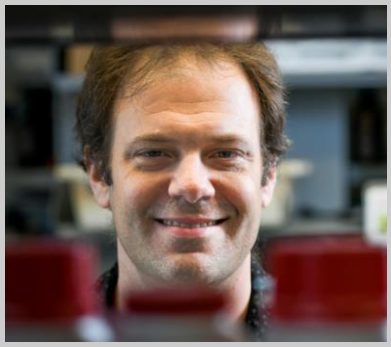
NC STATE UNIVERSITY

Comparative Medicine Institute

Nicolas Buchler



Associate Professor of Fungal Systems Biology

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Systems biology of the cell cycle and circadian clocks

Research emphasis:

The Buchler lab studies the systems biology and evolution of oscillators in gene networks, which are essential for patterning, cell proliferation, and differentiation in biological systems. Our work (mostly in fungi) is focused on oscillators such as the cell cycle, metabolic rhythms, and circadian clocks, which co-exist in the same cells and interact with one another through shared resources. We also develop tools and methods to measure gene dynamics in single cells (where the action is happening) and, thus, circumvent the population-averaging and masking that occurs with standard bulk assays.

Application:

- Comparative genomics and analysis cell cycle evolution (e.g. yeast, chytrids, animals)
- Single-cell gene dynamics, experiments and modeling.
- Agrobacterium-mediated transformation of fungi.

Collaboration potential:

- Mathematical modeling of gene networks (e.g. cell cycle, circadian clocks)
- Building microfluidic devices for perturbing and imaging single cells
- Study host-pathogen dynamics of pathogenic fungi in animals

Selected publications:

Gomez-Schiavon M, Chen LF, West AE, Buchler NE. BayFish: Bayesian inference of transcription dynamics from population snapshots of single-molecule RNA FISH in single cells. Genome Biology 18: 164 (2017)

Medina EM, Turner JJ, Gordan R, Skotheim JM, Buchler NE. Punctuated evolution and transitional hybrid network in an ancestral cell cycle of fungi. eLife 5:e09492 (2016)

Burnetti AJ, Aydin M, Buchler NE. Cell cycle Start is coupled to entry into the yeast metabolic cycle across diverse strains and growth rates. Mol. Biol. Cell 27: 64-74 (2016)

Zhou M, Wang W, Karapetyan S, Mwimba M, Marques J, Buchler NE, Dong X. Redox rhythm reinforces circadian clock to gate immune response. Nature 523: 472-476 (2015)