



DARWIN
Bioprospecting Excellence

ABOUT US

DARWIN is an SME founded in 2016 by scientists from the University of Valencia (UV) and the Higher Council for Scientific Research (CSIC). Our headquarters are located in the Science Park of the University of Valencia, and our activity is focused on the field of microbial bioprospecting, that is, on the **isolation, selection and characterization of natural microbial strains with applications in industry**.

Our bioprospecting services are based on **the combination of traditional cultivation approaches with the use of multi-omic technologies**, which leads us to provide a holistic interpretation of the projects we carry out. The innovative nature of our strategy has been recognized in internationally renowned scientific journals, such as Nature Biotechnology and Nature Methods (Vilanova et al., 2016; Tanner et al., 2017; Marx, 2017).

We have three microbiology and molecular biology laboratories that are fully equipped for the execution of bioprospecting projects. Furthermore, we have a stable workforce of highly qualified researchers in the field of microbiology and microbial biotechnology, including PhDs. in Biotechnology and Biological Sciences, predoctoral researchers, and graduates in Biotechnology, Biochemistry and Biomedical Sciences.

DARWIN's value proposal is based on our *know-how* of microbial ecology, our innovative approaches and our experience in industrial applied microbiology.

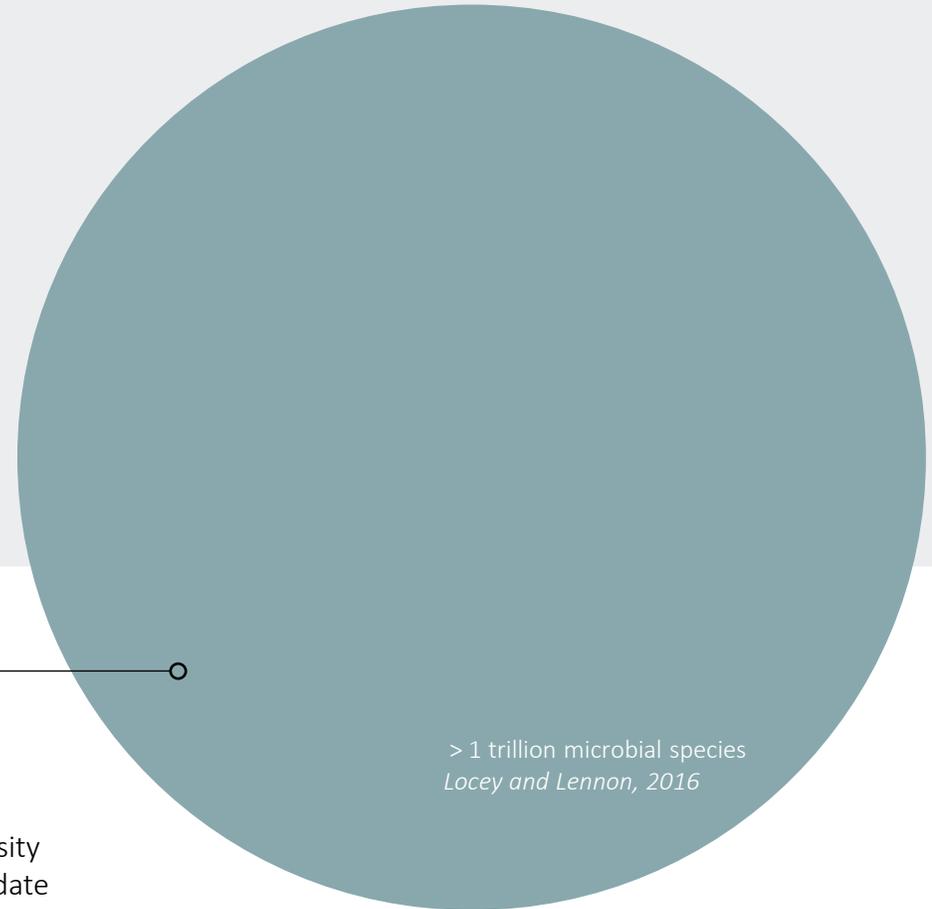


MICROBIAL BIOPROSPECTING

Microbial diversity is everything except random: **microorganisms are the result of evolution and adaptation.** This provides us with an incredible arsenal of unique and **useful tools** that can be used in a wide range of **industrial applications.**

