

GENOPOLE
INNOVATION TODAY, EVERY DAY

Sparking
innovation



Building
sectors



Developing
innovation



Europe &
International



Annual report 2021

BIOTECH INNOVATION
FOR HEALTH AND
SUSTAINABLE
DEVELOPMENT

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2021, A YEAR OF CHANGE FOR GENOPOLE



The adventure that is Genopole began in 1998 and continues today albeit in a setting radically different from that of its beginnings. At its Évry-Courcouronnes site, where genome exploration began, France's pioneer biocluster is in an intense period of transformation. In 2021, Genopole welcomed 19 new businesses forwarding innovations that address the reindustrialization and decarbonization goals of the France 2030 investment plan. Genopole benefits from a national and global context highly favorable to the emergence of biotechnologies. However, the specific environment within which Genopole evolves, now highly competitive both nationally and internationally, necessitates reorganization.

A new model of governance

An executive change in late 2021 has been paralleled by a closing of Genopole's two primary entities: the GIP (Groupement d'intérêt public, a form of public-private partnership for missions of public interest), responsible for the biocluster's multidisciplinary projects; and the SEM (mixed-economy company), in charge of its real estate development and management. The objective of this structural modification is to make Genopole more agile in its mission of intermediation & accommodation for its academic, economic and industrial partners.

New directions for research

Genopole is also reinventing its research and training. A new academic project is underway, involving both the University of Évry and Paris-Saclay University, as these two institutions intend to fuse in 2025–2026. The biocluster is also working to greatly heighten its relations with Paris-Saclay University, its teams, and its president, Sylvie Retailleau, to whom we at Genopole address our sincere congratulations and our best wishes for success in her new mission as Minister of Higher Education and Research.

This reinvention of research at Genopole also includes reinforcing our numerous partnerships with the various teams at the CEA (Alternative Energies and Atomic Energy Commission), a historic and academic pillar of science at the campus.

A changing landscape at Genopole

The advancement of scientific knowledge and biotechnologies opens novel paths to explore, not only in health but also in nutrition, the environment, biomaterials, cosmetics and more. Nations, industries and consumers are all impatiently waiting for innovations in those fields. To support their



STÉPHANE BEAUDET
PRÉSIDENT DE GENOPOLE

advent and industrial transfer, Genopole has worked closely with the Île-de-France Administrative Region to conceptualize and launch the development of two new R&D spaces, a foodlab and a biofoundry.

The campuses are evolving as well, with a new parking garage, the outfitting of Genopole's new head offices, an inter-business restaurant, and a building with laboratories and offices responding to the needs of arriving or growing biocluster labs and businesses.

Year 2021 was definitely one of mutation for the biocluster. Thus restructured, Genopole is entering a new era wherein it will adapt itself to an expanding perimeter of biotech innovation and energize a greater number of territories and industrial sectors than it did in its early days.

I'll take this opportunity to thank Genopole's partners and members, particularly the French State, the Île-de-France Regional Council, the Essonne Departmental Council, the Grand Paris Sud Urban Area, and AFM-Telethon, who, conscious of the major scientific, economic and ecological issues at stake, provide precious support to the biocluster."

Stéphane Beaudet
President of Genopole

Organization and resources

Genopole shapes and vivifies a research hub 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 (Groupement d'intérêt public, a form of public-private partnership for missions of public interest) 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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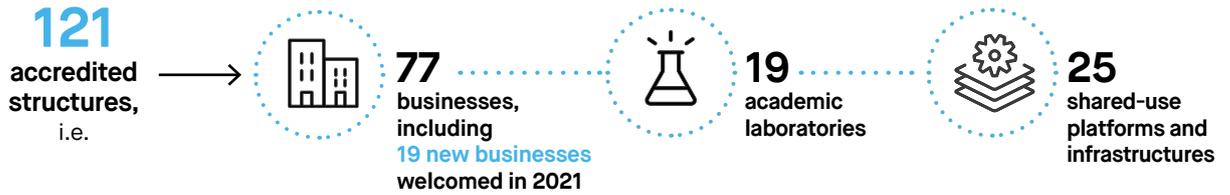
KEY FIGURES

THE GENOPOLE BIOCLUSTER

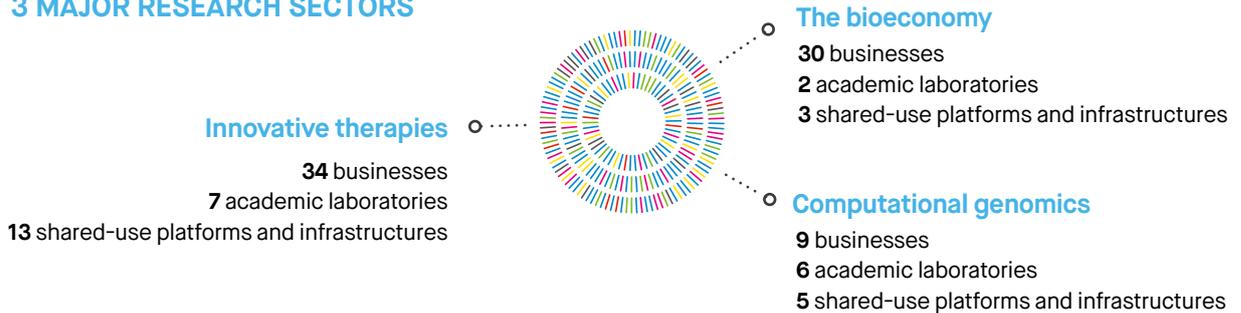
Since 1998, Genopole has counted:



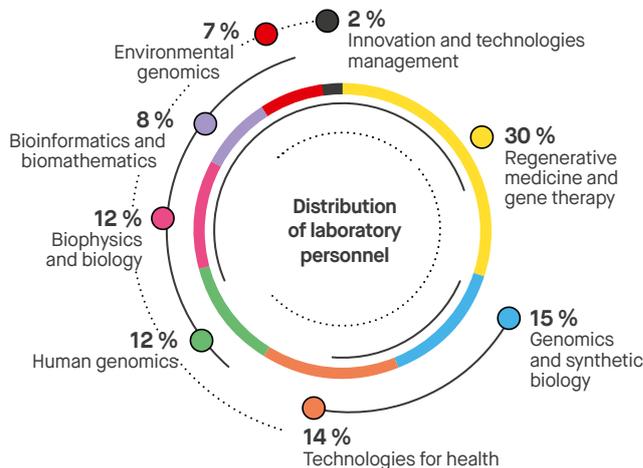
As of year-end 2021, 36% of them are still present:



3 MAJOR RESEARCH SECTORS

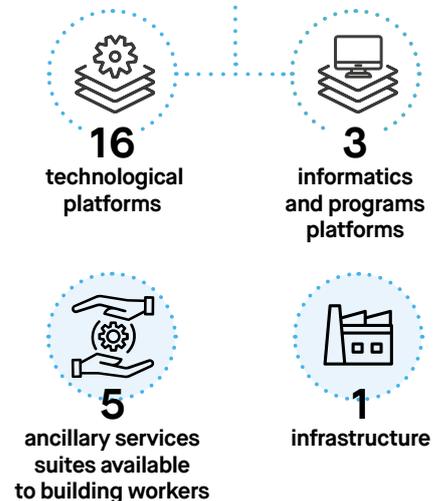


A WORKFORCE OF CLOSE TO 3,000



MUTUALIZATION

Platforms mutualized for the entire scientific community





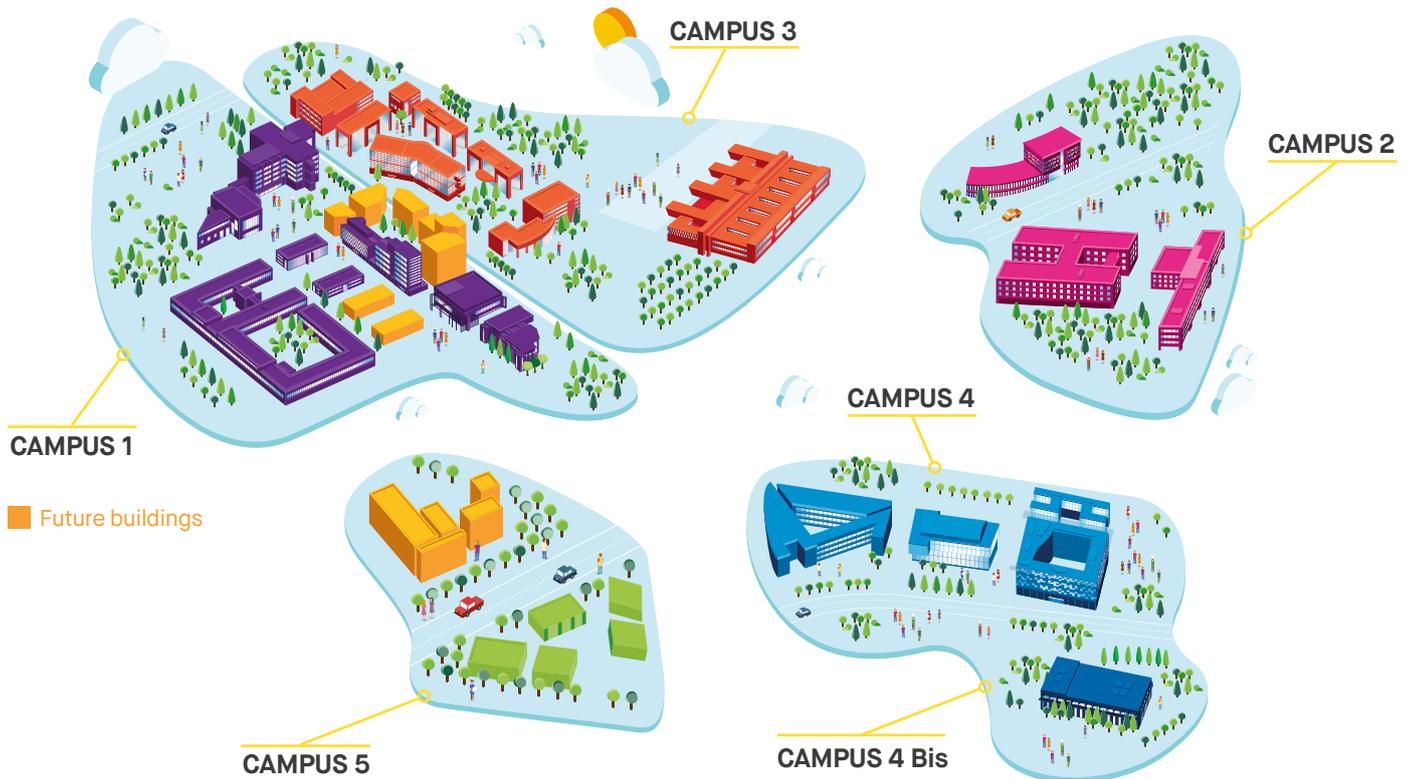
5 CAMPUSES



The Genopole biocluster occupies five campuses all within 3 kilometers of the city of Évry-Courcouronnes. In partnership with SEM (mixed-economy company) Genopole and the Essonne Chamber of Commerce and Industry (CCI), Genopole proposes real estate and premises designed for academic labs and biotech companies advancing innovations for health and sustainable development regardless of their maturity. In 2021, GIP Genopole's head offices moved to the newly-constructed Life Center building on Campus 1.

