



CATOLICA

CBOF · CENTRE FOR BIOTECHNOLOGY AND FINE CHEMISTRY
ASSOCIATE LABORATORY

PORTO

ANNUAL REPORT

2021



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1.1 Letter from the Board of Directors

It is our pleasure to share some of our centre's highlights and main achievements of 2021. At CBQF we understand the meaning of resilience, hard work, and hope, and we know that to reach the most impactful results, we need to be ambitious, creative, and push the limits our conventions, schedules, or borders.

We believed from the start that this year would again be inspirational - however, our expectations were surpassed, in the quantity, and above all, quality, of the outputs achieved. We were proud to support 67 doctorates, and to see our staff grow to +240 members, 117 of which holding a PhD. Our staff was very successful at applying and securing international funding from H2020, PRIMA and other sources. Of note, three international projects coordinated by CBQF initiated in 2021: two H2020 projects - RADIANT and STARGATE and the PRIMA ReCROP. Our expansion was also relevant regarding industry collaborations. We were present in the global community, through active collaborations, accepting invitations from all over the world to showcase our research results and strategies, but also locally, were CBQF continues to inspire the younger generations to pursue their passion for science in the areas of biotechnology and its broad applications.

CBQF celebrated its 30 years throughout 2021, including a series of high-level seminars in emerging topics relevant to CBQF's research areas; an exhibition of vintage equipment that brought nostalgia to our centre, as well as an endearing exhibition of drawings made by the children of CBQF's researchers. Celebrations culminated in a conference where we hosted Gunter Pauli, one of the fathers of the Circular Economy and author of the book Blue Bioeconomy.

Although 2021 was still marked by the Covid pandemic, CBQF, supported by the perseverance of our researchers was able to continue developing high impact research in the safest conditions. The combination of applied and fundamental research that defines our Centre allowed a response to societal and industrial challenges in its main areas of intervention, via the development of new products, applications, patents and growth of new and emerging areas of research.

Aiming at promoting the career development, CBQF implemented a new Training Programme for its researchers, with a series of workshops, mentoring sessions and training modules, including transferable skills. Also, CBQF designed and implemented its first plan of incentives to reward the efforts of its researchers. In line with the challenges imposed by the Associate Laboratory statute, and the development of its researcher's careers, CBQF will promote the implementation and monitoring of a research career path. At the same time, the researcher career statutes will be prepared by UCP in 2022. This will allow the consolidation of research teams and to retain and attract talent.

CBQF's vision to assure more international visibility and recognition in Science and Innovation deserved internal analysis, leading to the implementation of a stepwise strategy for the next 5 years. CBQF continues the commitment with its mission and the rigour that has characterised the centre for its now (over) thirty years of existence, and we wish to heartedly thank our staff, collaborators, and partners for their continued support.

1.2 About Us

Board of Directors

CBQF is coordinated by a directive board, with new members nominated in 2020.



MANUELA PINTADO
CBQF Director



ANTÓNIO RANGEL
Head of External Relations and Post-Graduation Activities



MARTA VASCONCELOS
Head of Scientific Strategy and Internationalization



FRENI TAVARIA
Head of Infrastructure and Scientific Platforms



JOÃO CORTEZ
Head of Funding, Sustainability and Career Development

Advisory Board

The External Advisory Board is composed of worldwide experts in CBQF's thematic areas, to ensure scientific excellence through the right steering of activities and yearly critical evaluation of performance, with suggestions for the future of the Centre.



JOSÉ TEIXEIRA
Full Professor
UMinho



MARGARIDA OLIVEIRA
Full Professor
UNL | ITQB NOVA



MARIA ASCENÇÃO REIS
Full Professor UNL |
LAQV@REQUIMTE |
UCIBIO



MARK VAN LOOSDRECHT
Full Professor
TU Delft



PAUL FINGLAS
Head of the Food Databanks National Capability,
Quadram Institute

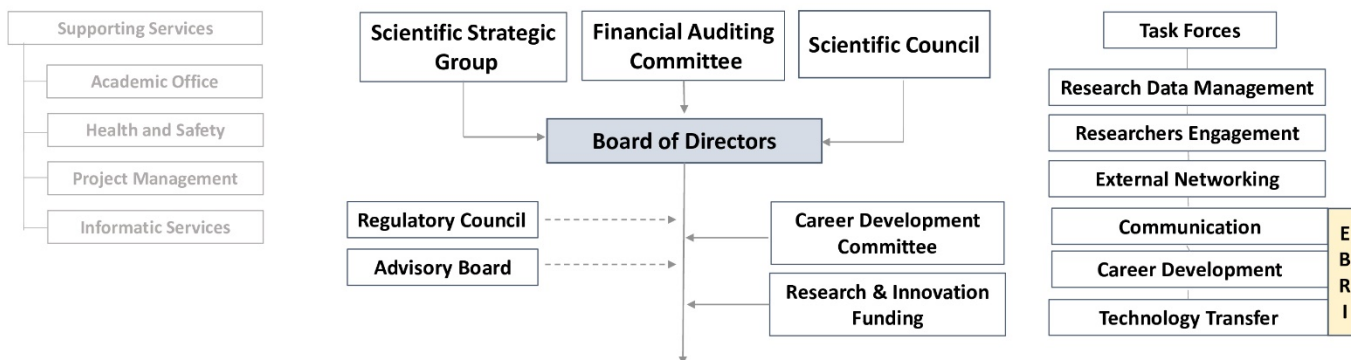


ROBERT HALL
Deputy Business Unit Manager Bioscience
Wageningen University, Professor



