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Toruń, 29. 03. 2023

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Review of the habilitation application of dr Rafał Łopucki

General remarks

Dr Rafał Łopucki is based at the Institute of Biological Sciences of the John Paul II Catholic University of Lublin. Since 2000 he held an assistance position, and since 2007 he is an assistant professor. From 2015 to 2022 he worked in the Roentgen laboratory at KUL, first as an assistant later as an, assistant professor. He received his doctoral degree in biological science at KUL in 2006 with an ethological study on *Relacje socjalne w populacji nornicy rudej Clethrionomys glareolus (Schreber, 1780)* supervised by Prof. Roman Andrzejewski. 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 2003 Dr Łopucki has published 43 papers in international scientific journals indexed in Scopus (retrieved 24.03.2023), including one correspondence letter to Science (Kitowski et al., 2021). His self-report notes two additional monographs and 13 non-indexed journal publications. This work is accomplished by 67 additional conference abstracts. These publications received 338 citations (without self-citations; Scopus retrieved 24.03.2023) resulting in a Hirsch index of 13.

In 18 of the 43 indexed publications Dr Łopucki served as lead author. These 18 papers received in total 243 citations so far (Scopus 24.03.2023). Highest scientific outreach had his 2017 first-author paper on *How small cities affect the biodiversity of ground-dwelling*

mammals and the relevance of this knowledge in planning urban land expansion in terms of urban wildlife that received 39 citations so far and his 2013 lead-authored paper *Effects of urbanization on small-mammal communities and the population structure of synurbic species: An example of a medium-sized city* with 34 citations so far. After more than 20 years in science (including the PhD period) this scientific output is acceptable while the national and international reception (assessed by the number of citations) is rather at the lower boundary compared to typical Polish habilitations in the field of ecology. However, I also note the increasing scientific output in the last three years with 24 publications since 2020. This is a positive aspect of this application and outweighs the prior moderate publication activity. In consequence, the scientific activity fulfils the requirements set by par. 219 of the Polish law of higher education.

I also compared the Scopus (419 with self-citations) and the Google Scholar citations (601), the latter counting all web mentioning. The respective quotient informs about the social outreach of a researcher. The current quotient of 1.43 means that Dr Łopucki does not have a strong outreach in non-scientific and popular media indicating that his work (at least as a co-author) is not widely recognized outside the strict scientific world. This is a pity given the inherent public relevance of urban studies.

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 Łopucki's scientific work is mainly centred around suburban ecology, particularly with respect to small mammals. Suburban ecology is interesting and a bit neglected. The gradient between rural (seminal) and urban (often city centres) have been studied intensively during the last 50 years. In this work suburban and smaller cities have often been treated as simple transient phases. This neglects the possible importance of suburbans in the process of adaptation towards living in a city. In this respect the study topics of dr Łopucki are well chosen.

The self-description of dr Łopucki, introducing into the topic and describing the major achievement, reads like a mini review and might be published as such. It contains the

necessary information to assess the quality and importance of the application and fulfils the current standards for such type of text. I was surprised about the number of publications included in the main achievement. Normally, three to five papers form a thematically closed set of papers accompanied by other scientific achievements. Dr Łopucki included as many as ten papers grouped into three sections: community ecology of small mammals, population dynamics and adaptations to urban life, and conservation and landscape planning. I assume, with this large number he wanted to cover other shortcomings of his application. All ten papers appeared in low to middle ranking scientific journals, two of them being published in *Ecological Indicators* and one in *Scientific Reports*. The quality of these journals (maybe with the exception of *Animals*, published by mdpi) does not raise concerns and is within what can be expected for a successful habilitation. The papers appeared between 2013 and 2022. In the light of the auto-description, author contribution does not seem to be an issue here. In all papers dr Łopucki served as lead author.

It is not my task to review these papers again. This has already been done by the journal referees. I have to assess whether in summary these publications suffice the requirements formulated in par 219, 220 of the Polish law of higher education.

The first group of four papers, deal with mammal community ecology. The papers appeared between 2013 and 2020 and received 67 citations so far (Scopus retrieved 24.03.2023). Given the international interest in the field and potential applications in bioconservation this international outreach is at most intermediate. In the papers Dr Łopucki and co-authors reported that

a decline in species richness and diversity along an urbanization gradient and an increase in the abundance of species best adapted to the city environment (synurbic species) were observed. The main factors influencing ground-dwelling mammals was isolation of green patches, while the management type of green areas had no significant effect (Łopucki et al. 2013),

the phenomenon of relatively unchanged fauna outside the downtown area shows that small cities have the potential to maintain a high level of diversity of small ground dwelling mammals if appropriate planning of further building expansion is implemented (Łopucki and Kitowski 2017),

the (least) weasel avoided urban areas (Łopucki et al. 2019),

in order to preserve the relatively high biodiversity of native wildlife in cities (even in central areas) appropriate actions should be taken in the early stages of city development (Łopucki et al. 2020).

Of course, these findings are not new and are rather what we expect. They are confirmative and mainly descriptive, and they add a local Polish picture. Nevertheless, they show that dr. Łopucki is an expert in small mammal faunistics and ecology.

The second group of three publications focuses on small mammal populations, particularly in behavioural aspects and adaptations. Despite of being recent (2019 and 2020 they already received 35 citations (retrieved 26.03.2023)).

