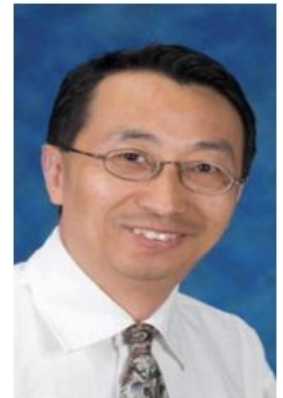


GATERSLEBEN LECTURE



Speaker: Prof. Dr. Henry H.-Q. Heng
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Title: How does macroevolution work? The speciation is driven by the creation and preservation of system information during a crisis.

Time: Tuesday, March 21, 2023, 2 pm

Place: VCS Zoom: <https://ipk-gatersleben-de.zoom.us/j/67807453716?pwd=a0oxWGNqTllxUWxvRVBRdXBjblpZz09>
Meeting-ID: 678 0745 3716 Kenncode: 328484

Skype for Business: <https://ipk-gatersleben-de.zoom.us/skype/67807453716>

Abstract:

The vast majority of current evolutionary studies are focusing on microevolution. While it has been assumed since Darwin's time that the accumulation of microevolution over a long period leads to macroevolution, this generally accepted dogma does not have solid evidence except many hand-waving explanations. Our decade-long study using a cancer model has investigated the connection between evolutionary phase transitions (macroevolution and microevolution) and the effect on system survival and population growth through contrasting mechanisms (rapid survival and gradual adaptation). Our findings include 1. Cancer evolution follows a two-step process (genome-based punctuated macroevolution followed by gene-based gradual microevolution), contradicting the Neo-Darwinian theory that macroevolution is simply a result of accumulated microevolution over time. 2. The order of genes on chromosomes plays a significant role in defining the new genomic code, going beyond the individual gene. Genome disturbance can alter the karyotype coding, leading to the formation of a new genomic system, which acts as the selection unit in macroevolution. 3. Stress-induced genome rearrangement creates new information necessary for evolutionary innovations, which are preserved through cellular duplication mechanisms and system inheritance, transforming rare evolutionary events into widespread traits. Building on our new understanding of cancer evolution, we have expanded our study to include the evolution of organisms. As anticipated, the two-phase evolutionary pattern provides a clearer explanation for organismal evolution. Specifically, the role of sex and developmental processes as significant evolutionary constraints can account for the extended stasis observed in the fossil record. Meanwhile, the massive extinctions, possibly caused by stress-induced genome disruption, provide a more comprehensive explanation for the diversification and increased complexity that often follows mass extinctions. We have proposed the Genome Architecture Theory of evolution to synthesize these observations.

References:

- Heng HH. 2019: Genome Chaos: Rethinking Genetics, Evolution, and Molecular Medicine. Academic Press
- Crkvenjakov R, Heng HH. 2022: Further illusions: On key evolutionary mechanisms that could never fit with Modern Synthesis. Prog Biophys Mol Biol. 169-170:3-11.
- Heng J, Heng HH. 2021: Karyotype coding: The creation and maintenance of system information for complexity and biodiversity. Biosystems. 2021 Oct;208:104476.

Prof. Dr. Nils Stein (Organizer)

Prof. Dr. Ingo Schubert (Host)