

MACROFLORAL-BASED AGE DETERMINATION OF THE SALTWATER COVE FORMATION (ANGUILLE GROUP), FISHER HILLS BLUESTONE QUARRY

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ABSTRACT

Fossil lycopsid and sphenopsid material has been recovered from massive sandstone of the Saltwater Cove Formation (Anguille Group), exposed in the Fisher Hills bluestone quarry. The flora includes Archaeocalamites radiatus (Brongniart, 1828), Lepidodendropsis vandergrachti Jongmans, Gothan and Darrah, 1937? and Sublepidodendron sp. cf. S. mirabile (Nathorst, 1920). An Early Carboniferous, late Tournaisian to earliest Viséan Triphylopteris Zone (Lepidodendropsis Subzone) age is indicated.

INTRODUCTION

The Saltwater Cove Formation¹ (Hyde, 1983) of the Anguille Group is at least 2700 m thick (Hyde, 1984, page 90). It comprises grey sandstone and shale of probable lacustrine–deltaic origin (Hyde, 1984; Knight, 1994). Plant debris is common in the formation, although much of it is fragmentary and generally unidentifiable. Fortunately, Dr. J.P. Tuach has obtained some well preserved material in his Fisher Hills bluestone quarry, 6.5 km southeast of Pynn's Brook (Figure 1).

In May, 1995, the author identified the lycopsid *Sublepidodendron* sp. cf. *S. mirabile* (Nathorst, 1920) from the Fisher Hills bluestone quarry. In August, 1998, Dr. Tuach led the author on another tour of the quarry (Plate 1), and he provided access to the best preserved material, which included the following (Plate 2):

Lycopsida

Lepidodendropsis vandergrachti Jongmans, Gothan and Darrah, 1937?

Sphenopsida

Archaeocalamites radiatus (Brongniart, 1828)

The specimen of *Archaeocalamites radiatus* (Brongniart, 1828) is a flattened pith cast, which is 30 cm long and 1.5 cm wide; Figure 2 is a simplified reconstruction.

Some large fossilized tree trunks were also seen in the quarry (Plate 3); these remain unidentified.

AGE OF THE SALTWATER COVE FORMATION

Archaeocalamites Stur, 1875 is a Late Devonian to Early Permian genus (Mamay and Bateman, 1991; Stewart and Rothwell, 1993, page 198; Taylor and Taylor, 1993, page 318). Unlike *Calamites* Brongniart, 1828, pith casts of *Archaeocalamites* Stur, 1875² (Figure 3) have aligned grooves and ribs in adjacent internodes (Scott, 1908, page 71; Seward, 1898-1919, page 383; Seward, 1933, page 189; Smoot *et al.*, 1982, page 331; Gensel and Andrews, 1984, page 169; Mamay and Bateman, 1991, page 489).

Wagner (1984, page 114, Chart 1) indicated a Late Devonian (Famennian) to Early Carboniferous (early Namurian) age for *Archaeocalamites*. Cleal and Thomas (1991, page 159, Figure 4.3) and Cleal (1991, pages 186, 193, 196) showed a Tournaisian to basal Namurian range in the Euameria paleokingdom. Mamay and Bateman (1991) subsequently described *Archaeocalamites lazarii*, sp. nov. from the mid-Early Permian. According to Mamay and Bateman (1991, page 489), *Archaeocalamites* is most common in the Early Carboniferous having sparse occurrences in the Devonian, the earliest Late Carboniferous and the mid-Early Permian.

Archaeocalamites radiatus (Brongniart, 1828) is known from Upper Devonian and Lower Carboniferous rocks in Europe, Asia Minor, North America and Greenland

¹ Unit 3 of Hyde (1984)

² Senior synonym of *Asterocalamites* Zeiller, 1879, according to Leistokow (1959)

