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CONVERSATION

Early-career researchers: an interview with Jodie Rummer

Jodie Rummer is an Associate Professor at James Cook University, Australia, where she specialises in conservation physiology. She received her Bachelor's degree in Marine Biology and her Master's degree from the University of West Florida, USA. Rummer then moved to the University of British Columbia, Canada, for her PhD in Zoology with Colin Brauner, after which she completed a short postdoc with Dave Randall at the City University of Hong Kong. She has been recognised with a L'Oréal-UNESCO For Women in Science Fellowship and was one of the Australia Broadcasting Corporation's Top Five Scientists under 40 in 2016.

Where did you go to university and how did you choose the subject that you studied?

I stayed in my hometown for my first two years of university. Initially, I studied at a small college, Lincoln Land College in Springfield, Illinois, and I earned an Associate's Degree in Biology knowing that I was going to go on to a bigger university. Staying in Springfield was great, because I could live at home, keep a part-time job waiting tables, and save a lot of money. All the cool kids were going away to university, living in dorms and going to parties, but I did really well in my first two years of university. I also connected with one of my biology professors, Warren Martin, who organised a field course on the coral reefs in Jamaica, and I was invited along. I had gone to the ocean with my parents on holiday when I was 8, but this trip was my first fieldwork experience and my first field trip to a coral reef. While looking at sea urchin populations and coral reef fishes, I decided marine biology was my path, so I started looking into transferring to the University of West Florida, USA, to finish my Bachelor's degree.

Back then, the University of West Florida was one of the few institutions with an undergraduate degree in marine biology. It was right on the coast, so we had estuaries, wetlands and marine ecosystems to study during weekly field trips: basically a lot of our laboratory experiences were in the field. That is when I learned that I loved physiology – it is a combination of all of the sciences that I really like, including math – and I had really cool comparative physiology and ecological physiology classes, which solidified my career path. I remember learning about fish and thinking, 'There are so many species and they are all doing different things', so fish physiology was where I started focusing. I also got to do some small research projects and to work with some of the graduate students, so I got a taste of real research right away.

Can you tell us about your career progression through graduate school?

I had already done a couple of projects on the coral reef ecosystems in the Dry Tortugas National Park, southwest of the Florida Keys, doing some high temperature and low oxygen studies on fish, but I was really interested in working on oxygen transport in fish. Fish have an amazing capacity for transporting oxygen and delivering it to tissues and they also use it to control buoyancy. My Master's research with Wayne Bennett at the University of West Florida looked at oxygen delivery in fish, but in a very applied way because they use that mechanism to fill and empty the swim bladder. However, this buoyancy mechanism can be detrimental for catch and release fisheries. When a fish is brought up very quickly from depth, the swim bladder can over expand and compress the internal organs, causing a lot of damage; when the fish is subsequently released, it can suffer injuries and may not survive. That was my first taste of conservation physiology.

The Master's project worked out well for me because the mechanism that I was studying was also of interest to Colin Brauner at the University of British Columbia in Vancouver, Canada. We put some ideas together for a PhD and I started with Colin in June 2004. That was a really big move for me. I became part of the UBC community, which is still important to me. It has shaped my career and a lot of the research that I do now was sparked by the work that I did with Colin.

Toward the end of my PhD, I also did some work with Dave Randall, who was Colin's PhD supervisor. I didn't have a postdoc lined up and he said, 'Why don't you come and do a fellowship with me for a year in Hong Kong?' I spent a little under a year with him, which was great. I had a lot of freedom to explore additional ideas

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that I had had after finishing my PhD. Dave has been an important mentor of mine.

Why did you move to Australia for your first research position?

After deciding to go to Dave's lab for my postdoc and while I was still in Vancouver, Göran Nilsson came to UBC to give a seminar. A bunch of us went out to dinner and he asked me about my next step. I told him that I wanted to combine the mechanistic physiology that I had done during my PhD with the coral reef fish research from my Master's and he told me about Phil Munday at James Cook University, Australia. The next morning, I googled Phil and when I got the courage to email him, he responded immediately: Göran had just emailed Phil and told him that he thought it would be great if we could collaborate. So, during my time in Hong Kong, I interviewed for an Australian Research Council Super Science Fellowship (the equivalent of an Assistant Professor position) and I got it. I started my 3-year position at James Cook University in August 2011.

