Annual Report

2024

INSTITUT de BIOLOGIA EVOLUTIVA
iBe
CSIC
upf.

We are a research institute working to understand the evolutionary mechanisms that generate biodiversity and to promote its conservation.

The Institute of Evolutionary Biology (IBE) is dedicated to understanding the mechanisms that generate biodiversity and the genetic basis of evolution. Our work is helping to unravel how evolution works and to translate discoveries into new ways to conserve biodiversity.

Founded in 2008, the IBE is a unique partnership between the Spanish National Research Council (CSIC) and the Pompeu Fabra University (UPF). It brings together more than 120 people and 25 research groups distributed in 3 scientific programs on Evolutionary Biology research.

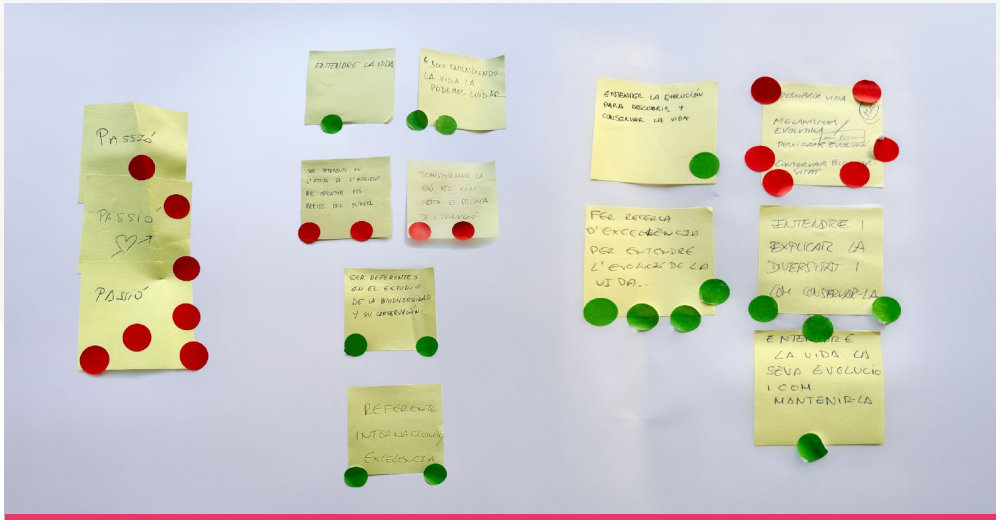
Highlights

Our journey along all paths of evolution

During 2024, the IBE underwent a deep process of reflection, engaging the community in revising our foundations and shaping our future perspectives. This process has given rise to our renewed mission, vision, values and purpose, which will guide the IBE scientific and management strategy for the 2025-2027 period.

We seek to understand life and its evolution
to contribute to planetary well-being.

This process was recognized by the CSIC, which awarded the ASPIRA-Max Josefa Barba accreditation to the IBE in acknowledgment of this collective process of self-evaluation. In parallel, the renewal of the UCC+i credential highlighted our continued commitment to scientific culture and to promoting evolutionary biology within society.



Our first and foremost value is passion.

ASPIRA-Max Josefa Barba accreditation to the IBE.

IBE director Salvador Carranza and deputy director Elena Bosch during a general meeting.

Highlights

Extending our partnerships to advance human health and trace our evolutionary past

The IBE has continued to evolve by broadening its community of collaborators. The Catalan Institute of Paleontology Miquel Crusafont (ICP-CERCA) has joined the IBE as an associated unit, strengthening research in paleontology.

In turn, the new CRG-UPF-IBE Joint Program on Evolutionary Medical Genomics has been launched, the first initiative of its kind worldwide. IBE researchers will contribute by exploring the evolutionary underpinnings of disease, with the aim of improving human health.

€360K in funding from the Generalitat de Catalunya for the new program during 2024.

18 scientific teams involved, including 8 from IBE.

Image of the attendees to the first IBE-ICP retreat.

