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Review of the habilitation application of dr Michał Budka

General remarks

Dr Michał Budka is based at the Faculty of Biology of Adam Mickiewicz University Poznan. Since 2013 he is assistant professor (adiunkt). In 2007 he received his bachelor degree in forestry and 2009 the master degree at SGGW. In 2013, he promoted with an eco-ethological study titled *Zmienność i funkcje głosu derkacza *Crex crex** supervised by Prof. Tomasz Osiejuk. From a formal point of view the application is appropriate and contains all the necessary elements for a proper assessment required by par. 220 of the Polish law of higher education.

Since 2011 Dr Budka has published 36 papers in international scientific journals indexed in Scopus (retrieved 02.01.2024). Google Scholar lists another 5 not indexed publications These publications received 265 citations (without self-citations; Scopus retrieved 02.01.2024) resulting in a Hirsch index of 12. Although this outreach is not outstanding (after 15 years in science), the number of annual citations is steadily rising. Six of the publications can be linked to the PhD thesis, while 30 papers since 2014 are achievements to be included in the present application. In 23 of the publications in international journals dr Budka served as lead author, a typical value at this stage of career. Highest scientific outreach have two 2013 first-author papers on *Formant frequencies are acoustic cues to caller discrimination and are a weak indicator of the body size of corncrake males* and *Neighbour-stranger call discrimination in a nocturnal rail species, the corncrake *Crex crex** (26 citations both) which

can be linked to the PhD. After more 15 years in science (including the PhD period) this scientific output is acceptable. The national and international reception (assessed by the number of citations) is typical for a Polish habilitations in a rather specialised field of biology. The quality of the journals in which dr Budka published does also not raise concerns. These are mostly ornithological and/or middle ranking, with a focus on conservation, avian biology, and behavioural ecology. In consequence, the scientific activity fulfils the requirements set by par. 219 of the Polish law of higher education.

I also compared the Scopus (325 with self-citations) and the Google Scholar citations (441), the latter counting all web mentioning. The respective quotient informs about the social outreach of a researcher. The current quotient of 1.36 means that Dr Budka has only intermediate outreach in non-scientific and popular media indicating that his work is not widely recognized outside the strict scientific world.

I have to say that I did not contact the authorities of his Institute for additional background information. My opinion about the achievement is solely based on the material sent to me and on common scientific data bases.

Publications linked to the application

Dr Budka is a professional 'birder'. His ornithological studied centre around bird acoustics and standardized acoustic bird identification, either at the species or at the individual level. Semi-automated sound registration for behavioural, evolutionary, or ecological studies has a long tradition. Fully automated environmental sound registration, however, is still in development and is controversed. Consequently, the topic of the present application is well chosen. Particularly, recent AI developments promise a high quality and automated pattern detection and analysis that should by far exceed current semi-automated bioacoustic analyses based on classical audio signal processing. Dr Budka shortly discusses these 'classical' methods and highlights the prospects and particularly the pitfalls associated with these spectrogram analytical approaches. I was surprised that dr Budka did not mention and discuss the prospects of large neural network approaches.

Nine papers are linked to the application. In eight of them dr Budka serves as first author. Attached are respective co-author declarations. These nine papers try to answer to basic starting questions: (the self-report mentions three starting questions, but the first two seem to be identical).

1. Does automated sound registration allow for a precise estimation of avian biodiversity and spatial distribution?

2. Does automated sound registration allow for the detection of new species and the study of bird ecology and behaviour?

It is not my job to review these papers again. I have to assess whether the content suffices for a successful Polish habilitation. The nine papers appeared in lower to middle ranking journals, particularly in specialised ornithological journals. The quality of the journals does not raise concern.

Dr Budka tested the first aspect from comparisons of classical human based diversity assessment and automated call recording in forest and agricultural land. Automated recording seems to be able to detect new species. Therefore, the general answer to both questions was 'yes' but only if there is a sufficient number of recorders. This results is rather expected although seemed to need confirmation. From a scientific point of view the studies are sound and do not raise any concern.

