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Report on the Doctoral Thesis by Magr. Petr Kuneš:

Human-driven and Natural Vegetation Changes of the Last Glacial and Early Holocene

The cumulative thesis by Magr. Petr Kuneš consists of seven papers plus an introduction and a summary. It follows a clear and interesting concept because it addresses three core questions that vegetation history as an important contributor to environmental history needs to answer:

(1) To understand the relationship between vegetation and pollen spectra under various conditions and vegetation types is crucial – and difficult. Chapters 2 and 3 provide an excellent example of both a set of modern samples from steep environmental and vegetational gradients and their application back in time.

(2) The quantification of very complex environmental changes calls for multivariate techniques. The four dimensions (in space and time) and the high number of plant taxa involved require appropriate methods. The chapters 3 and 4 are remarkable examples that will get international recognition. (I apologize for not being able to read the full text of the chapters 5 and 6).

(3) Interactions between the natural environmental changes and prehistoric human living conditions are of great pluridisciplinary interest. The chapters 4 to 8 develop a comprehensive picture for the Czech Republic with emphasis on the Mesolithic period (that was neglected so far compared to the Neolithic or Bronze and Iron Age).

The thesis is built on strong theoretical and methodological grounds. It goes far beyond pure descriptive reports of findings, it is full of innovative ideas and it fulfils the criteria for obtaining a PhD degree to a very high degree. I therefore recommend to the Faculty of Sciences to accept this thesis without any reservation.

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Questions to be discussed on May 16th 2008

1. Spatial scales: In both modern surface samples (for establishing the relationship between vegetation and pollen spectra) and in fossil pollen samples from cores, several spatial scales are functional together. But on your fossil grain its origin is not indicated. How did you address this problem in the field and how would you address it "in an ideal world without time constraints"? To what degree do you think we can improve our methods to link data and models? (incl. landscape topography, structure or patchiness of vegetation, mosaics, open ground without vegetation?).

2. How to determine a glacial refugium? You discuss some full-glacial records. Therefore the question: If the presence or absence may or may not be clear based on palynological data alone, what ways out of that problem do we have?

3. Climate is more than just mean annual temperatures..... Climate reconstruction is a busy field of research right now. But what possibilities do you see to separate winter- from summer temperatures? Or to get estimates of humidity (P-E)?

4. Anthropogenic indicators: You opened a new field in palynological discussions, namely the potential anthropogenic indicators before the advent of cultivated plants. Can you identify some **processes** (governed by human impact) that can possibly "make" a native species into an anthropogenic indicator? (including *Corylus* – an interesting case!)

5. Forest fires: Some of the pollen diagrams in your thesis also provide curves for charcoal particles. Could you please comment on the following problems related to the charcoal record:

- How to distinguish small local fires from larger fires in greater distances?
- How to determine fire frequency?
- Do you expect some tree genera more sensitive to fires than others?
- Do you expect taxa that can profit from fires?
- How will fires interact with the chemistry of peat or sediment?

6. Collaboration with archaeologists: You are already advanced in this field. But what possibilities do you see to address their classical question about the density of the human population by methods of natural sciences?

7. Climatic changes during the Late-Glacial were of high amplitude and high velocity. But a number of physical and biological factors prevents a simple and straight forward application of even the most complete late-glacial records to modelling the future global warming. What are similarities and what are differences of physical conditions between the Late-Glacial and the 21st or 22th century that need to be considered when "applying" late-glacial scenarios to modelling climate change or biotic responses?

Best regards

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