Involvement of microbial mats in early fossilization by decay delay and formation of impressions and replicas of vertebrates and invertebrates

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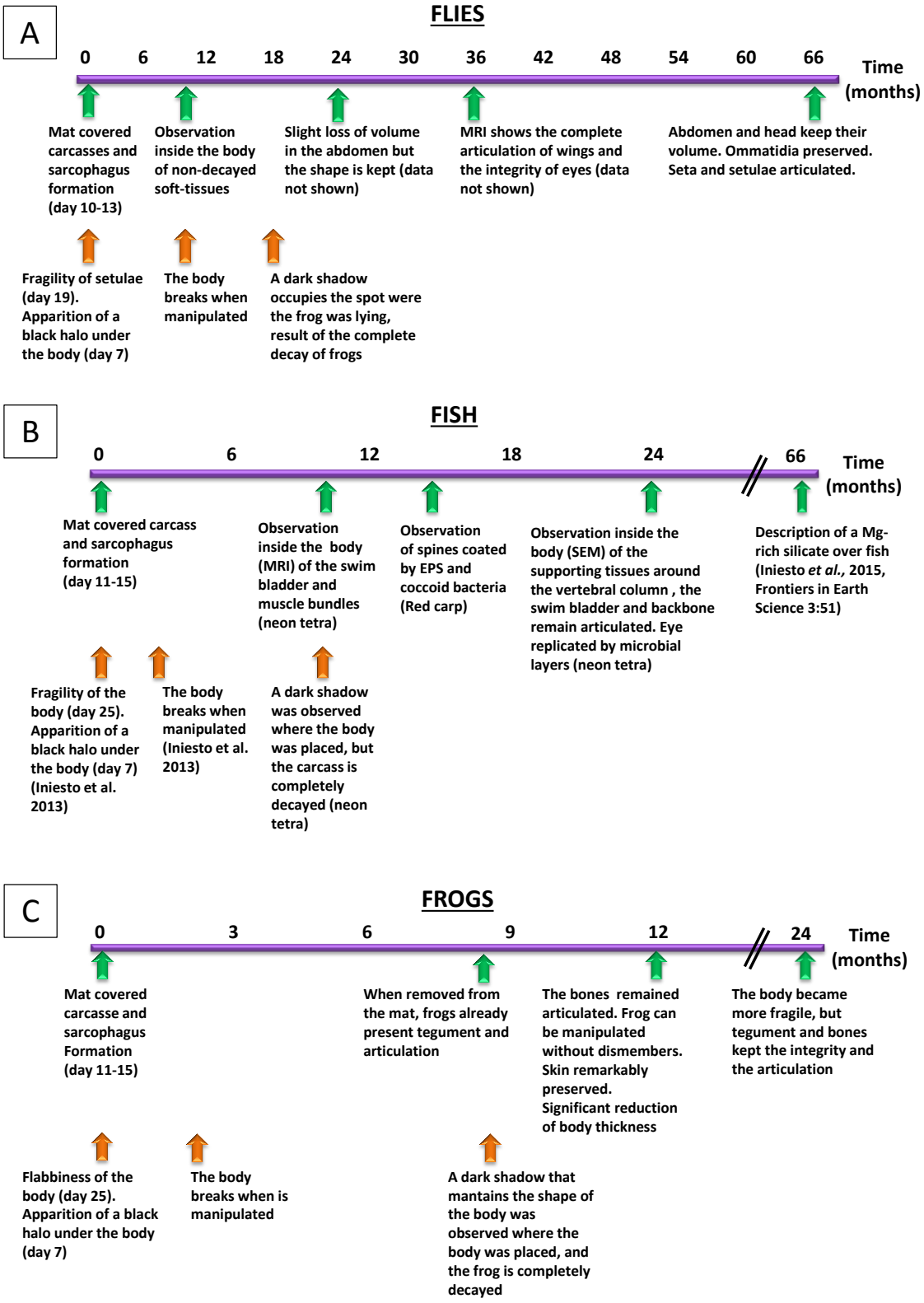
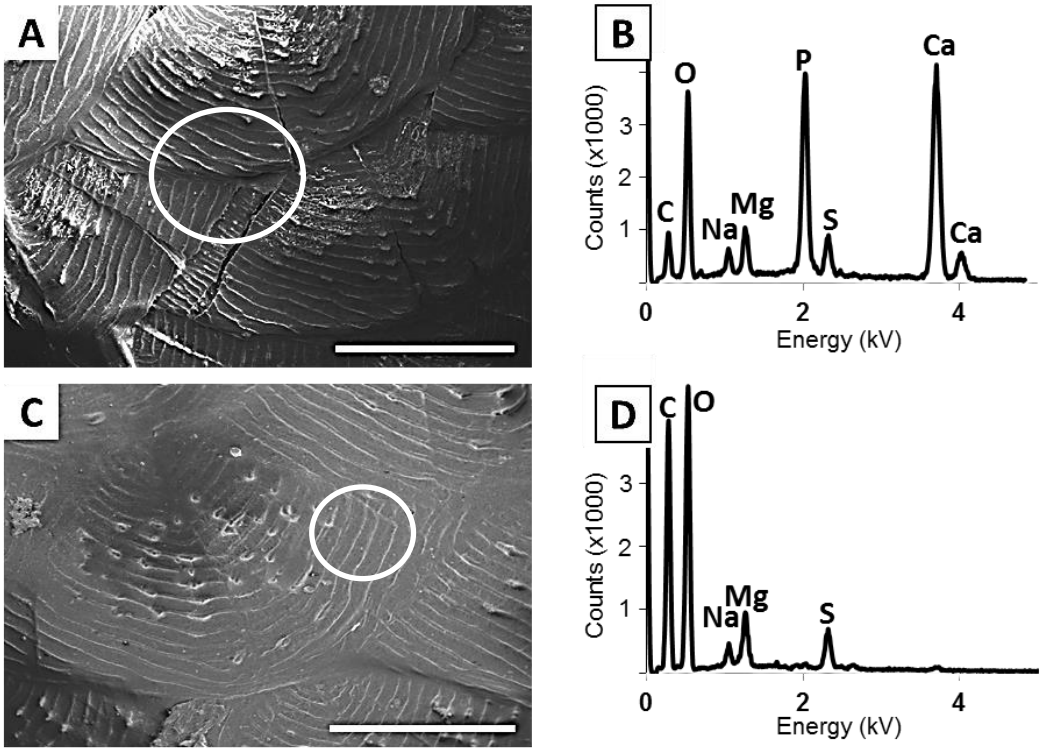
Supplementary Fig. S1: The diagram summarizes the sampling and several relevant events monitored during decay of flies (A), fish (B) and frogs (C) in mats (green) and controls over sediment (orange). Each arrow represents at least two bodies analysed in order to describe the decay state.