The first paper (Łopucki et al. 2019) finds that *urban animals undergo hormonal adjustment to urban conditions. (Corticosterone) concentrations of urban mice were lower compared to their rural conspecifics, while for body weight we observed an inverse relationship.* The authors state that *species that have managed to overcome fear of humans and adapt to anthropogenic stressors can therefore achieve measurable ecological benefits.*

The second paper (Łopucki and Kiersztyn 2020) deals with the behaviour of *Apodemus agrarius* and concludes *that urbanized environment modifies the daily activity patterns and that animals from the urban population have a longer active period than their rural counterparts.*

The third paper on aggressive behaviour of *A. agrarius* (Łopucki et al. 2021) reports that *urban animals are less likely to avoid close contact with each other and are more likely to show tolerant behavior. They also have a lower tendency towards monopolization of food resources.*

The latter results are interesting as they show a tendency for more social attitudes and lower levels of aggression under urban conditions. Behavioural traits have long been known as prerequisites for successful urban colonisation. In cats social urban life is well known. Dr Łopucki's work confirms that this holds even for small rodents at least with respect to conspecific tolerance. This is the first step to form social bonds.

The third group of again three publications deal with the interplay of urban areas as a habitat and urban planning. They appeared between 2015 and 2021 and received 48 citations so far (Scopus, retrieved 26.03.2023).

The first paper (Łopucki and Kiersztyn 2015) shows that the so-called ‘Hellwig’s method’ can be used in ecological decision making to assess the optimal combination of primary conservation area. The second paper, Łopucki et al. (2021) reports 50% lower hedgehog roadkills during the Covid-19 lockdowns. Finally, Łopucki et al. (2022) report on spatial avoidance between sousliks and moles on the Lublin airport grounds. The last two papers are typical autecology and largely descriptive. That less mammals are killed by car when no cars are present seems self-evident. The spatial avoidance between potentially competing soil living mammals is also rather expected. I was surprised by the application of Hellwig’s method. A short internet search revealed that this method is very rarely used, and if then by Polish scientists. I did not find any comparison of this and other more modern methods of parameter selection in linear models. Therefore, I’m not sure whether the Łopucki and Kiersztyn (2015) paper is sound. I treat this paper rather as a historical note.

The methodological toolbox of dr Łopucki is mainly based on classical mammal life and photo-trapping techniques, and is, on occasion, accomplished by spatial mapping and standard biochemical analyses. Modern molecular techniques for population analyses might have returned additional information. I also missed more advanced ecological methods of trait based community analyses, food webs and ecosystem functioning. The trapping techniques are accompanied by standard statistical analyses including multivariate models and GIS techniques. These methods are appropriate and do not raise concerns regarding the quality of the research.

Other scientific activities

Apart from the ten papers that entered the main achievement dr Łopucki has published 48 other scientific publications mainly dealing with different questions related to the ecology and conservation status of mammals, but also on birds and invertebrates, and purely biochemical work (the latter always as co-author). Despite of this effort dr Łopucki is not linked to the international scientific community. This is particularly astonishing as urban ecology is a global topic and similar work is probably conducted in all countries. Only few co-authored publications (none of the major achievement papers) appeared from international cooperation. The self-report also lists 67 national and international conferences. At all of the international conferences dr Łopucki was only a co-author and it is not clear whether he personally

attended the meeting (co-authors most often do not travel). This lack of international cooperation is clearly a weak part of the application.

Dr Łopucki contributed to two national scientific projects financed by external agencies. In an ongoing NCN project on European Deer he serves as the PI of the Lublin part within a consortium headed by researchers from SGGW. He lists also five other projects for which it is not clear whether these were funded by external sources and whether they had an official status. This grant activity is comparatively low and a weak point of the present application.

The self-report does not mention any membership of dr Łopucki in scientific associations or committees. This is another sign that dr Łopucki is weakly connected to the scientific community. Nevertheless he is internationally recognised as testified by the comparatively high number of journals and agencies for which he reviewed, notably also for Science. Currently he serves as a guest editor, unfortunately for an mdpi journal. This activity is within the current standards.

The self-report lists three short term (two weeks) scientific field trips to Belgium and Romania). Other internships only regard Polish institutions, some of them from Lublin. Therefore, dr Łopucki did not spend a longer time abroad to be counted as an international scientific internship. This is astonishing as dr Łopucki had the opportunity for networking as he took part in international cooperation initiated by Prof. Kiersztyn. This low international activity is again a weaker part of the present application

Didactic and other activities

Dr Łopucki is based at a university and therefore has the common didactic load of 210 hours per academic year. I was a surprised to see the Table with the effective didactic workload that in many years exceed 300 hours. So far, dr Łopucki promoted six bachelor theses.

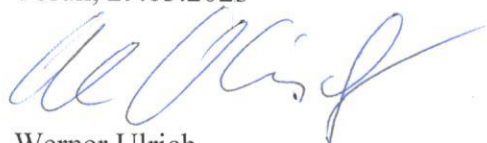
Popularization of science is becoming increasingly important. The self-report of dr Łopucki mentions 20 publications in popular science, although no details are given. He conducted several faunistic expertise for the private sector. From 2009-2015 he administrated the ‘Internet Lexicon for naturalists’ hosted at KUL. This popular outreach is typical for a university scientist.

Conclusion

My final verdict has to weight the scientific, organizational and teaching activities of dr Łopucki. Dr Łopucki is an expert in mammal ecology, particularly in urban ecology. The nine papers associated with his application fulfil the requirements for a successful habilitation. For his scientific work Dr Łopucki uses an appropriate toolbox. The total scientific output, given the long time in science, is intermediate but sufficient. I note the increasing scientific activity. I have reservations with respect to international cooperation and project lead. The activity in scientific organizations and administration is typical at this stage of career. In summary, the increasing scientific output outweighs the shortcomings in international cooperation.

In my view, dr Rafał Łopucki 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.

Toruń, 29.03.2023



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