Intervention from IBE director during the Joint Program on Evolutionary Medical Genomics inauguration Symposium.

Highlights

Leading initiatives to address global biodiversity challenges

Throughout 2024, the IBE has led both global and local scientific initiatives to advance biodiversity research and conservation.

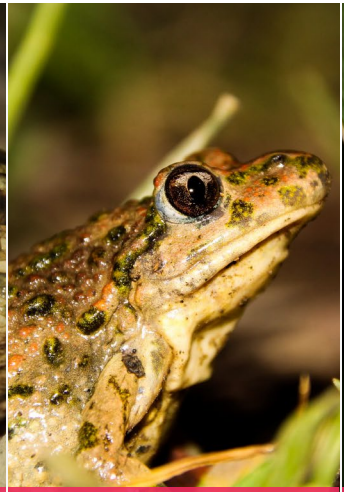
IBE scientists contributed to the European Reference Genome Atlas (ERGA) pilot project, generating reference genomes with unprecedented precision for over 14 key species of European biodiversity. This major European effort paves the way for an inclusive model of biodiversity genomics, benefiting species conservation, evolutionary research, planetary health, and the bioeconomy.

The IBE also pioneered a high-impact project for amphibian conservation in Catalonia, promoted by the Barcelona Zoo Foundation. Coordinated by Salvador Carranza, director of the IBE, the project will conduct a comprehensive assessment of amphibian populations and propose innovative measures to improve their conservation, combining technological advances with practical outcomes.

The IBE Biodiversity Program has celebrated the first BiodIBErsity Day, establishing itself as a reference meeting for the evolutionary science community. In addition, some researchers participated in the Traversing European Coastlines (TREC) expedition stop in Barcelona, exploring Mediterranean biodiversity, promoting its conservation, and engaging citizens in the challenges facing marine life.

Image taken during the BiodIBErsity Day.

Bufo spinosus



Pelodytes punctatus

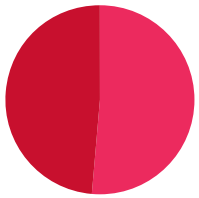
Hyla meridionalis

Meet our community

Data from 2024

127
Total members

61 Women 50%



66 Men 50%

19%
Foreign researchers

15
Nationalities

	Total	Women	Men
Principal investigators	25	6	19
Principal investigators *ad-honorem/emeritus*	2	0	2
Postdoctoral researchers	16	3	13
Predoctoral researchers	37	18	19
Technical personnel	30	22	8
Technical services personnel	8	5	3
Admin & general services	9	7	2

Meet our community

Recognition for an outstanding team

In 2024, IBE researchers were recognized through numerous awards and honors from prestigious organizations at international, national, and local levels. From senior to predoctoral researchers, the IBE continues to attract and retain exceptionally talented scientists who form a reference generation of evolutionary biologists.

Notably, during this period, IBE counted **4 ICREA researchers** on its team and maintained **4 active ERC grants**, highlighting the institute's commitment to high quality and innovation in evolutionary research. Additionally, the IBE reached 31% of its scientific labs led by women, strengthening the institutional commitment to diverse leadership in science.

Pablo Librado

- Newcomb Cleveland Award

Rosa Fernández

- New Member of the Young Academy of Spain
- Spanish National Research Award Ángeles Alvariño, in Natural Resources Sciences and Technologies

Elena Bosch and Vanessa Villalba

- Finalists for the "Vanguardia de la Ciencia" Awards

AWARDS

Tomàs Marquès

- Ciutat de Barcelona Award in Life Sciences
- New Academic Member of the Royal Academy of Sciences of Spain

Arcadi Navarro

- New Full Academic Member of the Royal Academy of Sciences and Arts of Barcelona