Other papers of the cycle deal with bird acoustics and bird ecology and behaviour. They deal mainly with singing behaviour, particularly at night. In general, all papers are largely descriptive, without deeper evolutionary or ecological background. It's faunistics in new clothes. However, pure faunistics is not science. For instance the two papers on nocturnal singing asks the question about the reason right in the introduction, but later only describe the details of the pattern. Are there fitness differences in nocturnal and non-nocturnal singers? Is this a predator avoidance strategy? Is it possible to infer this with molecular approaches? The theoretical background is therefore a weak point of this application. However, the papers appeared in international and indexed journals, were positively peer reviewed, and fulfil the standards for a scientific publication. Therefore, despite my critique regarding the theoretical background and problem solving, the nine papers fulfil the criteria set by art. 219 of the Polish law of higher education. They contribute to our knowledge on bird calls and advance our methods for bird counting and diversity assessment.

Other scientific activities

Beside of the nine papers linked to the application Dr Budka has published more than 20 papers in international journals as well as 2 monographs. All papers deal with ornithological questions particularly with bird calls. This very narrow range of interest is a weaker point. I expected to see a wider biological, particularly ecological and evolutionary scope.

Dr Budka works on Central European but also African birds. He made several field trips to Ghana, Mozambique, Cameroon, Nigeria, and Uganda and cooperates with international

scientists. This cooperation resulted in several multiauthor publications, for instance in *Methods in Ecology and Evolution*. This networking is a stronger aspect of this application. Dr Budka headed three external grants, one Preludium before the PhD, one Iuventus Plus grant and an ongoing NCN Sonata project. I also mention a Diamentowy grant, where he serves as supervisor. This is a comparatively high grant activity. Other aspects of scientific activity, like conference attendance, editorial work, refereeing, or scientific administration are well within what is expected at this stage of career. Dr Budka serves as editor for two scientific journals, *Diversity* and *Frontiers in Bird Science*. Unfortunately, these are mdpi and *Frontiers* journals, publishing houses of questionable reputation. A weak point of this application.

Dr Budka uses a rich methodological toolbox including sound detection and analytic devices, classical ornithological survey methods, and current statistical techniques. This rich toolbox allows him to answer his research questions and to tackle hitherto unsolved new problems. The diverse methodological approaches are a strong aspect of this application. The next step should include AI implementation.

An important aspect of today's science is popularisation. The application mentions two popular articles and a number of interviews and school lessons. In the field of faunistics and bird conservation I expected to see a bit more. However, the habilitation is a scientific degree and consequently science popularisation is not a major point of assessment.

Didactic and other activities

Dr Budka provides lectures and courses in bird ecology and faunistics according to the required amount of contact hours. He served as promotor of bachelor and masters theses. Currently he co-promotes one PhD project and advises one Diamentowy grant project. These activities are well within the standards and do not raise concern. I missed any mentioning of organisation activities.

Conclusion

My final verdict has to weight the scientific, organizational and teaching activities of Dr Budka with focus on science. Dr Budka is an expert in bird faunistics, behaviour, and ecology. The nine papers associated with his application appeared in international peer reviewed journals. These journals are reputed and are not launched by predatory publishers. They fulfil the requirements for a successful habilitation. For his scientific work Dr Budka uses an advanced and appropriate toolbox. The total scientific output is strong and constantly

increasing. Dr Budka is linked to the international scientific community and has ongoing projects in Europe and Africa. I have some reservations with respect to the limited scope of his activities (bird calls) and the mainly descriptive attitude. The activity in scientific organizations and administration might be stronger but is within what can be expected at this stage of career.

In my view, dr Michał Budka fulfils the requirements defined by art. 219 and 220 on the habilitation degree of the Polish law on higher education from 20.07.2018. I support his application to obtain the habilitation degree in the field of Biology.

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