



CATÓLICA

CBQF · CENTRO DE BIOTECNOLOGIA E QUÍMICA FINA
LABORATÓRIO ASSOCIADO

PORTO



Creating value
for people

ANNUAL REPORT

2020



TABLE OF CONTENTS



1. INTRODUCTION

- 1.1. Letter from the Board of Directors
- 1.2. About Us



2. WHO WE ARE

- 2.1. People
- 2.2. Students
- 2.3. Publications
- 2.4. Internationalisation
- 2.5. Leading Innovation



3. CUTTING-EDGE RESEARCH



4. PLATFORMS



5. EVENTS & OUTREACH



6. FUNDING



7. CELEBRATING 30 YEARS OF CBQF

1.1 Letter from the Board of Directors

CBQF's position as an international reference in Biotechnology started in the 90s, and one of its main endeavours is to remain at the forefront of Biotechnology research applied to Food, Environmental and well-being challenges, despite this being a fast-paced arena, where innovation is key. This has been a motivation to strive for constantly evolving our skills and technologies, and a continuous search for creative thinking within the CBQF's collective team of researchers, students and collaborators. As a recognition of its efforts, CBQF was rated as Excellent in both the 2019 evaluation as a Research Unit and as Associate Laboratory in the 2020 evaluation by FCT.

CBQF started celebrating its 30 years in 2020. This historical benchmark set the motto for a series of celebratory activities, which included a group of high-level seminars in emerging topics relevant to CBQF's research areas, an exhibition of vintage equipment that bring us the spirit of how science was made in the past at CBQF, as well as an endearing drawing exhibition of drawings made by the children of CBQF's researchers.

During 2020, characterised by the Covid pandemic, CBQF was still able to continue developing high impact research. The combination of applied and fundamental research that portrays the nature of our Centre has allowed a response to societal and industrial challenges in its main areas of intervention, favouring the development of new products, applications, patents and development of new and emerging areas of research.

CBQF continued to grow, now hosting 229 researchers and staff, 112 of which holding a PhD. Our staff was very successful at applying and securing international funding from H2020, PRIMA and other sources, submitting 2 successful applications as Coordinator of H2020 projects. Our expansion was also relevant regarding industry collaborations.

Reflecting its expansion, CBQF created a new research line, the Fermentation Solutions Research Group, which will focus on white biotechnology fermentation processes, on the resulting by-products and value-added biomolecules, while using renewable sources of carbon and nutrients. In this Line, the Alchemy project in collaboration with Amyris delivered the first biogenic silica from sugarcane ashes, presented to the cosmetic market. Three more processes for valorisation of sugarcane byproducts to produce ingredients from cellulose, xylan and lignin are under acceleration.

Investing in its staff, CBQF initiated a Training Programme, with a series of workshops, mentoring sessions and training modules, including grant writing and technology transfer, aimed at promoting the career development of our researchers. The response to the challenges imposed by the Associate Lab rules and the increasing implementation of research contracts replacing fellowships will promote the implementation and monitoring of a research carrier pathway, at the same time the researcher career statutes will be prepared by UCP for implementation in 2022. This will allow increasing consolidation of research teams and to retain and attract talent. Also, CBQF designed for the first time a plan of incentives for implementation in 2021, to reward the efforts of its researchers and concomitantly diagnose needs and limitations to allow their progress.

Finally, CBQF's vision to assure more visibility and boost its internationalisation and recognition in Science and Innovation will deserve internal analysis, leading to the implementation of a stepwise strategy for the next 5 years.

1.2 About Us

Mission

To **provide innovative and relevant knowledge in biotechnology** contributing towards the **health and well-being of the citizen** and the competitiveness of **sustainable agri-food systems**.

Vision

To be an **international flagship biotechnology research centre**, specialized in creating **transferable knowledge to industry and society** meeting **circular bioeconomy objectives**.

The Centre for Biotechnology and Fine Chemistry (CBQF) was established in 1991 and was granted the status of Associate Laboratory in 2004, renewed in 2020. CBQF was also rated as Excellent in the latest FCT evaluation of R&D Units (2019). Its activity is focused on applied biotechnology, with emphasis in food, environmental issues and health and well-being. It holds disciplinary competencies based on biosciences, bioengineering, nutrition and analytical chemistry, applied to thematic challenges focused on the health and well-being of the citizen and the competitiveness of the agricultural and food systems.