LUIS MESQUITA DIAS
President
AHSA

Governance



THEMATIC LINES

Environment and Resources

Automation and Miniaturization
 Bacterial Ecology
 Environmental Biotechnology & Resources
 Plant Nutrition & Biotechnology for Sustainability

Food and Nutrition

Food Safety & Microbiology
 Food Processing & Engineering
 Nutrition and Health

Biobased and Biomedical Products

Biomaterials & Biomedical Technology
 Bioactives & Bioproducts Research
 Metabolomics

Fermentation Solutions

Strain Design & Fermentation
 Biomolecules Innovation
 Valorisation of Fermentation Byproducts

RESEARCH PLATFORMS

Analytical Chemistry
 Structural Analysis

Consumer & Sensory
 Bioactives

Packaging & Materials
 Kitchen Lab

Cell Culture & Molecular Biology

2. WHO WE ARE

2.1. People

CBQF is only as rich as the people that work in the Centre, the remarkable men and women who push the boundaries of science and technology with their creativity, knowledge and determination.



240 RESEARCHERS



**6% INCREASE
FROM 2020**

117 RESEARCHERS WITH PHD

7 ARE COLLABORATORS **11** TECHNICIANS



2.2. Students



67 PhD
Students,
8 concluded
their theses



56 MSc
Students
concluded,
15 international

2.3. Publications

Data from 31 December 2021

 **211** ARTICLES IN INTERNATIONAL INDEXED JOURNALS



 **86%** IN COLLABORATION WITH NATIONAL/INTERNATIONAL ENTITIES

 **58%** OPEN ACCESS

 **11,853** CITATIONS (2021)

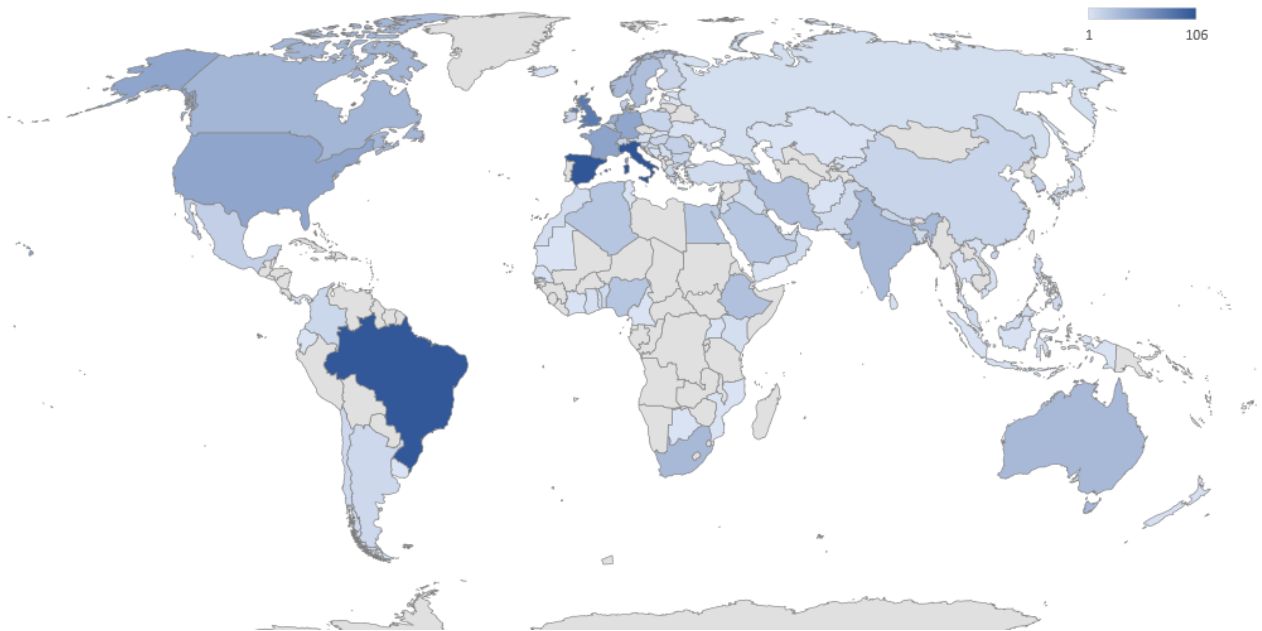
 **17** BOOKS/CHAPTERS

CBQF HAS AN H-INDEX OF **104**

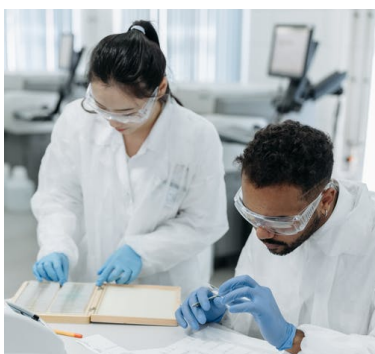
CBQF researchers published +810 indexed publications in the last 5 years. The quality and relevance of our publications is also reflected by the >41,770 citations during this period. In 2021, most articles were published in top international journal in the first quartile (80%) and 90% are in Q1+Q2.