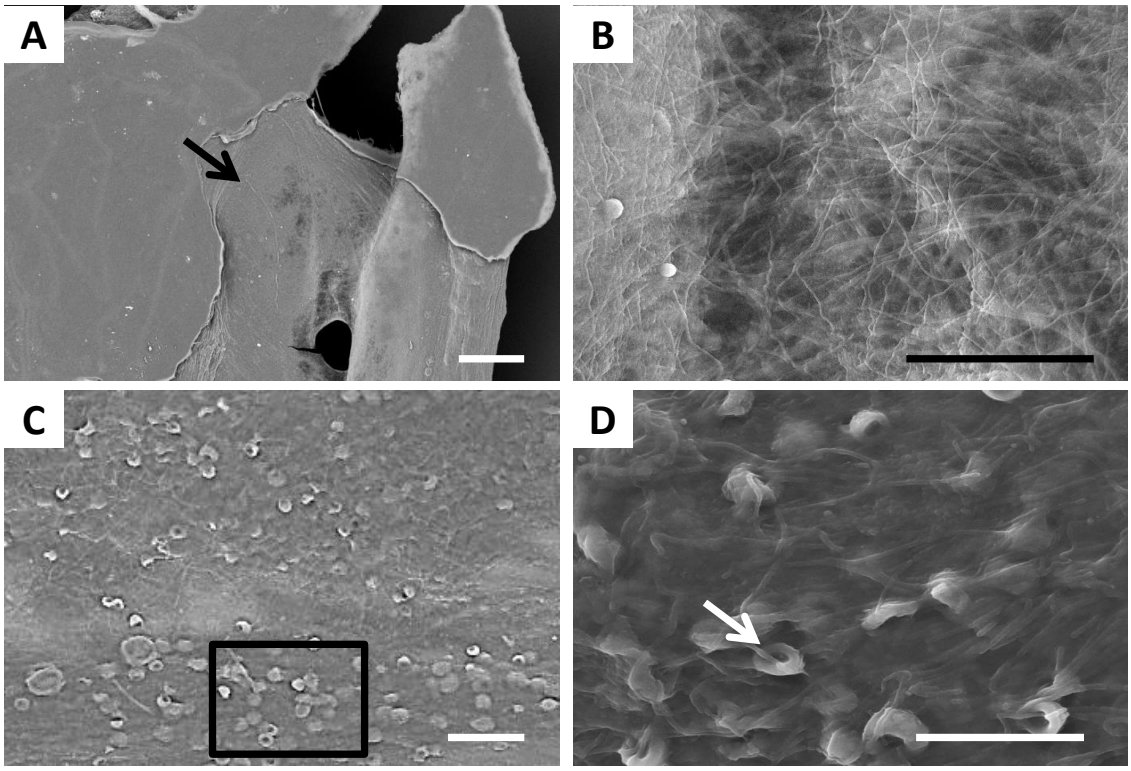


Supplementary Fig. S2: Energy-dispersive X-ray spectrometry (EDXS) of scales of neon tetra fish and the impression generated in the microbial mat.



