
What were *Prototaxites*?

by Fiona Walter

Prototaxites has been an enigma since its fossil remains were first discovered in 1843¹. Initially thought to be a gigantic prehistoric tree carrying fungal residue, scientists quickly realized that *Prototaxites* could not have been a tree at all. What exactly it is continues debatable to this day, however scientists have not given up trying to solve the mystery of the prehistoric giant fossil that may have given the nutrients to fuel Devonian perennial plants². The following provides insight into the general morphology of *Prototaxites* and its environment, and chronologically discusses the various pieces of evidence that support and conflict with the view that *Prototaxites* was a fungus.



Illustration of Prototaxites within a Silurian Landscape, Richard Jones

It is currently understood that *Prototaxites* flourished during the Devonian and Silurian Period, between 430 million and 350 million years ago, until the uprise of a variety of flora³. It has been argued that *Prototaxites* has either succumbed to this uprise of flora or to predatory fauna, the former being the less likely¹. It could be argued that, with consideration to an ecosystems' carefully balanced environment⁴, the former appears to be a more accurate interpretation of the chain of events. If *Prototaxites* had continued to spread, it could have overpopulated the soil and have become subject to a lack of nutrients sourced from their symbiosis with other flora. Consequently, they would have ceased to exist. Alternatively, even though we may have not found a direct descendant of *Prototaxites*, the idea of their existence cannot be excluded. In support of this theory it should be noted that many fungi to this day have adjusted morphology to maintain a

mutualistic relationship with their hosts in benefit of the ecosystem. With an approximated 2.2 – 3.8 million fungi species and only 120,000 described to date⁵, this, again, would not be an unrealistic theory.

The *Prototaxites*' morphology can be described to a limited degree as the soft-bodied parts of the organism were not fossilized⁶ and only a small amount of partially fossilized *Prototaxites* have been found⁷. "[The *Prototaxites*' anatomy] is evocative of a lot of different things, but it is diagnostic of nothing," as Paleobotanist Prof. C. Kevin Boyce (2017) accurately describes. The *Prototaxites* fossils that have been found have been carefully described and analysed, with the analysis continuously developing as scientific methods evolve. The first description of *Prototaxites* was made by J.W. Dawson in 1857¹ who examined the fossil externally. He concluded that, ascribed to the unbranched, non-septate tubes arranged in con- and eccentric rings, it must be the cross-section of a prehistoric conifer-like tree trunk and therefore named it *Prototaxites* – first yew⁸. Shortly after, in 1872, G.R. Carruthers argued that *Prototaxites* is either an algae, fungi or lichen as the interpretation of morphology was debatable and he believed that Dawson drew a conclusion too quickly⁹. Dawson was quick to agree after studies of the microstructure supported Carruthers' suggestions⁹. Due to a lack of development in scientific methods specific to morphological analysis, the mystery of the giant prehistoric fossil continued.

The quest to categorize *Prototaxites* continued in 2001 when F. Hueber¹, after 20 years of research, published a paper that concluded that *Prototaxites* is part of the Kingdom of Fungi. His basis for this conclusion was the analysis of the various fossil specimen under an SEM which, despite the organism abnormal size for organisms of the Devonian Period (1 metre in width, nearly 9 metres in height), steadily showed tissues consisting of three hyphal elements. Hueber sustained the research until, in 2007, he published another paper to confirm his initial conclusion. The reasoning for this conclusion was mainly by the results of isotopic analyses that showed irregularities in the Carbon 12 and 13 ratios which imply that the organism did not photosynthesize and the enormous size of the organism which would require a large network of mycelia to feed the body¹. This analysis appears in line with other findings, considering that mycelia, thought to be *Prototaxites*' mycelia, have been found in other fossilized vascular plants of the Devonian and Silurian⁷.

Most recently it has been argued in several papers that the *Prototaxites* is a lichen. The 2014 paper published by G.J. Retallack and E. Landing⁷ analysed the outermost structure of the Schunnemunk Tree, a *Prototaxites* found in 1898 in New York State. This meta-analysis of previous studies in conjunction with the new findings of the Schunnemunk Tree concluded that *Prototaxite* can either be classified as a lichen due to its uneven-paired branching or a Glomeromycota due to the structural dominance of large aseptate hyphae. The more recent paper, published by R. Honegger, *et al.* in 2017, used new findings of a *Prototaxite* found in Rhynie chert and the Welsh Borderland to compare *Prototaxites*' structure to current *Pezizomycotina* which is an Ascomycota known to enter

symbiotic relationship with algae. The results of this analysis showed overwhelming similarities in structure between the organisms and it was concluded that the *Prototaxite* is a lichen. Notably, the work of Honegger et al and Retallack & Landing, drew the same conclusion by different means of analysis.

Scientists over the course of 100 years have come closer to solving the mystery of the giant prehistoric organism *Prototaxites*. As time developed, scientific methods developed, and each step forward meant coming closer to forming a definite conclusion. Even though it appears that a lot of the research is manifested by drawing inferences without the 'living' evidence to support it, the analyses solidify in unity as most research has come to the conclusion that *Protoaxites* is a lichen. It is with peculiar excitement that the author awaits even more eloquent scientific methods to further lift the mystery of the genus *Prototaxites*.

Update as of publishing this article on my website, 16 October 2025: The picture in my article was taken from a recently published New Scientist article that re-summarises scientific opinion on what kingdom *Prototaxites* belongs to. It's hidden behind a paywall but if you happen to find it in waybackmachine I wouldn't deter you from reading it. [Link to article](#).

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