2.4 Internationalisation

International collaborations resulting in indexed peer reviewed papers in the last five years.



Internationalisation and collaboration are key traits of our culture. CBQF has published indexed peer reviewed papers with institutions from 116 countries in the last 5 years, along with collaborative projects, participation in networks and organization of events with other institutions - contributing to a fertile environment to produce multi- and interdisciplinary knowledge in a multinational and culturally diverse context.



21 international researchers
13 countries

Data from 31 December 2021.

2.5 Leading Innovation

20 Patent Applications submitted in 2021

40 Active Patent Families

Innovation Programmes

(Number of Teams in each programme)
 Ecotrophelia Europe (2); Born from Knowledge (2); HiSeedTech (2); H-Innova (1)

Entrepreneurship projects

Involving: 22 MSc Students;
 12 Researchers
 Delivering: 22 Prototypes and Business Plans

Leading knowledge transfer projects for 3rd countries (Erasmus+):



ARMDOCT
 ERASMUS+ PROJECT



Coordinating a Regional Project in Knowledge Transfer of R&D:



EBRI - European Bioproducts Research Institute

EBRI is a knowledge valorisation and knowledge transfer centre in Bioproducts field, based on the relationship between CBQF, the School of Biotechnology (ESB), and the scientific and business stakeholders in this business area, both nationally and internationally.



EBRI's goal is to intervene in the scientific, social, and economic communities, through the development of integrated training, R&D + I, and Technology Transfer initiatives within the general scope of Biotechnology, enabling itself as a forum for promoting the spirit of R&D + I, in a humanist perspective. It also aims to contribute to the development of integrated biotechnology-based entrepreneurship initiatives, especially at the level of pre-incubation of companies and encouraging the emergence of start-ups, increasing business-academia synergies.

3. CUTTING EDGE RESEARCH

Currently, activities are supported by thirteen Laboratories structured in four Thematic Lines that embrace societal challenges related to sustainability, society wellbeing and global economy.

ENVIRONMENT AND RESOURCES

The Environment and Resources Thematic Line aims at developing innovative approaches to environment and sustainability challenges, working towards specific national interests and internationally relevant topics in frame of the UN 2030 Sustainable Development Agenda goals. Research includes: i) identifying emerging chemical and biological hazards and associated risks in human impacted habitats and developing mitigating methods; ii) developing strategies for wastewater and soil treatment contributing to foster opportunities to move towards a circular economy model; iii) devising integrated strategies to plant production in face of new biotic and abiotic environmental challenges. The thematic line is organized in four laboratories:

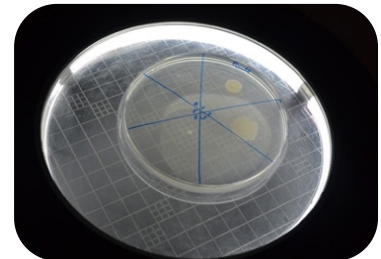


Automation and Miniaturization

Develops novel sample processing and sensing methods for monitoring key environmental parameters and emerging pollutants.

Bacterial Ecology

Explores the bacterial diversity in the interface humans-environment, with special emphasis on the impacts caused by humans and associated risks for human health and wellbeing.



Environmental Biotechnology and Resources

Microbial based processes for pollutants degradation and wastewater treatment and valorisation, focused on aerobic granular sludge technology; phyto-management of soil; and bioinoculants for sustainable crop production.

Plant Nutrition and Biotechnology for Sustainability

Works in the areas of plant nutrition and biotic stress, understanding the mechanisms that control nutrient uptake, transport and storage, simulating current and future climate change scenarios.



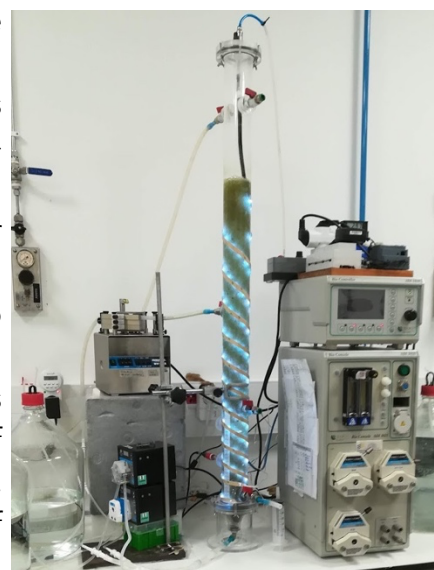
Main Achievements in 2021

In 2021, new analytical methods based on flow-based systems were developed for the determination of iodine in salt and algae, chromium (VI) and bromate in waters, iron, and manganese in soil leachates. These methods displayed working dynamic concentration intervals compatible with the content of these species in the aforesaid matrices.