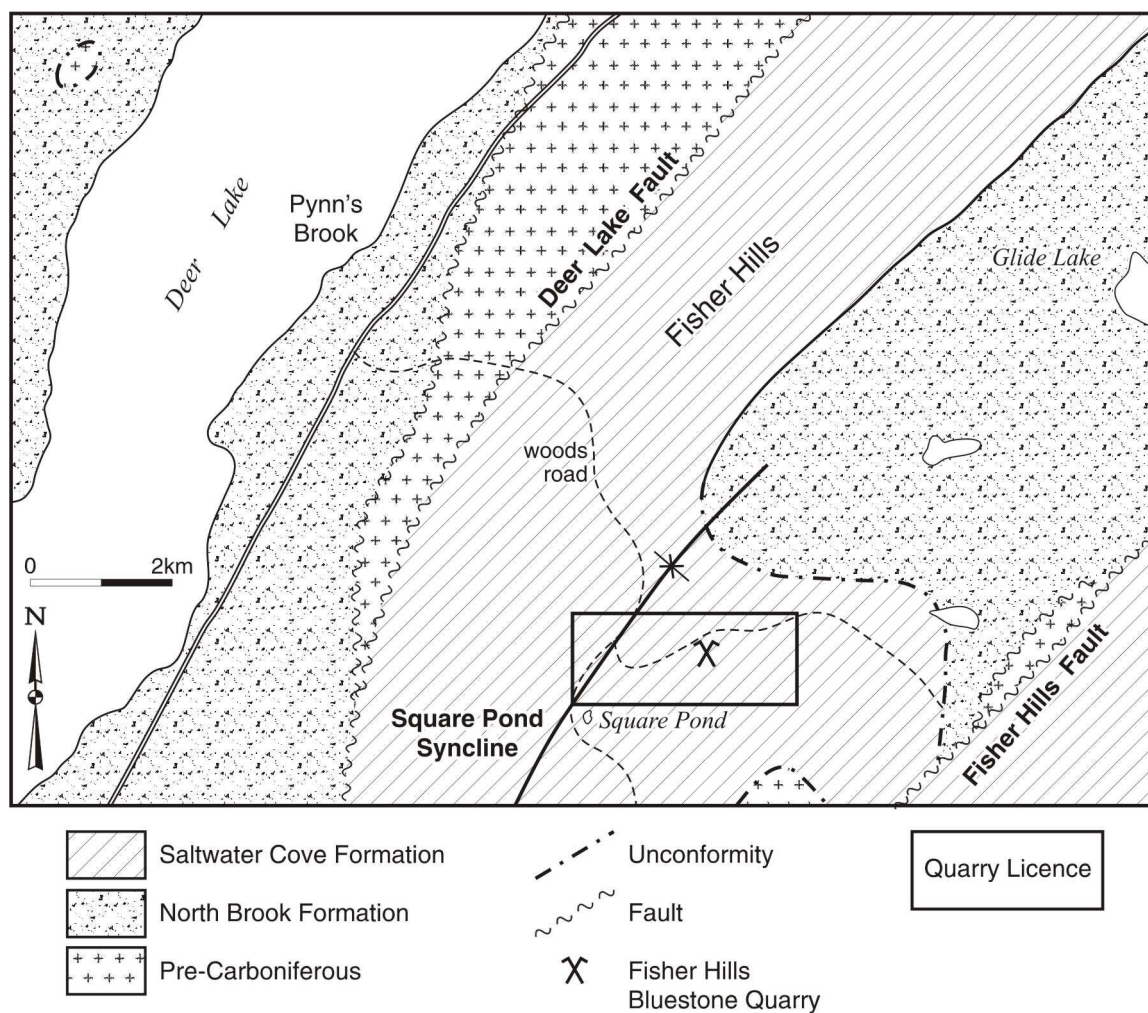


Figure 1. Simplified geology of the Pynn's Brook–Fisher Hills area, showing the location of the Fisher Hills bluestone quarry (from Knight, 1994, based on Hyde, 1983).



Plate 1. Dr. J.P. Tuach (operator of the Fisher Hills bluestone quarry, and discoverer of well-preserved plant fossils in the quarry).



Plate 2. Sandstone blocks collected by Dr. J.P. Tuach, which contain (top) *Archaeocalamites radiatus* (Brongniart, 1828) and (bottom, labelled "4A") *Lepidodendropsis vandergrachti* Jongmans, Gothan and Darrah, 1937? Black marker is 14.5 cm long.