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

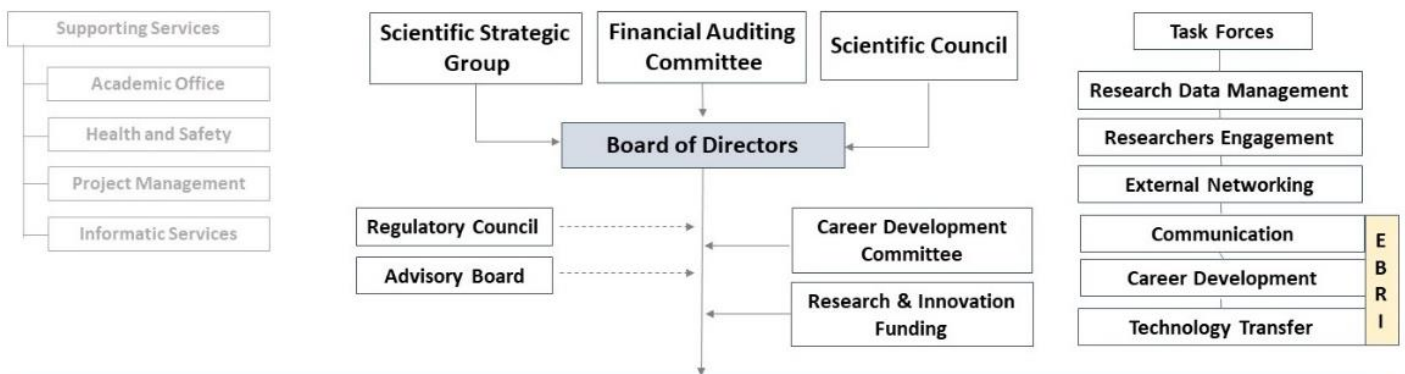


ROBERT HALL
 Deputy Business Unit Manager Bioscience
 Wageningen University, Professor



Luis Mesquita Dias
 Administrator of Vitacress

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
 Biophysics

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.



229 RESEARCHERS

112 RESEARCHERS WITH PHD

7 ARE COLLABORATORS

117 RESEARCHERS WITHOUT PHD

11 TECHNICIANS



10% INCREASE FROM 2019

Data from 31 December 2020.

2.2. Students



55 PhD
Students,
6 concluded
their theses



52 MSc
Students
concluded,
7 international



Fostering interdisciplinarity and cross-lab research work:

6 new PhD grants via the FCT pluriannual funding

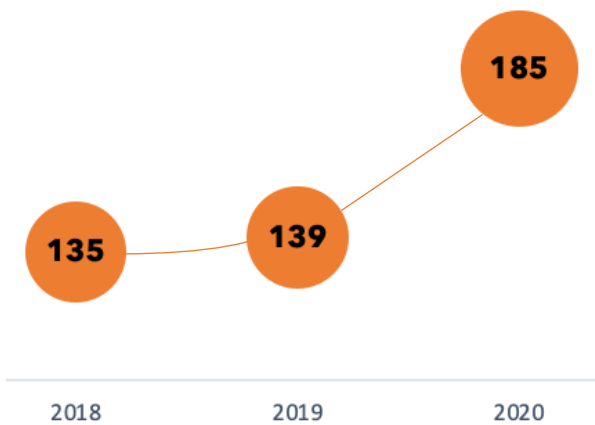
2.3. Publications

CBQF researchers published 690 indexed publications in the last 5 years. The quality and relevance of our publications is also reflected by the >35,500 citations of these articles.

In 2020, most articles were published in top international journal in the first quartile (79%) and 90% are in Q1+Q2.



