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‘Coronavirus Coup’ by the Wallenbergs: built a lab without government authorization

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Photos by Magnus Hjalmarson Neideman (unless indicated otherwise)

They received a multimillion-kronor grant from the Wallenbergs and used specially chartered jets. This is the story about a group of researchers who built a large-scale coronavirus test lab by acting first and requesting the needed authorization later.

On January 10 [2020], Lars Engstrand and Mathias Uhlén visited Shenzhen in southern China. In Sweden, this city of ten million people is best known for being the headquarters of Huawei, a fierce competitor to Ericsson. Often called China’s Silicon Valley, Shenzhen is also home to several of the country’s leading pharmaceutical and medical technology companies.

The two professors, who work at the Karolinska Institute (KI) in Solna and the Royal Institute of Technology (KTH) in Stockholm, respectively, are not your run-of-the-mill academics.

Engstrand has made a name as a leading researcher in the field of disease control, while Mathias Uhlén was one of the founders of med-tech companies like Biotage (previously Pyrosequencing) and Affibody. They were on location in Shenzhen to study how the Chinese managed mass testing in connection with the outbreak of the novel coronavirus in Wuhan, [capital city of Hubei province].

The visit was not to get an idea of what an extreme emergency was – the two were visiting Wuhan more out of curiosity, with a view to gaining knowledge that could be used in the future.

“We absolutely had no idea how big the situation would become. In the beginning, it seemed like it resembled the original SARS virus – a dangerous virus that had broken out in China but would be contained there. We were totally convinced that the disease wouldn’t spread, although we had actually discussed at the time how it might evolve,” says Mathias Uhlén to Svenska Dagbladet (SvD).

At this point of time, most people considered the coronavirus to be an isolated Chinese problem.

It would take a few months before it became apparent that the novel coronavirus would become a global crisis that would end up putting incredible strains on the Swedish healthcare system.

Lars Engstrand told us that the border to Hong Kong, from where he would fly home to Sweden, was closed just a few days after their visit to Wuhan.

“I was thinking how lucky we were to be able to get out of there. But we still believed at the time that the pandemic could be stopped within China,” he says.

On Wednesday, March 11 – two months after the professors visited Shenzhen – Stockholmers are completely focused on the arrival of the new “Gold Bridge” on the back of a specially equipped ship that had been traveling several months from China to the Slussen area, [where one

of Sweden's largest urban transformation projects is being carried out between the Old Town and the island of Södermalm]. Siv Andersson, Professor of Molecular Evolution at Uppsala University and Co-Director of the partly Wallenberg-financed Science for Life Laboratory (Scilifelab), is busy working on a completely different issue, even if it – like the new bridge – originated in China.

As one of the top executives of Scilifelab, she will soon play a key role in the fight against the coronavirus. But she is not aware of this when she arrives at Täckå Udden at ten in the morning.

That same day, the Public Health Agency of Sweden had decided to stop using tests to trace virus spread and would instead utilize all available resources to test people who were actually infected with covid-19.

Siv Andersson is invited by the board of the Knut and Alice Wallenberg Foundation (KAW) to report on the novel coronavirus and its potential implications for the world outside China.

The meeting is held at the Wallenberg family's villa Täckå Udden on Djurgården, located right at the inlet of Stockholm.

When Peter "Poker" Wallenberg, Chairman of the Board, arrives at the meeting, the consensus is that the coronavirus is primarily an internal problem for China and the greatest problem for Sweden would be difficulties importing components from Chinese subcontractors.

Just a few days earlier, Anders Tegnell, State Epidemiologist of Sweden, had stated in an interview with SvD that there was a moderate risk of the disease spreading generally in Sweden.

Peter Wallenberg and the other members of the KAW board still wanted to get an idea if there was something the board could do. The 16 Wallenberg Foundations, led by KAW, are after all the largest private financier of research, distributing more than SEK 2 billion annually in grants.

Siv Andersson would quickly correct their error in thinking that the coronavirus would remain within China's borders. When lunch was served, the barge-like ship carrying the Gold Bridge was passing outside the window. Peter Wallenberg returned the conversation back to the subject of the day and he stated that the coronavirus was something the Foundation had to keep an eye on and would most likely have to act on.

"Siv is a skilled educationalist, so we were scared to death after she finished her presentation. OK, I might be exaggerating a little, but after the meeting, we concluded that everyone could be infected. The important issue was to flatten the curve as much as possible," said Peter Wallenberg later when commenting on the meeting.

"But I still believe that no one really understood that half of the world would close down one week later."

Siv Andersson left the board members with a specific proposal:

"If we can test on a broad front, we can immediately isolate the people infected with covid-19 while others can continue to work and remain active in their communities."

It would turn out that Siv Andersson's meeting with the Wallenberg Foundations would have an effect. Already one week after her meeting with the board, an email landed in her inbox. It was sent by Göran Sandberg, Executive Director of the Foundations.