Figure 2. Simplified scale drawing of *Archaeocalamites radiatus* (Brongniart, 1828) pith cast in Plate 1. Specimen is 30 cm long and 1.5 cm wide.



Plate 3. Unidentified fossil tree-trunk in quarried block of sandstone. Black marker is 14.5 cm long.

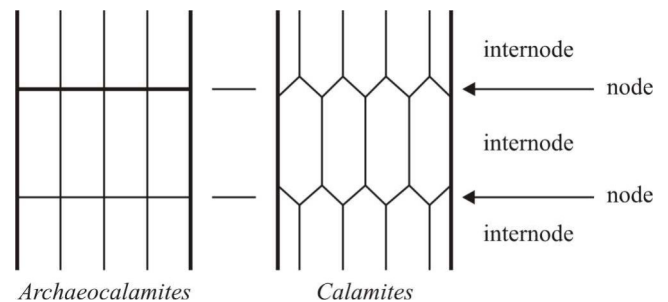


Figure 3. Diagram showing the difference between *Archaeocalamites* Stur, 1875 and *Calamites* Brongniart, 1828.

(Boureau, 1964, page 209; Lacey and Eggert, 1964, page 979).

Lepidodendropsis vandergrachti Jongmans, Gothan and Darrah, 1937 occurs in the Tournaisian *Triphyllopteris* Flora (Read, 1955; Boureau, 1967, page 473).

Sublepidodendron mirabile (Nathorst, 1920) occurs in Lower Carboniferous rocks in Spitsbergen, Scotland and China (Boureau, 1967, page 467).

An Early Carboniferous, late Tournaisian to earliest Viséan *Triphyllopteris* Zone (*Lepidodendropsis* Subzone) age is indicated for the Saltwater Cove Formation (Anguille Group) in the Fisher Hills bluestone quarry (Figure 4).

290 M.Y.	SERIES	STAGES	ZONES	SUBZONES
	LOWER PERMIAN	Autunian	<i>Autunia conferta</i>	
	STEPHANIAN	Stephanian C	<i>Sphenophyllum angustifolium</i>	
		Stephanian B	<i>Alethopteris zeilleri</i>	
		Baruellian	<i>Lobopteris lamuriana</i>	
		Cantabrian	<i>Odontopteris cantabrica</i>	
	WESTPHALIAN	Westphalian D	<i>Lobopteris vestita</i>	<i>Dicksonites plueckenetii</i>
			<i>Linopteris bunburii</i>	<i>Lobopteris micromiltoni</i>
		Bolsovian	<i>Paripteris linguaefolia</i>	<i>Alethopteris serlii</i>
				<i>Laveineopteris rarinervis</i>
		Duckmantian	<i>Lonchopteris rugosa</i>	<i>Neuropteris semireticulata</i>
				<i>Sphenophyllum majus</i>
		Langsettian	<i>Lyginopteris hoeninghausii</i>	<i>Neuropteris hollandica</i>
				<i>Laveineopteris Ioshii</i>
	NAMURIAN	Yeadonian	<i>Pecopteris aspera</i>	<i>Neuraethopteris larischii</i>
		Marsdenian		<i>Sigillaria elegans</i>
		Kinderscoutian to Chokierian		
		Arnsbergian	<i>Lyginopteris larischii</i>	
			<i>Lyginopteris stangeri</i>	
		Pendleian	<i>Neuropteris antedecens</i>	<i>Lyginopteris fragillis</i>
	VISÉAN	Brigantian	<i>Triphyllopteris</i>	<i>Diplopteridium</i>
		Asbian–Chadian		<i>Spathulopteris</i>
	TOURNAISIAN	Ivorian		<i>Lepidodendropsis</i>
		Hastarian	<i>Adiantites</i>	

Figure 4. Carboniferous and earliest Permian floral biostratigraphy of the Euameria Paleokingdom (after Wagner, 1984; Cleal, 1991). Age for the base of Carboniferous from Tucker et al. (1998). The strata of the Fisher Hills bluestone quarry are probably of Triphyllopteris Zone (Lepidodendropsis Subzone) age.

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