Dear Reviewer! Thank you very much for the attentive and comprehensive review. We tried to correct our mistakes, our manuscript was profoundly revised. Our answers to your notes are given in red colour.

Manuscript:

**Intra-specific Body Size Variation of Ground Beetles (Сoleoptera: Сarabidae) in Latitudinal Gradient**

Latitudinal variation of body size in Ground Beetles

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General Comments:

The paper is written clearly and concisely in most parts, although some paragraphs could be additionally clarified by splitting, and/or reformulating the sentences.

Methodology is inadequately described. Table should be reformatted and supplemented by some missing data (see specific comments below).

The Results are clearly delineated but graphical presentation of the Figures is not satisfactory in the present form, and should be substantially improved. Legends to figures might be more informative and descriptive.

The References list also requires additional check-up regarding the reference format of Periodicum Biologorum.

Furthermore, I recommend the authors to seek for a final linguistic check of the entire manuscript by qualified language expert.

**Specific Comments:**

## Page Paragraph Line Comment

1 1 Title: paper is dealing with intra- and inter-specific body

variations not only intra-specific …rename the Title (e.g. “Body size variations of Ground Beetles…” or “Body size variations in six widespread carabid beetles”…. or similar)

Corrected

Abstract: No more than 250 words (there are more than 450 words)

3 18 First section is not named “Background and Purpose”

Corrected

3 19 **Bergmann's rule**, Bergmann rule, Bergman rule (-n is missing)

or Bergmann's Rule – use one form; the first one is the most used in scientific papers - please also check throughout the text!

Corrected

3 27 You should use term “material” (without “s”)….material and

methods

Corrected

3 39-42 Abbreviated terms should be written in full when first

mentioned (*C*. *granulatus...*)

Corrected

3 41 Bergmann's clines or Bergmannian clines or Bergmann clines –

same problem as above

3 43 "*Carabus " -* font italics - please also check throughout the text!

Corrected

3 40;45 *P. cupreus* and *Poec. cupreus* –use one tipe of abbreviation

Corrected

Introduction

4 71 the left parenthesis is missing… 8, 9, 19)

Corrected

4 87-89 reformulate sentences (we…we…we…)

Corrected

Material and methods

4 92 “material” (without “s”)…

Corrected

4 98 The Table 1. is not adequate in its present form. Reformat the

table according to Periodicum Biologorum table-format.

“Table 1. Sampling localities and number of specimen of carabids used in the morphological analysis.” There is no number of specimens just sample size! Missing data!

We have searched the last issue of Periodicum Biologorum and formatted Table 1 in its way.

In our study sample size= number of specimen in morphometric analysis, because all sampled beetles were measured

5 101-103 It will be better to write: *Carabus (Carabus) granulatus*

Linnaeus 1758, *Carabus (Tachypus) cancellatus* Illiger 1798, *Carabus(Oreocarabus) hortensis* Linnaeus 1758 (missing),  Pterostichus melanarius Illiger 1798, *Pterostichus niger* Schaller 1783, *Poecilus cupreus* Linnaeus 1758.

Corrected

5 101 missing data – how many specimens of each species…from

which region …(sample size is varying a lot from one region to another)

Corrected and all information is given in Supplement 1

5 109 Figure 1. instead of Fig. 1. (This image was already used in

authors’ earlier publication)

Corrected

Perhaps will be better to write: Illustration of measurements: 1-2 (elytra length), 3-4 (elytra width)….

Corrected

5 112 two points (12)..

Corrected

5 114 “…influence of the habitation in area…” better to say “…the

impact of habitat…”

Corrected

5 115-128 very confusing part

“…our result reflect body deviations caused by the geographic location (latitude) only and not by other environmental factor …and the other sentence “…the model which estimated the variation of elytra length was recorded as follows (using the R syntax): \*\*\*\* Elytra.Length~fSex/(fRegion+fAnthropogen+fHabitat+fIsolation), where fSex – the factor, representing sex, fRegion- factor, representing the area etc.”

