

PHYLOGENY OF THE PROTO-ARTICULATES (AMPELOCRINIDS + BASAL ARTICULATES): IMPLICATIONS FOR THE PERMO-TRIASSIC EXTINCTION AND RE-RADIATION OF THE CRINOIDEA.

HOLTERHOFF*, Peter F., Dept. of Geosciences, University of Arizona, Tucson, AZ 85721, U.S.A.; BAUMILLER, Tomasz K., Dept. of Earth and Planetary Sciences, Harvard University, Cambridge, MA 02138, U.S.A.

Crinoids endured a major extinction event during the Permo - Triassic crisis, coming precariously close to total extinction. Nearly 100 genera are known from the Lower and Middle Permian while only two genera (*Holocrinus* and *Dadocrinus*) are known from the upper Lower Triassic. This dramatic bottleneck, coupled with the prolonged gap in the crinoid fossil record and attention to selected "key characters", led to the erection of a separate taxon for all post - Paleozoic crinoids; the subclass *Articulata*. Although the origin of the articulates has historically been considered enigmatic and there has been some debate as to whether all post - Paleozoic crinoids are truly monophyletic, recent work supports a single origin for the articulates (Simms and Sevastopulo, 1993). Additionally, this work indicates that the articulates are closely related to a diverse group of late Paleozoic cladid inadunates, the ampelocrinids *s.l.*, which are composed of members of the Ampelocrinacea Kirk (McGinnis and Strimple), along with selected species from the Permian of Australia and Russia, and range from the Early Mississippian to the Late Permian.

Using the ampelocrinids as the stem - group articulates, the goals of this study are to determine: 1) whether the "single survivor scenario" for the P-T crisis can be supported, or if the basal articulates were derived from separate clades from within the ampelocrinids; 2) which ampelocrinid taxa are the most viable candidates as sister taxa to the basal articulates; 3) what the distinguishing synapomorphies of the basal articulates are. To answer these questions, a preliminary phylogenetic analysis was performed using 33 ampelocrinid species, four basal articulate species, and two outgroup species coded for 44 characters.

Although various combinations of the data set were analyzed, each producing numerous equally parsimonious cladograms, the four Triassic articulates consistently grouped together as a single clade, supporting the single survivor scenario and the monophyly of the articulates. The interpretation of relationships between the articulates and the ampelocrinids is problematic as the articulates also consistently join the ampelocrinids low on the cladograms. This is attributed to the combination of plesiomorphic and highly derived characters for the articulates. The articulate synapomorphies include characters associated with the loss of the anal series from the dorsal cup and the slope of the radial facets. It is not clear how changes in these characters would have effected the function of these crinoids and it is unlikely that they played a significant role in increasing the probability of survival of this clade across the P-T crisis.