

**Workshop on**  
**Evolution of Complex Phenotypes**  
**Genes - Individuals – Societies**

**31st July - 1st August 2023**

Mapping genotypes to phenotypes, or phenotypes to genotypes, is one of the most challenging tasks in evolutionary genetics and molecular biology. The challenge increases the further the phenotypic traits are from the gene, and the more complex the phenotype is. For example, it is far more difficult to construct phenotype/genotype maps of traits that are consequences of genes -> proteins -> neuro-sensory-motor responses -> interactions of individuals and their environments, and interactions of individuals in social environments, than to map individual gene expression as a phenotype. How do you develop models for the evolution of these phenotypes? We will look at aging as a complex adaptive trait of individuals, and social physiology and behavior as complex adaptive phenotypes of groups. Even more challenging is to understand and develop evolutionary models for complex adaptive traits. In particular, what are the individual components and levels of biological organization under selection? What is a complex phenotype (define complexity) and how do highly complex systems at different biological organizational levels (genes, physiology, development, behavior, etc.) underlying phenotypes become modularized, organized into expressed phenotypes, and evolve?

In this two-day workshop we will present and discuss our own practical and theoretical experiences with complexity and complex phenotypes including 4 keynote talks.

## SCHEDULE

### Day 1: 31st July 2023

- 09:00-10:00 *Aging - Can an emergent property be reduced to mechanism?*  
by Prof. Marc Tatar
- 10:00-12:00 Science coffee: Pick 4 questions/topics from the talk and discuss in smaller groups (25-30 mins each)
- 12:00-12:30 Final discussion in bigger group
- 12:30-14:00 Lunch break
- 14:00-15:00 *The future of evolutionary theory: Integrating complex systems into evolutionary dynamics*  
by Prof. Manfred Laubichler
- 15:00-17:00 Science coffee: Pick 4 questions/topics from the talk and discuss in smaller groups (25-30 mins each)
- 16:00-18:00 Final discussion in bigger group
- 18:00- Dinner

### Day 2: 1st August 2023

- 09:00-10:00 *Social evolution -From one to thousands*  
by Prof. Jürgen Gadau
- 10:00-10:30 Discussion + Coffee break
- 10:30-11:30 *Societies to genes: can we get there from here?* By Prof. Rob Page
- 11:30-12:00 Discussion
- 12:00-14:00 Lunch break
- 14:00-18:00 Workshop by Prof. Jürgen Gadau and Prof. Rob Page
- 18:00- Dinner