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Review

of the Ph. D. entitled

*“Systematics and palaeoecology of the Late Cretaceous plants
in the Křivá Formation, southern Bohemia”*

by

Mgr. Zuzana Heřmanová

made by

Dr. Adam T. Halamski

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The Ph.D. of Mgr. Zuzana Heřmanová (*née Váchová*) consists of an introduction and of six papers, five of them published as peer-reviewed papers, the sixth one unpublished. All the papers are co-authored with Z. Heřmanová as the first author and J. Kvaček (the supervisor of the Ph.D.) as the second author; in two cases there is a third author.

All the papers are written in English. The language is clear, occasionally requiring minor corrections (mainly in the sixth paper, *cf. infra*). The fact that five of them have already been published as peer-reviewed papers proves that their scientific content and formal qualities are those required of a scientist. In particular, they testify that Mgr. Z. Heřmanová is able to conduct fieldwork, to prepare the obtained material, to make a correct description, to analyse the material according to modern standards of palaeobotany, to draw reasonable inferences from available data, and to present them in a form recognised by the international community. The reader is impressed by a wide array of modern methods of study of the palaeobotanical material used by Z. Heřmanová, including different kinds of scanning electron microscopes and a synchrotron-radiation x-ray tomographic microscope (SRXTM).

The first paper is particularly interesting because it is not limited to the palaeoclimatological analysis of a single (even if most interesting) flora but contains a valuable methodological discussion, namely that dealing with the interpretation of differences of palaeoclimatological values (like mean annual temperature and precipitation, temperatures of the coldest of the warmest months, &c.) obtained by three different methods. This testifies that the author is not only a passive user of methods invented by other scientists but is aware of their deep signification and limitations. I would, however, disagree with using *Platanus* as a modern relative of *Ettingshausenia*; the latter is a form genus, most often related to Platanaceae but sometimes also to Menispermaceae. All the more, the recent representatives of *Platanus* are relict species and it is quite hazardous to use their present distribution to get inferences about their past climatological preferences.

The second and the fifth papers reinterpret fossils previously thought to represent plants as insect eggs. They testify that the author is able to critically re-evaluate opinions of her predecessors and convincingly show that they should be abandoned. This is all the more worthy of admiration that the above-mentioned (false) interpretation of *Palaeoaldrovanda* was that of two world-renowned palaeobotanists E. Knobloch and D. Mai.

The third and the fourth paper are interesting contributions to our knowledge of the Normapolles complex. The description of *Budvaricarpus serialis* (the third paper) has been cited in a recent synthesis by Friis *et al.* (*Early flowers and angiosperm evolution*, 2011), an unusual privilege for a young author.

The sixth paper is an unpublished preliminary report on plant mesofossils from the Klikov Formation. Besides usual taxonomic descriptions, the paper contains a very interesting discussion on possible correspondences between leaf and mesofossil record. The conclusion stating that the correspondence is impossible to establish because these two records represent two different plant assemblages is certainly disappointing but just as topical as ever. Present-day palaeobotanists are very often obliged to correct the hasty conclusions of their predecessors. The above-mentioned papers prove that Mgr. Zuzana Heřmanová is aware of this problem, wherefore conclusions drawn by her, even if sometimes less 'impressive' than some of those from the past, are certainly better documented.

The duty of a reviewer is to stress even tiny imperfections of the presented work. First of all, I would like to dwell on the definition of the aims of the thesis as found in the 'Autoreferát'. In my opinion the phrase "A systematic

revision of selected plant reproductive structures from the Klikov Formation is the first aim of this thesis” [Autoreferát, p. 8] is not the best way of uniting the six contributions making the Ph.D. I would appreciate a more detailed explanation of what material has been ‘selected’ and why. The reader wonders whether the author has chosen the most frequent taxa or the best preserved ones, or just those which were interesting for her for some reasons. This should be clearly stated already at the beginning, otherwise the procedure of ‘selection’ might appear arbitrary.

Similarly, the phrase “Palaeoecological study of the Klikov Formation was the third aim of the thesis” is not particularly well adapted to the content. The author apparently refers to the first paper devoted to the palaeoclimatological analysis. ‘Palaeoecology’, however, suggests rather studying relationships of plants to the substrate, reconstructing palaeocommunities, and so on. The present formulation is somewhat misleading.

In the paper 5, p. 9, the Polish locality Rabka-Zaryte, represented on the map in Silesia near Wrocław, should be located in the Carpathians, some 200 km SEE.

In the paper 6, p. 4, the authors say that “Genus *Normapoles* sp. A is represented as one fruit”. First a formal thing, *Normapolles* (with two l’s) is a genus but *Normapolles* sp. A is already a species. Second thing is more important: *Normapolles* is a pollen form genus and should not be used for fruits.

The description of the Zliv locality (p. 17 of the Czech text) includes geographical coordinates that are manifestly false: 49° 04' 94" 30N, 14°23' 90" 40E. A minute (1') is divided into sixty seconds (60"), so one can never have 90 arc seconds! These coordinates are slightly different than those given in the paper 6, p. 1; this should be explained (different position inside the quarry?).

I think that publishing the sixth paper by Heřmanová & J. Kvaček will require supplementing the geological part. The authors state that “the mesofossils were extracted from one thin layer of dark sand within grey sandy [*should be* sandy]-claystones”. Several obvious questions arise: is this layer located in the lower or upper part of the sequence exposed in the quarry? how is it located in respect to the entire Klikov Formation? is there just a single layer or more than one? how rich is it, *i.e.*, how much sediment has been sieved to obtain how many specimens? is there any possibility to get a more precise dating with newly collected pollen (the interval is given only as ‘Late Turonian to Santonian’)?

Some additional minor errors are signalled herein:

Autoreferát, p. 8:	systemic	<i>should be</i>	systematic
Disert. práce, p. 15:	Quedlimburg		Quedlinburg
p. 17	<i>Quedlimburgipollis</i>		<i>Quedlinburgipollis</i>
Paper 6, p. 5	Taxon 13 represents		Taxon 13 is re-
	only one		presented by
	specimen		only one ...
p. 6	Pentaphylaceae		Pentaphylacaceae
p. 7	mega fossils		megafossils
	was discover		was discovered

The last question I would like to discuss is not so much an objection to Mgr. Zuzana Heřmanová but rather an expression of personal regret. It is commonplace to say that at present more and more scientific papers are multi-authored and indeed a large number of topics cannot be treated by solitary scientists. However, a ‘traditional’ Ph.D. has always been a single-authored work (even if prepared under the direction of a supervisor), so I must confess I am a little bit worried to see a Ph.D. composed solely of multi-authored papers. I would have preferred that at least one paper were authored by Z. Heřmanová only.

All the objections enumerated above should not obscure the main fact that Mgr. Zuzana Heřmanová is the first author of five published peer-reviewed papers, the contents of which represent valid contributions to Cretaceous palaeobotany, including in particular critical analysis of methods in common use among palaeobotanists, and that her Ph.D. thesis is a coherent set possessing a common subject and precise aims (even if their formulation is somewhat imperfect) that have been fulfilled.

I conclude therefore that Mgr. Zuzana Heřmanová may be allowed to publicly defend her Ph.D. thesis entitled “Systematics and palaeoecology of the Late Cretaceous plants in the Křivá Formation, southern Bohemia”.

Dr. Adam T. Halamski

Warsaw, 5th February, 2014