## Modeling Multilevel Evolutionary: qualitative modeling for quantitative insights.

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Non-supervised, open ended ('qualitative') modeling of evolutionary processes can be an important tool to understand and predict the structure and function of present day organisms.

I will demonstrate this in evolutionary models in which the genotype to phenotype mapping co-evolves with adaptation to variable environments.

In particular I will discuss :

- [1] the evolution and consequences of bi-stability in gene regulation,
- [2] the evolution and consequences of large(small) sized genomes
- [3] the shaping of the mutational neighborhood, and therewith the dynamics of adaptation