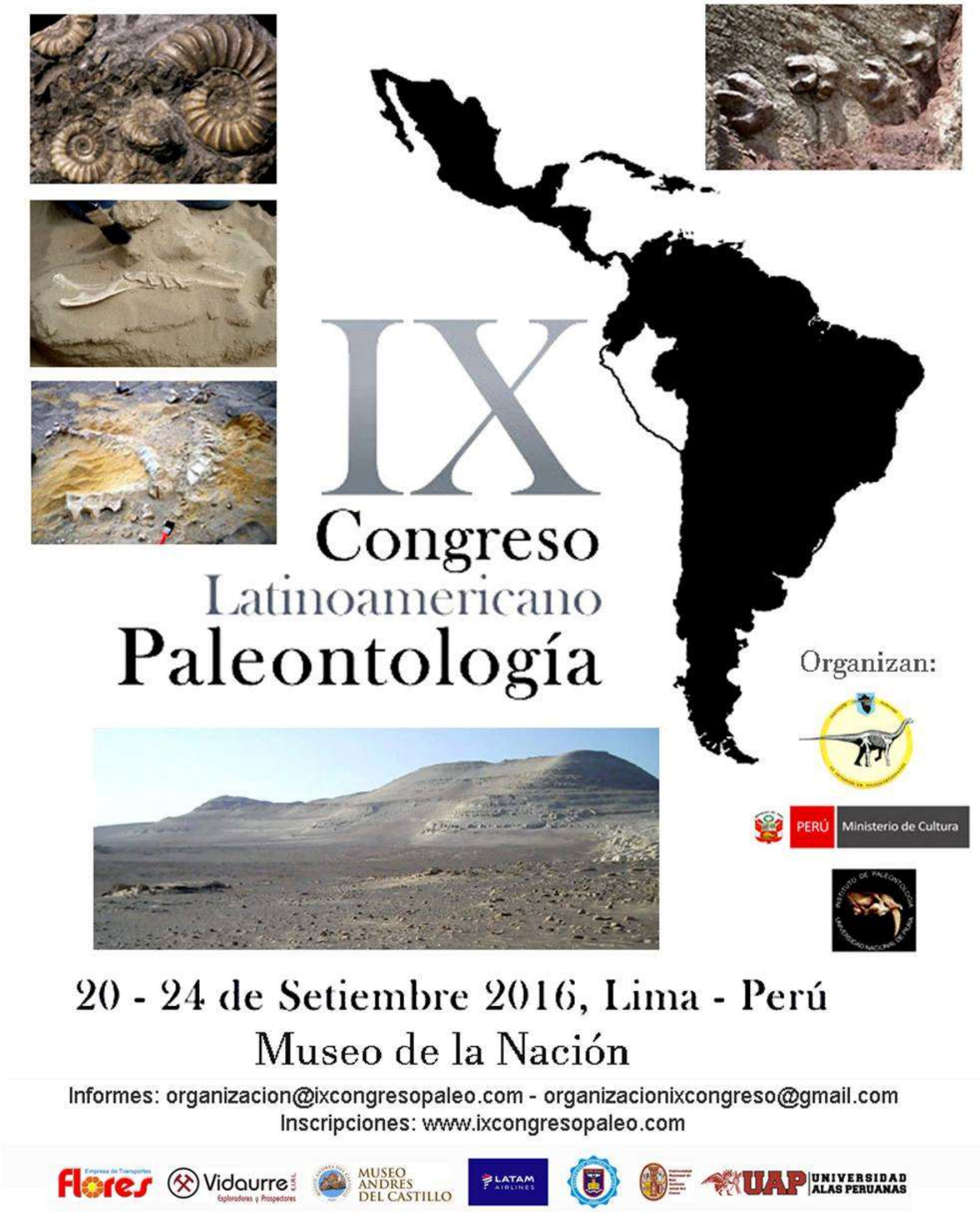
LIBRO DE RESUMENES



DECIPHERING FISH PRESERVATION AT THE CRATO MEMBER, SANTANA FORMATION (UPPER APTIAN), BRAZIL

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The early Cretaceous Crato Member, Santana Formation, Brazil, is comprised of siliciclastic rocks interbedded with carbonate, which host fishes with preserved soft-tissues, such as muscles, connective tissues, integument, and eyes. A comprehensive approach to understand how these structures have been exceptionally-preserved was still lacking. We noticed that generally two types of soft-tissue preservation occur: (i) 3D myomeres and eyes preserved by iron oxides/hydroxides; and, (ii) black carbonaceous compressions, frequently associated with integument preservation. It is possible that these preservational types have been controlled by the variation of palaeoenvironmental conditions, particularly burial rates. To investigate this, we performed Scanning Electron Microscopy (SEM), light microscopy of thin sections, and geochemical analyses (i.e. Energy dispersive X-ray fluorescence (EDXRF), Energy dispersive X-ray (EDX), micro-Raman Spectroscopy (µRS), and synchrotron micro-XRF (SR-µXRF)) at several samples with labile-tissues. We show that soft-tissues were either pyritised or kerogenised. Indeed, while the former are now composed of pseudomorphs after framboidal pyrite concentrated in Fe and O, the latter are made of C-rich amorphous material. µRS confirms that originally pyritised soft-tissues are now goethite replicas and carbonaceous specimens are, indeed, kerogenised. Petrographic thin-section analysis suggests that the two preservational types are related to different facies, that is, kerogenised fish host rock has more terrigenous influence (greater clay/organic matter contents and peloid levels) than the matrix embedding once pyritised specimens, suggesting higher sedimentation rates at the former. We propose that these higher burial rates led decaying carcasses to spend more time at methanogenesis than in sulphate-reduction (SR) bacterial sedimentary zones, in comparison to slower buried carcasses. This mechanism has been proposed to account for pyritisation-kerogenisation gradients of Ediacaran-Cambrian fossils. Additionally, sulphate downwards migration could have been variable owing to cement and clay contents at different facies, hence yielding SR with distinct thicknesses. This could affect carcass residence time at SR zone, and mineralisation. Furthermore, higher organic matter contents have likely inhibited pyritisation at kerogenised fish facies. Finally, whereas pyritisation yielded 3D muscle fibers, sarcolemma, tendons, and eyes, kerogenisation resulted in connective tissue and skin/scale preservation. Therefore, a preservational-fidelity gradient exists, revealing that pyritisation mineralised more labile-tissues with high fidelity, whilst kerogenisation conserved more recalcitrant tissues, while yet poorly preserving muscles. We suggest that the relative time of the onset of the two processes likely explains this gradient.

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