“Everything is everywhere but the environment selects”
Baas Becking, 1934

Fraction of microbial diversity explored up to date



ENERGY & ENVIRONMENT

We analyse the **composition of environmental microbial communities with both culture-dependent and culture-independent** (high-throughput sequencing) approaches. We have a vast experience in the bioremediation of contaminated sites and in the optimization of biogas production.

Applications:

- Optimization of organic agriculture.
- Improvement of soil quality.
- Improvement of anaerobic digestion processes.
- Biorremediation of contaminated water.
- Circular economy.
- Biodegradation of recalcitrant plastics.

Methodology:

Biostimulation and bioaugmentation. Real-time monitoring of microbial communities with portable sequencing strategies.





FOOD INDUSTRY

Microorganisms are key in **the production of fermented foods and beverages**, such as kefir, beer, wine or sourdough bread. In this process, the microbial starter culture determines not only the organoleptic qualities of the final product, but also its nutritional profile. We offer a wide range of microbial food starters and we also develop personalized starter cultures that are able to give the product the specific characteristics that the client desires.

Applications:

- Sourdough bread production.
- Fermented beverages: beer, wine, kombucha.
- Dairy products: beer, kefir, cottage cheese.
- Preservation of raw meat products.
- Aroma production.
- Probiotics and personalized nutrition.

Methodology:

End-to-end solutions, from problem detection to product design and implementation.



PROBIOTICS

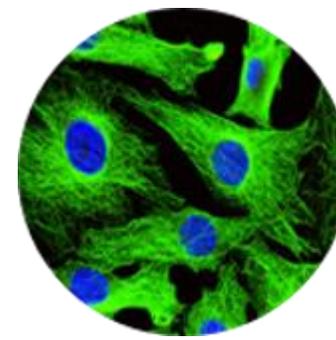
Probiotics are **live microorganisms that remain active in our gut and provide health benefits**, for example, through modulation of our microbiota or by interacting with our immune system. Aside from having a large collection of potentially probiotic strains for both human and animal use, we develop probiotic strains with specific activities adapted to our client's needs.

Applications:

- Antioxidant/anti-inflammatory effects
- Gut-brain axis
- Essential aminoacids and vitamin production

Methodology:

HTP screening systems based on prokaryotic and eukaryotic models, and possibility of human trials.





MICROBIAL SEQUENCING

By sequencing the total DNA of a sample, we can **identify and quantify all the microbial species that are present**: bacteria, fungi, yeasts and other eukaryotes. This method can be applied to study practically any microbiome, such as soil, water, food or human-associated. We offer personalized consultancy services adapted to each particular project.

Applications:

- Analysis of the human gut microbiota.
- Quality control and pathogen detection in foodstuff.
- Monitoring and tracing of epidemiological outbreaks that can affect animal health.
- Monitoring of microbial-based industrial processes.
- Quality control in soil and water.

Methodology:

Integrative analysis of multi-omic data, leading to a comprehensive view of community ecology.

