

A NEW FOSSIL LOCALITY IN THE BAY OF EXPLOITS, CENTRAL NEWFOUNDLAND

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ABSTRACT

A previously unrecorded shelly fauna was recovered from limestone lenses and layers in turbidite deposits of the Botwood Group exposed on Upper Black Island. The fauna is dominated by cyclopygid trilobites indicative of a probable Late Ordovician, Ashgill (Rawtheyan) age.

INTRODUCTION

A previously unrecorded shelly fauna was recovered from limestone lenses and layers in apparently slumped turbidite deposits exposed on Upper Black Island in the Bay of Exploits (Figures 1 and 2); O'Brien (*this volume*) has assigned these sedimentary rocks to the Botwood Group (see Twenhofel and Shrock, 1937; Williams, 1962). The fauna is dominated by cyclopygid trilobites, which include:

Cyclopyge ?marginata Hawle and Corda, 1847
Psilacella sp. cf. *P. trirugata* Whittard, 1952
Symphysops subarmata elongata Kielan, 1960

The trinucleid trilobite *Tretaspis* sp. undet. and one unidentified strophomenid brachiopod were also collected.

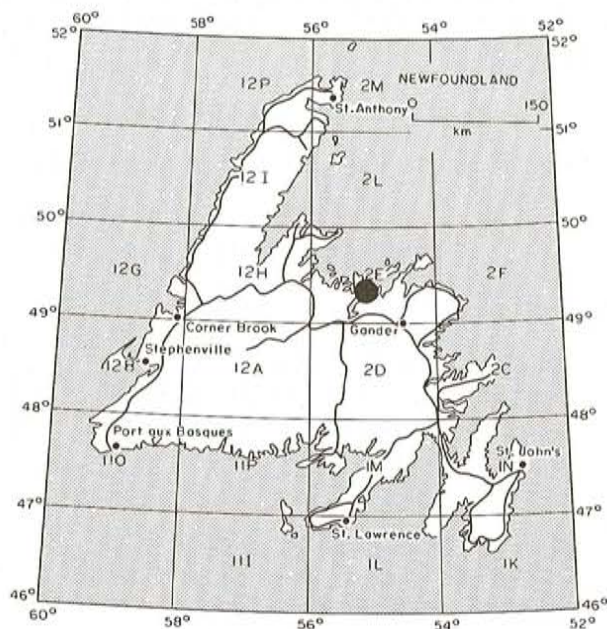


Figure 1. Map showing the location of the study area.

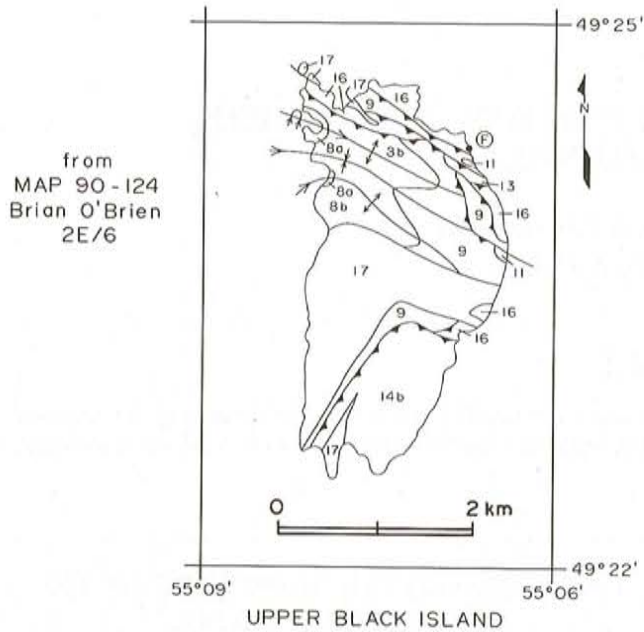
ENVIRONMENTAL SIGNIFICANCE OF CYCLOPYGID FAUNA

According to Fortey (1985, page 223) and Fortey and Owens (1987, page 105) cyclopygids probably swam at or about the limit of the photic zone (between 200 and 700 m water depth) near the edges of continental shelves and on upper slopes, or within deep marginal basins having free access to open ocean. The occurrence of Upper Black Island's cyclopygids in apparently slumped turbidites, indicative of a deep unstable slope, strongly supports Fortey's contention.

BIOSTRATIGRAPHIC SIGNIFICANCE OF CYCLOPYGID TRILOBITE FAUNA

The only previous record of cyclopygid trilobites in Newfoundland is that of Cocks (personal communication in Elliott *et al.*, 1989, page 2066, Table 1), who identified *Cyclopyge* sp. cf. *C. rediviva* (Barrande, 1846) along with the trinucleid *Dionide?* sp. from sandstone of the Sansom Formation exposed on the southwest shore of New World Island (Elliott *et al.*, 1989, Figure 2). *Cyclopyge rediviva* (Barrande, 1846) occurs in the Cernin Beds (Caradoc) of Trubin, Bohemia, Czechoslovakia.

