

FROM GRASSE PERFUMES TO BARCELONA'S BIOMEDICAL RESEARCH PARK

A PASSION FOR PERFECTION

What do a 'nose' which selects fragrances from thousands of possibilities and a scientist doing research into the behaviour of yeast cells have in common? In addition to an exciting job, they share their love of perfection. We travel to Grasse, a peaceful town in France's Provence region which has become the cradle of perfume. And in Barcelona we visit the city's Biomedical Research Park, a benchmark institution in Europe which is producing astonishing results. Perfection is not the goal, but the road towards excellence.

Grasse is a delightful town straddling Nice and Cannes, to be found at a privileged location between the Mediterranean sea and the French *département* of Alpes-Maritimes. Located atop a fertile valley with its own microclimate, it has all the conditions necessary to make it the world's capital of aromas. Its narrow medieval streets offered the world its first perfumes more than 300 years ago. Today the surroundings of Grasse are home to more than 40 essence factories, from which 7% of the world's perfume production emerges. An industry that has successfully adapted to modern times without losing the *savoir faire* of yesterday's artisans.

One of the companies that best represents the spirit of Grasse is Galimard, which takes its name from Jean de Galimard, a visionary aristocrat



Grasse is a quiet medieval town in the heart of France's Côte d'Azur.

who half-way through the 18th century began to perfume leather gloves to mask their strong smell – until then Grasse had been known for its tanneries. For years the same procedure was used to obtain essences – first of all vaseline was made from pig fat in which flowers were impregnated, mainly jasmine and rose. For the fat to absorb the aroma the flowers needed to be changed every two days and the

mass left to rest for two months; it was then washed with alcohol and filtered to eliminate impurities. The process was very laborious, requiring large amounts of delicate work and patience as well as enormous costs – two tonnes of flowers were needed for just one-and-a-half litres of oil.

Today things have changed. The process has become industrialised,



The 'nose' Caroline de Boutiny, at the Galimard laboratories.

but the care for detail continues, something that can be readily seen by getting to know the work of the ‘noses’, the wizards of smells. Normally they combine as many as 150 different ingredients to create an essence – the Galimard catalogue alone lists more than one thousand of them. Their work is similar to that of an “orchestra conductor in a laboratory”, as one of the company’s ‘noses’, Caroline de Boutiny, admits. Success is to be found in finding a balanced combination of basic notes – those that remain longest on the skin (woods and spices) – together with more volatile notes (citrus, exotic fruits and flowers like rose, jasmine and peony). “The most important thing is to have a good understanding of what the customer wants. Even so, finding a perfect aroma may be a very long process indeed. Once a customer asked us to create something based on the smell of ants! It took us three years to reach an agreement”, confesses De



Chemist Michel Teti checks the purity of perfume molecules.



Outside view of the historic Fragonard factory.

Boutiny. But her work deals not only with sensations; it requires pin-point precision with quantities – “If you put in 0.001 millilitres of a substance you get one thing; if you put in 0.002 millilitres you get something radically different”, she takes pains to emphasise.

A perfume’s molecules

Accuracy and meticulousness are both things very familiar to Michel Teti, the chemist in charge of the sophisticated machinery which shows to the tiniest detail the 400 molecules of lavender, for example, to check that the raw material is top quality and not adulterated. “We have to control everything. It sounds hard to believe but the composition of a molecule – such as linalool in the case of lavender – can totally determine the smell of the perfume”, he declares without moving too far from the

densimeter and refractometer, another pair of instruments enabling him to check the texture, colour, density and temperature of the essences.

The quality of the essences is Grasses’ main weapon in a global market where major perfume manufacturers opted for chemical substances a long way back. The industry in this small town had to reinvent itself. Fragonard is another of the emblematic names symbolising this philosophy. Agnès Webster Costa, who heads the company together with her two sisters, represents the third generation in control of the factory, and believes fervently in a vision split between industry and perfection. Some 10,000 bottles leave the Fragonard premises daily to be sold in countries the world over via the internet, and just the historic factory on its own has 20 steel tanks with a capacity of 600



Tanks containing essences in the Fragonard factory.



Jasmine has traditionally been one of the most widely-used flowers in Grasse.

THE KEY TO SUCCESS IN GRASSE PERFUMES LIES IN THE RAW MATERIALS AND MAKING SURE THAT THE INDUSTRIAL PROCESS FUNCTIONS PROPERLY

litres each. They launch new products every year, their presence in France is consolidated, and they intend to open stores at an international level.

Costa considers that the success of her company in particular and Grasse in general results from paying particular

attention to the quality of the raw material and making very sure that the whole process functions properly. This commitment to excellence has meant that major firms have come back to Grasse once again. “Now it would seem that they are coming back to their roots. Brands like Dior and Chanel are

buying up land so as to grow flowers here again”, says a satisfied Costa, who believes that this enchanting town has everything it needs to maintain its prestige.



