
Kimberley Railway Cutting

Highlights

Kimberley Railway Cutting is the best British locality for the Late Permian *Peltaspermum martinsii*, the only good example of the Peltaspermeaceae known from this country.

Introduction

There are a number of early records of plant remains from the now disused railway cutting [SK 500 452] in the village of Kimberley, Nottinghamshire (Wilson, 1876, 1881; Smith, 1913; Carr, 1914) and Carruthers (in Wilson, 1881) compared them with the Permian floras of continental Europe. The first species list was not, however, published until Stoneley's (1958) monograph on the British Permian plant fossils. Most recently, Townrow (1960) described specimens from here in his study on the pteridosperm family Peltaspermeaceae.

Description

Stratigraphy

About 10 metres of Upper Permian strata are exposed, lying unconformably on Westphalian (Upper Carboniferous) shales. A thin 'Basal' Permian Breccia is overlain by Marl Slate (the Lower Permian Marls of some authors), which in turn is overlain by Lower Magnesian Limestone. Plant fragments occur throughout the Marl Slate part of the sequence, but the most abundant and well-preserved material occurs in clay bands just below the junction with the Lower Magnesian Limestone. As at Middridge Quarry (see above), the Marl Slate here probably belongs to the Kazanian Stage, and was deposited in a shallow marine environment.

Palaeobotany

The plant fossils are preserved here as adpressions, sometimes with cuticles preserved. The following species have been reported so far:

Peltaspermales:

Peltaspermum martinsii (Germar) Poort and Kerp

Pinopsida:

Pseudovoltzia liebeana (Geinitz) Florin

Ullmannia bronnii Göppert

***Samaropsis triangularis* (Geinitz) Seward**

Interpretation

P. martinsii is now taken as a 'natural, whole-plant' species (Poort and Kerp, 1990). This is based on the presumed connection between fronds previously known as *Lepidopteris martinsii* (Germar) Townrow and ovulate structures identified as *Strobilites bronnii* Solms-Laubach. So far, a connection between these organs has not been proved, but there is a consistent association between them, including at Kimberley Cutting, and a close similarity in their epidermal structure. The ovulate structures were initially regarded as fragments of conifer male-cone (Florin, 1938–1945). However, Poort and Kerp (1990) demonstrated that they have ovules attached to small, peltate discs, similar to those of

Peltaspermum ottonis (Harris) Poort and Kerp from the Rhaetian of Greenland.

Fragments of *P. martinsii* foliage described by Stoneley (1958) and Townrow (1960) have yielded details of the frond architecture, particularly the presence of intercalated pinnules on the main rachis. They have also yielded cuticles, showing that stomata occur on both abaxial and adaxial surfaces of the leaf. Stoneley argued that the British specimens differed from those from Germany described by Gothan and Nagalhard (1922) in not having a papilla on each of the epidermal cells, but, by staining the cuticles with safranin, Townrow was able to demonstrate that epidermal papillae are present in at least some of the British specimens. The taxonomic significance of these epidermal papillae is thus doubtful (Townrow suggested that their presence or absence might be controlled by pinnule shape), and the German and British specimens are almost certainly specifically identical.

In contrast to Middridge Quarry (see above) and other sites in Durham, the dominant conifer remains at Kimberley Railway Cutting are shoots of *Ullmannia bronnii* (synonym *Hiltonia rivulii* Stoneley, 1956). *U. frumentaria*, the dominant form at Middridge, has not so far been reported here.

Small, winged seeds were identified by Stoneley (1958) as *Samaropsis triangularis* (Figure 7.9). Some authors have suggested that these might be the seeds of *Ullmannia frumentaria* (e.g. Weigelt, 1928), but Florin (1938–1945) reported rather differently shaped seeds attached to the dwarf shoot of that species. That *U. frumentaria* foliage has yet to be found at Kimberley is further evidence against this suggestion. It is instead more likely that they are the seeds of *U. bronnii*.

