



TIME TO REFLECT JUDITH MANK

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When I arrived at the Wissenschaftskolleg, the two large projects that I had embarked on when I set up my lab were nearing completion. This had happened many years sooner than I had planned, and I was in need of a moment to pause and consider my next research endeavour. I was able to use my time in Berlin to reflect and synthesize this work and construct my next research projects. As an evolutionary geneticist interested in the evolution of sex chromosomes and in the differences between females and males, the working group on Sexual Selection and Exaggerated Traits was a valuable resource and sounding board. The broader fellowship created a reflective and diverse environment within which to work.

I spent most of my three months in Berlin trying to synthesize two aspects of sex chromosome evolution, in an attempt to disentangle cause and effect. Sex chromosomes have unique constellations of genes and gene expression patterns that make them distinct from the rest of the genome. However, why this is the case is difficult to discern. It may be that these patterns actually caused the sex chromosomes to form, that they are a consequence of the unique inheritance of these chromosomes and emerged subsequently to sex chromosome evolution, or some complex mixture of the two. Moreover, although these unique patterns have been observed in many independent sex chromosomes in animals, some intriguing discrepancies have defied satisfying evolutionary explanations.

As I surveyed my own work on the topic, one that I had been pursuing in one form or another since I was a doctoral student, and integrated it with the work from many other laboratories, a dichotomy in the literature emerged. Although most quantitative genetic studies of sex differences in form or behaviour do not point to genes on the sex chromosomes, studies of the sex chromosomes themselves indicate that they are expressed very differently depending on whether they are present in males or females. Why don't these gene expression differences translate into a clear role of the sex chromosomes in phenotypic sexual dimorphisms?

As my fellowship progressed, it became increasingly clear that this conundrum, and the disentangling of cause and effect, might not be possible to resolve until we have a clearer understanding of how sex chromosomes form in the first place. Although sex chromosomes have been an object of scientific obsession for more than a century, the actual process of sex chromosome evolution is largely extrapolated from very old or very young sex chromosome systems. We therefore do not understand temporal dynamics over multiple evolutionary time scales.

And so I departed from Berlin in December, determined that the next series of laboratory studies that I embark on should more fully integrate the processes and consequences of sex chromosomes evolution. I am profoundly grateful to the Wissenschaftskolleg for giving me the time to reflect on this topic and for the time that the other Fellows spent discussing these topics, and I am very much looking forward to my next projects.