SciLifeLab

SciLifeLab at a Glance
2025

Cover image shows an Illumina Infinium MethylationEPIC BeadChip, displaying multiple sample arrays for high-throughput DNA methylation analysis, Clinical Genomics Linköping. Photo: Mikael Wallerstedt.

All photos are taken by Mikael Wallerstedt unless otherwise stated.

Text: Anna Frejd, Sofia Falorni, Johan Inganni, Suné Joubert, Victor Weman and Katarina Öjefors Stark
Graphic design: Karin Nedler
Version: September, 2025

Content

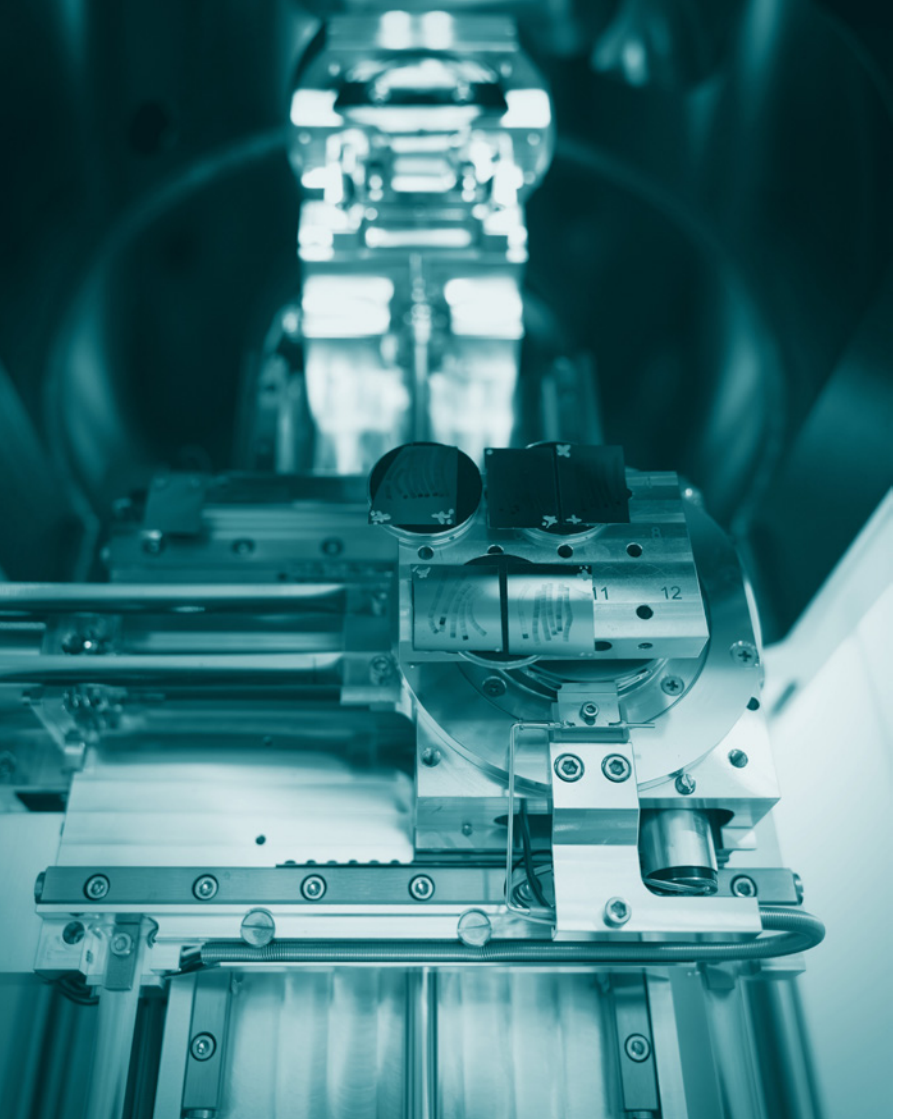

CHALMERS

About SciLifeLab

SciLifeLab is a Swedish state-of-the-art national infrastructure for life sciences that provides researchers in fields such as biomedicine, ecology, and evolution with access to advanced technologies and expertise. Collaboration across disciplines and sectors is central to everything we do, involving partners in healthcare, academia, industry, and international communities.

SciLifeLab enable life science research focusing on life on earth in all its complexity, from viruses and molecules, cells and tissues to ecosystems.

Founded in 2010, SciLifeLab receives funding from the Swedish government as a national research infrastructure. It leverages the capabilities of all major universities across Sweden to serve approximately 2,000 users annually, providing expertise and cutting-edge technologies.