185 ARTICLES IN INTERNATIONAL INDEXED JOURNALS



86% IN COLLABORATION



46 OPEN ACCESS



10,185 CITATIONS IN 2020



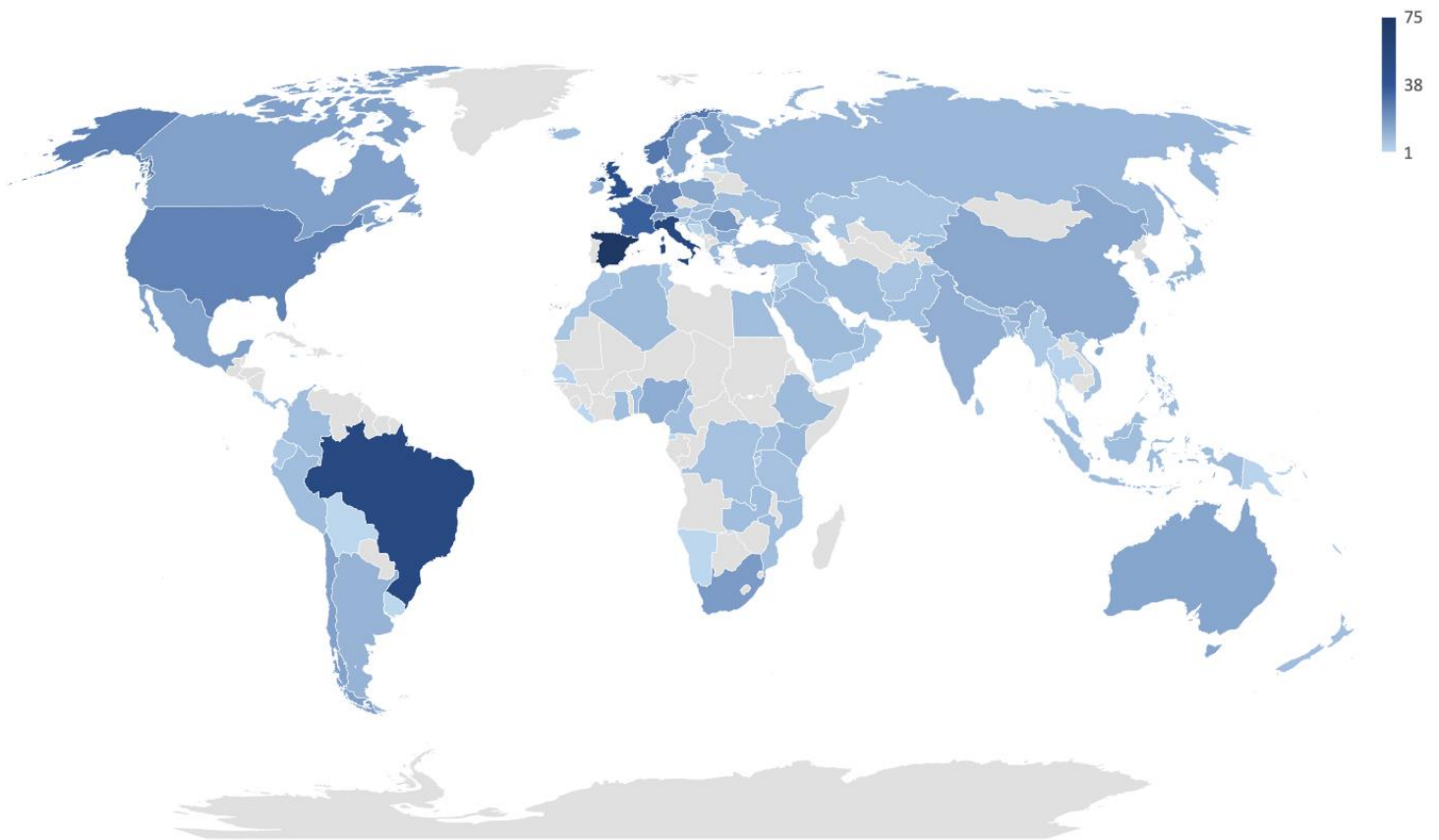
21 BOOKS/CHAPTERS

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

Data from 31 December 2020.

2.4 Internationalisation

International collaborations resulting in indexed peer reviewed papers in the last 5 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^(*)

12 countries

()Data from 31 December 2020.*

2.5 Leading Innovation

15 Patent Applications submitted in 2020

40 Active Patents

25 Laboratory Prototypes developed

Innovation Programs

Number of Research Teams:
Ecotrophelia Europe – 4; H-Innova – 1;
BioProducts Europe – 2; HiSeedTec - 1; EIT
Food - 1; Everis – 2; BfK - 1

CBQF/ESB Entrepreneurship projects

30 MSc Students
40 Researchers
25 Prototypes and Business Plans

Leading knowledge transfer projects for third countries in the context of E+:

- Capacity Building in Higher Education (SMARTI - Support for Innovative Methodology, Approaches and Tools for Teaching through the Medium of English to improve Educational Yield, Sustainability and Internationalization)
- ARMDOCT - Reforming Doctoral Education in Armenia in Line with Needs of Academia, Industry and Current EU practices.

Coordinating 2 Regional Projects in Knowledge Transfer of R&D:



Launch of **EBRI**, a Centre for Valorisation and Technology Transfer based at ESB/CBQF. Four staff were recruited to support innovation, IP management, marketing, career development and foster scientific services to the industry.



7650 Square meters

5 Floors

40 Offices

9 Classrooms

84 Laboratories

10 Meeting rooms

1 Auditorium

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. After the strategic reflection, CBQF decided to create in 2020 a new Thematic Line: the “Fermentation Solutions” thematic line, led by Raquel Madureira.

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:

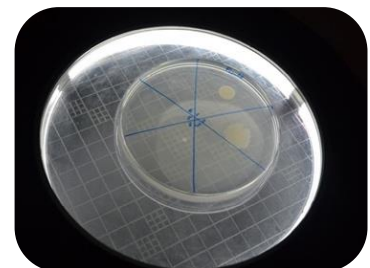


Automation and Miniaturization

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.