Neus Font, Luis Ferrandez and Blai Vidiella

- CSIC Award for outstanding doctoral thesis

Xavier Bellés

- Honorary Member of the Italian National Academy of Entomology

Scientific Highlights

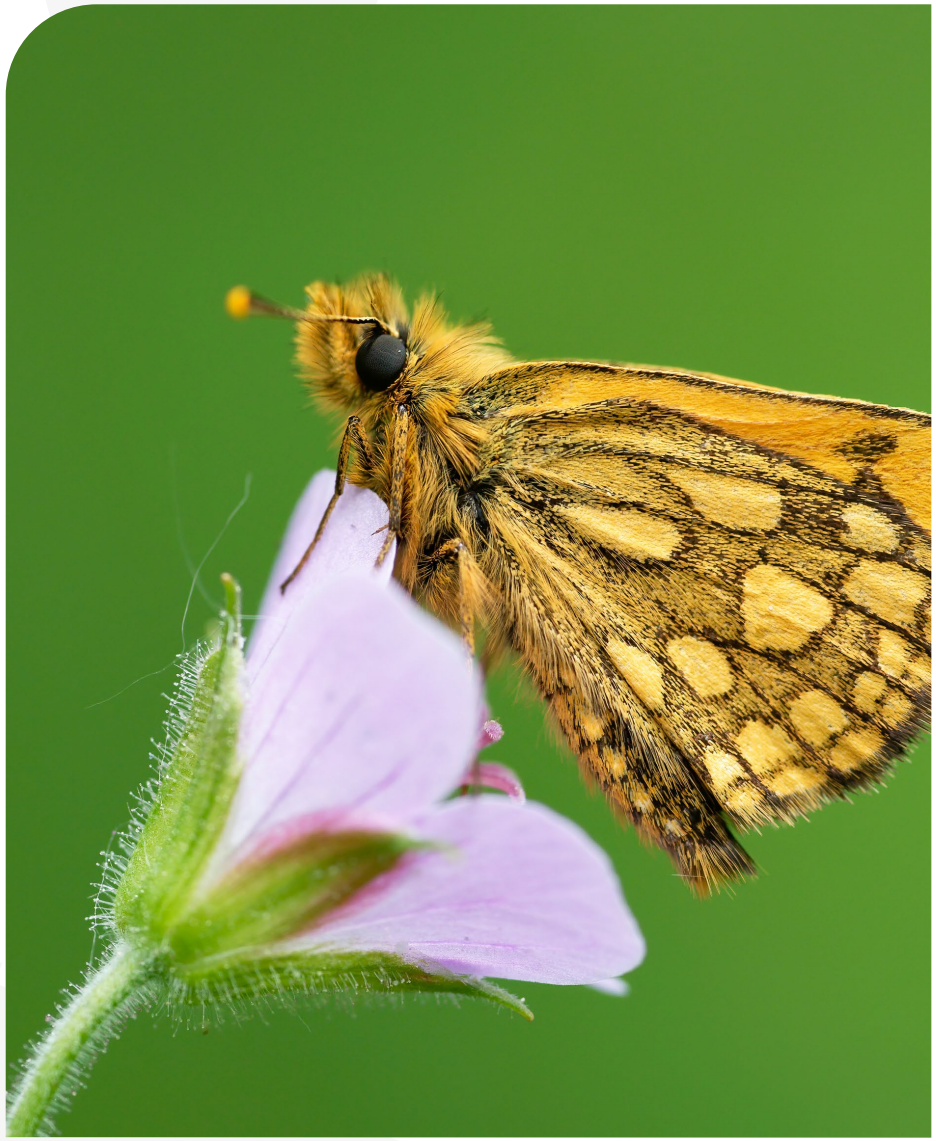
In 2024, the IBE reassured its position as a leader in evolutionary research, making significant contributions to understanding the mechanisms that generate and sustain biodiversity.

Through groundbreaking publications, the IBE has advanced knowledge in areas such as genomics, ancient DNA analysis, and population dynamics, offering new insights into species evolution and conservation. The IBE also deepened understanding of human evolution, adaptation and health, providing valuable perspectives on our species' past and resilience in the face of future challenges. By harnessing global research networks, we explored the complex interactions that drive evolutionary processes, laying the foundation for innovative approaches to addressing biodiversity loss and fostering planetary well-being.

