

## **EUOMPHALOPSIS AND POLHEMIA (GASTROPODA) FROM THE LOWER ORDOVICIAN CATOCHE FORMATION, WESTERN NEWFOUNDLAND**

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### **ABSTRACT**

*Euomphalopsis magnus* new species, a large, but uncommon gastropod, and *Polhemia taneyensis* Cullison, 1944, are described from the Catoche Formation of the Port au Port Peninsula and the Port au Choix area. *Euomphalopsis* Ulrich and Bridge, 1931 and *Polhemia* Cullison, 1944, have not been previously described from Newfoundland or the northern Appalachians.

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### **INTRODUCTION**

In the mid-19th century, James Richardson (*in* Logan *et al.*, 1863) measured stratigraphic sections through autochthonous and allochthonous Ordovician sequences in western Newfoundland. The macrofossils he obtained were described and illustrated by Billings (1865) who named 45 new species of gastropods. Until recently, Billings' (1865) was the most current treatment of these snails.

Lower Ordovician shallow-water platform carbonate rocks of the St. George Group are widely exposed in western Newfoundland (Figure 1). The Barbace Cove Member of the Boat Harbour Formation, and the Catoche and the Aguathuna formations of the St. George Group form an unconformity-bounded, late Canadian to Whiterockian sequence (Figure 2). Recently, this sequence has been systematically sampled for a variety of macrofossils, i.e., trilobites (Boyce *et al.*, 2000), gastropods (Rohr *et al.*, 2000, 2001; Rohr and Measures, 2001) and graptolites (Williams *et al.*, 2000), as part of a continuing study supported by the National Geographic Society, the Geological Survey of Newfoundland and Labrador, and Sul Ross State University.

Sections of the Catoche Formation were examined on the western Port au Port Peninsula, east of the Cape St. George–Mainland road (Route 463 – *see* Figures 1 and 3), and on the Great Northern Peninsula, on the Port au Choix Peninsula, between Barbace Cove and Laignet Point (the Catoche Formation Reference Section – *see* Figures 1 and

4), and between Hunters Point and Back Arm, St. John Bay (the Catoche Formation Type Section – *see* Figures 1 and 4).

### **LITHOSTRATIGRAPHY**

The St. George Group is a 500-m-thick succession of subtidal and peritidal limestone and dolostone, widely exposed in western Newfoundland (Figure 1). It is divided into the Watts Bight, Boat Harbour, Catoche, and Aguathuna formations (Knight and James, 1987, 1988 – *see* Figure 2 for the latter three). Both gastropod species described in this study were recovered from the Catoche Formation.