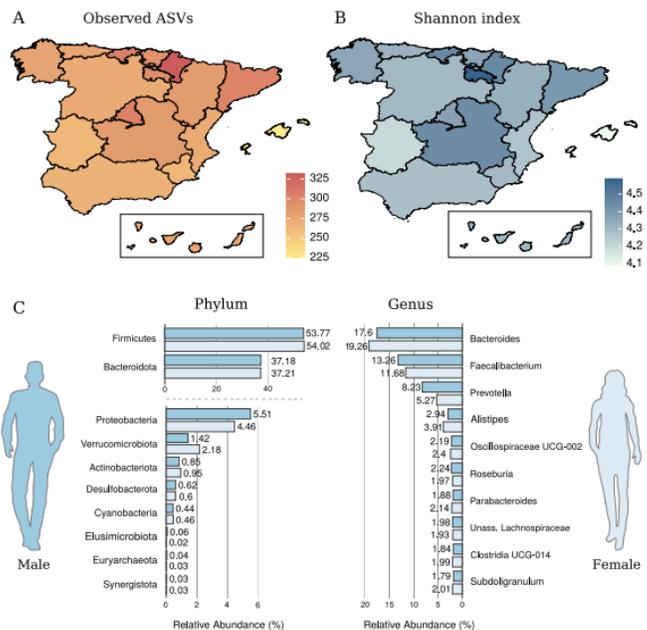




OPEN **The Spanish gut microbiome reveals links between microorganisms and Mediterranean diet**

Adriel Latorre-Pérez^{1,2}, Marta Hernández^{2,3}, Jose Ramón Iglesias², Javier Morán³, Javier Pascual¹, Manuel Porcar^{1,4}, Cristina Vilanova¹ & Luis Collado⁵

Despite the increasing evidence of links between human gut and health, the number of gut microbiomes that have been studied to date at a country level are surprisingly low. Mediterranean countries, including some of the most long-lived and healthy countries in the world, have not been considered so far in those studies at a large scale. The main objective of this work is to characterize the gut microbiome of a healthy adult population of a Mediterranean, paradigmatically healthy country: Spain. Stool samples from 530 healthy volunteers were collected, total metagenomic DNA extracted, and the microbial profiles determined through 16S rRNA metataxonomic sequencing. Our results confirm the associations between several microbial markers and different variables, including sex, age, BMI and diet choices, and bring new insights into the relationship between microbiome and diet in the Spanish population. Remarkably, some of the associations found, such as the decrease of *Faecalibacterium* with age or the link of *Flavonifractor* with less healthy dietary habits, have been barely noticed in other large-scale cohorts. On the other hand, a range of links between microorganisms, diet, and lifestyle coincide with those reported in other populations, thus increasing the robustness of such associations and confirming the importance of these microbial markers across different countries. Overall, this study describes the Spanish “normal” microbiome, providing a solid baseline for future studies investigating the effects of gut microbiome composition and deviations in the adherence to the Mediterranean diet.



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OUR COLLECTION OF MICROBIAL STRAINS

As a result of our intensive R&D work, today we have our own collection of more than 1.200 microbial strains, isolated from multiple natural environments and belonging to more than 250 different species. This collection is available to our clients to search for activities of interest. Among the main applications of the strains, the following stand out:



PROBIOTIC STRAINS

Lactobacillus spp. (20 species, 149 unique strains), *Saccharomyces* spp. (2 species, unique strains), *Pediococcus pentosaceus* (2 unique strains), *Leuconostoc* spp. (2 species, 12 unique strains), among others.

Main applications: gut health, stimulation of the immune system, antioxidant effect, etc.



FOOD STARTERS

Lactobacillus spp. (20 species, 149 unique strains), *Pichia* spp. (6 species, 24 unique strains), *Acetobacter* spp. (5 species, 18 unique strains), *Lactococcus* spp. (2 species, 4 unique strains), among others.

Main applications: industrial production of sourdough bread, aroma production in plant-based fermented milk, food preservatives, etc.



ENVIRONMENT & ENERGY

Pichia occidentalis (2 unique strains), *Escherichia fergusonii* (9 unique strains), *Lactobacillus fermentum* (6 unique strains), *Acetobacter cibirongensis* (1 unique strain), *Enterobacter* spp. (3 unique strains), among others.

Main applications: biofertilizers, bioremediation, wastewater treatment, improved biogas yield and quality, etc.





