

GENOPOLE

ANNUAL
REPORT
2022

*BIOTECH
INNOVATION
FOR HEALTH
AND SUSTAINABLE
DEVELOPMENT*

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Stéphane Beaudet & Gilles Trystram

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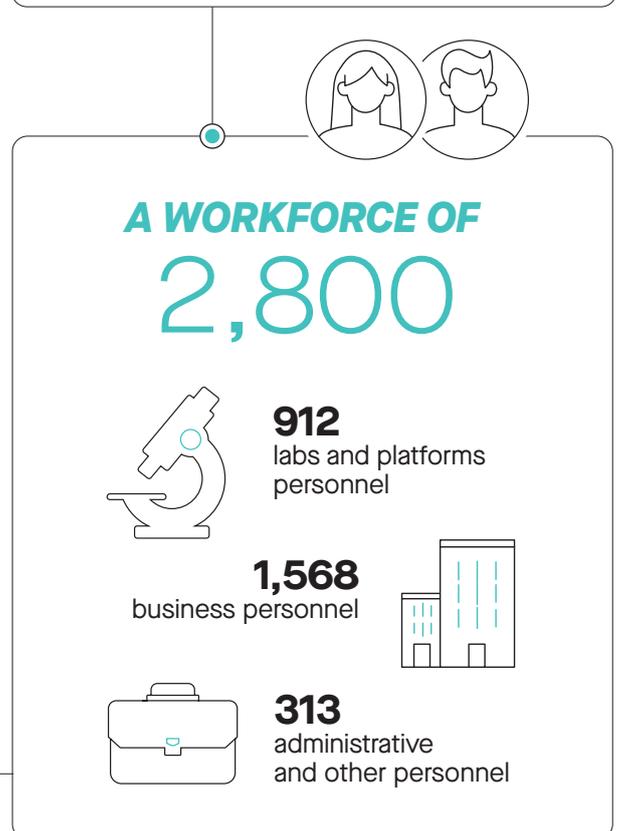
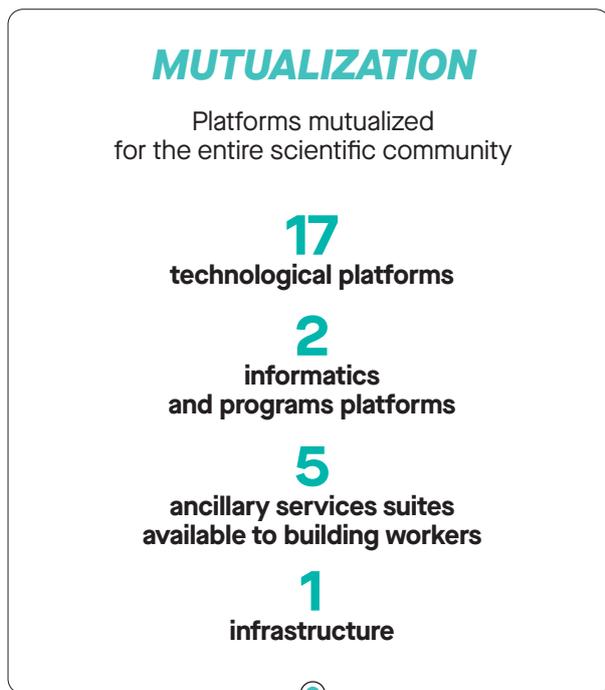
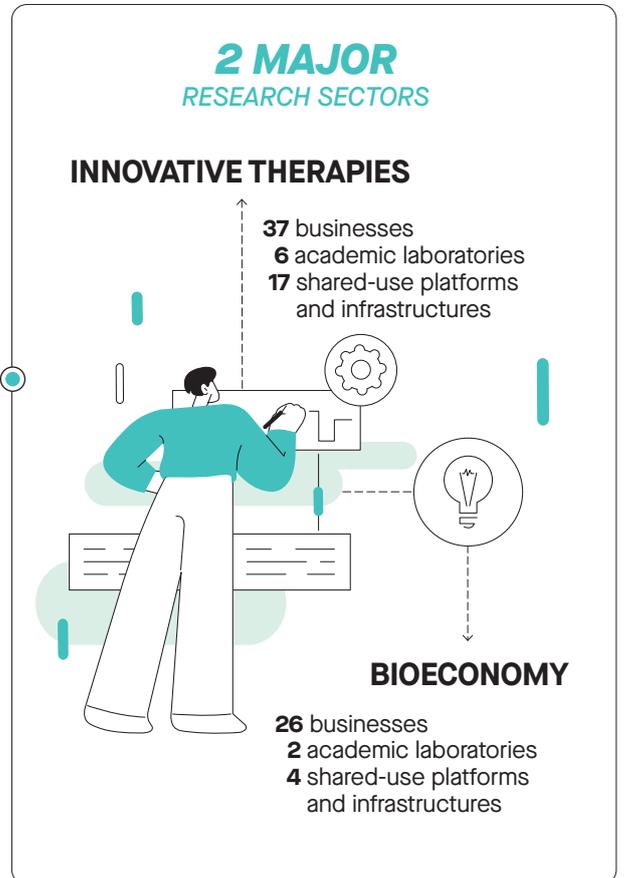
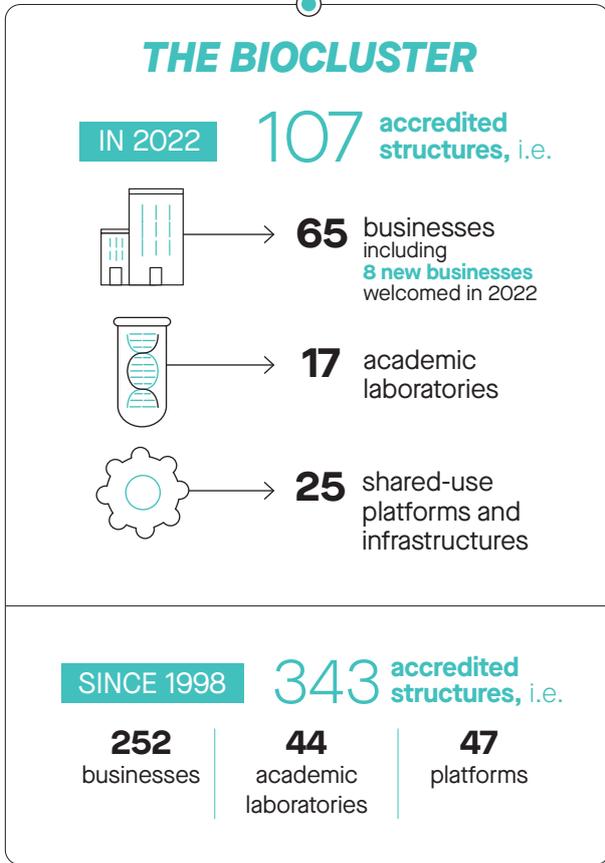


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KEY FIGURES



2022

A new dawn for the biocluster



WATCH
STÉPHANE
BAUDET'S
2022 WISHES
VIDEO
(IN FRENCH)

Year 2022 laid the foundations for a new chapter in Genopole's history, ushering in solid, stable and collegial management with Genopole's GIP and SEM entities. This new chapter is being written in coherence with the ambitions of the French Nation, as expressed in the France 2030 plan, and those of the Île-de-France Administrative Region, with its Impact 2028 plan for economic development, innovation and internationalization.

A dynamic of reinvention

France needs cutting-edge laboratories and innovative start-ups to meet its goals in health security & independence, industrial relocation, and decarbonization & the green economy transition.

The academic laboratories and biotech businesses that Genopole accompanies are busy inventing new ways to empower manufacturing, healthcare, farming, nutrition, mobility and more. Genopole itself is focused on inventing new tools and spaces to support their creativity.

Thereto, the biocluster benefits from the continuing support of the French Ministry of Higher Education and Research, as reiterated by Minister Sylvie Retailleau,

whom we had the pleasure of welcoming at Genopole in November. We thank her again for her mobilization to boost the GIP during her presidency of Paris-Saclay University. The arrival of Gilles Trystram at the helm of the GIP has accelerated this dynamic. I was pleased to accompany Paris-Saclay University President Estelle Iacona in numerous exchanges with the Saclay hub, exchanges that will result in concrete and collective initiatives to strengthen the territory's excellence in academic research in 2023.

From innovation to production

To convert this enormous research and innovation potential into production potential, Genopole has developed an ambitious real estate strategy to be deployed in 2023. It involves several construction programs under the guidance of SEM teams headed by David Bodet. The careful consideration of feedback from Genopole's accompanied businesses, who notably confront challenges related to premises, enabled a change of Évry-Courcouronnes's urban land use plans (in association with Grand Paris Sud) to ease the construction of large industrial facilities, which will bring recognition to Genopole as a site for biomanufacturing in France.

I would like to express my thanks to Chief Executive Gilles Trystram, Deputy Director David Bodet and all of the involved teams for this outstanding work done in 2022 to bring a new dynamic to Genopole. I also thank our founding members and partners, the French State, the Île-de-France Administrative Region, the Essonne Administrative Department, the Grand Paris Sud Urban Area, the AFM-Téléthon and the Essonne Prefecture, all steadfast allies lending their support to enable our ambitions. —

Stéphane Baudet
President of Genopole



After the interim assured by David Bodet, to whom I express my thanks, I began my function as chief executive in September 2022, delighted with the idea of participating in the growth of this fertile ecosystem, where biotech innovations grow to improve our health, change our industries and protect our environment. All links in the value chain are present at Genopole: from training within the rich academic environment at Évry-Courcouronnes and Paris-Saclay, to academic research piloted by renowned research organisms, and on to the development of businesses. This annual report will help you discover Genopole's activities.

Sparking innovation

Sparking innovation. What a good way to express how Genopole stimulates and accompanies the desire to pioneer, and how it welcomes up-and-coming talent in a composite and dynamic ecosystem where novel research topics regularly see the day. For example, since its launch, the Atige program has made it possible for 34 researchers to create their own teams at the biocluster. The inventiveness at Genopole is also fueled by local synergies. To illustrate, in 2022, eight innovative projects proposed by staff members at the South Île-de-France Medical Center (CHSF) were chosen by

Genopole for development in partnership with researchers at the biocluster and students at Évry-Courcouronnes's *Grandes Écoles*. The Shaker is one of Genopole's outstanding programs. It identifies the best innovative ideas and molds them into new start-ups: year 2022 saw 12 projects developed in this way.

State-of-the-art technological platforms

To develop innovation and build sectors, Genopole invests €1 million annually into the acquisition of cutting-edge technological tools, made available thereafter to the campus's laboratories and companies. Rigorously updated in consultation with research organisms and universities, this armada of 25 technological platforms provides world-reaching competitiveness to Genopole and contributes to its attractiveness. Together, those aspects lead companies to choose Genopole right out of the gate: in 2022, eight new companies joined Genopole for its real estate offer and accompaniment, particularly within the growth-enabling Gene.iO program. These companies are not abandoned in their Europe & international aims either. There also, Genopole provides support through its exploratory missions and business match-making via its network of investors, financiers and sister hubs. This growing international visibility reached a new mile-marker in 2022 thanks to the European Commission's green light for the Genopole-coordinated COBIOE project aimed at supporting the development of drug biomanufacturing.

It goes without saying that the accomplishment of all these missions is built upon the unfaltering support from our members, the French State, the Île-de-France Administrative Region, the Essonne Administrative Department, Grand Paris Sud and AFM-Téléthon, who provide 79% of Genopole's funding. In 2023, Genopole aims to pursue its actions to enable biomanufacturing, company maturation and research in a strengthened plan of action in partnership with Paris-Saclay University. —

Gilles Trystram

Chief Executive of Genopole



01.

ORGANIZATION AND RESOURCES

Genopole shapes and vivifies a research biocluster for genomics and life sciences, energizes the growth of biotechnologies by creating, accompanying and welcoming innovative businesses, and strengthens a life sciences academic center in partnership with the University of Évry-Paris Saclay. To carry out its missions, GIP Genopole benefits from qualified teams, secure funding and vast, developing, real estate holdings that respond to the needs of innovative biotech companies and labs.

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THE GIP GENOPOLE TEAM

An operational team

GIP (Groupement d'intérêt public, a form of public-private partnership for missions of public interest) Genopole benefits from multidisciplinary teams committed to creating a fertile environment for research and innovation.

Our missions:

- Constitute and enliven a biocluster dedicated to genomics, post-genomics and other related scientific fields.
- Favor the development of public and private biotech research.