During that time I was able to build my own research programme and lab – literally from an empty room with just a −80°C freezer – with a lot of freedom and autonomy. I worked with Phil quite a bit, and we started co-supervising some Honour's and PhD students.

In my mind, I was going to get the most out of the 3-year position, build collaborations and let the experience catalyse my career. I thought that my wife, Kim, and I would be moving back to North America at some point, so I kept an eye out for faculty positions and interviewed for a few. But then I was promoted at James Cook and encouraged to apply for another fellowship, a Discovery Fellowship, to stay. Currently I am finishing that fellowship and have been offered a permanent position at the university as an Associate Professor.

In 2015 you were awarded a L'Oréal-UNESCO For Women in Science Fellowship; can you tell us about the scheme and your experience?

The L'Oréal-UNESCO For Women in Science Fellowships are designed to catalyse something in a female scientist's career, such as a research project or organising a conference or a workshop. In France, L'Oréal is the most famous and oldest cosmetic company and, maybe 20 years ago, the senior management realised that they had a lot of scientists working for the company, but they were not holding on to their female scientists and they did not know what the problem was. So, in 2000, they teamed up with UNESCO to do something about it. They decided to raise the visibility of women in science and offer a fellowship programme to highlight their careers at the early- to mid-career transition point where we seem to lose them. In the year that I won, I was one of three from Australia, but it is a global award and there are about 200 recipients annually across the world. The more that I learned about the programme, the more I appreciated it and respected what it does.

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I used the money to catalyse my shark work in French Polynesia, which is now in its fourth year and is another example of a combination of physiology with a big conservation problem. The aquatic conditions in the shallow water nursery areas around the island of Moorea are really challenging. The sharks are born and reside there for several months in the summer when the water conditions are most challenging. They have to grow, swim, eat and avoid predators, but they may be caught accidentally in the fisheries and conditions are getting worse because of climate change, other anthropogenic stressors and increases in the island's human population. I started this project to try to understand the physiological limits of these baby sharks and how we can predict what ongoing and future conditions might do to shark populations in French Polynesia. The L'Oréal-UNESCO fellowship catalysed the project and it continues to be a huge part of my ongoing research programme.

How does an understanding of physiology empower conservation?

In some cases, physiological data can tell us which areas we need to designate as 'off limits' for development, boat traffic, etc. For example, some of our work in Moorea has shown that jet skis are really stressful to spotted eagle rays. They are already stressed from other factors due to climate change, so let's avoid extra stressors. Conservation physiology helps us to identify what the limits of an animal are so that we can alleviate any other stressors and maybe start to look at larger scale changes that can be made to these areas to prevent them from getting extra disturbances. For example, if the water is shallow, let's maintain the natural mangroves that protect these coastal areas from storm surges and other stressors. French Polynesia is off limits for shark fishing but it still happens, so knowing that it takes a shark at least 4 h to recover – perhaps even longer if the water is warm – allows us to raise awareness with local communities.

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How has the JEB Travelling Fellowship scheme helped to develop your career?

I have received two and I used the most recent one for research at Lizard Island Research Station in the northern part of the Great Barrier Reef to understand local adaptation in fish populations. The Great Barrier Reef is 2300 km long and spans a latitudinal gradient, so there are species that live close to the equator in the north and further from the equator in the more southern regions of the reef. From these distinct populations we can learn what the warmer water populations might be doing that is different from the cooler water populations to help us to understand what might happen to them as the climate changes. Could we see geographical redistributions of these populations to more forgiving thermal habitats? That fellowship catalysed a lot of the work that I have been able to do at Lizard Island. I have gone back almost every year since, sent students, and we have produced some amazing papers out of that research facility.

That fellowship catalysed a lot of the work that I have been able to do

How do you use social media to promote science?

