Zone in these unfavourable environments.

At the end of the Famennian finally (in the so-called „Strunian" deposits: „Fa2d" and „Tn1a": during the *costatus*-Zone) more marine influences are reappearing: rhythmic alternating thin-bedded sandstones, shales and calcareous layers with stromatoporoids and foraminifera.

The conodont associations are characteristic of a Polygnathid–Icriodid Biofacies mixed with elements of a Bispathodid–Pseudopolygnathid Biofacies; this is indicative of a new transgression which only will by completed during the Lower Carboniferous.

Palmatolepis Conodont Apparatuses – Empirically Derived Composition and Structure.

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Some Late Eo- and Mesotriassic Conodont Multi-Elements: Notes on their Taxonomy, Phylogeny and Distribution.

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A comparative study of Late Eotriassic and Mesotriassic conodont Multi-elements from North America (Utah, Nevada) and the circummediterranean region indicates their derivation from two major stocks: Ellisoniid *(Ellisonia, Furnishius, Parachirognathus, Hadrodontina* and *Pachycladina)* and Xaniognathid. The latter branches into two substocks: Neogondolellid *(Neogondolella, Neospathodus, Pseudofurnishius, Carinella* and *Epigondolella)* and Gladigondolellid *(Gladigondolella).*

The paleogeographic distribution of these taxa was controlled by paleoecologic factors relating to their habitat.

A Summary of Chesterian (Carboniferous) Conodonts from the Illinois Basin, USA.

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The Chesterian Series in the Illinois Basin is a sequence of dominantly limestone units alternating with clastic intervals of shale and sandstone. The clastic units are mostly nonmarine and essentially lack conodonts, but conodonts have been reported from all limestone formations or members.

Because of lack of study, however, some have almost no record of conodonts. For example, published accounts list only a few specimens of discrete element *Hindeodella* from the Vienna Limestone, but the present study shows that conodonts are diversified and moderately abundant in it. This is true of the other formations.

At least ten multielement genera have been recognized in the Chesterian Series. They are *Adetognathus, Cavusgnathus, Gnathodus (Dryphenotus), Hindeodus, Idioprioniodus, Kladognathus, Lochriea, Lambdagnathus, Synprioniodina ?,* and a new genus whose Pa element is discrete element *Spathognathodus campbelli.* In part these genera are recognized on the basis of statistical analyses, and much of the new data on occurrences is based on collecting done specifically for multielement analyses. Generally, sets of four samples were collected from single beds or portions of beds that were selected to represent a variety of environments. These samples were analyzed both collectively and individually.

We used four binary similarity coefficient (Baroni-Urbani-Buser, Jaccard, Simpson, and Phi) for which we believe levels of significance can be calculated by using standard clustering strategies. Our analysis also included the Fager coefficient because it has been used commonly in conodont studies. The data were clustered by using all five coefficients with both the complete linkage and unweighted pair clustering strategies. The Phi coefficient permits the selection of a level above which single element taxa are associated at probabilities significantly greater than randomly expected. Treating the Baroni-Urbani-Buser, Jaccard and Simpson coefficients as binomial probabilities also permits the selection of levels above or below which associations are significantly different from those expected on a random basis. Finally, the assumption of binomial probabilities also permits the direct assessment of the significance of linkages between clusters.

On the basis of bedding-plane assemblages, results are still somewhat mixed in that both ecologic and biologic species groupings are recognized. The former includes larger numbers of elements in broader groups. For species whose element composition is known from bedding-plane assemblages, generally no more than three elements of a species have been grouped. The near mutual exclusion of *Cavusgnathus* and *Gnathodus* was obvious without the aid of a computer.

Recent Progress of Conodont Biostratigraphy in Japan.

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Since the first description of Carboniferous conodonts from the Omi Limestone, Central Japan by IGO and KOIKE (1964), many contributions concerning conodont biostratigraphy of Japan have been published. Our Paleozoic geologic columns are not entirely complete, but Silurian, Devonian, Carboniferous and Permian strata yield conodonts from limestone, chert, siliceous tuff and shale. Silurian conodonts have been reported from Shikoku, Hida and Kitakami Massifs. Although these faunas are rather poor, they contain characteristic cosmopolitan species. Devonian conodonts are also poor, but Lower Devonian *Icriodus woschmidti–Spathognathodus remscheidensis* fauna and some other sporadical occurrences of Lower and Middle Devonian conodonts have been reported. The uppermost Lower Carboniferous to Upper Carboniferous conodonts are rather rich in Japan and they are well zonated in the certain sections. Permian conodonts are also rich in Japan. Recent comprehensive investigation by Hisaharu IGO elucidated prolific conodont fauna and their zonation and correlation.

Triassic conodont-bearing chert and siliceous shale are widely distributed in Japan. Previously, these siliceous rocks are mostly thought as the Permian. Recently, zonation of Triassic conodonts came from both calcareous and siliceous facies has been established. These conodont study brought many new evidences concerning the geologic development of the Japanese Islands.

On Vicarious Lower Ordovician Simple Cone Conodonts. Problems in Lower Ordovician Conodont Taxonomy.

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Vicarious: deputed, acting as a substitute; Latin = deputy

During the latest Cambrian-earliest Ordovician, the apparatus architecture (or type) and the simple cone elements which occupied the positions underwent considerable differentiation and specialization.

As is well known by post-Ordovician conodont workers in particular, some elements in an apparatus evolved slowly (e. g. ramiform elements) and some evolved rapidly (e. g. platforms). Similar if not identical elements, particularly conservative elements are found commonly, not only in apparatuses of related species, but also of unrelated genera. Many problems in Lower Ordovician conodont taxonomy have arisen because workers have not appreciated the vicarious nature of many of the elements and the different architectural types which evolved in different provinces.

The most common and variable vicarious element in Ordovician apparatuses is the oistodiform element. More form species have been erected for this form species than any other simple cone genus. *O. lanceolatus* s. f. illustrates best the concept of vicariousness for, as a form species, it has been identified in many faunas which do not contain the MES *O. lanceolatus.* The acontiodiform element s. s. is a very conservative element which makes the identifications of multielement genera such as *Acodus, Diaphorodus, Oistodus* or *Triangulodus* that are based solely on such elements, very difficult. Oneotodiform elements s. l. have a simple morphology with rounded cross-sections and no ornamentation. Consequently, differentiation of form species in small faunas is extremely difficult. Taxa such as *Prooneotodus, „O." nakamurai, „O." ovatus, „O." variabilis* (in MES *Drepanoistodus acuminatus* sensu van WAMEL) *and Pseudooneotodus* are undoubtedly polyphyletic. Element types such as acodiform, scandodiform, drepanodiform and coelocerodontiform are commonly vicarious.

Although the apparatuses of North Atlantic species are reasonably well known, those from other areas are just becoming known. The construction of multielement species from the literature of poorly known faunas must be undertaken with caution for the vicarious nature of many elements leads to

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