Whether focused on administrative management, research and business, infrastructures and platforms, international affairs or communication, the GIP Genopole teams are all driven by a shared passion: bring progress to life sciences and enable innovation. With their commitment, energy and renowned know-how, these teams have made that passion an objective to be reached via their actions to accompany and develop the biocluster's laboratories, start-ups and businesses.



Gilles TRYSTRAM
CEO



David BODET
Deputy Director
Chief Executive of
SEM Genopole



Christophe LANNEAU
Director
Research
& Platforms
Department



Department
Business
& Partnerships



Nahil JACQUEMIER
Director
Marketing
& Communication
Department



Olivier TOMAT
Director
Enterprises
Department

THE GIP GOVERNANCE

GIP Genopole

GIP Genopole is able to serve thanks to the unfailing support of its 12 members, four of which are fund providers. The GIP has policy and scientific strategy bodies to guide the assurance of its missions. The biocluster receives stable support from a number of public entities (French State, Île-de-France Regional Council, etc.) who contribute significant funding for investments in and the functioning of shared-use technological platforms, the teams serving Genopole's labs & businesses and more.

GIP GENOPOLE GENERAL MEETING

The General Meeting is composed of representatives designated by each member institution. The General Meeting administers and makes all decisions concerning the GIP, for example, its budget and annual program. It also deliberates nominations to the Committee for Science, Innovation and Industry and elects the president and vice-president.



Stéphane Beaudet,
President,
General Meeting



Laure Darcos,
Vice-president,
General Meeting

COMMITTEE FOR SCIENCE, INNOVATION AND INDUSTRY (CSII)

The CSII is composed of qualified persons with particular competencies in Genopole's fields of activity. Its members are approved by the General Meeting. The role of the CSII is to provide the General Meeting with opinions and recommendations on the scientific and industrial orientations of GIP Genopole. A seat on the CSII is accorded *intuiti personae*; the members act in strict independence of their affiliations.



Emmanuelle Quilès,
President, Committee for
Science, Innovation and Industry



French Government
(Ministry of Higher Learning and Research)
Sylvie RETAILLEAU, minister



Île-de-France Regional Council
Valérie PÉCRESSE, president



Essonne Departmental Council
François DUROVRAY, president



Grand Paris Sud - Metropolitan Area
Michel BISSON, president



Town of Evry-Courcouronnes
Stéphane BEAUDET, mayor



AFM-Téléthon
Laurence TIENNOT-HERMENT, president



SEM Genopole
Stéphane BEAUDET, president



Inserm
Didier SAMUEL, CEO



CEA
François JACQ, chairman



South Île-de-France Medical Center
Gilles CALMES, director



Évry-Paris Saclay University
Vincent BOUHIER, president



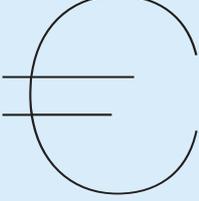
Paris Saclay University
Estelle IACONA, president

Genopole thanks its members

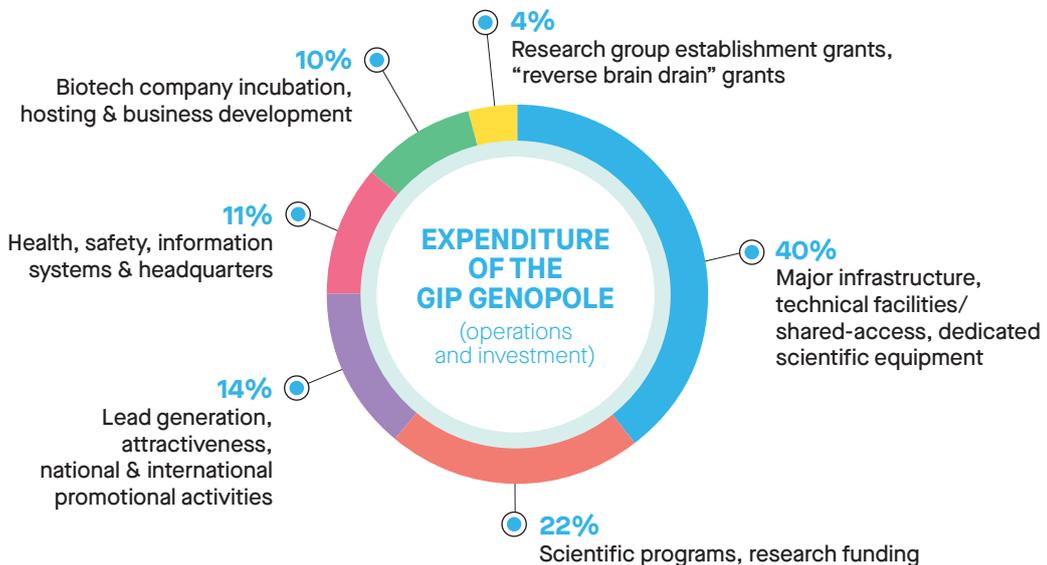
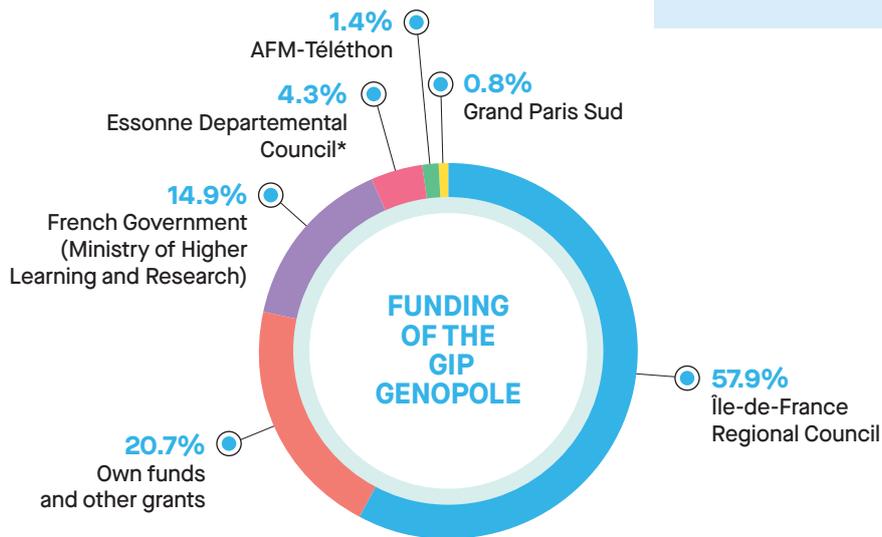
THE BUDGET

Genopole's total budget for 2022, investments and operations included, was €19.4 million, with public collectivities financing 78% of it. The Île-de-France Administrative Region was the primary contributor, supplying €11.3 million, or 58% of financing. Of that sum, 66% was earmarked for investments and 34% for operations. The French State, via its Ministry of Higher Education and Research, was the second largest contributor.

The largest part of the budget went to Genopole's shared-use technological platforms. Clearly a major asset, these platforms are available to and enablers for the biocluster's public and private researchers. The platforms thus play a primary role in Genopole's attractiveness and positioning.



€19.4 M
Budget for Genopole in 2022



* remainder from a 2016 investment subvention

THE GENOPOLE BIOCLUSTER

5 campuses at Évry-Courcouronnes

“Genopole’s new dynamic calls for the construction of additional floor space. Over the next three years, supplementary infrastructures and platforms will see the day to satisfy the growing needs of businesses already at the biocluster and anticipate the needs of new arrivals.”

DAVID BODET, DEPUTY DIRECTOR
OF GIP GENOPOLE AND CHIEF EXECUTIVE
OF SEM GENOPOLE

The Genopole biocluster comprises five campuses, all located within three kilometers of Évry-Courcouronnes and of which 42,000 m² is managed by SEM Genopole. Campus 1 is growing, with the addition of 21,000 m² of lab and office space conceived to adapt to the constant evolution of technologies and work practices. Called **Genopole Next**, this new construction project is a major step forward for biotechnologies, enabling already present companies to grow and arriving companies to set up shop at the biocluster. One of its key characteristics is the concept of flexible spaces able to respond to diverse needs. With that flexibility, Genopole can offer bespoke spaces truly co-conceived with the concerned business.

The Genopole Next concept was developed in partnership with the main territorial actors, including Grand Paris Sud, the city of Évry-Courcouronnes and SEM Genopole, as well as the investors Patriarche and Runlabs.

That close partnership fueled an ambitious project well-aligned to the France 2030 strategy and the new dynamic at Genopole. Genopole Next is scheduled for completion in 2025. It will offer a modern and agreeable workplace facilitating the exchange of ideas and the development of tomorrow’s innovations.



GENOPOLE KEEPS YOU INFORMED

L'Escale

Genopole is a founding member of the association L'Escale, the missions of which are to contribute to the personal growth and well-being of its members and ease exchanges between the biocluster's various entities. L'Escale is also a place where the association proposes 15 or so volunteer- or professionally-led activities (fitness, yoga, Pilates, danse, athletics, football, volleyball, badminton, etc.) to Genopole's citizens. A number of sports facilities (running track, football pitch, gymnasium) are available to L'Escale thanks to a partnership with Evry-Courcouronnes's sports service. At year-end 2022, L'Escale counted 150 members.

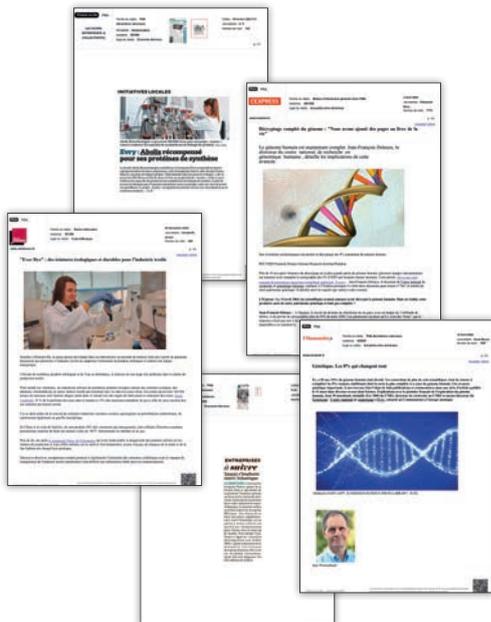
“The ‘life at the site’ dimension is essential for creating a feeling of belonging at the biocluster. It includes favoring encounters between Genopole’s citizens via cultural, sporting or recreational extra-professional activities, thus contributing to a well-being at work.”

ANNE-SOPHIE CARLIER,
HR AND SITE-LIFE MANAGER

In the press

INCREASING MEDIA PRESENCE

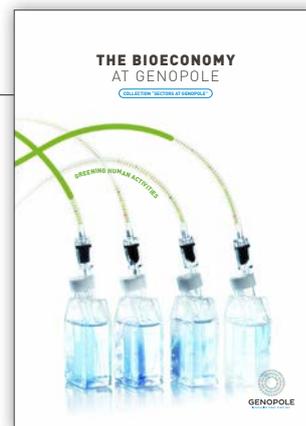
Compared to the previous year, Genopole's media presence grew in 2022. The number of citations grew 11% to 308, editorial space 83% to 105 pages, opportunities to see 3%, and share of professional press titles 24%. Also editorial space in general-public publications was multiplied by four, attaining 22 pages. Genopole's presence in national media grew 20%. The web remains Genopole's main media vector, representing 62% of citations. Therein, 54% of the citations were on professional websites, which provided twice the editorial space of general websites. Institutional websites and blogs were the sources of 11% of web citations. Genopole's media presence conveys the image of a biocluster of innovations, an enabler of project/business creation and support, and a motor of territorial economic development.



Publications

“The Bioeconomy at Genopole” is out!

Following upon the publication of a pamphlet on its innovative biotherapies strategic sector, Genopole has now edited **“The Bioeconomy at Genopole”**. The pamphlet presents the growth of the sector at Genopole; a sector that builds upon life sciences and technologies to contribute to industrial production, more sustainable agriculture and nutrition, and ultimately an entirely new economic model. The growing number of non-medical biotechs at Genopole over the last decade illustrates this dynamic. All links in the value chain, from training to R&D and on to the development of industrial processes, are present today at the biocluster.



READ THE
PAMPHLET
ONLINE
(IN FRENCH)



02.

SPARKING INNOVATION

Genopole's mission is to nurture the genesis of innovative start-ups and new research projects in a territorial ecosystem benefiting from the presence of the South Île-de-France Medical Center and numerous higher-learning institutes propitious to the emergence of talent.