127
Publications

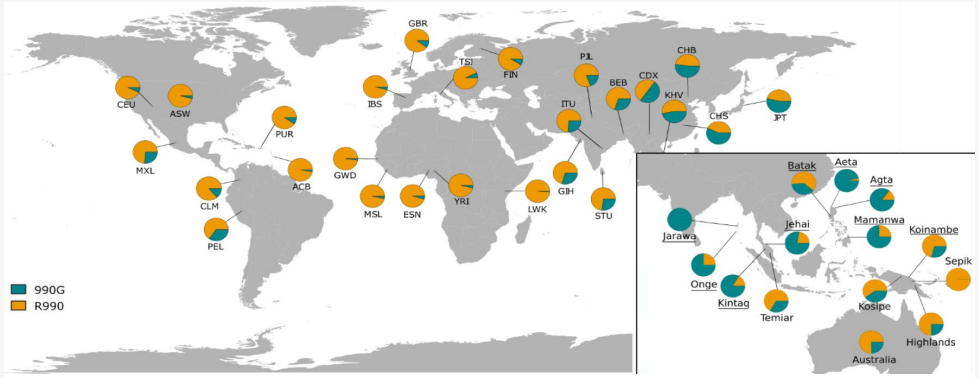
41,5%
Led by IBE researchers

84%
Q1 Publications



Scientific Highlights

Genomes, populations and species



Genetic adaptation may have enhanced survival in Southeast Asian populations

Led by IBE principal investigator **Elena Bosch**, the study has identified a genetic variant in Southeast Asian populations that may promote greater fat accumulation. Found in indigenous groups from the Andaman Islands, Malaysia, and the Philippines, this adaptation could have provided an evolutionary advantage in the nutritionally challenging and dangerous conditions faced by hunter-gatherers in the tropical jungle. The research, first authored by **Barbara Sinigaglia**, suggests that increased fat reserves may have facilitated earlier sexual maturity, boosting survival and reproductive success in hostile environments.

Sinigaglia B., Escudero J., Biagini S.A., Garcia-Calleja J., Moreno J., Dobon B., Acosta S., Mondal M., Walsh S., Aguileta G., Vallès M., Forrow S., Martin-Caballero J., Migliano A.B., Bertranpetit J., Muñoz F.J., Bosch E. (2024). **Exploring Adaptive Phenotypes for the Human Calcium-Sensing Receptor Polymorphism R990G**. Molecular Biology and Evolution 41(2):1–18.

Figure caption: Map showing the distribution of the studied mutation, which has been identified at high frequency in populations of Southeast Asia, particularly in the Andaman Islands, the Philippines, and Malaysia (highlighted in green).

Demographics of North African human populations unravelled through genomics and AI

A study co-led by IBE researchers **David Comas** and **Òscar Lao** shows that Arab and Imazighen populations in North Africa have distinct genetic origins. The findings trace the Imazighen back to the Epipaleolithic, over 20,000 years ago, and place the genetic origin of the current Arab population in the 7th century CE. The team, with first author **Jose Miguel Serradell**, developed an innovative demographic model using artificial intelligence to analyse complete genomes from North African populations.

Serradell J.M., Lorenzo-Salazar J.M., Flores C., Lao O., Comas D. (2024). **Modelling the demographic history of human North African genomes points to a recent soft split divergence between populations**. Genome Biology 25(1):201

Figure caption: Archive image of Morocco (North Africa).

