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Cell scientist to watch – Abdou Rachid Thiam

Abdou Rachid Thiam was born and raised in Senegal. Following his undergraduate studies at ESPCI Paris, he obtained a PhD in 2010 from the Université Pierre et Marie Curie Paris VI for his work on the properties of emulsions using microfluidic technology, in the group of Jérôme Bibette. Abdou Rachid then moved to Yale University for a postdoc, funded by a Marie Curie Fellowship, where he worked with James Rothman, as well as Frederic Pincet and Tobias Walther, to reconstitute and study intracellular vesicle trafficking with emulsion droplets. He then became a group leader at the École Normale Supérieure de Paris, where he now also chairs the Biophysics Research Axis. His Biological Emulsions lab combines membrane biophysics and emulsion science with cell biology to understand organelle dynamics, with a special focus on the formation and functionalisation mechanisms of lipid droplets. Abdou Rachid is the winner of the Claude Paoletti Prize (2018), the CNRS bronze medal (2020), as well as the Biophysical Society's Thomas E. Thompson Award (2022).

What inspired you to become a scientist?

I didn't necessarily know early on that my path would lead to a career in science. I grew up in Senegal, where science is not the first kind of job people would think about choosing. So, I gradually built an interest in science. For my PhD, I studied fluid mechanics and microfluidics, and the lab I worked in was doing a lot of translational science – my PhD advisor has actually founded several companies. So, at that time I thought that if I stay in science, I really want to have a direct impact on society. But I later realised that the 'translational' part doesn't necessarily need to be immediate. I was mind-blown when I got into biology and saw that there are so many things that we don't understand yet, and the realisation that I could help answer such open questions made me fall in love with fundamental research.

Tell us more about how you decided to move to the USA and join a cell biology lab for your postdoc!

I have a really open-minded personality and like to be flexible when making choices. I initially wanted to work on topics where I could use a lot of mathematics and physics, so fluid mechanics was a perfect fit. I then also got into microfluidics, which offered a way to revisit the physics of emulsions and allowed me to make several new discoveries during my PhD, even though emulsion science is more than a century old! At the end of my PhD, Frederic Pincet at École Normale Supérieure de Paris introduced me to James Rothman, who was visiting Paris to give a seminar, and he saw the power of applying some of the tools I was developing for biology. After our chat, he offered me a postdoc position, so that's how I ended up at the Cell Biology department at Yale, where I was investigating intracellular vesicle trafficking and soon realised that I was working at the oil–water interface where COPI proteins, which bud vesicles



Abdou Rachid Thiam

from the Golgi, act just as emulsifying agents. That's when I really started to dig into the biology.

Without a prior background in biology, I imagine it initially took quite an effort to get up to speed with the field

Indeed, there was a lot of literature on vesicular trafficking and membrane biology that I had to digest – so I spent four or five months reading loads of biochemistry, biophysics and cell biology papers, trying to make connections between these fields and understand how things work in biology. It felt a bit like entering a forest where you are lost, but at the same time also interested in everything you see. Thinking back, it was quite a big step, as I also had to learn about all the basics, including what model organisms or a western blot are. But it was very special to be surrounded by scientifically great people and watch how they approach their questions and rigorously attack scientific problems. In particular, I was lucky that Bruno Antonny was having a sabbatical period at Yale and was sitting near me, so we often exchanged ideas. Later, I would discuss a lot with Tobias Walther, and I was constantly in his lab, so I learned a lot of cell biology there, too; I spent the last year of my postdoc working with him and Bob Farese.

What challenges did you face when moving back to France to start your own group?

I was fortunate that I had European funding for my postdoc, for which the third year had to be completed in France, so I was very independent in my final postdoc year and could focus on the questions I wanted to work on in my lab. Getting a position went very quickly, and within a month I had job offers for PI positions

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Abdou Rachid Thiam's Biological Emulsions research group.

from two different places. Joining a physics department at a very large institute that has four or five Nobel Prize winners and where people work in various fields including basic physics, astronomy and high-energy physics, the main challenges were not being known and that the importance of the work I was doing was not initially recognised. Since I also spent the last year of my postdoc at this institute, I had to express myself quite loudly in the beginning to be acknowledged as a PI and receive the things I asked for, but this was only temporary.

What questions are your lab trying to answer just now?

All our questions revolve around organelle biology. We are trying to understand how lipid droplets assemble, how proteins are targeted to lipid droplets and how lipid droplets remodel their membranes. We are also interested in how lipid droplets interact with other organelles, such as mitochondria, and how they are targeted by the autophagy pathway, as this is important for organelle homeostasis. We're trying to develop new tools to be able to reconstitute these processes and bring biophysics closer to cell biology. Beyond this main focus, we also have some applied projects, and I'd say about twenty percent of my research is translational – it's sometimes actually quite refreshing to talk to people and feel that you can have an immediate impact on their life.

What's your approach to doing multidisciplinary research?

Without wanting to sound derogatory, what I realised is that I didn't want to stay in the classical biophysicist 'box' where you just use physics for biology and are told by biologists what the interesting questions to study are. People often talk about interfaces between fields, but I didn't want to just be at the interface, I wanted to cross it, with the help of people who are on either side. So, what really excites me is navigating between two fields.

And how do you go about building a multidisciplinary team?

I really like to be around people who are different, and already during my postdoc I was sitting around biochemists, cell biologists

and biophysicists, so I often had to convert my vocabularies. Similarly, in my lab I am aiming to generate an osmosis between biologists and physicists by simply making them sit next to each other, because having them frequently communicate provides a lot of energy to solve questions. We currently have three cell biologists, four physicists and a chemist; they all have their own projects and questions, but a physicist might help pinpoint key physical parameters that will impact a cell biological process studied by a biologist, and the biologist can advise a physicist what would be a good experiment to do.

“[...] in my lab I am aiming to generate an osmosis between biologists and physicists by simply making them sit next to each other, because having them frequently communicate provides a lot of energy to solve questions.”

Your team includes researchers from various nationalities, so diversity is clearly important to you

Yes indeed, I have a team with several people from very different cultures. I believe that my Senegaleseness naturally led me to be warm and welcoming (Senegal is known as the land of 'teranga', literally meaning welcoming country); this helped me bring together scientists from different horizons and with different perspectives. I find it magical how science unites people! The academic world has realised the importance of multidisciplinary in science, which has led to major discoveries and transformations of our societies, but similarly, multiculturalism is extremely beneficial to academia in the long run – so we should keep this in mind and try as much as possible to create diversity.

“I believe that my Senegaleseness naturally led me to be warm and welcoming [...].”

Finally, could you tell us an interesting fact about yourself?

I like challenges, and to reach and break records just for the sake of proving that something is not impossible. So, I am constantly pushing myself to get better at everything, whether that is sports, cooking, science or anything else. Actually, when I am facing what might seem like a difficult situation, I take it as an opportunity to reset myself and become stronger, and I always try to stay positive.

Abdou Rachid Thiam 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.