Environmental and clinical multidrug resistant bacteria (*Escherichia coli*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa* or *Staphylococcus aureus*) were compared based on genomic analyses and when possible, on phenotypic testing. These studies unveil the capacity of the same genetic elements and acquired genes to thrive in both types of environments. Metagenomics data produced by the groups and their partners and public database are supporting the identification and design of adequate antibiotic resistance markers in waters and soils. These tools will be used for testing and validation using field samples. A policymaking report commissioned by JRC-EU was prepared addressing antibiotic resistance-related risks, mitigation and monitoring strategies to include in the revised Wastewater Directive under preparation.

Granular sludge systems based on bacteria and/or microalgae proved to be an interesting option to treat different types of industrial wastewater (agri-food, chemical and pharmaceutical) and, the surplus biomass produced in those systems a feasible material to recover bio-based products, contributing to a Circular Economy model. Selected elite bacteria able to degrade wastewater pollutants are valuable for devising bioaugmentation processes, especially when immobilized in bio-based materials recovered from surplus biomass. The group also evaluated the synergetic effects of bioinoculants and soil amendments (biochar) on the mitigation of different abiotic stresses in crop production in agriculture and in the phytoremediation of contaminated soils, contributing to increasing soil quality and health. Field experimental plots were monitored to assess the contribution of such a strategy to foster soil health and crop production.



A new H2020 project dealing with valorisation of sustainable food chains utilizing underutilized crops started in 2020 (RADIANT). The project will monitor the progress of 20 AURORA farms across Europe that are implementing resilient and dynamic value chains. The impact of sustainable farming practices dealing with legume valorisation was demonstrated at the farm and at the food product level. The group monitored the success of the first Portuguese Legume consortium of stakeholders that completed their field trials with participatory farmers that aim to transition to legume-based farming systems in the north of Portugal. The comprehensive nutritional characterisation of the vast collection of legumes for food, feed, and non-food uses was expanded to include non-nutrients, such as canavanine, polyphenols, tannins and saponins. The mechanisms of disease resistance for several plant pathogens, in particular the kiwifruit bacterial canker and the pinewood nematode were further elucidated, and new elicitors were tested to induce crop resistance.

FOOD AND NUTRITION

The overall objectives of this Thematic Line are centred on promoting the health and wellbeing of the citizen - focusing on the EU priorities for high standards of safe, nutritious and affordable food, aligned with the 2030 Agenda goals. Challenges throughout the food chain are tackled using innovative research, education and outreach strategies by a multidisciplinary team focused on:

i) Microbiological quality and safety of foods; ii) The interface between public health nutrition and food science/technology; iii) High quality and safe foods, through development and optimization studies using engineering as a tool.



Food Microbiology

Focus on safety and quality, including the adaptation, survival and virulence of microorganisms to stresses imposed by the food supply chain, microbial ecology studies, biological control strategies and impact of microbial metabolites.

Food Processing and Engineering

Contributing to high quality and safe food products via development and optimisation studies using engineering as a tool. Transport phenomena and kinetics are studied to improve thermal and non-thermal processes (osmotic dehydration, UV radiation, ozone treatments, ultrasound), packaging systems as well as shelf-life prediction. Novel technological approaches are used in developing added value foodstuffs with extended shelf-life.



Nutrition and Health

Focusing on firming research at the interface between public health nutrition and food science/technology, thereby maximizing research translation including dietary assessment tools improvement, setting of links between dietary intake and health, study of new functional products with food bioactives (algae/legumes/cereals) and their impact on biological function including gut microbiome. New encapsulation approaches are studied for bioactives/next generation probiotics.

Main Achievements in 2021

Research on food safety issues is transversal to the various laboratories. Innovative clean-label decontamination methods targeting the main foodborne pathogens established, combining non-thermal treatments with biological hurdles (bacteriocins, plant extracts and phages). Anti-SARS-CoV-2 strategies were developed for the textile industry, building on the Lab's experience in antimicrobial technologies in the food area.

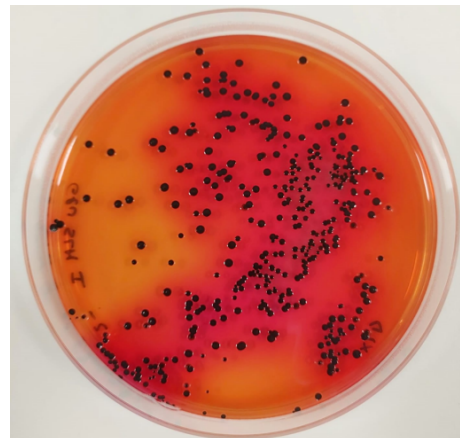
More than 500 *Listeria monocytogenes* genomes were sequenced, in collaboration with the National Health Institute Doutor Ricardo Jorge. Novel pathways of cross-contamination of foodborne pathogens in domestic environments revealed. New insights on the interaction between microorganisms and the chemical composition of wines and its role in sensory attributes. Mild processes such as ultrasound were used coupled to less severe thermal treatments for the processing and production of high quality and safe juices. Valorisation of the residues of several fruits into valid food ingredients were attained, via transformation into gluten-free, nutrient-rich dehydrated flours with interesting rheological properties. Their use as pastes, with high fibre content, enabled fat replacement in several pastry recipes. A natural healthy mixed fruit leather snack with long-term storage was developed, contributing to the increasing demand of consumers seeking healthier and more natural products. Different extraction methods for specific bioactive compounds from vegetable by-products and/or residues from the food industry and from microalgae were used and optimized. Adequate packaging for microalgae extracts started to be developed.