### **BIOSTRATIGRAPHY**

#### **TRILOBITES**

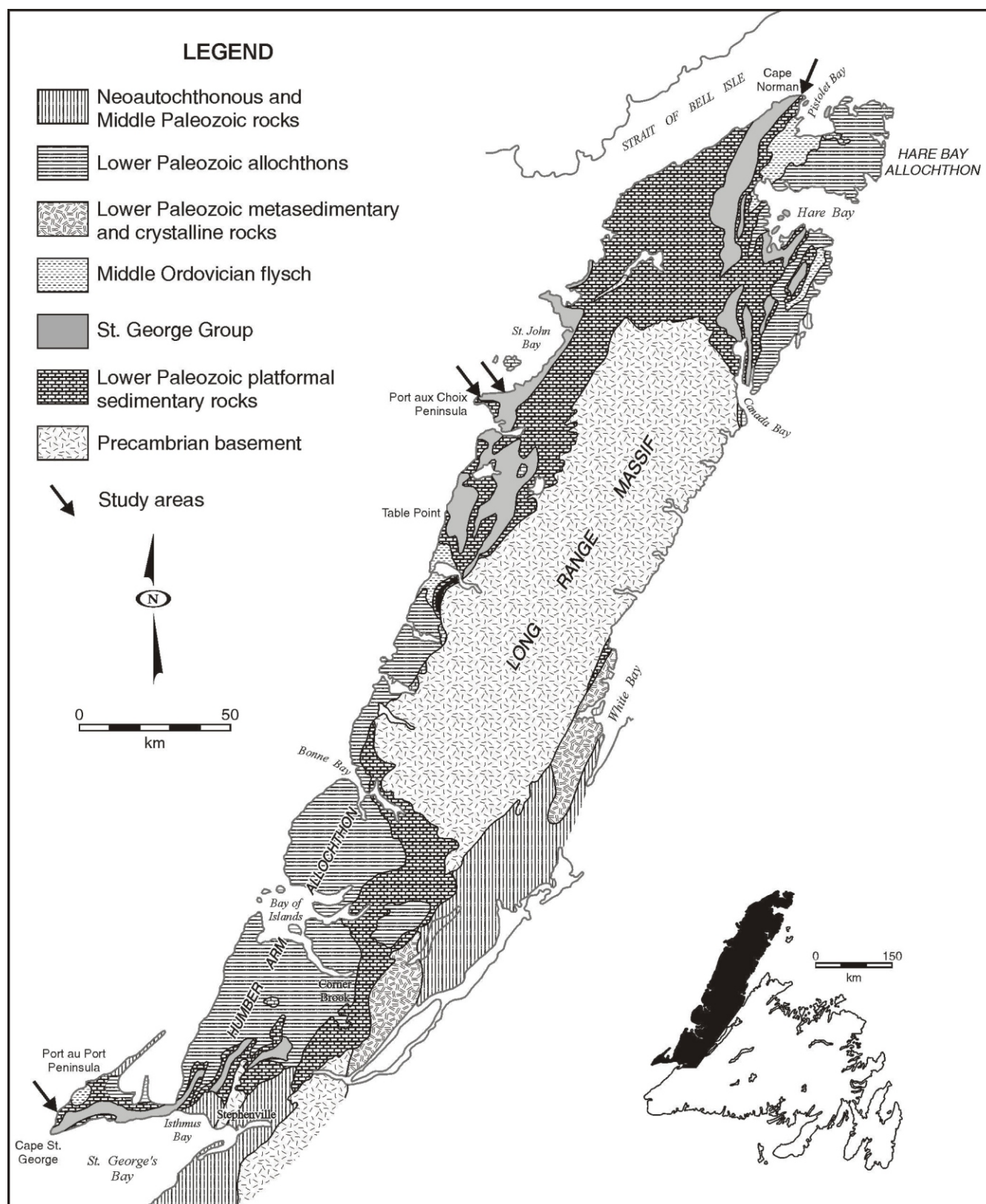
Detailed biostratigraphic sampling of many of the St. George Group sections, throughout western Newfoundland, enabled Boyce (1989, 1997), Boyce and Stouge (1997) and Boyce *et al.* (2000) to recognize seven distinct trilobite zones in the interval spanning the upper Boat Harbour Formation (i.e., the Barbace Cove Member) to the uppermost Aguathuna Formation and the basal Table Point Formation of the Table Head Group (*see* Figure 2).