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HELPING BUSINESS CREATION

The Shaker: turning innovative ideas into start-ups

The Shaker program reached a milestone in 2022, welcoming its tenth and eleventh classes. Now in its fifth year, the six-month program has succeeded in its goal of turning projects into companies and the people behind those projects into entrepreneurs.

Since 2017, the Shaker has accompanied 57 innovative projects, 47 of which finished the program and 29 of which became start-ups. Of these latter, 17 continued their development at Genopole in the Booster and now Gene.iO acceleration programs, and 14 joined the biocluster, including Quantoom Biosciences (formerly SynHelix), Yeasty and Nutropy.

Twelve new teams for 2022

The two calls for candidates collectively identified 12 teams for accompaniment in the 2022 Shaker classes. Program Manager Juline Beudez emphasizes the diversity of the profiles: “Some are students, others recent graduates, and several already have professional experience, but they all share the same energy and desire to make their innovative projects real and take on the adventure of entrepreneurship.”

Beyond the diversity of their paths, the laureates also present a variety of research subjects, all in coherence with Genopole's strategic orientations and the nation's major goals: the growth of biomanufacturing; the production of alternative proteins, biological tools to prevent pathogen propagation, novel and more efficacious medical practices, etc.

The inset on the right presents a few of the projects forwarded by the laureates.

“The Shaker was born of Genopole's strong conviction that entrepreneurs are made, not born. The program is a sort of initiation, during which the laureates will benefit from accompaniment and discover a scientific ecosystem that will help them overcome obstacles and consolidate their profile as a bioentrepreneur.”

OLIVIER TOMAT, ENTERPRISES DEPARTMENT DIRECTOR

> IN HEALTH



The Félome project is the brainchild of Laina Freyer, 42, a postdoctoral researcher at Institut Pasteur, and Thomas Aubin, 34, an HR informatics project chief. In the setting of veterinary medicine, they propose a domesticated cat genome sequencing and analysis service to bring progress to the discovery of genetic markers of disease.



The Skinorga project carried by PhD student Cécile Nait Meddour, 27, is aimed at developing novel skin organoids (multicellular three-dimensional micro-tissues) and other derived models intended for skin disease research and active compound screening in the settings of pharmaceuticals and cosmetics.



The objective of the **Alt Biotech project**, fostered by Sakina Elkassouani, 33, an experienced professional in the distribution sector, is the large-scale, affordable, non-animal-based production of growth factors with the goal of resolving a major issue in the development of cell culturing.

> IN FOODTECH



The Auralip project presented by the entrepreneur Laetitia Halbeisen seeks to develop a 100% plant-protein-based alternative to meat for the food & agriculture industry via the fermentation of grains and their oil cake, rich in healthy amino acids and omega 3 and 6 fatty acids.





Atige 2022 : Genopole finances a new research team

Adnan Imeri is the 2022 laureate of the Genopole Thematic Actions Incentive program. Abbreviated "Atige," this program provides three years of funding for the creation of a new research team at the biocluster. Adnan will join the IBISC lab as an associate researcher where he will focus on the crucial question of genomics data security in healthcare and the potential of blockchain technology therein.

The yearly Atige call for candidates is an opportunity not only for researchers to give new momentum to their careers by creating their own research team but also for Genopole to impulse new



READ THE
INTERVIEW



> The Atige program

34 Atiges attributed in all;
20 at the biocluster as of year-end 2022:

- 6 underway
- 14 having created a research unit or integrated a laboratory at the biocluster

research themes contributing to its strategic orientations, such as genomics, biotherapies or synthetic biology, among others.

For example, **Guillem Rigail**, researcher in biostatistics and laureate of the 2016 Atige, has become, as of 1 January 2022, an Inrae research director at the Genopole biomathematics laboratory LaMME and at the Institute of Plant Sciences Paris-Saclay (IPS2). Thanks to Atige, he has created a team dynamic, overcome technological barriers and developed, in close partnerships with biologists, methods and algorithms to cut months off of gene expression analyses aimed at clarifying such major issues as plant stress responses to climate change.

The 2020 laureate **Olivier Biondi** did his Atige work at LBEPS and went on to be named professor at the University of Évry in 2022. He launched pioneering research on the therapeutic effects of physical exercise in neuromuscular diseases, with the objective of providing the vital scientific data needed by practitioners to personalize the care of their patients and explore the combination of exercise with other therapeutic approaches (genetic, pharmacological, etc.).



Call for Innovative Ideas #5: eight useful projects for medical practice

The Call for Innovative Ideas was launched in 2018 by Genopole in partnership with the South Île-de-France Medical Center (CHSF). Its yearly objective is to enable collaborative projects between the hospital's departments and the biocluster's labs. Since extended to the personnel of the Arpajon and South Essonne hospital centers and supported by Grand Paris Sud, the call's fifth edition retained eight new innovative biomedical ideas. They aim to, for example, improve the patient care itinerary, better adapt department organization to the flow of activity, train personnel through digital tools or smooth the exchange of health data.

The call's laureates benefit from Genopole funding and accompaniment to evolve their ideas into projects. For this fifth edition, they will also benefit from the support of students from partner establishments (ENSIIE, Telecom SudParis, Icam University of Évry) in the form of internships or study projects, and furthermore from the expertise of the Computer Science, Bioinformatics and Complex Systems lab (IBISC).

"Genopole's aim is to bring innovative ideas arising from real hospital practice to the research stage. A project addressing real needs and integrating real constraints from day one has a better chance of leading to real solutions for patients and clinicians."

NATACHA VITRAT, CALL FOR INNOVATIVE IDEAS MANAGER AT THE RESEARCH DEPARTMENT

A FERTILE ECOSYSTEM



Science Festival: for a sustainable Earth

fête de la Science

On 8–15 October, Genopole and the University of Évry were again able to welcome the public for the Science Festival after two years of the COVID-19 health crisis. The event drew 1,000 students and the general public with its timely theme: climate change and the role of science for a sustainable Earth. The festive, week-long event, in step with UNESCO's Learning Cities label for Évry-Courcouronnes and in partnership with the DNA Learning Center and Planète Sciences, included lab visits, stands, workshops, and even games and scientific experiments at MicroFolie in the Évry 2 shopping center. Moreover, to celebrate science at home, the Science Festival's dedicated website was enriched with filmed visits, how-to's for small experiments, and scientific games invented by Évry-Courcouronnes's students in biotechnologies. It now counts over 100 things to discover!

Strengthening ties among neighbors

The biocluster benefits from the close ties it has with Grand Paris Sud's higher learning and research establishments, grouped with Genopole within the association Évry-Sénart Sciences and Innovation. This alliance stimulates the interdisciplinarity indispensable to the growth of life sciences and technologies, including notably digital and engineering sciences. This territorial energy is an asset for Genopole's Call for Innovative Ideas and its postdoctoral ApogeeBio fellowships program. The association also contributes to the territory's scientific events. For example, the 2022 edition of the yearly colloquium was focused on sustainable development. It highlighted the role of Genoscope in the exploration of marine plankton and the environmental-management technologies of three Genopole start-ups: EvalDépol, Safeinsight and Anova-Plus.



Training in bioinformatics for health genomics

The fifth edition of Genopole's Autumn School was held under the banner "Bioinformatics and Biostatistical Tools in Medical Genomics" on 21–24 November. The event, organized with the University of Évry and the support of national and international experts, trained biologists, clinicians and informaticians in the use of human genomics data analytical tools.

Genopole holds its first "Digital4Genomics"

In partnership with the University of Évry, Télécom SudParis and ENSIIE (*Grande École* for computer sciences in industry and business), Genopole held its first hackathon on the subject of the sharing, preservation and use of genomics big data. Around the clock, from 19 to 21 May, nine teams of students and researchers imagined solutions to problems put before them by researchers, entrepreneurs and hospital practitioners.

The Évry campus aligns itself in the innovation chain

For 2022, as in years past, Genopole, the University of Évry-Paris Saclay and Évry-Courcouronnes's *Grandes Écoles*: Télécom SudParis, ENSIIE and IMT-Business School, came together at the start of the year to express their shared wishes. The event was held on Tuesday, 25 January in the presence of Essonne Prefect

Éric Jalon and Grand Paris Sud Urban Area President Michel Bisson. There, Genopole President Stéphane Beudet underlined the territory's shared ambition of consolidating the innovation chain, from academia to industrial transfer for issues in pharmaceuticals, the environment, nutrition, digital sciences, etc.

WATCH THE EVENT (IN FRENCH)





03.

DEVELOPING INNOVATION

To catalyze the emergence of biotech companies and the development of life sciences research, Genopole pilots growth-support programs and access to numerous shared-use technological platforms.

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ACCOMPANYING BUSINESSES

65 companies in Genopole's vigor!

Genopole accompanies 65 innovative biotechs and maintains close ties to 17 "alumni" companies, these latter being graduates of its programs or former portfolio companies regularly invited to participate in biotech events or act as mentors for Gene.iO.

8 new companies joined the biocluster in 2022, 5 resulting from Gene.iO, 1 from the Shaker, and 2 from prospectation:

Innovative therapies

- **Byorna** is developing a messenger RNA biomanufacturing platform based on fermentation in eukaryote cells.
- **Cgenetix** is elaborating diagnostic kits for the early identification of organ graft rejection risks.
- **DNTech** is forwarding a rapid and automated kit to detect pathogenic bacteria in the foods sector.
- **EndoGene.Bio** is developing a home diagnostic test for endometriosis.
- **InnoBiomil** furnishes cell culture products that meet the highest biopharmaceutical regulatory standards.
- **Kyron.bio** deploys systems biology to increase cell line yield for the development of therapeutic proteins.
- **SE Therapeutics** exploits the power of microbial proteins to create innovative therapies.

The bioeconomy

- **The Very Food Company** supplies affordable, ready-to-use, plant-based ingredients to replace milk products and eggs.



Workforce

The 49 biocluster-site companies employ 864 people. Additionally, there are 704 people employed either by these biocluster companies at other sites in Île-de-France, or by the 16 Genopole-accompanied businesses located outside of the Genopole campuses. Thus, the global workforce of the Genopole portfolio counts 1,568 employees.

Fund-raising

In 2022, 15 Genopole companies (including 6 Gene.iO companies) raised close to €35 million. The companies raising the most money were Standing Ovation, AB Science, Synsight, Faircraft, EndoGene.bio and Phagos.

As concerns public funding, six companies raised a collective total of €427,000 in unsecured loans from Réseau Entreprendre and Wilco. More than €10 million were supplied by Bpifrance to 22 Genopole companies (including 9 Gene.iO companies) in the form of repayable advances, loans, or grants. Among these latter, the i-Lab competition, organized by the French Ministry of Higher Education & Research and Bpifrance, provided a part of the obtained funding to five Genopole laureates of it: Adlin (Booster), Phagos (Gene.iO), Cearitis (Shaker and Booster), Ever Dye (Gene.iO) and Standing Ovation.



WATCH THE INTERVIEW WITH PAUL RINAUDO (ADLIN SCIENCE) ON BFM BUSINESS (IN FRENCH)

BOOSTING GROWTH

Gene.iO: boosting company fund raising

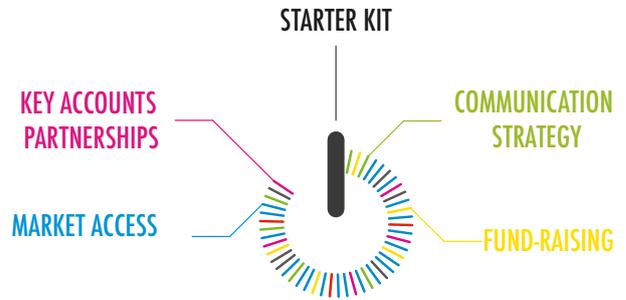
Gene.iO is the logical next-step after the Shaker program for the accompaniment of start-ups at Genopole. Companies accepted to Gene.iO follow an intense course of coaching with the aim of successfully obtaining initial financing, a decisive step in a company's maturation.

In 2022, **Gene.iO** welcomed its second class counting six companies selected for the originality and market potential of their innovations. Five companies from the 2021 class (Ever Dye, Phagos, Nutropy STH Biotech, Quibiotic) decided to establish shop at Genopole after completing their training, followed by two more (DNTech, CGenetix) from the 2022 class.

The year-long Gene.iO program starts with a 360° audit to identify the start-up's needs and continues with coaching based on four Strategy Packs: Market Access, Fund Raising, Key Accounts Partnerships, and Communication Strategy.

The program is bearing fruit: since its creation in 2021, Gene.iO has resulted in 21 jobs created at the biocluster and 52 in Île-de-France. As for financing and as of 2022 (classes 1 and 2), the accompanied businesses have collectively raised €4 million and received €3.5 million in grants.

