



ANNUAL REPORT

2024

CIIMAR | INTERDISCIPLINARY CENTER OF MARINE AND
ENVIRONMENTAL RESEARCH OF THE UNIVERSITY OF PORTO

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About LEGE-CC

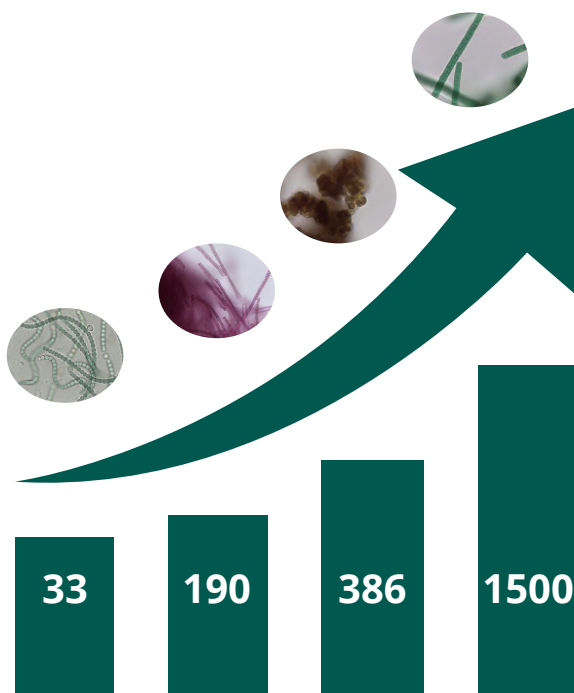
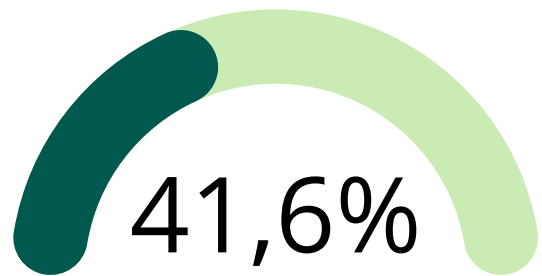
Our Story

The Blue Biotechnology and Ecotoxicology Culture Collection (LEGE-CC) is a biological resource center located at the Interdisciplinary Center of Marine and Environmental Research (CIIMAR). Established in 1991, LEGE-CC holds the distinction of being Portugal's oldest culture collection of its kind. It started with just 45 strains from Portuguese ecosystems, today, the collection contains over 1 500 different strains of cyanobacteria and microalgae. These invaluable resources have played a pivotal role in the creation of the Portuguese Blue Biobank. LEGE-CC is also affiliated with esteemed organizations like the World Federation for Culture Collections (WFCC) and the European Culture Collections Organization (ECCO), as well as research infrastructures like EMBRC and MIRRI. LEGE-CC has achieved ISO 9001 certification, a mark of quality and excellence in its management and service.

Similar to other biological resource centers around the world, LEGE-CC aims to provide various services, including the distribution of starter cultures for different purposes, isolation and identification of strains, strain deposit, consultancy, and training courses. LEGE-CC serves as the core source for numerous projects and scientific studies, with strains undergoing screening for various purposes such as anti-cancer, anti-biofouling, anti-microbial, anti-biofilm, anti-obesogenic, and related health applications, cosmetics, and food production. LEGE-CC has made concerted efforts to explore both national and international locations, focusing on underexplored environments, isolating diverse microorganisms to increase the availability for biotechnological diversity and providing the collection with a unique geographical and phylogenetic richness.



