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.

By H. IGO

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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.

By D. J. KENNEDY

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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

incorrect reconstructions. Detailed attention to description of elements and their variation and detailed sample by sample logs of large faunas are required for stability in taxonomy in these early stages of Lower Ordovician multielement taxonomy.

BRANSON & MEHL Localities – Historical Perspectives.

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Middle and Upper Triassic Conodont Zonation of the Tethyan Realm.

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In the Middle-Upper Triassic there are the following conodont faunal provinces within the Tethyan realm: Asiatic, Dinaric (with Balkanide subprovince), Austroalpine, Westmediterranean-Arabian, Germanic, and Nevadic ones. Revized conodont zonations are established for all these conodont provinces. These zonations are correlated with the stratigraphic subdivision and with the ammonoid successions. A Middle-Upper Triassic standard conodont zonation is established and the conodont zonations of all faunal provinces are correlated with this standard zonation.

Silurian Conodonts from Yokokura-yama, Shikoku, Japan.

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The studied Silurian sequence about 80 metres thick have yielded the conodonts characteristic of the Llandovery-Wenlock boundary interval. The conodont fauna from the lower clastic part (ca. 40 m thick) are characterized by the more or less frequent occurrence of *Apsidognathus tuberculatus, Ozarkodina* sp. and *Panderodus* sp. and also by the more sporadic occurrence of *Ambalodus galerus* s. f., *Astrognathus tetractis* s. f., *Belodina* sp., *Carniodus carnulus, Hadrognathus staurognathoides, Llandoverygnathus pennatus, Pseudooneotodus tricornis, Pygodus lyra* and *Pterospathodus amorphognathoides.* In contrast the upper predominantly carbonate part have yielded *Dapsilodus* spp., *Ozarkodina excavata excavata, Panderodus* sp., *Pseudooneotodus beckmanni, P. bicornis* and *Walliserodus* sp. In this horizon the occurrence of *Kockelella ranuliformis* is noticeable although they are very low in the frequency of occurrence.

The described composition suggests that the lower clastic part are correlatable to the upper *celloni* and the *amorphognathoides*-Zones (latest Llandovery and earliest Wenlock) whereas the upper carbonate part to the lower or the lowest *patula*-Zone (early Wenlock). Zonal assignment of the uppermost part of the studied sequence remains not clear because except for the frequent occurrence of *Ozarkodina excavata excavata* and the rare occurrence of *Kockelella ranuliformis* no marker species of the *patula* or the *sagitta*-Zones have been recovered from this horizon in spite of closer examinations.

Taxonomy and Phylogeny of some Lower Carboniferous Conodonts and Preliminary Standard Post-*Siphonodella* Zonation.

By H. R. LANE, C. A. SANDBERG & W. ZIEGLER

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The attempt to synthesize a workable global conodont zonation of Upper Tournaisian and Lower Visean (Osagean) strata resulted in a preliminary standard global zonation for the post-*Siphonodella*-pre-*Cavusgnathus* interval (pre-*Gnathodus bilineatus* in Europe) based on conodont faunas from Western Europe and Central and Western North America. The phylogeny and taxonomy of six genera –