Sean Tomlinson

Sean Tomlinson is a researcher at the University of Adelaide, Australia. He is interested in how physiological traits contribute to a species' niche and distribution, and is currently focussing on population dynamics and extinction in Australian and New Zealand fauna. Sean is an Associate Editor of *Conservation Physiology* journal.

Tell us about your research background and interests.

My current research uses biogeography to understand the dynamics of population decline and extinction in the fauna of Australia and New Zealand. I got into this role because I was interested in spatial ecological modelling and I wanted to substantially upskill in that area. Modelling extinction dynamics through space and time seemed like the most challenging way to grow those skills. The ecological consequences of the East Polynesian expansion, and a project on the interaction of moa with Polynesian colonists of New Zealand, have also fascinated me for years. In honesty, though, I see myself as a conservation physiologist with a strong interest in how environmental change affects patterns of diversity through the mechanisms of physiological adaptation and constraint. My background has always been broadly in thermal biology and conservation, and I expect that I'll increasingly try to apply the skills that I've learned in spatial ecological modelling to adapting physiological data to conservation.

What are you working on currently?

I have a nasty habit of moving from one study area to the next and collecting up projects that I never really put down. As a result, I've got some work on thermal tolerance limits and distributions of alpine Australian insects that's creeping closer to completion, and some work on comparative thermal constraints on restoring insect pollinators after mining that I'm polishing up with a former student. There's a couple of new, very fruitful, collaborations on the metabolic ecology of plant seeds, and some work on the drivers of short-range endemism in threated plants. I'm also just finishing a project on the extinction dynamics of megafaunal birds in New Zealand, and the conservation implications of these. I suppose the questions are essentially all the same: how do physiological traits and constraints define niches and distributions in changing ecosystems?

What does a typical day look like for you?

I've been working entirely *in silico* for a while. A typical day involves logging onto a computer and reviewing what the modelling completed, or else troubleshooting issues. Although modelling may seem easy because there's no data collection required, I've had several projects where I've had to run models 24/7 for a couple of years to get the outputs.

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Previously my days have been much more varied. I've run respirometry trials to collect data on thermal performance, or headed into the field to collect plant seeds or check insect traps, or had meetings with students or colleagues to thrash out thesis chapters and manuscripts. I'm hoping to drift back to the more varied style of work again soon.

What do you most enjoy about your work?

Variety. There's a genuine intellectual freedom in the academy that doesn't really exist in many workplaces. Funding and insecure tenure notwithstanding, there's nothing really stopping me from crossing the hallway and starting a conversation with a colleague in a totally different field to initiate a whole new program of research and field of knowledge.

What do you find most challenging?

Precarity and constraint. I've come to the end of my 3rd postdoctoral appointment and in that time I've supervised multiple higher degree students to completion, engaged with undergraduate teaching, held PI roles on competitive grants, and maintained my own research output. Yet I'm still conscious of having to find the next role.

What are you hoping to work on in the future?

I'm really open-minded. Like I said before, I tend to pick up new things with utter impunity and I never really put them down. So whatever new thing comes my way, I'm pretty sure there'll be something fascinating in it, as long as it involves some kind of physiological data and meeting the global biodiversity conservation challenge.

What advice would you give to aspiring scientists in this area?

Never give up. In the end I think the thing that gets us through the challenges is sheer determination. Building networks and collaborations and jumping on opportunities is important, but setbacks do happen. A grant may not get funded, or a project may run over time. When these setbacks occur it's sheer determination that helps you to pick up the loose ends and get back on track. Having said that, people do get tired, or decide to focus on other opportunities like having kids or buying a house. This should not be regarded as failure, and it's OK to have a plan B.

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Who are your scientific heroes?

Stephen J Gould and Jared Diamond. I always found that Gould had an intuitive understanding of the scientific paradigm that led to surprising "left of field" interpretations given the temper of his times. Gould was also, however, broad-minded and clearly well-read. In much of his work, particularly his essays (collated into a series of popular science books), the hard science was tempered and informed by a sensitivity and a humanity. This made the communication much easier to swallow, and also made him less stubborn and trenchant than other movers and shakers of his time.

I've found the same avante garde approach in much of Jared Diamond's work, particularly his work on the Pacific and the likely patterns and consequences of human expansion across Oceania. Add to that the fact that Diamond began life as a comparative physiologist and became a household name.

Selected Publications from SEB or affiliated journals.

Ayton S, Tomlinson S, Phillips RD, Dixon KW, Withers PC. 2016. Phenophysiological variation of a bee that regulates hive humidity, but not hive temperature. Journal of Experimental Biology 219, 1552–1562.

Dalziell EL, Tomlinson S. 2017. Reduced metabolic rate indicates declining viability in seed collections: an experimental proof-of-concept. Conservation Physiology 5, cox058.

Rajapakshe RPVGSW, Turner SR, Cross AT, Tomlinson S. 2020. Hydrological and thermal responses of seeds from four co-occurring tree species from southwest Western Australia. Conservation Physiology 8, coaa021.

Tarszisz E, Tomlinson S, Harrison ME, Morrogh-Bernard HC, Munn AJ. 2018. An ecophysiologically informed model of seed dispersal by orangutans: linking animal movement with gut passage across time and space. Conservation Physiology 6, coy013.

Tomlinson S, Dalziell EL, Withers PC, Lewandrowski W, Dixon KW, Merritt DJ. 2018. Measuring metabolic rates of small terrestrial organisms by fluorescence-based closed-system respirometry. Journal of Experimental Biology 221, jeb172874.