PERIPHERAL GALLERIES AND NEW PERSPECTIVES

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I first visited Berlin as a PhD student and then as a postdoc, while collaborating with the Landgraf Lab at Freie Universität Berlin. Coming back to Berlin with young children was a different experience, but still enjoyable, albeit from a completely different perspective. As a postdoc, I never noticed Berlin's network of playgrounds, full of sand, wood, and a water pump during the summer months. Even with children, I still managed to get a bike ticket (fortunately without a kiddo on the back), and thoroughly sampled the *döner* landscape (despite the name, "Oriental Snack" by the Halensee station is quite good).

I owe a debt of gratitude to Kirsten Traynor, who first invited me to a Thursday evening dinner at the Wiko, which convinced me that I had to apply in the future. Jana Petri

was incredibly welcoming, and we loved visiting her neighborhood yard sale. Many of those toys were supposed to remain in Germany, but seem to have migrated back to Panama/Auburn (including some *zu verschenken* glassware). I can only assume that Giovanni Galizia did not fully mention my predisposition for mischief. Fortunately, I've done my best to redirect those urges towards more productive endeavors (watch out, future inhabitants of the Villa Walther, some rogue crocuses have been planted along the north side of the building).

Some of the more mundane aspects of life in Berlin are those I remember most fondly. Identifying the house by the blue bridge ("El Puente Azul"), looking for swans in the ponds, and making spätzle. Traveling anywhere requires the M19 bus, and the coveted first-row seats on the upper level of a double-decker are a top-notch view. Once I realized that the bus and bikes traveled at about the same speed, a favorite activity was to have spouse and kiddos on the bus, while I would race the bus on my bike alongside, waving as we passed each other. We convinced our 3-year-old that the bus would stop only if you yelled "estamos aquí, estamos aquí" (we're here, we're here). Breaking up trips between multiple forms of transportation makes any travel a special event.

The staff at the Wiko are wonderful, and everyone helped us with so much paperwork that would have been insurmountable otherwise. The kitchen staff, who kindly would provide cookies to the kids whenever we came by for a "Miko Café" (we needed to work on his table skills). Dunia, who has an incredible knowledge of where to find random things in Berlin (some not so random, like chipotle peppers, or passable tortillas). The childcare staff for Thursday nights was indispensable, making it possible to fully enjoy the wonderful meals and company.

An unexpected perk of having young children is the interactions with others in a similar boat. Trick-or-treating through the Villa Walther revealed certain differences between children. Lucas, for example, was careful to note his peanut allergy to each person handing out candy. Miko, half-wearing his crocodile outfit, carefully unwrapped each piece of candy he received, immediately eating it while handing empty wrappers to the next member of the National Academy.

Of all the gear we purchased while in Berlin (which wasn't much), the bikes, and seats for the kiddos, were by far the most useful. Having a bike immediately increased our transportation radius and made my spouse's commute to Humboldt-Universität that much faster (and provided a nice morning ritual). Having a kid on the back of the bike does also carry its risks. For example, one afternoon we were biking down the Ku'damm,

and my passenger behind was oddly quiet. He wasn't sleeping, so I asked what he was up to and, as I reached back, realized he had opened my fanny pack. He was rummaging through my wallet. Next thing I heard was a "flap" on the ground as he threw its contents out into the road. Fortunately, I was able to recover most of it.

Another unexpected perk of this time abroad was that my mother was able to stay with us for a couple weeks to help with childcare and enjoy the city during the warmer part of the year. My spouse and I categorize visitors along two axes: on one axis is helpfulness; the other is their propensity for fun. Fortunately, my mother ranks high on both axes and has a knack for finding random events about town. Many colleagues asked my spouse, "Are you ok?" upon hearing that my mother was visiting for an extended time, but she seemed to be ok with the arrangement—or was good at hiding her true feelings. I mention these personal aspects of our time in Berlin partially as a way to remember them, but also to acknowledge that spending time at a new institution is not just an academic transition, but also a personal one.

During orientation at the Wiko, I was pleased to hear from Barbara, the Rector, that we were free to pursue whatever topic of research we found interesting. This type of freedom is rarely afforded in academia, and following one's curiosity is critically important for developing new lines of inquiry. The research I had originally applied to do at the Wiko had already become a significant focus of my lab, and so, faced with a period of open-ended research, I decided to delve into something new.

When honey bees build their nests inside an empty cavity, they attach their combs to the interior walls. However, they do not attach the combs continuously, creating gaps between the comb and wall. These gaps are called "peripheral galleries" and they were first described by my PhD advisor, Tom Seeley, during his PhD. Since the original study, published almost 50 years ago, peripheral galleries have been a largely unexplored aspect of honey bee nest architecture.

Fortunately, I already had a dataset that we had collected in the field, which would serve as an important starting point for exploring peripheral galleries in semi-natural nests. In this dataset, we allowed honey bee colonies to build their nests freely within an empty nest box. We did, however, provide wooden structures upon which the bees could build their comb, so that we could repeatedly image the nests without destroying them (this makes them "semi-natural," as the wooden frames also provide space for bees to move from one comb to another, but we do have other data streams in the lab that we can use to fill these gaps).

The first step in my investigation was observational—simply looking at individual combs and entire nests to see where the bees did and did not attach their combs to the wooden supports. "You can observe a lot by just watching" is excellent research advice from Yogi Berra, which I try to impart in my lab. This work also involved some supplementary software for quantifying the attachments and classifying the contents of the comb/nest (this software was previously developed in the lab, albeit for other purposes/projects). This period of observation was also important for developing multiple alternative hypotheses, corresponding critical predictions, and eventual experimental tests that could be conducted once back in the lab.

Talking with other researchers at the Wiko, especially historians, made me realize how fortunate it is to be an experimental biologist working with living organisms. While we cannot talk directly to our research subjects, if you design the right experiment, you can ask them questions indirectly, and repeatedly. For example, if I modify the space upon which the bees can build their comb, how will this alter their attachment points? The experimental work that was inspired by my time at the Wiko is currently underway, and will continue through the 2025 field season (and potentially multiple field seasons).

My previous work in honey bee architecture has always focused on positive space, what the bees build, never on the negative space, or what they leave open. This change in perspective might seem minor, but it's a bit like revisiting a city with young children—it changes what you notice. These new passageways, however, would not have been possible without the phenomenal support of the Wiko. I am immensely grateful for the time they provide for researchers to investigate ideas that would otherwise be skipped over.