(d) Stone City Bluff, Burleston County, TX USA

The Stone City Bluff locality is part of the Stone City Member, which lies within the late Middle Eocene Crockett Formation, overlying the Sparta Sand Formation and as part of the larger late Middle Eocene Claiborne Group [1-4]. The Member is made up of a variety of bedforms that expose a thick transgressive sequence [4]; strata preserve both marine, nearshore features, with preservations of bioclasts, burrows, and vertebrate fossils [4,5, 6], along with intervals of terrestrial river water inputs. This near-shore marine interpretation is supported by X-ray Diffraction and Mossbauer spectral analyses of clay pellets from the Stone City Member, which suggest normal marine conditions and basic pH (7.5-8.5).

The Stone City Member has undergone minimal taphonomic alteration, and preserves one of the most diverse Middle Eocene vertebrate fauna within the Gulf Coastal Plain [5]. These diverse taxa include shallow neritic dwellers (i.e., gastropods, bivalves, ootolith-based taxa, rays, teleost fish, reptiles and sharks) and low to moderate diversity of foraminifera [1, 5]. Specifically, Stone City preserves three species of sand tigers (Carcharias cuspidata, C.hopei, Striatolamia macrota [1]). The extant fauna is comparable to modern Gulf Coastal Plain fauna living in shallow inner shelf marine waters, and suggests that Stone City preserves a record of a tropical to sub-tropical climate with normal marine salinity [1, 3, 5].

Broadly, the sedimentology of the Stone City Member preserves three distinct depositional modes: primary shelf sediments dominated by dark glauconitic clay-silts and a matrix supported fossil assemblage that suggest marine near shore deposition, large deposits of fossils and bioclasts which suggest high energy storm deposition, and fine sandstone deposit with preserved burrows which represent a low energy marine environment [6]. The high energy storm environment is useful for deposition of large vertebrate fossils [4,6]. Shark teeth are sampled from the PQ sands within the Stone City Member, which is a unit of unlaminated upward fining sandstone [1-4, 7]. The fauna collected from the PQ sands included 14 species of shark, 11 species of fish, 12 species of rays/batoids, 5 species of reptiles and 1 specimen of mammal, as well as teredolites, wood logs, octocorals and otoliths. The majority of the shark teeth were collected from the base of the unit, over many years [7]. It is possible that the high energy storm system could have preferentially deposited larger clasts. However, our wide distribution of tooth heights from the MGB suggests that both small and larger teeth were well preserved. This is also supported by the range of fossils present from both marine and terrestrial environments.

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