

## CONTROLS ON THE SKELETAL TAPHONOMY OF ANURANS FROM LACUSTRINE-HOSTED CENOZOIC LAGERSTÄTTEN

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The skeletal taphonomy of fossil vertebrates has enormous potential in understanding the origins of Lagerstätten as it informs on biological, chemical and physical characteristics of the depositional setting. Analysis of the skeletal taphonomy of a particular taxon in different fossil biotas can thus explain variations in preservation through space and time. Anurans are an ideal test case because their body plan has been conserved since the Mesozoic and they are abundant components of many Cenozoic lacustrine Konservat-Lagerstätten. Here we undertook a systematic analysis of the skeletal taphonomy of 180 anurans from Geiseltal (Eocene, Germany), focusing on completeness and articulation. We compared our results with published data on anurans from Libros (Miocene, Spain) and with new observations on the taphonomy of anurans from Enspel (Oligocene, Germany), Bechlejovice (Oligocene, Czech Republic) and Messel (Eocene, Germany). Our results reveal important shared taphonomic patterns. Anurans from all five biotas show a decrease in completeness from proximal limb elements (e.g. humerus) to distal limb elements (e.g. phalanges). Completeness is typically highest in the torso, excepting hip bones, which are often preferentially disarticulated or lost. These taphonomic trends are controlled by proximal factors that include the size and location of bones in the body, the 3D configuration of joints, stomach rupture and the decay resistance of connective tissue. These trends are superimposed by inter-biota variations in completeness and articulation, e.g., displacement and/or loss of entire limbs and larger body units, ultimately yielding a unique taphonomic signal for each biota. The primary controls on anuran skeletal taphonomy therefore reflect characteristics of the skeleton (bone size, configuration, location), soft tissue (decay rate, tissue recalcitrance) and depositional setting (water temperature, depth and bottom currents). These indices, and ultimately the broad palaeoclimatic setting and lake physiography, are the key taphonomic controls on the preservation of anurans in lacustrine-hosted Cenozoic settings.