



ANTS AND INTELLECTUALS JENNIFER H. FEWELL

Jennifer H. Fewell is a Behavioural Ecologist interested in the evolution and organization of complex social groups. She received her Bachelor of Arts in 1979 in Neurobiology and Behaviour at Cornell University, followed by a Master's of Science in 1985 and a Doctorate in 1988 from the University of Colorado under the direction of Michael Breed. Her dissertation work and NSF Postdoctoral Fellowship, with Mark Winston at Simon Fraser University, examined the regulation of foraging behaviour in ants and honey bees. She moved to Arizona State University as Research Faculty in 1991. During this time, she worked collaboratively with Robert Page, at the University of California, Davis, using self-organizational models to address the question of how division of labor can emerge and evolve. This became a primary research focus throughout her career. She transitioned into an Assistant Professorship at Arizona State University in 1993, where she currently holds the position of President's Professor. In 2005, she co-founded ASU's Center for Social Dynamics and Complexity and served as its first Natural Sciences Director. She additionally has served as Faculty Leader of the Organismal, Integrative, and Systems Biology Group in ASU's School of Life Sciences, and as Associate Dean of Faculty in ASU's Teachers College. – Address: School of Life Sciences, Arizona State University, Tempe, AZ 85287-4501, USA. E-mail: j.fewell@asu.edu.

Those Fellows reading this report have likely already experienced the first day of Wiko. As we did in our September session, they have congregated in the seminar room and introduced themselves by their expertise and planned projects. At this point, they have not yet built a community, and it remains an open question how this collection of individuals

will coalesce, what form this community will take. A Wiko group could, in theory, move through the year as a loose collection of individuals, each one continuing their projects from home institutions, albeit in a very lovely space. If so, it would be a productive but boring year. Wiko offers the opportunity to expand intellectually and culturally far beyond what any Fellow brings upon arrival. I suspect this is, in actuality, the hidden function of this space – a project in community emergence.

As humans and as intellectuals, we grow opportunistically from our communities, and this was certainly the case for me. Over the year, our group of Fellows became something more coalescent, something more cohesive and perhaps something more interesting than a loose association of intellectuals. A community emerged from our collective selves. I suppose I should not be surprised at this. After all, my research centers on the emergence of social organization. It focuses primarily on the organization of work in insect societies, scaling in size from small social collectives to the thousands (millions) of workers coordinating tasks within a mature social insect colony. We are clearly not ants, but there are still insights to be gained, and one of these is that groups self-organize. Whether humans, social primates, or social insects, individuals brought together with a common purpose form cohesive societies; we see the emergence of a cooperative group.

As an academic, however, the question is how this new community might influence or expand a research program. How do we move outside of our intellectual comfort zones, or break through our intellectual facades? In that first 2016 Wiko meeting, a brave colleague stood up and declared that perhaps our success should be measured not in the projects that we accomplished, but instead in not accomplishing that project at all. If so, then I can report partial success. Although the year was valuable in advancing my main project, many of my more valued “breakthroughs” in this year came from intersections with colleagues far outside my field. This resulted in a collection of new inspirations, only some of which may materialize as products, but all of which have expanded my perspective.

At Work at Wiko: My core project at Wiko was to draft a synthesis on division of labor and the organization of work in animal systems. I have spent much of my research career on this topic, and there is currently no grand synthesis. The book, in progress, presents the argument that division of labor is in large part a product of social self-organization. By this, I mean that it emerges spontaneously when individuals coordinate and participate collectively in the multiple tasks they perform as a society. The emergence argument

makes the case that members of a social group spontaneously divide work, producing a division of labor in which different individuals specialize in different tasks. This task specialization is initiated through natural variation in individual task propensities; different individuals have intrinsically different sensitivities to the need for a given task. It is also driven by the consequence that performing a task reduces subsequent need for that task. Simply put, we only wash the dishes when we see there are dishes to be washed, and some of us see this before others do. Because some individuals are more responsive to the need for a task, they are more likely to perform it. When they do, they reduce the likelihood that others perform it also – they become the specialist. Because different individuals have sensitivities for different tasks, a division of labor naturally emerges.

This seems at first to be a simplistic vision of the complexities of work organization. Indeed, multiple layers are added during the evolution of division of labor in insect and vertebrate societies. These include the adaptive coordination and regulation of work within cohesive societies, as exemplified by the social insects. On a more individual level, other social dynamics are also involved. Task performance is often determined by dominance hierarchies, and also by social policing. All of these contribute to the organization of work. They also potentially generate emergent disparities in work performance, influencing the social costs and benefits of working together. Thus, emergent division of labor can generate advantages for a social group (as is the case with the highly social insects), or alternatively disrupt social evolution, as when the costs of specializing in a difficult task fail to outweigh the benefits of cooperating.

