



Local diversity hot spots in the Middle Miocene of the Central Paratethys: influence of environment and sampling

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Species richness captured by historical fossil inventories is a complex function of true local diversity, degree of outcrop-scale heterogeneity in species composition and sampling intensity. Disentangling these factors is hindered by the fact that the 'systematists follow the fossils' (Raup, 1977) and thus non-uniform research effort may both drive apparent diversity patterns and follow the actual presence of highly fossiliferous strata.

The molluscan fauna of Lapugiu de Sus (Hunedoara District, Romania) constitutes one of the most diverse Early Badenian (Langhian) assemblages of the Paratethys Sea, with almost one thousand species reported during 170 years of extensive studies. We evaluate whether this exceptional richness reflects the actual diversity hot spot or just a long history of fossil-collecting by comparing the fauna of Lapugiu with other Paratethyan molluscan lagerstätten of similar age. The literature-derived species lists for each section were contrasted with independent abundance data based on a standardized sampling protocol (42 samples, 24,000 specimens, and 530 species from six localities).

Although individual samples from other localities can exhibit comparable diversity levels, richness estimates for samples from Lapugiu are all consistently high, reflecting increasing evenness in more offshore depositional settings. This translates to the highest diversity at the outcrop scale when all samples are pooled. In contrast to other localities, however, for which data from historical inventories corresponds well to our quantitative estimates of total richness, the number of species described from Lapugiu is much higher than expected. This excessive richness likely reflects the 'Bonanza Effect' (sensu Dunhill et al., 2012), where uniformly species-rich deposits were attracting intensive taxonomic studies. The strong positive feedback between palaeontological sampling effort and fossil diversity may thus greatly overestimate the true differences in species richness between the most diverse faunas and more typical, background, fossil assemblages.

References

- Raup, D.M., 1977. *Paleobiology*, 3: 328-329.
Dunhill, A.M. et al., 2012. *Palaeontology*, 55: 1155-1175.