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**Review of the habilitation application of dr. Magdalena Witek,  
Museum and Institute of Zoology, Polish Academy of Sciences**

**General remarks**

The current scientific interests of Dr Magdalena Witek are centred around the ecology, life history, and co-evolution in host parasite systems and social parasitism in ant colonies of the genus *Myrmica*. Dr Witek achieved her master degree from the Jagiellonian University in 2001 with a thesis titled *Immune function and reproductive output in female Great tits *Parus major**. At the same University she finished her PhD studies in 2008 with a thesis on *Host ant specificity and larval development in *Maculinea* butterflies*. Since 2012 she is a lecturer at the Museum and Institute of Zoology, PAN.

I have to say that I do not know Dr Witek personally. I did not contact the authorities of her home institute for additional background information. Therefore my opinion is solely based on the material sent to me and on common scientific data bases.

To date Dr Witek published 35 scientific articles in international journals indexed in the Scopus data base. This work was cited 432 times leading to a H-index of 13 (Scopus, retrieved 26.04.2018). Ten of these publication (joint IF 15.3; cited 238 times) appeared during the PhD studies, 25 papers (joint IF 46.5; cited 194 times) appeared after obtaining the PhD (2009-2018). This demonstrates a significant increase in scientific activity and international recognition. The scientific output, the number of citations, and the H-index are well within the current standards for a Polish habilitation. Importantly, most papers were published by an international group, of which Dr Witek is a member. This internationalisation is a very positive aspect but still not common in Polish science.

Dr Witek had several scientific internships in Great Britain, Germany, Italy, Bulgaria, Hungary, and Romania. Most important is a three year post-doc stage at Turin University (2009-2012). She headed two grants from the National Science Centre; an ongoing Opus grant that started in 2016 and a Fuga grant from 2012-2016. Prior she was awarded by a student's grant from the Polish Ministry of Science & Higher Education and a Start grant from the Foundation for Polish Science. Since 2016 she is also involved in a joint research project under the agreement of scientific cooperation between the Polish Academy of Sciences and the Romanian Academy. Since 2016 she evaluates grant applications for the Polish Science Centre (NCN). She conducted submission reviews for several international journals, particularly for Ecology Letters, Oikos, and Oecologia. These achievements are worth of being mentioned and above current Polish habilitation standards in environmental biology.

### **Scientific achievements**

#### *Papers associated with the application*

A bundle of five papers in middle ranking international journals (impact factors between 1.9 and 2.5) on the social parasitism in *Myrmeca* ants form the backbone of her application. All papers are multi-authored and Dr Witek serves as the first and corresponding author. One of these papers (published in *Insectes Sociaux*) is a review.

Social parasitism refers to a host-parasite relationship, where the parasite depends on the labour provided by host species. Social parasitism is widely distributed among ants and other social insects and surely deserves attention. Many evolutionary and ecological aspects of social parasitism are still unknown. In this respect the study object is well-chosen and topical.

It is not my task to review the five papers again. This has already been done by the journal referees. My task is to judge whether these papers contribute sufficiently to science to justify inclusion in a habilitation application. I think they do although I have some reservations against the rather descriptive appeal of the work.

The papers are published in specialised but renowned journals. Nevertheless I have some critical remarks on the presented bundle. In general I missed a wider theoretical background in ecology and evolutionary theory. The papers describe life cycles, parasitism rates, influence on host performance, and interactions. This is a typical entomological and partly faunistic approach.

A first major finding of Dr Witek regards the detection of "chemical insignificance" of parasite ants with respect to their hosts pointing to an important strategy in social parasitism.

A second finding regards the pattern of co-occurrences of social parasites. It appeared that local co-occurrence is frequent. Therefore, direct competitive exclusion seems to be of minor importance. Dr Witek speculates about temporal segregation and differences in resource exploitation although direct evidence is still lacking. Further, Dr Witek found a negative impact of parasite presence on host productivity (fitness) and possible changes in the frequency of ant worker castes. Such changes are rather expected although direct evidence was so far largely lacking. Finally, Dr Witek showed that host ants do not discriminate between own and parasite larvae and that even the parasite is attractive. Apparently ants do not possess effective defending mechanisms pointing to an ongoing arms race between hosts and parasites. We might speculate that the costs of parasites are still lower than the costs for evolving and applying an effective defence. Of course, these results and interpretations are not particularly new and rather confirm previous knowledge and theory. This is one reason why the present application is based on publications in at most intermediate journals.

The present application is largely based on field observations and laboratory experiments. The respective methodological approaches used by Magdalena Witek do not raise concerns. They are in general well-designed. The analytical parts of the papers use standard statistical and modelling techniques, but are appropriate. However, the whole study project is inherently evolution centred. I missed a deeper evolutionary approach based on molecular genetic studies. In its present form the study is too descriptive. That's a pity as the study object calls for a deeper analysis of ultimate causes. However, within the current Opus grant, Dr Witek intends to widen her perspective towards evolutionary aspects, particularly those connected with ant personality, at the individual and colony level. This is currently a hot topic in evolutionary ecology and entomology. She also intends to study the co-evolution of *Maculinea* butterflies and *Myrmica* ants using experimental approaches. I think she should extend these studies to the molecular level, for instance by identifying the molecular pathways triggering this arms race. Studies on ant personality also require a molecular genetic background.

#### *Other scientific achievements and activities*

Apart from the bundle of five papers that form the core of the present application Dr Witek has published (mostly as co-author) 20 papers in international journals. These are again centred around the biology and population ecology of *Maculinea* butterflies and *Microdon* hoverflies, all being parasites of ants. Additional work regarded the influence of fungus parasites on ant colonies. In this respect, most important is the study in Scientific Reports (co-

authored by Dr Witek) indicating that pathogens can modify host recognition abilities, making the society more prone to accept both conspecific and allospecific organisms. Consequently, Dr Witek's approach to social parasitism covers a wide spectrum of multispecies interactions. This fact deserves emphasising.

Finally Dr Witek is interested in insect conservation as testified by several papers on habitat preferences and conservation states of ants and parasites.

### **Education and administration**

The educational and administration activities of Dr Witek are the weakest part of her application. Her self-presentation is silent about any administrative activities apart of being member of an NCN panel.

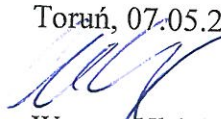
As a member of the Polish Academy of Sciences Dr Witek does not have daily contact with students. Nevertheless she mentions participation (it does not become clear in which form) in student education at UJ and the Turin University. In her home institute she organised student trainings. These activities are typical for pure scientists in science institutes. Whether they qualify for regular university teaching remains an open question.

### **Conclusion**

My final conclusion has to weight the scientific, educational, and administrative activities of Dr Witek. The educational, and administrative activities are clearly below typical habilitation applications. However, the habilitation is a scientific degree and thus the scientific activities and achievements are of major importance. In this respect the application of Dr Witek fulfills current requirements. Her scientific level is high, she is well embedded in international scientific networks, the study object well-chosen, and her bibliometric records are above current Polish standards.

Therefore, my final verdict is positive. In the light of my evaluation, I think that this is a comparatively strong application and well within current standards. Dr Witek fulfills the requirements defined by art. 2, 4, 21A, 25, and 26 on scientific degrees and titles of the Polish law from 2003 (changed by Dz. U. 2016, pos. 882, 1311). I support her application to obtain the habilitation degree in the field of Biology.

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Werner Ulrich