FIGURE

57,000 m²
in development



SEM Genopole manages the office and lab real estate on Genopole Campuses 1, 3 and 5.

The **Essonne CCI** provides start-ups with an incubator comprising offices and BSL-1 and 2 labs on Campus 3.

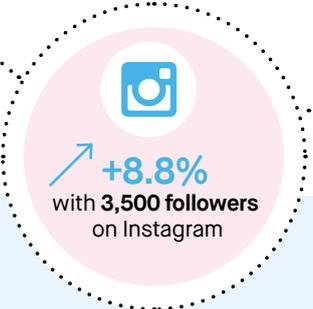
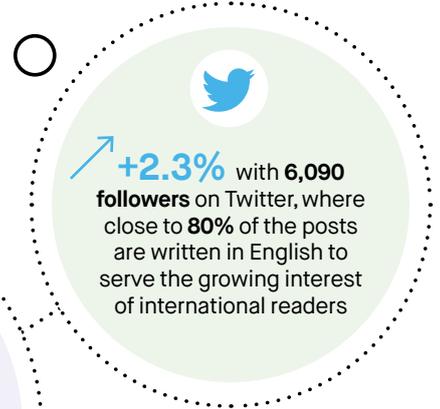
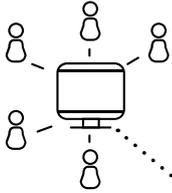
GIP Genopole manages a floor-space offer intended for technological platforms or public laboratories supervised by academic organizations such as the CEA, the CNRS, Inserm, the University of Évry, Inrae, etc.



GENOPOLE KEEPS YOU INFORMED...

Online

Genopole's social media presence is growing:



In the press



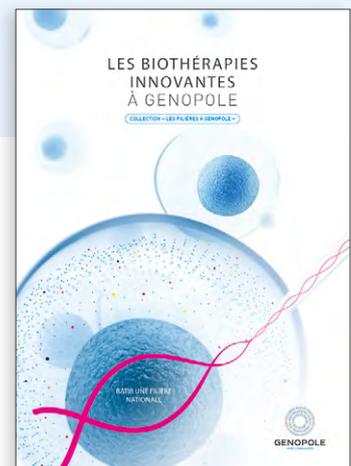
FIGURES



The 2021 media results for Genopole and the biocluster comprised progressions of 36% for the number of articles and 66% for the number of mobilized supports. The published articles present Genopole as a place of biotech innovation and a supporter of project and business creation. Genopole is also identified as an actor in the development of the territory.

Publications

Genopole is publishing a collection of pamphlets presenting its three strategic sectors. The first of them, published in 2021, focuses on innovative biotherapies and provides a panorama of the entire value chain present at the biocluster. It discusses Genopole's targeted training offer and its academic laboratories, technological platforms and businesses covering the full scope of biotherapeutic innovation, from the discovery of novel gene and cell therapies through to the development of biomanufacturing and industrialization processes. The collection will be completed with two other pamphlets on the bioeconomy and computational genomics, Genopole's two other strategic sectors.





TEAMS AND GOVERNANCE



The GIP team, serving the biocluster

GIP Genopole comprises several departments, each with recognized expertise in the accompaniment & development of laboratories, start-ups and businesses, and in the impulsion of innovative projects.



David BODET
CEO



Christophe LANNEAU
Director Research & Platforms Department



Laurent PÉPIN
Director Business & Partnership Department



Nahil JACQUEMIER
Director Marketing & Communication Department



Olivier TOMAT
Director Enterprises Department



Nathalie LOUPIAS
Administrative Executive

Governance

GIP Genopole is able to serve thanks to the unflinching 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, Ile-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 personæ*; the members act in strict independence of their affiliations.



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



BUDGET

Genopole benefits from the unwavering support of its members. Public collectivities financed 75% of its 2021 budget of €15.4 million. The GIP's own resources represented 23.6% of the budget. The Île-de-France Administrative Region was Genopole's main financier, providing €8.7 million (56% of budget).

The funding of the biocluster's shared-use technological platform offer, its principal differentiation asset, represented the largest cost allocation within the 2021 budget.

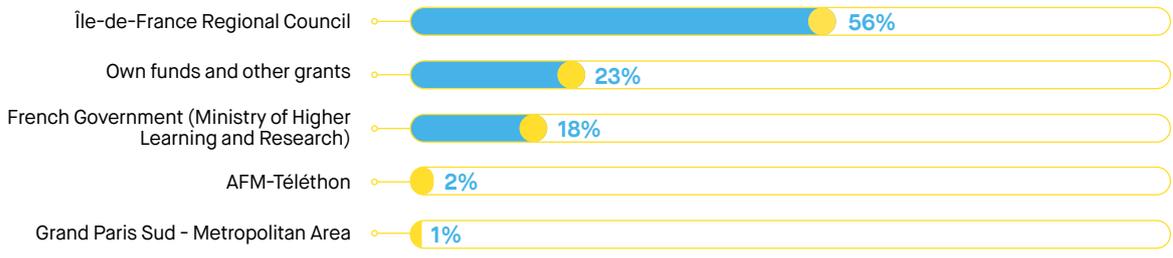
Funding bodies



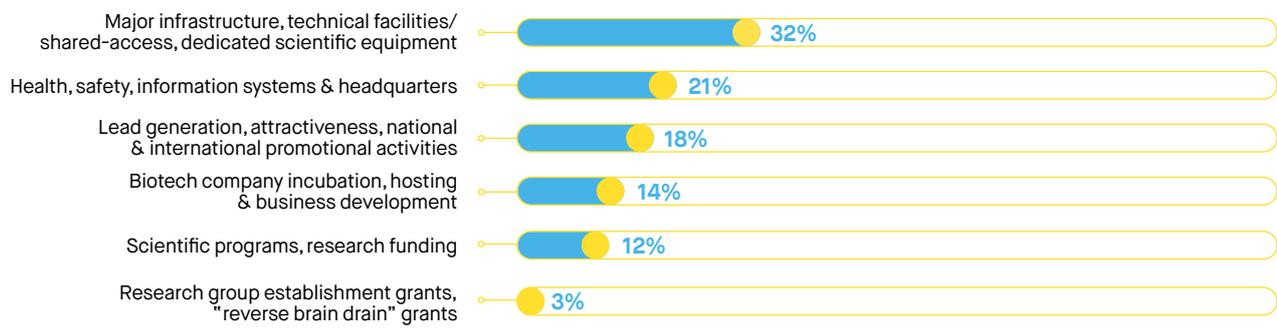
€15.4 million
total annual budget

FIGURE

Funding of the GIP Genopole

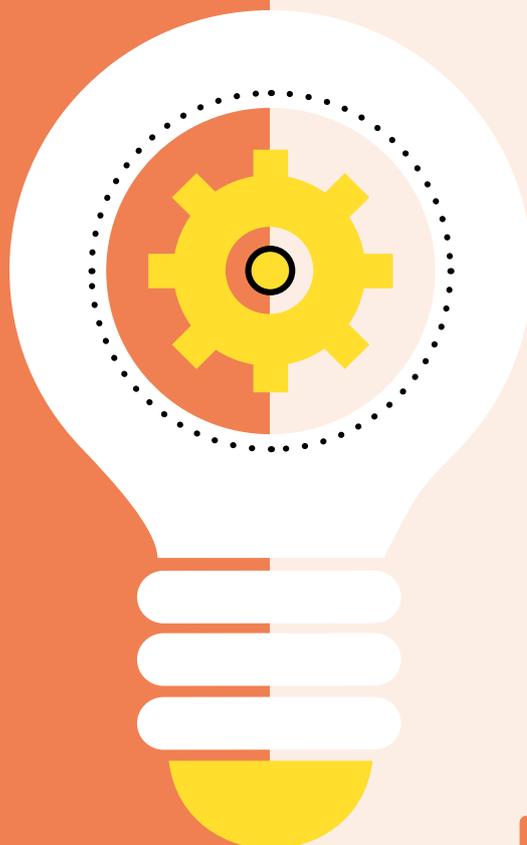


Expenditure (operations and investment) of the GIP Genopole



Sparking innovation

Genopole's mission is to nurture the genesis of innovative projects for business or research. It carries out that mission 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.

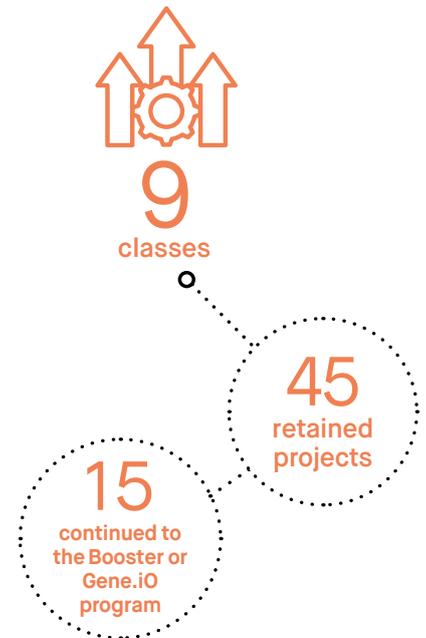


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CREATION ASSISTANCE PROGRAMS

The Shaker : a springboard for biotech innovation



The Shaker is Genopole’s accompaniment program for promising but still embryonic biotech projects. It detects these projects among diverse profiles in terms of age and education: students, post-docs, researchers, engineers, reorienting workers, etc., and provides the holders with the accommodations needed to fructify their concepts. The Shaker’s endgame is to move these innovators tempted by the adventure of entrepreneurship from idea to action. The six-month Shaker program provides the technical and human environment needed to scientifically validate the biotech idea and transform it into a start-up project with high industrial potential. **Close to 70% of the projects accompanied by the Shaker have resulted in business creation.**

“ The Shaker breathes energy and entrepreneurial competency into selected projects to transform their enormous potential as quickly as possible.”