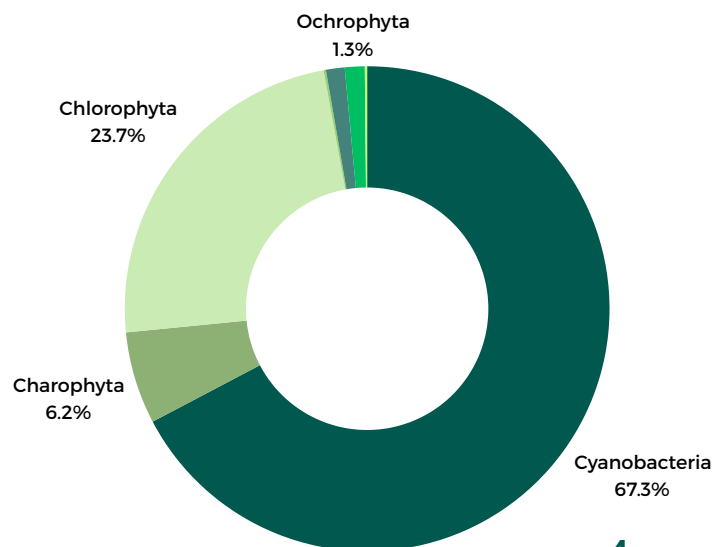
Over the past five years, the strains provided by LEGE-CC have contributed to the publication of over 700 scientific papers, resulting in three patents and the sequencing of more than 50 genomes. This represents approximately 41.6% of the strains requested during this period, showcasing the significant impact of our collection on scientific research and its publication in peer-reviewed journals.

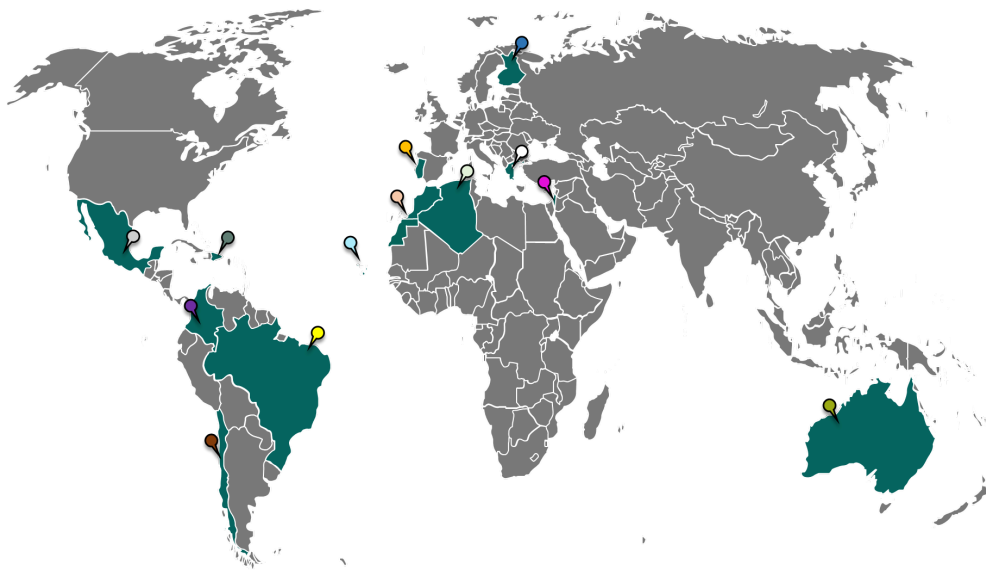


LEGE-CC has demonstrated significant growth over the years, reaching approximately 1,500 cyanobacterial strains in 2024. These strains now represent nearly 70% of the collection, reflecting the core focus of the researchers' work.

