



The Unreasonable Effectiveness of Reaction-Diffusion in Vertebrate Skin Colour Patterning

Dec 1st (Thursday): 11am-12pm ET

Michel Milinkovitch



First, I will show that scale-by-scale ontogenic colour change dynamics has evolved independently in multiple species of lizards. Second, I will show that deterministic reaction-diffusion (RD) can quantitatively predict, not only the bulk statistical properties of adult patterns, but also, more surprisingly, a large proportion of the scale-by-scale patterns of individual animals. Third, I will discuss how we identify and quantify the sources of the residual error of individual scale-by-scale patterns. Finally, I will show that RD models predict, in ocellated lizards, unsuspected subtle colour sub-clustering that correlates with the colours of the scales' neighbours. Hyperspectral imaging and histological analyses indicate that colour sub-clustering is present in real lizards, confirming the numerical model non-trivial prediction.

Michel Milinkovitch is a Full Professor in the Department of Genetics & Evolution at the University of Geneva (Switzerland) and President of the Division of Biology since 2019. He is also a member of the Institute of Genetics and Genomics in Geneva (iGE3) since its foundation (2011) and a group leader of the Swiss Institute of Bioinformatics (SIB) since 2014. In his 'previous life' as an evolutionary geneticist, he contributed to quantitative analysis and modelling in Molecular Phylogenomics and Applied Evolutionary Genetics. His more recent focus is on Evolutionary Developmental Genetics and the Physics of Biology. He specialises on non-classical model species in reptiles and mammals and integrates data and analyses from comparative genomics, molecular developmental genetics, as well as mathematical modelling and numerical simulations. He has published over 100 papers in international peer-reviewed journals, given over 150 talks around the world, been a reviewer for over 50 biology and physics journals, supervised 20 Ph.D. theses, and has made headlines in the media, such as the BBC, National Geographic, The New York Times, and others.

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