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Interview

Daniel Oliver: the CEO of crowdfunding platform Capital Cell on the future of alternative financing

Agri-CRISPR & Co.

Brave new food

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Bioeconomy
Uncertainty about review of EU strategy hampers investments

Orphan Drugs
How can healthcare systems establish value-based pricing?

Allergies
New biotech solutions target oversensitive immune systems

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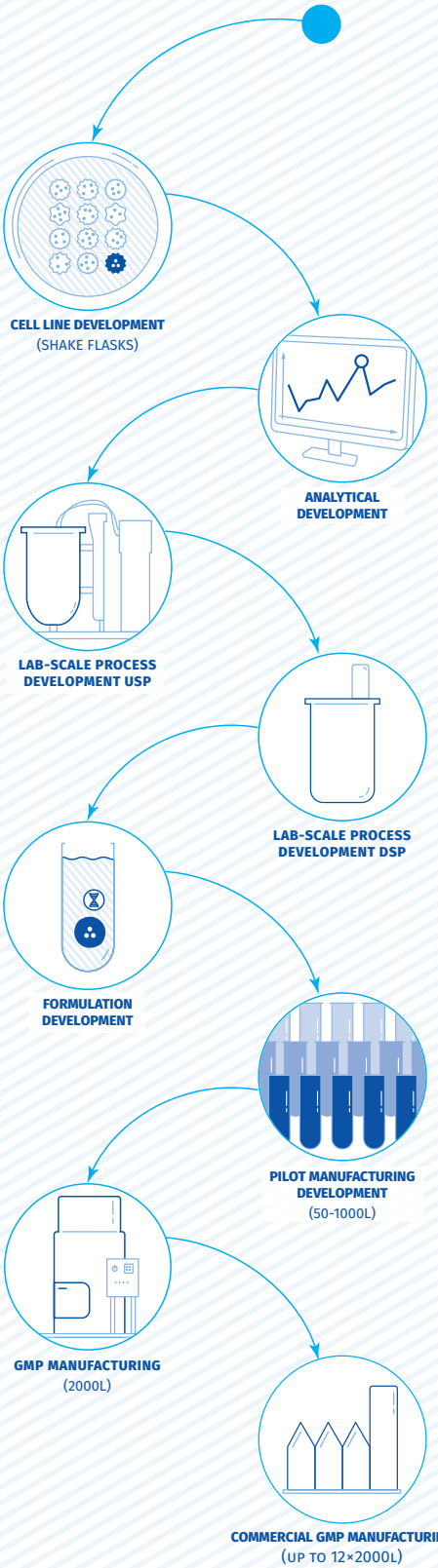

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COVER STORY

CRISPRed crops and agbiotech's future

European consumers have consistently been averse to allowing GM crops onto fields and into supermarkets on the continent, despite huge efforts by trade organisations and many politicians to force the issue. But how will they react to genome-edited versions of plants, which don't contain DNA foreign to the species, but have simply been engineered to optimise specific characteristics? Will GEOs be able to bypass the regulatory hurdles that have stopped companies like Monsanto cold? An era of brave new food awaits.

INSIGHT EUROPE

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ORPHAN DRUGS

Help save my life

More and more drugs for rare diseases are hitting the market, thanks to quasi-monopolies granted to developers as an incentive to motivate R&D in the sector. Now that Big Pharma is beginning to dominate the field, discussion has shifted to overpricing, instead of providing affordable ways of reimbursement. Could networking and data exchange across Europe help resolve the confict?

DNA PHENOTYPING

Biotech vs. Allergies

Estimates say that by 2025, half of all Europeans could suffer from some type of allergy. The reasons for allergy development are still largely a mystery, but researchers are beginning to make progress in treating them. The most promising path is allergen immunotherapy – a method with roots dating back over a century.

Pictures: groupcheers/fotolia.de (top), masterzphotofo/fotolia.com (middle), fotolia.com/ Sashkin (bottom)

SPECIAL

EU Event Compass

EDITORIAL

It's so CRISPy

Rejecting genetically engineered crops has become a tradition in Europe, as citizens increasingly express a yearning for the'natural' country life. NGOs like Friends of the Earth or Greenpeace have built funding campaigns on the idea. So, do agribiotech companies really stand a chance when they say they'd like to introduce a new generation of engineered crops through the back door? Even though it really is impossible to distinguish genome-edited crops from breeds conventionally mutated by untargeted shot-gun radiation, science-based discussions on whether or not to label such products as GMOs is damning them to an unwinnable battle. What still counts more than facts is that CRISPRed plants are perceived not as 'natural', but probably the industry's next food scandal.

On page14, our cover story shows what kind of value creation CRISPR & Co. could contribute in the long run to healthier, more fruitful crops that are better adapted to the demands of climate change.

