Abstract:
Bromalitic specimens from the Florissant Formation, 34.07 ± 0.10 Ma, from the Florissant Fossil Beds National Monument, were analyzed via taphonomic and phylogenetic approaches to elucidate potential origins and preservation mechanisms. Many of the clasts are volcaniclastic and originated from the Guffey stratovolcano and others that are part of the Thirtynine Mile volcanic field. These sediments contain a highly diverse, excellent and uniquely preserved flora and fauna. Major work has been completed on the paleo-microvertebrates and invertebrates specimens of the formation, though little work has been done on the bromalites. Preliminary analysis of 25 specimens showed an affinity, based on content, morphology and size, to two major morphotypes, A and B, with an intermediary unresolved morphotype combining the former. Morphotype A, 13 specimens; high content of crushed invertebrate shells, ovoid (rarely sinusoidal) in shape and are on average 19.68mm by 13.19mm, with little to no groundmass (organic rich).

Analysis of 25 bromalitic specimens revealed two major and one unresolved morphotypes based on shape, size and content:

- Morphotype A: high content of crushed invertebrate shells, ovoid (rarely sinusoidal) in shape and are on average 19.68mm by 13.19mm, with little to no groundmass (organic rich).
- Morphotype B: entirely groundmass, no shells, sinuosoidal to kidney shape with few ovoid, on average 14.67mm by 9.5mm, diameter average 4.75mm.
- Unresolved specimens: contain both shells (small quantity and crushed) and a high quantity of groundmass, irregular to sinusoidal in shape, and on average 17.33mm by 11.59mm.

Initial analysis of these 25 bromalitic specimens point to primary vertebrate producers, and are most likely related to fossil vertebrates already described from the Florissant formation.

Morphotype A, generally ovoid and having large shell content, is believed to be ornithoregurgitalites, evidence of predatory behavior of shorebirds. Morphotype B, sinusoidal and high organic content, are understood to be coprolites or bottom-feeding fish (suckers and catfish). While the unresolved bromalites represent general consumulites, or intermediary forms of the previous, additional analyses need to be performed to rule out potential behavior of previously unknown vertebrates. Through the comparison of the above recognized morphotypes, identification of specific consumers and their biologic functions were possible; elucidating larger trophic structures present within the ecology of the Florissant Lake system.

Discussion

Analysis of 25 enigmatic bormolitic specimens from terrestrial lacustrine sediments of the Florissant Formation reveal higher trophic structures related to predator and scavenging behaviors. Two major morphotypes, A and B, were established, based on morphological features, which were then related back to dietary and physiologic behaviors of known vertebrates from the Florissant Fm. Morphotype A, generally ovoid and having large shell content, is believed to be ornithoregurgitalites, evidence of predatory behavior of shorebirds. Morphotype B, sinusoidal and high organic content, are understood to be coprolites or bottom-feeding fish (suckers and catfish). While the unresolved bromalites represent general consumulites, or intermediary forms of the previous, additional analyses need to be performed to rule out potential behavior of previously unknown vertebrates. Through the comparison of the above recognized morphotypes, identification of specific consumers and their biologic functions were possible; elucidating larger trophic structures present within the ecology of the Florissant Lake system.