"He wrote that they were prepared to provide funding if we were willing to start testing," she says.

Money should not be allowed to be a hinder. The Foundations were immediately prepared to grant SEK 50 million to finance the tests. The focus of this grant was to test for the virus, meaning tests on infected persons. (Other labs are doing antibody testing to see who has had covid-19.)

Assigning the task to Lars Engstrand and Mathias Uhlén was the natural thing to do, Siv Andersson felt. The two were already associated with Scilifelab, and after their visit to China, they already had a good idea of what a test lab should look like.

The two professors were accustomed to working with this type of large-scale project, but this one would be completely different. When a university builds a large test laboratory, the process usually takes several years. Now they had to get started as fast as they could, preferably within a few weeks.

Mathias Uhlén later described their mission as a completely impossible task.

"The lab didn't even exist five weeks ago. Now we can perform several thousand tests a day," he says.

After their trip to Shenzhen, Mathias Uhlén and Lars Engstrand had time to sketch out the design of a lab that could manage thousands of tests per day. However, when KAW got in touch with them, they only had some loosely formulated plans and had chosen the premises they could use at KI.

Other than that, most other things were missing, such as the robots for handling the test samples and the test kits – the swabs used to take samples and the reagents.

"There was already a global shortage of equipment. Everyone was hunting for it," says Lars Engstrand.

They could still manage to place orders thanks to their personal contacts and the network they had built up within Scilifelab.

"There has been a tremendous demand for reagents internationally, but we have had personal relationships with many of the suppliers for many years, which allowed us to get quick deliveries," Mathias Uhlén says.

But there was one more thing.

When they ordered the equipment from China and booked the aircraft for making the delivery, KI did not have the [Swedish government's] authorization to conduct large-scale tests for the healthcare sector. Waiting for such authorization to go through the usual bureaucratic process

would be a big risk. The startup of the lab would be delayed for several weeks if they could not begin preparations, and there was a risk that the test kits and laboratory robots would be “sold out” by the time Sweden finally placed its order.

“When we started, we didn’t even have government authorization to allow the university to conduct large-scale diagnostic testing. We were authorized last week, but KAW had already granted SEK 60 million in funds,” says Mathias Uhlén.

The researchers had contacted the board and described the problem. The board gave them the immediate go-ahead. “We ordered the equipment, hoping we would receive our authorization,” says Mathias Uhlén.

“KAW took a major financial risk. We purchased robots and reagents for SEK 50-60 million without knowing if we could use them,” he says.

The decision was made at a time when the Swedish authorities, according to Uhlén, had a rather cool attitude towards mass testing, or were actually completely against it.

“Maybe the debate article helped that we wrote for the Dagens Nyheter (DN) newspaper on March 28. After it was published, the authorities changed their position rather quickly,” he says.

Just before midnight on April 1, the SAS plane landed at Arlanda Airport carrying five metric tons of machinery and other test equipment. Transporting everything from China to Sweden was not exactly simple.

A number of technicians, who would help set up the equipment, had to accompany it on the flight. In the coronavirus situation, this proved to be more difficult than expected.

The original idea, to fly to Sweden via Hong Kong, was not possible because the technicians would be quarantined there because of the new rules and regulations. They then managed to make reservations on a KLM flight via Shanghai to Amsterdam, but when it was time to board the aircraft, KLM refused to let the personnel on the plane. They still do not know why today.

They finally managed to charter an SAS plane that could fly directly from Shenzhen to Stockholm, while the technicians took a Lufthansa flight via Frankfurt.

Laura Bergtoft from the Wallenberg Foundations could finally receive the cargo late that night and verify that everything had arrived as planned.

The test robots that were shipped on the plane were world-class. At the time, they were the only ones of their type outside China. Access to this advanced equipment was absolutely crucial for Sweden’s ability to increase its testing capacity.

Since their visit to Shenzhen, Mathias Uhlén and Lars Engstrand knew that an extremely high degree of automation would be needed to handle a large number of tests in such a short time.

After waiting anxiously on the edge of their seats, KI was also given the green light by the Swedish authorities to start using the lab.

In March, testing capacity in Sweden was around 200 tests per day. Now the goal was to initially manage 5,000, and close to 10,000 tests daily a few weeks later. In a news release published on May 14, Scilifelab announced that the lab was now operating at full capacity.

The staff of hospitals in the Stockholm region [on the east coast], and the Västra Götaland region [on the west coast], were the first to be tested.

Mathias Uhlén says that building up such a comprehensive testing operation in the space of only a few weeks is almost unique in the world.

He agrees that this might sound somewhat “trivial”: a barcode reader that scans labels on test tubes, a robot that dispenses the right amount of liquid drops in the right test tube in the right order, and a computer to keep track of everything. It is not the first time this has been done – others have set up similar lab processes many times before.

“In a way, you might wonder why our lab is special. Every ICA grocery store in Sweden also has a barcode reader connected to the cash register at checkouts.

