

CELL SCIENTISTS TO WATCH

Cell scientist to watch – Benjamin Towbin

Benjamin Towbin studied Molecular Biology at the University of Basel, Switzerland, before carrying out a Master's in Biomedical Sciences at the University of Utrecht, The Netherlands. He then pursued his PhD with Susan Gasser at the Friedrich Miescher Institute for Biomedical Research, Basel, studying the dynamics of subnuclear chromatin organisation during *C. elegans* development. For his postdoc, Benjamin joined Uri Alon's lab at the Weizmann Institute of Science, Rehovot, Israel, with funding from HFSP and SNSF to work on optimality principles in bacterial growth control. Following a second postdoc with Helge Großhans, funded by a Marie Skłodowska-Curie Individual Fellowship and by the Engelhorn Foundation, he set up his independent group in 2019 at the University of Bern, where he applies quantitative systems biology approaches to study optimality principles at a multicellular scale using *C. elegans*.

What inspired you to become a scientist?

Like many kids, I was fascinated by nature and had many questions on how the world works. I always enjoyed browsing through books with cool little experiments, and of course to try them out. What also helped strengthen my interest was that I would always get answers to the questions I asked, as I'm a son of two scientists; because of that, I also had an idea of what a career path as a researcher could look like and how to approach it.

Could you tell us about the main theme of your lab and what questions you are trying to answer just now?

The big questions we are asking is how the development of an organism is highly robust in a given environment, yet shows high plasticity in response to different environments. Regarding the developmental robustness part, we are looking at how animals maintain a constant body size despite heterogeneity in their growth rate. For the plasticity, we want to understand how organisms compute an optimal balance between growth and ageing in different environments. We address these questions using *C. elegans*, and specialise in making precise measurements of phenotypes, such as growth. Our approach is to introduce subtle but precise manipulations of molecular circuits. We then compare how these manipulations affect phenotypic outcomes and compare the observed effects to those predicted by mathematical models. Our research relies a lot on live imaging in a microchamber system with which we track many individual animals over their entire developmental trajectory.

You worked on a completely different topic, namely chromatin and epigenetics, during your PhD. Why did you decide to change research fields?

Although I can see how it might seem a big step in terms of research approaches, my motivation has always been to understand the complexity of life – so the shift in topics wasn't



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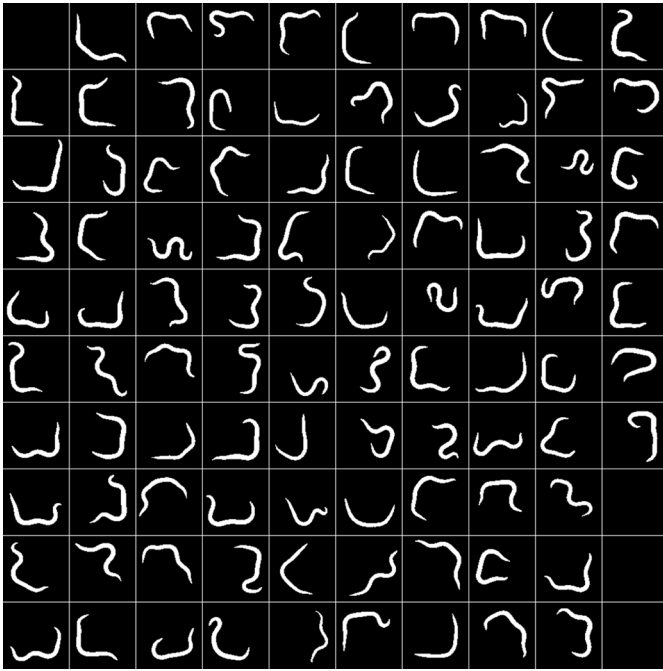
really a change in my interest, but rather an extension of approaches to address my interests. In Susan Gasser's lab, I had the opportunity to observe the complex process of how DNA moves inside the nucleus, and it felt quite natural to me to expand my toolkit and understand the complexity of biology by abstracting it to models, which then help build new hypotheses – so this is what led me to join Uri Alon's group. But I was certainly thrown into cold water in the sense that I had to learn to ask questions from a very different perspective compared to my PhD project. Then, I did another postdoc, which helped define my own line of research using *C. elegans* as a model, and during that time I also learned new methods, such as the microchamber technology we're currently using.

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Were there any challenges you faced when starting your own lab that you perhaps didn't expect?