Gene.iO 2022 class



The six 2022 laureates

- **Biomanufacturing:** Byorna, Kyron.Bio and Quibiotic (from the Shaker)
- **Diagnostics:** CGenetix, DNTech
- **Foodtech:** The Very Food Company



READ THE PRESS
RELEASE (IN FRENCH)



Mentoring: the Gene.iO advantage

The Gene.iO laureates receive the support of mentors selected by Genopole, notably among the heads of formerly accompanied businesses. That support, founded on solidarity, feedback and the sharing of experience, brings great advantages to the laureates in human terms. For their part, the mentors get the satisfaction of contributing to the growth of start-ups. Listen to the testimonials of Anne Feraudet, COO at BIO SUPPORT and Antoine Prestat, CEO of PEP-Therapy (in French).



A chance to shine together with Paris-Saclay Spring

As in past years, Genopole partnered with Paris-Saclay Spring held 12–13 May to put a spotlight on the site's innovative gems. At the roundtables, I-Stem (Inserm) Director Cécile Martinat spoke on the innovations seeing the day in translational medicine (replay 1), and Genopole Enterprises Director Olivier Tomat presented the Foodtech axis and research on novel sources of proteins and ferments (replay 2). Of note, the Spring 50 selection, which distinguishes 50 Paris-Saclay cluster start-ups, counted five companies that were laureates of Genopole's acceleration programs. In health: Aiintense (Booster), Floating Genes (Shaker, Gene.iO) and InnovHem (Shaker, Booster); and in foodtech: Protème (Shaker) and Yeasty (Shaker).



**1— TRANSLATIONAL
MEDICINE**



**2— NOVEL SOURCES
OF PROTEINS AND
FERMENTS**



Genopole sponsors the Digital Startup Trophy

Genopole sponsored the “Health” category of the 2022 Digital Startup Trophy, an event created by IMT Starter, the incubator of Évry-Courcouronnes's Grandes Écoles. The winner in that category was **Eva Derabanne**, with her project ScreenMe, which is aimed at developing an application able to instantly indicate to physicians if a patient is eligible for a clinical trial. With her win, Eva will receive personalized accompaniment and benefit from preferential pricing for the Strategy Packs piloted by Genopole.

...Trophée
startUp
numérique

“Our mission is to bring Genopole's actors together at and around events, where connections are made and public-private partnerships organized, thus propelling innovation in new, dynamic and fruitful projects.”

NAHIL JACQUEMIER,
MARKETING & COMMUNICATION DIRECTOR



Making ties with industrials and investors

Another Genopole mission is to create relations between its network of investors & corporate groups and its accompanied biotech start-ups. Both have reciprocal interests: the former are looking for disruptive innovations and the latter financing and commercial agreements.

Building such relations with investors and financiers is the objective of Partnering Week, one of Genopole's pillar operations. Held 26–30 September, the event drew 40 large, national or international groups from such sectors as health, biobased materials, greentech, agritech, alternative proteins, AI, and more. About 100 meetings were organized between the groups and the Genopole biotechs working in their fields.

A double interest

Either Gene.iO laureates or Strategy Pack users, six start-ups, CGenetix, Ever Dye, Nutropy, Phagos, Safelnsight, STH Biotech and Synsight, benefited from particular attention, with studio-recorded presentations and personalized videos to valorize their activities. “We had communicated via the videos upstream of Partnering Week to attract the interest of investors and large groups,” comments STH Biotech CEO H  lo  se Mailhac. “By doing so, we obtained a baker’s dozen of interviews with investors, and about the same with industrials,” she continued. “Without Partnering Week, having such opportunities would have been much more complicated and long.”

For their part, the corporate groups come to Partnering Week curious to discover the innovations forwarded by the start-ups: “What interests me at Genopole, which is a major hub for synthetic biology, is to discover new technologies, in principle outside of our industry,” explains Laurent Chantalat, open innovation scouting manager at L’Or  al Research & Innovation. “I’m interested in having access to new biotech innovations, a field that will become increasingly present in the cosmetic industry.”

An exemplary development

A highlight of Partnering Week was the 27 September roundtable on why the timing of synergies is crucial for start-ups. That activity underlined the itinerary of **SynHelix** (see p. 32), a Shaker-developed and Booster-accelerated company that became the French affiliate of an international group in only three years. In the video, investor Alain Huriez (AdBio Partners) and Quantoom Biosciences CEO and Univercells CTO Jos   Castillo explain the solid reasoning that led them to commit to the very young start-up so rapidly.



**WATCH THE ROUNDTABLE:
GENOPOLE PARTNERING WEEK -
THE EXEMPLARY DEVELOPMENT
OF SYNHELIX**

“The yearly Partnering Week event translates Genopole’s mission of creating connections. The accompanied start-ups gain quality visibility in the eyes of major industrial groups with the goal of obtaining financing or commercial partnerships.”

H  L  NE VIRASITH,
INVESTOR RELATIONS MANAGER



Three programs

to strengthen competencies and support the development of new scientific orientations



Three ApogeeBio laureates join the biocluster



ApogeeBio's first call retained three candidates for two-year postdoctoral positions in Genopole research teams. Launched by Genopole and its partners (Universities of Évry and Paris-Saclay, Genethon, Télécom SudParis, IMT-Business School, CEA, CNRS, Inserm) in 2021 with European cofinancing, ApogeeBio offers foreign or living-abroad French researchers two years of salary, personalized accompaniment to ease their stay, and professional accompaniment to prepare their long-term carriers.

- **Luana Claudino de Melo (Brazil) is joining the company Enalees** to develop a veterinary antibiotic resistance detection test.
 - **Vijay Ingole (India) is joining the start-up Synovance** to focus on the fermentation-based biomanufacturing of a compound used in plastics, nylons and other products.
 - **Jesus Mercado Cordova (Venezuela) is joining LITEM** (Laboratory of Innovation, Technologies, Economics and Management) to develop a computational model of the diffusion of technological innovations in the biofuels sector in France.
- All three will contribute to the bioeconomy sector at Genopole.

“ApogeeBio enlarges Genopole’s horizon to an international scientific community. The call for candidates is relayed through European and global networks for scientific employment. In addition to the opportunity it represents for young researchers around the world, this new program contributes to the international visibility of Genopole and its partners.”

ROXANE BRACHET,
ACADEMIC
PARTNERSHIPS MANAGER



DISCOVER
APOGEEBIO



Master 2 Grants support training through research

The third edition of the **Master 2 Grants** conferred financing for the internships of six students at the laboratories Lambe, LBEPS, LGRK, SABNP, and the start-up Altar (now a part of Ginkgo Bioworks). With the 16 grants allocated since the creation of the program, Genopole seeks to give its actors opportunities to explore new subjects of interest, and students the desire to pursue research at the biocluster.

Encouraging PhD student training

The purpose of the **International Mobility Grant** is to enable the acquisition of new competencies by PhD students, who transmit those competencies thereafter to the hosting lab. The 2022 edition sent a Genethon PhD student to EMBL Barcelona to participate in the EMBO workshop “The molecular and cellular basis of regeneration and tissue repair”.

ACCESS TO TECHNOLOGICAL PLATFORMS

The platform offer: a Genopole specificity

Whether academic labs generating new discoveries or biotech companies confirming their potential, access to technological equipment is an ineludible key to success. Genopole supports progress in life sciences and the development of biotech innovation by making onerous technological equipment available to its labs and businesses on a shared-use model. Called “platforms” in Genopole parlance, this facet comprises 25 technological installations comprising more than 600 pieces of sometimes state-of-the-art equipment and the competencies that go with them.

25 platforms for research and biotech innovation

Genopole provides its actors with access to:

- 17 technological platforms with specialized equipment and the expertise needed to run them,
- 2 computer software platforms,
- 5 ancillary services platforms reserved for the occupants of specific premises (incubator or buildings),
- 1 informatics infrastructure.

The platform offer has sufficient diversity to cover the totality of biotech-related research domains. The platforms notably supply the technologies that are inescapable for the growth of innovative therapies and the bioeconomy (Genopole’s strategic sectors) and furthermore contribute largely to the biocluster’s attractiveness.

“Genopole continuously optimizes its platform offer to supply its actors with the technological means they need to empower biotechnologies, now recognized as key solution providers for today’s health and environmental concerns.”

JULIEN PICOT,
CORE FACILITIES MANAGER



**SCIENCE
TECHNOLOGY**



Les cercles Genopolitains

Encourage the user network and catalyze innovation

To inform Genopole’s citizens about the available equipment and technologies and to maximize platform use rates, Genopole facilitated **31 “Sciences & Techno” meetings**, four of which included innovative equipment demonstrations.

In 2022, there were **227 platform-laboratory, platform-company, or platform-platform interactions**, 90% of which resulted in research partnerships, service deliveries, or co-supervised student projects.



DEVELOPING INNOVATION Access to technological platforms

11 new pieces of shared-use equipment and an additional offer in cellular biology

Genopole earmarked €1.6 million in 2022 to ensure that its current equipment was maintained to the highest standards and to acquire novel equipment responding to the new needs of its actors or to the evolution of techniques. Particularly, a high-resolution mass spectrometer, a digital PCR system, a multimode microplate reader, a pipetting robot, a device for in-gel protein quantification and study and an integrated system of 48 microfermentors were brought in to strengthen the offer. France has only three structures currently equipped with the microfermentor system, which, at Genopole, will be managed by the start-up Nutropy and mutualized to accelerate the development of bioprocesses for the production of compound of interest in food, therapeutics, industry and more.

The cellular biology platform at I-Stem has also joined the Genopole shared-use offer. Able to perform all steps in cell-line creation, genomic control and master cell banking, this plat-

form will provide biocluster actors with a new service in tailored cell production, potentially useful in, for example, research on biological or pathological mechanisms, or in therapeutic compound screening.

The DNA & Cells Bank, a key contributor to the innovative therapies sector at Genopole, was equipped with two additional nitrogen tanks. As Europe's leading bank for rare genetic diseases, it conserves more than 430,000 samples and processes 3,000 new samples of patient and patient-family blood or DNA yearly.

Also contributing to the growth of biotherapies is the **laboratory Cithera**, a center for cellular bioengineering innovation, which is currently establishing a national, clinical-grade iPS cell bank at Genopole. In 2022, Cithera benefited from 26 dedicated scientific instruments: epifluorescent video microscopes, CO₂ incubators, vacuum systems, etc.



Key figures for the platforms

€ €17 million invested*

 650 pieces of equipment

 The know-how of 150 scientists, technicians and engineers

 A yearly average of 70 publications resulting from platform-enabled studies

 18 patents

 3 software licenses

*since 1998



04. EUROPE AND INTERNATIONAL

By participating in major biotech events across the globe, building relations with new clusters and piloting European projects, Genopole affirms its international presence and gives impetus to the biocluster's growth via access to markets and scientific competencies, the arrival of new companies and labs, and much more.



Prospecting, networking and shining internationally

Genopole is mobilizing internationally to achieve two objectives: build its own renown beyond France to attract foreign companies to the biocluster; and make high-potential Genopole companies known to industrials, investors and other bioclusters across the globe, thus increasing their chances for codevelopment, licensing or services contracts and supporting their international development.

The 2022 **American BIO convention** was held in June in San Diego, California. Genopole's participation in the four-day event gave it access to more than 3,000 companies from across the globe and high visibility for the biocluster to the audience of more than 13,000 participants. GIP Genopole shared a stand there with Choose Paris Region, Medicen, Grand Orly Seine Bièvre, the AP-HP and Institut Carnot. During a roundtable with French Ambassador to the United States Philippe Étienne, Genopole spotlighted its capacities in biomanufacturing and its founding role in France Biolead.

About 100 meetings were arranged between 25 corporations or SMEs (Merck, Boehringer, Bristol Myers Squibb, etc.), 20 investors (Taiho, Astellas Ventures, Theodorou, etc.) and 8 Genopole companies subscribed to the Key Accounts Partnerships or Fund Raising Strategy Packs (Synsight, Deeptope, Phagos CGenetix, Safelnsight, STH Biotech, Ciclix, Luxia).

Also, in November, Genopole participated in ITAP (Industrial Transformation Asia Pacific), an event held in Singapore. That voyage was part of a European Cluster Collaboration Platform (ECCP) exploratory mission to open the Singaporean market to SMEs in biomanufacturing. The mission enabled contacts with local actors in innovation (A*Star (Agency for Science, Technology and Research), SG Innovate, etc.) and included a visit to the National University of Singapore's SynCTI biofoundry.



