GATERSLEBEN LECTURE

IPK LEIBNIZ-INSTITUT

Speaker: **Prof. Dr. Ian R. Henderson**
Department of Plant Sciences,
University of Cambridge, Cambridge
United Kingdom

Title: ***Structure, function, and evolution of centromeres***

Time: **Tuesday, September 15, 2026, 2 pm**
https://ipk-gatersleben-de.zoom-x.de/j/64783767811?pwd=hndGuIynz0tMsTZ3oKnPjTsgHfQDL8.1
ID: 647 8376 7811
Kenncode: 184928

Place: **IPK Lecture Hall and via Zoom,**
Corrensstr. 3, 06466 Seeland OT Gatersleben

Abstract:
Centromeres evolved at the root of eukaryotes to segregate chromosomes during cell division. Despite their ancient origin and essential function, centromeric DNA sequences evolve rapidly and adopt a diversity of architectures, including point centromeres, satellite arrays, transposon clusters, and holocentrics. To analyse centromere evolution at a broad phylogenetic scale, we characterised architectures across 327 diverse Darwin Tree of Life genome assemblies. Centromere architecture was uncorrelated with phylogenetic relatedness, with similar configurations arising independently across divergent lineages. We modelled centromeric evolution as a cycle, in which satellite and transposon-based architectures interconvert, with independent origins of holocentricity. We curated >23 million centromeric satellite repeats comprising 284 families from 176 species. Despite high sequence divergence between satellite families, higher-order repeats are conserved across species, indicating functional constraint at the level of repeat architecture, rather than primary base sequence. The satellite arrays are heavily invaded by diverse transposon families, which are overall enriched for retroelements, consistent with multiple convergent adaptations to the centromeric niche. In 89 species, transposons themselves constitute the primary centromere structure. We further observed centrophilic transposons forming tandem arrays and higher order repeats, suggesting a mechanism for satellite regeneration. Our sample includes at least five independent origins of holocentricity in plants and animals, which have varying association with periodic satellite arrays. We propose that sequence instability and meiotic drive promote turnover of centromere states, driving repeated architectural interconversions during evolution.

Education
2004 Ph.D in Plant Genetics, John Innes Centre, University of East Anglia, UK.
2000 MA in Biological Sciences (First Class), University of Oxford, UK.

Employment
2020- Professor, Department of Plant Sciences, University of Cambridge, UK.
2016-2020 Reader, Department of Plant Sciences, University of Cambridge, UK.
2012-2016 Lecturer, Department of Plant Sciences, University of Cambridge, UK.
2009- Fellow of Gonville and Caius College, Cambridge, UK.
2008-2016 Royal Society University Research Fellowship, University of Cambridge, UK.
2004-2008 Postdoctoral researcher, University of California, Los Angeles, USA.

Prof. Dr. Nils Stein (organizer) *Dr. Inna Lermontova (host)*