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Large stromatolites around the K-P boundary in northern Patagonia, Argentina

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Large stromatolites have been discovered in Pichaihue, northern Patagonia, Argentina. There are isolated outcrops, composed of pyroclastic flows, ash-fall tuffs, and calcareous sediments of the Malargüe Group. The presence of stromatolites, oncoids, serpulids, bivalves, and gastropods, as well as silicified stems of macrophytes, indicates shallow marine environments, which range from normal to brackish, and fresh-water environments. SHRIMP U-Pb dating in zircons yielded an age of 64.3 ± 0.9 Ma that confirms the correlation to the Maastrichtian-Paleocene transgression from the Atlantic Ocean that reached the foothills of the Andes [1].

In the eastern outcrop, the stromatolites are decimetric beds with very thin lamination. On petrographic section micritic and siliciclastic laminae were identified. The laminae are millimetric and irregular with clotted micrite, dark organic matter, and siliciclastic material. In the western outcrop, the stromatolites consist of domes of up to 1 meter high of dark to light brown color. Many of the large stromatolites preserve a mass of serpulids in the core of the structure. The presence of large columns (diameter 30 to 100 cm) indicates that the shoreline was exposed to wave action. Recent studies support the relationship between morphostructures *versus* water depth and energy and also indicate that larger stromatolites are associated with episodic currents in deeper waters.

Figure 1: Large stromatolite (scale geology hammer in shade) and close up view showing mass of serpulid tubes as core of stromatolite. Pichaihue, northern Patagonia.

Microbial activity was suspected from outcrops, polished and thin sections, and SEM analysis showed undoubtedly the presence of cyanobacterial filaments, nannobacteria and coccoids microbes that clearly support the microbial origin.

Numerous authors have made reference to an increase in the abundance and extension of stromatolites in marine environments following periods of global biodiversity crises, but very few [2] refer to the K-P boundary extinction event. This contribution supports the proposal that after a major extinction (K-P in our case) special environmental characteristics are suitable for the development of microbial communities. Those communities are quickly disrupted when normal conditions are re-established.

References:

[1] Aguirre-Urreta B et al. (2011) Gondwana Research 19: 482-494.

[2] Astibia H et al. (2012) Geologica Acta 10(3): 209-226. 105:443-798