Europe



- After the American version, Genopole was also present at **Bio-Europe**, held in Leipzig, Germany in October. The biocluster representatives held discussions with foreign contract development and manufacturing organizations and contract research organizations seeking to furnish services mainly in innovative therapies.

- A member of **EIT Health** since 2019, Genopole participated in **its Summit 2022** held in May in Stockholm, Sweden. With more than 2,000 innovative start-ups, pharmaceutical groups, clusters and political deciders in attendance, the

event was an opportunity to build European strategies for health innovation (biomanufacturing, digital health).

- In May 2022, Genopole was elected to the **Council of European Bioregions' (CEBR) administrative board**. By bringing together more than 40 European health-focused bioclusters, the CEBR optimizes support actions for entrepreneurship and innovation. Genopole pilots the CEBR's Internationalization group, which organizes collective initiatives to open foreign markets to accompanied businesses.



COBIOE: building a common European strategy for biomanufacturing

The objective of the **“Growing Connection for Bio Ecosystems” (COBIOE) project** is to bring about a common and inclusive European strategy to strengthen the health biomanufacturing sector. Constructed and coordinated by Genopole, COBIOE is the first EU initiative for the sector. The project was selected by the European Commission and signed 27 December by the GIP and its four partners composing the consortium: CEBR, EIT Health, Health Cluster Portugal and ScanBalt. All are major ecosystems for health innovation in Europe.

COBIOE has three objectives: (1) identify actors in the biomanufacturing value chain (2) create an interactive network and particularly connections with isolated actors to reduce European regional fractures, and (3) give visibility to the network to enrich it and strengthen cooperation.

By taking an active part in the creation of a European biomanufacturing alliance, Genopole is giving energy to the sector in France and strengthening its position in Europe. COBIOE will be managed in coherence with the objectives of France BioLead and PIIEC santé, a substantial European project to structure the sector at the continental level. The partnerships, technologies, competencies and other outcomes of COBIOE will benefit the biocluster’s actors and heighten its attractiveness.



LEARN MORE ABOUT THE LAUNCH

COBIOE
Growing Connection for BIO Ecosystems

BUILDING TOGETHER AN ALLIANCE TO EXPAND THE BIO-MANUFACTURING INDUSTRY IN EUROPE

Joining forces, fostering synergies

Interested in bioproduction?
Check out your opportunities on www.cobioe.eu

The partners: CEBR, EIT Health, GENOPOLE, Health Cluster Portugal

Coordinated by GENOPOLE

Funded by the European Union
Viewpoint Agreement #10100012

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“The European Health Data Space is one of Europe’s most ambitious initiatives of the last decade, and France is one of its pillars. European actors have identified Genopole as a reference biocluster for the health sector. Our partnership with ScanBalt has given us an opportunity to open our ecosystem to this decisive subject for health research and innovation projects.”

ALEXIS BITON, EUROPEAN AFFAIRS OFFICER

Toward a European Health Data Space

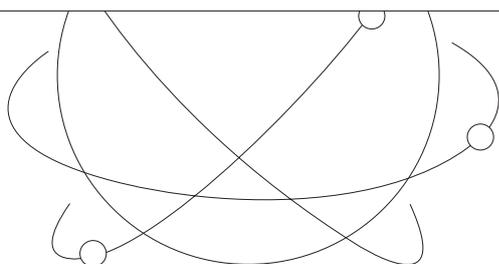
Impulsed by the launch of GEN.ERA, Genopole’s cooperation in genomics with Tartu BT Park, the coordinator of ScanBalt, a network of Baltic Sea clusters, led the two clusters to organize a conference held 8 June at Genopole on the European Health Data Space. Accredited by the French Presidency of the Council of the European Union, the event drew 40 in-person and 290 virtual participants: researchers, entrepreneurs, physicians and patient association delegates, among others. Representing 14 European countries, the participants learned about the ambition of the Health Data Space, the possibility of shared regulation, the protection, access & sharing of data and much more.



Genopole: a biotech hub in the European University Alliance for Global Health

Genopole is an associate partner of the European University Alliance for Global Health. This pilot initiative, abbreviated EUGLOH, currently groups nine universities: Paris-Saclay University, Lund University, Ludwig Maximilian University of Munich, University of Porto, University of Szeged, University of Alcalá, Hamburg University, University of Novi Sad, and Uit The Arctic University of Norway.

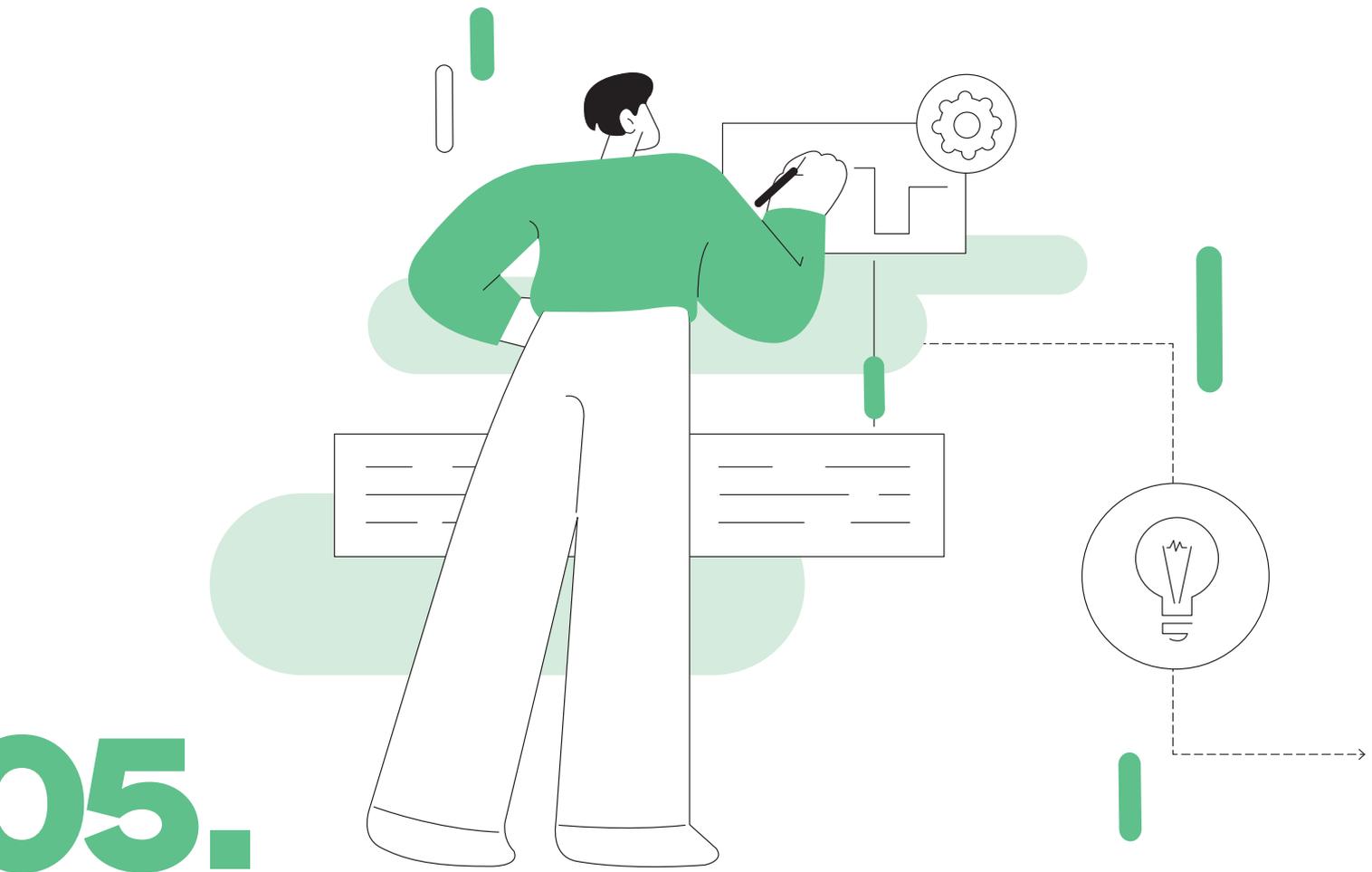
EUGLOH is cofinanced by the Erasmus+ program and coordinated by Paris-Saclay University. On 15 December, Genopole welcomed 35 students from five Alliance universities for an introduction to biotech entrepreneurship, comprising a short training session, a visit to the incubator and a meeting with Madeleine Moscatelli, cofounder of the start-up EndoGene. Bio. With its involvement in EUGLOH, Genopole further solidifies its relationship with Paris-Saclay, extends its network of partner European universities and tempers the first link in the biotech innovation chain: training.



GEN.ERA : clusters cooperating to tackle the global market

The Genopole-coordinated **European project GEN.ERA** (diGital gENomic alliance to Explore new maRket for Acceleration) reached its end in 2022. The five clusters that partnered to construct a shared strategy for the conquest of the extra-European international genomics market identified and analyzed three promising markets for their businesses: the United States, Japan, and Singapore. The phase aimed at meetings and contact-building with local facilitators of market access was slowed by the COVID-19 pandemic, but an initial exploratory mission was carried out in Singapore. A plan for future actions was presented at the GEN.ERA closing event held 14 June at the Estonian cluster Tartu BT Park.





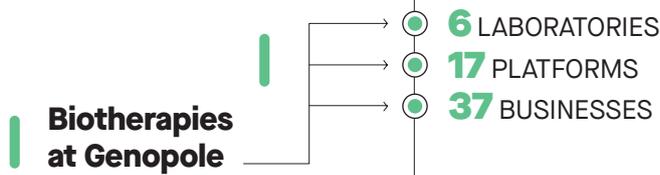
05.

BUILDING SECTORS

To stimulate biotechnology innovation and through actions aimed at training, basic research, and industrial deployment in France and in the world, Genopole is structuring two primary sectors: innovative therapies and the bioeconomy.

- > Innovative therapies 29
- > The bioeconomy 34

INNOVATIVE THERAPIES



Genopole strengthens its support for biotherapies and health biomanufacturing

Genopole continues its commitment for the biomanufacturing of advanced therapy medicinal products by accompanying biocluster actors, facilitating dedicated conferences, participating in national actions for the support of the field, and consolidating its international partnerships for biotherapies and biodrugs in Europe and beyond.

A conference entitled **“Innovative, Combinatory Therapies for Neuromuscular Diseases”** was held at the biocluster on 16 May, in an in-person format to empower exchange. Organized by Genopole, in partnership with Professor Olivier Biondi from the Exercise Biology for Performance and Health Laboratory (LBEPS) and Doctor Émilie Vénéreau from the Tissue Regeneration and Homeostasis Unit at the San Raffaele Scientific Institute (Milan, Italy), the event drew more than 60 researchers in biotherapies and neuromuscular diseases. Presentations on pharmacological, cellular, genetic and physiotherapeutic innovations laid a foundation for a discussion on the promising perspective of combinatorial therapeutic strategies.

Paris Region (of which Genopole is a partner), united French and European actors in pharmaceutical biomanufacturing to discuss the sector’s issues, potential synergies between digital sciences and biomanufacturing, and processes engineering.

Genopole is giving impetus to health biomanufacturing in France within its role as a founding member of **France BioLead**. Officially launched on 7 December by the French Ministry of Economics, Finance and Industrial and Digital Sovereignty, France BioLead associates 15 public and private entities with the mission of structuring, piloting and promoting the nation’s biodrug manufacturing sector and its actors. Notably, one of its primary objectives is to double biodrug manufacturing in France by 2030.



On 28 September, a hybrid **colloquium entitled “Microbiota: Prevention and Health”** attracted more than 150 participants. Organized in partnership with Inrae and the CNRGH, the event underlined the growing role of the microbiome in understanding and treating diseases. Two of the featured subjects were The Human Gut Microbiome Atlas and the **French Gut Project**, recently launched in France to analyze

Internationally, Genopole was chosen by the European Union to coordinate the COBIOE project, a European alliance for health biomanufacturing (see page 25).

100,000 fecal samples. Also, two Genopole businesses presented their research: Enterome, a company developing drug candidates from the intestinal microbiome; and Luxia Scientific, which is focusing on bacterial vaginosis diagnostics.

