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CELL SCIENTISTS TO WATCH

Cell scientist to watch – Alexey Amunts

Alexey Amunts earned his PhD in 2010 from Tel Aviv University for his work on the structure of a plant photosystem I in the lab of Nathan Nelson. He then moved to the MRC Laboratory of Molecular Biology (LMB) in Cambridge, UK, for a postdoc with Venki Ramakrishnan, where he used cryo-EM to study ribosomes from human and yeast mitochondria. Since 2016, he has been a group leader at the Science for Life Laboratory (SciLifeLab) and Stockholm University. His lab is investigating the mechanisms, assembly and evolution of bioenergetic complexes. In 2019, Alexey was selected for the EMBO Young Investigator Programme, and he has also received the Cancer Foundation Junior Investigator Award, as well as funding from the ERC, Wallenberg Foundation and SSF Future Leaders.

Alexey Amunts

What inspired you to become a scientist?

I think science is a unique profession; you have the opportunity to work on anything that you like, so there's a freedom of action, and it also allows for constant growth and self-development. I think for this reason, it's attractive to people who are independent thinkers, but who also want to challenge themselves and contribute something to society. When such people come together, they form a certain intellectual environment that is very stimulating – it not only allows you to make discoveries, but also to enjoy the process. This is what inspired me. In addition, I learned from my grandmother, who was a neuroscientist back in the Soviet Union, that there is no age limit to science. Many scientists reach their peak in their 60s or 70s. Even at that age, you can feel young because you're constantly exposed to new technologies and discoveries, and are surrounded by young students and postdocs.

How did you get interested in structural biology?

It was the main thing I was exposed to through my PhD supervisor Nathan Nelson, who is actually one of those people who never gets tired of science – he's now 82 years old and is still doing cutting-edge lab work himself in the field of structural biology of photosynthesis, which was the subject of my graduate work. During my PhD we became close friends, and through his friendship and mentorship I had a chance to absorb from him what it takes to become a scientist, and with this came the interest in structural biology as a central concept to understand and visualise complex biological processes. I think of structural biology as a fundamental tool to investigate life.

For your postdoc you moved to Venki Ramakrishnan's lab. Did you anticipate the later explosion of the cryo-EM field back then, when you started working with this technique?

Looking back, I could come up with all kinds of thoughts. But as a postdoc, the type of work I was doing required a lot of focus and a combination of intellectual, mental and physical effort, so I didn't actually have a chance to think about the future of cryo-EM too much. I'd like to say, though, that working in the environment of the LMB in Cambridge, one is surrounded by very bright and visionary scientists who not only anticipated the later explosion of cryo-EM, but actually could make it happen themselves. I feel very fortunate that I was able to see this and be in the company of these researchers.

And would you say that now is the best time in history to be a structural biologist?

Yes! And even if it's not, one has to believe that it is. I always try to convey to the students and postdocs in my lab that they are the right people at the right time and in the right place to make the next big discovery. Once people have this realisation, they will find a way to overcome any challenge to make things happen.

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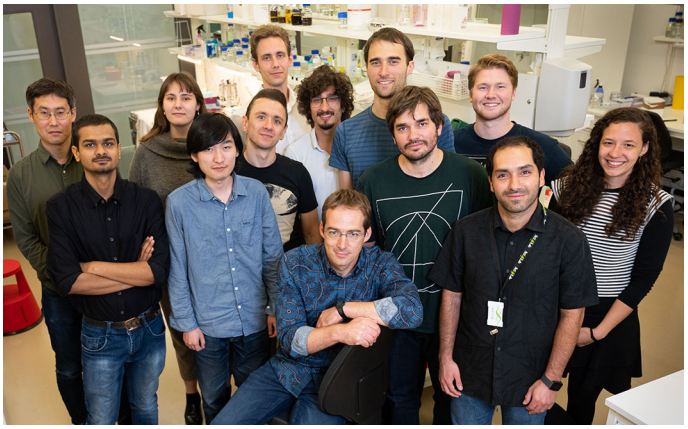

The Amunts lab.