Our research infrastructure

SciLifeLab runs over 40 units, located at eleven Swedish universities and organized into the following technology platforms:

- Genomics
- Clinical Genomics
- Proteomics
- Metabolomics & Exposomics
- Spatial Biology
- Cellular & Molecular Imaging
- Integrated Structural Biology
- Chemical Biology & Genome Engineering
- Drug Discovery & Development
- Bioinformatics

... by the numbers

676 staff scientists

51% women

~250 technical data staff

Distributed across all sites & platforms

~70%

Of infrastructure staff hold PhD

~4 600

user projects in 2025

~2,000

individual users in 2025

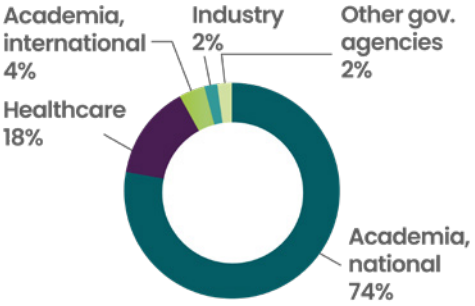
>900

infrastructure-enabled publications in 2025

~2,500

researchers yearly trained in technology and data driven life sciences

Resource allocation across sectors



Funding

Total

Governmental

- National research infrastructure **387 MSEK**
- SFO funding **180 MSEK**
- Drug development **61 MSEK**
- Pandemic laboratory preparedness **33 MSEK**

Non-governmental

- DDLS **296,4 MSEK**

* 1 EURO = 11 SEK

Life science data management, data science, and artificial intelligence

SciLifeLab and Wallenberg National Program for Data-Driven Life Science (DDLS) is a national research and training program funded by the Knut and Alice Wallenberg Foundation, coordinated by SciLifeLab on behalf of ten Swedish universities and the Swedish Museum of Natural History. The program recruits talent in data-driven life science and engages in:

- Development of a national data platform for sharing research results, computational applications, and AI models in accordance with the FAIR principles (Findable, Accessible, Interoperable, Reusable), ensuring that research data is searchable, accessible, compatible with other data, and reusable by other researchers.
- Support for research data management for Open Science and simplified access to computational and storage infrastructure.
- Support for computational specialists, bioinformaticians, and software engineers in life sciences research and strategic initiatives in AI and health data projects.

SciLifeLab Voices: Ola Spjuth

In our SciLifeLab Voices series we sat down with Ola Spjuth, Professor at Uppsala University and SciLifeLab AI Lead, to talk about how AI is transforming research and what lies ahead for Sweden's life science community.

Your research group works at the interface between life science, data, and technology. What are the main scientific questions your lab is exploring right now?

My research focuses on how AI and automation can change the way we explore biology. We aim to understand how cells respond dynamically to drugs, toxins, or genetic perturbations. A central question is how to use AI to integrate high-content imaging, molecular profiling, and time-resolved experiments. We also explore how to make experiments adaptive — where AI can propose what to test next and having robotics close the loop.

You have also been leading the work on SciLifeLab's new AI strategy. How did that process begin, and what were your main goals when shaping it?

I was appointed AI Lead at SciLifeLab in January 2025, engaged a reference group, and during the spring we started a broad dialogue with experts across Sweden and internationally. The main goal was to outline a strategy for how to make AI an integrated part of SciLifeLab's infrastructure, and to be clear about what we should and should not do.

What do you see as the most important steps to build AI competence across the life sciences community?

We need to expand on AI training on all levels – from introductory courses for experimentalists to advanced workshops for AI specialists. We should also strive to build an active national AI community that can support each other and collaborate across institutions.

What do you see as the biggest practical challenges in turning the AI strategy into reality over the coming years?

SciLifeLab is a diverse organization with many data-generating platforms and units having different setups with instruments, data, and people. This heterogeneity will pose many challenges, but it is also our strength, and the engagement I met across the platforms makes me confident we will get there.

The strategy is described as a living document that will evolve over time. How do you see it developing as technologies and research needs continue to change?

The AI field is moving incredibly fast, and the strategy must evolve with it. We need to stay up to date with the latest trends and pilot emerging technologies so that we can filter and translate them to the life sciences.

Photo to the left: Ola Spjuth.

Read the full story ⟶

Highlights 2025

Throughout 2025, SciLifeLab achieved several important strategic and operational milestones.

Infrastructure services

The research infrastructure supported over 4,600 projects involving close to 2000 unique users.

Research network and international recruitment

In 2025, the network of infrastructure and research group leaders consisted of 419 individuals. Including 51 SciLifeLab fellows, 30 of whom are alumni, and 36 DDLS fellows.

Scientific excellence

Between 2020 and 2025, SciLifeLab produced 8,627 scientific publications, showcasing a consistent delivery of high-quality and internationally competitive research. These publications are produced by both the SciLifeLab research community and through projects carried out by the research infrastructure.