Scientific Highlights

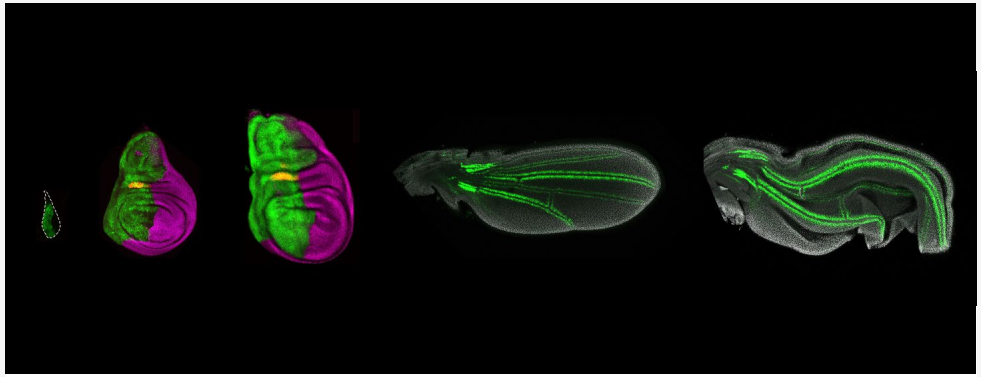
Complexity of life

Discovering why cockroaches preserved a genetic error for 350 million years

The IBE team led by **José Luis Maestro**, reveals that an erroneous triplication of the insulin receptor gene improved the survival of cockroaches, termites, mantises, and stick insects. According to the study, first authored by **David Pujal**, these ancient duplications -dating back 400 and 350 million years- may help explain how genetic redundancy can drive evolutionary innovation across animal groups.

Pujal D., Escudero J., Cabrera P., Bos L., Vargas-Chávez C., Fernández R., Bellés X., Maestro J.L. (2024). **Functional redundancy of the three insulin receptors of cockroaches**. Insect Biochemistry and Molecular Biology 172(July):104161.

Figure caption: Female Blattella germanica carrying an ootheca.



Discovered the genetic mechanism that regulates the transition from adolescence to adulthood in insects

A study published in PNAS, co-led by IBE researchers **Xavier Franch** and **David Martin**, has revealed how insects complete metamorphosis by inactivating the Broad gene, responsible for maintaining adolescence, through the action of the E93 gene. This work, with **Josefa Cruz** as first author, completes the genetic model of insect development and may help understand similar processes in humans, including those involved in cancer.

Cruz J., Ureña E., Iñiguez L.P., Irimia M., Franch-Marro X., Martín D. (2024). **E93 controls adult differentiation by repressing broad in Drosophila**. Proceedings of the National Academy of Sciences of the United States of America 121(51):e2403162121.

Figure caption: Wing development during the larval (left images) and pupal (right images) stages of Drosophila melanogaster, observed through fluorescence microscopy. The image shows the differential expression of various genes involved in regulating wing development during these stages.

Scientific Highlights

Biodiversity

Previously uncharacterized fish parasite unveiled worldwide

An international study published in Current Biology and led by IBE researcher **Javier del Campo** has uncovered a previously unknown apicomplexan parasite present worldwide in many marine fish. Despite belonging to a clinically important group, it had gone unnoticed until now. According to the study, first authored by **Anthony Mario Bonacolta**, its presence is geographically and taxonomically widespread in fish species around the planet, with potential implications for commercial fishing and oceanic food webs.

Bonacolta A.M., Krause-Massaguer J., Smit N.J., Sikkel P.C., del Campo J. (2024). **A new and widespread group of fish apicomplexan parasites**. Current Biology 34(12):2748–2755.e3.

Figure caption: Red-lipped blenny.

How butterflies survived the Ice Age reveals clues to their future in the face of climate change

An international study led by **Roger Vila** at the IBE reveals that European butterflies survived the Ice Age by retreating to southern refuges and later recolonizing the continent through dispersal routes. These findings reveal the effects of climate change on biodiversity in the past and shed light on the future of butterflies in the face of global warming.

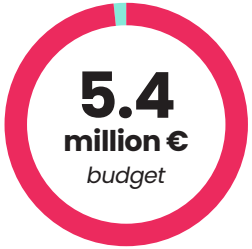
Dapporto L., Menchetti M., Dincă V., Talavera G., Garcia-Berro A., D'Ercole J., Hebert P.D., Vila R. (2024). **The genetic legacy of the Quaternary ice ages for West Palearctic butterflies**. Science Advances 10(38):eadm8596.

