A SOLUTION TO THE ENIGMA OF *PROTOTAXITES*

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Specimens of silicified plant remains resembling fossilized wood were discovered by W.E. Logan during his exploration of Gaspé Bay, Quebec, Canada in the summer of 1843. They were given to J.W. Dawson who, in 1857, convinced by his observations of microscopic details in ground thin-sections, described the specimens as silicified, partially decayed wood closely allied with the conifers. In 1859, Dawson enlarged the description based on specimens he had collected in 1858 and proposed the name *Prototaxites* in allusion to the affinity of the fossils to the subfamily Taxineae and the Recent genus *Taxus* (yew). He attributed exogenous growth and terrestrial habitat to the genus. Subsequent studies of fragmentary specimens by Dawson resulted in his description in 1863 of another genus, *Nematoxylon*, professed to be similar to *Prototaxites* but differing in minute details of anatomy. Some years later, in 1872, with scathing criticisms of Dawson's observations and interpretations, W. Carruthers, an English botanist of note, initiated a completely revised interpretation of the taxonomic position and habitat of *Prototaxites*. His examination of thin sections of specimens given to him by Dawson suggested three possible groups to which the genus might be assigned, 1) the lichens, 2) the fungi, or 3) the algae. He commented that no one would venture to consider the first two and that the only conclusion could be that *Prototaxites* belonged with the green algae but were comparable in size with a very large brown alga such as *Lessonia*. He also informally established a new name for the genus, *Nematophycus*. Dawson, in 1888, informally changed the name to *Nematophyton* but did not change his interpretations as to the taxonomic position of the genus with the conifers. His interpretation was ignored and no one questioned the validity of Carruthers' interpretation until A.H. Church in 1919 suggested that *Nematophyton* (*Prototaxites*) could just as well be a large fungus comparable to the large woody basidiomycetes. His comment was ignored and the affinity of *Prototaxites* with the brown or red algae has been expressed in publications as recent as 1993.

The genus, with rare exception, occurs in continental, fluviatile deposits associated with the entire spectrum of land plants known for the Devonian, thereby excluding from consideration marine algae as likely relatives. Evidence derived from the study of nearly all available species of the genus, as well as potentially related genera, clearly indicates that *Prototaxites* belongs with the septate Eumycota (higher fungi). Its anatomy parallels that of the woody basidiomycetes. The genus represents a gigantic fruiting body with a trimitic system of hyphae comprising heavily thickened, non-septate skeletal hyphae (30-50 µm diameter), thin-walled, septate, generative hyphae (20-50 µm diameter) and thin-walled, septate, mycelial hyphae (10-15 µm diameter). Specimens are known 1.25 m in diameter at the base and in one instance, 8.8 m tall. Growth was probably phototropic. As many as 150 growth increments (rings) have been recorded indicating it was perennial. Each growth increment is interpreted as the outer surface of the fruiting body at periods of reproductive activity. It is proposed that the gigantic fruiting body arose from an extensive mycelium with saprobic nutrition. The genus appears in the earliest Devonian and disappears from the record at the latest Devonian. Its extinction may be attributed to the extensive feeding on its corpus by some, as yet unidentified, arthropod.