Sensory and consumer science studies were used to establish and explore the sensory properties of food products, decode consumer's product experience and predict products market performance. Prototyping different Products and Processes, including technical and economic viability studies, looking ahead to possible knowledge transfer opportunities. Scale-up studies, involving different stakeholders, were developed based on patented technologies. Application of novel processes to recycle packaging materials (super critical fluids) and evaluation of their chemical safety were studied. More sustainable packaging based in cellulosic materials and olive industry wastes were developed to improve barrier properties and include active components to enhance preservation.

Within a study involving +2000 toddlers in Portugal, the early determinants of childhood obesity continued to be explored. Work on the adhesion of institutionalized elderly to the Atlantic diet was completed and less met components of the adherence index were identified. The impact of more sustainable dietary patterns incorporating legumes continued to be explored.

Different algae, cereals and legumes integrated the formulation, biological function validation and in vitro digestion of new functional foods, some in pre-validation to enter the market. Microbial produced CLNA-enriched probiotic fermented milk and avocado/coconut/pomegranate oils replacement of milk fat in yoghurt were proven successful for functionalisation of dairy foods toward lipid metabolism modulation properties.

Together with the Food Microbiology and the Bioactives and Bioproducts laboratories, novel sustainable solutions for additive/sugar/fat replacements as reformulation strategies of different food categories were studied. Spray-drying encapsulation of next generation probiotic *Akkermansia muciniphila* promoted its survival under atmospheric conditions over storage enabling its incorporation into different delivery matrices to be used as live biotherapeutics (patent application). A multidisciplinary project targeting solutions to overcome the impact of the COVID pandemic on the physical and mental health of university students was done.



Contaminated chicken

BIOBASED AND BIOMEDICAL PRODUCTS

The Biobased and Biomedical Products Research Thematic Line has been organized to combine CBQF capacity to respond to National and EU priority for future growth of Bioeconomy and Circular Economy, reinforcing capacity and opportunities on the bio-based products. The thematic line focuses on these challenges by exploring novel bioactives and bioproducts from renewable sources (including byproducts), promoting added value applications for food, quality of life and biomedical sectors and using metabolomics approaches to understand biological systems or processes. The thematic line involves a multidisciplinary team to respond to R&I challenges with a wide range of competences. Besides the thematic line receives regularly foreign researchers (ca. 10/year), reflecting the internationalization capacity and consolidated network with academia and industry, with technology transfer of eighteen patents. The thematic line is organized in three laboratories:

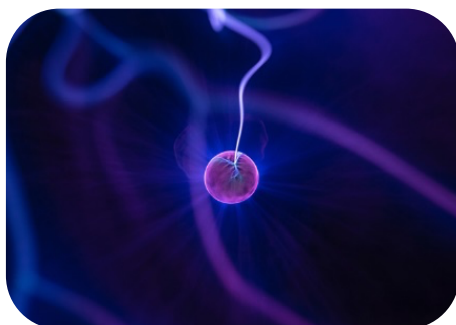


Bioactives and Bioproducts Research

Working on integrated solutions to obtain value-added molecules/products from renewable sources, including microalgae, and several agri-food by-products and losses, using bio-refinery approach and revealing composition and bioactive and functional properties to define sustainable and high added value applications towards different industrial synergies.

Biomaterials and Biomedical Technology

Research on biomaterials and biopolymer engineering for biomedical applications, focusing on wound healing and regeneration and on effective technologies for the terminal sterilization of sensitive biomedical polymers.



Metabolomics and Signal

Focused on a transversal knowledge detained by CBQF, applied to different biological systems to enable a better understanding of phenomena through signal processing. Several synergies with other internal laboratories have been established to promote CBQF value.

Main Achievements in 2021

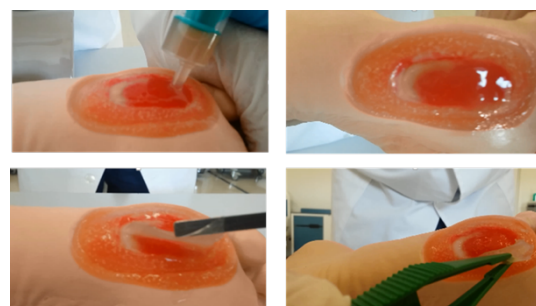
In this year, the Bioactive and Bioproducts Research Laboratory has expanded the results on developing new solutions to obtain value-added molecules/products from renewable sources.

