



LAKESIDE INSPIRATION
FERENC JORDÁN

Ferenc Jordán, born in 1973, is a Hungarian biologist, a theoretical ecologist with an M.Sc. in biology and a Ph.D. in genetics from Eötvös University, Budapest. His key interest is how to quantify the importance of species. The hope this line of thinking offers is to make conservation efforts more objective, efficient, and successful. For this, he takes a systems ecology approach and performs network analysis on food webs. But he is also interested in animal social networks, landscape graphs, and other interesting network problems in biology. He spent five years at the Collegium Budapest, Institute for Advanced Study, as a Branco Weiss Fellow (from ETH Zürich, 2003–2008). Then he was principal investigator and group leader at Microsoft Research – COSBI in Trento, Italy (2008–2014). Currently he is scientific adviser and group leader at the Danube Research Institute of MTA Centre for Ecological Research (Budapest, Hungary), Associated Professor at Stazione Zoologica Anton Dohrn (Naples, Italy), and Visiting Professor at the University of Antofagasta (Chile). He is an active reviewer (e.g. *ERC*) and editor (e.g. *Ecology Letters*), as well as the Editor-in-Chief of the journal *Community Ecology*.
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My Year in Grunewald

Sitting on the balcony of Villa Walther, watching the swans swimming on Herthasee and drinking a Sherry Amoroso Medium Sweet, I really cannot focus on my task, writing this report. The storm is just over, the birds dance in the sharp sunshine, and the sherry is

better and better. But the bottom-right corner of my laptop takes me down to earth: 2017.07.11. So, the end is close, back to the mission.

According to my own expectations and the working conditions, I am closing an absolutely refreshing and super-productive year in Wiko. Surrounded by wonderful fellow Fellows, a fantastic staff, the sweet babysitters of the Thursdays' Kinderparties, and the nice people of Grunewald, it was not hard to be productive. The peace of mind one can experience at Wiko is surely unique and helpful for creative work.

Let me start with the social context. Even if I cannot classify myself as a sportsman, my social roles were focused on physical activities. First, I infinitely enjoyed the coordination and transportation of Fellows to and from the Olympiastadion. This year we had an exceptionally large number of Fellows interested in football, and two, three, or sometimes six of us were regular visitors at Hertha BSC matches. With beer and bratwurst, this is the best way to get to know each other better and better. Strongly advised to future Fellows. Second, it was a privilege to organize the Wiko Ping-Pong Championship, and, with the excellent support of the staff, this resulted in a nice day bringing people very close to each other. It could have happened much earlier! Very strongly advised to future Fellows. Football and ping-pong proved that they can create communities.

And Now About Science

My main research theme has not yet resulted in a submitted paper, but I have made great progress. Integrating interspecific interaction networks (e.g. food webs) with animal social networks seemed to be an easy exercise. I was basically interested in how social networks and food webs shape each other. Premium examples are the increased cohesion of baboon social networks under predation pressure (in one direction) and the increased success of predator avoidance in groups of well-networking marmots (in the other direction). First, I wanted to collect the available data and perform a meta-analysis. Then I changed my mind and intended to collect case studies and write a review. Now I see the almost total lack of data, so the whole idea seems to be evolving toward an "opinion" or "perspectives" paper. Yet, all of the difficulties perfectly underscore the need for this kind of research. I expect to finish this work around September [7]. I will send it to some of the Fellows (Gadagkar, Fewell, Kappeler, Beissinger for sure) and, based on the feedback I hope to get from them, the paper will be submitted in some months' time. If I can finish it properly, this piece of work will be a massive bridge between community ecologists and behavioral/socio-ecologists.

I did not want to invite too many people, but three short visits made my year even richer. The short visits of two of my young Hungarian colleagues resulted in a published [2] and two submitted [3, 4] papers. Juliana Pereira and I wrote a technical piece on landscape ecology and habitat networks [2]. In this paper, we present some methodological developments on multi-node centrality approaches in studying and quantifying habitat networks; we demonstrate our techniques with the example of forest birds in Catalonia. This can be helpful for making conservation management more efficient. With Anett Endrédi, we discussed and concluded a research project and finished two papers on food webs [3, 4]. One is about trophic hierarchies [3]. It aids us in understanding how structure can help predict dynamics in ecological communities. The other is a simulation effort supporting the multi-species view of maximum sustainable yield assessment in marine fisheries [4]. These have been long projects, but the Wiko environment provided a perfect scene for concluding them. Both of these young colleagues were mesmerized by the Wiko atmosphere and showed how to convert inspiration into efficient work.

My third guest over the year was Volker Grimm (Leipzig). We had long and interesting discussions but, since he has an extremely busy year, we did not plan anything explicit. Yet, I am invited to visit his lab in Leipzig in the not very distant future, and he will send some of his students to a conference I am organizing.

I had a chance to visit Alexander Wacker and Ursula Gaedke at the University of Potsdam; I gave a talk and enjoyed the company of their great group. We planned more collaboration for the end of the year, but we ran out of time. They have excellent data on lake ecosystems, and my approach might provide interesting results for them. I think we will be able to work on our ideas.

