# SEPTAL IMPLOSION IN COILED NAUTILOIDS FROM AN UPPER CARBONIFEROUS UNIT IN OHIO, USA

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More than 200 coiled nautiloids of *Metacoceras mcchesneyi* (Murphy, 1970) from a strip mine in Columbiana County, Ohio were concentrated in a storm deposit shell lag within a silty-shale marine unit (Lower Conemaugh-Upper Pennsylvanian). Apertural and other mature modifications indicate these cephalopods represent a mature or nearly mature population.

The degree of distortion and/or crushing of the nautiloids are variable. Some are diagenetically flattened while others appear to be essentially complete, undistorted three-dimensional specimens. Twenty-seven undistorted specimens were randomly selected and sectioned longitudinally one to three times. Serial sections revealed that the septa in every specimen were collapsed and/or telescoped. Septal fragments were moved and packed towards the conch apex or moved and grouped within the conch with the appearance of having settled out of the carbonate-rich silt that filled the conch. This destruction of internal features without external shell distortion can only be accomplished by limited implosion.

For the nautiloids in this marine unit, a hydrostatic pressure increase could be accomplished by increasing water depth by transgression and/or basin subsidence; however, implosion could not have occurred in the water column or at the water-sediment interface. The specimens had to have been buried to prevent separation of the conch pieces following implosion. Irregularly shaped carbonate concretions are present in the shell lag and fill the conchs of the three-dimensional nautiloid specimens. The concretion lithology is distinct from the silty-shale matrix of the marine unit. Hallam (1962) reported irregularly shaped carbonate concretions to have been emplaced under a thixotropic condition (i.e. in a condition of fine balance between a liquid and solid state). A thixotropic material has the ability to flow when a stress is applied. We have concluded that after burial, the nautiloid cameral spaces were probably filled with both liquid and gas, and the body chamber had to be filled with solid thixotropic material. To prevent conch collapse at the time of septal implosion, thixotropic material filling the three-dimensional nautiloid body chamber acted as a liquid at the time of stress release during septal failure. The stress was produced by combined lithostatic and hydrostatic pressures which fluidized the concretion material that flowed into the phragmocone during septal collapse. The concretion material quickly reformed into a solid state after the septal implosion, thereby preventing the collapse of the conch from lithostatic pressure.

Hallum, A., 1962. A Band of Extraordinary Calcareous Concretions in the Upper Lias of Yorkshire, England. Jour. Sed. Pet. 32, 840-847.