Agrofood by-products and losses valorisation included several vegetables, mushrooms, agro-industrial biomasses, cereals and legumes (soya). Also, animal by-products, namely fish and meat samples have been studied. Undervalued renewable sources from sea as algae and microalgae and fish, from agroforest and functional oils rich in polyunsaturated fatty acids and insects were also valorised. For all derived products/molecules, the nutritional and bioactive profile and properties were studied, as well as their stability, bioavailability and impact on gut microbiome, showing potential for value added applications.

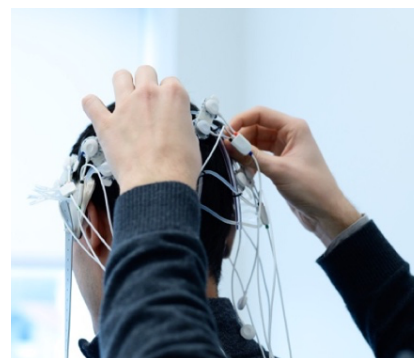
New applications were also developed mainly in food products to maximize value or complement some other industrial applications namely packaging, cosmetic, aquaculture, conservation, textiles. This resulted in collaborations and publications with 34 different institutional partners from 9 different countries with 6 new projects starting this year.



The development of new biomaterials for wound healing and regeneration is a major research line at BBT covering all aspects of the molecular design, fabrication of scaffolds and nanoparticles, physico-chemical characterisation and study of the biological behaviour of the developed systems in each of the application contexts. A new silk-based bio-aerogel particulate system has been developed to face exudative wounds, in collaboration with the University of Santiago de Compostela and in the frame of the COST Action AEROGELS. The development of sericin-based hydrogels is presently under the financial support of project HYDROSER for its international patenting. A new National project has also started, TEX4Wounds: "Development of Advanced Textile based Materials for the Treatment of Wounds" (POCI-01-0247-FEDER-047029). The use of supercritical CO₂ to assist in the decellularization of biological tissue has also grown onto a successful project. A collaboration protocol has been established for starting a new project on the decellularization of placental tissue for regenerative medicine applications. The area of microbial ecology has continued the work along the lines of understanding the mechanisms underlying probiotic adhesion to keratinocytes and the abiotic factors influencing this adhesion. The development of oro-dispersible films containing probiotics to control unwanted microbial proliferation was also evaluated. Furthermore, a collaboration within the same thematic area with another group using 3D skin models to acquire and correlate biological / biomedical data collected by biosensors and thermography in attempts to automatically evaluate the stage of wound healing was done. The application of image processing techniques enabled the collection of patterns of microbiological activity throughout wound healing.



The Metabolomics and Signals Laboratory continued the work interacting with the other internal laboratories focused on data analysis applied to different biological systems (fermentation, physiological events, etc.). Signal processing methodologies have also been used to enable a deeper understanding of phenomena.



FERMENTATION SOLUTIONS

The Fermentation Solutions Research Thematic Line focuses on white biotechnology fermentation processes, on the resulting by-products and value-added biomolecules, using renewable sources of carbon and nutrients (e.g., sugarcane). The use of white biotechnology is essential for the future competitiveness of European industry, providing a sound technological base for a sustainable society and bioeconomy and for the development of bioindustries of the future. This line works on the development and improvement of fermentation processes for industry, on finding attractive solutions for their by-products and disruptive applications for the produced biomolecules. Applied research and market driven innovative solutions for cosmetic and skin care, pharmaceutical, food and animal feed and materials applications with strong engagement of companies at an early phase of product development. Activities are settled in a profound link and interaction with European and International industries. This thematic line involves a multidisciplinary team to respond to R&I challenges with a wide range of competences, and is organized in three laboratories:

Strain design and fermentation

Uses in-house built software products for microorganism's design, genome editing tools, metabolic and physiological engineering to develop efficient fermentative processes, which are optimized on lab-scale bioreactors to obtain large amounts of value-added bio-products/biomolecules, e.g., high value terpenoids for the pharma, cosmetic, and food industries.



Biomolecules innovation

Focused on understanding and unfolding the potential of different sustainable biomolecules produced via fermentative processes, aiming to create new products and business opportunities in the fields of cosmetics, pharma, nutrition and biomedicine.

Valorisation of fermentation by-products

Focuses on the development of integrated processes to value fermentation by-products through the use of green extraction technologies, purification processes and product formulations for cosmetic, food and animal feed industries.