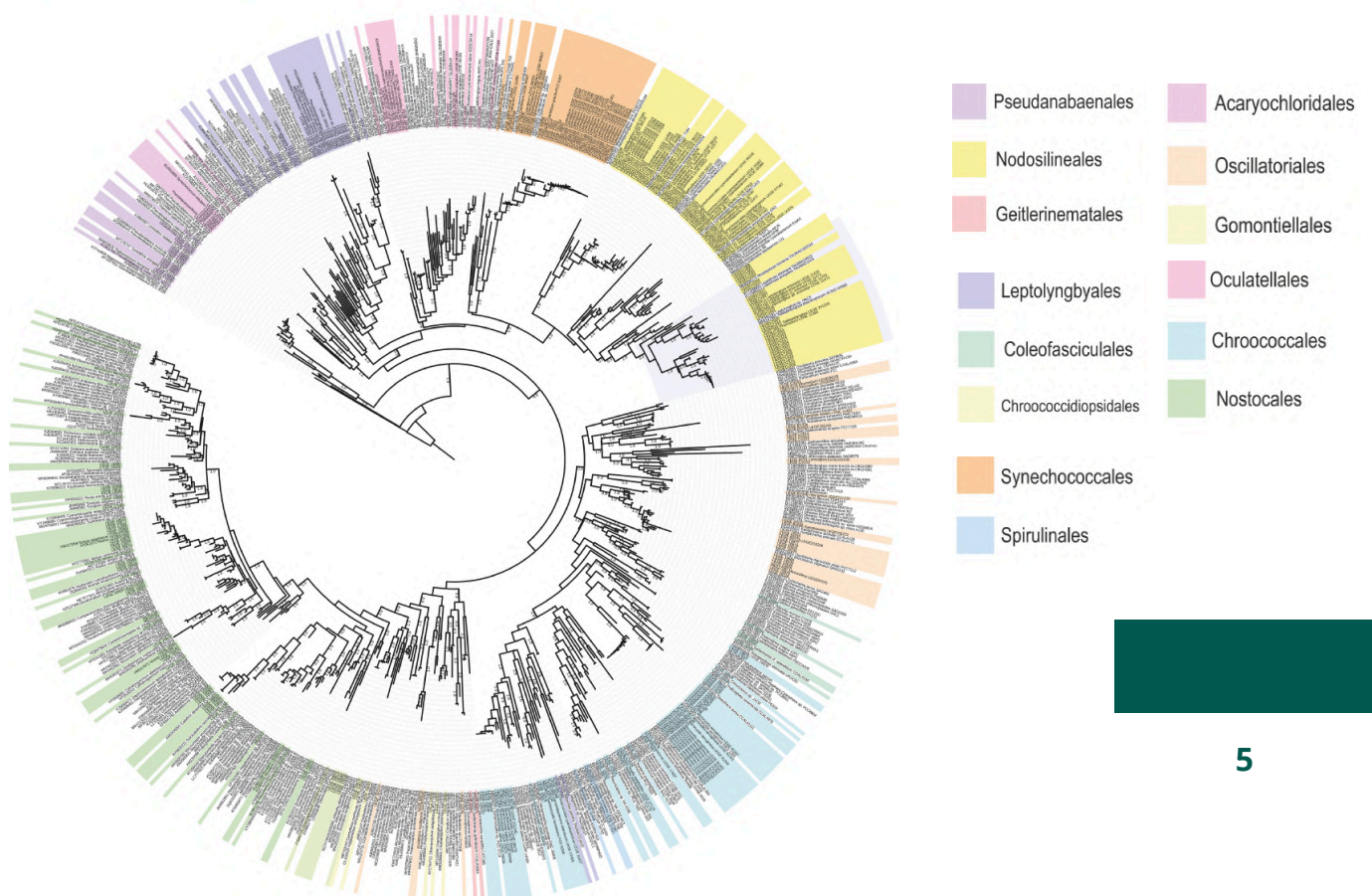
Despite only a fraction of LEGE-CC strains being explored to date, in previous studies, the collection demonstrated great potential, serving as an excellent resource for these addressing contemporary challenges.

LEGE-CC strives to be recognized as one of the world's leading culture collections, renowned for its significant scientific and technological contributions. Its mission includes advancing the economic potential of cyanobacteria and microalgae, promoting the preservation of microbial biodiversity, and driving technological innovation and biotechnological applications for these microorganisms.





The Culture collection holds strains isolated mainly from Portuguese territory, including the Azores and Madeira archipelagos and incorporates diverse environments such as freshwater, marine, brackish, and terrestrial habitats. In addition to Portugal, strains have been collected from various countries worldwide due to the sampling trips made by the staff team, including Australia, Brazil, Bolivia, Chile, Colombia, Morocco, Mexico, the Dominican Republic, and Cape Verde. LEGE-CC has made concerted efforts to explore both national and international locations, focusing on underexplored environments, isolating diverse microorganisms to increase the availability for biotechnological diversity and providing the collection with a unique geographical and phylogenetic richness.