Jordi Camí, director and founder of Barcelona's Biomedical Research Park.



Hundreds of scientists from 55 countries work at the centre.

FROM YEAST TO THE BIOLOGICAL COMPUTER

Neither is Barcelona's Biological Research Park a stranger to prestige either. It is one of the most important scientific hubs in Southern Europe. Inside the impressive building rising opposite the city's Barceloneta beach area, work some 1,400 people from 55 different countries. Its annual R&D budget amounts to 80 million euros, and the centre is equipped with ground-breaking equipment. It is a "factory of the future" as the persons in charge of it like to say. The discoveries made here are key elements for medical science in 20 or 30 years' time.

At first sight, chaos reigns in the centre's laboratories, shared by seven different institutions. Nonetheless it is a perfectly controlled chaos of white coats and test-tubes in which there is margin for trial and error and rectification, but never losing sight of meticulousness and obsession for detail. Each and every movement determines the results.

Some of the most outstanding results include the first biological computer, created by scientists of Barcelona's University Pompeu Fabra (UPF) after five years of intense work. The work concerns the combination

of genetically-modified cells so as to achieve biological systems with decision-making capacity according to pre-defined criteria. The work, headed by researchers Francesc Posas and Ricard Solé, opens a door for the regulation of biological systems and the treatment of their diseases. An entire universe open for exploration.

Jordi Camí, the director of and brain behind Barcelona's Biomedical Research Park, highlights the fact that the discovery is an important one – "They have shown that cells can be programmed to make them work like a computer. It is a major step forward, one of enormous creativity", he says with satisfaction. And although he says that caution is the watchword so as not to create false expectations, he also admits that the possibilities are enormous. For example, in the case of diabetes, there may be cells programmed to capture blood sugar levels, make a computation, and react



SCIENTISTS FROM THE UNIVERSITY POMPEU FABRA HAVE DEVELOPED A BIOLOGICAL COMPUTER AT BARCELONA'S BIOMEDICAL RESEARCH PARK

One of the Petri dishes enabling construction of the 'biological computer'.

according to requirements – either secrete insulin (bringing down the glucose level) or else glucagon (increasing it). This way these programmed cells would act as an artificial pancreas, bringing about a major improvement in patients' quality of life.

Salty and shining cells

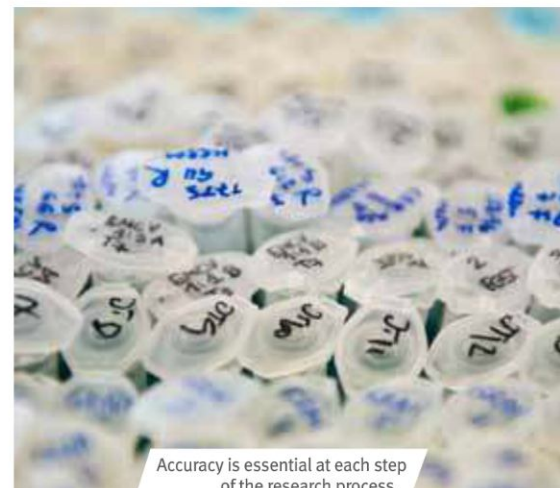
To build this biological computer, Solé, Posas and their team work with yeast cells. This type of cell was chosen because they are the easiest organisms to manipulate in the laboratory, but also because they have nucleated cells, just like human cells. The yeast cells had different genes inserted so that they would respond to environmental stimuli and produce other signals. For example, some of them were modified to react to the presence of salt; others to produce GFP (Green Fluorescent Protein). If they emitted a green light, it meant that the biological computation was working. In the laboratory, the

yeast cultures are maintained in a chamber at a temperature of 30°C and placed on supports which move them constantly so as to make sure that they get the necessary oxygen.

A discovery of this nature needs years of painstaking work and, as Camí remarks, it also requires special discipline. In the world of science truths are always "perfectible", he says, and are being constantly reviewed and updated by the scientific community. "We have to carry out experiments in such a way that independent third parties can reproduce the same conditions and reach the same conclusions". For this reason, there is no margin for error, and there is an obligation for everything to be perfect, since the slightest change might totally invalidate the results of the entire research.

So little matter whether we are dealing with prestigious French perfumes

or research that could save lives a few years hence. The factories of Grasse and the scientists of Barcelona's Biomedical Research Park demonstrate that large amounts of talent, experience and innovation are not by themselves sufficient to bring things to a successful conclusion. One ingredient has to be added, one that is no secret for them – a passion for perfection.



Accuracy is essential at each step of the research process.