Models of the emergence of division of labor in insect societies have been explored in detail for decades now. What is less apparent is how ideas about work organization in animal societies could inform, and in turn be informed by, sociological and economic perspectives on human social organization. Although one cannot become a sociologist or economist in a year's sabbatical, it was a goal of mine to use the interdisciplinary community of Wiko to gain insights into the possible connections between human and non-human systems. The many discussions I had with researchers in these fields and the associated reading lists (I simultaneously thank you and complain) presented invaluable additions to my work. In turn, I was able to assess the level to which my work on the biological underpinnings of division of labor might connect with a much broader audience than the one to which I am typically exposed. A summary take-home is that the emergence of division of labor and its social consequences – in ants, in mammal societies, and particularly in human social relationships – is about much more than who is washing the dishes.

Facades and How to Break Them: My project on division of labor fit well with my initial view of the utility of Wiko. It required a shift in my perspective, however, to go beyond this and realize the more transformational benefit of this space and the community temporarily residing within. A partial wake-up occurred during a seminar by a Fellow on historical architecture. In her seminar, she spoke of architectural facades, their symbolism and function. From this, two thoughts struck me. The first, quite in keeping with my biologist mind, involved the potential parallels and limitations of architectural use by humans and animals. Does architecture provide a unifying theme, or is it a way to separate the cultural human from the human as biological being?

The second thought was more personal. What of our own intellectual facades? Instead of providing points of intersection, do the academic faces we present to each other actually generate intellectual barriers? From this, I began to move beyond considering the weekly Fellows presentations as useful summaries of our projects, to potentially valuable and varied sources of intellectual connections. Some of these have led to useful project ideas. I hope, for example, to join with my Co-Fellows in interdisciplinary workshops on the human and animal faces of architecture. I had a lively series of discussions with a classicist on human versus animal use of identifying tags, perhaps as a general mechanism for deciding with whom to cooperate; these again allowed me to connect basic principles between the human and animal realms. I also particularly enjoyed arguing alternate biological interpretations of Shakespeare, which had no bearing at all on my research but were pure fun. A subset of these connections may gel into cross-disciplinary products, but even if they do not, they widened the boundaries of my research and provided much enjoyment.

The discussions and exchanges in our Fellows group also exposed me to a diverse set of political, ethical, and religious values. These exchanges were empowering, and often less than comfortable. They widened my perspective beyond the bubble that I normally inhabit. This was the case in November 2016, when the US went through one of the most unusual and in some ways disturbing leadership changes of its modern history. The solidarity of the Fellows group at this moment, again during the Women's March in January 2017, and for the March for Science in March 2017, exemplified the power and even the joy that facing challenges as a community can bring.

Leaves and the Spaces Beyond: When I initially thought of how to organize this report, I thought first in terms of space use. Any designed environment, an ant nest or an institute,

channels individual communication to shape what individuals do and how they communicate. In an institute, this happens during seminars and associated discussions, but it also occurs in the myriad less formal spaces in which we meet. The intellectual space that a year at the Institute gave was of immense value. Wiko gave me the breathing room needed to move the division of labor project forward. Of the spaces that I occupied during my time there, most of my measurable productivity occurred in the seclusion of my apartment office. This was a lovely space, where I could look out over the walkways and take tea breaks while watching the birds. Other Fellows distributed themselves among offices, coffee shops, side rooms, and the library. There are multiple spots to choose. In this space, we did the work we came for.

These spaces, however, cannot be where the most exciting points of intersection occur. The most interesting and emergent “distractions” occurred in less formal places than the seminar room or my office. Discussions initiated in the restaurant over meals and wine were continued as Fellows met along the sidewalk of Koenigsallee, on our daily walk from the main buildings to the Villa Walther, and on across the Hasensprung. We met unexpectedly on walks and explorations into the forest Grunewald, or even on the M19 heading downtown. One day on my way out of the seminar, I passed another Fellow, a photographer shooting pictures of the leaves falling on the sidewalk. I expressed my dismay at my own photography skills, and he explained that a photograph of a leaf “is not about a leaf. It captures the element of you that you see in the leaf”. I explained that leaves must fall for the tree to survive the winter, and I showed him the juncture built into the leaf’s stem for it to fall more easily. He liked that information, and so we went on an adventure in discovering leaves. I spent many hours away from my book on division of labor, watching how leaves fall on the sidewalk, thinking of how they decay, critically assessing hundreds of leaf photographs – all beautiful – and contemplating the biology of leaf abandonment. That beautiful distraction, to me, is Wiko.