

Learning from the Altmeister

How reading Ernst Mayr's books (in his bathtub) changed my research.

Axel Meyer

As an evolutionary biologist, I am trying to gain a better understanding of how diversity — at the level of both genes and organisms — arises. Specifically, I am a molecular evolutionary biologist, I collect and analyse DNA sequences and complete genomes. But my main passion is catching and observing fish — in particular, the cichlid fishes from Africa. The unparalleled diversity of literally thousands of cichlid species makes them one of evolution's most interesting problems. Cichlids boast stunning beauty, famously exuberant variety, complex social behaviours and morphological diversity.

I was one of those boys who collected beetles, frogs and newts, and I bred fish — many fish. My room had a tropical rainforest climate and housed a menagerie of many living and dead animals, including fish, amphibians, rabbits and a magpie — my parents were very tolerant and supportive. At school, I concentrated on biology and chemistry and experimented with (often explosive) chemicals. In one 'experiment' that went slightly awry, I blackened my mother's laundry room. But fish were my main obsession and I never had any doubt that I wanted to be a (fish) biologist — I was just not sure what kind.

On a good day, we might have the illusion that we have our life (or research directions) under control, and know exactly where we are going next — nice try! For example, James Watson started out interested in ornithology, and look where he ended up. If we are honest, we will admit that even the straightest-looking curriculum vitae is influenced by the vagaries of which fellowship or grant we get, which paper or book we read early on in our careers, which new method comes along or — probably most importantly — whom we meet.

In the 1980s, while I was a graduate student in the Zoology Department at the University of California, Berkeley, I spent a year 'out' on a fellowship at Harvard University. There I studied the functional morphology of cichlids with Karel Liem (who, more than anyone, understands a cichlid's head), and was invited to join a discussion group with Ernst Mayr, the eminent evolutionary biologist. In my first year as a PhD student, Mayr had published a paper on cichlid species flocks that was a crucial guide for understanding their diversity.

Mayr had left Germany for the United States after receiving his doctorate from Berlin's Humboldt University. Sometimes called the 'Darwin of our times', Mayr has addressed central issues in evolutionary



Mentor: Ernst Mayr, who celebrates his 100th birthday this year.

biology that Darwin did not, such as what species are and how new species arise. One of his main insights was that new species often arise through the accumulation of genetic differences between populations in separate geographic regions, preventing homogenizing gene flow — so-called allopatric speciation. Old concepts and new studies were dissected in those evening discussions with Mayr, with us young evolutionary biologists (60 years younger than the Altmeister) listening in awe, not daring to disagree with his — often strong — opinions. These seminars and further interactions with Mayr influenced my thinking and research in general and on the 'cichlid problem' in particular. His advice was invaluable — learn from nature, know your animals, read, read widely and critically synthesize.

I guess Mayr took a liking to this young German whippersnapper, and I felt a bit like a grandson. That summer he asked me to 'house-sit' while he was at his farm in New Hampshire. It was as if I was living in Charles Darwin's Down House in Kent, only this one happened to be on Chauncy Street in Cambridge, Massachusetts. Most full-blooded scientists define themselves simply by being scientists, relegating the other necessities of life to the background. Mayr's house was spartanly furnished, with orange crates serving as bookshelves in his small office — the person who lived here was clearly obsessed with science.

So there I was, reading Mayr's books in his bathtub in his house, feeling a communion with a scientific predecessor. This was the basis for a great admiration, even affection and friendship. Mayr is notoriously single-minded, focused on science alone, and would greet you with "How is your work going?" rather than "How are you?". Since those house-sitting days, Mayr has suggested — no, told me — which scientific problems to tackle and even how to live my life. He would say "marry that woman", "write that book", or "go back to Germany" — I am thankful to say that I followed only some of his advice.

Mayr celebrates his 100th birthday this July, but his infallible memory, incredibly sharp synthesizing mind and even his admirable work ethic persist today. He has been

right on most occasions, but not on everything. Cichlid species flocks typically did not turn out to have several ancestral lineages, but only one — making the cichlid problem even bigger, as speciation rates must be even faster than previously thought. And (sorry Ernst!) speciation in cichlids is likely to be more often sympatric — that is, without obvious geographic barriers to gene flow — than you predicted.

When I returned to Berkeley in 1987, I joined Allan Wilson's laboratory in the Biochemistry Department — the first laboratory to tackle evolutionary problems using the then-new technique, the polymerase chain reaction. There have been other influences, notably Marvalee and David Wake at Berkeley, who demonstrated how to 'live' an integrative approach to organismal biology. But Mayr and the polymerase chain reaction changed my little scientific world and opened up new ways with which to revisit old problems in evolution, and how to tackle new ones that even Mayr had not thought of before.

Did I mention that Watson knew Mayr when he was a college boy interested in ornithology? Luckily, Mayr's pervasive scientific influence did not work on him. But it worked on me. ■

Axel Meyer is in the Department of Biology, University of Konstanz, 78457 Konstanz, Germany. A symposium in honour of Ernst Mayr's 100th birthday will be held on 10 May 2004.

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