Artificial Intelligence

In 2025, SciLifeLab Group Leader Ola Spjuth formed a working group to develop a national SciLifeLab AI strategy. This strategy aims to integrate artificial intelligence into the research infrastructure to strengthen Swedish life sciences. It includes the development of AI-ready data ecosystems, the provision of computational infrastructure and AI services, and investments in technology and skills development.

Ethical, legal, and societal issues (ELSI)

2025 saw a renewed focus on ELSI, with investments in integrating ethical reflection into data-driven research and SciLifeLab's operations.

Funded feasibility studies for clusters of excellence

SciLifeLab was the lead or co-applicant in several clusters of excellence applications that were granted funding from Vinnova and the Swedish Research Council.

SciLifeLab PULSE

Received 6.88 million euros through the Marie Skłodowska-Curie Actions COFUND, part of the EU's Horizon Europe program, for the Program for Future Leaders in Life Science (SciLifeLab PULSE). PULSE is a five-year program in which SciLifeLab will recruit 48 international postdocs.

Open Science

Open and FAIR data sharing is central to Open Science. SciLifeLab supports the research community in making data, source code, and other research outputs openly accessible through services, user support, and policy documents.

SciLifeLab and Wallenberg National Program for Data-Driven Life Science (DDLS)

In 2025, the DDLS program recruited seven new DDLS fellows and enrolled 44 new PhD students in its national research school through its partner organizations. The collaboration with WASP and WASP-HS aims to address groundbreaking research questions at the intersection of artificial intelligence, life sciences, and the humanities and social sciences. In 2025, this collaboration resulted in six financed projects: three DDLS/WASP and three DDLS/WASP-HS.

Alpha Cell

The Alpha Cell research program aims to combine data, biology, and AI to develop virtual cell models—predictive models that describe the function of human cells in both health and disease. In late 2025, we recruited key personnel, laying the groundwork for operations to get underway in 2026.

Laboratory Preparedness for Pandemics

During 2025, the Pandemic Laboratory Preparedness (PLP) program strengthened Sweden's capacity to address infectious threats through national calls for technology development, expanded wastewater environmental monitoring, and improved BSL-3 operations at central laboratories. The program has further been strengthened by both developing the national data infrastructure and integrating AI and advanced analytics into the Swedish Pathogens Portal.

Translation to healthcare

During the year, the strategic area for translational research has driven an effort with the goal of establishing molecular medicine units, linked to SciLifeLab reserach infrastructure, at Sweden's university hospitals.

Drug Development

An exit project from SciLifeLab's Drug Discovery and Development showed effects after investigating the antiparasitic drug mebendazole and the possibility that it could be repurposed for treatments in cancer and autoimmune diseases.

The world's smallest Dala horse

In a charming meeting of nanotechnology and cultural heritage, a microscopic Dala horse — the iconic Swedish wooden horse — has been sculpted using a focused ion beam at Umeå Centre for Electron Microscopy (UCEM), a unit at SciLifeLab. The result is barely seven micrometres long: about one-tenth the width of a human hair, the same size as a red blood cell, and completely invisible to the naked eye. Yet it keeps every characteristic curve and detail of a traditional Dalahäst.

"Instead of removing material with the ion beam to study, for instance, cellular structure, our goal was to create something — to sculpt with precision on the nanoscale," says Nils Hauff, staff scientist at UCEM. "This truly was an unusual and exciting challenge for me."