Olivier Tomat,
director of Genopole Enterprises

Reaching renown

Year 2021 saw an increase in registrations for the program, showing that it is now well known in the biotech innovation community.

Nine new teams participated in the year’s eighth and ninth classes, launched with the March and October Welcome Sessions. The teams joined the Biotech Lab, a shared scientific research space at the Genopole Incubator, and followed an introduction to entrepreneurship program.

The Shaker projects, consolidated into start-ups, contribute to Genopole’s three strategic sectors: innovative therapies, the bioeconomy and computational genomics.

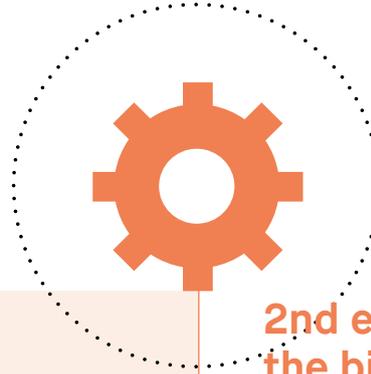
For example, in 2021 **three Shaker start-ups** set up shop at Genopole:

- ▶ **Nutropy**, with a focus on developing the production of dietary proteins by precision fermentation;
- ▶ **Safelnsight**, who’s working on a technology to detect endocrine disruptors in everyday products;
- ▶ and **STH Biotech**, a company with a plant-based biotechnology for the production of cannabinoids for the pharmaceutical, nutraceutical, cosmetics and other industries.

These three start-ups are pursuing their development in the Gene.iO program, the logical next step after the Shaker. Gene.iO is designed to accelerate initial fund-raising campaigns or commercial agreements.



ATIGE: two new research teams in synthetic biology and biotherapy



> THE ATIGE PROGRAM

33 Atiges attributed in all; **2** in 2021

9 underway

8 integrated within a biocluster laboratory

2 resulting in created research units

In 2021, two researchers benefited from Genopole Thematic Actions Incentive (Atige) grants for the creation of new teams at the biocluster. Andrew Tolonen has joined the Genomics Metabolics Unit, where he is strengthening **the synthetic biology aspect** of the bioeconomy sector through the development of a bioprocess to transform lignocellulose from plant, wheat and wood waste into butanol fuels. Frank Griscelli is now at the Cithera laboratory to carry out research on **cell therapies for cancer** and thus accelerating the biotherapies sector. His work employs iPS cells to create CAR-NK (chimeric antigen receptor-natural killer) cells targeted to tumor-specific antigens.

2nd edition of the biomedical research grants

The 2021 biomedical research grant was awarded to pharmacy resident Dr. Benjamin Querin. The grant financed a Microbiology Master 2 for him at Paris-Saclay University, followed by a genomics study of the microbiota of breast milk, co-supervised by the CNRGH (National Center of Human Genomics Research) and the hospital hygiene service of the South Île-de-France Medical Center (CHSF). The study's objective was to better understand the **bacterial component of breast milk** and ensure the safety of its use with premature babies. By easing scientific training and research at the master or PhD level, Genopole empowers biomedical research at the CHSF.



Genopole supports innovation in the hospital

Since 2018 and with the support of Grand Paris Sud, Genopole and the South Île-de-France Medical Center have teamed to enable projects between the hospital's departments and the biocluster's research labs. The program, intended for the hospital personnel and entitled "**Call for Innovative Ideas,**" is one of Genopole's cornerstone actions for research and biomedical innovation. The program's fourth edition was officially launched among the physicians and paramedical personnel of the hospital center on 10 September 2021. Of the 23 innovative ideas submitted, **eight were retained**. The concerned specialties included diabetology, cardiology, rheumatology, clinical pharmacy, psychiatry and neonatology. Aiming to optimize patient care and notably diagnostics & treatments, the retained ideas will need the biocluster's expertise in such areas as genetics, informatics and artificial intelligence. To evolve these ideas into projects, all will benefit from Genopole accompaniment, access to its ecosystem (labs, businesses, engineering schools, etc.) and financing.

The Call for Innovative Ideas since 2018:

- ▶ 25 projects launched in 12 medical specialties
- ▶ 5 prototypes
- ▶ 3 scientific publications
- ▶ 1 patent
- ▶ 1 business project
- ▶ 1 clinical trial
- ▶ 10 master or engineering internships



A FERTILE ECOSYSTEM

The Science Festival celebrates 30 years

For the 30th edition of the Science Festival held 4–9 October, Genopole, the University of Évry and UNESCO’s Learning Cities program teamed to invent novel activities and events to spread the word on sciences and technologies. Two escape games challenged the public in virtual laboratories, where they learned about insects as a more ecological source of nutrition, or sports sciences as a means to measure the benefits of exercise in health and sickness. The program also included online or in-laboratory meetings, experiment stands, and games at the cultural space MicroFolie in the Évry 2 shopping center in partnership with the city of Évry, The DNA Learning Center, Planète Sciences and Sénart’Lab. The website made specifically for the event and available throughout the year offers **more than 80 activities and contents**.



VISIT THE WEBSITE



The Évry Research and Higher Learning Campus’s Wishes

The Évry Campus Wishes ceremony was held 27 January at the University of Évry amphitheater. In addition to the in-person audience, the event was also broadcasted live on YouTube. The executives of Genopole, the University of Évry-Paris Saclay and the Grandes Écoles Télécom SudParis, Ensiie and IMT-BS spoke on the theme of the Common Good to the gathering of state and collectivity representatives. Évry-Courcouronnes Mayor and Genopole President Stéphane Beudet, Grand Paris Sud Urban Area President Michel Bisson and Essonne Prefecture Secretary General Benoît Kaplan thanked the five establishments for their collective efforts first to benefit the lives of students particularly fragilized by the pandemic and more generally to forward the development of the territory.

ESSI federates research and higher learning in Grand Paris Sud

Genopole is an active member of Évry-Sénart Sciences and Innovation (ESSI), which brings together Grand Paris Sud’s research and higher learning in life sciences, engineering, digital sciences and social sciences, among others. The ties that form within this institution naturally weave interdisciplinary projects. These latter benefit from, for example, the Call for Innovative Ideas in hospital research or the postdoctoral grant program ApogeeBio. In 2021, Genopole signed a convention with ENSIIE (French Grande École for computer sciences and applied mathematics), an ESSI member, to strengthen digital sciences for biotechnologies, health and sports. That convention should be advantageous particularly for Genopole’s computational genomics strategic sector.

Meeting the start-ups at La Fabrik’ and Genopole

Genopole and La Fabrik’, an Évry-Courcouronnes service to accompany projects proposed by the territory’s youth, invited the city’s entrepreneurs for an online get-together held 30 June. Four young business founders, accompanied from the start by Genopole project managers or La Fabrik’ teams, turned on their mikes to share their experiences. They spoke of the interest of the territory’s resources for entrepreneurial accompaniment to accelerate and ensure the development of their start-ups.

Supporting the iGEM team to kindle new projects in synthetic biology



As always, Genopole provided its support to the Évry Paris-Saclay team participating in the renowned international synthetic biology competition iGEM. The 2021 team didn’t disappoint, bringing home a gold medal for the thorough work they did in their project “**Evolution T7**” exploring the power of natural selection to create new, useful biological functions. The process imagined by the team opens new vistas, particularly in biomanufacturing. Also, the team’s website earned the “Best Wiki” mention, placing it in the top-ten of the 350 websites in competition.

Developing innovation

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

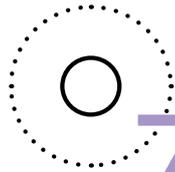
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BUSINESS KINETICS



19 new companies join Genopole



77

companies in Genopole's portfolio

FIGURE

With the same number of departures and arrivals, the Genopole company portfolio remained stable from 2020 to 2021. The Genopole ecosystem welcomed 19 new companies, some coming from the Booster and Gene.iO acceleration programs and others resulting from prospection.



Of note among the newcomers are:

BIOECONOMY

- ▶ **Phagos** proposes an alternative to antibiotics in aquaculture (oysters, shrimp).
- ▶ **Standing Ovation** is advancing a novel, plant fermentation-based cheese production method.
- ▶ **Plantik** is developing a powerful technology to accelerate the creation of novel plant varieties.

COMPUTATIONAL GENOMICS

- ▶ **Luxia-Scientific** produces and markets diagnostics and analytical programs for the human microbiome.

Fund raising

Twenty-four businesses raised **€48.8 million** in 2021. The fund-raising leaders among those companies were Core Biogenesis, Altar, Global Bioenergies, Faircraft, Pep Therapy and Synhelix. The public investments bank Bpifrance provided €16.3 million to 17 businesses as repayable advances, subventions or loans within the settings of various competitions (Innov'Up, iNov, i-Lab), French Tech grants, the Investments for the Future program and others. Twelve of those 17 companies were accompanied within the Booster or Gene.iO acceleration programs. Furthermore, six companies, including four Booster or Gene.iO laureates, obtained a total of €365,000 in unsecured loans mainly from Wilco, Réseau Entreprendre and the Crédit Agricole.

Workforce

The **77 Genopole portfolio companies employ 1,664 people**. Of those companies, 53 are located at the Évry-Courcouronnes campus, where 875 people work. The remaining 24 companies are off-campus but in Île-de-France in their majority.

Most of the companies, 62%, are innovative start-ups with less than 10 employees. For the rest, 26% of the companies count 10 to 49 employees and 12% of them 50 or more. This family photograph reflects the success of Genopole's programs to get new companies up and running. It also hints at the efforts Genopole intends to intensify, namely attracting more large companies by offering pertinent services and working premises.

77 BUSINESSES AND 1,664 EMPLOYEES





MEANS FOR GROWTH

Intermediation to help companies grow

Large corporate groups have come to recognize Genopole as a reliable intermediary for technology scouting, that is, the ever-growing need of these entities to find useful innovations developed in start-ups. In 2021, Genopole's year-spanning intermediation efforts resulted in a green science co-incubation project under development at the biocluster with a large group.