#### **GRAPTOLITES**

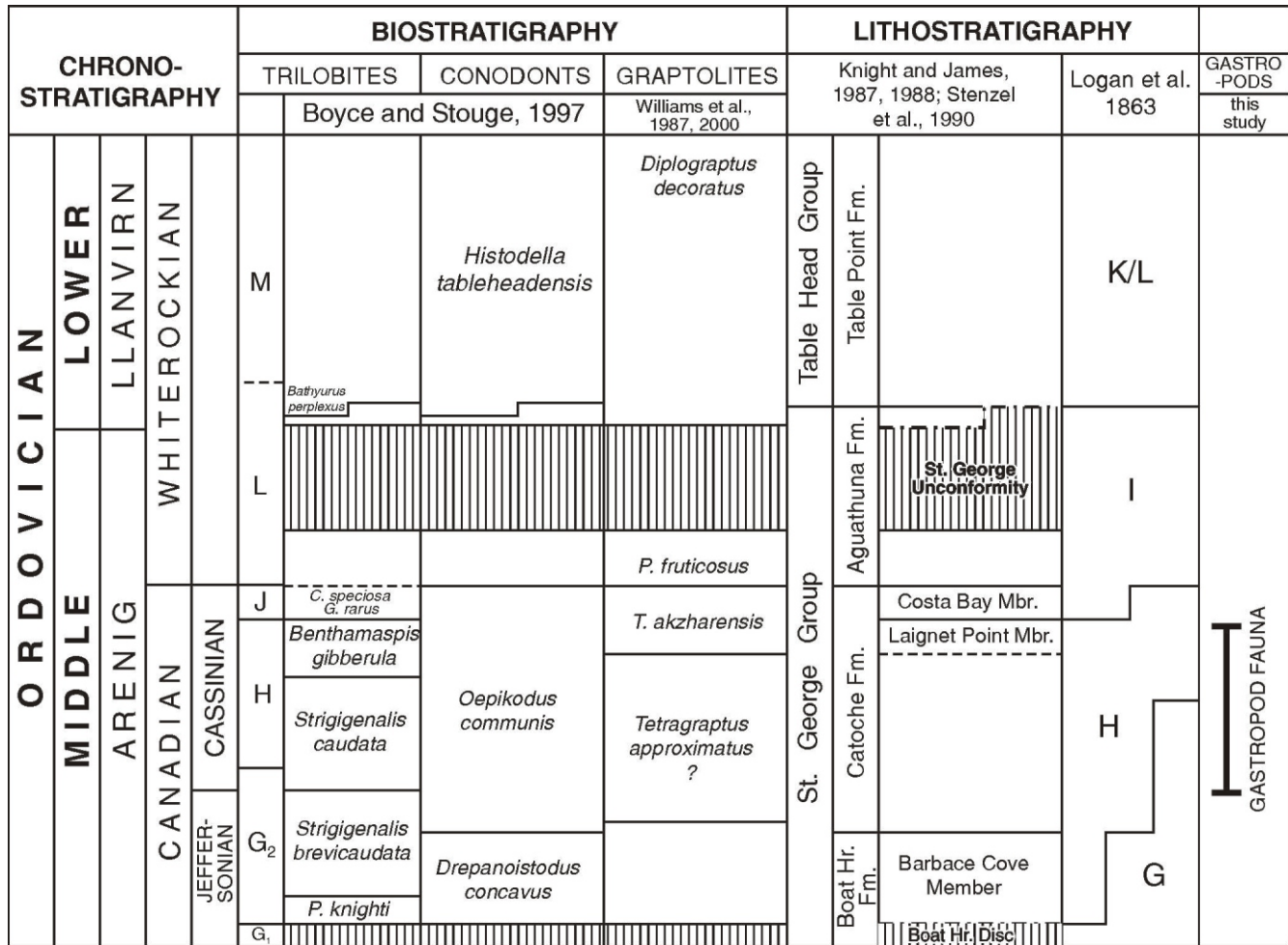
Graptolites recovered from the Catoche and Aguathuna formations allow the correlation of much of this interval

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<sup>1</sup> Regional Geology Section



**Figure 1.** Geological terranes and outcrop distribution of the St. George Group in western Newfoundland (based on Knight and James, 1988). Arrows indicate areas sampled for gastropod fossils.



**Figure 2.** Chronostratigraphy, biostratigraphy and lithostratigraphy of the upper St. George Group gastropod study interval. The Laignet Point member is an informal unit (Knight, 1977a, b; Stouge, 1982).

with the *Tetragraptus approximatus*, *Didymograptus* (*Expansograptus*) *nitidus* and *Didymograptus* (*Didymograptellus*) *bifidus* zones (James et al., 1988; Williams et al., 1987, 2000 – see Figure 2).