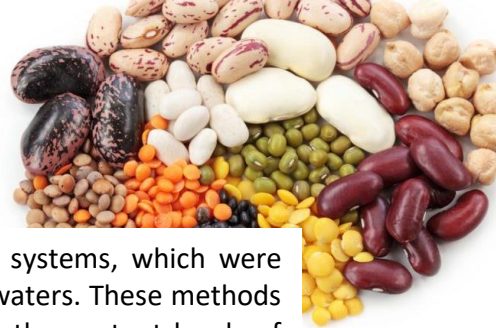
Environmental Biotechnology and Resources

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 2020

This Thematic Line delivered novel methods based on flow-based systems, which were developed for the determination of iron, copper and zinc in coastal waters. These methods displayed working dynamic concentration intervals compatible with the content levels of these metal ions in coastal waters and allowed to cope with the influence of salinity in diverse matrices. Novel methods for the automatic monitoring of phosphate and micronutrients in soils were developed. Microfluidic paper-based analytical devices were constructed to measure biomarkers (urea, nitrate, nitrite, ammonia) in non-invasive sampling associated with biological fluids (e.g. saliva).

The tolerance of wastewater and clinical multidrug resistant bacteria to stress conditions and survival in complex microbial communities was studied and revealed that wastewater and clinical isolates have similar behaviour. This conclusion is supported by genomic evidence which show that in *Escherichia coli*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa* or *Staphylococcus aureus*, evolution of antibiotic resistance may be more related to the genetic lineage than to the habitat. International antibiotic resistance monitoring in wastewater environments is an ongoing activity that aims to establish guidelines for global monitoring.

On an applied note, aerobic granular sludge applied to wastewater treatment plants proved to be an interesting option for the recovery of bio-based products, contributing to the transition to a Circular Economy model. The microbial diversity and metabolic overlapping within the granules microbiome are at the basis of the stability of aerobic granular sludge processes when dealing with the variable composition of food industry wastewater. Selected elite bacteria were able to degrade wastewater pollutants, and the metabolic pathway of degradation was elucidated. The recovered exopolysaccharides proved to be a feasible immobilization matrix for the development of bacterial delivery systems. Bioinocula and biochar were also tested to mitigate the impact 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 established to assess the contribution of such biofertilizers to soil health.

Regarding work developed on agricultural crops and systems, the thematic line contributed to the identification of the physiological, molecular, and biochemical processes that underly the differential degree of tolerance of tomato and legumes to combined stresses (drought and nitrogen) or elevated CO₂. In the scope of the H2020 INCREASE project, the thematic line organized and promoted a citizen science experiment aimed at promoting biodiversity and showcasing the important role of germplasm banks on the preservation of such biodiversity. Several papers were published on the impact of sustainable farming practices dealing with legume valorisation. The thematic line established the first Portuguese Legume consortium of stakeholders and initiated field trials with participatory farmers that aim to transition to legume-based farming systems in the north of Portugal. Two LCA papers were co-authored on the nutri-environmental footprint of legume-based products.



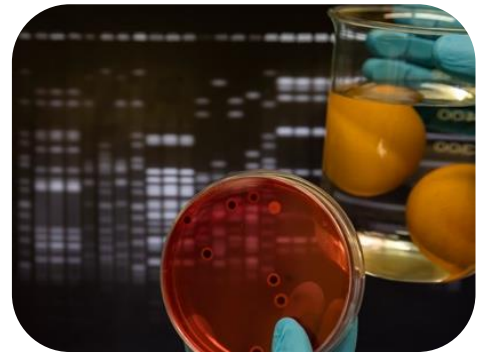
FOOD AND NUTRITION

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

Works on safety and quality aspects, including the adaptation, survival and virulence of microorganisms to stresses imposed by the food chain, microbial ecology studies and impact of microbial metabolites. Molecular approaches are used to study new biocontrol techniques, in particular for *Listeria* (bacteriocins, phages, plant extracts) to be used in various food matrices.

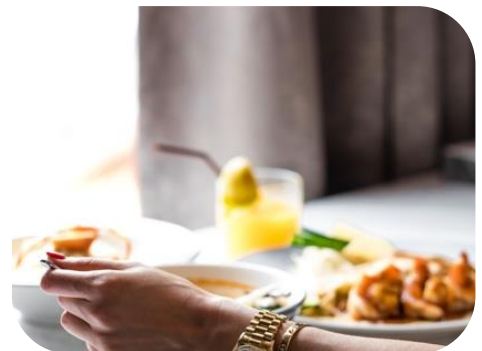


Food Processing and Engineering

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) and packaging systems as well as shelf-life prediction. Novel technological approaches are used in the development of 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.