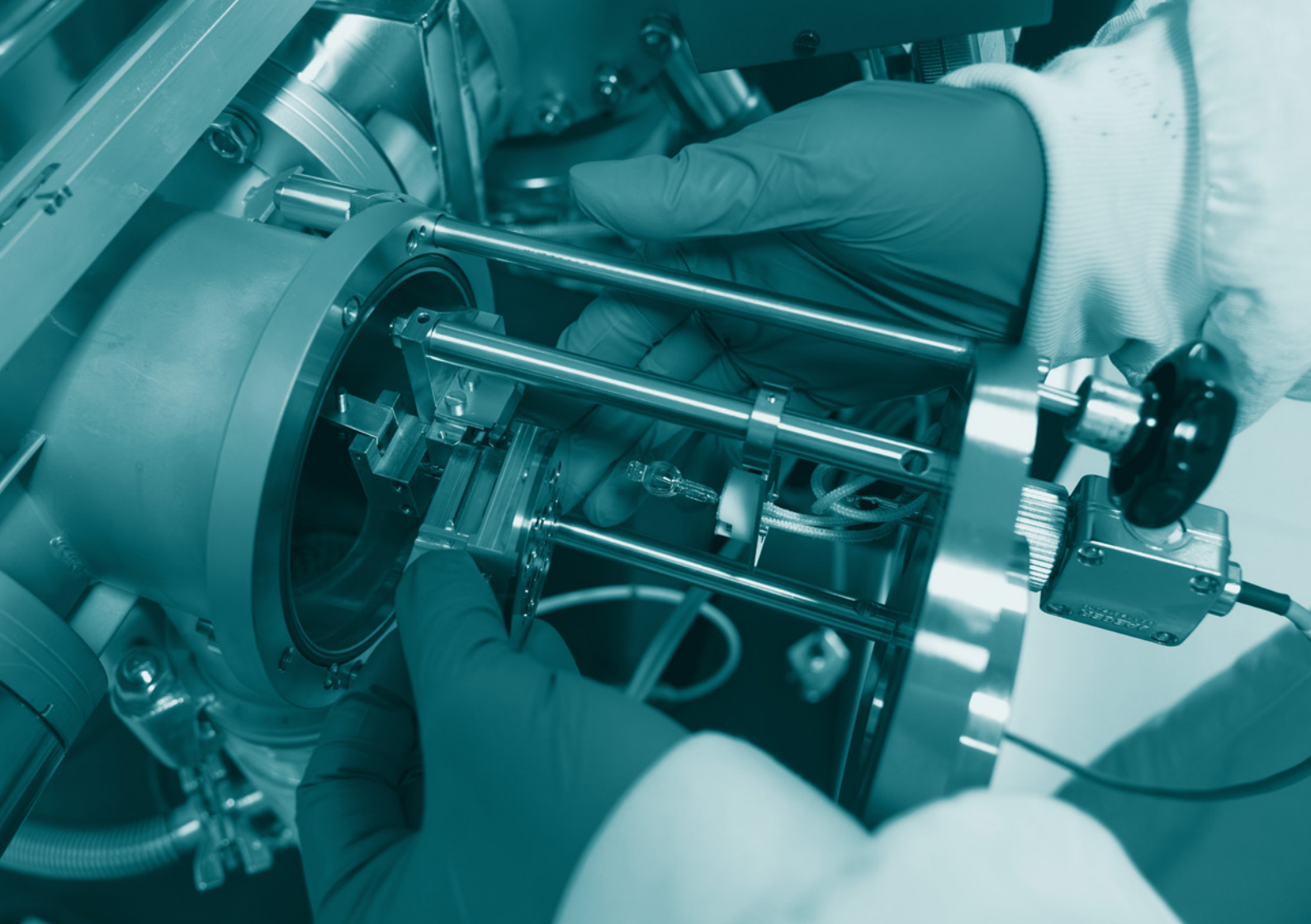
The focused ion beam (FIB) is normally used to mill away layers of biological or material samples to reveal their insides. Here, the same beam became a sculpting tool, carving the horse from a small block of platinum. "It's a bit like using a laser beam as a chisel," Hauff explains. "One of the key technical challenges was ensuring the structure didn't get blown away by the ion beam's energy — at this scale, even the tiniest force can be too much." The sculpting itself took about a day; the design and planning took weeks, much of it spent building a shared vocabulary between an artist and a scientist.

That artist is Erik Olof Wiklund, already known for exploring scale — he previously built the world's largest gingerbread house. The idea traced back to a museum visit in Dalarna, where he saw what was then the smallest known Dala horse, several millimetres tall. "I remember thinking it was unnecessarily large to be the world's smallest," he says. Rediscovering the idea in an old notebook during his master's at the Umeå Academy of Fine Arts, he went looking for help — and found it right on his doorstep. "I never imagined the help I needed would be right here in Umeå — it felt too good to be true."

For both, the collaboration became a lesson in what happens when disciplines meet. "It was fascinating to see how Erik approached the electron microscopy images from an artistic perspective," says Hauff. "He thought about angles, light, and form in ways we typically don't when documenting research samples."

"This project is a great example of how our national infrastructure can be used in novel and creative ways," Hauff reflects. "It reminds us that scientific instruments don't only belong to the lab." As Wiklund concludes: "And how much fun it can be to let different worlds meet."

Photo to the left: Nils Hauff.
Photo on this page: the worlds smallest Dala horse.



SciLifeLab as a national research infrastructure

SciLifeLab's research infrastructure provides the Swedish life science community with access to world-leading technologies, advanced instrumentation, and expert support. The research infrastructure's national mandate means that it is available on equal terms to researchers at higher education institutions across Sweden.

