



## **Constraining the link between spherulite growth and silicate minerals: insights from the reappraisal of East Kirkton Limestone (Lower Carboniferous, Scotland)**

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Understanding the geochemical origin and timing of formation of unusual non-marine carbonate precipitates formed in highly alkaline and saline sublacustrine settings is a hot topic of research in carbonate sedimentology. The East Kirkton Limestone (West Lothian, Lower Carboniferous, Scotland) is constituted by an interesting array of uncommon freshwater calcium carbonate components (spherulites, botryoidal crusts, shrub-like forms, and oncoids) growing in close association with organic-rich argillaceous matrices, primary fine-grained chert, and volcanoclastic tuffs. These sediments display petrographical, sedimentological and textural features suggesting a sequential origin for their silicate and carbonate phases likely generated from contemporaneous solutions characterized by high carbonate alkalinities and salinities. The drainage of alkali olivine-basalt (basanite) terrains, coupled with the syn-sedimentary fault-related thermal to ambient hydrolysis of the volcanic basement may have produced unique lake chemistries responsible for this facies spectrum. Despite the lacking of actualistic analogues for East Kirkton limestone sediments, similar biogeochemical processes and hydrochemistry compositions may have occurred in modern lake systems such as Mono Lake in California.