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**BIOSTRATIGRAPHIC AND PALEOENVIRONMENTAL SIGNIFICANCE OF NEWLY DISCOVERED
PALAEONISCID FISH AND VASCULAR PLANT REMAINS FROM THE SNAKES BIGHT FORMATION
(ANGUILLE GROUP) NEAR CODROY, SOUTHWESTERN NEWFOUNDLAND**

by

W.D. Boyce
Newfoundland Mapping Section

Abstract

Articulated palaeoniscid fish and vascular plant remains have been recovered for the first time from the upper part of the Snakes Bight Formation (Anguille Group) near Codroy, southwestern Newfoundland. An Early Carboniferous, latest Tournaisian to earliest Viséan (= Early Mississippian) age is strongly indicated by the fossils, which favorably compare with those contained in the Albert Formation of southeastern New Brunswick and the Horton Bluff Formation of Nova Scotia. The Snakes Bight Formation was probably deposited in a freshwater, lacustrine environment rather than in marine conditions.

INTRODUCTION

The Snakes Bight Formation (Anguille Group) predominantly consists of thinly bedded black siltstones, mudstones and shales and thinly to thickly bedded gray sandstones; it also includes minor conglomerates, intraformational slump deposits and carbonate lithologies (Baird and Coté, 1964; Knight, 1983). Even though the formation had not yielded diagnostic nonmarine vertebrates that are common in the time-equivalent Albert Formation of New Brunswick and the Horton Bluff Formation of Nova Scotia (Bell, 1960; Carroll et al., 1972; Greiner, 1974), past workers generally interpreted it as a freshwater lacustrine deposit (Baird and Coté, 1964; Belt, 1969; Knight, 1983). Because no definitive nonmarine fossils were known, there remained some potential that the beds might be of marine origin (Knight, 1983, p. 31).

In June, 1984, P. Dean, J. Meyer, A. Best and D. Andrews discovered articulated fish remains near the top of the Snakes Bight Formation in the vicinity of Codroy, southwestern Newfoundland (Boyce et al., 1984) (see Dean and Meyer, this volume, Figure 2); unfortunately, at that time, most of the specimens proved impossible to collect. Because of the fishes' potential importance in determining the marine/nonmarine nature of the formation, the author visited the locality in July to retrieve the specimens and collect additional material, including plant remains.

All the fish collected display the thick, heavy, overlapping, diamond-shaped or rhombic black scales and deeply cleft shark-like heterocercal tail characteristic of the order Palaeoniscida (Colbert, 1980; Moy-Thomas and Miles, 1971; Romer, 1966). The following palaeoniscid genera have been identified: *Acrolepis*, ?*Canobius*, *Elonichthys* and *Rhadinichthys*. The plants collected include *Aneimites acadica*

Dawson and *Asterocalamites scrobiculatus* (Schlotheim).

Note: The Codroy palaeoniscids are neither the first nor oldest fish fossils found in Newfoundland; their significance is that they are the first complete ones. Landell-Mills (1919, p. 7) and Hyde and Ware (1981, p. 25) report abundant fragmentary palaeoniscid debris from the Rocky Brook Formation (Deer Lake Group) of the Deer Lake Basin; Dr. R. Hyde also obtained an incomplete palaeoniscid from talus within the Anguille Group of the Deer Lake Basin (Dr. R. Hyde, personal communication, 1984). The oldest fossil fish so far obtained in Newfoundland are incomplete Silurian ostracoderms discovered by F. O'Brien at the base of the Clam Bank Formation on Port au Port Peninsula (F. O'Brien, personal communication, 1984).

**BIOSTRATIGRAPHIC SIGNIFICANCE OF THE
COLLECTED FLORA AND FAUNA**

Aneimites acadica Dawson and *Asterocalamites scrobiculatus* (Schlotheim) both occur in the Horton Bluff and Cheverie Formations (Horton Group) of Nova Scotia (Bell, 1960). *Aneimites acadica* Dawson also occurs in the Albert Formation of southeastern New Brunswick (Lambe, 1910; Bell, 1960) and has been reported from Lower Carboniferous strata in Scotland (White, 1927).

With respect to the palaeoniscid genera in the Snakes Bight Formation, *Acrolepis* also occurs in the Horton Bluff Formation of Nova Scotia (Dawson, 1878; Carroll et al., 1972), and *Canobius*, *Elonichthys* and *Rhadinichthys* occur in the Albert Formation of New Brunswick (Lambe, 1910; Gussow, 1953; Greiner, 1974). The *Rhadinichthys* from the Snakes Bight Formation (see Figure 1) in fact may be conspecific with the Albert Formation species *R. alberti* (Jackson) illustrated by Lambe (1910). *Acrolepis*, *Canobius*, *Elonichthys*

