Self organization of diversity in living systems

At many scales, biology presents an astounding diversity of discrete states or species that coexist. This includes the genetically identical cells in our body, different species that coexist in spite of fierce competition, and a vast diversity of viruses and diseases that propagate and interact though the immune systems of their hosts. I will discuss these broad features of diversity in terms of a few illustrative models, and I will do so while drawing inspiration from daily social phenomena. In particular, I will present:

1) a model for bi-stability, which guides our understanding of epigenetics and also of break-down of lake food-webs;
2) a model for biological diversity of competing lichen species, inspired from classical models of coral reefs; and
3) models for disease spreading, inspired by spreading of ideas or words among humans.

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