	219
	Total funding (€)	202,204,109.22	149,520,663.58	351,724,772.80	43,595,251.90	20,436,165.83	64,031,417.73
SIGNED	Number of Projects	1	168	169	35	38	73
	Total funding (€)	214,697.24	84,861,424.30	85,076,121.54	13,450,543.21	4,688,137.58	18,138,680.79
COMPLETED	Number of Projects	131	15	146	35	30	65
	Total funding (€)	57,093,457.13	1,996,050.92	59,089,508.05	11,651,718.56	4,216,704.01	15,868,422.57

* Data that includes the number of projects signed and completed in the year.

		EU NON-FRAMEWORK PROGRAMME*				
		LIFE	INTERREG V	RFCS	OTHER	TOTAL
CURRENT*	Number of Projects	44	25	8	7	84
	Total funding (€)	17,229,939.75	6,127,266.64	2,010,111.01	18,227,934.50	43,595,251.90
SIGNED	Number of Projects	6	5	3	21	35
	Total funding (€)	2,932,518.41	992,778.50	622,726.63	8,902,519.67	13,450,543.21
COMPLETED	Number of Projects	10	20	2	3	35
	Total funding (€)	1,608,615.41	5,134,488.14	449,631.45	4,458,983.56	11,651,718.56

International agreements

COUNTRY-ENTITY WITH WHICH THE CSIC HAS AGREEMENTS IN FORCE. NUMBER OF FOREIGN ENTITIES WITHOUT DUPLICATES

GERMANY	21	PHILLIPINES	1	PANAMA	1
ANGOLA	3	FINLAND	7	PERU	5
ARGENTINA	7	FRANCE	28	POLAND	6
AUSTRALIA	1	GHANA	2	PORTUGAL	6
AUSTRIA	4	EQUATORIAL GUINEA	2	UNITED KINGDOM	11
BELGIUM	22	HONDURAS	3	CZECH REPUBLIC	3
BRAZIL	21	HUNGARY	1	DOMINICAN REPUBLIC	2
BULGARIA	1	INDIA	6	ROMANIA	4
CANADA	3	IRAN	3	RUSSIA	1
CHILE	17	IRELAND	1	SERBIA	1
CHINA	16	ISRAEL	1	SOUTH AFRICA	1
COLOMBIA	21	ITALY	30	SWEDEN	11
REPUBLIC O KOREA	1	JAPAN	5	SWITZERLAND	5
COSTA RICA	2	KENYA	2	THAILAND	1
CUBA	3	MALAYSIA	2	TAIWAN	1
DENMARK	4	MOROCCO	5	TUNISIA	1
ECUADOR	5	MAURITANIA	1	TURKEY	3
EGYPT	1	MEXICO	23	UKRANIA	3
SLOVAKIA	1	MOZAMBIQUE	1	URUGUAY	3
SPAIN	51	NIGERIA	1	UZBEKISTAN	2
USA	30	NEW ZEALAND	1	VENEZUELA	2
ETHIOPIA	1	NETHERLANDS	7	TOTAL	442