Figure caption: Lycaenidae mud puddling.

Funding and projects

New external funds raised in 2024

During 2024, the IBE successfully acquired funding for a broad range of innovative projects, secured via competitive and non-competitive grants from a variety of public and private organizations.



External funding raised in 2024

Competitive funds
5.39 million €

Contracts and agreements
85,000 €

IBE team led by Javier del Campo during a submarine campaign in Mas Caials, Cap de Creus.

Lablife at IBE.

Scientific life

Building a strong, diverse community at IBE

Fostering an engaged community lies at the heart of IBE's vision. In 2024, numerous activities were organized to enrich scientific life and encourage meaningful connections within our community. A key highlight was the **biannual Retreat**, where IBE personnel spent two days off-site participating in presentations, discussions, and social gatherings with colleagues.

Over the past year, we also hosted five seminars that supported the academic growth of our members. Additionally, every fortnight the community was invited to an informal break, fostering casual interactions and strengthening the social life of the center.

12
PhD theses defended

5
IBE Seminars

1
Retreat

27
Undergraduated and master students trained

6
International

21
National

Our committees continued to make a significant impact on community life, each offering unique perspectives and initiatives. In 2024, the IBE diversity Committee implemented the first year of the 2024-2026 Gender and Diversity Equality Plan, based on the ACT on gender survey results (2021) and aligned with CSIC and UPF diversity plans. A brief description of the actions executed in 2024 is available here.

The sustainability committee also contributed to lowering the IBE carbon footprint and reducing everyday waste during 2024. A comprehensive record of their work is available here.

Together, these efforts reflect IBE's ongoing dedication to cultivating collaboration, engagement, and innovation within the community.

Image taken during the last Christmas holiday IBE celebration, featuring a Kahoot game for the entire IBE community.

Communication & outreach

In 2024, our research maintained a strong media presence, earning recognition from specialist journals, mainstream media, and digital platforms, underscoring our international impact. Additionally, our social media audience reached **8,236 followers**, a **14% increase** across platforms compared to 2023.

Sharing evolutionary science, engaging the world.

Through our Public Engagement Program, we reached a **target audience of 20,903**, engaging **1,465 participants** in outreach activities and broadcasting content across our channels, garnering over **16,200 views**.

We are proud to highlight that more than 50 IBE community members actively contributed to this program, participating in 34 activities, either with IBE leading or being a contributor.

49
News published on IBE website

18
Press releases

117,302
Web page views
www.ibe.upf-csic.es

Together, these efforts reflect IBE's commitment to making research accessible and meaningful for everyone

Press highlights

3 CAT
Científics europeus obtenen genomes de referència d'un centenar d'espècies del continent.

3 CAT
L'herencia genètica fa als europeus i americans més susceptibles als efectes adversos dels medicaments.

DIARI ARA
L'únic vertebrat endèmic de Catalunya, en perill crític d'extinció.

LA VANGUARDIA
Un 70% de europeos tienen un gen denisovano que predispone a trastornos psiquiátricos.

RNE: A hombros de gigantes
Hace 4.200 años se empezó a usar el caballo como medio de transporte.

