

# 3RD CROSSING THE PALAEOANTHROPOLOGICAL- ECOLOGICAL GAP (CPEG)

**Abstract book**

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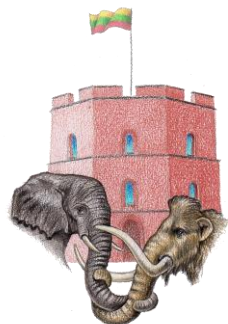
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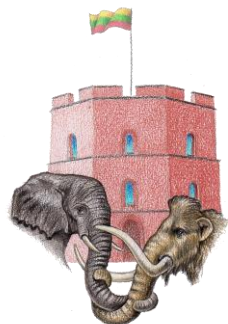
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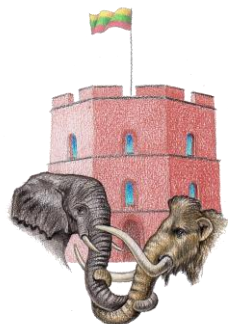
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## MEGACLIMATE CAUSED TRANSITIONS AND MULTISTABILITY IN MACROEVOLUTIONARY DYNAMICS OF LARGE MAMMALS

S. Bekeraitė, R. Stankevič, K. A. Haaga, I. Juchnevičiūtė, A. Spiridonov

On multi-million-year timescales, the climate system of the Earth exhibits complex wandering behaviour. We investigated the evolutionary impacts of long-term climate change by analysing the dynamics of Cenozoic mammal evolution, looking for the presence of state transitions,

multiple stable equilibrium states and their association with long-term climate evolution.

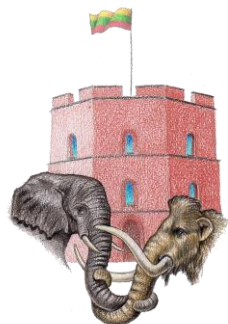
We performed Bayesian modelling of Artiodactyla, Carnivora and Perissodactyla evolutionary histories. Then we used causal inference methods in order to test the information-theoretic extent of associations between the climate and mammal diversity levels. We then employed recurrence plot analysis of the species richness time series, identifying the main transitions and regimes in large mammal evolution. Joint recurrence plots of diversity-Cenozoic oxygen isotope record as well as recurrence quantification analysis were used to further investigate the coupled dynamics of climate and mammal evolution.

We found that several transitions between different states of the long-term climate evolution correspond to subsequent transitions and multistable states of diversity.

The evidence for

the main climate transitions is recovered from joint recurrence states of diversity time series alone, indicating coordinated phase space behaviour of three different mammalian orders and climate. The diversity fluctuations increased in amplitude during the Coolhouse regime in Oligocene and Miocene, with the diversity evolution entering an unprecedented trajectory during the Icehouse climatic state of Plio-Pleistocene.

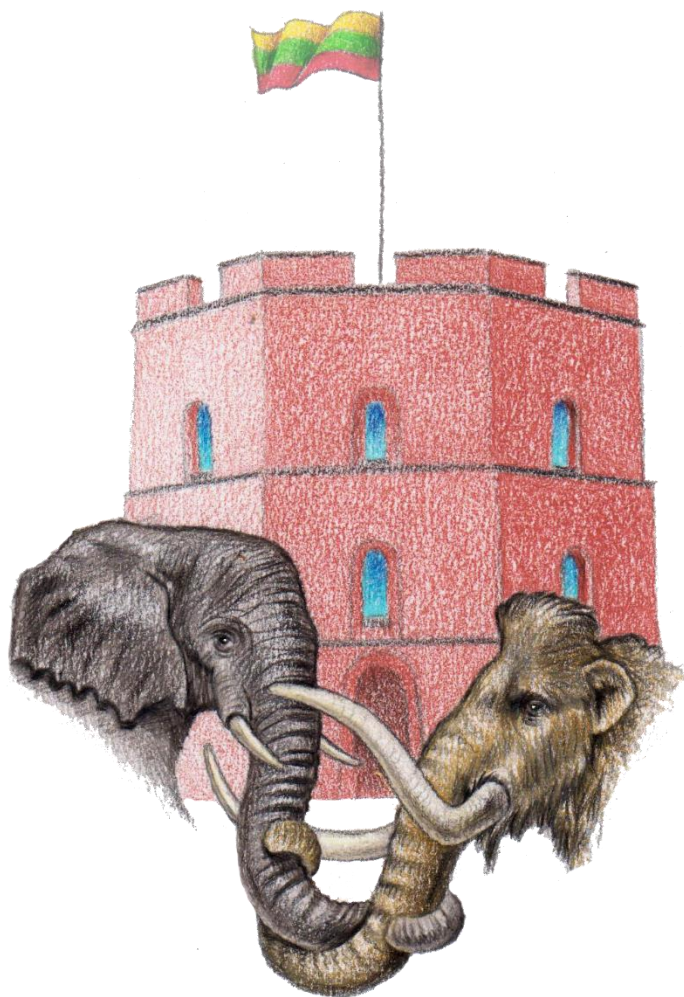
Phase space-based analyses suggest that mammal diversity evolution has been coupled with the dynamical state of paleoclimate on multi-million-year timescales. The presence and stability of transient diversity equilibrium states depends on the underlying climate regime.





# CPEG

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