Throughout the year, Genopole's teams organized meetings between its accompanied businesses and actors in industry. For example, Genopole teamed with Choose Paris Region for an April webinar on the subject of future nutrition in Île-de-France, with the participation of Gourmey, Cearitis and WatchFrog. Another such event had been held in February as part of Bioket on the theme of new challenges and opportunities for the bioeconomy, with Ynsect, Altar and NextProtein present.



Connecting to major industrial groups

Partner4Biotech is Genopole's flagship event for building business connections. At the entirely-digital 2021 event held 28–30 September, **40 Genopole-accompanied businesses** were able to exchange with **25 major international corporations**. **More than 110 meetings** were held between the heads of Genopole start-ups and industrials in the fields of health, cosmetics, nutrition and others. The event generated a number of opportunities for financing, industrialization, R&D, proof of concept and marketing partnerships.

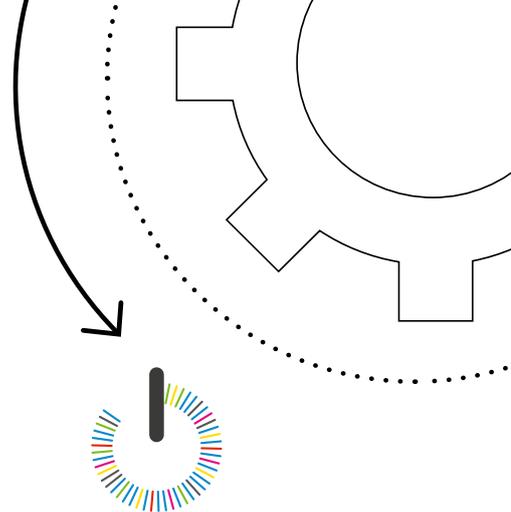
A filmed roundtable held under the banner "Keys for a Successful Partnership" gave two Genopole companies (Altar and Innovhem) an opportunity to exchange with and receive advice from two major groups (Danone and Servier) on strategies for building corporate partnerships.

Building relations with investors

Genopole is also a match-maker for investors. At year 2021's Invest4Biotech event, held 6–7 May, Genopole's start-ups were able to pitch to then meet with close to 30 investors. Throughout the year, Genopole remained focused not only on helping its companies obtain financing but also enlarging its network of investors, particularly at international forums such as BIO or RESI (Redefining Early Stage Investment).

"Partner4Biotech gave us access to business developers, decision-makers from major groups and representatives from their investment funds. It was a great opportunity for us, a very interesting first handshake, especially with the industrials from the cosmetics field, which is currently turning to green chemistry for biosourced molecules."

Isabelle Malcuit,
Scientific Director at Algetech



GENE.iO

Gene.iO: the “tech-to-cash” transition accelerator

A start-up goes through a delicate and critical moment in its development: that where despite a solid technological foundation, it has not yet passed the threshold of industrial and commercial deployment, a moment highly dependent on successfully raising funds. Therein is the *raison d’être* of Gene.iO: to give start-ups access to leading competencies in bio-innovation so that they can obtain initial financing or an initial commercial agreement, and thus pass this vital and decisive step in the acceleration of their business.

Gene.iO saw the day in 2021, as Genopole’s new acceleration program born of five years of experience with the bioclusters previous program, the Booster, which accompanied 33 start-ups between 2017 and 2021. Conceptualized on a foundation of feedback from Booster laureates, interviews with prospective contacts and discussions with other French incubators, Gene.iO is custom fitted to the precise needs of early-stage companies **looking for initial funding.**

An à la carte program

Gene.iO is both a collective and a personalized program. It comprises a common “Starter Kit” (€20,000 repayable advance, accompaniment by a dedicated mentor, access to the technological platforms, arrival assistance, and more) to which each start-up can add any of four specific training “Strategy Packs”: Market Access, Key Accounts Partnerships, Fund Raising, and Communication Strategy.

Training is provided throughout the year-long program by external consultants carefully selected for their expertise in bio-innovation. The financial model of Gene.iO is radically different from that of the Booster in that the Strategy Packs must be purchased by the start-up.

Gene.iO’s first laureates

Announced in October, the first Gene.iO class counted nine start-ups.

- ▶ Innovative therapies:
Floating Genes, Optec4Life
- ▶ The bioeconomy:
Ever Dye, Nutropy, Phagos, SafeInsight, STH Biotech
- ▶ Computational genomics:
Ciclix, Deeptope

The laureates’ innovations target:

- ▶ cleaner **industrial processes**,
- ▶ improved **treatments/diagnostics** for human and animal diseases,
- ▶ novel **biomanufacturing methods** for compounds of therapeutic, cosmetic, nutraceutical and nutritional interest.



“ From the 26 candidates, we selected nine start-ups for the pertinence of their innovations and the level of their advancement in coherence with the Gene.iO objective: accelerating the ‘Tech to Cash’ transition.”

Sihem Ouasti,
Gene.iO Program Manager



Echoliv Lauréat de la catégorie **“L’innovation OneHealth”**
parrainée par **Genopole**

Genopole supports Echoliv and its AI software for liver cancer

Genopole sponsors the Health category of the Digital Start-Up Trophy (in French: Trophée Start-Up Numérique) event held yearly by IMT Starter, the incubator of Évry-Courcouronnes' *Grandes Écoles*. The 2021 victor in that category was the medtech Echoliv, headed by Jules Bayet and Victor Neuillet. The start-up is developing an artificial intelligence aimed at helping radiologists and hepatologists detect hepatocellular carcinoma, the main cancer of the liver, in its early stages.

“ The software improves the echographic identification of liver cancer. The gains in time and precision are both beneficial in terms of life expectancy for the patient. I’m very happy about supporting this project, which ties in with others under development here at Genopole.”

Stéphanie Olas,
Genopole Project Manager



Three programs to stimulate research potential

Genopole finances three research support programs, all aimed at strengthening scientific competencies and facilitating novel research orientations in the academic laboratories, and R&D axes in the biocluster’s businesses.

ApogeeBio replaces the postdoctoral allocations

In 2021, Genopole replaced its Postdoctoral Repatriation Allocation Program by **ApogeeBio**, a new program retained by the European Commission in January (see page 33). The cofinancing from Europe and the support from Genopole’s scientific partners (Genethon; Évry and Paris-Saclay Universities; TSP and IMT-BS *Grandes Écoles*; CEA, Inserm and CNRS supervisory bodies) will allow the number of grants to be doubled and the program extended to international researchers. The first ApogeeBio call for candidates was launched in 2021 and its first grants will be attributed in 2022.

Five Master 2 scholarships to encourage vocations

Five students benefited from scholarships to fund **six-month Master 2 internships** in such labs as Lambe, IBISC, SABNP or Genoscope. Launched in 2019, the Master 2 scholarships encourage students to pursue research as a career and give labs and businesses an opportunity to explore new research projects.

Scholarships to enable study abroad for PhD students

From its seventh call for candidates, Genopole retained three PhD students for **short international training scholarships**. Because of the COVID-19 pandemic, the students pursued their learning online, receiving training in bioinformatics methodologies for the analysis of multiomics data, new technologies for genomics analyses, and software programs for the structural analysis of enzymes, competencies shared thereafter with their teams.



ACCESS TO TECHNOLOGICAL PLATFORMS

25 shared-use platforms providing concrete technological solutions

Genopole’s “platforms” provide access to technological equipment and the know-how that goes with them. They afford the biocluster’s laboratories and companies great support for their R&D by making more than 600 devices available to them on a shared use basis. In that offer are routine devices, but also state of the art technologies well out of the financial reach of any one entity. Genopole’s technological platforms play a vital role in making the biocluster attractive for new public or private teams.

An offer that adapts to changing technological needs

In 2021, Genopole committed more than €2 million to its shared-use technological platforms, with the primary goal of keeping its offer at the state-of-the-art level to best respond to the changing needs of actors at the biocluster. Thereto, the Genopole Enterprises/CCIE incubator benefited from the addition of a multimodal plate reader, a sterilization autoclave and a high-performance centrifuge, and the OCCIGEN imagery–cytometry platform a next-generation multicolor flow cytometer and a high throughput, high resolution imaging technology now equipped with a robotic arm.

Energizing the strategic sectors

To increase the momentum of its strategic sectors, Genopole set its sights on reorganizing and optimizing its microfluidics platform, a vital technology for research in the production of innovative biotherapies or of-interest compounds by synthetic biology. Also, the spectrometry platform grew with the addition of a surface plasmon resonance device coupled with a MALDI-TOF/TOF mass spectrometer. This instrumentation is used to analyze biomanufacturing-derived products and thus serves the bioeconomy sector.

Growing the network of users and catalyzing partnerships

Learning about the equipment and new technologies available at the platforms:



Inciting interactions

Despite restrictive health-crisis conditions there were:

- ▶ More than **220 interactions** with labs, businesses, and other platforms;
- ▶ **90%** of which led to partnerships and/or provisions of service.

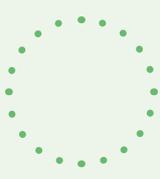


— THE STRUCTURAL BIOLOGY PLATFORM UPS ITS GAME

Genopole and the University of Évry provided the structural biology platform with an Opera Phenix Plus HCS imaging system, a cutting-edge technology, unique in Île-de-France, that teams high throughput and high resolution. Particularly, the imager unleashes the potential of the MicroTubule Bench technology developed by the Genopole lab SABNP. Because it explores protein-protein and protein-RNA interactions in living cells, that unprecedented method carries great interest in human health.

“By removing technological blockades to the discovery of novel therapeutic compounds, Genopole’s support gives new energy to research and innovation in human health.”

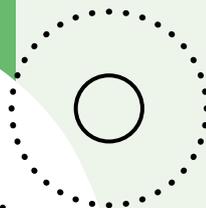
Julien Picot,
Platforms Manager at Genopole



Building sectors

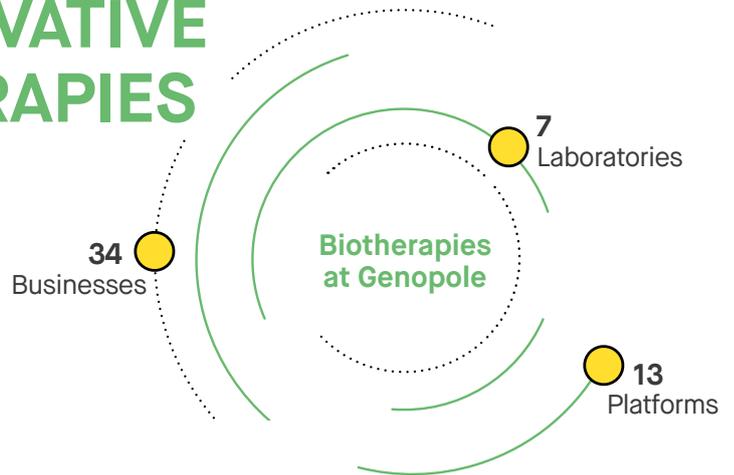
In an environment where universities, academic laboratories and biotechnology companies work side-by-side, and with a vision ranging from training in basic & applied research through to industrial development, Genopole gives muscle to the entire spectrum of innovation maturation in three priority sectors.