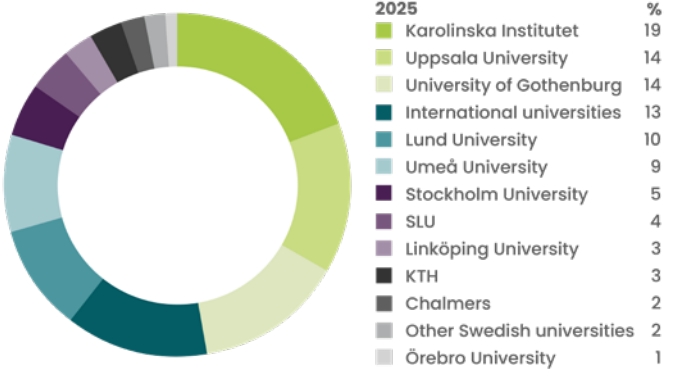
The broad range of available technologies enables researchers from academia, healthcare and industry supporting use of complementary methods and analysis for biomolecular research and to address complex societal challenges in health, environment and climate.

A continued upward trend of research infrastructure usage

In 2025, around 2,000 users utilized the SciLifeLab infrastructure; the majority (78%) were academic users. The number of international users (13%) increased compared to 2024, indicating a continued strong international usage of the infrastructure. Another highlight is that the bioinformatics unit 'Support for Computational Resources' in Uppsala had 1,088 registered users in 2025. This represents an increasing need for data storage and computing capacity.

Looking beyond academic users, SciLifeLab's infrastructure was used by around 230 users (22%) working in healthcare, industry, or other government agencies. Almost 100 private companies used the infrastructure in 2025.

See distribution of academic users of SciLifeLab's infrastructure in 2025, below.



News piece

SciLifeLab Voices: Mia Bäckström & Disa Larsson Hammarlöf

Hi Mia and Disa, can you tell us a bit about yourselves, what you do, and how you ended up coordinating the SciLifeLab PULSE MSCA-COFUND program?

Disa: I work as a Research Coordinator at the SciLifeLab Operations Office. In this role, I lead efforts to support and develop SciLifeLab's research community.

I got involved in the PULSE initiative early on, back in 2021, when the need for a strong, internationally competitive SciLifeLab postdoc program was identified.

Coming from a research background myself, I know how important it is to have strong support and good mentors. That's why PULSE is built around these principles, along with a focus on leadership, collaboration across disciplines, and long-term career development.

Mia: As an administrative coordinator at the Office for SciLifeLab in Uppsala, I have various responsibilities. For example, I serve as the local HR representative, supporting recruitment processes and handling staff-related matters.

Regarding PULSE, in 2023, when it was time to apply to the Marie Skłodowska-Curie Actions (MSCA) COFUND for the SciLifeLab PULSE postdoctoral program for the second time, Disa asked me if I was interested in taking on the role of program coordinator. It was an easy decision to say yes to this exciting opportunity.

How has the interest in PULSE been so far?

Disa: We've seen great interest in the PULSE program right from the build-up phase and continuing into the launch. Hundreds of PIs have expressed interest in recruiting a PULSE postdoc, and we've received applications from many truly excellent candidates.