Corrected

6 119 “In other word…” “s” is missing “In other words…”

Corrected

Results

6 146 “In order to illustrate the way of our analysis we demonstrate the

results of linear models when estimating the role of main environmental factors in body size variation in one of the species in study…” Which species? There is no data in previous section (Material and methods) about sth like that!

In “Material and methods” we wrote that six carabid species were in study. All of them were analyzed in analogues way. As the example of such the analysis we presented the results of modeling, how different environmental factors affected studied traits in **one** of the explored species – *Pterostichus niger –* and gave some comments about this species traits variation (Fig. 2). The other five species were treated in the same way. The final conclusion was given in manuscript: We conducted the same analysis for all studied species. Results were published earlier *(13, 14, 17).* The main conclusion was as follows: different traits varied in differing directions under the influence of the same environmental factor.

6 151 “…in the *P. niger* traits variation in size. E. g. in shadowed

biotopes (elm, lime) elytra length…” lower case e.g.

Corrected

7 155 Figure 2. In the present form it is very hard to follow which of

the measured traits significantly vary with latitude …it will be better to left only “a” and “b” images (traits that vary significantly)

Name the axes…not only mm but for e.g. elytra length/mm

Corrected

7 157 “…(signed as “@” – the contribution of area, “%”-

anthropogenic disturbance, “$” – type of vegetation.”

Except right parenthesis is missing it will be much better to use some other symbols like circle, triangle or sth similar…

Corrected

We simply removed all symbols at all, because it is understandable the impact of which factor (region, anthropogenic or habitat) was studied.

7 165-166 “…Another example. Northwards from Tatarstan, in Udmurtia,

elytra length in *C granulatus* became longer…” punctuation marks missing

Another example**:** Northwards from Tatarstan, in Udmurtia, elytra length in *C****.*** *granulatus* became longer…

Corrected

7 167 remove font italics “….*P. melanarius* *elytra* length*…”*

Corrected

8 169 Figure 3. should be modified or replaced… in this form it is

difficult to see elytra length variations …perhaps it will be more clearly if you use different colors but probably the best will be to change the way this results are displayed

Mari El or Mariy El Republic???

We tried to modify this figure because of its importance to the understanding of our results: each region has its own color, colors change in rainbow turn – from the bottom (low latitudes, red color) to the top (high latitudes, violet color).

7 171 Figure captions: describe figures in more details

8 182 Figure 4. Name the axis-not only %

Corrected

9 193 Figure 5. Name the axis- y: not only mm; x: latitude value

missing… put the name of the species on the top of each image - it will be easier to see differences

Corrected

Discussion

11 209 „There has been shown that relatively large insects with long

development times tend to express converse Bergmann clines, whereas relatively small insects with short development times tend to express Bergmann clines (2).” Do you mean in earlier studies?

Corrected

239 “…Matlin (34, 34)…” correct (34, 35)

Corrected

241 “…diversity (including meso- and microclimatic diversity the period of…” parenthesis is missing

Corrected

Conclusion

12 274 “We showed three types of latitude body size variation in

carabids.”

What about the lack of samples in northern regions?

(“Additionally the lack of the pronounced fluctuations in elytra length in *Poec. cupreus* might be determined by the lack of samples in northern regions: the highest latitude where that species was sampled in our study was 55°47’N.”)

Among 6 species studied the only *Poec. cupreus* was not sampled in northern regions. We discussed in the manuscript two reasons why such type of elytra length variation was observed in that species.

References

14 314-411 check the entire list and correct according to Periodicum

Biologorum reference style - abbreviations, double space or

missing space etc.

14 337 “…R DEVELOPMENT CORE TEAM 2011 R: **a** language and

environment… „ Upper-case A

Corrected

14 345 “WANG M, BUSHMAN B 1999 Integrating…” WANG M C, BUSHMAN

B J 1999….

Corrected

14 377 BLANKENHORN W U, FAIRBAIRN D J 1995 Life-history adaptations

along a latitudinal cline in water striders. *Journal of Evolutionary Biology. 8*: 21 -41

Incomplete article title: Life-history adaptation along a latitudinal cline in the water strider Aquarius remigis (Heteroptera: Gerridae).

Corrected

15 397 “…available online: insectscience.org/8.47 “ ??? URL

Corrected