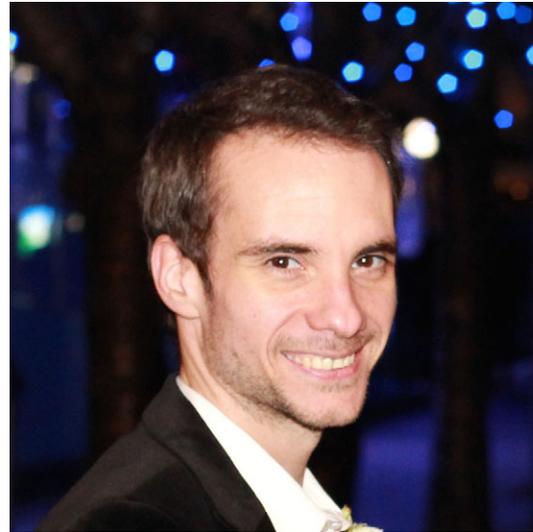


CELL SCIENTISTS TO WATCH

Cell scientist to watch – Emmanuel Boucrot

Emmanuel Boucrot obtained an undergraduate and a master's degree in biochemistry at the University of Geneva in Switzerland. He pursued his PhD in immunology at the University of Aix-Marseille II in France, supervised by Stéphane Méresse in the laboratory of Jean-Pierre Gorvel. Emmanuel moved to the USA for his postdoctoral training in the laboratory of Tomas Kirchhausen at Harvard Medical School, first as an EMBO fellow and then as a Human Frontiers Science Program fellow. Before starting his own laboratory in 2011, Emmanuel held another postdoctoral position in the laboratory of Harvey McMahon at the MRC Laboratory of Molecular Biology in Cambridge, UK. He is a recipient of a Lister Institute Research Prize and a BBSRC David Phillips Research Fellowship. His group at University College London is interested in studying the mechanisms of clathrin-independent endocytosis, as well as investigating properties of quiescent cells.



What motivated you to become a scientist?

My dad was a physicist at CERN, the European Organization for Nuclear Research, and I was always fascinated about why he was so excited to go to work, because a lot of my friends' fathers were not so keen. I wanted to have a job that I was happy to go to every day. I was not gifted enough to study physics and more interested in medicine and biology, so I chose this path. I kept the research aspect of what my dad was doing, but just in a different discipline.

What motivates you now?

I find it fascinating that on a limited scale we can discover things that nobody else has seen. Biology in particular is so complex; there are a lot of things to understand and it's exciting. I like the challenge of designing experiments, getting data, making conclusions, having something new and interesting and then building on that.

What is the research focus of your group?

My group has two themes. One is endocytosis. We have recently described a new route of endocytosis, which is independent from the previously known pathways, and we are trying to understand what its function is. It seems to only be active when a particular receptor is activated, so in the long term that could be an opportunity to modulate drug entry into the cells. The second line of research is into quiescent cells. For a long time people thought they were boring as they were being 'quiet', but actually they constitute a very large proportion of our body, although we still don't know how much. One reason is that we don't have a marker and the second reason is that to do *in vitro* work, we need non-cancerous cells and until recently, there was no such system. But now there are primary cell lines that still have contact inhibition, so we set that project up and made very good progress. We will also be looking at cancer stem

cells. A lot of anti-cancer drugs target cells that divide, so if a cancer stem cell can become quiescent, it's going to escape and you risk a relapse; so learning more about that would be very valuable. I'm a cell biologist doing fundamental basic research, but in the long term we want to do something useful.

"(...) when I saw something with potential I didn't let it pass."

What elements, inside or outside the lab, have contributed to your success so far?

I think the truth is that I was very fortunate. I started my PhD in a lab in Marseille, and we were looking for targets of Salmonella proteins in human cells. I did a yeast two-hybrid screen and we found a new, unknown protein. That was pure luck! It could have been that the screen didn't work or that we found fifty targets, but the screen was perfect – we only found one protein. It was still tricky, because it was an uncharacterised protein, so we spent quite a few years figuring it out, but that's what really started my scientific career – I had a very good paper that opened the door to a good postdoc and so on. Having an opportunity to find something is down to luck, but when I saw something with potential I didn't let it pass. Of course, once you have some success, it's easier to get funding, and once you have funding, it's easier to attract people who are good themselves.

