

# Newly discovered stromatolites and bimodal magmatism at ~1.23 Ga in the Burro Mountains of New Mexico: Mesoproterozoic rifting formed a shallow ocean basin in southwestern Laurentia

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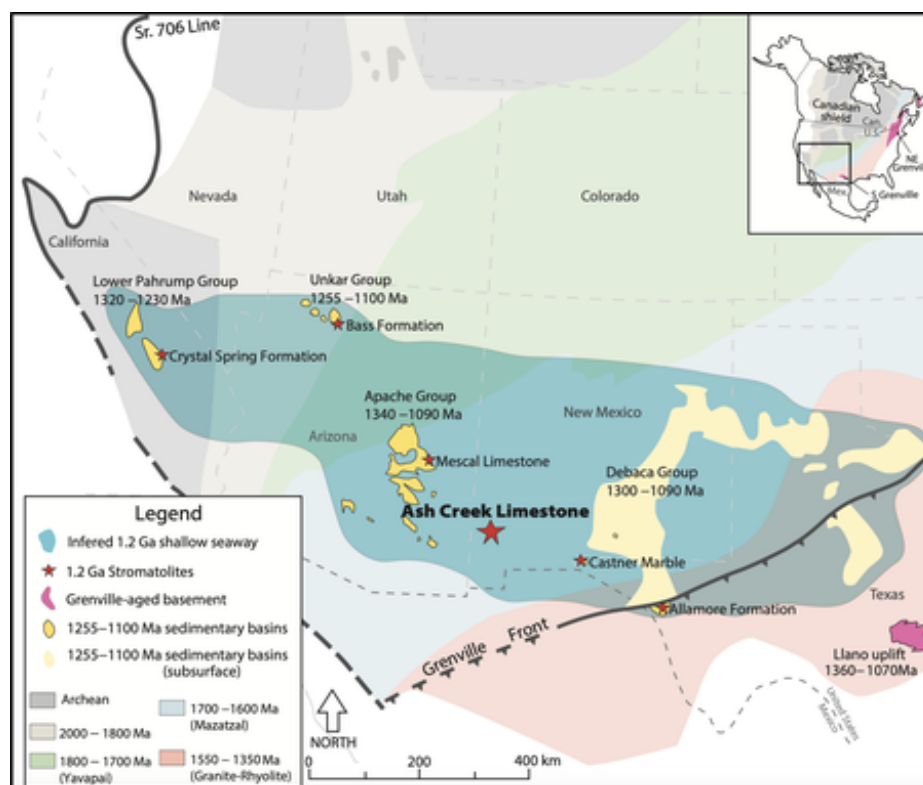
We interpret a newly discovered laminated limestone associated with Middle Proterozoic rocks in the Redrock and Brushy Mountain quadrangles of southwestern New Mexico as representing stromatolites, possibly

*Conophyton*. This locality is geographically aligned with other outcrops of ~1.2 Ga stromatolites documented in the southwest U.S., such as those in the Bass Formation (Grand Canyon, AZ), the Mescal Limestone (Salt River Canyon, AZ), the Castner Marble (Franklin Mountains, TX), and the Allamoore Formation (Van Horn, TX). These stromatolites have similar morphologies to those found in Texas and represent the first instance of Proterozoic fossils identified within the state of New Mexico. The

stromatolite-bearing unit, termed here the Ash Creek Limestone, is exposed along with a marble unit surrounded by the ~1225 Ma Redrock Granite (Williams, 2015). Mapping at 1:6,000 scale shows that the carbonates are also associated with a unit consisting of serpentinite interbedded with talc (forming a rock informally referred to as ricolite), meaning they share a similar depositional setting. The carbonates are only found surrounded by granite, whereas ricolite outcrops are typically in contact with a metabasalt. The metabasalt yielded a U-Pb zircon weighted mean  $^{207}\text{Pb}/^{206}\text{Pb}$  age of  $1229 \pm 12$  Ma ( $n = 35$ ; MSWD = 0.8). This represents the first direct dating of ~1.2 Ga mafic volcanism in the area, and these rocks are similar in age to anorthosite dated at  $1223 \pm 6$  Ma and  $1231 \pm 4$  Ma (Ramo et al., 2003). Together, the ~1.2 Ga bimodal magmatism and shallow marine limestone units indicate that the tectonic setting of southwest Laurentia at this time involved a NW-SE-trending Mesoproterozoic seaway that formed as a result of coeval regional extension during the early stages of the Grenville orogeny.

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Map of the southwest United States highlighting localities where ~1.2 Ga stromatolites have been found in the past and in this study (Ash Creek, Redrock, NM). Locations of Mesoproterozoic sedimentary basins and a proposed shallow seaway also shown. Modified from Mudler et al., 2017.

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## **Keywords:**

Proterozoic, Grenville, New Mexico, Stromatolite, Bimodal, Laurentia

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