- › Innovative therapies 19
- › The bioeconomy 22
- › Computational genomics 26





INNOVATIVE THERAPIES



Genopole: a motor for biotherapies

In 2021, Genopole strengthened its place as a leader in biotherapy development and production. Forty laboratories and businesses, with the support of eight technological platforms, contributed to the discovery, optimization and clinical & industrial development of gene, cell and other innovative therapies.



By providing equipment and recruitment assistance, Genopole lent its support to the growth of the **Genomic Therapy Technology Research Accelerator (ART-TG)** and the **Cithera** innovation center. The mission of this latter is the onsite construction of a clinical-grade stem-cell bank for cell therapies. Together, ART-TG and Cithera form the Magenta industrial integrator as accredited by the Biopharmaceuticals Major

Challenge. Genopole presented **Magenta** in *Institut Paris Région's September 2021 Note Rapide*, which provided an overview of Île-de-France actors in biotherapies & biomanufacturing and the issues in those fields.

Genopole also strengthened its commitment to the regional and national dynamic for health biomanufacturing set in motion in 2020. With 11 other clusters and competitiveness hubs, Genopole participated in the **French Bioproduction Tour 2.0**, and organized its third of May Île-de-France stop. That initiative strengthened bonds between the regional actors and stimulated the creation of a national structure for health biomanufacturing.

Year 2021 witnessed the first **regional conference for biotherapies and biomanufacturing**, headed by the Île-de-France Region and in partnership with Genopole, the Medicen cluster, and Choose Paris Region. That event invited 130 participants from academia, politics, industries and start-ups to debate propositions aimed at strengthening biomanufacturing in Île-de-France. It resulted in 11 recommendations to structure the biotherapy ecosystem, increase the region's attractiveness and accelerate biomanufacturing industrialization.

The **France Biomanufacturing Congress**, a major yearly event for the sector, included a roundtable held 23 June and facilitated by Genopole on the subject of accelerating novel biomanufacturing means. Three Genopole biotech start-ups, Fabmid, Synhelix and Core Biogenesis, presented the potential of their innovations to improve the yield and quality of processes while reducing costs.

"The Biotechnological Revolution and Tomorrow's Medicine"

Genopole wrote a chapter on gene therapies for the book "*La révolution biotechnologique et la médecine de demain*" (The Biotechnological Revolution and Tomorrow's Medicine) published by Doin Editions on 18 March 2021. Intended primarily for students and teachers, the work presents the technologies derived from life sciences that are currently changing patient care and laying a path to personalized medicine in cancers, genetic diseases, viral diseases, metabolic disorders, bone diseases and much more.





Companies

Yposkesi extends its biomanufacturing capacities

One of Europe's largest developers and manufacturers of viral vectors for gene therapies, Yposkesi proposes its know-how to biotech and pharmaceutical companies active in the research or marketing of advanced therapy medicinal products (ATMPs). To increase its biomanufacturing capacities, Yposkesi is building a new 5,000 m² plant at Genopole. Once active, it will be one of Europe's largest sites dedicated to ATMPs. The site represents an investment of €58 million, of which €1.3 million is covered by a subvention from the France Relance call for proposals. In the past, Genopole had contributed €8 million to finance the construction of Genethon Bioprod, which, in 2016, became Yposkesi and today part of the South Korean group SK Pharmteco.

FIGURE

5,000 m²
of floorspace for Yposkesi's second site, one of Europe's largest for advanced therapy medicinal products.

"This extension demonstrates our exceptional technological expertise in the biomanufacturing of gene therapies."

Alain Lamproye,
Executive President of Yposkesi



Pep-Therapy tests its cancer drug candidate

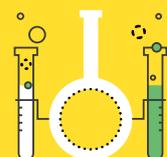
Pep-Therapy develops innovative, bifunctional "cell penetrating & interfering" peptides, that is, a combination of small proteins able to enter into cells and thereafter specifically block key protein-protein interactions involved in pathologies while leaving normal mechanisms untouched. After raising €2.75 million, the company teamed with Institut Curie to launch the first clinical trial for its drug candidate PEP-010 in the setting of solid tumors and more particularly in metastatic triple-negative breast cancer and platinum-resistant ovarian cancer. Preliminary data on safety and tolerability are expected for 2022.

AML: AB Science launches clinical studies

AB Science, which has a laboratory at Genopole, has been authorized by the ANSM, France's drug safety authority, to begin phase I/II clinical study of its anticancer molecule AB8939 in the setting of acute myeloid leukemia (AML), a quick-spreading hematological cancer that develops in the bone marrow and spreads rapidly to the blood. The trial will evaluate the tolerability and efficacy of the molecule as second and third-line treatments in patients who are not able to undergo intensive chemotherapy. The same authorization was also accorded to AB Science by the Canadian health authority.

Three simultaneous publications on major diseases for SABNP

The original method developed by the laboratory SABNP (structure and activity of normal and pathological biomolecules) to study protein-RNA interactions is proving its aptitude for discoveries. The method combines the lab's patented technology MicroTubule Bench with high-resolution imaging acquired in 2021 thanks to support from Genopole and the University of Évry. The simultaneous publication of three manuscripts in September illustrates the reach of their approach: working with academic teams and the Genopole company Synsight, the lab was able to elucidate three key mechanisms in cancers and neurodegenerative diseases, and identify a potential drug treatment.



Research



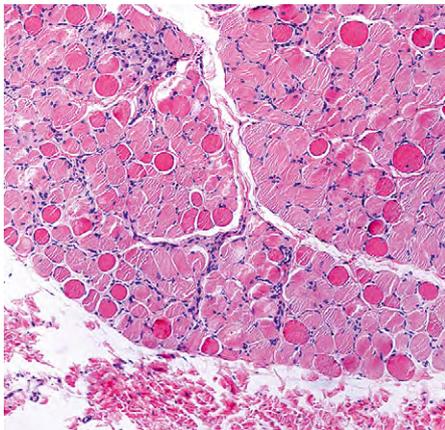
Promising gene therapy for Charcot-Marie-Tooth disease

Nicolas Tricaud heads the Diseases of Myelinated Fibers team, created at I-Stem through the support of the Genopole Atige program. He has published promising results from a gene therapy study performed in a rat model of Charcot-Marie-Tooth disease type 1A. This latter is a hereditary neurological disorder resulting from damage to the myelin sheaths of peripheral nerves. In the study, the adenoviral vector carrying the gene therapy was injected directly into the sciatic nerves of the rats, targeting thus the cells affected by the disease. The therapy greatly reduced myelin sheath defects and motor and sensory deficiencies.



“The Genopole concept saw the day in the labs of AFM-Téléthon. Its history and identity are inseparable from the development of genomics and its application to human health, and resultantly the South Essonne area has become a major actor in tomorrow’s medicine.”

Christian Cottet,
CEO of AFM-Téléthon

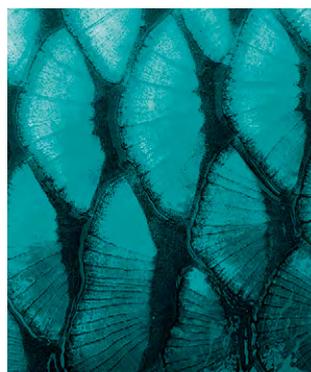


Duchenne muscular dystrophy may appear before birth

The Muscular Diseases team at I-Stem performed a study to differentiate iPS cells into muscle cells and analyze the expressed genes. In so doing, the researchers were able to reveal very early manifestations of Duchenne muscular dystrophy. Indeed, molecular dysregulations are observed in the cells of patients with the disease compared to those of healthy controls. The study’s results suggest that the disease may develop before birth and even before myogenesis, and thus also point to a need for novel consideration of the myopathy’s course, as its belated diagnosis, usually around the age of four, could potentially limit treatment efficacy.

15 genetic risk factors for Lou Gehrig’s disease

Amyotrophic lateral sclerosis (ALS), also known as Lou Gehrig’s disease, causes motor neuron death and progressive paralysis of all the muscles. Genethon’s DNA and cell bank contributed to the largest ever pangenome-wide association study on this currently untreatable and ultimately fatal disease. Using DNA samples from more than 30,000 patients and more than 120,000 controls, the scientists searched for variations frequently associated with the disease across the entirety of the genome. They identified 15 such sequences correlated to increased ALS risk. Those sequences took the form of genes, repeated sequences and regulatory elements for which further studies may elucidate involved mechanisms and shed light on possible therapies.

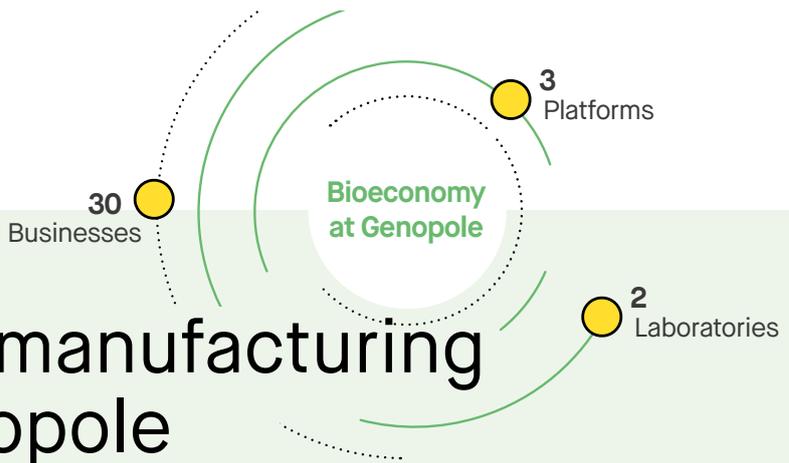


Treating deep wounds with fish skin

CERITD is sponsoring a clinical trial on the use of therapeutically-prepared fish skin for the treatment of deep diabetic ulcers. The trial is coordinated in France by the Diabetic Foot Unit at the South Île-de-France Medical Center, a Genopole partner. The healing and infection-prevention effects of the fully-natural, omega-3-rich fish-skin matrix will be tested on more than 200 patients.



