

ian, and the early Upper Devonian some *Icriodus* species such as *I. fusiformis*, *I. culicellus*, *I. rectirostratus*, *I. retrodepressus*, *I. regularicrescens*, *I. obliquimarginatus* and *I. subterminus* have a wide or sometimes nearly cosmopolite dispersion in different magnafacies areas (type Ardenno-Rhenish and Hercynian-Bohemian) and there is no marked difference in the earliest occurrence of each species. This means that the geographical dispersion of at least some *Icriodus* species was due primarily to good communication seaways which could be modified in the course of time and not to very specialised local facies factors. Having in mind the SEDDON and SWEET model for conodonts, the dominance of *Icriodus* in shallow water shelf environment implies no restriction in geographical dispersion. Particularly in this environment, anomalies in the vertical distribution of *Polygnathus* taxa, e. g., *P. serotinus*, *P. linguiformis* div. subspecies, *P. cooperi cooperi* can be noticed.

Reexamination of Late Pennsylvanian and Early Permian Conodont Apparatuses Using Clustering Techniques.

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Conodont faunas containing easily identified Pa elements assignable to the genera *Diplognathodus* and *Hindeodus* have been reported from Upper Pennsylvanian and Lower Permian strata of North America. If the seximembrate model for the apparatus of each genus is correct, the remaining elements should also be present. However, previous investigators have normally considered ramiform elements which might be assignable to the two genera as attributable to species of either the *Idiognathodus*–*Streptognathodus* plexus or *Adetognathus*. It is suggested that the ramiform elements reported from the uppermost Pennsylvanian and lowermost Permian are more likely related to the Pa elements of *Diplognathodus* and *Hindeodus* than to the previously accepted association with the Pa elements of the *Idiognathodus*–*Streptognathodus* plexus and *Adetognathus*.

Three data sets obtained from the literature were analyzed using a number of different similarity measures, clustering procedures and data transformations in order to examine various aspects of the faunas. The results of the different cluster analyses maintained remarkable consistency both within and between the three data sets and provide an interpretative outline. The results are interpreted as supporting the association of the various ramiform with *Diplognathodus* and *Hindeodus* rather than with *Idiognathodus*–*Streptognathodus* and *Adetognathus*. This satisfies the apparatus structure of *Diplognathodus* and *Hindeodus*, but opens the question of the Late Pennsylvanian and Early Permian apparatus structure of *Idiognathodus*–*Streptognathodus* and *Adetognathus*.

Extinction of Triassic Conodonts.

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There is some agreement that extinction of higher taxa is one of the expected, even predictable results of evolution and not the result of inadequacies shared by all species of a group. This view is in contrast to ideas that higher taxa extinctions might be explained by a catastrophic, „across the board“ related cause.

The extinction of conodonts is an event that can be used to test different extinction models. For example, if diversity of species population size decreased, conodonts would be subjected to localized extinctions due to random fluctuations in environmental conditions and inability to recolonize. This should be identifiable in the rocks. Alternately, if there were adverse environmental factors that affected the conodont life style and caused extinction of the entire group, sedimentary petrology of the rocks in which this occurred might give some signal.

The Upper Triassic-Lower Jurassic rocks of western North America and Austria apparently bear normal marine faunas and have no significant unconformity. In Austria, 19 conodont form-species were progressively reduced by extinction during the Norian. Some 7 species reportedly evolved during the Norian-Rhaetian interval and 4 survived until near the close of the Rhaetian. In North America, only 5 species are present during the Norian. Two of the North American species survived until late Norian but became extinct prior to the Rhaetian. Carbonate sequences indicate that there were minor envi-

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Zoologisch-Botanische Datenbank/Zoological-Botanical Database

Digitale Literatur/Digital Literature

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