I was also able to give a talk in Göttingen at Teja Tschardt's lab. He is reportedly one of the leading German ecologists and it was wonderful to see his colleagues and research lab. We have shared collaborators, so many interesting topics came up during a great dinner in this charming city.

In the first few weeks after my arrival, I wrote a little piece [1]. The topic is the learning of ecosystems, which is becoming an increasingly hot issue, and we certainly need more research in this direction. My paper is only a response to an earlier paper published in *Trends in Ecology and Evolution*, but the prestige of this journal is so high that even these little pieces can make their impact on science. We will see. Anyway, this is exactly the kind of paper I would never have written at home – but in the Wiko atmosphere it just poured out of my keyboard.

I have made great progress on two additional projects as well, where papers are close to submission [5, 6]. Colleagues in Naples (Stazione Zoologica) and I have been working a lot on a network approach to better understanding marine phytoplankton communities [5]. There is a need to better study the microbial compartment of the food web and complete our knowledge in this direction. If the ecosystem is composed of mammals, birds, and the “rest”, according to the views of many conservationists, the “rest” is very important and interesting. We definitely want to contribute to a systems view of ecology and we want to emphasize the importance of invertebrates and microorganisms in natural ecosystems. Colleagues from Rome (Istituto Casa Sollievo della Sofferenza-Mendel) and I did some modelling work. We performed a large number of simulations to better understand the difference between network types (e.g. random, scale-free, small world) from the viewpoint of how nested their multi-node centrality sets are [6]. We compare the idealized network types to real food webs, and this research is a nice parallel to our research on landscape graphs, too [2]. Both research lines will contribute, in different ways, to make conservation management more efficient and quantitative.

My strategy is always to have short but efficient conversations, I am not the one who speaks for hours and hours over a coffee. I had great conversations and there is a chance for future collaboration with my fellow Fellows Jihwan Myung, Jennifer Fewell, Peter Kappeler, and Steve Beissinger. We did not want to load each other with lots of extra work, but potential collaborations are clearly being shaped on the horizon (Jihwan and I actually have a pre-preliminary manuscript). I learned a lot from all of them (about parrots, ants, and lemurs, as well as clocks). It was also extremely interesting to see and compare the working style of many of us. We have the speakers, the writers, the thinkers, the integrators, et cetera. I think that my own working style has also matured a bit.

Varietas delectat – and also important, as all biologists know very well. Listening and talking to the non-biologist Fellows was always so interesting and refreshing! I was influenced mostly by the talks of Maria Mavroudi and Cornelia Jöchner. Following the talk of Maria, I just bought and read a book about Byzantium and I felt angry about not having heard much more about it during my school years. Historians and biologists are deeply related, anyway; we know this. Cornelia and I performed a little project on the topological analysis of the four Wiko villas. It started in the Teeküche of the Neubau and invaded our minds. Finally, we gave a talk about it in July. The small but enthusiastic audience (as many Fellows as staff members!) gave interesting and very useful comments. Following earlier research on the Medici, we studied the topological constraints of the

Wiko workspace. This will probably not turn into a paper, but it was great fun, for sure – and potential collaboration is possible; I plan to visit Cornelia and talk to her students. If they are as enthusiastic as expected, we could eventually write a paper on our findings. But having long and thoughtful chats with Carey Harrison, on many things, on almost everything, was maybe the key feature of my Wiko year. I cannot imagine not seeing him in the future, maybe over a vegetarian bratwurst.

All in all ... Several minor projects instead of a single major one. But it is impossible to focus on a single topic in this intellectual environment! The several minor opuses are interrelated and synergistically help each other. All of them will make me remember the context they were born in. It was a year that gave me mental munition and motivation for a long time, I am sure. Thanks for all, Wiko!

Publications with Wiko Affiliation:

- [1] Jordán, F. (2016). “How can mature ecosystems become educated?” *Trends Ecol. Evol.* 31: 893–894.
- [2] Pereira, J. and Jordán, F. (2017). “Multi-node selection of patches for protecting habitat connectivity: fragmentation versus reachability.” *Ecological Indicators* 81: 192–200.
- [3] Endrédi, A., Senánszky, V., Libralato, S., and Jordán, F. (2018). “Food web dynamics in trophic hierarchies.” *Ecological Modelling* 368: 94–103.
- [4] Mórész, Á., Endrédi, A., and Jordán, F. “On the additivity of pairwise perturbations in food webs: a step towards multi-species MSY assessment.” *Theoretical Ecology*. Manuscript submitted.
- [5] D’Alelio, D., Jordán, F., and Ribera d’Alcalá, M. “Key players and key interactions in different regimes of a planktonic food web.” Manuscript in preparation.
- [6] Capocefalo, D., Mazza, T., Jordán, F., and Scotti, M. “A multi-node approach to non-local network safety.” Manuscript in preparation.
- [7] Jordán, F. “Interactions between food webs and social networks of animals.” Manuscript in preparation.