I use social media to give scientists a face and voice, to show what it means to be a scientist today: what we get up to, how we cope with

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today's challenges – from an academic perspective, but also from a political perspective, raising visibility. Social media is also great for networking: I have made amazing connections through it and formed a lot of collaborations. I have also made connections with the media in general through social media to raise awareness of my research with the general public. I believe that science is not just for scientists, it is for everyone. Taxpayers pay for science, so they deserve to know what we are up to and what we are discovering in a way that is accessible to them.

I use social media to give scientists a face and voice, to show what it means to be a scientist today

You wrote for Outside JEB when you were a graduate student; how did that experience contribute to your development?

I learned so much when I was writing for Outside JEB. It was hard, but it shaped a lot of the way in which I communicate science today. The experience also allowed me to launch the new Conservation Physiology in Action section in Conservation Physiology, so now I am an editor training young writers and teaching them how to tell the story.

As an editor of an Open Access journal and an Editorial Board member of another, what are your views on Open Access publication?

I think that the journal model is starting to change, but we still have a way to go. I believe that scientific information should be freely available, probably now more than ever with climate change. A lot of my work is based on coral reef ecosystems around small island nations that depend heavily on the health of their reefs for ecotourism and food. Island communities don't usually have access to high profile journals where our work is published, so they are not getting the scientific information that they need. I try to publish my research Open Access, but it is so expensive, so I have to trade off whether I can afford the cost. Publishing Open Access gives hope that the people that need the information will be able to obtain it. But even if a paper is published Open Access, the end users may not be able to read it and understand how the information is valuable, so it is also important to issue press releases and engage with social media to get information out to the general public and stakeholders, so that it can be used in a meaningful and dynamic way.

Can you tell us about your experiences of living and working in other countries where you have dealt with the immigration system?

Dealing with the immigration systems in Hong Kong and Canada was pretty easy. Kim and I were both granted permanent residency in Australia within months of moving here and we are working on our citizenship right now, but that has been a challenge for me. Australia has two rules when you are applying for citizenship. The first is that you cannot have been away from the country for more than 90 days in the past year, which I have because I travel a lot with my research. Also, you can't have been out of the country for more than a year in the past 4 years, which I have. Initially, the authorities said that I would have to wait until I could satisfy the requirement, but my answer was 'Until when? Do I just stop travelling?' This has been a challenging problem to resolve, as I have to travel. I have provided letters of support stating that I travel for work and confirming that I am not living in other countries, which we hope will resolve the problem.

What has been the most exciting moment in your career to date?

Publishing in Science was pretty amazing; it was a dream but I never expected it to happen. The entire issue was about oxygen delivery. Other colleagues, including Michael Berenbrink and Roy Weber, had papers in the same issue; it was a real win for comparative physiology. Winning the L'Oréal-UNESCO award was also very exciting. The company made videos about our research, they had big screens at the presentation and produced huge posters about us; it was quite humbling. We also had the full wardrobe and make-up treatment. It was like being a rock star.

What has been your experience of working with the media?

I enjoy it, and I always learn a lot from the experience. Last year I was recognised as one of Australia's Top Five Scientists under 40 by the Australian Broadcasting Corporation (ABC) and Radio National (RN). Part of that prize was to go to work with the ABC/RN for 2 weeks and to learn from the best science presenters and journalists. We were their scientists in residence, so we also gave them stories – not only our own research but I also had a couple of colleagues that were coming out with amazing studies at the time, so I was able to bring them in too. In return, we learned about broadcasting technology and the most effective ways that we can talk about science.

What do you most like doing outside of the lab?

I enjoy practising yoga, running, climbing – mountains and in the gym – eating good food and enjoying wine with friends. I co-own a climbing gym in Townsville with Kim and a couple of other people. It's a full-time job for Kim. She is their programme director and organises all of the kids' programmes. Kim is also the coach for the local and national climbing teams, which compete nationally and on an international basis. They are planning for the 2020 Olympics in Japan, which is very exciting. Regarding the gym, I joke that I am the silent partner, but I put in my two cents when I can.

Jodie Rummer was interviewed by Kathryn Knight. The interview has been edited and condensed with the interviewee's approval.