THE BIOECONOMY



A growing biomanufacturing sector at Genopole

The bioeconomy is a major axis for Genopole. The sector is growing on a foundation of progress in sequencing technologies, advances in synthetic biology and the promising possibilities of certain innovations on several markets. Thirty biocluster companies are active in this sector rich in disruptive innovations empowering both the industrial future of France and the environmental protection of the planet. Also, the academic actors Genoscope (CEA) and its Genomics Metabolics mixed research unit contribute to the sector's growth via the sequencing of numerous plant species and the analysis of bacterial genomes, all sources for novel functions.

Research and R&D at Genopole explore many facets of the bioeconomy, in fields such as envirotech (biodetection of pollutants), agritech (responsible agricultural practices, alternative proteins, etc.) and industrial biotechnologies (biofuels, ingredients, materials, aromas, cosmetics, etc.). Genopole was France's pioneer site for synthetic biology, which continues to be highly present at the biocluster. The field directs lab-cultured microorganisms toward the production of compounds of interest for industry. Today's objective is the pre-industrial deployment of the specialty. Thereto, Genopole launched a "biofoundry"-style integrative platform project for synthetic biology in 2021. Also to support its position, Genopole sponsored the March 2021 **Bioket event**, which was focused notably on innovative bio-

mass pretreatment, process modeling and advanced fermentation. There, Genopole provided a plenary presentation entitled "Synthetic biology, a multi-stage rocket for the bioeconomy?". Year 2021 also saw the conceptualization of a **foodlab, named Protopia**, that will take the form of a shared-use laboratory with the equipment necessary for research on new foods and protein alternatives. Genopole's objectives with this initiative are to respond to the needs of its growing number of accompanied start-ups and to attract new businesses with a structure currently unique in Île-de-France. In this manner, Genopole intends to consolidate its bioeconomy strategic sector. Indeed, this latter is an increasingly dynamic entrepreneurial space in sync with the expectations of society and industry, and an object of growing attention from investors.

"The Biofoundry will be a place of innovation and acceleration for bioeconomy actors."

Christophe Lanneau,
director of Research & Platforms at Genopole

Press visit: Greener industries thanks to biotech

Genopole held a press visit 16 December under the banner "Biotech Innovations for More Sustainable Industry" with the goal of spreading the word on the biocluster's commitment to bioindustry. After a presentation on GIP Genopole's orientations by Chief Executive David Bodet and Director of Research & Platforms Christophe Lanneau, the journalists visited the laboratories and interviewed the heads of six of the biocluster's biotech active in the fields of agro-industry, nutrition, cosmetics, textiles and pharmacy: **Abolis, Algentech, Anova-Plus, EverDye, Synovance and WatchFrog**. Each is forwarding a biosourced innovation contributing to the development of more responsible, energy-efficient and cleaner industrial processes. The visit resulted in reports on the major French radio stations France Inter and Radio Classique and in several specialized magazines.





Companies

Abolis contributes to manufacturing relocalization

Abolis conceives and develops microorganisms able to produce compounds of industrial interest. In November, the company was granted €900,000 from France Relance's "Relocalization in Critical Sectors" call for proposals.

"This State support will help us relocalize production in numerous fields such as health, nutrition and chemistry via the use of vanguard technologies like synthetic biology," comments Abolis CEO Cyrille Pauthenier. "These bioprocesses impact the environment less than conventional processes do and contribute to securing supply chains." The subvention from the French State will enable the acquisition of new technological tools, making the company able to conduct more projects in parallel and thus accelerate the production of compounds of interest in France and Europe.



2021: a key year for Ÿnsect

Year 2021 was an important one for Ÿnsect. In April, it became international with the acquisition of Protifarm, a Dutch company specialized in the production of mealworm-based dietary ingredients for human consumption. Because the company was thereto specialized in animal nutrition and natural fertilizers, the acquisition also represents Ÿnsect's first steps into human nutrition, particularly dietary supplements for athletes and the elderly, noting that the use of mealworms for human nutrition is now authorized in Europe. Finally, the acquisition will also increase manufacturing capacities, with the addition of Protifarm's vertical farm, which produces 1,000 tons of product yearly, to Ÿnsect's sites at Dôle and Amiens.

Global Bioenergies brings its biosourced makeup to market

In June, Global Bioenergies reached a milestone in its history with the market launch of its makeup line LAST, the first ever, according to the company, to marry naturalness and durability. "We are marketing a line of products using bio-based isododecane, the primary ingredient in long-lasting mascaras and lipsticks, representing as much as 25 to 50% of their formulas. Previously, isododecane has always been petroleum-based," explains Global Bioenergies CEO Marc Delcourt.

The company chose to invest in the cosmetics market, where the higher price of biosourced isododecane compared to its petroleum-sourced equivalent is more acceptable to a clientele increasingly seeking naturalness in products. A large range of mascaras, eye shadows and lipsticks, all containing more than 90% natural ingredients, is available at the Colors That Last website.

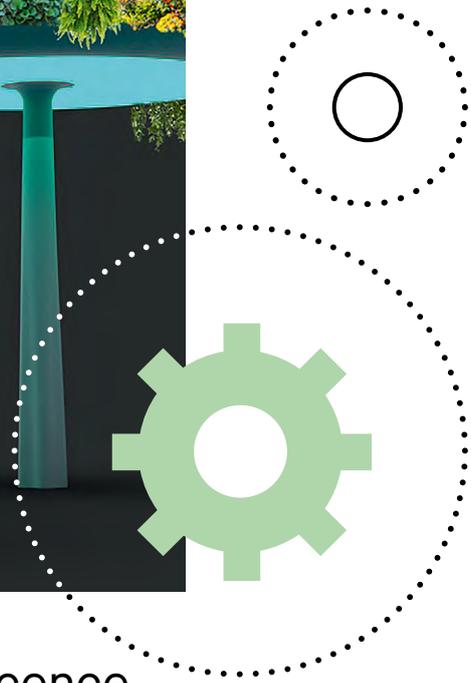
LAST



A world's first in synthetic biology and green chemistry for Algentech

The Genopole company Algentech has achieved a world's first by developing a high-yield production system in plant chloroplasts. Their unprecedented approach earned publication in Nature Plants on 21 June, and with it, Algentech has

become an actor in biosourced production in France, ready to welcome industrial partnerships across numerous sectors. Their technology is deployable notably for the production of proteins, nucleic acids, enzymes, therapeutic compounds and other molecules of interest for the pharmaceutical, cosmetics, food & agriculture, energy and other industries.



Glowee’s bioluminescence lights the city

FIGURE

3
patents
protect our
expertise

Glowee selects marine bacteria and leads their evolution in the lab to increase their bioluminescent capacities with no direct genetic manipulation. The start-up has made great progress in terms of light intensity and has thus decided to target the urban lighting market, proposing a range of novel street furniture to collectivities, promoters and urbanists. For example, the company has created a meeting spot in the form of a small oasis of freshness with plants and the soft light of bioluminescence to make it easy to find. *“Both the environmental impact and the light pollution generated by our biological lighting are much lower than those of conventional lighting,”* explains Glowee founder and CEO Sandra Rey, who recently signed a partnership with the city of Rambouillet for a pilot project in bioluminescent street furniture.

Europe supports Algama’s fish alternatives

In October, the food technologies company Algama received a €2 million subvention from the European Commission to develop its algae-based substitute for fish. The company aims to finalize its R&D on a range of vegan products imitating smoked salmon slices and marseled tuna. The subvention was obtained from a call for proposals by the European Maritime and Fisheries Fund.



Research

Genoscope's Pierre-Loïc Saaidi interviewed on France Culture

On 9 September, teaching researcher Pierre-Loïc Saaidi was interviewed on "The Scientific Method," a program by France Culture, a major French public radio station. In that interview, he described the technology his team at Genoscope (CEA/CNRS/University of Évry-Paris Saclay) used to discover the degradation of chlordecone underway in West Indies soils. Chlordecone is an insecticide that was banned in 1993 and previously thought to be non-biodegradable. It continues to pollute the soils, waters and coastlines of the West Indies, and remains detectable in the blood of 90% of the islands' inhabitants. That discovery by the Évry team gave hope of possible environmental remediation but raised questions on the resulting transformation products: their number, their toxicity and the new contamination risks they may create for foods and the ecosystem.



Looking for nitrogen-fixing marine organisms

Genoscope researchers contributed to the world's first inventory of the nitrogen-fixing organisms present in all of the Earth's oceans. Because they capture atmospheric nitrogen and make it available to other life forms, these microorganisms, called diazotrophs, are an indispensable element of the oceanic ecosystem. The researchers took advantage of the thousands of ocean plankton samples collected from across the globe by the Tara Oceans expeditions. They combined high throughput analyses of DNA sequences and an artificial intelligence approach applied to millions of microscopy images of plankton samples. The team established the global abundance, diversity and distribution of diazotrophs, creating thus precious data in a context of global climate change and disruption of the marine nitrogen cycle.

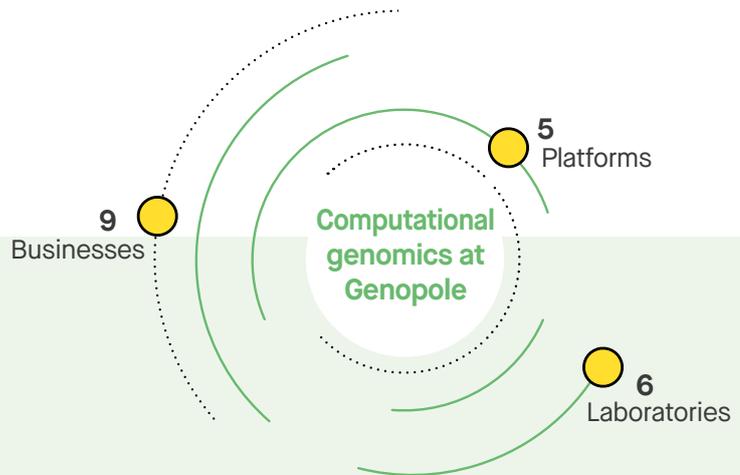
Complete sequencing underway for the banana

Nine years after their first publication of the banana genome, the national sequencing center Genoscope and the organization Cirad have teamed again to fill in the remaining holes in the genomic sequence of *Musa acuminata*. Calling upon the ability of nanopore sequencing to read very large DNA fragments, the researchers successfully established the entire, gapless sequences of five of the fruit's eleven chromosomes. The importance of the work resides in its contribution to identifying genomic regions of agronomic interest, those involved in disease resistance for example, in one of the world's most widely-consumed fruits.