Caracterización microbiota natural asociada a frutos secos

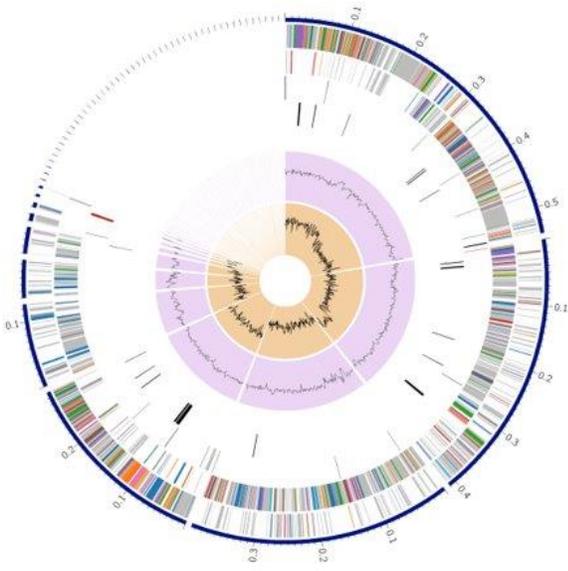
Aislamiento y caracterización de especies potencialmente probióticas

Diseño y validación de un método de incorporación a frutos secos crudos

Aislamiento y caracterización de especies potencialmente probióticas

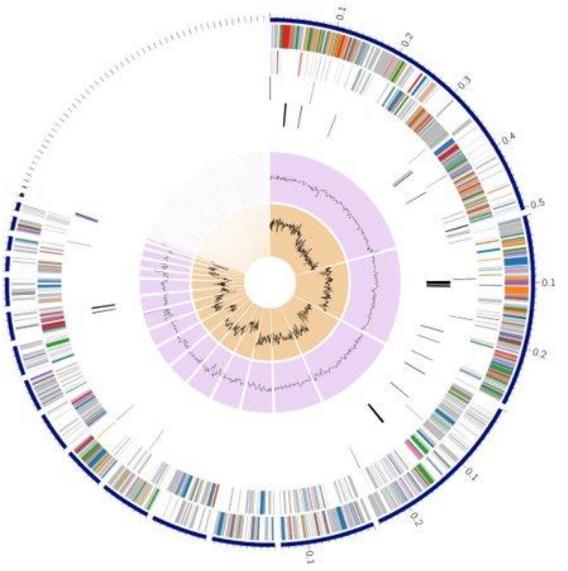
Pediococcus pentosaceus I12

Aislado de cacahuete



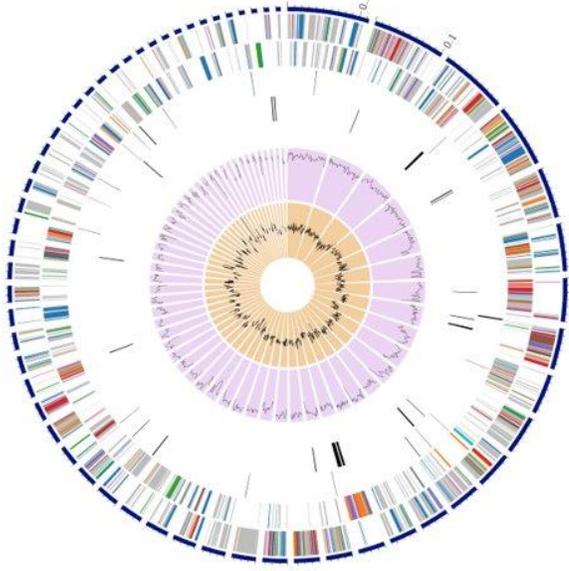
Pediococcus pentosaceus I25

Aislado de pistacho



Lactobacillus fermentum I20

Aislado de almendra

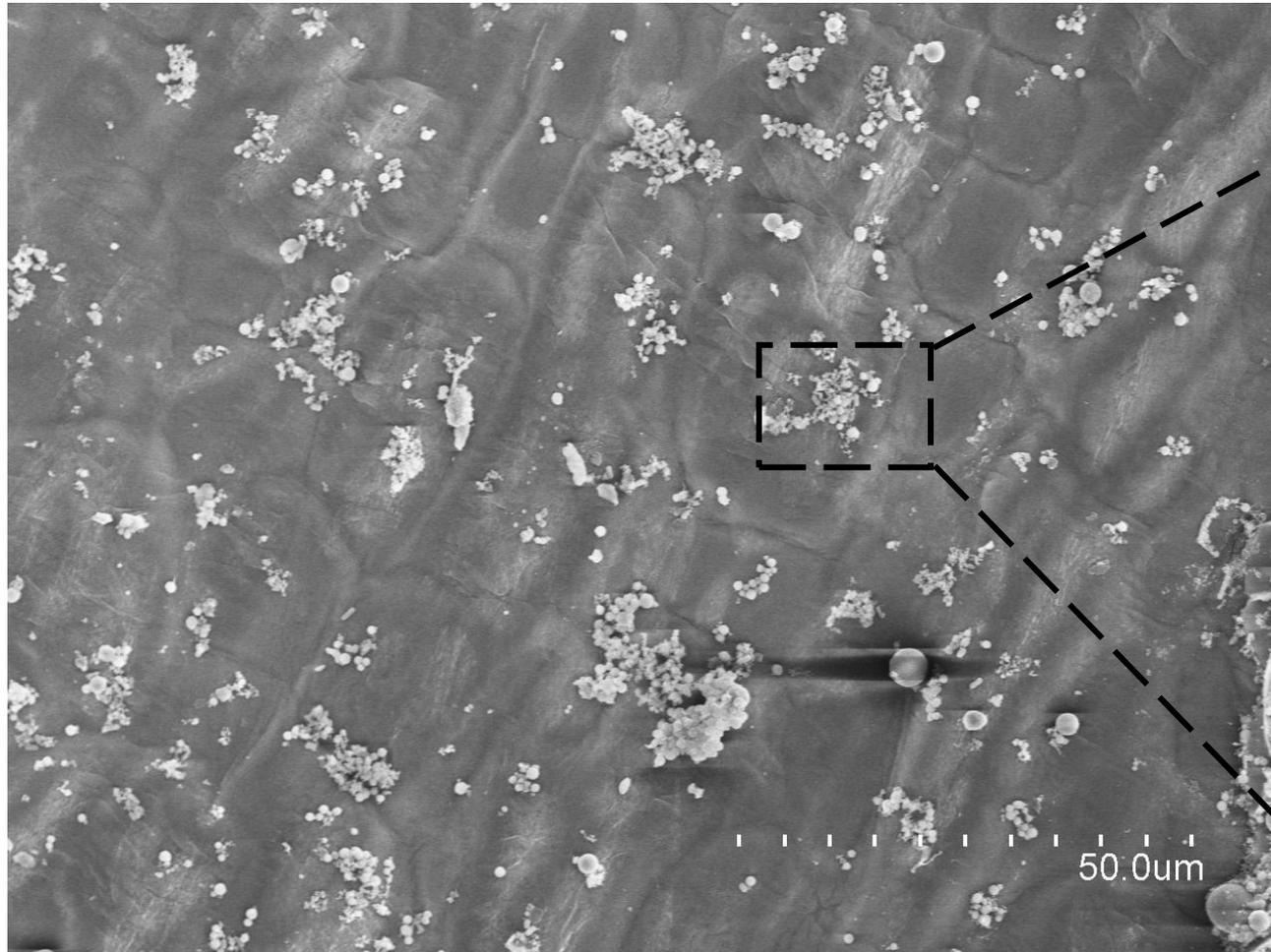


Aislamiento y caracterización de especies potencialmente probióticas