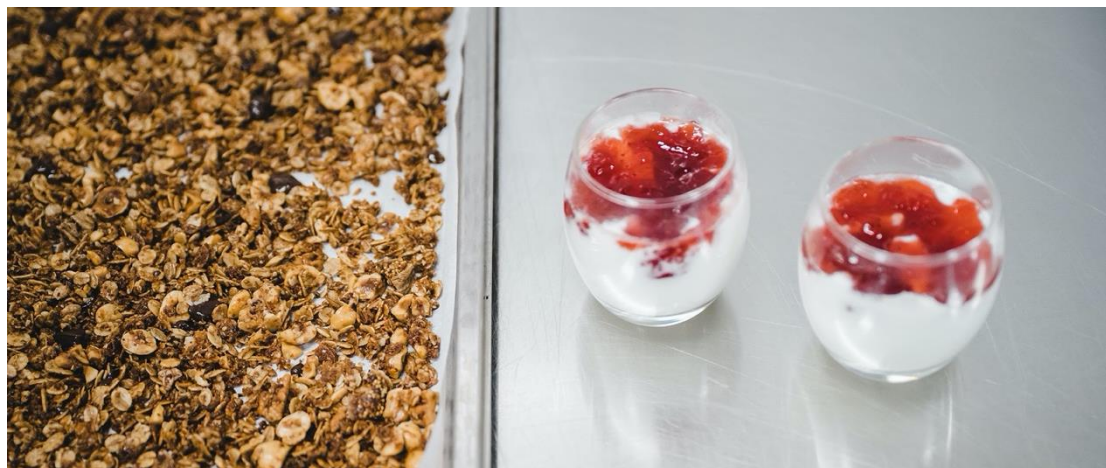
Main Achievements in 2020



Food safety and sustainable circular economy were research topics transversal to its three research laboratories. The hurdle approach, combining non-thermal technologies with biocontrol strategies targeting the main foodborne pathogens, namely lactic acid bacteria, phages, bacteriocins and plant extracts has been conducted. The studies on genome characterization of *Listeria monocytogenes* were continued, in collaboration with the National Health Institute Doutor Ricardo Jorge. Additional knowledge on consumer behaviour along the food journey - from food choice to consumption - on pathogens was achieved. Studies were conducted to investigate the interaction between microorganisms and the chemical composition of wines and its role in sensory attributes.

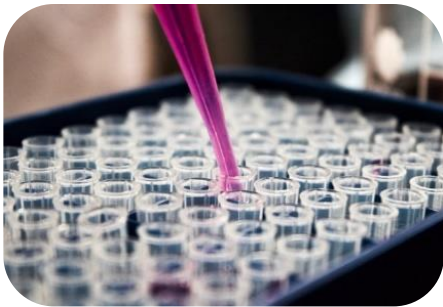
Mild processes (ultrasound coupled to less severe thermal treatments) in processing and production of high quality and safe juices were studied. Valorisation of fruit residues was attained in the form of gluten-free, nutrient-rich dehydrated flours, and their application as fat substitutes in pastes, as a mixed fruit leather and as a snack (including grape and tomato pomaces) was assessed. Fresh-cut fruits enriched with bioactive compounds through osmotic dehydration-assisted impregnation was achieved. Several studies focused on using sensory and consumer science to explore food product sensory properties and predict their performance in traditional and new markets were conducted. Prototyping of different products and processes, including technical and economic viability studies and scale-up studies based on patented technologies (ongoing valorisation processes) were performed as knowledge transfer opportunities.

Validated nutritional epidemiology tools were applied to +500 Nairobi population individuals and to +2000 toddlers in Portugal for assessment of their nutritional status and food intake. Non-targeted metabolomic studies of human physiological samples showed the impact of legume-based diets on specific metabolites related to energy metabolism, plant-based diet biomarkers and gut microbiota activity. Different food formulation strategies targeting preferences and identified deficits of institutionalized elderly, the lowering of glycemic index of plant-based products, functional foods based on algae/cereals/legumes nutritional and bioactive composition eventually combined with probiotic strains (symbiotics), product characterization and biological properties validation using *in vitro* models and human faecal fermentation assays were developed. Formulation and encapsulation approaches for several next generation probiotics and incorporation into food and pharma as live biotherapeutics were continued.



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, 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

Focused on a transversal knowledge detained by CBQF, applied to different biological systems (fermentation, physiological events, etc.) 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 2020

The multidisciplinary team of the BIOBASED AND BIOMEDICAL PRODUCTS Thematic Line has increased its efforts to respond to National and EU priority for future growth of Bioeconomy and Circular Economy, reinforcing capacity and opportunities on bio-based products.