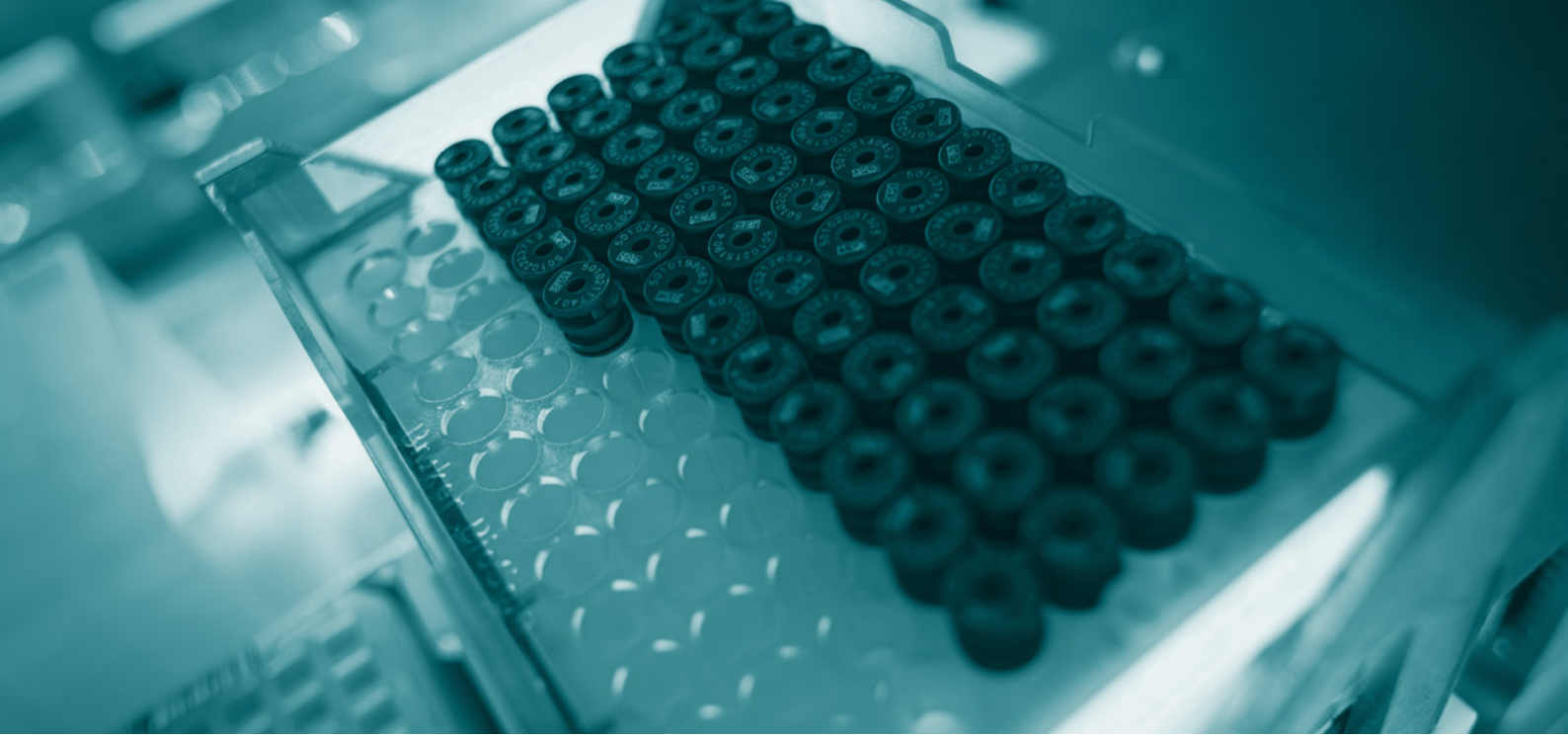
Out of 45 applications, 32 were invited to the interview stage following a very stringent evaluation based on excellence, impact, and project implementation. Diversity is a strong focus for us, and we were excited to receive applications from scientists of 27 nationalities, applying from 22 different countries.

We're also grateful for opportunities to 'pay it forward'for instance, by sharing insights and supporting the launch of other postdoc program initiatives.

Mia: We are really proud of the fact that more than 65% of the applicants in the first call are women. This shows that our outreach efforts to attract women to postdoctoral positions have been successful. It also aligns very well with one of the MSCA goals: promoting gender diversity.

Photo to the left: Disa L. Hammarlöf and Mia Bäckström.

Read the full story →



Enabling research to address complex and demanding societal challenges

SciLifeLab has three strategic research areas: Translation to healthcare, pandemic laboratory preparedness, and planetary biology. By bringing together expertise from across disciplines, these areas create new opportunities for research and collaboration.

Translation to healthcare

By promoting the adoption of advanced biotechnology and AI in healthcare, SciLifeLab strengthens Sweden's position in molecular life sciences. The goal is to make Sweden a global leader in implementing these technologies by 2035, enabling more effective, patient-centered precision medicine*.

By establishing a national competence cluster, we aim to accelerate the transfer of advanced molecular profiling, AI-based data analysis, and innovation to university hospitals while also supporting growth in the business sector.

What is precision medicine?
Precision medicine uses detailed molecular and clinical data to tailor healthcare to individual patients.

Laboratory preparedness for pandemics

Launched in 2021, the strategic area for pandemic laboratory preparedness aims to strengthen Sweden's ability to detect, monitor, and respond to future infectious disease threats. Through research, skills development, and technological innovation, it helps build long-term national capacity while supporting healthcare, government agencies, and other key societal functions.

The program supports research on infectious diseases, including antibiotic resistance, and ensures that expertise, technologies, and infrastructure remain in place between crises. In the event of a future pandemic or other societal emergency, we can rapidly mobilize resources for diagnostics, sequencing, data analysis, and environmental monitoring.

Since its launch, the initiative has grown into a national network of 24 units across Sweden.

Planetary Biology

The Planetary Biology strategic area focuses on how biological processes interact with Earth's environment and shape life across scales ranging from genes and organisms to entire ecosystems. The strategic area supports research on biodiversity, climate change, ecosystem stability, and other processes that influence life on our planet.

Addressing these challenges requires collaboration across scientific disciplines, research infrastructures, and societal sectors.

By bringing together expertise in molecular biosciences, environmental research, and technology development, the initiative strengthens research aimed at understanding the connections among biological processes, biodiversity, and Earth's ecosystems.

SciLifeLab's postdoctoral program PULSE

The EU funds the SciLifeLab PULSE postdoctoral program (2025 to 2030) through the Marie Skłodowska-Curie Actions (MSCA) COFUND initiative. PULSE aims to train 48 future research leaders in Molecular Bioscience and Innovation at the international level. The program originally included nine Swedish universities as partners and 24 associated partners in academia and industry. In 2025, they expanded the collaboration to include two additional universities and six associated partners.

