Concentration (and transport?) of conodonts in internal sediments in limestone breccias: Silurian–Lower Devonian Chillagoe "Formation", "Bellevue" area, Hodgkinson Province, north Queensland, Australia

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An internal sediment has been sampled for conodonts as part of an inquiry (Webb and others, ms.) into the mode of formation of the enclosing breccias. The brecciation appears to be confined to a broad irregular zone within a long (3.5 x 0.25 km) lenticular limestone body within the Silurian–Lower Devonian Chillagoe "Formation". These breccias have brittle-fracture textures, as opposed to the ubiquitous stylobreccias of the Chillagoe, and are typically developed in very thickly parted to massive light-grey lime-mudstone to wackestone, a facies of the Chillagoe usually with very poor conodont recoveries (1 per kg). The breccias are oligomict pack-breccias typically with a crackle fabric grading into intact limestone, but also show increasing disorganisation to a rubble fabric of angular clasts, identical to the host rock type, ranging in size from metres down to the finest silt. The matrix, when present, is recrystallised calcite.
Occasionally, areas between clasts contain laminated carbonate sediments. These are composed of fine-grained calcite with disseminated iron-oxide particles resulting in red, yellow, or brown colour. They may also contain clasts of the host rock, quartz grains, and fossils: not uncommonly crinoid ossicles and, rarely, brachiopod fragments.

The sample is from a red- to yellow-brown internal sediment 40 cm thick enclosed in a breccia of light grey probably peloidal lime-mudstone. Remarkably, conodonts are not only present in the internal sediment, they are relatively abundant: 27 per kg (estimate from incomplete picking). However, they are dominated by short-tipped Panderodus (85 %) and this dominance is typical of the much-lower-yielding facies represented by the host rock. Other conodont species and microfossils are rare.

A comparison of this collection with those from unbrecciated limestones of this body confirms its unusual nature. The poorly parted limestone which hosts the brecciation occupies the upper 170 m of the limestone body. A sample from near the top of this interval, 30 m above the sample of internal sediment, yielded a meagre fauna typical of this Chillagoe facies: recovery of 1 per kg, with short-cusped Panderodus as the only microfossil. This collection is too small to be expected to yield rare species but would appear to be typical of Barrick's (1983) Panderodus unicostatus Biofacies, as is the composition but not the abundance of the collection from the internal sediment.

The remainder of the sequence in the limestone body is an underlying 40 m of distinctly parted (medium to thick) medium–dark-grey limestone. It varies from wackestone with a well-sorted calcarenite texture, to floatstone with features suggestive of mass flow. Two conodont samples from this interval yielded relatively abundant and diverse microfossils: one, of late Llandovery–Wenlock age, had a conodont recovery of 28 per kg, with a composition matching Barrick's (1983) Dapsilodus obliquicostatus Biofacies (cones dominated by the nominate species, not by Panderodus). Another collection, from the top of this interval, was less abundant and less diverse: microfossils are common and moderately diverse; conodont recovery of 9 per kg; Panderodus unicostatus Biofacies but transitional to Mixed Biofacies (70 % short-cusped Panderodus, but with occasional Dapsilodus, three or more noncone species, and a long-cusped Panderodus).

The combination of conodont composition and recovery of the internal sediment does not make paleoenvironmental sense. Moreover, the conodonts are not only 30 times more abundant than in the sample from the enclosing massive unit, they are much smaller, as indicated by biometric measurements. Further, although both of these collections exhibit similar colour alteration (5 or 6), the former are faintly yellow brown and have a glittery coarsely crystalline surface.

The internal sediments must, it seems, be lithogenetic artefacts. The abundant but almost monomict conodonts may have been concentrated from the sparse lime-mudstones. Logan and Semeniuk (1976) observed concentrations of crinoid ossicles in internal sediments from the Canning Basin and suggested differential etching. More recently, Logan (1984) has proposed that the fluids so released could attain substantial flows and transport the products well away from the source. Implications for sampling in deformed regions are discussed.

References
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Abstracts

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