The Laboratory of Bioactives and Bioproducts research has explored through several projects novel bioactives and bioproducts from renewable sources including acorn, microalgae, insects, but also agri-food losses and wastes, including vegetable and fruit by-products, marine and meat byproducts and other biomasses rich in lignocellulose. Several extracts/fractions rich in peptides, polyphenols or carotenoids, polyunsaturated lipids or fibres were obtained and characterised in terms of composition and biological properties, stability and bioavailability. Encapsulation's strategies were developed for some of the unstable extracts. Finally, the highest performance fractions were tested in added value applications for food, quality of life and biomedical sectors. Yet, extracts from several types of microalgae (commercial and new species) were obtained using emergent technologies (ionic liquids, steam, super-critical, HPP and MEF).

The group of Metabolomics and Signal Lab has progressed on the approaches to understand biological systems or processes. The metabolomics approaches have particularly been applied to wines and on the development and validation of new cork solutions, using extrusion and injection technologies, which provide added value to the cork sector, benefiting the wine sector. Digital signal processing and artificial intelligence have been implemented to progressing on the diagnosis of neurodegenerative, cardiac and speech diseases and on the development of biosensors and smart-tools for fast controlling and monitoring living cities & spaces and agri-food & biological/biomedical systems.

The thematic laboratory on Biomaterials and Biomedical Technology maintained the activity on the development of natural-based materials for tissue healing and regeneration and has explored the use of supercritical CO₂ technology for processing and sterilization of sensitive biomaterials and biological tissue. Finally, the study of skin ecology and microbial relationships and the development of new materials to promote and a healthy skin has also been explored. Several synergies with other internal laboratories were established and within thematic laboratories in this line.

Several projects have been executed during 2020, namely Extratoteca, Divino, BIOma, MEDIASMART, ALPHAMAIS, MOBFOOD, Co-CerealValue, Gastrocure, Valormar, MicoBioExtract, FODIAC among others. It is important to highlight the strong collaboration with industry namely Vitacress, Poveira, Silos de Leixões, Gérmen Moagens, Decorgel, ETSA, BLC3, Silvex, Campotec, Frutus, Primor, Formague, A&R house, LTD; Bioinicia; EVRA SRL, among others.



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.



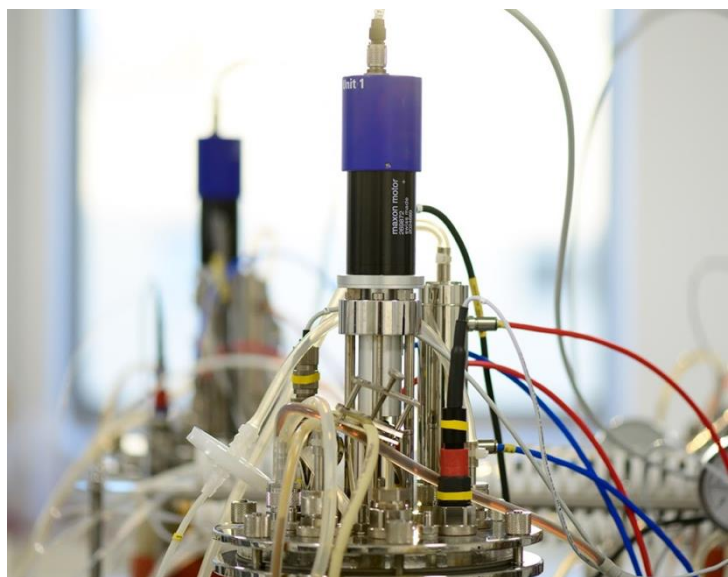
Main Achievements in 2020

The FERMENTATION SOLUTIONS Thematic Line, as part of CBQF since October 2020, has developed an integrated platform of yeast design and fermentation for efficient and sustainable production of new biomolecules for the pharma, cosmetic, and food industries. New biomolecules are under development by strain design using an in-house built software for microorganism design, genome editing tools, metabolic and physiological engineering. 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.

Two projects, HandCare and GluVac, ending in July and August 2021, respectively, explored the use of squalane and beta-glucans for the development of products and solutions for the COVID-19 pandemic. HandCare developed four hand disinfection products, three for retail and one for health professional's use, all having squalane in their composition as emollient and microbiome protector. GluVac 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 2D models to test and validate anti-psoriatic agents, as well ingredients with potential to protect human skin from daily environmental aggressions, namely UV radiations and pollution particle matter.

During this year the Thematic Line 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 compliance with all requisites of the International Conference on Harmonization Guideline for Good Clinical Practice E2 (R6).

The FS Thematic Line is also engaged to deliver positive environmental and economic impacts, through science-based R&D solutions to support sustainable waste management. In this context, the thematic line 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 cosmetic. The FS thematic line established a task force focused on Sustainability Studies of the valorisation processes. Jointly with the Process Development task force, these work on product differentiation, sustainability, economics, comparative performance with benchmarks. Finally, the thematic line has met with different companies to establish potential projects for the future, including [Minerva](#), [TMG](#), [Centro Tecnológico do Calçado de Portugal \(CTCP\)](#), [Colep Healthcare](#), [Zeocel](#), [Notplas](#), [Logoplaste Costa Brazil](#).



