

Senckenberg | Königsbrücker Landstraße 159 | 01109 Dresden

Dr. L. Kunzmann

31.08.2017

**Review report on habilitation thesis:  
Late Cretaceous floras in Central Europe and their palaeoenvironment  
by Dr. Jiří Kvaček (Prague)**

Since several years Jiří Kvaček is well-known and well accepted in the paleo-discipline community as expert in Cretaceous plants, floras and environments. His long list of scientific publications as well as scientific books show that he conducts successfully research projects on these topics and that he is part of a network of international specialists on Cretaceous staff who are frequently his co-authors. Regularly, he gives talks in international conferences, both palaeobotanical and botanical, and co-organizes special symposia. He is also an expert in nomenclature of fossil plants and therefore member of the committee for fossil plants. All these facts underline his scientific reputation.

Late Cretaceous climate and environments are indeed interesting as a model for a general greenhouse world but with tremendous short cool intervals with polar ice shields. To understand ecosystem evolution under these conditions plant fossils are excellent indicators for these changes as plants and vegetation immediately reflect habitat conditions.

The thesis is a framework based on seven scientific, peer-reviewed publications. For six of which he is the first author; to the seventh publication, the book on the Gruenbach Flora the two co-authors contributed equally. According to my experiences this amount of scientific contribution is right the overall standard of a habilitation thesis in paleontological sciences. It is not the purpose of this report to re-evaluate the results and significance of these articles as this has been already done by the peer-review process which terminated in publications.

**SENCKENBERG NATURHISTORISCHE SAMMLUNGEN DRESDEN**

Dr. Lutz Kunzmann | Sektionsleiter Paläobotanik | Abteilung Museum für Mineralogie und Geologie

T +49 (0) 351 795841 4406 F +49 (0) 351 795841 4404 Lutz.Kunzmann@senckenberg.de www.senckenberg.de

SENCKENBERG Gesellschaft für Naturforschung | Senckenberganlage 25 | 60325 Frankfurt am Main  
Direktorium: Prof. Dr. Dr. h.c. Volker Mosbrugger, Prof. Dr. Andreas Mulch, Stephanie Schwedhelm, Prof. Dr. Katrin Böhning-Gaese, Prof. Dr. Uwe Fritz, Prof. Dr. Ingrid Kröncke

Frankfurter Sparkasse | IBAN DE15500502010000760157 | SWIFT HELADEF1822 | UStIDNr. DE114235295

Mitglied der Leibniz-Gemeinschaft

First of all, I would like to state that the scientific scope of the thesis is nicely resolved as this thesis indeed sheds new light on the habitat structure and environmental parameters based on fossil plant proxy data of these Late Cretaceous ecosystems. Moreover, this thesis not only opens a single window into the Late Cretaceous world it ranges from the Cenomanian to the Campanian und thus it covers a time interval of ca. 30 Ma, which is rather long.

Certainly, the time intervals and fossil floras treated in the thesis come from the main and most important publications of the author. However, for a more complete history of vegetation and climate in the Late Cretaceous Maastrichtian floras, although present in Central Europe, are missing.

Main purpose of this report is to evaluate the capability of Jiří Kvaček to integrate the results of these papers into a comprehensive picture of this deep-time evolution of ecosystems. One can finally state that the assertions and conclusions reveal the first and rather complete history of vegetation and terrestrial climate in the Late Cretaceous of Central Europe.

The thesis follows in all accounts scientific policy. It is clearly and logically organized. The presentation of the topic including the data and results is excellent with some minor issues. Main issue is the lack of scientific questions in the introduction. Although the aim of the study is quite clear from the table of contents, the abstract and summary research questions have to be formulated.

Another matter of debate is the selection of fossil floras for this integrated study which strictly follows the publication record. I regard the choose of the Gruenbach Flora not directly as problematic but the Gruenbach locality definitely was not part of central Europe in the Late Cretaceous but rather part of the Tethys realm. So, any results of palaeoclimatic comparison between the other floras and Gruenbach should include the distinct palaeogeographic situation which is not properly reflected in the thesis.

I also missed a statement on the problem to detect short-term climate changes with fossil macrofloras. The floras treated are able to explain long-term history of climate and habitats as well as vegetation units. However, recently short-term global sea level changes (large-scale drops) in the Late Cretaceous have been interpreted as evidence for the existence of polar ice sheets in an overall greenhouse world. Perhaps such short-term events could never be recognized with macrofossil assemblages.

A very interesting and important chapter is that on whole-plant reconstruction and naming. It is so far unique in the amount of whole-plant proposals for the Late Cretaceous reconstructed from isolated organs or plant parts. Really convincing are the nomenclatural consideration about naming and circumscriptions of isolated organs as well as whole-plant taxa. I recommend, beyond this thesis, to publish this chapter in a similar outline as a review article.

Of great value is also the chapter on reconstruction of habitat types including their typical plant associations. This is the first and most important step towards the reconstruction of vegetation belts in Europe based on macrofossils (pollen belts are already introduced, namely

Normapollis province etc.) and the evolutionary and palaeogeographical history of those belts. However, this is a task for future investigations.

Minor issues:

Figures are quite rare in the thesis. Although one can read the publications listed in the Appendix, it would have been more attractive for the reader of the thesis to find some images of the key fossils for the habitats that are characterized.

Fig. 1: "B. area of Quedlinburg and Walbeck"; this basin is called in Germany Subhercynian Cretaceous Basin and Quedlinburg, Blankenburg and others sites are main localities. The sediments are Coniacian to Campanian in age but underlying strata are also of Cenomanian-Turonian age and widespread in NW Germany. Walbeck, Maastrichtian in age, is situated north of this area in a smaller independent basin.

In conclusion, I highly appreciate that Jiří Kvaček has written this cumulative thesis presenting his knowledge on the European Late Cretaceous floras which is concomitantly state-of-the-art in this research topic. This thesis nicely summarizes what have been published in recent times by Jiří Kvaček and his co-authors and thus provides a fundamental update of our knowledge on Late Cretaceous biota and environments in Central Europe. For the research field the

thesis is an outstanding contribution to science and an excellent proof for conferment of a habilitation doctorate to him. According to my experience both the performance of investigation, goal-driven collaborative networking and publishing as well as this thesis are distinctly excellent.

I therefore hardly recommend to accept this thesis as habilitation performance. Furthermore, I evaluate the overall quality of the thesis with EXCELLENT to VERY GOOD (mark: 1.3) taking the above mentioned minor issues into account.

Dr. Lutz Kunzmann  
Dresden, August 31, 2017