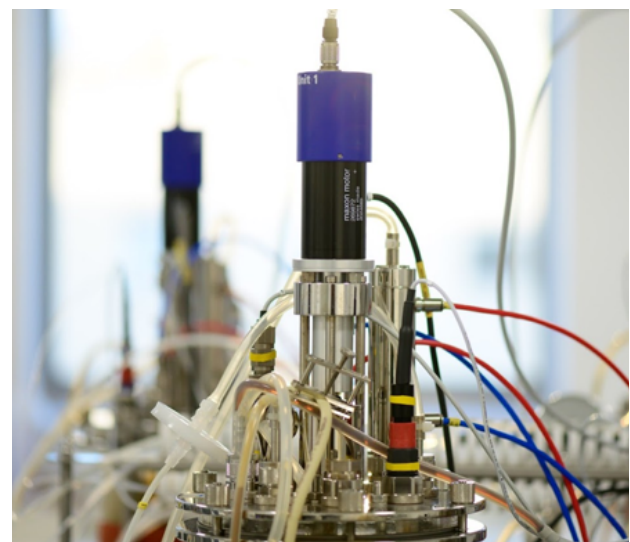


Main Achievements in 2021

The FERMENTATION SOLUTIONS Thematic Line has been working with the development and consolidation of an integrated platform of yeast design and fermentation for efficient and sustainable production of new biomolecules for pharma, cosmetic, and food industries. New biomolecules are under development by strain design using in-house built software for microorganism design, genome editing tools, metabolic and physiological engineering. In this line, a new yeast strain was designed, which will produce carnosic acid, a compound with known antimicrobial activities that can be used as food and cosmetic preservative. The FS group works with the understanding and unfold of the potential of these sustainable biomolecules produced via fermentative and compounds from residues valorisation processes, to create new product and business opportunities in the fields of cosmetics, pharma, and biomedicine. During this first year, two projects HandCare and GluVac, explored the use of squalane and beta-glucans (derived from yeast residue) on the development of products and solutions for COVID pandemic. Both projects ended this year in July and August 2021. From HandCare project four hand disinfection products were developed, three for retail and one for health professional's use. Two were hand sanitizers alcohol based, another were alcohol wipes and the last a hand washing. All having squalane in their composition as emollient and microbiome protector. GluVac project led to the development of a unique methodology to purify pharma-grade glucans suitable to be included in vaccine formulations. Three different vaccine formulations centred on glucans were developed and their value to improve prophylactic vaccines further validated in animal trials.

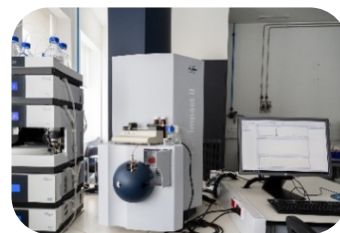
Our Bioactivities platform developed innovative ex vivo models to test and validate anti-inflammatory agents, as well as ingredients with potential to protect human skin from daily environmental aggressions, namely UV radiations and pollution particulate matter. During this year the group initiated the establishment of the skin microbiome studies, which will support the evaluation of the impact of molecules/ingredients/products on skin microbiome. A first clinical trial protocol was validated by an external expert which confirmed to obey to all requisites of the International Conference on Harmonization Guideline for Good Clinical Practice E2 (R6). In addition, the FS group is engaged to deliver positive impact in the environment and economic tissue, through R&D of science-backed solutions that will support sustainable waste management. In this context, the group has been working on the valorisation of sugarcane and fermentation side streams. This year we established three more processes of valorisation of sugarcane residues to produce ingredients from cellulose, xylan and lignin, which their process development will be accelerated for commercialization of the final products for pharmacy and cosmetics.

This year, the group established another task force besides the Process Development (P&D), focused on Sustainability Studies of the valorisation processes. Both task forces are working on product differentiation, sustainability, economics, comparative performance with benchmarks. Finally, the group has established collaboration and projects with 8 new different companies along this year to establish potential projects for the future.



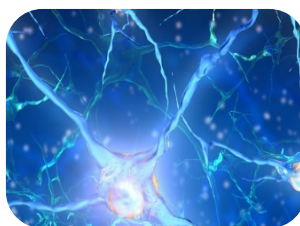
4. PLATFORMS

The specialized staff at the CBQF **Analytical Chemistry** platform work with a range of instrumental analysis possibilities, which approaches are based on mass spectroscopic, spectrometry and electroanalytical techniques, and flame detection methods.



The **Bioactives** platform offers the capacity to perform complete biochemical, biological and functional profiles of bioactive compounds and matrices and bioproducts, considering several different types of applications from food ingredients to cosmetic aimed for human or animal consumption.

The CBQF **Consumer and Sensory** platform focus on using science to establish and explore the sensory properties of food products, to decode consumer's product experience and to predict products performance in traditional and new markets.



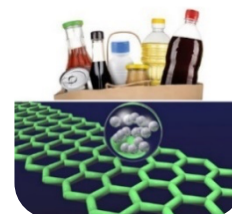
The **Structural Analysis** platform is operated by researchers in the biotechnology field and offers the capacity to perform very complete physico-chemical and morphological characterization of samples, with special focus on liquids and semi-solids aimed for human consumption or application.

The **KitchenLab** is a true atelier of food possibilities, with all needed for the design, handling and preparation of food, framed in a research center equipped with the most advanced resources in the areas of chemistry, biology, physical and sensory analysis, dedicated to food science and technology and human nutrition.



The **Cell Culture and Molecular Biology** Platform comprises: a Cell Culture Lab (screening of therapeutic or toxicological/ pathogenic activities of chemicals, materials and microorganisms) and a Molecular Biology Lab (extraction, purification and quantification of nucleic acids, and the expression and quantification of particular genes from biological samples).