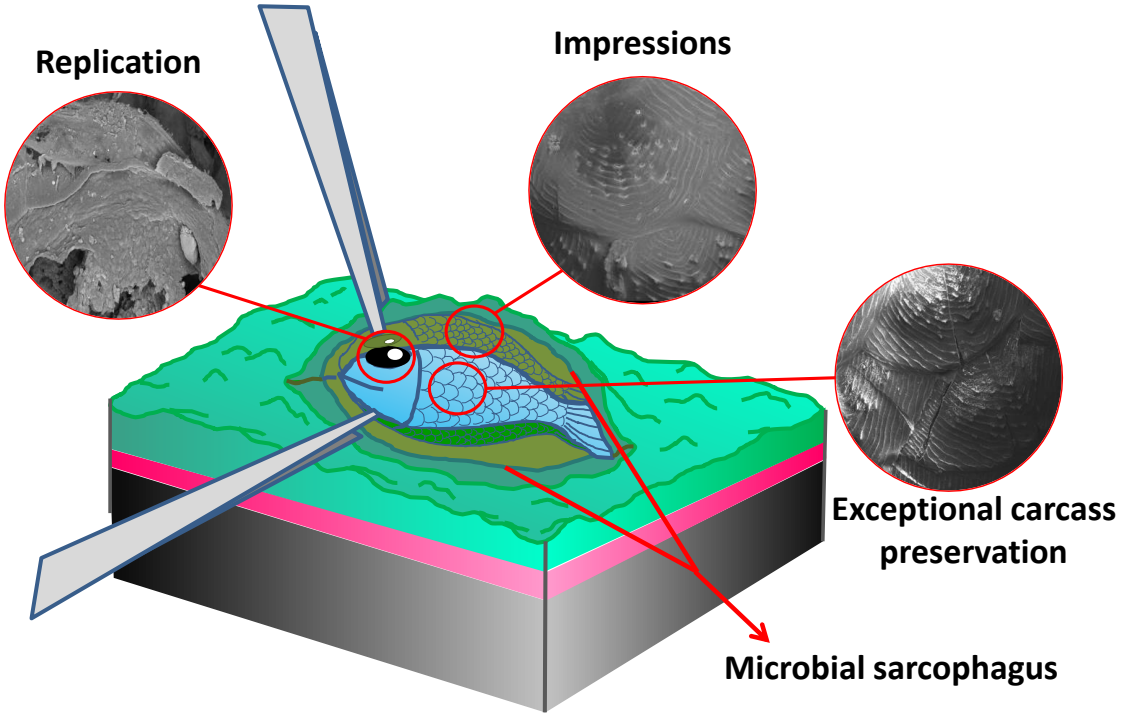
(A) Scales of red carp and the corresponding EDXS spectrum (B). (C) Impression generated in the microbial mat and its EDXS spectrum (D). EDXS confirmed the mineral composition of the scales, made mainly of calcium phosphate, in contrast with the organic composition of this impression. Scale bars: 500 µm.

Supplementary Fig. S3: Integrity of frog carcasses while covered by mats after 12 months



(A) Interdigital webbing of the frog. The surface is partially covered by the mat, but the integrity is remarkable in those zones in which the membrane is exposed (arrow). (B) Skin of the frog at higher magnification, where skin-deep blood vessels are evident. (C) Surface of the leg of frog with skin still covering the appendix. (D) Detail of the surface showed in C. A large number of microbial cells are embedded in a matrix that covers the tegument, and small protuberances of the skin (arrow) rise to the surface despite the microbial film after 12 months. (Scale bar: A, 200 µm; B, 50 µm; C, 70 µm; D, 30 µm)

Supplementary Fig. S4: Schematic diagram of the preservation of carcasses (a fish in the example) into a microbial mat.



After the coverage of the mat, the intimate contact of the upper layers of the mat and the surface of the body results in the formation of fine impressions and replicas. In addition, the sarcophagus leads to a delay of decay and the preservation of structures such as scales, and even inner soft-tissues.

Supplementary Table S1: Data of the measuring of the different cells observed at SEM

	N	Meaning Value	SD
Cells in Fly Mould	118	0.828	0.133
Cells over scales	270	0.802	0.165
Small Cells over Fish Scales (<0.85)	159	0.701	0.107
Medium Cells over Fish Scales (>0.85)	111	0.959	0.088
Cells over Fish Bones	130	0.852	0.134
Filaments in Frog Mould	74	2.267	0.206
Filaments from the upper layers	65	12.77	2.11
Cells from the upper layers	25	3.65	0.79