The challenge was the sudden diversity of tasks at the beginning, from ordering lab equipment to advertising a job and then selecting

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Computational segmentation of individuals of *C. elegans* growing in micro chambers.

who to hire. It was the first time in my life I was doing many of these tasks, which meant I was also less certain whether I was making the right decisions, and everything took longer than expected. Since then, I've learned to better prioritise and make sure to not only work on those things that are urgent, but also on things that are important.

And beyond prioritising, what advice would you give to early-career researchers who are planning to set up their lab in the future?

Don't be shy to ask for help! It's good to think carefully about who to ask for the specific task or issue, and I've found that people, more often than not, will be happy to help. Actually, one of the challenges of the 2020 lockdown and then social distancing was that, especially as a new PI, it became more difficult to get to know my colleagues and ask them for advice in the beginning – seeing people every day at the institute, which is now luckily the case, makes it so much easier!

On the flip side, is there any piece of scientific advice that has stuck with you?

I have received lots of different advice, but something I often remember is how during my PhD when people entered the office feeling annoyed about a failed experiment, a postdoc in the lab half-jokingly used to say “Well, do it again, just better!”. Even if he didn't mean it completely seriously, I do think there is something true to this; scientists need to be resilient to failure and have the mindset of ‘what can I do better next time?’ – whether it's to do with experiments, or grant and paper submissions.

You have a pretty interdisciplinary team already. What's your approach to running a lab?

I want to empower the individual, but also make sure that everybody works together. So, it's important that all lab

members have a good sense about each other's projects. Therefore, beyond traditional lab meeting presentations with PowerPoint slides and the latest experimental data, I also encourage conceptual presentations on a whiteboard, where anyone can interrupt the moment something is not clear. This is also a great exercise for the presenter, as they get to learn how to take a step back and explain their work in a way that even a broader audience can follow and think along. Actually, I also organise similar exercises about communicating science at the institute level.

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That's interesting, could you tell us a bit more about these events?

I've organised elevator pitch workshops, where students from different labs come together and practice a three-minute pitch in which they summarise their projects and put the ‘why I'm interested in this’ in the centre. And I'm now organising a conference called ‘Theory across biology’, where there will only be chalk talks and the traditional poster session will be replaced by flipchart presentations – people will have to draw and explain their work on the go. We'll have a wide range of disciplines, from metabolism all the way to ecology and evolution. I think we can all learn a lot across different fields, and it will be a lot of fun!

Given that you're a fan of chalk talks, I take it that you also enjoy teaching?

Yes, I really do. I am in the fortunate situation that my current position is not bound to a specific teaching curriculum, which gives me a lot of freedom in teaching topics that I am passionate about and to explore different styles of teaching. I am currently teaching a lecture series on systems biology where we cover the principles of using mathematical modelling to understand biology. This was also a blackboard lecture, which made it easier for me to explain at a pace that each student could follow and to interact and discuss with the students. It also allowed me to better understand things that I previously thought I knew very well, so teaching has that added value, too.

Switching gears a bit, gender equality is important to you; what in your view are the current biggest challenges to achieving this in academia?

I think one of the biggest challenges is the unconscious bias we have towards gender roles, which isn't an academia-specific issue. So, it's important to be aware of such gender biases and mitigate them without perturbing the equal opportunity of every individual. Eventually, we should of course overcome these biases. But entirely overcoming unconscious bias has proven more challenging than many expected. Importantly, we should not only revisit expectations towards roles at the workplace, but also address our biased expectations regarding gender roles outside of work, such as care

duties and their implications on the career trajectory of each individual.

Being a parent, how do you juggle research and family life?

I live in a dual career family, which not only means that my partner and I both have jobs, but that we both have two jobs – and it is often challenging to perfectly juggle our commitment to our day jobs and our role as parents. I think what is important is that each of us can support the other when most needed in our careers. This way, we both get to enjoy time with our kids, and we can equally share the responsibility of being there for them when they need us. Compared to my postdoc time, I can now be more flexible as a PI since my work is not as tightly bound to my physical presence in the lab anymore. Living closely to my extended family has also made things a lot easier.

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

As a kid and then teenager, playing classical guitar was the centre of my life. I was very close to studying guitar for a music career, but eventually chose a different path – it's always interesting to think back at how such decisions have impacted your life. I still play, although of course not with the same dedication and intensity, and since my children also started playing instruments, I have gotten to pick up my guitar more frequently again as well.

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