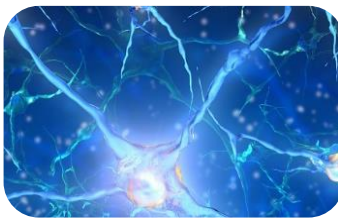
4. PLATFORMS

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 cosmetic to food ingredients 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.



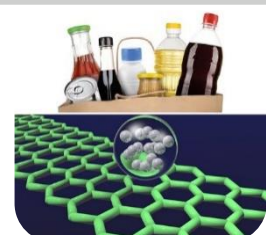
The **Biophysics** platform is operated by researchers in the biotechnology field and offers the capacity to perform very complete physico-chemical and morphological characterization of samples, with special focus on liquids and semi-solids aimed for human consumption.

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, among other: 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 as well as 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. EVENTS & OUTREACH

Event Numbers

11 Biotalks & Seminars



35 Other Scientific Meetings and Conferences

Media Numbers

234 Media News:

9 TV News pieces

12 News in the National Radio

44 News in Printed Press

169 News in Online Media

17,5 M Visualizations

1,39 M€ ROI

Outreach Highlights

Inauguration of the new building on February 7, 2020, by the President of the Republic, Marcelo Rebelo de Sousa. Ceremony attended by the Bishop of Porto, Manuel Linda, the Rector of UCP, Isabel Capelo Gil, and the Minister of Science, Technology and Higher Education, Manuel Heitor.



Visit of the Minister of Science, Technology and Higher Education, and the Presidents of FCT and the Council of Associate Laboratories (August 2020)



World's first sugarcane biosilica discovered by Portuguese researchers

“The world's first biosilica made from sugarcane was discovered by researchers from the CBQF-UCP, in a partnership with Amyris Bio Products Portugal. This new plant product is a sustainable and biological alternative to be used in the cosmetic industry. Traditional silica is made from sand, so its replacement helps to preserve this natural resource and the places where it is found.”



CBQF in the top 10 institutions worldwide with the most impact on research on antibiotic resistance in the environment

According to the journal Global Health Research and Policy, in a study that evaluated the activity and impact of research carried out on this topic, worldwide, between 2000 and 2019, based on the number, evolution and citation index of scientific publications, the CBQF occupies 3rd place in the top 10 of most cited institutions.

Católica names auditorium from the Building of Biotechnology “Auditório Comendador Arménio Miranda”

The 24th of November, World Science Day and National Scientific Culture Day, was a special day for CBQF, but also for Comendador Arménio Miranda. On this day, the Católica in Porto gave the name “Auditório Comendador Arménio Miranda” to the auditorium of the Building of Biotechnology. This initiative results from the donation of Francisco and João Miranda, sons of Comendador Arménio Miranda. Who wanted to recognize their father and Católica, considering the important role that Arménio Miranda always revealed in the scope of innovation and entrepreneurship and considering, equally, the fundamental role that the Faculty of Biotechnology and CBQF have, in their area of competence, in the training of dynamic professionals, promoting their critical sense and entrepreneurship.



Researchers are able to control and eliminate the bacteria that cause listeriosis in milk

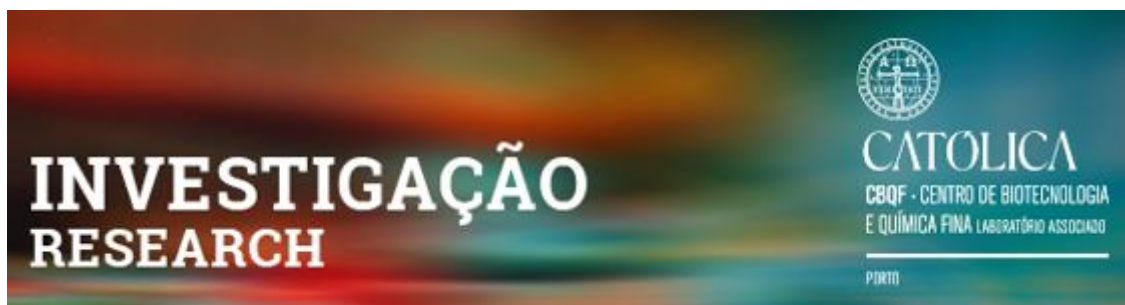


“Researchers at the School of Biotechnology in Porto managed to eliminate and control in milk the bacteria that causes listeriosis, the pathogenic bacteria that "kills most in Europe".”