COMPUTATIONAL GENOMICS



A developing network



Genopole is building a strategy on three pillar sectors, each contributing to its ambition of transforming life sciences technologies into tomorrow's therapeutic and industrial solutions. The computational genomics sector lends its fundamental support to the two other sectors: innovative therapies and the bioeconomy. It takes on the challenge of valorizing the "Big Data" resulting from large-scale sequencing. This involves standardizing those data, aggregating them with others, and interpreting the information within to better understand biological mechanisms, improve disease diagnostics & treatments, and conceptualize biological—and thus more sustainable—processes for the manufacture of medicines, materials, energies and more.

In this still-emerging sector, Genopole has the advantage of counting six laboratories for research in bioinformatics, biomathematics and genomics, nine businesses developing applications in bioinformatics and artificial intelligence, and five shared-use platforms, two of which provide informatics tools. In 2021, Genopole financed the outfitting of the CEA premises housing the National Center of Human Genomics Research (CNRGH) and CRefIX, the reference center responsible for sequencing processes harmonization.

The biocluster constructed a network of academic and industrial partners and foreshadowed a proposed project for an institute responding to their needs in computational genomics. That project, the objective of which is to federate a community of biologists mathematicians, informaticians and researchers in human and social sciences, was submitted by Genopole and the University of Évry as an "interdisciplinary object" in a call for expression of interest by Paris-Saclay University. The operational model and offer of this future computational genomics institute will be consolidated in 2022.

In 2021, to accompany the emergence of a computational genomics sector, Genopole pursued its initiatives to energize initial bioinformatics training with the territory's higher learning facilities. As part of those initiatives, the IBISC laboratory provided training to students at the *Grande Écoles* Télécom SudParis and ENSIIE. Strengthening the offer of high-level, two-axis training in biology and data sciences is a major issue in computational genomics. To successfully address it, new concepts and innovative methods need to be invented in mathematics, statistics and informatics, all in synergy with biological sciences.

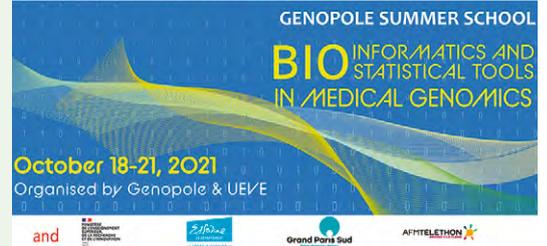


Research

Training for computational genomics in healthcare

Genopole's Bioinformatics and Biostatistical Tools in Genomics for the **Summer School** accompanies the growth of the computational genomics sector by offering a yearly program of conferences and practical training with the support of the University of Évry-Paris Saclay, the Jean Dausset Foundation and the French Institute of Bioinformatics. The various sessions of its fourth edition, held 18–21 October, were led by 12 experts from major French and European research centers (UPSay, INRAE, EBI-EMBL, Inserm, Institut Curie, U-Sheffield UK) and two representatives of international industrial research (GSK UK and Agency for Science, Technology and Research, Singapore).

With support of iledeFrance



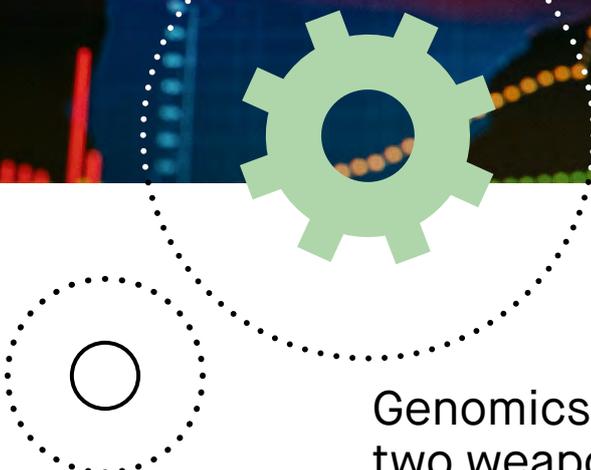
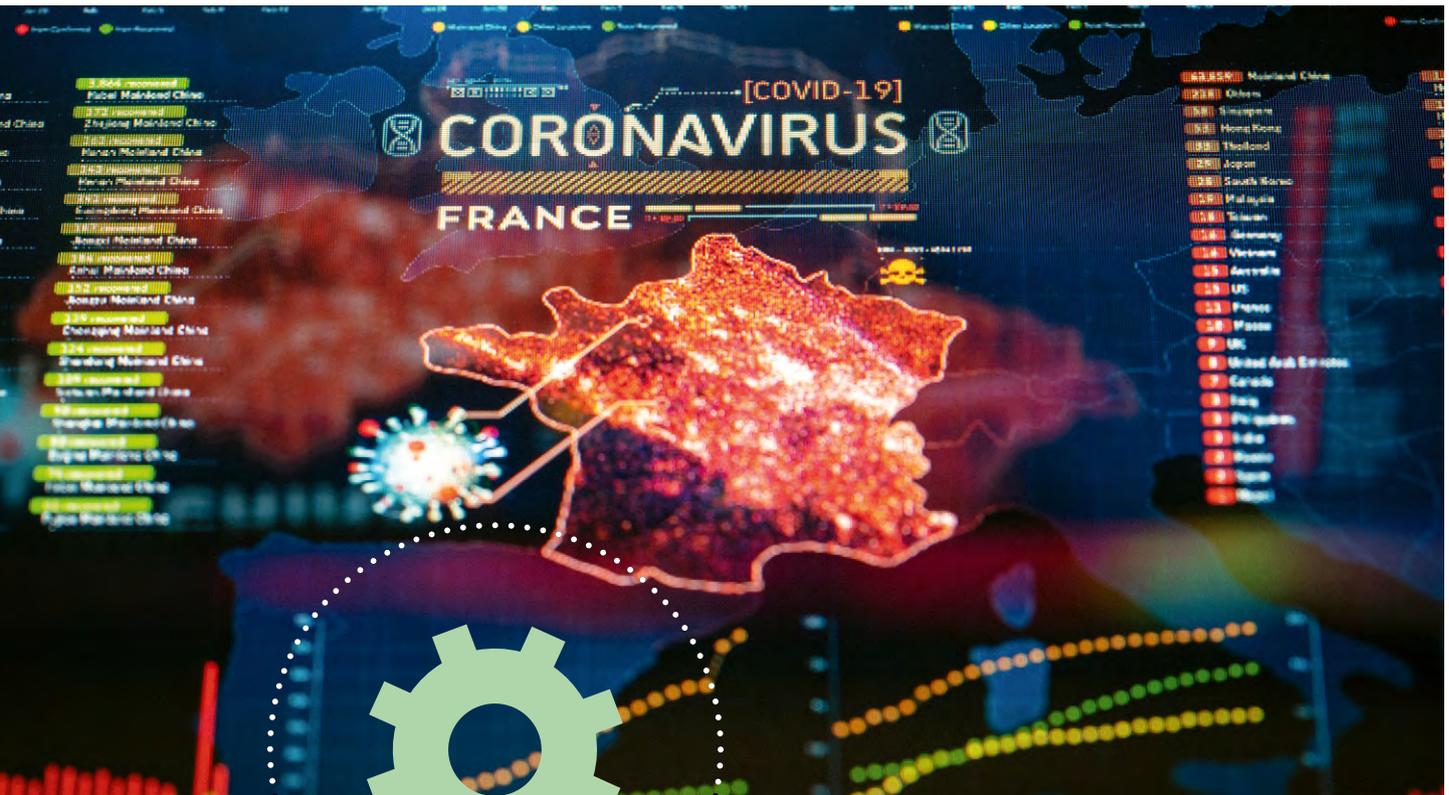
A dataset to train artificial intelligence

The AROB@S team at IBISC (Computer Science, Bioinformatics and Complex Systems) has brought together an initial, standardized, non-coding RNA dataset that can be used to train machine learning models. This powerful artificial intelligence method will accelerate discoveries in the small RNA sequences involved in gene expression normally and major pathologies such as cancer abnormally. Automatically updated from public sources, the dataset is available to the scientific community via the EvryRNA platform's website.

AI for gene therapies

The Genopole company WhiteLab Genomics, a specialist in artificial intelligence for gene and cell therapies, has teamed with two of Genopole's major actors in gene therapy: Genethon and the Genomic Therapy Technology Research Accelerator (ART-TG). Within this partnership supported by the Île-de-France Region, WhiteLab Genomics is providing its Catalyst™ platform, its machine learning algorithms and public and propriety databases to the research teams so that they can optimize their experimental protocols. With that access, Genethon will accelerate the development of AAV vectors with improved specificity to targeted tissues and thus greater efficacy and safety. ART-TG will be able to improve the quality and yield of lentiviral vector biomanufacturing. The expected time savings and efficacy gains will contribute to lowering treatment costs.





Genomics and bioinformatics: two weapons to fight COVID-19

Underlining the need for a national COVID-19 surveillance network

Several Genopole laboratories remained in the fight while COVID-19 continued its pernicious course in 2021. In an opinion piece published 14 January in the newspaper Figaro, 13 scientific personalities, including Jean-François Deleuze, Director of the National Center of Human Genomics Research (CNRGH/CEA), underlined the urgent need to **create a national network for coronavirus variant surveillance** via the mobilization of the large-scale DNA sequencing expertise available in private companies, academia and hospitals.

POSCOVD: A project for mass diagnoses of COVID-19

Marco Mendoza, laureate of the special project call launched within the Île-de-France Region's DIM (Domain of Main Interest) Elicit, was present on 20 January for a colloquium held under the banner "Innovative technologies to Fight SARS-CoV-2." There, he presented his **project POSCOVD**, intended to replace individual COVID-19 testing by grouped testing of thousands of patient samples, which should reduce per-patient time and cost. POSCOVD includes the integration of a molecular barcode in each sample, thus making it possible to massively sequence the pool of samples then extract individual results by informatics analysis.

