

## PALAEONTOLOGY AND PALAEOECOLOGY OF THE LOWER CAMBRIAN EMU BAY SHALE LAGERSTÄTTEN, KANGAROO ISLAND, SOUTH AUSTRALIA.

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The last two decades have seen the status of deposits containing soft bodied Cambrian fossils rise from geological curios into one of the foundations of modern thinking on early metazoan evolution and ecology. Some thirty of these soft bodied assemblages or Lagerstätten, resembling the Burgess Shale fauna are now known. One of these is the Lower Cambrian Emu Bay Shale fauna from Kangaroo Island, South Australia.

The Emu Bay Shale has been mapped in two localities approx. 8 km (5 miles) apart on the northern coast of Kangaroo Island, at Emu Bay and at Big Gully. Previous investigations into the numerically abundant Lagerstätten fauna at Big Gully have highlighted its unusually pauperate diversity, with only some seven species described. The preservation is also unusual, comprising replacement by iron stained calcite. The fauna is confined to a 10 m thick basal siltstone. The age of the deposit is believed to be mid to upper Botomian and is thus marginally older than Early Cambrian soft bodied assemblages found on the North American continent and predating the better known Middle Cambrian Burgess Shale.

In late 1991, a study of the Emu Bay Shale was undertaken to document the palaeontology and palaeoecology of the fauna. Preliminary findings, whilst increasing the number of species, confirm the pauperate diversity of the fauna. The new forms include several specimens of anomalocarid appendages. These not only represent the first occurrence of this form in Australia, but also the first occurrence outside the Burgess Shale of anomalocarid appendages with 11 segments, as compared with the more common and widespread 14 segment appendages. This connection may be important in the light of recent palaeoreconstructions which show the west coast of Canada and eastern Australia in close proximity during the early Cambrian. Also the spatial arrangement of the appendages indicates that anomalocarids may have shoaled and hunted in groups. They appear to have fed on the sea bottom, possibly using their appendages to probe the muddy bottom for shallowly buried prey as well as for capturing and transporting prey to the mouth.

The assemblage appears to be dominated by the preservation of hard or permineralized body parts. However, abundant calcified ribbon-like structures concentrated on some bedding planes have yet to be classified. Several exceptionally preserved specimens of *Myoscolex* appear to have a series of metamericly repeated 'paddle-like' appendages, similar to some forms from the Burgess Shale, thus casting doubt on an annelid affinity.

The assemblage appears representative of a deep water, low oxygen environment prone to periodic anoxia, possibly similar to the accretionary environment of the Burgess Shale.

The Emu Bay Shale at Emu Bay exhibits a shelly assemblage, mostly comprised of disarticulated *Hsuaspis* exuvia with occasional small *Redlichia* exuvia and hyolithids. No calcite replacement is evident. The location represents current swept, probably shallow water environment.