Cyclopyge and *Psilacella* have long geological ranges, extending from the Arenig to the Ashgill (Fortey and Owens, 1987). *Symphysops* is an exceptionally widespread genus, occurring in Kazakhstan (U.S.S.R.), Quebec (Canada), Ireland, Poland, Bohemia (Czechoslovakia), Wales, Scotland, and China (Apollonov, 1974; Cooper and Kindle, 1936; Dean, 1974; Kielan, 1960; Marek, 1961; Price and Magor, 1984; Reed, 1914; Sheng, 1980). According to Kobayashi and Hamada (1971), *Symphysops* is restricted to Ashgill age rocks. However, in China the genus is reported from the *Sinoceras chinense* and *Nankinolithus nankinensis* zones of the Yenchingian Stage, equivalent to the Caradoc Series (Sheng, 1980, Table 4). Furthermore, Wright (*in* Whittington *et al.*, 1984, page 28) reports *Symphysops* from latest Caradoc (Onnian Stage) strata in the Upper Whitehouse Group of the Girvan district, Scotland.



LEGEND

SILURIAN OR DEVONIAN

SOUTH ARM GABBRO

- 17 dykes, sills and sheets of gabbro, diorite and associated diabase and mafic pegmatite

ORDOVICIAN AND SILURIAN

BOTWOOD GROUP

- 16 unseparated units of limy shale, coticule-bearing argillite, calcareous sandstone, siliceous wacke and rare limestone; interbedded mafic flows, feldspathic wacke, mafic breccia and laminated argillite; olistostrome and conglomerate containing blocks of reefal limestone and mafic volcanic rocks

ORDOVICIAN

POINT LEAMINGTON

- 14b dark grey, carbonaceous shale and light grey, quartzofeldspathic wacke; olistostrome with black shale matrix.

LAWRENCE HARBOUR SHALE

- 13 unseparated units of black carbonaceous shale; black pyritiferous siltstone with black shale partings; grey chert with bioturbated black argillite laminae

COBBS ARM LIMESTONE

- 11 massive limestone; marble; interbedded limestone and calcareous wacke

ORDOVICIAN OR EARLIER

LAWRENCE HEAD VOLCANICS

- 9 mafic pillow lavas

NEW BAY FORMATION

- 8a thin-bedded grey shale; interbedded grey shale and sandy-to-pebbly wacke; 8b feldspathic wacke and grey argillite; minor conglomeratic to pebbly wacke

Figure 2. Geology map of Upper Black Island showing cyclopygid trilobite locality.

Cyclopyge marginata Hawle and Corda, 1847 and *Symphysops subarmata elongata* Kielan, 1960 are widespread Ashgill species. In Poland, they occur in the *Staurocephalus clavifrons* Zone (Kielan, 1960; Marek, 1961). As such, they are indicative of the Rawtheyan Stage (Ingham and Wright, 1970, page 238). The two species also occur together in the Ashgill of Kazakhstan (Apollonov, 1974). *Cyclopyge marginata* Hawle and Corda, 1847 also occurs in Bohemia (Marek, 1961), Quebec (Cooper and Kindle, 1936; Apollonov, 1974), and possibly Wales (Whittington, 1966); *Symphysops subarmata elongata* Kielan, 1960 has also been reported from Ireland (Dean, 1974).

Psilacella trirugata Whittard, 1952 was originally described from the 'cyclopygid beds' of the Upper Whitehouse Group of Girvan, Scotland. These strata were originally regarded as Ashgill (Whittard, 1952); however, they are now recognized as latest Caradoc, Onnian Stage (Ingham, 1978; Whittington *et al.*, 1984). Despite this, Apollonov (1974, page 27, Plate 10) also reports *Psilacella trirugata* Whittard, 1952 from the Ashgill (Chokparian) of Kazakhstan, which correlates with the Rawtheyan Stage. This indicates that the species may be long-ranging.

Ingham and Wright (1970, pages 237, 238) indicate that, in the Ashgill, the trinucleid genus *Tretaspis* occurs in Pugsillian, Cautleyan and Rawtheyan strata. According to Fortey and Chatterton (1988; Text figure 27), only one trinucleid genus (*Raphiophorus*) survived past the Ashgill. This means that the Upper Black Island fossil locality is no younger than Ashgill.

To summarize, based on the presence of *Cyclopyge ?marginata* Hawle and Corda, 1847, *Symphysops subarmata elongata* Kielan, 1960, and *Tretaspis* sp. undet., the Upper Black Island fossil locality is probably Ashgill (Rawtheyan) in age. The occurrence of *Psilacella* sp. cf. *P. trirugata* Whittard, 1952 certainly indicates an age no older than latest Caradoc (Onnian).

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