Coffee with Science is a place where young and senior researchers share their experiences, knowledge and think about new ways to collaborate. This is also the right space to deepen your knowledge about what CBQF researchers are carrying out, and at the same time to share with the communication team what is happening.



CBQF Monthly Newsletter was launched during 2020 and it became an important vehicle for all CBQF researchers to keep up with the latest news of their colleagues and institution - sharing successes, experiences and activities.



Some of the other events that took place in 2020



Other Outreach highlights:

- Application to Programme “Verão com Ciência” sponsored by FCT and DGES.
- The first results of AquaVal, a European project in which CBQF is involved, were shared through a webinar. The project aims, through technological solutions based on bacteria, microalgae or bivalves, to address the shortage of water in freshwater aquaculture – which limits the sector's production rates – by reusing this resource.
- Prof. Cristina L.M. Silva was invited to lead the Education Committee of IUFoST for emerging issues and priority areas. CBQF-ESB was also accepted as Adhering Body of IUFoST, representing the interests of Portugal in food science and technology. Prof. Silva was also invited to integrate the working group in microbiology COPEG, of the European Association of fruit juices.
- Presentation of the ALCHEMY project by Prof. Manuela Pintado at the event PLATETIERS World Gathering, in the Session Sustainable Biotech: R&D from Portugal to the World. Altice Arena, Lisbon, 23 Oct 2020.



COVID-19 pandemic

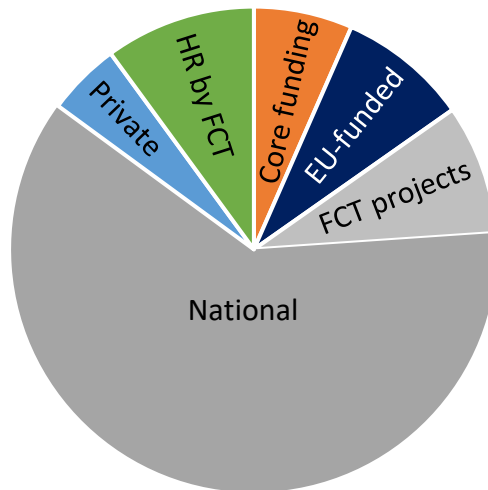
CBQF was committed to help during the COVID-19 pandemic: 50,000 Culture Media Tubes for Hospitals in the North and 250 Protective Visors were produced.

6. FUNDING

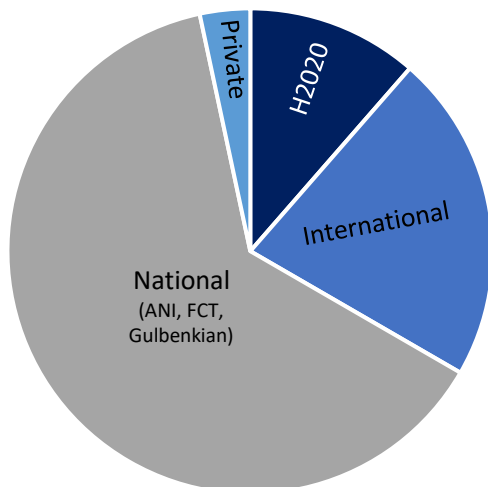
CBQF is supported by the Foundation for Science and Technology (FCT) and competitive funding secured from national and international sources. Since 2016, CBQF has been granted competitive R&D funding from national (€12.8M) and international sources (2.6M€, H2020 and other international). Of note, in 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 2020 CBQF secured 1.91 million € in competitive projects, one third of which were EU-funded projects - a 22% increase from 2019.

Funding executed: 5.97M€



Competitive funding sources (%)



7. CELEBRATING 30 YEARS OF CBQF

Opening Event 30 Years Celebrations of CBQF

November 24, 2020, World Science Day and National Day of Scientific Culture, marked the beginning of the 30th anniversary celebrations of CBQF - Center for Biotechnology and Fine Chemistry. Different national and international stakeholders attended the event, including the Minister of Science, Technology and Higher Education, Manuel Heitor.

CBQF Then & Now – Equipments

CBQF is celebrating 30 years of ground-breaking research in fields ranging from food innovation and safety to environmental bioremediation and monitoring going through microbiology assessment and fermentation processes. Within three decades the evolution in laboratory equipment's was substantial as illustrated in the "CBQF then & now – equipment" exhibition. Below is one of the equipment shown in the exhibition.

THEN (1993)



NOW (2019)



Fermenter

My parent is a scientist @ CBQF

In line with the CBQF 30 year's celebration and emphasizing the human aspect of research, children of CBQF researchers have made illustrations showing their perspective on their parents work as Scientist @ CBQF.



Catarina, 9 years old

Emma, 9 years old



CATÓLICA

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LABORATÓRIO ASSOCIADO

PORTO



Creating value
for people



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