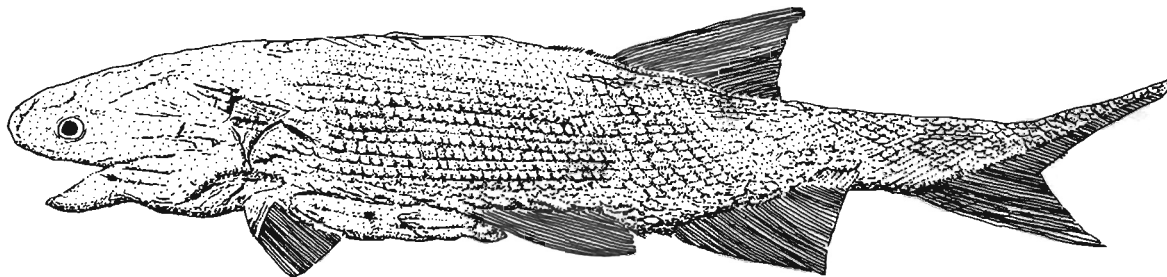


Figure 1: Artist's reconstruction of *Rhadinichthys* sp. cf. *R. alberti* (Jackson) obtained from the top of the Snakes Bight Formation (Anguille Group) near Codroy, western Newfoundland. Approximately natural size. Reconstruction by Dave Leonard, based on nearly complete specimen.

and *Rhadinichthys* are also common in Lower Carboniferous strata in Scotland (Traquir, 1903; Moy-Thomas and Bradley-Dyne, 1938; Schram, 1983).

Based on the above floral and faunal similarities, the top of the Snakes Bight Formation at least, is regarded as biostratigraphically correlative with the Horton Bluff and Cheverie Formations (Horton Group) of Nova Scotia and the Albert Formation of southeastern New Brunswick. Bell (1960) and Playford (1963) assigned these formations an Early Carboniferous, Tournaisian (Early Mississippian) age on the basis of their contained macroflora and microflora, respectively. Barss (*in* Hacquebard, 1972, p. 73, Table 11) subsequently proposed a provisional miospore zonation of the Horton Group, comprising seven lettered zones from A to G. In terms of this zonation, the Horton Bluff, Cheverie and Albert Formations contain Zone G miospores, and the Horton Bluff at its base contains Zone F miospores (Hacquebard, 1972, Fig. 4). Also, Greiner (1974, p. 1109) reported Late Devonian fish from the base of the Albert Formation. According to Barss (*in* Hacquebard, 1972, p. 73, Table 11), Zone G is latest Tournaisian although Barss and Hacquebard (*in* Hacquebard, 1972, p. 71, Table 1) suggest that it may extend into the earliest Viséan.

In summary, an Early Carboniferous, latest Tournaisian to earliest Viséan (= Early Mississippian) age is strongly indicated by the fossil plants and fish collected from the upper part of the Snakes Bight Formation, because they favorably compare with those contained in the Horton Bluff and Cheverie Formations (Horton Group) of Nova Scotia and the Albert Formation of New Brunswick. This information is summarized in Figure 2.

PALEOENVIRONMENTAL SIGNIFICANCE OF THE COLLECTED FLORA AND FAUNA

Unfortunately, the fossil plants and fish do not by themselves indicate whether the Snakes Bight Formation is of marine or nonmarine origin. Many of the plants collected in the field were fragmentary and current-oriented, suggesting that they have been transported. Of the fish present, *Acrolepis* appears to be mostly a marine genus. However, Traquir (1877-1914, p. 111) reports one species, *A. hopkinsi*, as occurring in both estuarine (freshwater to brackish) and marine beds. Three of the fish genera, *Canobius*, *Elonichthys* and *Rhadinichthys* occur mostly in freshwater deposits, but Traquir (1903, p. 692) and Schram (1983, p. 5,6) list species of these genera associated with definite marine fossils (i.e. articulate brachiopods, cephalopods, echinoderms, etc.).

Knight (1983) has already pointed out the lithological similarity of the Snakes Bight Formation to the lacustrine Albert Formation of New Brunswick (Greiner, 1962, 1964) and the lacustrine middle argillaceous member of the Horton Bluff Formation of Nova Scotia (Carroll et al., 1972; Hesse and Reading, 1978). This, coupled with the fact that no marine invertebrate fossils have yet been found in the Snakes Bight Formation, particularly within the carbonate lithofacies F of Knight (1983), suggests that this formation is probably a freshwater lacustrine deposit, as concluded by Knight (1983, p. 33).

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| AGE | ZONE | NEW BRUNSWICK | NOVA SCOTIA | S.W. NEWFOUNDLAND | |
|--------------------------|------------------|----------------|-----------------------------|-------------------|------------------------|
| VISEAN | G | WELDON FM. | WINDSOR GP. CHEVERIE FM. | | |
| | | ALBERT FM. | | | SNAKES BIGHT FM. (TOP) |
| F | HORTON BLUFF FM. | | | | |
| E | | | | | |
| D | | | | | |
| LATE DEVONIAN | C | | | | |
| | B | | | | |
| MIDDLE TO EARLY DEVONIAN | A | MEMRAMCOOK FM. | | | |

Figure 2: Biostratigraphic correlation chart showing possible age range for the top of the Snakes Bight Formation (within the dashed lines). Miospore zones are those of Barss (in Hacquebard, 1972). Biostratigraphic correlation of New Brunswick and Nova Scotia lithostratigraphic units after Hacquebard (1972) with modification after Greiner (1974).

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