Team

Director | Vitor Vasconcelos

BSC IN BIOLOGY, FACULTY OF SCIENCES, UNIVERSITY OF PORTO | MSC IN APPLIED ECOLOGY, FACULTY OF SCIENCES, UNIVERSITY OF PORTO | PHD IN BIOLOGY, FACULTY OF SCIENCES, UNIVERSITY OF PORTO



And all started with the first *Microcystis aeruginosa* strains isolated since 1991 from several water bodies in Portugal during my PhD thesis in Toxicology of cyanobacteria at the Faculty of Sciences of Porto University, with some work done also at the University of Helsinki (Finland) and at the Wright State University, Dayton, Ohio (USA). My research interests were initially the toxins produced by cyanobacteria and their impact in environmental and human health and resulted in the first Monitoring Program of Toxic Cyanobacteria in Portugal together with the General Directorate of Health. But cyanobacteria produce much more than just toxins and lately my research interests also deal with unraveling bioactive compounds produced by cyanobacteria using genomic, proteomic and bioassay guided approaches. The Blue Biotechnology and Ecotoxicology Culture Collection has expanded to more genera, species and environments (marine, brackish and freshwater, soil), and I am interested to find new bioactive compounds with pharmaceutical, cosmeceutical, nutraceutical and antifouling properties.

Curator | Raquel Silva

BSC IN APPLIED BIOLOGY, UNIVERSITY OF MINHO | MSC MOLECULAR BIOLOGY, BIOTECHNOLOGY AND BIOENTREPRENEURSHIP IN PLANTS, UNIVERSITY OF MINHO | POS-GRADUATED IN QUALITY CONTROL, FACULTY OF PHARMACY, UNIVERSITY OF PORTO



Born in Madeira and living in Braga, I initiated my academic path at University of Minho, where I completed my BSc degree in Applied Biology (2015). Having developed particular interest on the medicinal uses of plant bioactive compounds, I enrolled the master course in Molecular Biology, Biotechnology and Bioentrepreneurship in Plants, in University of Minho (2018). In 2017 I took part of the ERASMUS+ program and initiated my master thesis in the Department of Biosciences of Università degli Studi di Milano. During this project I had the opportunity to improve techniques including in vitro culture, genetics and transcript/protein analyses and also computational/statistics among other molecular and biochemical approaches. I initiated my professional path at CIIMAR in 2019 where I integrated LEGE-CC team mainly responsible for maintenance on a molecular level with the identification of strains. Currently I work as the Curator of the Blue Biotechnology and Ecotoxicology Culture Collection (LEGE-CC). My job within the culture collection is to manage the team and assure the maintenance of the collection, legislation related issues such as Nagoya Protocol, management of LEGE-CC database and website. I also contribute to increase the biodiversity by isolating and identifying new strains of microalgae, mainly cyanobacteria. I am also a collaborator in the Consortium of Portuguese BlueBiobank.

Taxonomist | Guilherme Scotta Hentschke

BSC IN BIOLOGICAL SCIENCES, UNIVERSIDADE FEDERAL DE SANTA MARIA (UFSM) | MSC IN BOTANIC, UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL (UFRGS) | PHD IN BOTANIC BIODIVERSITY, INSTITUTO DE BOTÂNICA DE SÃO PAULO (IBT)

Born in Cachoeira do Sul, Brazil, in november 1982. In 2007, I have graduated in Biological Sciences in Universidade Federal de Santa Maria (UFSM). During this period, I have worked with phytoplankton from freshwater systems, with main focus on green algae. In 2009, I completed my master degree in Universidade Federal do Rio Grande do Sul (UFRGS), working with Chlorococcales from the freshwater Laguna dos Patos, in Brazil. In 2014, I obtained my PhD title in Botanic Biodiversity, with emphasis in cyanobacterial taxonomy, at Instituto de Botânica de São Paulo (IBt). My thesis encompassed primarily a taxonomical study of the terrestrial cyanobacteria from coastal regions of the Atlantic Rainforest, São Paulo, Brazil. Furthermore, I have tested the antioxidant potential of the respective isolate strains. I also have taught from 2014 to 2018, for medical sciences undergraduation courses at Universidade Luterana do Brasil (ULBRA) – campus Cachoeira do Sul, and I worked at the same place as Research Coordinator. During 2019, I have been a Post-Doctoral student in European Blue Biobank (EBB) project. Currently I work at CIIMAR and LEGE-CC as taxonomist of Cyanobacteria and microalgae.



