

Publication edited by CBB Capbiotek

Bretagne, leader in marine biotechnology and cosmetic

With a rich maritime heritage and a unique coastline, Bretagne was destined to capitalise on its resources.

Ranked as the third French biotechnology region in the 2014-2016 BioMap compiled by Biotech Finances, Bretagne has become a major player in European biotechnology sectors.

The region has turned its Atlantic and Channel coasts into a major boon, profiting from its geographic location and unparalleled marine resources. The result speaks for themselves; a strong regional economy based on biotechnologies and marine science makes Bretagne the leading French region in marine cosmetics and oceanographic research.

FROM BIOMASS TO FINISHED PRODUCTS

With 700 species of seaweeds recorded, Bretagne is a reserve of unquantifiable natural riches that, thanks to the efforts of marine biotech companies, are ever more lucrative.

These companies harvest and process this biomass for use in cosmetics, foodstuffs and plant health and agricultural products. Seaweed and, more specifically, the development of marine active ingredients, offer a strong potential for research and innovation.

This marine potential, and the businesses that benefit from it, are what make Bretagne the leading French region in marine cosmetics.



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CUTTING-EDGE BUSINESS...

Today, over 60 companies in Bretagne are specialised in marine biotechnology, making the region a choice location for the cosmetics and health sectors. First and foremost, Bretagne is home to the international group **Yves Rocher**, the pioneering leader in plant and marine cosmetics.

Also based in the region are companies such as **Codif International** in Saint-Malo, which specialises in the use of marine biotechnology for innovation in luxury cosmetics. **BiotechMarine** produces a broad range of active marine ingredients, the fruit of its research on seaweed, and **Algues & Mer** studies seaweed on the island of Ushant. **Javenech** (in Fougères) works for the research and development of marine biopolymers.

Abyss' Ingredients and **Polymaris Biotechnology** develop active ingredients for cosmetics from marine products and microorganisms found on the Breton coast. The list goes on: **Agrimer**, **Setalg**, **Technature**, **Lessonia**, **Cimaprem** and **Algotherm** all specialised in the formulation and manufacture of seaweed powders.

Not to mention third party manufacturers, such as **Aquatonale Laboratoires d'Armor**, **Ocealys**, and **Science et Mer**, which specialise in marine cosmetics.

Further information about Bretagne's cosmetic sector on the map www.bdi.fr.

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| HCS-Pharma



Product launches and presentation of INNOVATIVE PROJECTS

MARINE BIOTECH AND COSMETIC KEY FIGURES

1 biotech network

Supported by the regional council of Brittany, **Capbiotek** is the breton network dedicated to biotechnology (marine and agrobiotech)

1 international competitiveness cluster: Pôle Mer Bretagne Atlantique

1 network of technology platforms:

Biogenouest and the platforms Prodiabio and Lipidocean, and Biodimar

4 technology transfer centres: CBB Capbiotek, ID2Santé, IDMer and CEVA,

the only technical centre in Europe dedicated to research on marine vegetation and its practical applications

2 marine-biology stations (Roscoff and Concarneau)

Over **150** companies in cosmetics industry that provide more than 5,880 jobs

60 marine biotech companies, 1,400 jobs

50% of national research in **oceanographic is based in Bretagne** (including the European Institute for Marine Studies, Université de Bretagne Occidentale & Sud /Pôle Halieutique, CNRS, Ifremer, etc.)

Laboratoires Science et Mer present RIV-AGE 2.0: sustainably producing marine active ingredients

RIV-AGE 2.0 is a major collaborative project, that was developed following an initial R&D phase (RIV-ALG project, financed by the region of Bretagne). It involves Les laboratoires Science et Mer and 4 partners: Universités de Bretagne Occidentale & Nantes, C-WEED Aquaculture and CHIMEX. Its purpose is to develop new marine active ingredients for cosmetics using sustainable processes.

One of the objectives of RIV-AGE 2.0 is to control the production of resources; one component is dedicated to sustainable environmental management. Another component concerns the identification and production of families of marine active ingredients using eco-responsible processes.

These ingredients are derived from seaweeds and marine plants found along the coast of Bretagne, and which have not yet been used in the field of cosmetics. The focus is mainly on three families of active ingredients: anti-ageing, antimicrobial and UV-protective agents.

Dedicated to marine biotechnologies - one of the priorities of the region of Bretagne and Capbiotek - this collaborative, industrial research project - which has been certified by Pôle Mer Bretagne Atlantique and Cosmetic Valley - was selected following the 20th call for tenders of the FUI (Single Interministerial Fund).

The first active ingredients are expected in 3 years' time.

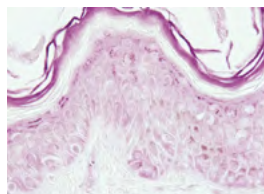
Maud Larnicol - m.larnicol@scienceetmer.com

Algues & Mer presents: INVINCITY®

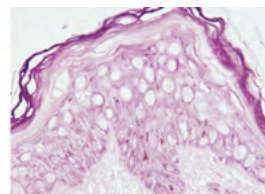
Algues & Mer has been innovating! INVINCITY®, the first active ingredient that protects the skin from pollution and fights against damage to prevent polluaging®.

