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O.042 Re-investigation of *Stauroxylon beckii*, an Early Carboniferous species with possible Devonian relationships

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Stauroxylon beckii is a plant from the Tournaisian (Early Carboniferous) of the Montagne Noire in France, discovered and described by Galtier in 1970. This taxon is often forgotten by recent authors, likely because of its exclusively French description. However, it possesses interesting characters, with the combination of (1) a cruciform actinostele with mesarch protoxylem strands at its centre and ribs tips, (2) an arc-shaped trace that is abaxially concave and becomes circular when emitting secondary traces, and (3) secondary growth, with pycnoxylic secondary xylem. This work reinvestigates the holotype of *Stauroxylon* and possibly related specimens also identified by Galtier in the light of our current knowledge of Devonian–Carboniferous plants. *Stauroxylon* is also included in phylogenetic analyses using the matrix of Toledo *et al*. (2021). *Stauroxylon beckii* shows general similarities with the Stenokoleales, the early seeds plants, and the aneurophytalean progymnosperms, giving us a new opportunity to investigate the relationships between these groups. *Stauroxylon* can be distinguished from the Stenokoleales by the lack of division of its primary xylem ribs and the fact that traces to lateral organs are never emitted in pairs. *Stauroxylon* also differs from typical Late Devonian–Early Carboniferous seed plants, notably by the anatomy and mode of emission of the traces to its lateral organs. Overall, *Stauroxylon* seems to be more likely related to Aneurophytales, especially with *Tetraxylopteris* and *Proteokalon*, than with other groups. This possibility, already suggested by Galtier in 1970 and supported by our new observations and the phylogenetic analyses, is particularly intriguing since all currently known Aneurophytales are dated from the Devonian. We discuss the implications of this result for our understanding of Late Devonian–Early Carboniferous plant evolution and present future research directions on this subject.

References

Toledo, S., Bippus, A.C., Atkinson, B.A., Bronson, A.W. & Tomescu, A.M.F., 2021. Taxon sampling and alternative hypotheses of relationships in the euphyllophyte plexus that gave rise to seed plants: insights from an Early Devonian radiatopsid. *New Phytologist 232*, 914–927.

O.043 Variation and affinities of Wenlock to Middle Devonian *Pachytheca*

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Following more than 170 years of debate since its discovery, the affinities of *Pachytheca* remain unresolved. A collection of hundreds of millimeter-sized charcoalified spheres from a Lochkovian Lagerstatte in the Welsh Borderland, studied by scanning microscopy, provides anatomical details that confirm the Bauplan of the colony/organism, viz., a central body of intertwining filaments (medulla) that radiate centrifugally through a ball of mucilage/EPS (cortex), the entire structure commonly limited by an ensheathing, possibly fungal, layer. A few specimens show a broad channel occupied by filaments extending from the medulla to the exterior—its limits marked by a papilla or a pair of small circular