TEMASEK LIFESCIENCES LABORATORY

Metazoan-Like Genome Compartmentalization In The Human Fungal Pathogen *Cryptococcus neoformans*

DATE
24 AUGUST 2026

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TLL,
LEVEL 1 AUDITORIUM

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ABSTRACT

While eukaryotic genomes are typically partitioned into a transcriptionally active A compartment and a repressed B compartment, primary chromosomal arrangements are defined by the positioning of centromeres, which may cluster together, as in yeasts, or disperse along the nuclear periphery, as commonly observed in metazoans. Remarkably, the basidiomycete fungus *Cryptococcus neoformans* exhibits both organizational states. We show that the unique spatial organization of its centromeres and telomeres establishes a metazoan-like A/B compartment in *C. neoformans*. Strikingly, metazoan-like, late-replicating centromeres shape chromosome arrangement and contribute to the large-scale organization of chromosomes in *C. neoformans*. Our findings not only reveal the remarkable plasticity of genome organization in *C. neoformans* but also suggest that centromere replication timing may serve as a fundamental determinant of higher-order genome architecture.

ABOUT THE SPEAKER

Kaustuv Sanyal is Director of Bose Institute, Kolkata, and Professor at JNCASR, India. His research focuses on chromatin organisation, chromosome structure and segregation, and pathogenic yeasts. A Fellow of the American Academy of Microbiology and several Indian science academies, he is a recipient of the National Bioscience Award and Tata Innovation Fellowship.

RECENT PUBLICATIONS

1. Narayanan A, Joshi S, Harchand R, Prasad R, Rudramurthy SM, Nishant KT, **Sanyal K*** (2026) Segmental duplications and supernumerary chromosomes drive antifungal drug resistance in Candida auris. ***Nature Communications***
2. Polisetty SD, Dutta S, Vadnala RN, Notani D, Padinhateeri R, **Sanyal K*** (2025) Organization principles of dynamic three-dimensional genome architecture associated with centromere clustering states. ***Proceedings of the National Academy of Sciences, USA***
3. Reza MD, Aggarwal R, Verma J, Podh NK, Chowdhury R, Mehta G, Manjithaya R, **Sanyal K*** (2025) Autophagy-related protein Atg11 is essential for microtubule-mediated chromosome segregation. ***PLOS Biology***

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