What challenges did you face when starting your lab that you didn't expect?

They gave me this empty lab and all I had was the funding. I started from scratch – I had to hire students and postdoctoral researchers, train everyone, design their projects and make a transition from planning my own experiments to planning someone else's. We're here because of scientific success, which doesn't mean we'll

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Emmanuel and his dogs on their way to win a sled dog race held at Chamrousse (France) in 1995.

become good managers, and we have to learn that on the spot. I'm not going to lie, it was very hard; it required accepting that things are going to be slow in the beginning. If I did it myself, it would be quicker, but I'm already trained, so I had to accept that someone had to go through the training period. It required patience and a lot of trust. Trusting people is another thing you have to learn. When one of my students comes with something interesting or surprising I can check it, but at some level she or he did the experiment and I have to trust them. That's something I needed to learn, because I can't do everything myself.

How are the challenges different now?

I have total freedom, which is great, but at the same time I have to make decisions about where to take my research. If I tell my students 'do this', they're going to do it, so I have to think twice before I give them advice, otherwise we're going to waste a lot of time. It's very exciting, because we can really do what we want, but at the same time, I wonder if I have enough experience to really plan everything that is required to do a good, convincing study that will be meaningful. I feel more responsibility. I have published only one paper from my group so far, but we have three coming, so I think we're on the right track.

Do you still do experiments in the lab?

I want to continue as long as I can. This week I'm teaching, so I'm not doing that much, but I try to spend 50% of my time in the lab. I usually help people on specific experiments, for example, right now I'm finishing a paper from a student who left six months ago. Also, when I want to test a new idea, instead of asking a student, I'll do it myself. It's always good to give someone a project that I know will work, otherwise it can be very frustrating for a student. I've learnt how to deal with failure, and I know what it's like when experiments don't work, but for some students it can really shatter their confidence, so it's better that I do the beginning, which sometimes includes a lot of failure.

What is the best science-related advice that you have ever received?

"Make sure you enjoy it" – that's from my last supervisor, Harvey McMahon. He loves science, being in the lab and doing experiments, even if he is very senior, and I think having passion is the key. Most of us chose this path because of that, and if we lose it, we won't be good scientists. We have to publish to get funding, but at least for me, the point is to get the new information, to go to the microscope and find a phenotype. That's why it's exciting, so keep enjoying it! The papers get published a year after the discoveries, and the grant award is going to come even later, and by then it's old news.

What is the most important advice that you would give to someone about to start their own lab?

I would say "don't be in too much of a hurry". When we start, we want to skip steps and we try to reproduce what we knew as a postdoc. Most of us will forget that the lab we were in was established many years ago, so you can't emulate that right away. I notice some of my colleagues are very frustrated because the process is slow. The start-up grant is for five years, and of course we need to publish, but there's still a lot of time and no point in overworking yourself, being too stressed and putting too much pressure on students. Be patient and enjoy the process. Rome was not built in a day, and by the same logic it takes time to build a lab and a team. And it's really not linear, it takes a long lag phase, and then you get all the benefits. But if you don't do the first part properly and don't train people properly to have rigor in setting up and analysing experiments, then you will never reach your full potential later.

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Could you tell us an interesting fact about yourself that people wouldn't know from your CV?

I used to do sled dog racing between the ages of 10 and 20 years old. I was really crazy about it. I started with one dog, and then got more, and at some point we had ten dogs in my parents' garden. They supported me greatly, but the deal was that I had to take care of the dogs, no matter what. I had to train the dogs before the race season in the forest with a four-wheel motorbike, and my dad drove us to races every weekend between December and April. I was fortunate enough to participate in the world championship four times, and that took us to visit great places such as Alaska. I stopped when I was 20 because university was taking too much time, but it was really good training that gave me a strong sense of responsibility early on.

Emmanuel Boucrot was interviewed by Anna Bobrowska, Editorial Intern at Journal of Cell Science. This piece has been edited and condensed with approval from the interviewee.