# Coastal hydrothermal field was hot spot for biotic diversity on the Paleoarchean Earth

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The 3.4 Ga. Strelley Pool Formation (SPF) in the Goldsworthy greenstone belt of the Pilbara Craton, Western Australia contains a thin chert-sandstone unit that represents a shallow water coastal depositional environment. Of special interest in this unit are carbonaceous massive cherts and silicified stromatolites.

Carbonaceous massive black cherts with coniform structures (~3cm high) contain diverse microfossils, such as clustered small (< 10$\mu$m) spheres, solitary large spheres, flanged and non-flanged lenses, clusters composed of large spheroids, and chambered lenses. Large spheres and lenses are significantly large, up to 80$\mu$m along the major dimension. The massive cherts contain pyrite and spharelite abundantly, and display diverse shale-normalized REE patterns, distinct from contemporaneous seawater pattern. The cherts are also enriched in heavy metals such as Ni, Cu and Zn. These features suggest deposition of the massive cherts from hydrothermal fluids. Thus, coniform structures in the massive chert characterized by diffuse sulfidic laminae are not stromatolite, but more likely siliceous sinter. On the other hand, finely laminated carbonaceous cherts locally with conical to domal structures are interpreted as silicified stromatolite.

Although biological affinities of microfossils and stromatolites in this SPF locality are under investigation, this study emphasizes how diverse the microbial community in Paleoarchean coastal hydrothermal environment was, at least partially due to the high availability of various energy sources in this environment including reducing chemicals and sunlight.

Reference
Sugitani et al. (2015) Geobiology 13, 507-521 & 522-545.