INVINCITY® is concentrated in High Molecular Weight (HMW) Fucoidans. A&M extracts the fucoidans from certified organic Ascophyllum nodosum seaweed that is harvested on Ouessant Island, in Bretagne, France. Protects from polluaging® INVINCITY® acts well before the visible reactions caused by pollution, regulating a specific receptor to polyaromatic hydrocarbons: AhR (Aryl hydrocarbon Receptor, found in keratinocytes, melanocytes, fibroblasts & Langerhans cells). When activated by a pollutant, they trigger the expression of genes controlling reactions like oxidative stress, inflammation, melanogenesis...

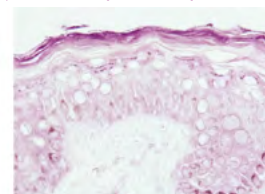
Ex-vivo tests show that INVINCITY® reduces AhR expression by 73% compared to placebo



Untreated skin



Skin + Polluting agents:
(heavy metals + hydrocarbon)



Skin + Polluting agents:
+ INVINCITY® 3%

©Algues & Mer

Repairs polluaging® damages INVINCITY® reduces redness and dark-spots to bring back the global brightness to the skin. When the skin detects pollution, it sends an alert message which activates the production of inflammatory mediators. VEGF (Vascular Endothelial Growth Factor), one of these specific mediators, boosts the vasodilatation and the capillary permeability: redness appears. With INVINCITY®, the VEGF peak is stopped and the VEGF concentration comes back to the baseline level (in-vitro test). Furthermore, INVINCITY® shows a significant tyrosinase inhibition activity. **+ INVINCITY® increases collagen density in the papillary dermis and improves the skin barrier function.** Other tests - in vivo - are in progress.

Jean-Noël Villemin - jn.villemin@algues-et-mer.com

Agrimer presents: caviar exfoliant and caviar skincare

Marine polysaccharides have made it possible to develop this gellable active base in the form of pearls that disperse completely when pressure is applied to the skin.

Manufactured pearl by pearl, Agrimer's "caviar" is composed of a unique formula, identical on the surface and in the heart of each pearl. As there is no envelope to eliminate, the pearls literally melt onto the skin. The pressure and shearing force upon application break down the three-dimensional structure of the pearls, forming a protective network at the skin surface. The oligosaccharide chains - which provide a veritable cocktail of nutrients - thus disperse, forming a homogeneous, moisture-replenishing and slightly filmogenic micro-lattice.



This innovation is the fruit of several years of research on controlling the gelling strength, the size of the pearls, stabilisation of the active ingredients and exfoliating particles, and on the resistance to pressure upon application. The galenic form, resembling caviar, has great potential. The caviar skin treatment allows the active ingredients to be applied sparingly, precisely where the skin needs them, such as onto wrinkles or pigmentation marks. Used in combination with the specific sculpting technique, the exfoliating caviar is a veritable professional breakthrough; it doubles up as both a leave-on exfoliant and a care product, thanks to its protective residual film and its matrix that diffuses the active ingredients, such as "Aquaactifs".

Noël Guelennoc
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CODIF laboratories have discovered a revolutionary molecule that is able to reduce the appearance of the "pigmentary torch" effect: **EPS WHITE**

Released from the Poly-Mer project, which was supported by the French government and the regional council of Brittany, is a unique discovery. For the first time, researchers have managed to characterise a marine exopolysaccharide including 2 amino acids that allow a withdrawal as micro-vesicles which facilitate its penetration into the epidermis..

It interacts with receptors localized on the surface of the melanocytes, to inhibit the

formation of the pigmentary synapse and therefore melanin transfer to the keratinocytes. It counters the effects of urbanization by protection the skin from inflammation and melanin synthesis pollution and UVs induced. Clinical tests have shown a reduction in the number of pigmentary spots on the cheeks: -6% after only 2 weeks of treatment; -20% after 8 weeks. 96% of users observed a reduction in the number of pigmentary spots

Gabrielle Moro - g.moro@codif.com

Lessonia presents: its first marine active cosmetic ingredient

A new active cosmetic ingredient of Lessonia has been developed according to the principles of marine glycobiology. Fucoreverse is an active ingredient that reverses the signs of aging. A clinical study against placebo involving 42 subjects has shown the product to significantly reduce the depth of wrinkles.

The original composition is obtained using technology that hydrolyses the fucoidans in brown seaweed, allowing the most biologically active fucose derivatives to be extracted. These are the fucose derivatives with the lowest molecular weight and are saturated with sulphur. This highly active composition is currently unrivalled on the market. These fucose derivatives, which bind to biological receptors, are known to



regulate the inflammatory process and stimulate cell metabolism, thus reversing the signs of ageing. Lessonia will also be presenting alternatives to polyethylene at its stand.