“But you have to remember that they are not just scanners connected to a device. It is more like hundreds of terminals that have to be integrated with systems for inventory, logistics and accounting. While ICA developed its systems over a period of many years, we had to do ours in a few weeks.”

Mathias Uhlén says the two test lines in the lab are like a miniature automated factory, in which the first line scans a barcode on the test tubes, after which a machine adds a small quantity of test liquids before another machine reads the results. The test tubes are fed into the machine, but that is the only time people are to touch the tubes.

This makes the tests much more reliable.

“I would be arrogant to say that a machine can’t make mistakes, but I have actually not experienced it. In contrast, we know from studies that a person who must handle a large number of tests makes a mistake in two to three percent of the cases,” says Mathias Uhlén.

On Sunday, March 22, Siv Andersson convenes around ten researchers from several universities associated with Scilifelab for a large meeting that is conducted as a video conference for health safety reasons.

“We have received SEK 50 million to spend on research now. What should we do with the funds?” Siv Andersson asked her colleagues.

The money is in addition to the donation made by the Wallenberg Foundations for the test lab at KI. KAW’s total grant has now reached SEK 130 million.

On March 25, the grant is formally announced and the interest is enormous among Swedish researchers who want to participate.

“We thought we would get no more than 30 applications. The application period was only five days, which is incredibly short. We received 285 applications,” says Siv Andersson.

There are good reasons why the Foundations, which normally finance research around Sweden, chose to let all the funds go via Scilifelab.

Processing a grant application usually takes the Foundations between six months and a year. It is a complicated process in which universities first select the projects that will be allowed to seek a grant. KAW selects a project by conducting a peer review, in which recognized researchers around the world, including Nobel laureates, review the proposals. After the peer review, KAW decides who gets the grants.

[In this case], the goal was to grant funding in just a few weeks. Scilifelab collaborates with a large number of top researchers in Sweden and they agreed to plow through the applications during weekends and evenings in order to make the grant decisions in record time.

“We have quite a lot of expertise in our management group and Scilifelab has an efficient organization that made it possible to handle this type of application quickly,” says Siv Andersson.

Peter Wallenberg says the goal was to maintain the same scientific level of excellence as in a normal [application] process but admits that there is a greater risk for mistakes when applications are handled at turbo speed.

“There is a chance, of course, that some projects will not produce the results we hoped for. But you cannot sit on your hands and do nothing. We have to make the best possible analysis of each application in the time we are allowed.”

Compared with the test lab, the new grants are designated for long-term projects, although “long-term” here is still not what would be normally associated with long-term research.

“The time horizon is usually ten to 15 years when you talk about long-term research. In this case, we are talking in terms of a year or so,” says Siv Andersson.

The funds will be earmarked for pharmaceutical research and method development.

“Developing methods for antibody testing is an example of a project to screen people and determine if they have had covid-19; if they are immune, they can move freely in communities again. It is incredibly important that these tests are accurate. If they aren’t, they create a false sense of security and incorrectly indicate that a person is immune,” says Siv Andersson.

Back to the test lab at KI: here, 100 people are working today on a full-time or part-time basis. They are probably the most qualified basic lab technicians in Swedish research history.

“It is quite fascinating to see how people pitch in [and join the cause]. We have 85 very experienced researchers who now sit and pack test tubes,” says Lars Engstrand.

Starting up the new lab was not entirely without problems. On May 11, SVT – the Swedish national public television broadcaster – reported that more than 100 tests in an ongoing study in the healthcare sector in Stockholm will have to be redone. In a few cases, test tubes had leaked, making the tests unusable. In other cases, labels had fallen off, making it impossible to ascertain who the test belonged to.

“But there was never a risk that the tests would produce incorrect results, but a few of them have to be done again,” says Mathias Uhlén.

What concerns Peter Wallenberg today is how the crisis will impact the Foundations next year. The Foundations have not “burned” all their funds on the test lab – SEK 130 million is a rather small sum in relation to the total grant budget of slightly more than SEK 2 billion.

However, the Foundations are completely dependent on dividends from their shareholdings. The Wallenberg Foundations own shares in major companies like Investor and Saab; these holdings have a value of around SEK 90 billion.

Now that many companies are postponing their dividends, either due to financial problems or for a fear of bad publicity or losing access to government emergency financial assistance, all of this will impact the Foundations’ ability to make grants.

We will not be able to grant as much for research next year,” says Peter Wallenberg.

All of the persons interviewed for this article point out that they do not want extra meetings or have to leverage their personal contacts with Chinese universities the next time there is a pandemic.

The four weeks it took to establish the test lab at KI is four lost weeks,” says Peter Wallenberg.

“After this experience, we have to ensure that Sweden builds up [the resources for] better preparedness, because this will happen again. It is just a question of how and when. We see [the test lab] as a way to participate and create the conditions for better preparedness,” he ends.