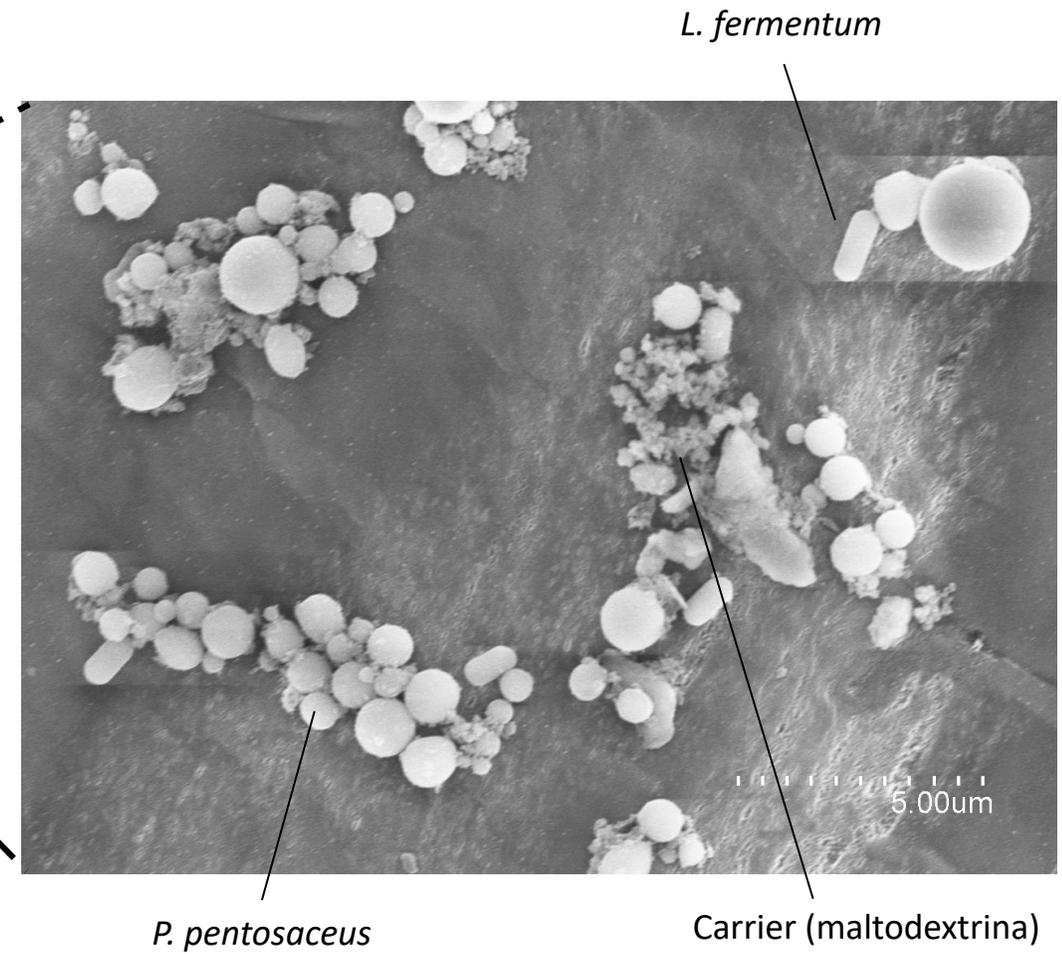
- Resistente al paso por el tracto gastrointestinal humano
- Capacidad de adhesión al epitelio intestinal
- Especie GRAS/QPS
- Ausencia de genes de resistencia a antibiótico
- Ausencia de otros factores de virulencia
- Ausencia de genes de biosíntesis de aminas biogénicas (putrescina, cadaverina, etc.)
- Estabilidad genómica
- **Efectos relacionados con anti-inflamación y sistema immune**
- Alto rendimiento de fermentación en condiciones industriales
- Alta supervivencia a la liofilización



Diseño y validación de un método de incorporación a frutos secos crudos



**Superficie de almendra non-pareil cruda
suplementada con el mix de probióticos**



LA FIRMA MANTIENE LA SENDA DE EXPLORAR NUEVAS LÍNEAS ENFOCADAS EN LA SALUD

Importaco diversifica con una nueva gama de frutos secos enriquecida con probióticos

Aíslan bacterias probióticas propias de los frutos secos con beneficios antioxidantes y antiinflamatorios



Archivo - Teresa Cercós y Amparo Devesa en el laboratorio - IMPORTACO - Archivo

Importaco impulsa una investigación pionera

Demuestra que los frutos secos son una fuente de microorganismos probióticos





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