



THE NATURE OF NURTURE IN SOCIAL  
INSECTS: THE EVOLUTIONARY  
IMPORTANCE OF SOCIAL INTERACTIONS  
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During my brief (month-long) but delightful stay as a short-term Fellow at the Wissenschaftskolleg, I mainly participated in the workgroup convened by Manfred D. Laubichler and Robert E. Page, “Social Insects as a Model System for Evolutionary Developmental Biology”. Briefly, my research is centered in evolutionary genetics and evolutionary ecology, with a focus on how social interactions affect the genetic basis, evolution, and development of complex phenotypes. I integrate theory and empirical study by using evolutionary genetic models together with quantitative genetic, genomic, and field- and lab-based experimental approaches. I use social insects as a model system because they are exemplars of social evolution, yet the genetic and evolutionary implications of their extensive social interactions are not well understood. Furthermore, social insects are established model systems for long-standing themes of social evolution research, such as the evolution of cooperation and conflict. My research provides novel insights into these traditional areas of social evolution research, but, more fundamentally, into the broader biological question of the genetic basis, evolution, and development of complex phenotypes. Thus,

my two main research topics, how social interactions affect the genetic basis, evolution, and development of complex phenotype and the evolution of cooperation and conflict in societies, fit very well within Rob and Manfred's workgroup.

I found the Wissenschaftskolleg to be an ideal setting for our workgroup, consisting while I was there mainly of Rob Page, Manfred Laubichler, Olof Leimar, Tanja Schwander, Harald Wolf, and Adam Wilkins. We had casual meetings at least once a week where we progressed through a series of discussions about social insects as a model for Evo Devo and Devo Evo. I would say that the relaxed but extremely intellectually stimulating atmosphere of the Wiko enabled us to start with the basics, each bringing different expertise, and move on to advanced discussions that I do not think would have been possible in other academic settings. Some of the topics I personally enjoyed discussing and learning about most were further details about gene regulatory networks from Manfred Laubichler and Adam Wilkins, as well as adaptive dynamics approaches to study evolution and the contribution of genetic and environmental factors to polymorphic traits with Olof Leimar and Tanja Schwander.

I was also fortunate to be able to attend a four-day workshop on Developmental Evolution of the Superorganism (January 14–17, 2010) attended by many leaders in the fields of social insect evolution and Evo Devo, including Bert Hölldobler, Mary Jane West Eberhard, Ehab Abouheif, Klaus Hartfelder, Raghavendra Gadagkar, and others. While we did not reach a consensus, and in fact much of the workshop involved the leaders of the field expressing their various and sometimes opposing opinions, the atmosphere of the workshop was certainly enjoyable and I think all of the associated discussion very productive.

Besides the many stimulating discussions on a wide array of topics with various Fellows and short-term Fellows, the main material result of my stay at the Wissenschaftskolleg was that I completed two manuscripts, one with Rob Page and Gro Vang Amdam and one with Manfred Laubichler, both of which are currently in review:

Linksvayer, T. A., O. Kaftanoglu, E. Akyol, S. Blatch, G. V. Amdam, and R. E. Page Jr.

“Larval and nurse worker control of developmental plasticity and the evolution of honey bee queen-worker dimorphism.” *PLoS Biology*, submitted.

Linksvayer, T. A., J. Fewell, J. Gadau, and M. Laubichler. “Developmental evolution in social insects: regulatory networks from genes to societies.” *Journal of Experimental Zoology B: Molecular and Developmental Evolution*, in review.

Finally, I also must say that the location of the Wissenschaftskolleg is itself inspiring: the architecturally diverse neighborhood is wonderful to walk through, in particular with autumn colors, and it is also conveniently located within easy reach of the rest of Berlin. Other highlights of my stay include the delightful common meals and of course table tennis with Tanja Schwander, Olof Leimar, and others. The main thing I regret about my stay was that it was too short and I hope that if I am ever able to come again I will be able to stay longer!