On 7 April at Paris-Saclay, Genopole led the roundtable “The challenges of innovation in biomanufacturing: how to accelerate” at the sixth edition of the **France Bioproduction Conference**. The roundtable included Alain Lamproye (Yposkesi CEO), Angélique Manceau (Biowest sales director) José Castillo (Quantoom Biosciences CEO), Laurent Pépin (Genopole director of prospection & partnerships) and Serge Braun (AFM-Téléthon scientific director). The conference, organized by Polepharma and Medicen



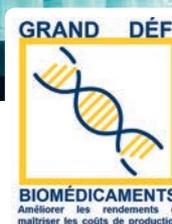


RESEARCH

The Évry ecosystem commits to the Biodrugs Major Challenge

On 3 February 2022, the French Government's Biodrugs Major Challenge action (a part of France 2030), with its budget of €13 million, retained eight novel technological projects for the production of innovative bio, gene or cell therapies aimed at rare or common diseases. The competencies of four Genopole entities, the laboratories **ART-TG**, **CiTHERA** and **I-Stem** and the company **Yposkesi**, will be called upon for three of the laureate projects:

- **ASMA** (Acoustic solutions for manufacturing advanced therapies) combines technologies to improve the key steps of gene material transfer and thus production yield in gene therapies.
- **STELLAR** (Stem cell differentiation evaluation on line–light holographic analysis recording) aims to be a continuous and non-destructive quality control system for cell therapies.
- **SOFTCELL** is taking inspiration from phytoplankton culturing to develop a bioreactor for the high-volume production of human stem cells.

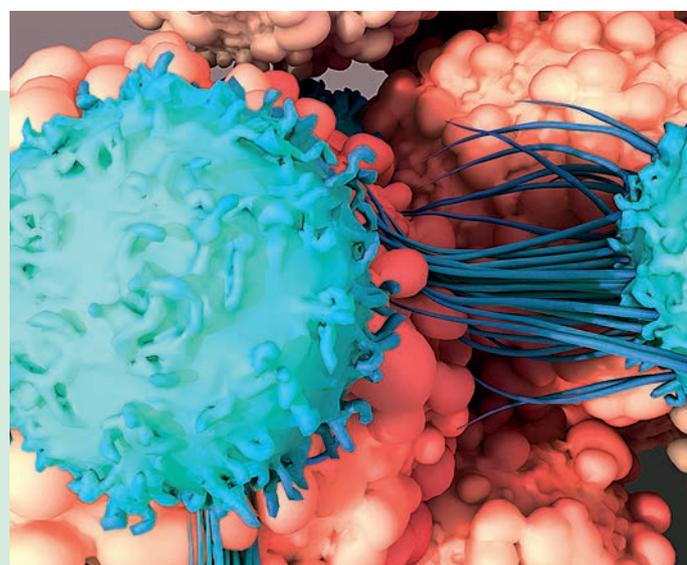


Seven years of hindsight and conclusive results for a Genethon gene therapy

Gene therapies represent the main source of hope for people with Wiskott-Aldrich syndrome, a severe immune deficiency caused by mutations in the WAS gene, leading in turn to defective white blood cells. The laboratory **Genethon** conceived and produced a lentiviral vector and promoted an international *ex vivo* gene therapy clinical trial aimed at this disease. An article published 24 January in *Nature Medicine* provided long-term efficacy results after a mean seven years of follow-up of eight patients aged 8 months to 30 years at the time of treatment. Its authors reported the resolution of primary symptoms such as recurrent infections, a reduction in bleeding and autoimmune disorders, and no observed adverse effects.

Enabling CAR T-cells for solid tumors

The **SysFate** team at the Genomics Metabolics Unit is participating in the European project T-FITNESS chosen by the European Innovation Council and launched on 1 September to make CAR-T cell treatments for solid tumors a reality. CAR-T-cell therapy is a type of immunotherapy that harnesses the immune system's T lymphocytes for the battle against cancer. Although remarkably efficacious against blood cancers, this approach has, to date, shown only limited action against solid cancers. Hoping to change this latter aspect, the Genopole team will, in a first step, use its genome analysis expertise and TETRAMER bioinformatic tool to identify the transcription factors responsible for the loss of efficacy of CAR-T approaches over time.

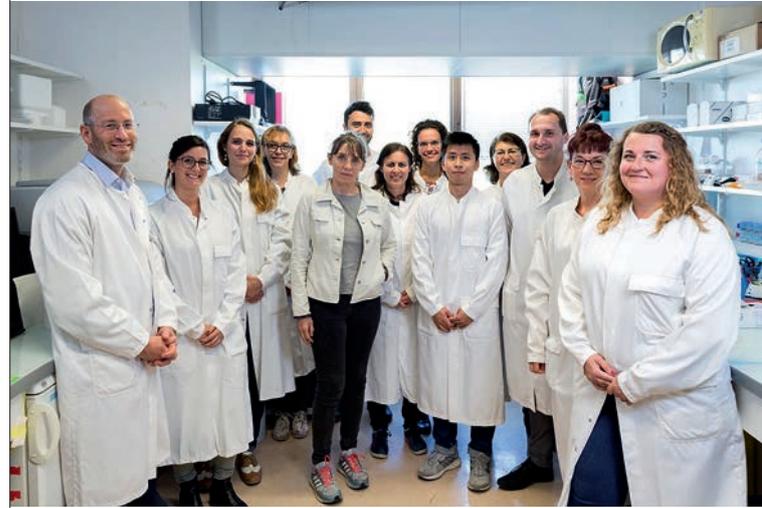




RESEARCH

Genethon: uncovering a second key mechanism of Duchenne muscular dystrophy

Genethon's Progressive Muscular Dystrophies team has identified a second source of muscle dysregulation in Duchenne muscular dystrophy (DMD) involving mitochondria, the cellular organelles responsible for energy production. Since the 1970s, muscle energy loss in DMD was attributed uniquely to disturbed calcium regulation. The Genethon team's work has indeed brought to light a more complex supplementary mechanism involving the dysregulation of microRNA expression directly affecting mitochondrial activity and leading to the degeneration of muscle fibers. This notable breakthrough puts novel molecular pathways on the map and thus creates new therapeutic possibilities to explore.

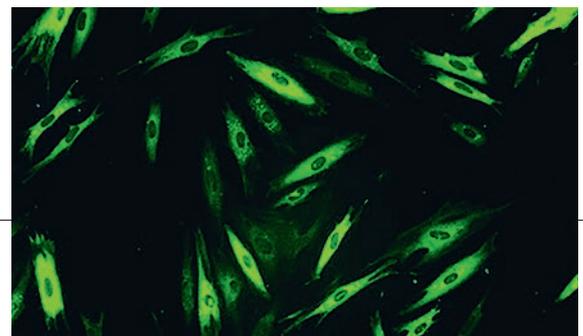


An artificial intelligence that explains its choices

Researchers from the **Computer Science, Bio-informatics and Complex Systems (IBISC)** laboratory have developed an artificial intelligence (AI) that furnishes clinicians with a medical diagnosis and the explanatory biological data to back it up. Called GraphGONet, the system is built upon a new type of neural network integrating knowledge on genes, their expression levels, the proteins and associated biological functions they code for and more, in its deeper layers. The user is provided with information on the biological elements involved and how much each contributes to the AI's diagnosis. By associating prediction and explanation, GraphGONet respects the need for an IA to be transparent, which ensures the clinician as to the validity of the medical diagnosis. Such a tool will contribute to the growth of personalized medicine and help unveil mechanisms involved in specific diseases.

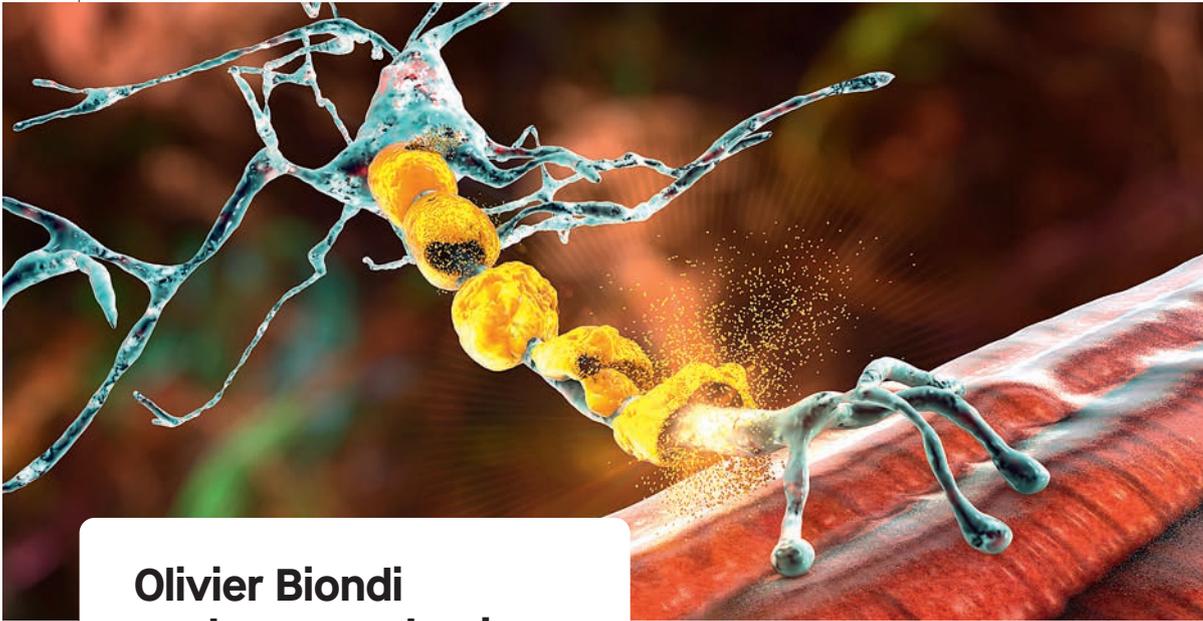
A therapeutic advance for three genetic diseases

Researchers from **I-Stem** and **Genethon**, in partnership with the AI company Kantify, have identified a promising drug combination in the setting of three genetic diseases sharing similar molecular mechanisms. In a cellular model of limb-girdle muscular dystrophy type R3 (LGMD-R3), the team tested nearly 1,000 therapeutics already approved by the American Food and Drug Administration for other indications. Alpha-sarcoglycan is a striated muscle protein that, although misfolded in people with LGMD-R3, does retain some of its function—if it is not broken down by cellular quality control systems. Thus the team's objective was to identify compounds able to block that protein breakdown. Aggregating results from cellular tests and data on the available drugs, the team's AI-driven approach identified therapeutic potential in 47 compounds. Therein, the researchers identified moreover an association of two compounds showing a strong capacity to inhibit the breakdown of muted α -sarcoglycan. In their work, the researchers also showed that this protein breakdown involved not one but two mechanisms, an observation that allowed them to enlarge their results to two other diseases sharing traits with LGMD-R3: limb-girdle muscular dystrophy type R5 and cystic fibrosis.





RESEARCH



Olivier Biondi explores mechanisms activated by physical exercise

Laureate of the **2020 Atige**, Olivier Biondi is now making his projects real at the biocluster. Recently named as a professor at the University of Evry-Paris Saclay, he created his team within the **Exercise Biology for Performance and Health Laboratory** (LBEPS) and began his pioneering research on the effects of physical exercise on neuromuscular diseases.

In the medium term, Olivier Biondi aims to furnish physicians with scientific data enabling the adaptation of exercise to each patient and each disease. Further in the future, he will study the synergistic effects of exercise when combined with pharmacological, gene, cell, or other therapies.

WATCH THE INTERVIEW (IN FRENCH)



“We are developing, on one hand, protocols to have an extensive view of the mechanisms of action of physical exercise, and on the other, more precise cellular and molecular analyses to better understand those activated mechanisms.”



A trio of genome sites associated with arterial hypertension

A large-scale genomics study published in *Nature Communications* has unprecedentedly revealed three genome sites associated with primary hyperaldosteronism, a leading cause of arterial hypertension. That work called upon the competencies in genomics and mathematics/bioinformatics available at the **National Center of Human Genomics Research** (CNRGH, CEA/François Jacob Institute of Biology) and the Paris-Cardiovascular Research Center (PARCC). The discovery of more frequent variations at those sites in people with primary hyperaldosteronism may ultimately improve early detection of the disease and bring a better understanding of the mechanisms involved in it.



COMPANIES

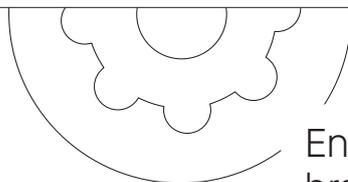
Innovhem recognized for its sickle-cell anemia management method

The yearly **Créatrices d'Avenir Trophies** recognize women heading innovative Île-de-France companies. In 2022, its Innovation Trophy went to Marie Cambot, CEO and cofounder of Innovhem, which was also one of four French companies chosen by the European Union's Women TechEU program.