In the first call for applications (January to March 2025), we recruited 21 postdocs, and the program's second call opened in December to recruit 27 postdocs in 2026.

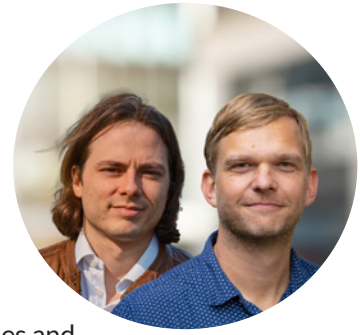
SciLifeLab Data Centre

SciLifeLab Data Centre provides services for both the research infrastructure and the research community. These services include support for research data management, operational support, coordination of IT issues, and consultation and collaboration with national e-infrastructure, computing centers, research data offices, and university IT departments.

Data Centre integrates the principles of open science and FAIR into all aspects of its operations. It offers support to researchers and infrastructure units to make data, source code, and other research outputs accessible. This support has been strengthened during the year through the development of new resources and policy documents, as well as through continued national and international collaboration, including work within the framework of CoARA*.

** CoARA is a global initiative started in 2022 by the EU Commission, Science Europe and the European University Association (EUA). The coalition aims to maximize the quality, effectiveness, and impact of research and promote a consensus on research assessments. SciLifeLab is committed to improving research assessment practices at both the national and international levels.*

Supercomputers find molecular needles in virtual haystacks



Two new studies from SciLifeLab researchers show how supercomputers can rapidly identify new drug candidates — sifting through billions of virtual molecules to find the rare few worth testing.

One of the biggest challenges in drug discovery is finding the most promising molecules among a vast number of possibilities. Traditional approaches test physical chemical collections in the lab, which is costly and overlooks candidates that only exist in far larger virtual libraries. Two recent publications, in Nature Computational Science and Nature Communications, demonstrate a different route. "Our computer models can search through databases containing billions of virtual molecules, which can speed up the costly drug development process," says SciLifeLab Fellow Jens Carlsson (UU), who co-led the studies.

The scale is staggering. "These databases are enormous and even access to the strongest Swedish supercomputers would not allow us to computationally dock all molecules against our proteins of interest," says DDLS Fellow Andreas Luttens (KI), first author on both studies. The solution was to train machine learning models to pinpoint the best-scoring molecules out of billions of candidates. Working with the University of Santiago de Compostela, the team even discovered a novel molecule that binds two proteins at once — A2AR and D2R, both implicated in Parkinson's disease.

"It's amazing that we can now design these complex molecules and show that they actually work exactly as we hoped," says Carlsson.

The second study took a build-it-up approach. Investigating OGG1 — an enzyme linked to cancer and inflammatory diseases — the researchers started with tiny molecular fragments and grew them step by step into larger molecules, which showed promising anti-inflammatory effects. "It's like solving a molecular jigsaw puzzle, where one piece is attached to new pieces until it forms a drug molecule that perfectly fits the target protein," Carlsson explains.

A new algorithm from Luttens, called UniverseGenerator, showed the stepwise strategy could work not only for the billions of molecules available to buy today, but for sextillions — a 1 followed by 22 zeros — of theoretical ones. "This strategy allows us to efficiently search through the largest databases," the researchers note. "However, the true breakthrough will come when we can reliably predict which of these molecules can also be synthesized in the lab."

Photo to the left: Andreas Luttens and Jens Carlsson.

Read the full story →

Research at SciLifeLab

A national network of scientific leaders

SciLifeLab Group Leaders are a dynamic, interdisciplinary network of life science researchers and technology experts. During 2025, SciLifeLab had 419 group leaders, engaged in addressing health, biodiversity, sustainability and technology development to address life science challenges.

The Group Leader community spans researchers from universities across Sweden, including SciLifeLab Fellows and DDLS Fellows.

This community fosters collaboration and innovation, by combining technologies, cutting-edge science and strategic areas to form a thriving research community.

Bibliometric analyses

SciLifeLab brings together researchers across traditional institutional, university, and sectoral boundaries, thereby facilitating networking and interdisciplinary studies in an inspiring research environment. Bibliometric analysis of SciLifeLab's output of scientific publications* shows that SciLifeLab contributes to increased impact for Swedish life sciences research at both the national and international levels.

**** Consistent output of high quality research***

Between 2020 and 2025, SciLifeLab produced 8,627 scientific publications, showcasing a consistent delivery of high-quality and internationally competitive research. These publications are produced by both the SciLifeLab research community and through projects carried out by the research infrastructure.