Something researchers outside the field might find hard to grasp is how you get from a structure to a molecular mechanism

I think this is the most interesting, and also the most demanding, part. You get certain data, and then it's up to people to extract meaningful information from these data – and different individuals might come up with different insights. This is where I really feel that supervision and mentorship become critical. You need to motivate and engage people to an extent that they spend enough time thinking about the problem. This also requires previous knowledge and an understanding of related fields; therefore, communication with colleagues is important.

The Protein Data Bank is celebrating its 50th anniversary this year. How important has this database been for your field?

I'm really glad you ask this, because when you look at other fields, it's unprecedented that a young student from anywhere in the world can go on the internet and download atomic coordinates of the most complex biological systems, which took years for a group of scientists to produce, then start investigating them independently on their computer. In this respect, the Protein Data Bank really is a flagship project for open science. It shows that sharing data in an accessible form – and it's a big effort to provide the data in a way that anyone can use – is a major driving force for progress in research.

Some of your lab's recent work is visualised in beautiful narrated animations. In your view, what is the biggest value of this form of communicating research?

First of all, my core belief is that good science is good science and will always be recognised as such, regardless of how it is communicated. However, the information flow today can be overwhelming, so these animations become relevant because they can be used as a tool to break down some very complicated studies into relatively simple concepts that are also aesthetically and visually pleasing, and are therefore more accessible. So, it basically helps to convey a message by reducing the activation barrier for readers, and it also saves people's time. Of course, it's important to remember that the scientific details and scientific accuracy should not be compromised in an animation. There is also an added value from the perspective of the people in our lab, because it allows them to express their creativity in a way that is slightly different from what they do in their everyday work.

Your lab has recently contributed to an interactive 3D COVID-19 exhibition. Do you think that participating in science outreach activities should be more of a priority for scientists?

What I'd say is that, as scientists, we do have social responsibility to spread knowledge and to engage people in more positive and cooperative thinking. But this does not have to be something very demanding. For example, in Stockholm we also organise a seminar series called 'Science for non-scientists', where group leaders give talks for non-scientific personnel. Just the fact that we get people from different professions, different nationalities and different backgrounds together in the middle of the day to learn about science is already wonderful and a great contribution to society. There are small things we can all do – it doesn't need to be something fancy like an exhibition.

What advice would you give someone who is about to start their own lab?

My advice would be to talk to people about your science. Firstly, because it brings you to a certain intellectual place where you can think differently, and in a more creative way, about your own ideas and shape them towards productive directions. Secondly, talking to people means listening to people, and this teaches you how other people think. When you learn how to talk and listen, a market of ideas emerges, and you can build up something together that is bigger than the sum of its parts. So, when starting your own lab, either look for an environment that encourages people to talk to each other openly, or if that doesn't exist yet, then try to form such an environment, because this can make a big difference in your scientific career.

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What is your approach to collaborations? You've even collaborated with pharmaceutical companies; have you found these to be different to academic collaborations?

We like to collaborate, because it's an opportunity to learn from interesting people and develop our work in new directions that we otherwise wouldn't go in. I think a really basic thing for a successful long-term collaboration, like for any relationship, is to start by giving without asking for anything in return. If the other side does the same, then we can have a fruitful and enjoyable time working together. Typically, our approach is to host guest scientists in the lab. Once working together, the communication becomes informal, so it doesn't matter which country, institution or industry the collaborators come from, or if they are a PhD student, postdoc or professor, we are all on the same path. And I'm just very glad that we've gained a reputation for being good collaborators, including with pharmaceutical companies.

Finally, could you tell us an interesting fact about yourself that people wouldn't know by looking at your CV?

Something that I tend not to highlight too much, mostly to avoid confusion, is that I completed service in a special unit of the Israeli army. This was quite a formative experience and also an important maturation step for me. There, you have to take

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difficult decisions within a very short period of time and take responsibility for that. You also have to find ways to cooperate, so you need to learn how to consider individual needs under pressure and lead people by example. In retrospect, this was very useful, because there are many parallels with doing science and leading a research group. I also think the experience has made me a better mentor for students and postdocs in the lab and has helped me to build a productive research environment.

Alexey Amunts was interviewed by Máté Pálfy, Features & Reviews Editor at Journal of Cell Science. This piece has been edited and condensed with approval from the interviewee.