Innovhem, a company born in the Shaker and accelerated in the Booster, is developing a medical system to improve the management of sickle-cell anemia, the world's most common genetic disease. The company's innovation combines disease biomarkers and artificial intelligence, and "responds to a true need," explains Marie Cambot. "A survey of physicians revealed that 90% of them consider that they do not have sufficient diagnostic tools available to them," she adds. "However, precisely defining disease severity and predicting its course are vital to the physician's ability to propose personalized treatments to each patient."



READ THE INTERVIEW
WITH MARIE CAMBOT
(IN FRENCH)



Enalees sells its human diagnostic branch to Biosynex

In 2020 and in partnership with Bertin Technologies, **Enalees** developed a rapid isothermal amplification SARS-CoV-2 RNA detection test on a portable reader validated with the help of Institut Pasteur. Enalees is now selling that human diagnostic branch to the Alsatian company Biosynex. "Enalees will continue to produce its human tests for Biosynex for one year," states company CEO Laurent Thiery. "In parallel, we will pursue the development and production of tests for infectious diseases in animals, which is the focus of our company." In other news, Enalees obtained a €500,000 grant from the Île-de-France Administrative Region as part of the France 2030 investment plan to solidify its supply chain, develop its range of products and enlarge its facilities at Genopole.

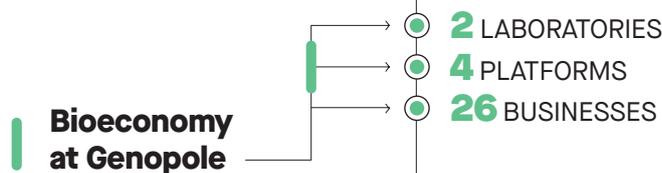


A European boost for SynHelix

Created in the Shaker, welcomed to Genopole and developed in the Booster, **SynHelix** has a solid automated technology for the synthesis of long DNA fragments. Its disruptive innovation, a less costly alternative to other existing processes, has the notable advantage of applicability in numerous markets, and particularly in health. The Belgian Group Univercells, a specialist in biodrugs has acquired SynHelix and made it its French affiliate under the new name of Quantoom Biosciences. The company continues to pursue its development with Genopole, assures its CEO Irina Gbalou: "We intend to stay in Évry-Courcouronnes, to maintain our ties to Genopole's rich ecosystem and its great perspectives for recruitment, projects and partnerships."



THE BIOECONOMY



The bioeconomy: a growing source of innovations for the environment



Genopole is an important element of the bioeconomy in France. Thriving on progress in knowledge and technologies and addressing the imperative for industrial transformation, the bioeconomy sector is growing at Genopole, where it increasingly generates research projects and business creations in a nurturing environment of effective accompaniment and pertinent shared-use technologies (fermentors, mass spectrometry, and much more). Genopole's commitment to the sector was visible in 2022 via its active involvement in a number of bioeconomy events.

• Sponsoring of Bioket

In March, Genopole became a sponsoring partner of Bioket, France's main bioeconomy event organized in 2022 by Bioeconomy For Change in Lille. Genopole Research & Platforms Director Christophe Lanneau spoke there on the theme of "Digital Biofoundries, a game-changer for the Industry." He evoked the campus's biofoundry project, this latter positioned to respond to preindustrialization questions and integrated in the future regional biofoundry network within Île-de-France's DIM (domain of major interest) BioConvergence program.

• Front and center at the iGEM competition

Genopole mobilized strongly for the yearly international synthetic biology competition iGEM, born in 2005 at the Massachusetts Institute of Technology (Cambridge, USA) and held in 2022 in Paris for the first time. At its 90m² pavilion shared with the University of Évry-Paris Saclay and the Grand Paris Sud Urban Area, Genopole highlighted its contributions to the emergence of synthetic biology, including the first-ever higher-education training program for the field, the biocluster's numerous academic teams and companies in it, and Genopole's now decade-long support for Évry's iGEM teams, the 2022 version of which presented a cancer biosensor project.

• At the international food exhibition SIAL

Genopole participated in SIAL, the world's largest food innovation event, held in 2022 in October at the exhibition center Paris Nord Villepinte. There, Genopole promoted its commitment to a future of more environmentally sound nutrition. Choose Paris Region organized several roundtables at which Abolis CEO Cyrille Pauthenier, Genopole Enterprises Director Olivier Tomat and Genopole Prospection & Partnerships Director Laurent Pépin emphasized the domiciliation and growth opportunities offered by the biocluster to food biotechs, and announced its Foodtech Lab project, a prototyping space for the development of alternative proteins at Genopole.

"The 21st century's industrial revolution will be born of green chemistry biotechnologies. We support the development of the bioeconomy and industrial biotechnologies because they drive the innovations that will enable more localized manufacturing methods consuming less fossil fuels and lowering environmental impacts."

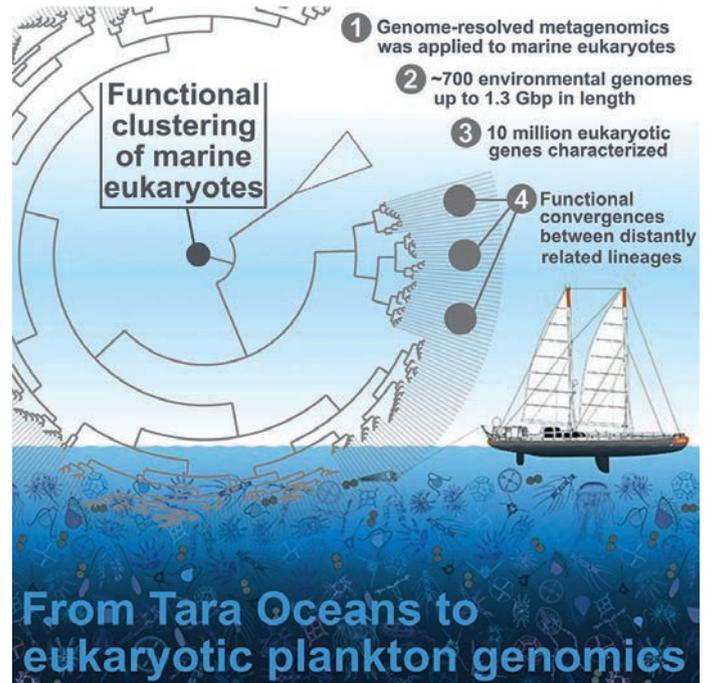
GILLES TRYSTRAM, CHIEF EXECUTIVE OF GENOPOLE



RESEARCH

A constellation of planktonic life revealed

In a pioneering study, **Genoscope** used its massively parallel DNA sequencing capacities and bioinformatics tools to reconstitute the nearly complete genomes of 700 planktonic eukaryotes contained in samples of marine water gathered from across the globe. That work represents a tour de force for the large and complex genomes of these species, furthermore impossible to isolate and cultivate in the laboratory. Planktonic eukaryotes contribute largely to the movement of matter, energy and oxygen in the oceans, and thus to the equilibrium of the planet.



Galaxy-SynBioCAD: accelerating green chemistry

Presented on 27 October at the International Workshop on Bio-Design Automation (IWBD), the informatics platform Galaxy-SynBioCAD is an unprecedented toolshed for the in-silico construction of metabolic pathways in microorganisms. It covers all steps, from conception through to scripts to pilot genetic assembly and production robots.

It seeks to extend the range of compounds produced by biological pathways instead of by chemical synthesis. Created by Genoscope's **Genomics Metabolics Unit** and the Micalis Institute, the open-source web portal is available to the synthetic biology and industrial biotechnology communities.





RESEARCH

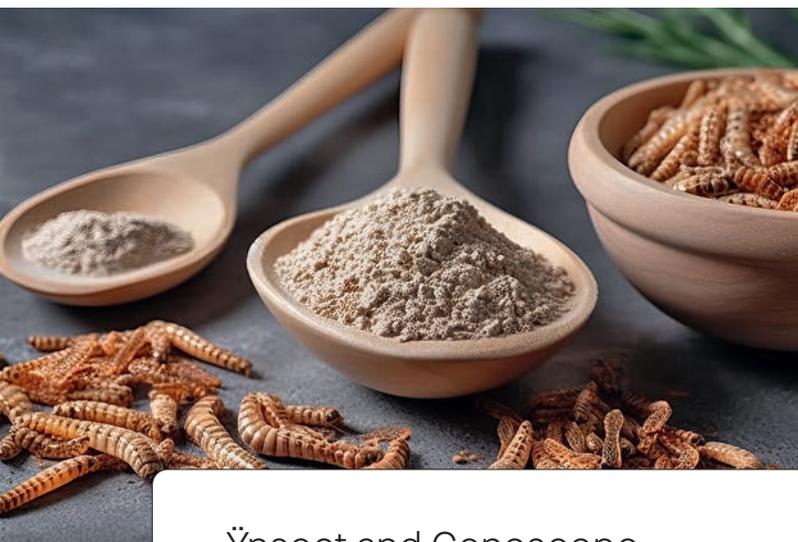
A Genoscope researcher provides expertise at OPECST

On 17 February, Teaching Professor **Pierre-Loïc Saaidi** of the **Genomics Metabolics Unit** presented his team's research on chlordecone pollution in the West Indies to OPECST, the French parliamentary office for the evaluation of scientific and technological choices. That team's ten years of work supplied the first laboratory demonstration of the possible bacteria-based degradation of chlordecone, a now-forbidden pesticide thereto considered non-biodegradable. After that demonstration, the team showed the phenomenon in natural conditions by discovering the same degradation products in Martinican soils. This research has changed the paradigm on the soil pollution in the West Indies resulting from the massive use of chlordecone in the past and created new perspectives for remediation.



When genomics tells the story of the donkey

Genoscope was part of an international genomics study, published in *Science*, on the history of the domestication of the donkey, very different from that of the horse. Indeed, donkeys were domesticated about 7,000 years ago in a single region of the Horn of Africa and shown their worth in agricultural tasks and transportation in rugged, arid areas. Via their role in human society and breeding practices, donkeys have since differentiated into regional subpopulations with distinct traits. A better understanding of the genetic basis of its resilience in rough desert environments will prove useful for breeding practices in the era of environmental change.



Ynsect and Genoscope: innovators in insect farming selection

Ynsect, the world leader in mealworm production and transformation, and Genoscope, a national sequencing center, have merged their competencies for a disruptive objective: the genomic selection of farmed insects. Called Ynfabre, the program for the selection of *Tenebrio molitor* beetles is unprecedented. Ynsect will pilot this project aimed at selecting reproduction insect lines for the large-scale production of mealworms (the larval form of *Tenebrio molitor*), which are a source of proteins and other nutriment (oils, vitamins, etc.). Furthermore, the company is currently building the largest-ever insect farm for animal nutrition today and human nutrition tomorrow.

COMPANIES

Abolis wins national INPI trophy

The biocluster company **Abolis** was selected by the INPI Trophies' jury for its "Responsible Innovation" prize. Across five categories (export, industry, responsible innovation, partnership research and start-up), the INPI (national institute for intellectual property) Trophies recognize five innovative French companies who stand out for their industrial property strategies, a vital aspect for business valorization and growth.

Intellectual property at the heart of the company

Abolis thus finds itself on the top of the INPI Trophies' podium in its category thanks to its proactive and coherent intellectual property policy. The Genopole company has developed a platform to create "custom-tailored" microorganisms able to sustainably produce compounds of industrial interest via fermentation. Cyrille Pauthenier founded Abolis at the age of 26 and won the Technological Potential Prize in the 2013 edition of the Genopole Young Biotech Award. Since then, his company has grown significantly and now employs more than 50 people. Abolis works with several major names in cosmetics, pharmacy and nutrition, all on the lookout for biosourced products.

Abolis serves its clients from the study of the project to the start of the industrialization phase. It respects best practices in computer and data security and places intellectual property at the center of its activities.



“The INPI Trophy recognizes how we practice industrial property every day. For us, it is primordial to exercise our intellectual property strategy in concert with our scientific breakthroughs: patents, markings and confidentiality are present at the very conception of our solutions!”

