



Xtremolife

Advancing Sampling and screening of Extremophile Microorganisms for biodiscovery of Bioactive Compounds from Volcanic, Desert, and Polar Ecosystems

SUMMARY: The EU-funded project XTREMOLIFE aims to accelerate the bioprospecting and biodiscovery of extremophile microorganisms from desert, polar, and volcanic environments, as well as the identification of their bioactive compounds, including enzymes, metabolites, and novel chemical agents. Supported by a €4.5 million budget from Cluster 6 of the Horizon Europe programme, the project unites 11 partners across five European countries, the Netherlands, Norway, Portugal, Spain, and France, to foster cross-border collaboration in pursuit of its ambitious goals.

INFORMAL SUMMARY: Xtremolife wants to go to the toughest places on earth to find the toughest microbes. We want to understand what makes them thrive in places where most life forms would die. This can help us understand how life works (even outside of the planet) and to make novel drugs, enzymes and bioactive compounds. Xtremolife will deliver a data base of EU extremophilic culture collection (EXTREMO-BANK), select newly isolated strains, study their metabolism, scale up their production, produce a exploitation roadmap and businesses cases, and execute an unusual communication plan.

XTREMOLIFE: An EU Initiative to Unlock the Biotechnological Potential of Extremophiles

Extremophiles are microorganisms that thrive under **extreme environmental** conditions such as high salinity, intense heat or cold, and highly acidic or alkaline pH levels. These remarkable organisms are of great scientific interest across disciplines, from ecology and evolution to studies on the origins of life and the search for life beyond Earth. Because their habitats are difficult to access and cultivate, extremophiles remain a **largely untapped source of bioactive compounds** with significant scientific and industrial potential.

Aligned with the **European Union's ambition for a circular and sustainable blue bioeconomy**, the **XTREMOLIFE project** applies cutting-edge biotechnology and environmentally friendly approaches to advance the understanding of extremophile organisms and explore their potential applications.

The project investigates **remote and extreme environments** that are challenging to reach due to their harsh climatic and physicochemical conditions. To support this, **deployable and portable sensor and sampling platforms**, including the *FerryBox*, *XTREMOsensor*, and **machine learning-based**



microscopic imaging systems, are being developed. These innovative tools can operate from ships, small vessels, or during on-site expeditions and will be deployed in **extreme aquatic ecosystems** such as the **Antarctic** (polar, cold, variable salinity), the **Canary Islands** (volcanic, high temperature, low pH, arid), and the **Tabernas Desert** in Spain (desertic, hypersaline, high temperature, low rainfall). The systems will deliver **real-time environmental data** to optimize sampling and collection strategies, expanding the frontiers of field research in these unique environments.

In parallel, XTREMOLIFE will explore the **extensive culture collections of extremophiles** maintained by project partners, a valuable but still underexplored resource. The project aims to elucidate how these microbial communities thrive, interact, and can be harnessed for **industrial applications** in fields such as **pharmaceuticals, chemistry, and biotechnology**.

Project Objectives: Uncovering the Potential of Extremophilic Microorganisms

- **Develop and optimize tailor-made sampling methods** to explore and better understand extreme environments, ensuring all activities comply with EU regulations on ethics, safety, and responsible research in science and technology.
- **Investigate marine and other aquatic ecosystems** characterized by complex and extreme conditions, focusing on **extremophilic microorganisms** that can survive and thrive in such challenging habitats.
- **Uncover the metabolic, physiological, and adaptive mechanisms** that enable extremophiles to withstand harsh ecological conditions, providing new insights into their unique survival strategies.
- **Optimize the cultivation and production of bioactive compounds** from extremophilic microorganisms under **industrially relevant, safe, and sustainable (SSbD)** conditions, advancing the potential for innovative biotechnological applications.

Original outreach strategy: Public engagement through Micropia Museum and citizen-science program in touristic cruises



Beyond its scientific ambitions, XTREMOLIFE will distinguish itself through original and engaging communication and outreach activities, developed in partnership with two major institutions. A collaboration with the **Micropia Museum in Amsterdam**, which welcomes around **110,000 visitors** annually, will include a series of interactive initiatives such as daily lab talks, a “Microbe of the Month” feature, and a temporary exhibition linked to the project during its final six months.

In parallel, a citizen science program led by **NIVA in collaboration with Viking Cruises** will bring XTREMOLIFE to a broader audience. Through the **Viking Cruise Citizen Science Program**, around **1 million passengers** per year will have the opportunity to attend daily lectures where scientists present the project’s approaches and results, watch informative videos and documentaries, and visit onboard laboratories to engage directly with the research.



Kick-off in the Netherlands: Partners meet in person to launch the project

The project officially launched on **October 1, 2025**, marking the beginning of a **48-month initiative** scheduled to conclude on September 30, 2029. The kick-off meeting, held from **8 to 10 October** at **Wageningen University**, the **coordinating institution**, provided a crucial opportunity for partners to meet in person. This gathering allowed for detailed planning of the project’s launch and upcoming activities, laying a strong foundation for the work ahead.



XTREMOLIFE Project Partners: A Consortium of Leading European Institutions and Innovators

The XTREMOLIFE consortium brings together **11 partners** from **five European countries**, the Netherlands, Norway, Portugal, Spain, and France, representing a balanced mix of academic, research, and industrial expertise:

- **Wageningen University (WU)** – University, Netherlands
- **Algreen B.V.** – Private company, Netherlands
- **Norsk Institutt for Vannforskning (NIVA)** – Research institute, Norway
- **Nord Universitet (NORD)** – University, Norway
- **GreenCoLab** – Collaborative research laboratory, Portugal
- **Universidad de Las Palmas de Gran Canaria (ULPGC)** – University, Spain
- **Fundación Canaria Parque Científico Tecnológico de la Universidad de Las Palmas de Gran Canaria (FCPCT-ULPGC)** – Research foundation affiliated with university, Spain
- **CIIMAR** – Research institute, Portugal
- **Erdyn Consultants** – Consulting company, France
- **Micropia** – Science museum and research foundation, Netherlands
- **Fykia Biotech** – Biotechnology company, Portugal
- **Universidad de Huelva (UHU)** – University, Spain



PRESS CONTACT:
 Marine BELLON
 European Project Consultant | Erdyn
 marine.bellon@erdyn.fr | +33 6 95 10 73 41