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BiotechMarine (subsidiary of SEPPIC) presents: **EPHEMER™**

BiotechMarine has been innovating with "Celebrity™", its macroalgal cell-culture technology. It is the first active cosmetic ingredient in the world to be produced using this new technology.

EPHEMER™ is a gametophyte extract taken from macroalgal cells grown in a laboratory during an ephemeral phase in the life cycle of the seaweed *Undaria Pinnatifida*. This *in vitro* culture is unique in the world of cosmetics. During this phase, the macroalgal cells stockpile antioxidant molecules. These protect the skin as soon as 24 h after application by acting on the

mitochondria to temporarily reduce the production of free radicals.

From 8 days, EPHEMER™ preserves the mitochondrial DNA, which is essential for the proper functioning of the mitochondria, which are inherited only from our mothers. *In vivo* tests against a placebo have confirmed this effect. After 28 days, the skin is able to fight more effectively against the free radicals that cause skin aging. After 56 days, there is a clear improvement in the skin's microrelief, compared to the placebo.

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BRETAGNE, land of innovation for flavor and fragrance

Besides to be a leader in marine biotechnology, the region is also very attractive for flavor or fragrance main manufacturers. Indeed, 4 of the 10 industry leaders (Givaudan, Symrise, Mane, Robertet) are now implanted in Bretagne to develop natural products (from plant to microalgae extracts).

EVENT COSM'ING 2016

COSM'ING 2016
SAINT-MALO
Palais du Grand Large
29th June ► 1st July

COSM'ING - the international cosmetic ingredient and biotechnology convention - is back this year for the seventh time, from 29th June to 1st July. B2B meetings 29th June – Scientific Symposium 30th June and 1st July

COSM'ING always features the latest biotechnological developments and scientific trends and is the only event of its kind, attended by a range of professionals who wish to play a role in developing biotech in cosmetics. The event is organised by CBB Capbiotek, and brings together scientists, researchers, and businesspeople who share a common interest in the development of innovative products and technologies, as well as in how to transfer these to the cosmetics industry.

www.cbb-capbiotek.com/cosming2016

Ephyla presents: Catiomerc, for the eco-design of cationic bioburdens for cosmetics.

The Catiomerc project involves developing new, 100% natural cosmetic products from marine-sourced active ingredients by producing cationic bioburdens. These bioburdens - created by combining an extract of chitin (a molecule from the family of carbohydrates found in the exoskeleton of crustaceans) and a type of clay - produce a stable emulsion with no added surfactants and form a protective film on the surface of the skin and hair.

The Catiomerc project will respond to the growing market demand for biocompatible additives and raw materials that offer a natural alternative to the current chemical processes used to produce cationic components. In addition, the industrial scaling-up of the manufacture of this high-added-value eco-product - which provides an alternative means of developing

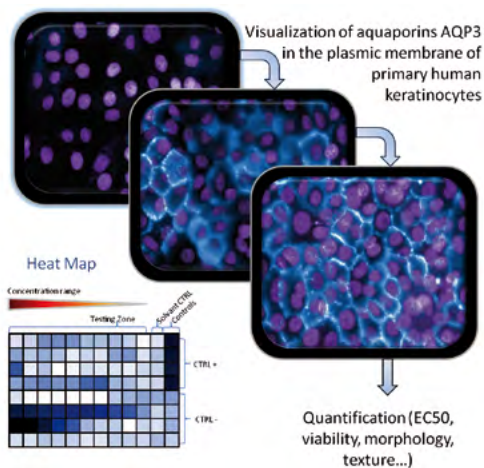
the economic potential of biomass in Bretagne - uses reactive extrusion, an innovative production method with a low environmental impact. In France, the natural and organic cosmetics market is growing by almost 40% per year. Ephyla's eco-design approach has led the company to join forces with a manufacturing company in Canada, with a view to entering the North American market in addition to the European and Asian markets.

Catiomerc is the fruit of a collaborative project between the companies Ephyla, Arclay Technologies Naturelles and the research centres of the Université de Bretagne Sud, including LIMATB (now IRDL), and has received the support of the regional council of Bretagne, the departmental council of Morbihan, Vannes Agglomération and the Centre Québécois de Valorisation biotech.

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HCS-Pharma presents: high-throughput active-ingredient screening

HCS-Pharma is a company stemming from the pharmaceuticals sector that proposes in vitro R&D services using cellular imaging. The company's expertise allows it to test both the effectiveness and the safety of active cosmetic ingredients. Its facilities are capable of screening anything from a small batch-size to a large chemical library. The company's activity relies on an automated platform linked to an automated image-analysis system, which enables the rapid assessment of molecules produced via high-throughput synthesis or from biological extracts (thus making bio-guiding possible). The use of cellular imaging on relevant cellular models (keratinocytes, fibroblasts, etc.) makes it possible to quantify several parameters during a single analysis (cell count, toxicity, expression and activation of proteins, phenotype, etc.).



These high-content analyses, in terms of biological information, may also be used for a single extract or active ingredient.

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