Technician | Carlos Pinheiro

BSC IN BIOLOGY, UNIVERSITY OF AVEIRO | MSC IN APPLIED BIOLOGY, UNIVERSITY OF AVEIRO, WITH SPECIALIZATION IN TOXICOLOGY AND ECOTOXICOLOGY

Originally from Amarante, I completed a degree in Biology at University of Aveiro (4 years). In 2009, I have joined to the Laboratory of Ecotoxicology Genomics and Evolution (LEGE) research group, nowadays designated as Blue Biotechnology and Ecotoxicology (BBE), to do my academic internship (1 year) focused on the “Effects of cyanobacterial extracts and pure toxins on the growth of microalgae”, under the supervision of the Doctor Vitor Vasconcelos (BBE) and Doctor Susana Loureiro (CESAM & Department of Biology, University of Aveiro). During the internship, I had the opportunity to work with cyanobacterial strains, their cyanotoxins (namely, microcystin-LR and cylindrospermopsin) and possible implications to the aquatic environment. With this internship, my research interest in toxins produced by cyanobacteria and their impact in aquatic environmental health had grown and, therefore, in 2010 I decided to continue in this research area and initiate my master thesis intituled as “Joint toxicity effects of cyanotoxins and chemical compounds”, focused on binary chemical mixtures between cyanotoxins and naturally occurring chemicals such as metals and pesticides. In 2012, I completed my master’s degree in Applied Biology (2 years), with specialization in Toxicology and Ecotoxicology, under the supervision of the Doctor Vitor Vasconcelos (BBE) and Doctor Susana Loureiro (CESAM & Department of Biology, University of Aveiro). Currently, I am working as a technician on Blue Biotechnology and Ecotoxicology – Culture Collection (LEGE-CC) giving technical support on the maintenance and development of the collection by isolating and identifying new strains of microalgae and cyanobacteria using molecular tools.



Infrastructures

Culture Collection Room



Our culture collection rooms are categorized into prokaryotes and eukaryotes, specifically housing cyanobacteria and microalgae. Both rooms are maintained under controlled conditions to ensure optimal growth of the microorganisms. Each strain in these rooms is cataloged and identified with a unique LEGE code, accompanied by its specific growth medium, and two copies of each strain are preserved.

Temperature - 19°C

Photoperiod - 12/12h light/dark cycles

Light intensity - 10-30 $\mu\text{mol photons m}^{-2} \text{ s}^{-1}$

Isolation Room

Our isolation room houses all environmental strains received at CIIMAR and initiates the isolation process. This room is maintained under specific conditions, distinct from those in the culture collection room, allowing us to sustain cultures that thrive only at higher temperatures. Additionally, it features an incubator designed to support strains that grow at lower temperatures. The strains in this room are organized by sampling site and are identified using user codes rather than LEGE codes.

Temperature - 22-24°C

Incubator - 3-70°C

Photoperiod - 14/10h light/dark cycles

Light intensity - 10-30 $\mu\text{mol photons m}^{-2} \text{ s}^{-1}$



Services

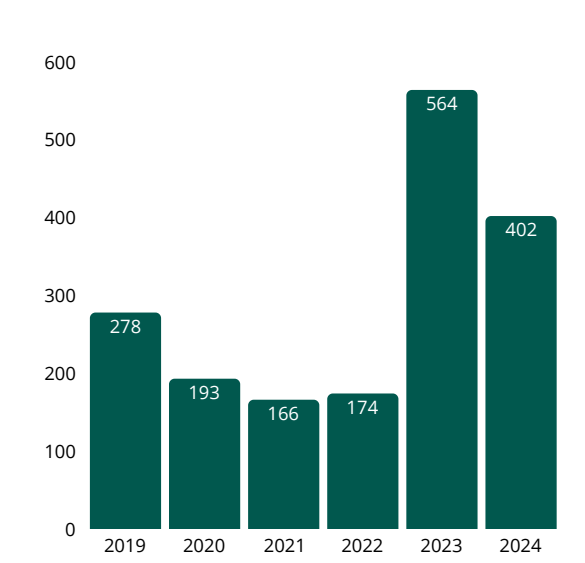


LEGE-CC offers a variety of services, leveraging the diversity of our collection, our expertise, and certified processes. Our team of specialists has a strong background in molecular biology and genetics, complemented by a taxonomist with expertise primarily in cyanobacteria and microalgae.