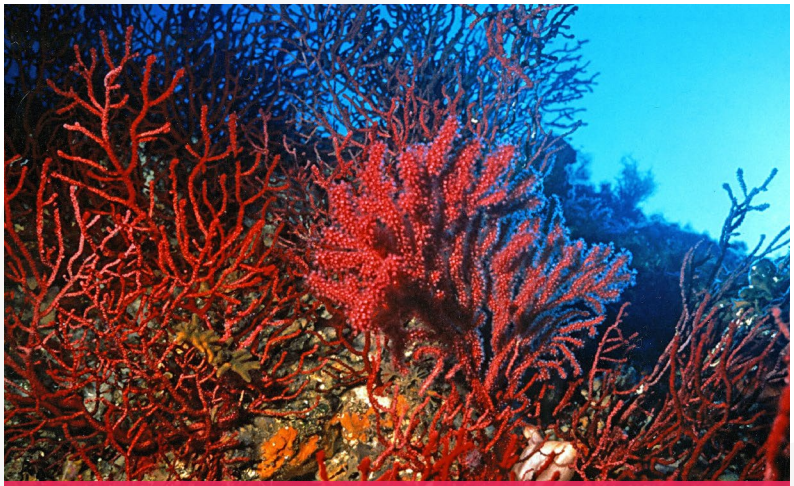
LA VANGUARDIA, RNE
El cambio climático favorece la proliferación de cucarachas y su resistencia a los insecticidas.

LA VANGUARDIA, RNE
Las cucarachas: las supervivientes del mundo animal.

EL PAÍS
Nace una nueva medicina que aplica la teoría de la evolución para combatir el cáncer o las pandemias.

QUO
Un microbio unicelular ayuda a los corales a sobrevivir al cambio climático.

The Montseny Brook Newt, the only catalan endemic vertebrate species, is at the brink of extinction.



Paramuricea clavata - Banyuls-sur-Mer.

Social Media

8,236
Followers on Social Media

+14%
Increase since 2023

Public engagement & science education

20,903
Target audience reached

1,465
Participants in outreach activities

16,213
Views of content across all IBE channels

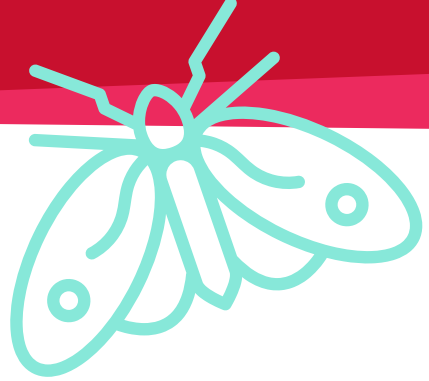
Highlighted projects

IBE takes part in the "Traversing European Coastlines" (TREC) expedition stop in Barcelona

11F: Close the Scissors

Setmana de la Ciència
IBE Open Doors

Research programs



During 2024, the IBE restructured its scientific programs to align with the new strategy for the years to come.

Biodiversity

Ancient Population Genomics lab
Pablo Librado

Butterfly Diversity and Evolution lab
Roger Vila

Evolutionary Microbiology lab
Macarena Toll-Riera

Evolution of Networks lab
Sergi Valverde

Metazoa Phylogenomics lab
Rosa Fernandez

Microbial Ecology and Evolution lab
Javier del Campo

Phylogeny and Phylogeography of Mammals lab
Jose Castresana

Systematics, Biogeography and Evolution of Reptiles and Amphibians lab
Salvador Carranza

Genomes, Populations, and Species

Algorithms for Population Genomics
Oscar Lao

Archaeogenomics
Vanessa Villalba

Comparative Genomics lab
Tomàs Marquès-Bonet

Evolutionary Genomics lab
Arcadi Navarro

Evolutionary Population Genetics lab
Elena Bosch

Evolutionary Systems Biology lab
Jaume Bertranpetit

Genomics of Individuality lab
Francesc Calafell

Human Genome Diversity lab
David Comas

Human Population Genomics
Tábita Hünemeier

Complexity of Life

Biology and Ecology of Abundant Protists lab
Daniel Richter

Complex Systems lab
Ricard Solé

Evolution and Developmental Biology lab
Xavier Franch and David Martin

Evolution of Insect Metamorphosis lab
Xavier Bellés

Insect Reproduction lab
Maria Dolors Piulachs

Multicellgenome lab
Iñaki Ruiz-Trillo and Elena Casacuberta

Nutritional Signals in Insects lab
Jose Luis Maestro

Joint Program on Evolutionary Medical Genomics (CRG-UPF-IBE)

Associated Unit in Paleobiology (IBE-ICP)

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