

## Late Palaeozoic foliage from China displays affinities to Cycadales rather than to Bennettitales necessitating a re-evaluation of the Palaeozoic *Pterophyllum* species

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The epidermal anatomy of *Pseudoctenis samchokense* is described revealing non–bennettitalean characters of these

leaves from the Permo-Carboniferous of China (and Korea). The specimens were originally described as Pterophyllum samchokense suggesting a bennettitalean affinity. They can no longer be considered bennettitalean since their cuticles lack the distinctive brachyparacytic stomata of that clade. Pterophyllum was originally erected as a morphogenus for segmented leaves from the Mesozoic and has subsequently been clearly assigned to the Bennettitales. The segmented leaves from the Permo-Carboniferous of Shanxi and Hebei, China described herein require a new ordinal and generic assignment since the non-bennettitalean cuticular characters documented reinforce the uncertainties in attribution of any foliage older than Late Triassic to the Bennettitales. Based on leaf-architecture and epidermal anatomical characters, the specimens are at best assigned to the cycadalean genus *Pseudoctenis*. This genus was formerly known only from Mesozoic rocks. Consequently, the specimens are highly significant, as they are among the oldest known vegetative remains of cycads. Re-evaluation of the affinities of all specimens assigned to *Pterophyllum* from Palaeozoic rocks is thus essential. Based on a review of other Permian-Carboniferous fossil leaves assigned to *Pterophyllum*, we conclude that none yet reveals definitive bennettitalean characters.

**Key words:** Cycadales, Bennettitales, *Pseudoctenis*, *Pterophyllum*, cuticle analysis, epidermal anatomy, Carboniferous, Permian, China.

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