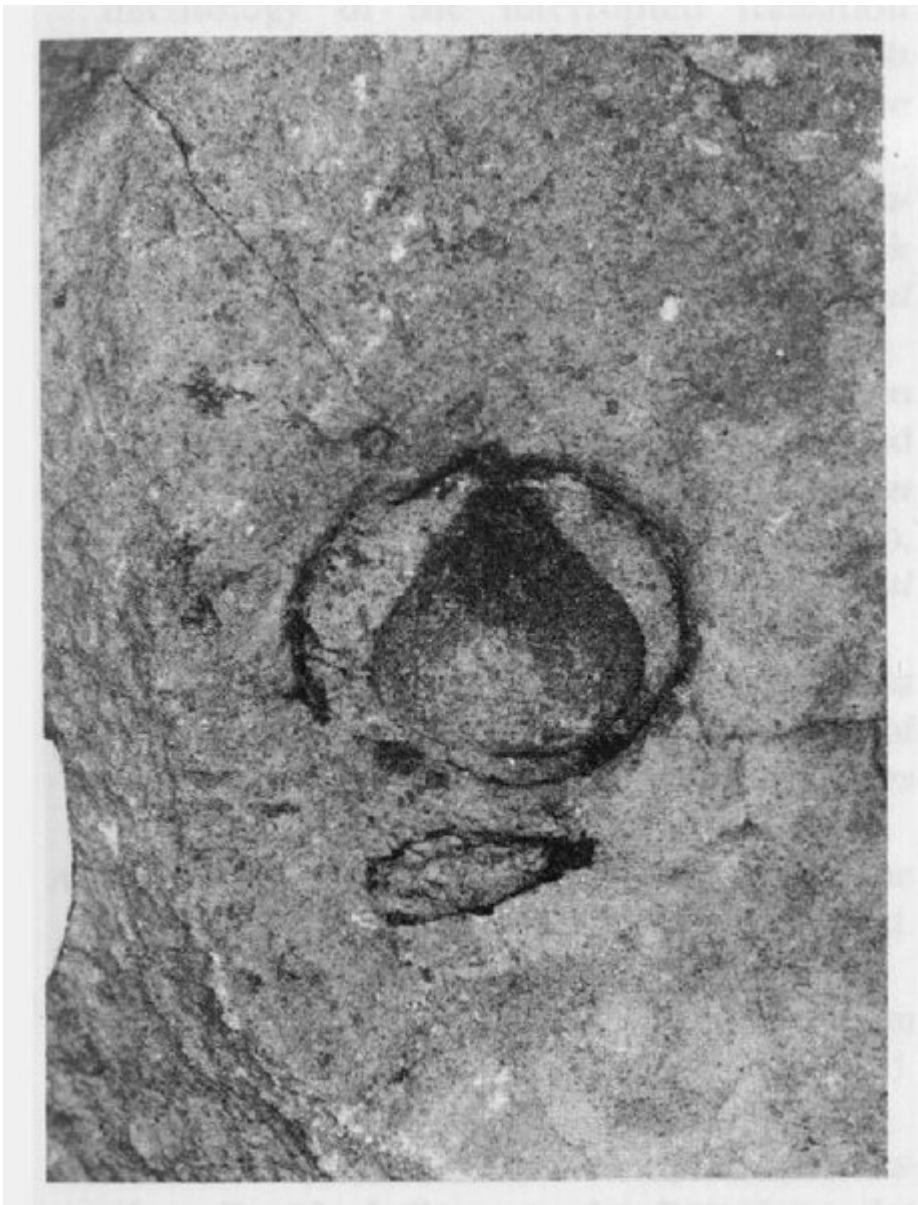
Stoneley (1958) reported examples of the lobed 'cone scales' of *Pseudovoltzia liebeana* (Figure 7.10), but she illustrated them by only a diagrammatic silhouette, revealing nothing of their fine detail (if any was preserved). This is unfortunate as the detailed structure of the bract and dwarf-shoot is a key feature for justifying the position of this species within the Majoniaceae, one of the most important families of conifer found in the palaeoequatorial Permian (Clement-Westerhof, 1987, 1988).

The assemblage from Kimberley Railway Cutting is meagre compared with that of Middridge Quarry (see above) and of the classic Kupferschiefer sites in Germany (Schweitzer, 1962, 1968). It is of significance, however, as the best British locality for *Peltaspermum martinsii*. This species is the only well-documented British representative of the Peltaspermaceae, one of the very few families of land plants that survived the Palaeophytic–Mesophytic floral transition, discussed in the introduction to the present chapter.

Conclusion

Kimberley Railway Cutting is the best British locality for the group of seed plants with fern-like fronds, known as the Peltaspermaceae. The family is now extinct, but during the Permian and the succeeding Triassic Period (290–205 Ma) it was an important element of the equatorial vegetation. These British examples are about 270 million years old. It was one of the very few families of land plant to have survived the large-scale vegetational change that occurred between the Palaeozoic and Mesozoic eras, around 250 million years ago, as discussed earlier in this chapter.

[References](#)



(Figure 7.9) *Samaropsis triangularis* (Geinitz) Seward. Conifer seed; Natural History Museum, London, V.6209. Marl Slate (Upper Permian), Kimberley Railway Cutting. x 3. (Photo: Photographic Studio, Natural History Museum, London.)



(Figure 7.10) *Pseudovoltzia liebeana* (Geinitz) Florin. Cone scale from a conifer; Natural History Museum, London, specimen V.35128. Marl Slate (Upper Permian), Kimberley Railway Cutting. x 3. (Photo: Photographic Studio, Natural History Museum, London.)