SciLifeLab and Wallenberg National Program for Data-Driven Life Science (DDLS)

The goal of DDLS is to recruit and train the next generation of data-driven life scientists and to establish world-leading computational and data science capabilities within Swedish life sciences. In doing so, the program aims to bridge the gap between life sciences and computer science. Including the recruitment of outstanding early-career research leaders to the eleven partner organizations, establishing a national research school that provides training for doctoral students and postdoctoral researchers through a dedicated curriculum of specialized doctoral courses, and providing advanced bioinformatics support. Since its start in 2021, the program has recruited 36 new Principal investigators (DDLS fellows) and enrolled 96 PhD students in its national research school to the program's partner organizations. The upcoming recruitment round for DDLS fellows (2026–2027) will focus specifically on recruiting international researchers with strong expertise in artificial intelligence/machine learning (AI/ML) applicable to life science.

The collaboration with the Wallenberg AI, Autonomous Systems and Software Program (WASP) and WASP-HS (Humanity and Society) aims to address groundbreaking research questions at the intersection of artificial intelligence, life sciences, and the humanities and social sciences, through activities such as interdisciplinary calls, network meetings, and other cross-disciplinary collaborations. To date, this has resulted in 40 projects: 31 DDLS/WASP and 9 DDLS/WASP-HS.

The DDLS program has significantly strengthened the ecosystem for data-driven life sciences in Sweden by recruiting qualified technical staff, establishing data services, and providing bioinformatics support at partner organizations. The services developed and operated within the DDLS data support and databases area have a broad international impact and are open to the entire Swedish life sciences sector.

Spatial biology among the stars – meet Stefania Giacomello

From plants to spaceflight, Stefania Giacomello's research is unified by one question: how do organisms adapt to changing environments? With spatial transcriptomics as her tool, she maps gene activity in precise locations — on Earth and beyond.

"I came in contact with biotechnology early on in my studies, and I was immediately hooked," says Giacomello, Group Leader at SciLifeLab. That fascination drew her into spatial transcriptomics, a way of mapping where genes are active in a tissue. "Instead of just knowing what genes are turned on, we can also tell exactly where in the body, a single organ or even in a single cell it's happening."

Her path there ran through spruce trees — as a PhD student in Italy, she joined an effort led from Umeå to sequence the enormous spruce genome, which brought her into contact with SciLifeLab. "SciLifeLab was at the forefront of the spatial transcriptomics field and one of the few places where spatial technology development was done — it was the perfect match." But the road from postdoc to group leader was hard. "I don't want to sugarcoat it — I struggled for several years," she says. "I've learnt that things might not go the straight path, but you have to be determined and keep pushing, not giving up on your dreams."

Perseverance paid off with her first Formas grant — and then a chance encounter changed everything. Invited to present in California, she was approached during a coffee break by researchers from NASA's GeneLab. "It was a once-in-a-lifetime opportunity," she says. It pulled her into space omics: the study of how spaceflight affects biology. "Space is both a diverse and an extreme environment, and it allows us to study the plasticity of the body. Understanding how the body adapts to space helps us understand how it adapts to change in general."

She's now analysing over 30 brain samples from space-exposed mice, observing molecular changes in the hippocampus with intriguing echoes of neurodegenerative disease — though, she cautions, "we need more data to support those findings." As scientific chair of ISSOP, she works with NASA, JAXA, and European labs to standardize spaceflight research.

Leading her own lab remains the deepest reward. "Through my students I get to delve into new topics and see them grow into researchers. Science tends to be individual, but the process of sharing and learning from each other is what I enjoy the most."

Photo to the left: Stefania Giacomello.

Read the full story ⟶

Collaborations

Collaboration with entities outside the academic environment, such as healthcare, industry, other government agencies, and international stakeholders, is a strategically prioritized part of our core operations. Collaboration takes place at multiple levels within SciLifeLab.

Examples of collaborations

European Molecular Biology Laboratory (EMBL), WASP and WASP-HS, Wallenberg Centres for Molecular Medicine (WCMM), RIKEN, EATRIS-ERIC, The Swedish Childhood Tumor Biobank (BTB), AstraZeneca Open Innovation (via CBCS), Genomic Medicine Sweden (GMS)

National initiative on drug discovery

The overall goal of the Drug Discovery & Development platform at SciLifeLab is to translate academic research ideas into attractive investments for drug development. The platform achieves this goal by offering a combination of high-quality infrastructure and expertise that accelerates the development of drugs with the potential to improve human health.

In 2025, SciLifeLab's Drug Discovery & Development platform platform continued to support and expand its portfolio of drug development projects. Through open calls for proposals and one-on-one meetings, the platform identified more than 10 promising projects, which, following evaluation by the national steering committee, led to 8 new drug development programs.