A digital map of COVID-19 biological mechanisms

The digital COVID-19 Disease Map, which gathers all known molecular mechanisms of the coronavirus pathology, was published 19 October in Molecular Systems Biology. Anna Niarakis, teaching researcher in computational systems biology at the GenHotel laboratory, was one of the four coordinators of this international project involving nearly 300 biologists, bioinformaticians and clinicians in 30 countries.



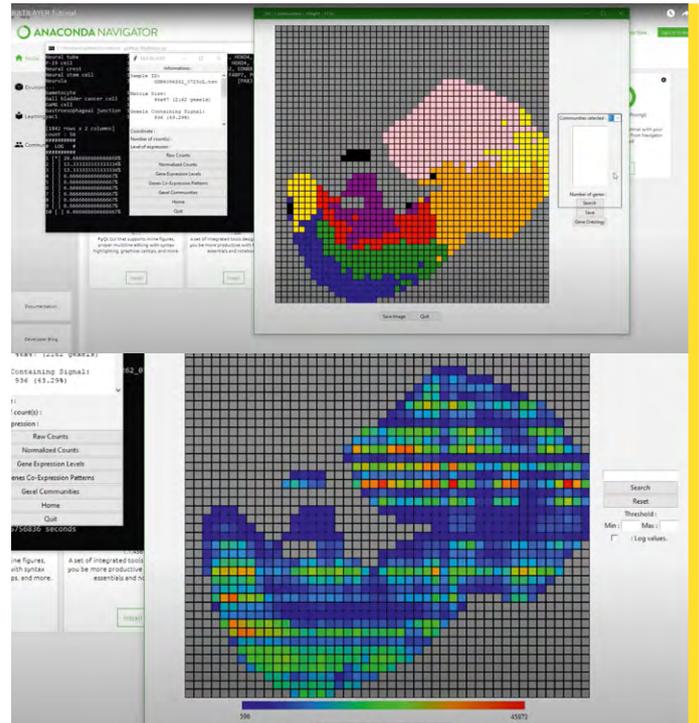
FIGURE

International project involving
300
biologists,
bioinformaticians
and clinicians in
30
countries



Virtual reality to train future surgeons

The French National Research Agency retained the **Show-Me virtual reality surgical training program** forwarded by the Genopole lab IBISC. The program aims within the next four years to provide teaching surgeons with a virtual patient via which they will be able to transmit their knowledge. Show-Me will build upon improved knowledge on learning processes and virtual reality technologies associating images, gestures and the spoken word. The project saw the day thanks to researcher-physician interactions impulsed by Genopole.



Multilayer digitizes organs

Created with the support of a Genopole Atige grant, the Sysfate team at the Genomics Metabolics mixed research unit has developed an algorithm, called **MULTILAYER**, that furnishes images of activities in biological tissues. Their technology takes inspiration from imaging analysis, replacing pixels by expression data from thousands of genes, point by point, in tissue slices. With its ability to reveal various functional zones in tissues and organs, MULTILAYER may contribute to a better understanding of diseases and their molecular diagnosis.

A mobile application to fight antibiotic resistance

Researchers from LaMME (Évry Mathematics and Modeling Laboratory) and the Genomics Metabolics unit have developed a **mobile, artificial intelligence application for the automated analysis of antibiogram images**. Google provided a grant for the project, carried out in partnership with *Médecins Sans Frontières* and the Bacteriology-Virology Department of the Henri-Mondor Hospital. Freely available to health professionals across the globe, the tool facilitates the reasoned choice of the specific antibiotic to be used as a function of the susceptibility/resistance profile of the bacterium in question. It thus contributes to slowing the progression of antibiotic resistance, which, if left unchecked, could become the world's leading cause of mortality.



Europe & 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.

- › **Enlarging networks** 31
- › **International action** 33





ENLARGING NETWORKS

More ample international deployment

International presence is a major component of Genopole’s growth strategy. Building intercluster alliances increases the impact and reach of actions to support innovation. Being present for biotech events wherever they may be in the world seats Genopole’s renown and enables benchmarking against best practices and the prospection of companies potentially interested in joining the biocluster.

Although the pandemic hampered in-person possibilities, a number of European and extra-European events were held.

BIO, the world’s top international biotech convention, was held virtually in June. For the event, Genopole partnered with Business France, Choose Paris Region, Medicen and others to promote the advantages of the Île-de-France Region. The videoconference united 21 companies sharing their aspirations for development in France. BIO strengthened Genopole’s ties to the North Carolinian (USA) research cluster Triangle Park, the Japanese cluster Kawasaki and the Belgian cluster BioWin.

To increase the biocluster’s visibility in the United States, Genopole participated in a meeting organized by the Ohio Chapter of the French-American Chamber of Commerce, notably on the subject of the health and biotech sectors. The event was an opportunity to attract American companies to the biocluster and ease the arrival of Genopole companies in the US.

In Europe

Held in Munich, the Old Continent’s BIO International twin, BIO-Europe Spring, was a privileged opportunity to meet with new (CataloniaBio (Spain)) and already-known (BioWin (Wallonia, Belgium), BioM (Munich Germany), etc.) clusters and participate in close to 30 meetings with several pharmaceutical companies such as BJT Pharma and key account companies like Seppic, a specialist in cosmetics, dietary supplements and pharmaceutical ingredients.

There too, Genopole, an event “Gold Sponsor” with Choose Paris Region and Medicen, promoted the assets of the Île-de-France Region in health innovation and especially the biomanufacturing sector.

Year 2021 also brought **new partnerships with European clusters**. The Eastern European nations were given priority because of their strong potential in computational genomics and innovative biotherapies, both strategic sectors for Genopole. Partnerships were created with Lithuanian (Lithuanian Biotechnology Association), Estonian (Tartu Biocluster/University), Slovenian (Technology Park Ljubljana), Danish (Medicon) and German (Biocon Valley) clusters, with which Genopole was able to submit the European projects URINBB and Braintech.

The biocluster also reinforced its ties to the ALISEI (Advanced Life Science in Italy) network, created during the September **Meet in Italy** event (**more than 300 participants** from the field of health biotechnologies) to encourage interactions between multidisciplinary research, pharmaceutical industries and public health organisms in Italy.

“ During a global-scale health crisis that revealed biotech’s potential for innovation, Genopole accelerated its support for the international development of companies by multiplying its joint projects with other European clusters and its connections on the international scene.”

Laurent Pépin,
Director of Prospection and Partnerships





Committed to a European dynamic

Reelected to the executive committee of the Council of European BioRegions (CEBR) network, Genopole participated in the Internationalization Special Interest Group, which builds upon intercluster partnerships to ease the deployment of companies outside of their native countries. That work also gave rise to a European-scale analysis of the biomanufacturing sector. Still in the setting of that sector, Genopole teamed with EIT Health, a health innovation network uniting more than 150 partners, and that network opened a door to another, EIT Food, a recent European community focused on innovations for sustainable and healthy nutrition. Both played a role in the creation of the Food4Health initiative to support novel products marrying nutrition and health, an axis aligned with the Protopia foodlab project currently underway with Genopole's leadership.



A network of university partners

Training is a keystone element of Genopole's contributions to the biotech innovation value chain. The biocluster continues to expand its network of European Universities, with the recent additions of the University of Porto (Portugal), the University of Szeged (Hungary), Greifswald Medical School (Germany) and the Hanze University of Applied Sciences (Netherlands). Two are members of EUGLOH, of which Genopole is an associated partner.

Genopole: an EUGLOH associate

Counting five European higher learning institutes, the European University Alliance for Global Health (EUGLOH) was born of a pilot initiative co-financed by the **Erasmus+** program and coordinated by Paris-Saclay University. At the 2021 EUGLOH annual conference held in October, Genopole presented its expertise in entrepreneurship and biotechnologies and their utility for adapting training to emerging needs in business or for learning transversal entrepreneurial competencies.



INTERNATIONAL ACTION

Cooperation and sharing expertise between clusters

Genopole has grown its partner biocluster network, notably toward Eastern Europe, a region renowned for its capacities in computational genomics and biotherapies. In that way, the biocluster progressively develops Europe-wide cooperation advantageous for the growth of its strategic sectors. Such cooperation is illustrated well by GEN.ERA, an alliance of entities acting as one pan-European cluster.

GEN.ERA: two years to construct a European strategy for internationalization

Launched in 2020, GEN.ERA (diGital gENomic alliance to Explore new maRket for Acceleration) associates Genopole, the project coordinator, with four other clusters. The consortium successfully completed the first two steps in its shared strategy for growth in the international genomics market: the identification of the five most-promising markets (USA, Singapore, Japan, China, Australia) and the completion



of analyses of those markets, transmitted thereafter to the partner clusters' businesses. Simultaneously, contacts were established with access-easing intermediary structures such as the Japan External Trade Organization or the Genome Institute of Singapore.

ApogeeBio extends its allocations to foreign researchers

The European Commission retained the research allocations program ApogeeBio submitted by Genopole and its partners: Genethon, the University of Évry, Paris-Saclay University, Télécom SudParis, the Institut Mines-Télécom Business School and their supervisory bodies. The program will thus take on a new dimension. It will double the number of yearly allocations, propose a multidisciplinary research offer and become available to researchers from around the globe. Accordingly, ApogeeBio will contribute to enriching the biocluster's international network.



“ With five years of new European projects to come, ApogeeBio brings a new and durable dynamic to the site.”

Roxane Brachet,
Academic Partnerships Manager at Genopole

Visa4Biotech heads to East Asia and the British Isles



Year 2021 saw Visa4biotech events focused on Japan and the United Kingdom. A 29 March Visa4biotech held with Medicen set a path for closer relations with the Japanese cluster Kawasaki, which, like Genopole, accommodates innovative companies in health and the bioeconomy. After a presentation of the two ecosystems, B2B meetings were held in the presence of the Japanese pharmaceutical company Astellas and the University of Tokyo. Six French and seven Japanese companies had the opportunity to present their know-how. That event was followed up by a webinar held in November with 40 people in attendance. It opened the microphones for three Genopole companies, Hybrigenics Services, Abolis and Eukarys and three Japanese entities, the Gene Therapy Research Institution, Knowledge Palette and the Japanese affiliate of Elixirgen Scientific. Another Visa4biotech in March was held in cooperation with the French Embassy and Business France in the United Kingdom. That conference gave Genopole companies an opportunity to build relations with British entrepreneurs and investors.

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