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Report on the PhD dissertation submitted by Pranav Banshidhar Ranjan

The PhD dissertation submitted by Pranav Banshidhar Ranjan is dedicated to the study of the paleontology and biostratigraphy of the complex and diverse proboscidean fauna from the Plio-Pleistocene epoch in the South of Eastern Europe and the Upper Siwaliks of India. The study focuses on the Elephantidae family, providing a comprehensive analysis of their evolutionary patterns and the subsequent implications for biostratigraphic correlations. The candidate employed a multidisciplinary approach, incorporating geological, paleontological, and morphological analyses, to elucidate the complex interconnections between these two geographically distinct regions. This thesis contributes significantly to our understanding of the evolution of proboscideans and the broader implications for the geochronological and paleoenvironmental contexts of the two studied regions. As the study area is located at the crossroads between Europe and Asia, the fossil record may contain species from the two areas, which makes the task very complex. This report is based on the self-report (*avtoreferat*) in 31 pages written in perfect language.

The first chapter provides a comprehensive review of the research history of the proboscidean fauna in the Plio-Pleistocene, highlighting relevance for the biostratigraphy of the two regions. The decision to use the species name *Archidiskodon meridionalis* could have been discussed and justified briefly, because most researchers now agree to use *Mammuthus meridionalis*.

The second chapter introduces the materials and methods employed to reach the objectives of the work. The first part of this section outlines the materials employed in the research, describing where and when they were collected and the institutions where they are currently stored. This information is really important if researchers want to access these specimens for future research. The methods section is describing the techniques used to study the different elements (teeth, lower jaws) and the microstructure of the tusk and tooth enamel. The candidate shows strong skills to use different approaches including morphology, osteometry, and microscopic analyses, and to combine the results to reach the objectives of the work. This approach is innovative and original. He followed rigorous scientific protocols which are necessary to attest for the reliability and accuracy of the conclusions reached in this dissertation.

The chapters 4 to 6 present the results of the thesis. First, the dental, jaw and tusk morphology of the fossils using the standard terms used in the field; then the geological and stratigraphic context; and finally the studies of the microstructure of the tusks and teeth of *A. meridionalis*. The candidate has used both tusks and teeth to identify the specimens at the genus and sub-species levels, respectively and the results are impressive. For the tusks, even fragmentary elements could be used to identify the specimens to the genus level. This is really

important to avoid destructive sampling on complete tusks and to take advantage of the fragmentary remains that usually lack of paleontological interest. For the teeth, the microstructure revealed evolutionary changes related to an increase in the abrasiveness. The destructive method proposed by the candidate is useful both for phylogeny and paleoecology. It could be nicely complemented with dental mesowear and microwear analyses to correlate these changes to immediate changes in diets and habitats of these populations of extinct species.

In the following chapter, the results are contextualized within the broader framework of paleontological and geological knowledge. The implications of the findings for biostratigraphic correlations between the South of Eastern Europe and the Upper Siwaliks of India are thoroughly discussed. I would have expected a stronger emphasis on the evolutionary scenarios and migration patterns for proboscideans drawing on the comparative analyses conducted earlier in the thesis.

The conclusion summarizes the key findings of the research and the contributions to the field of paleontology and biostratigraphy. The limitations of the study could have been discussed further, and avenues for future research proposed. It is also important to highlight that the candidate published three papers in peer-reviewed journals (two as first authors) and presented his work in 7 conferences or sessions (5 as first author).

Besides some very minor issues, this thesis represents a significant contribution to the field of paleontology, enriching our understanding of proboscidean evolution and the biostratigraphic correlations between the Plio-Pleistocene of the South of Eastern Europe and the Upper Siwaliks of India. Through meticulous research and multidisciplinary analyses, the study provides valuable insights into the Plio-Pleistocene fauna of these regions, shedding light on the interconnectedness of ecosystems and species in the distant past. The work presented by Pranav Banshidhar Ranjan deserves to be defended and he merits a high grade for his PhD.