

Assessment report on PhD thesis by Iwona Giska entitled: "*Effect of metal pollution on genetic variation in natural populations of selected soil invertebrate species with different dispersal potential*" submitted to Jagiellonian University, Cracow, Poland

I found the thesis of Iwona Giska original and innovative. The aspect concerning possible link between genetic polymorphism and pollution by heavy metals was tested in the most appropriate way, e.g. using three species (the earthworm, the centipede and the rove beetle) that differ with dispersal potential. Furthermore, RAD-tag markers that allowed to scan genomes are very innovative methodology and prove the originality of the research in this thesis. Another original aspect is the finding of at least three cryptic species within *Lithobius forficatus* using mtDNA and nuclear RAD-tag sequences.

In my opinion the scientific quality of the thesis is very high. The experiments were designed very well, methodology is modern and excellent, all statistical tests were performed in an appropriate way. All the papers included in the thesis have good scientific background. Results on metal concentrations (measured in different ways) as well as population genetic data are presented in a clear, well readable way. Discussion in all four papers is also well written and address all important issues.

The thesis consists of General introduction, four chapters dealing with population genetics of studied species and data of heavy metal concentrations in the study sites near Olkusz, Poland. The thesis ends with General discussion and Bibliography sections. The thesis is well written, I did not find any errors in spelling or English grammar. The subdivision into four papers is well planned. Each part has a good structure and represents very good style of writing. The text is clear and concise. Tables and Figures are well described and self-explanatory. The reasoning is based on good literature search.

I have only a few minor comments concerning the Thesis of Iwona Giska.

- Site OL1 is mentioned as the most polluted, while from Table 2 in paper 1 it is clear, that the most polluted is OL2 (especially when pore-water concentrations and extractable concentrations are considered). This fact is also properly stated in General discussion chapter. I am sure, this does not affect the interpretation of results, however it could be cleared and explained.
- Should all sites in the Olkusz area (as a total combined sample) be compared with unpolluted TR site that shows very high genetic polymorphism (Paper 2: Tables 2 and

5) (in case of *Lumbricus rebellus*) and with Kozienicka Forest sample (paper 4, Table 2 for *Staphylinus erythropterus*)? In my opinion, the genetic polymorphism within TR and PK samples (that origin from unpolluted areas) may be considerably higher than in a combined sample including the studied populations from polluted OL area.

- The Author of thesis suggests that high genetic polymorphism in mtDNA in polluted areas may result from some adaptations. It is worth to check the type of substitutions in studied mitochondrial gene(s) (e.g. synonymous/nonsynonymous) – this may help to test this interesting assumption.
- In paper 3 no info concerning heavy metals on genetic polymorphism is present in Abstract. Indeed, no such impact was detected, however it might be stated in Abstract.

Overall assessment

Despite the abovementioned, minor comments, this is a very good/excellent thesis. The hypotheses are well defined, methods are modern and appropriate, all the experiments were well designed and controlled, results are sound and discussion addresses all important issues, making this thesis an original and important contribution to ecotoxicological, population genetics and evolutionary sciences.

Based on the above, I conclude that the thesis of Iwona Giska fulfils all the requirements of a PhD thesis, as specified by Polish law (article 13 “*Ustawy o stopniach naukowych i tytule naukowym oraz stopniach i tytule w zakresie sztuki* (Dz. U. z 2003 r. nr 65, poz. 595; ze zm. w Dz. U. z 2011 r. nr 84, poz. 455”). I am convinced that Ms Iwona Giska should be admitted to the final stages of the PhD track.

Łukasz O. Gróździński rozprawy

Sincerely yours

Białystok, 26.02.2016

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