VALÉRIE BRUNEL, GENERAL MANAGER
OF ABOLIS BIOTECHNOLOGIES

READ THE
PRESS RELEASE
(IN FRENCH)





COMPANIES

Europe selects **Synovance** for its biomanufactured colorants

Synovance has joined Altar and Glowee as a laureate for funding by the European Innovation Council's EIC Accelerator program. Its sustainable colorants, produced via genetically modified bacteria, represent a solution for textile manufacturers committed to reducing their environmental impact. Notably, jean makers have shown interest in Synovance's bio-indigo. The EIC Accelerator grant will enable the commercialization of its first products in 2023 and capital support will contribute to industrial upscaling.

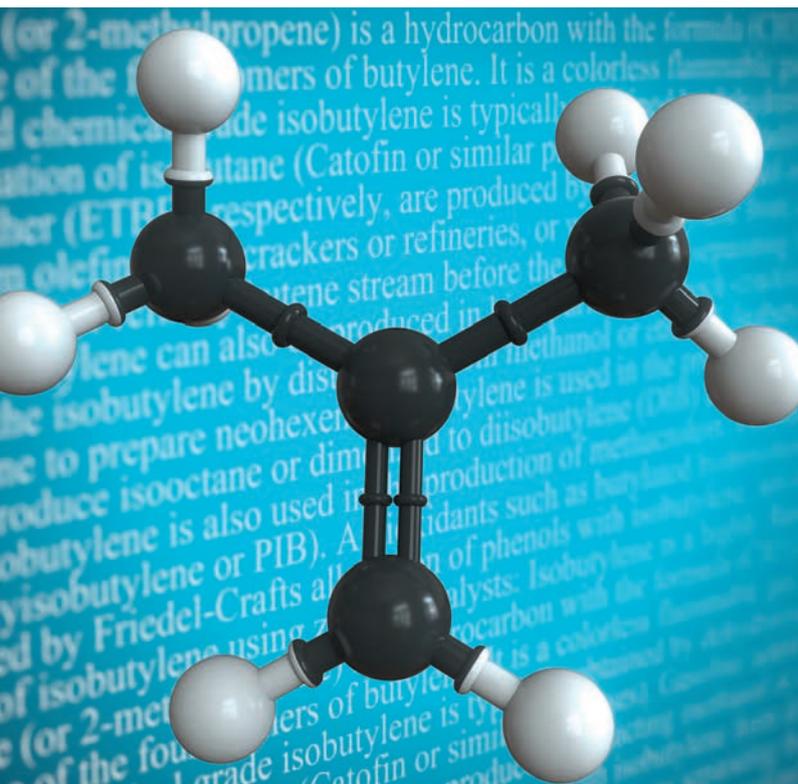


LISTEN TO THE FRANCE INTER RADIO STATION REPORT (IN FRENCH)



Global Bioenergies synthesizes an additional compound for greener industry

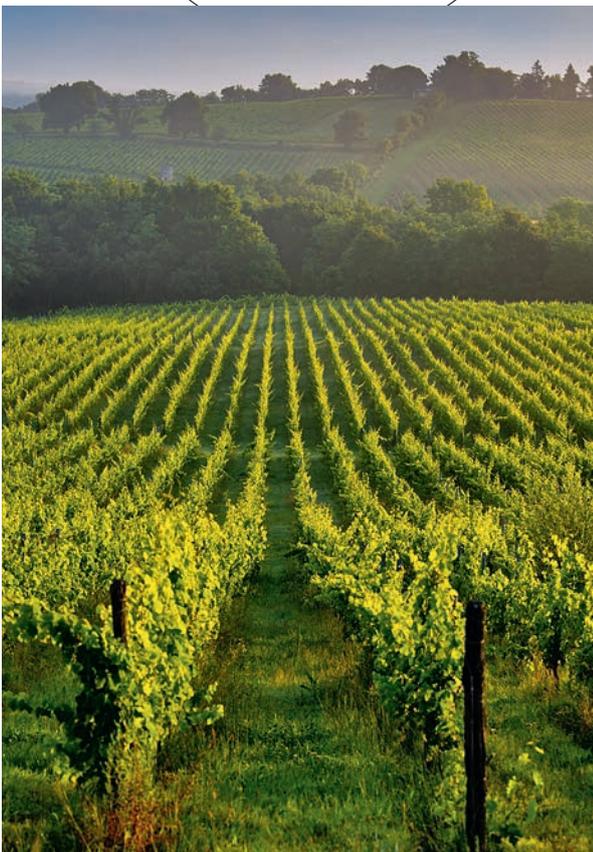
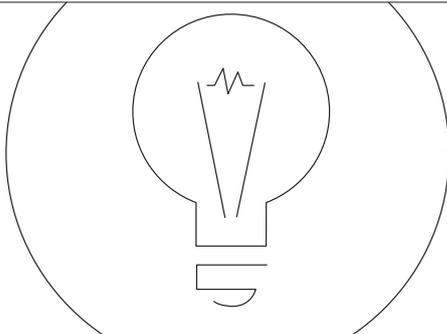
Global Bioenergies has developed a biosourced process for the production of a compound of industrial interest: prenic acid. This latter is a five-carbon intermediary in the synthesis of isobutylene, a historically petroleum-based compound that Global Bioenergies biomanufactures for the cosmetics, biofuels, fine chemicals and other industries. The new process for the biological production of prenic acid represents new opportunities for portfolio products, "perhaps aromas, perfumes, glues, paints; prenic acid plays a part in numerous compounds that, today, are derived from petroleum," explains Global Bioenergies CEO Marc Delcourt.



COMPANIES

Standing Ovation raises €12 million for its vegan cheese

Standing Ovation gathered €12 million in series A funding for the development of the company's cheese substitutes, the fabrication of which involves non-animal caseins (a milk protein) obtained via microbial precision fermentation. The group Bel has taken a stake in Standing Ovation's capital to accelerate the development of its alternative proteins and ultimately the production of novel food products marrying nutritional quality and responsibility.



Altar joins the American group Ginkgo

Altar has taken on a new dimension by joining the American group Ginkgo Bioworks, the world leader in cell programming. Altar will pursue its growth at Genopole while furnishing Ginkgo with its propriety technology for the uninterrupted, algorithmic culturing of microbial suspensions to accelerate the development of microorganisms able to respond to bioindustrial needs.



Anova-Plus teams with Corteva for integrated farming

Anova-Plus, one of Genopole's first companies, has partnered with the international company Corteva. With the goal of empowering the agroecology transition, Anova-Plus's genomics diagnostic kits for plant diseases and parasites (in grapes, potatoes, wheat, olives, corn) will be integrated and commercialized within Corteva's Plant Health Products portfolio. By genetically identifying "plant enemies," Anova-Plus enables the targeting of treatments and by extension guides the choice of plants.



06. AN EVOLVING BIOCLUSTER

Whether basic, translational or clinical, research is the first step toward the emergence of health innovations for the benefit of patients and care provision systems. The completion of the projects presented will solidify a complete, coherent and coordinated offer covering the aggregate of challenges encountered by the biocluster's businesses and research labs. In so doing, Genopole will coalesce its place as an international-scale Île-de-France biocluster of excellence within Paris-Saclay.

> Innovative projects 41

INNOVATIVE PROJECTS



"In 2022, we conceived an unprecedented partnership project with L'Oréal Group, a world-leader in cosmetics. This public-private framework calls upon the alliance of our respective competencies to catalyze disruptive innovations that will advance the transition toward a green economy and the transformation of the industrial model."

LAURENCE LACROIX-ORIO,
CORPORATE RELATIONS MANAGER

A new envirotech incubator

Within its transition program for a greener future, the world-leading cosmetics company L'Oréal chose Genopole for its first **Green Sciences Incubator**. Together, L'Oréal and Genopole are committing to a green revolution for cosmetics, an industry seeking radical innovations to enable greater sustainability, more naturality and thus a smaller carbon footprint for the sector.

Throughout year 2022, the GIP and SEM Genopole teams constructed a new partnership model necessitating adaptation, creativity and reactivity. The public/private partnership proved novel and ambitious in its goal of supporting innovation for a more responsible industrial model. The alliance pledges to favor the emergence of ambitious projects and actively contribute to the development of a more environmentally friendly future for the cosmetics industry. Furthermore, the partnership aims to favor the growth of start-ups forwarding disruptive innovations for reindustrialization and to attract new French or international businesses to the biocluster.

More than 1,200 m² renovated for life sciences

In 2014, with support from the French State, the Île-de-France Region, the Essonne Department and the Grand Paris Sud Area, the CEA and Genopole acquired two buildings on Campus 2 to consolidate the biocluster by preserving about 15,000 m² for the accommodation of research teams and ensuring the long-term presence of the CEA's life sciences research groups.

The buildings house two important national research centers within the CEA's François Jacob Institute of Biology:

- The National Center of Human Genomics Research (CNRGH), which enables responses to scientific questions necessitating high throughput sequencing and genotyping thanks to the development and deployment of innovative integrated technologies.
- Genoscope, a national sequencing center now focusing on environmental genomics and the search for sustainable biological solutions in synthetic chemistry to reduce pollution, energy consumption, and fossil-fuel use.

Year 2022 saw two renovations for these buildings. The first concerned 900 m² for Genoscope aimed at strengthening the synthetic biology teams, particularly the Genomics Metabolics mixed research unit 8030.

The second, 350 m² renovation was done to support the activities of the Center of Reference, Innovation, Expertise and Transfer (CReFIX), a mixed service unit created as part of the Genomic Medicine France 2025 plan and the CNRGH. This renovation's objective was to accommodate and encourage the stay of new research teams.



A biofoundry project

To respond to current and future environmental challenges, production methods need to evolve. A decade from now, the field of “made in biology” will provide solutions via living processes for many aspects of life: medicine, food and even the manufacture of new materials, just to name a few. To attain this vista, Genopole is looking to create a biofoundry at its campus with the goal of accelerating the transition between research and industrialization. The integrated platform will use synthetic biology techniques to conceive, construct and test genetic approaches for the efficacious production of compounds of interest (in health and elsewhere) and high-performance, environmentally friendly materials. The biofoundry will deploy process automation, robotics, machine learning and artificial intelligence to reach its goals.

This project is part of BioConvergence for Health (BioConvS), an Île-de-France DIM (domain of major interest) aimed at creating a regional network of biofoundries to enable synthetic biology for health and to structure an internationally renowned territory of excellence in bioengineering, biomanufacturing and biotherapies. Genopole's biofoundry will also contribute to the French government's objectives of reindustrializing the nation and durably favoring the economic valorization of innovations.

In 2022, a permanent work group and an operational orientations committee composed of financial partners, academicians and industrials was created to submit propositions to the general meeting by year-end 2023.



A new foodtech incubator

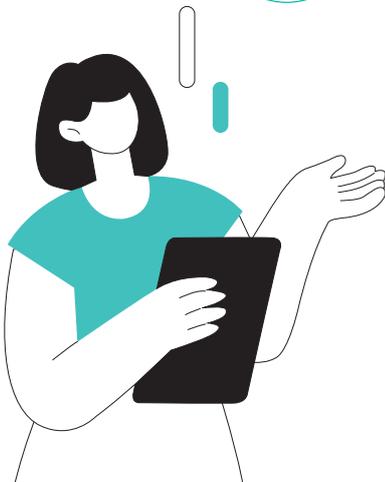
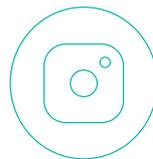
With the emergence of such domain leaders as Gourmey, Algama, Nutropy, Standing Ovation and Yeasty, Genopole is positioned to become a reference hub for alternative proteins. The Protopia project will bring complete conception-to-upscaling support to foodtech start-ups, including concept validation, the minimum viable product, acceleration and growth. The project is built upon a shared laboratory space, open innovation and acceleration programs, and an enabling ecosystem of universities, institutions, businesses and investors. Protopia's premises will comprise labs for cell culturing, biochemistry/microbiology and food elaboration & analysis. Preliminary work was done in 2022 in partnership with SEM Genopole.



“The Genopole biomanufacturing facility will support research projects towards industrialization. It is not just a technological infrastructure, but also a training tool and an opportunity to establish a network of stakeholders in synthetic biology in the Île-de-France region.”

CHRISTOPHE LANNEAU,
DIRECTOR RESEARCH &
PLATFORMS DEPARTMENT

A growing social network presence



+ 30%

with close to
13,000 followers,
used systematically
for communication
campaigns on calls
for proposals for
such programs as
the Shaker, Gene.iO,
Atige, ApogeeBio,
biomedical grants,
etc.

+ 9%

with
3,500 followers

+ 2%

with **6,105
followers**
and constant
progression
in international
readers thanks to
the use of English
as the default
language.

ANNUAL REPORT 2022

BIOTECH
INNOVATION
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