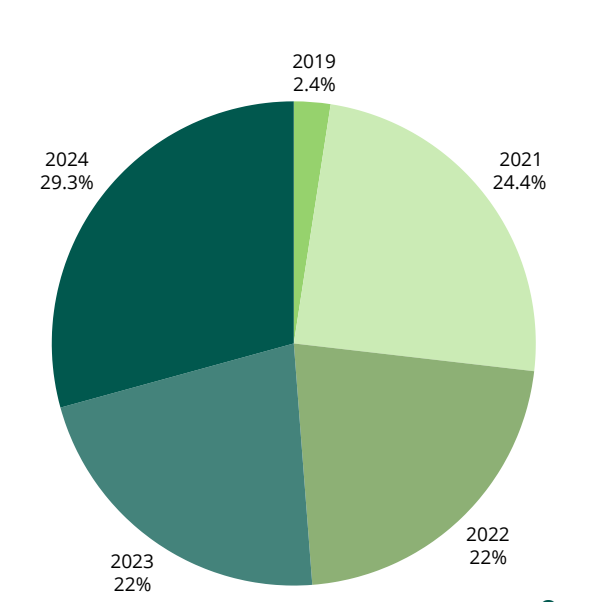
Our primary focus is the supply of cultures, and our team excels in essential techniques such as the isolation and identification of cyanobacteria and microalgae. We also offer consultancy services for external projects as well as for our in-house researchers.

If you wish to entrust your strains to our care, we provide a strain deposit service.

Number of strain requisitions over the last 5 years



Percentage of sales over the last 5 years



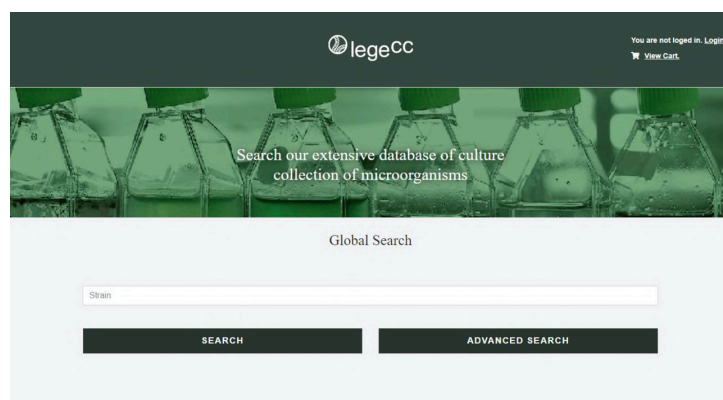
Website and database

Since 2017, we have maintained an online catalog featuring 400 cyanobacteria strains. Researchers use this catalog to select strains that best suit their investigations and projects.



To enhance researchers' access to the collection, we have improved our social media channels, particularly our website. The website now features a searchable database, allowing users to explore and find information tailored to their research needs.

In this database, you can customize your search using filters such as environment, habitat, morphology, genera, color, and pH.



As part of our efforts to enhance accessibility and user engagement, we have developed an interactive website that serves as a comprehensive resource. The platform allows users to explore our services, pricing, and procedures for ordering strains. Additionally, it provides access to a curated collection of documents and protocols designed to support effective work with microorganisms.

Highlights of 2024

ISO 9001 Certification: A Milestone Achievement for LEGE-CC



In the past year, LEGE-CC achieved the prestigious ISO 9001 certification, a testament to the quality and efficiency of our management processes and services. This certification underscores our unwavering commitment to adhering to rigorous standards and fostering continuous improvement.



By attaining this certification, LEGE-CC has reinforced its mission to deliver outstanding services in the preservation and distribution of cultures. Our dedication to excellence ensures that we consistently provide reliable and high-quality outcomes, strengthening the trust and satisfaction of our partners and clients.

