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Note on a new method of using hydrofluoric acid for the study of conodonts in cherts in the Torlesse terrane, New Zealand.

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A number of papers have described procedures for the recovery of conodonts from cherts by dissolution in hydrofluoric acid (Ethington & Austin, 1993; Stone, 1987), but, in our experience, the techniques have generally led to fragmentation of the conodont specimens.

A new method of etching by hydrofluoric acid allows observation of whole conodonts in chert samples. The method was developed on material of Permian age from New Zealand. Although this technique does not, at present, enable entire conodonts to be extracted from the rock, it makes it possible to photograph conodonts in even highly microbrecciated cherts, and the technique should be applicable to conodont-bearing cherts of any age.

The new technique involves HF etching of the surface of small samples of chert, preferably split along bedding planes. Samples weighing about 5 kg were collected *in situ* from siliceous pelagites (cherts) from the Torlesse terrane, near Meyers Pass, South Canterbury (Ford, 1995). The blocks were split or chipped along bedding planes to produce a large number of thin, 5 cm square samples. These wafer-sized chips were placed in a 1 litre polypropylene (NOT glass) beaker, and covered with 35% HF.

The chips slowly turned white over a period of 15–30 min as a reaction gel formed on the surface of each chip. When whitened, the HF was carefully decanted off and replaced with water. Taking care not to abrade the now soft skin of reaction gel, the samples were gently rinsed with water until the HF was neutralized sufficiently for the chips to be viewed under a binocular microscope. Often small amounts of gel were lost so care was required at this stage. The samples were kept immersed in a tray of water, and individual chips examined in a petri dish using a low power binocular microscope.

Samples which yielded conodonts were transferred to a container of water for storage until a photographic record could be made. Photography had to be carried out within 24 h to minimize damage due to gel breakup and crystallization. Crystallization of the gel begins after the acid is neutralized and will continue, though more slowly, even if the specimens are kept in water. The maximum storage period appears to be 24 h. Chips which yielded conodonts were more likely to contain additional specimens, and were re-etched after photography, and removal of the gel with a stiff brush (toothbrush). Although this method makes it possible to record specimens photographically, and identify them, no satisfactory method of permanent storage of specimens has yet been developed.

Figure 1 illustrates a selection of etched, microbrecciated conodont specimens, and Fig. 2 demonstrates the method of reconstructing a conodont element from a photograph. Meyers Pass specimens were identified as *Mesogondolella bisselli* (Clark & Behnken, 1971), and *Xaniognathus abstractus* (Clark & Ethington, 1962), which allows an age determination of Early Permian for this part of the otherwise poorly fossiliferous Torlesse terrane.

This method has allowed the first precise faunal correlation between the Permian sequences of the Torlesse and Caples terranes in southern New Zealand, and provides a firm basis for international correlation using Permian conodont zonation schemes. Because of the pervasive fracturing of these conodonts, due to the highly indurated and strongly deformed nature of most of the rocks of the Torlesse terrane, traditional methods of microfossil extraction based upon dissolution of the chert yielded unidentifiable conodont 'dust'. This technique also obviates the need to decant residue through filter paper, with the problems mentioned by Ethington & Austin (1993), and preparation of samples takes considerably less time (15 min rather than several hours or days).

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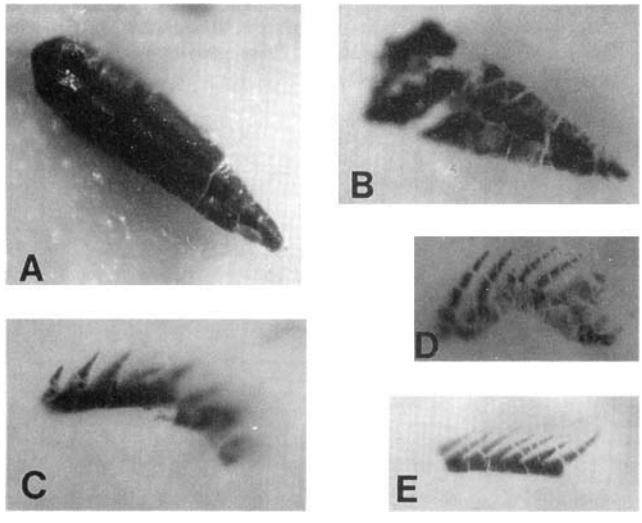

Fig. 1. Examples of light microscope photographs of typical microbrecciated conodont specimens from Meyers Pass cherts. **A, B.** *Mesogondolella bisselli* (Clark & Behnken 1971). **C–E.** *Xaniognathus* elements A, ×60; B, ×80; C, ×54; D, ×78; E, ×50.

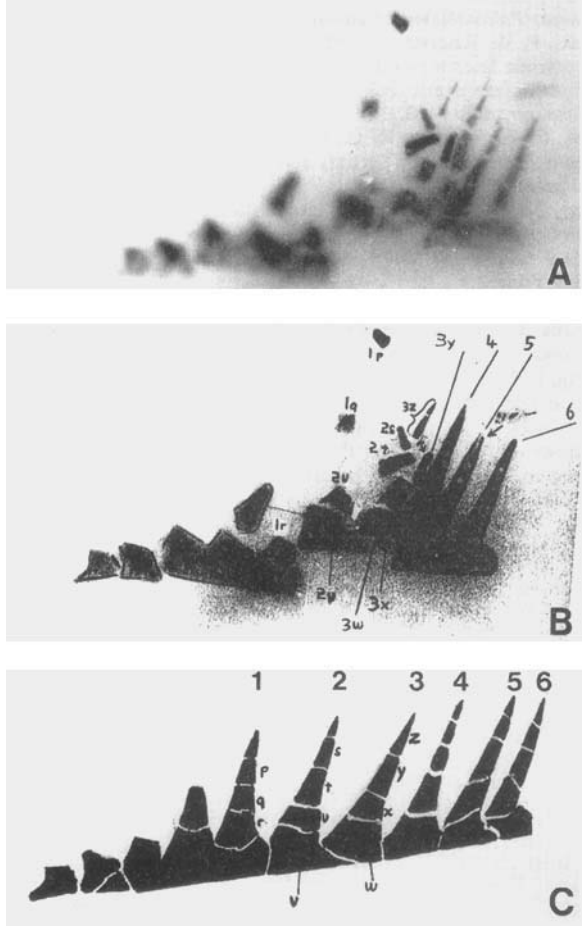

Fig. 2. Method of reconstructing a microbrecciated conodont element from an etched specimen. A–C. ?*Prioniodella* sp., ×106.