



The site of Cherves-de-Cognac (Berriasian, SW France): a case of "discrete" Konzervat Lagerstätt leading to physiological conclusions.

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Paleontological sites which yield numerous, diversified and well preserved vertebrate remains are not common. They are considered as sites of exceptional preservation, according to the concept of Lagerstätt introduced and developed by Seilacher during the 1970's and 1980's. More often, these vertebrate Lagerstätten are recognised upon either the concentration of more or less diversified fossils (Konzentrat Lagerstätt) or the high quality of preservation of the fossils themselves (Konzervat Lagerstätt). Considering the Mesozoic, some spectacular sites which concentrate a highly diversified and well preserved vertebrate fauna are known over the world.

The recently discovered site of Cherves-de-Cognac (SW France), dated from the Berriasian (Early Cretaceous), has been excavated from 2001 to 2007 and yields a highly diversified vertebrate fauna, since all the major vertebrate clades are represented (Chondrichthyans, Osteichthyans, Amphibians, Squamates, Chelonians, Crocodyliformes, Pterosaurians, diverse Dinosaurs including Aves, and Mammals). However, beyond the common vertebrate macro-remains, the particularity of this site consists in the high concentration and diversity of well preserved vertebrate micro-remains, accumulated in this ancient lagoon. Such micro-remains, mainly teeth, are found in the 63 marly levels of the section, among which the richest yields up to 35,000 teeth per metric ton of sediment. In this richest level, the micro-vertebrate Konzentrat Lagerstätt itself, 26 families of vertebrates are identified. Such a high concentration

and high diversity give the opportunity to access the methods of quantification and reconstruction of the initial biodiversity, requiring a minimum amount of fossil data. The structure of the proximal biocenose can be reconstructed from this diversified taphocenose, as well as the possible trophic relations.

Beside this paleontological richness and diversity, an unexpected aspect of conservation has been highlighted by using X-ray tomographic methods at the European Synchrotron Radiation Facility (Grenoble, France). The method was initially used to reconstruct 3-Dimensional images of these inframillimetric teeth, with taxonomic objectives. But the non-destructive tomographic sections revealed fine details of the particularly well preserved internal micro-structure. The main result concerns the recording of physiological features, such as tooth growing rate and termophysiology. For example, growing marks are clearly present in crocodylomorph teeth and clearly absent in mammal teeth, while they appear in small theropod (avian and non-avian ones), leading to discuss the metabolic rate in very small dinosaurs.

Thus, if the site of Cherves-de-Cognac can be considered as a *Konzentrate Lagerstätt* regarding the high diversity and high concentration of vertebrate micro-remains, it can also be considered as a *Konservat Lagerstätt* according to the good preservation of the specimens, notably at the discrete micro-structure level.