This significant accomplishment positions LEGE-CC to make even greater contributions to the field of marine biotechnology. It enhances our ability to respond effectively to the evolving needs of the sector, upholding the values of safety, reliability, and innovation that define our work.

This milestone reflects our ongoing efforts to drive progress and create value.



Dissimination and Events



LEGE-CC established social media channels to strengthen its public presence. For example, since April 2024, the LinkedIn account has gained nearly 350 followers, while the Facebook page has attracted almost 700 followers within the community.

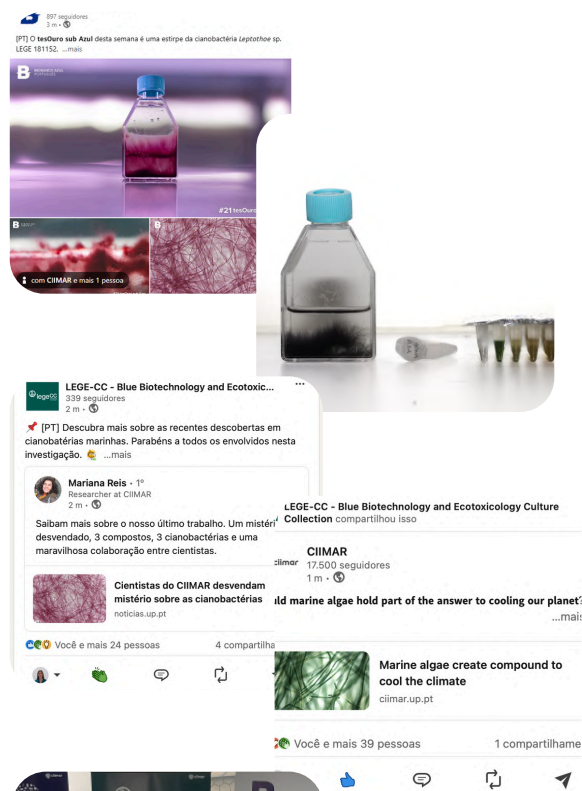
TO ENSURE A STRONG AND CONSISTENT SOCIAL MEDIA PRESENCE, WE HAVE FOCUSED ON DELIVERING HIGH-QUALITY AND RELEVANT CONTENT. KEY HIGHLIGHTS INCLUDE:

tesOuro sub Azul: a Portuguese BioBank initiative, have been shared to raise awareness about our strains and their applications.

Academic Updates: Regular updates on newly published research papers have been shared to keep followers informed of our latest scientific contributions.

Behind-the-Scenes Insights: Content showcasing our daily activities has been posted to offer a glimpse into our work and foster a connection with the community.

These efforts have contributed to sustaining our visibility and engagement across social media platforms.



Scientific Communication

LEGE-CC team actively participated in international conferences such as ISAP24 and ALGAEUROPE24, showcasing their work in preserving and providing high-quality strains while emphasizing the role of cyanobacteria as a sustainable resource and their biotechnological applications.



Through presentations and workshops, the team highlighted advancements in taxonomy, genomics, and biotechnological applications, fostering interdisciplinary collaboration. Their presence also facilitated networking, strengthening partnerships with researchers, industry, and promoting the collection as a critical resource for the global scientific community.

In the past year, LEGE-CC achieved the publication of several papers in prestigious scientific journals. These publications played a crucial role in sharing groundbreaking advancements in the taxonomy and identification of cyanobacteria with the broader scientific community. The primary objective of these publications is to identify as many cyanobacteria as possible, ensuring their availability to our researchers for further study and application

Publications 2024

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Hentschke G. S., Santos K. R. d. S., Mattos L. d., Oliveira F. & Vasconcelos V. 2024. — A journey through Cyanobacteria in Brazil: a review of novel genera and 16S rRNA sequences. *Cryptogamie, Algologie* 2024 (6): 63-75. <https://doi.org/10.5252/cryptogamie-algologie2024v45a6>. <http://cryptogamie.com/algologie/45/6>

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TECHNICAL INFORMATION

Title: Annual Report 2024

Organization: CIIMAR -Interdisciplinary Center of Marine and
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World Federation for Culture Collections