However, the next generation of crops won't ever become a business success here without acceptance from the European public. To gain it, the industry will have to do more than produce great products. In an era of alienation from our biological roots, it will somehow have to learn from NGOs to address urbanite demands for a more 'natural' living experience.

Thomas Gabrielczyk
Editor-in-Chief

Mashed potatoes, lightly smoked?

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Brave new food

CRISPR & CO. The possibilities offered by CRISPR/Cas9, TALENs and other new genome editing technologies are making the mouths of plant breeders water – and not just because the methods give seed developers new options when it comes to optimising traits such as yield, resistance to environmental stress, diseases or pests. Gene-edited plants could soon make inroads even with Europe's strict regulators, and throw open the door to tastier, healthier food.

Last year, an exceptional dinner for actors, politicians, journalists and other city celebrities was planned at a haute cuisine restaurant in New York. It was billed as a world first, a meal of the future – the launch of an expedition into an age of new food. On the menu: tofu and soy burger, lightly smoked mashed potatoes, and soy milk and strawberry *fontainebleau* for dessert. Not all that exceptional on the surface...but all were made with ingredients from gene-edited plants designed by biotech company Calyxt. André Choulika, head and founder of the Cellectis Group, Calyxt's mother organisation, explains that the event mirrored a similar dinner given in Paris 250 years ago: "When we were having chips and fries at Calyxt made from one of the first harvests of our genome-edited potatoes, I thought: 'This is a historic event.'" The chips were made from potatoes with a gene that had been edited to inactivate the enzyme responsible for the degradation of sugars in the tuber, keeping them sweeter in cold storage and reducing the formation of the carcinogen acrylamide during the frying process. "While I was thinking that billions of people could eat such food in the future, I was reminded of Antoine Augustin Parmentier," Choulika says. The 18th-century French botanist shot to fame for his role in making the potato a pillar of France's food supply. To overcome myths that the foreign tuber was toxic – some skeptics even claimed it transmitted leprosy – Parmentier invited members of the elite class like King Louis XVI and American ambassador Benjamin Franklin to enjoy a range of potato recipes. The sly promoter also had potato fields guarded during the day, but left them unguarded at night, giving farmers the chance to steal the 'valuable' plant. It's hard to say how much those tricks contributed to making potatoes a staple food for hundreds of millions of people in the EU alone. But Choulika decided to revive the idea "to enable a new food revolution that will influence the 21st and further centuries."

Calyxt's dinner will probably not convince the European public to put aside its concerns on genetically modified organisms (GMOs) or their gene-edited organism cousins (GEOs), but the event did raise public awareness of new genome editing technologies, and how much they could change humanity's food supply in the very near future. Practically every major seed company and leading breeder is already pursuing genome editing, at least for research purposes. And a big reason why is the game-changing gene-scissor technology CRISPR/Cas9.

ANDRÉ CHOULIKA
CEO, Cellectis Group

? What will be the Next Big Thing in plant breeding?

! *Most of the effort in biotechnology tries to focus on the farmer's needs, in a kind of race for productivity. But we don't need more yield. We already produce more than we can even consume. Calyxt is therefore trying to improve the quality of food."*

CRISPR – a booster for plant breeding

Take Bayer, for example. If the German giant is given the go to acquire Monsanto, it will control about 40% of the global seed and pesticide market. CRISPR/Cas9 is "a relatively new technology in our plant breeding activities," says Adrian Percy, Head of Research and Development at Bayer's Crop Science division. Even so, the company "has been working on genome editing for a few years now, using different types of nucleases like meganucleases and TALENs" (Transcription Activator-Like Effector Nucleases).

According to Percy, the goal is to speed up development in plant breeding and biotechnology, particularly when it comes to introducing disease resistance or insect resistance traits into new varieties. Another area of high interest is increasing plant resistance to abiotic stress factors like […]

›› Read the full story in the printed issue.

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Treating a rarity – how to pay for value?

RARE DISEASES Since US senators in February conveyed the impression that drug developers might have misused market monopolies related to orphan drugs (ODs) to overprice their compounds, the status has come under closer scrutiny. Neither the US nor Europe currently have consistent approaches for deriving value for OD therapies. Pooling expertise and scattered patient data across borders could help ease both diagnosis and development, providing a foundation for pricing and giving patients much faster access to treatments.

›› **Read the full story in the printed issue**.

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Public Enemy Number One

ALLERGEN IMMUNOTHERAPY The concept has been around for more than a century, but recent advances in the field are causing numerous experts to say it's widely underused. The goal of allergen immunotherapy (AIT) is to induce a specific immune tolerance by confronting patients with increasing levels of allergens. AIT developers are now working on improving efficacy and safety, while at the same time trying to speed up the still lengthy process of desensitisation. Peanuts in particular are in the crosshairs, as they cause one of the most life-threatening common allergies in humans.

›› **Read the full story in the printed issue**.

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