

Andreas Wagner: ESPO 2025 keynote speaker

The keynote speaker for ESPO 2025 in Stuttgart is renowned evolutionary biologist and author Professor Andreas Wagner, from Zurich. Prof Wagner will focus on the congress theme of 'Innovation', giving us his unique perspective on how evolution drives human creativity. Ahead of the event, ESPO President Ray Clarke caught up with him for an exclusive interview, offering a glimpse into what delegates can look forward to.



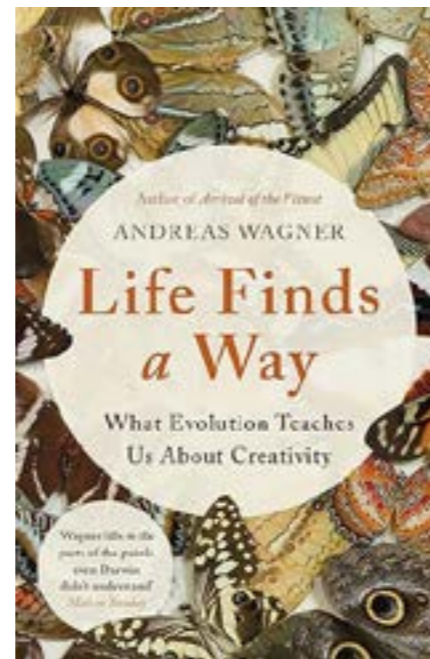
Prof Andreas Wagner,
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<http://www.ieu.uzh.ch/wagner/>

Prof Wagner, first give us a little background re your journey through academia. What was your original degree and how did your interests develop?

My original training is in molecular genetics, and I received a masters degree in this field from the University of Vienna. During my PhD thesis at Yale University, I began working on questions in evolutionary biology. I continued this work during post-doctoral appointments at the Institute of Advanced Study or 'Wissenschaftskolleg' in Berlin, as well as at the Santa Fe Institute in New Mexico. During this time, the first genomes were sequenced, including the human genome, and they opened completely new opportunities to study evolutionary processes. Research in my first lab at the University of New Mexico leveraged these opportunities to study how evolution creates new features of life. I continue to ask these questions in my current position at the University of Zurich, where we combine genomics with experimental evolution in the laboratory.

Tell us a little about your lab in Zurich and the team you work with.

I work with a team of 10 to 20 young scientists, mostly PhD students and post-doctoral scientists. They come from all over the world to join us in Zurich. About half of these scientists work in the laboratory. Most of them perform evolution experiments. In a typical experiment, we might expose a population of microbes to a hostile environment – for example, an environment that contains antibiotics or heavy metals – and then observe how evolution changes these microbes over a few thousand generations. This is possible, because microbes have very short generation times, such that even an experiment of 1000 generations might



take only a few weeks. During this time, the microbes typically evolve remarkably fast to survive and grow better in the hostile environment. We then read the DNA sequence of their genomes and study the changes it experienced during evolution to find the changes that causes these new abilities. The other half of my team works computationally and mathematically, studying genomes and modelling their evolution to better understand how evolution can be so enormously creative.

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Many of us have only a vague idea of what 'evolutionary biology' is. It seems to be at the interface between science and philosophy and the humanities. Do you think scientists think enough about creativity, or are we too focused to think beyond the boundaries of science?

While it is true that there are many intersections between evolutionary biology and philosophy and the humanities, evolutionary biology is increasingly becoming a hard experimental science. Researchers in this field not only conduct experiments like those I just described in the laboratory, they also perform experiments in the field where they might expose small, fast-evolving organisms to new evolutionary pressures, such as new predators, and study how evolution helps them to adapt. In addition, complete genome DNA sequences have become available for hundreds of thousands of species, which helps us reconstruct their evolutionary history.

Many scientists in this field are specifically interested in the evolutionary history of one organism, or its ability to meet the new challenges it has to

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overcome through evolution. A smaller group, including myself, are also very interested in finding out how evolution is similar to, or different from, human creativity. We find multiple intriguing parallels between how evolution creates the new, and how humans do. Some of these are highlighted in my book, *Life Finds a Way*, which speaks to the enormous creative powers of humans and of nature. I hope that books like this will prompt more scientists to explore the connections between their research field and the wider world outside it.

Yes, I loved your book. I came away from it with renewed optimism about human potential and felt it had a positive message for us all despite the awful circumstances in so many parts of the world today. Humans

are essentially creative and still evolving. Do you think human creativity will ultimately solve problems such as the climate crisis and international conflicts?

Because I am an optimist by nature, I believe that we will eventually overcome these challenges, and perhaps that is reflected in the book. However, the book is mostly about creativity in nature and technology. Many of the challenges we face are not just technological, but a mix of the technological and the political. Unfortunately, the science of evolution can help us little with political challenges. But, here too, I feel that there are enough people, and especially young people, who are committed to change that this change will eventually happen as the next generation enters leadership positions.

INTERVIEWED BY



Prof Ray Clarke,
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