The CBQF **Packaging & Materials** Platform allows the characterisation, development and testing of materials and packages, regarding safety and food shelf-life. It hosts the Portuguese National Reference Laboratory for Food Contact Materials.



5. HIGHLIGHTS

Events & Outreach



Closing Conference - 30 Years of the Centre for Biotechnology and Fine Chemistry: Celebrating the past and challenging the future, 28th Oct 2021

The 30th anniversary of CBOF deserved a year full of celebrations. Gunter Pauli, author of the Blue Economy book, gave the keynote speech in the closing event.

1st International Conference - Launch Event of INSURE.hub, 27th October 2021

The new platform, whose vision is the promotion and implementation of innovation and management processes in a circular perspective, results from the mobilization of UCP and Planetiers New Generation. Over 400 participants attended the event.



Closing session of the Mentorship Program “Comendador Arménio Miranda”, 14th October 2021

As part of the partnership between the Universidade Católica Portuguesa and Frulact, PhD students participated in the mentoring program “Comendador Arménio Miranda”.



Events

23 Biotalks & Seminars

18 Other Scientific Meetings and Conferences

Media Reach

314 Media News:

6 TV News pieces

39 News in Printed Press

267 News in Online Media

9,7 M Visualizations

1,29 M€ Advertising Value Equivalent

Coordination of International Projects

In 2021, CBQF initiated 3 international projects under its coordination:

RADIANT - Realizing Dynamic Value Chains for Underutilized Crops

RADIANT is a European project that aims at promoting crop diversification, environmental and agrobiodiversity preservation, and fair economic development through the valorization of Underutilized Crops, combating the agricultural paradigm of monoculture and industrialized agriculture. It is a multi-actor consortium (29 entities from 12 countries) composed of researchers, farmers, value chain actors and consumers.



Total Budget: €5,999,715
 Website: <https://www.radiantproject.eu/>

RECROP - Bioinocula and CROPPing systems: an integrated biotechnological approach for improving crop yield, biodiversity and RESilience of Mediterranean agro-ecosystems



Total Budget: €1,398,127
 Website: www.cbqf.esb.ucp.pt/en/recrop

CBQF works with 10 other partners across Europe and Africa to redesign Mediterranean agrosystems with improved resilience capacity and higher productivity, focusing on the development of sustainable agricultural production systems through the combined use of biotechnological tools and environmentally friendly agronomic practices.

STARGATE - Sensors and data training towards high-performance Agri-food systems

CBQF, INRAE, Wageningen UR and IPK form the STARGATE project consortium which addresses a key societal challenge: to evolve the agri-food system's practice to promote more resilient and sustainable systems, starting from more resistant, nutritious and diverse crops at farm level, to guarantee safer, healthier and sustainable options for consumers.



Total Budget: € 899,221
 Website: <https://stargate-hub.eu/>

Other Highlights



CBQF ranks among the most cited institutions in the field of research on antibiotic resistance in the environment.

CBQF renews the Associated Laboratory Statute, recognized as Excellent by the Foundation for Science and Technology (FCT).



Célia Manaia, Manuela Pintado, Paula Teixeira, Marta Vasconcelos and João Fernandes are **among the most cited researchers in the world in 2020**.



CBQF researchers together with a research group from the University of Córdoba (BIOPREN RNM-940 and HIBRO AGR-170) have patented the process of obtaining natural extract with beneficial properties from oak leaves.

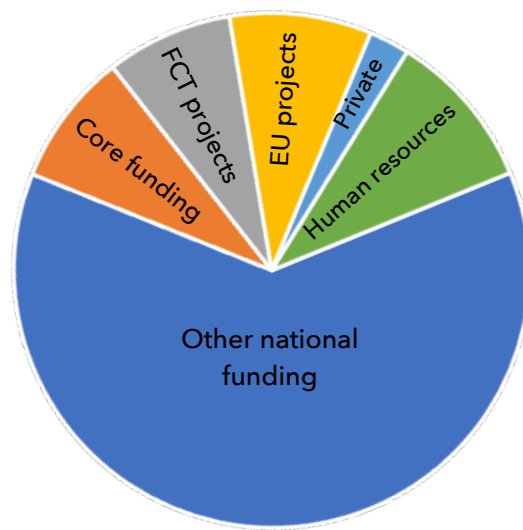
During 2021, CBQF completed one year of its Monthly Newsletter, a compilation of the latest news of the Centre, where the successes, experiences and activities are shared with all CBQF researchers.



6. FUNDING

CBQF is supported by the Foundation for Science and Technology (FCT) and competitive funding secured from national and international sources. In the past 5 years, CBQF has been granted competitive R&D funding from national (€22.9M) and international sources (3.6M€, H2020 and other international). Of note, in 2018, CBQF initiated a large >25M€ AICEP-RCI grant in partnership with Amyris Inc. In line with its applied science profile, CBQF also secured >1.5M€ from private sources.

In 2021, CBQF had 101 competitive projects running, with a total funding executed during the year of 5.7M€.



Competitive funding sources (number of projects)

