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A new caridean shrimp fossil with exceptionally preserved organs from the Middle Jurassic of La Voulte-sur-Rhône, France

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We used propagation phase contrast synchrotron X-ray micro-computed tomography (PPC-SRμCT) on an exceptionally preserved fossil caridean from the Callovian of the La Voulte-sur-Rhône Konservat-Lagerstätte. The tomographic data reveal the shape of the mandible and pereiopodal epipods allowing the description of a new genus and species of Acanthephyridae (Caridea) shrimp, *Mandocaris polyphaga* gen. et sp. nov. Most organs are exceptionally preserved in either mineral denser to X-ray than matrix, interpreted to be sulfides, or in mineral of lower density than the matrix, interpreted as carbonate/phosphate such as fluorapatite. We herein propose a taphonomic scenario for the preservation of *M. polyphaga* gen. et sp. nov.: it died from unknown causes not caused by an injury, as no wound is visible, falling on the sediment/water interface, it laid on its right side, and was probably covered by sediments and/or a microbial mat, thus quickly becoming entombed in the anoxic zone of the sedimentary column. Once there, many anatomic structures were replaced by phosphates. Sulfides precipitated concomitantly or quickly afterwards, probably aided by both internal and external source of metal ions. The importance of the external source of metal ions (hydrothermalism) is clear due to the prevalence of sulfides in the ventral side of the specimen, an area more permeable due to its abundance in thin membranes prone to decay. The loss of integrity thereafter led to sediment invading the body cavity, thus obliterating a few ventral anatomic details, including some pereiopodal muscles, part of the hepatopancreas, most of the gills, and possibly reproductive organs. The nodule was then formed, closing the system, and protecting the specimen from further diagenetic degradation.

Key words: Crustacea, Caridea, synchrotron, tomography, anatomy, Konservat-Lagerstätte, Callovian, Middle Jurassic.

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