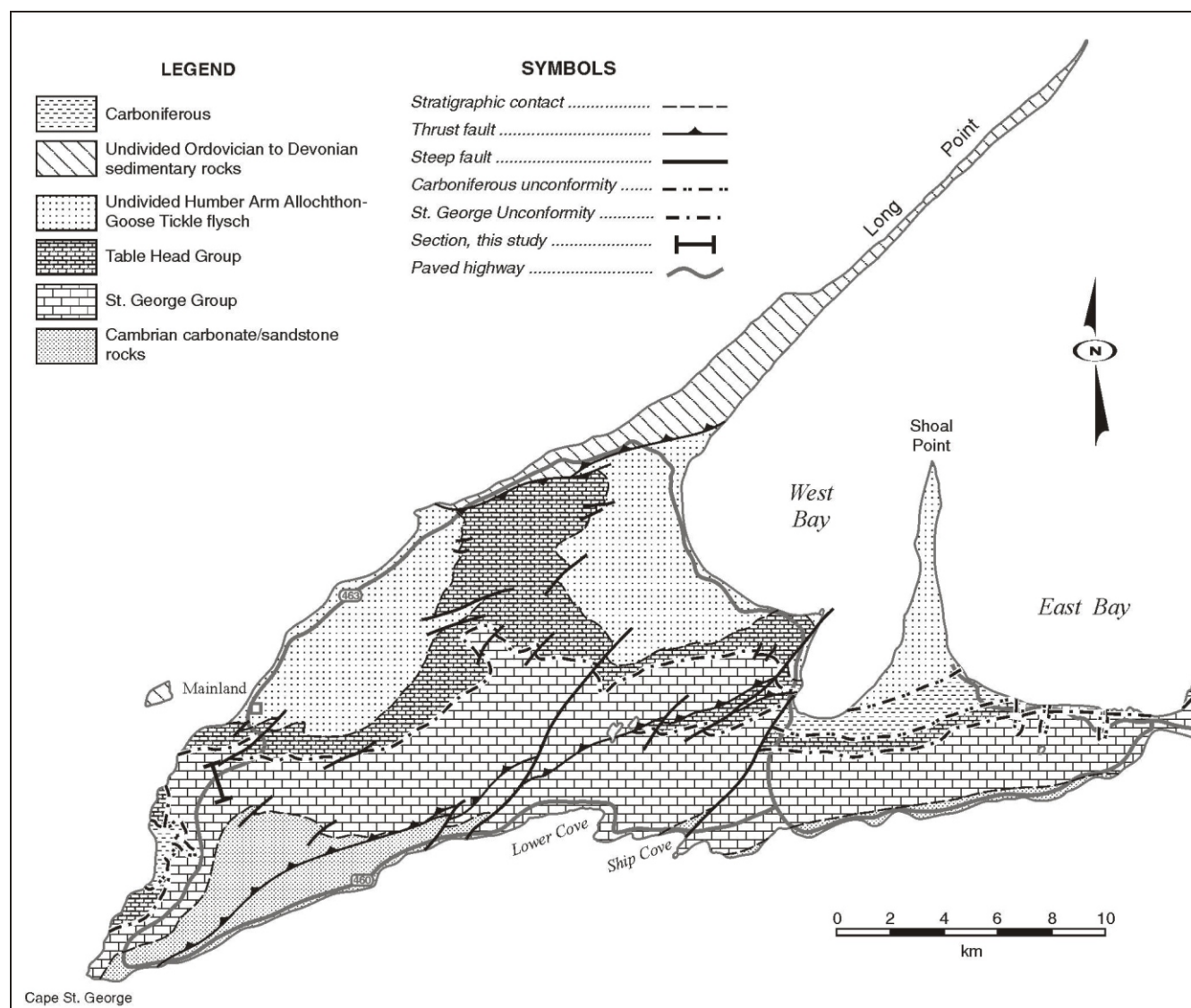
## GASTROPODS

Molluscs are the most obvious macrofossils in the Catoche Formation, and gastropods occur in most of the beds. The gastropod faunas are abundant and diverse (see Billings, 1865; Rohr et al., 2000, 2001). In addition to these published faunas, specimens of *Euomphalopsis* and *Polhemia* were collected; these have previously never been reported from western Newfoundland (or the northern Appalachians).

*Euomphalopsis* ranges from the Late Cambrian through to the Middle Ordovician. The type species, *Euomphalopsis involuta* Ulrich and Bridge, 1931 (in Ulrich et al., 1931), is

from the Gasconade Dolomite in Missouri. Ulrich and Bridge (1931) also report the same species from the Oneonta Dolomite in Iowa, the Chepultepec Dolomite in Tennessee and possibly the Oneonta Dolomite in Minnesota. An undescribed species is present in a collection by E.O. Ulrich from the Mosheim Formation (Middle Ordovician) in Tennessee. Yochelson (in Webers et al., 1992) described *Euomphalopsis spletstoesseri* from the Upper Cambrian (Dresbachian) of West Antarctica, and he also assigned *Pelagiel-la* sp.? Butts, 1926, from the Upper Cambrian or Lower Ordovician of Alabama to *Euomphalopsis*.

*Polhemia* Cullison, 1944 is a distinctive and relatively abundant gastropod known from the late Canadian/Arenig of the south-central United States and Newfoundland. The genus is represented only by its type species, *Polhemia taneyensis* Cullison, 1944, from the Jeffersonian portion of the Cotter Formation of Missouri, and by new material from Newfoundland. The species described here occurs through-



**Figure 3.** Geological map of the Port au Port Peninsula (after Stockmal and Waldron, 1993) showing the location of the St. George Group section at the western end of the peninsula.

out the Cassinian portion of the Catoche Formation, and it is the first occurrence of the genus in the northern Appalachians.

### SYSTEMATIC PALEONTOLOGY

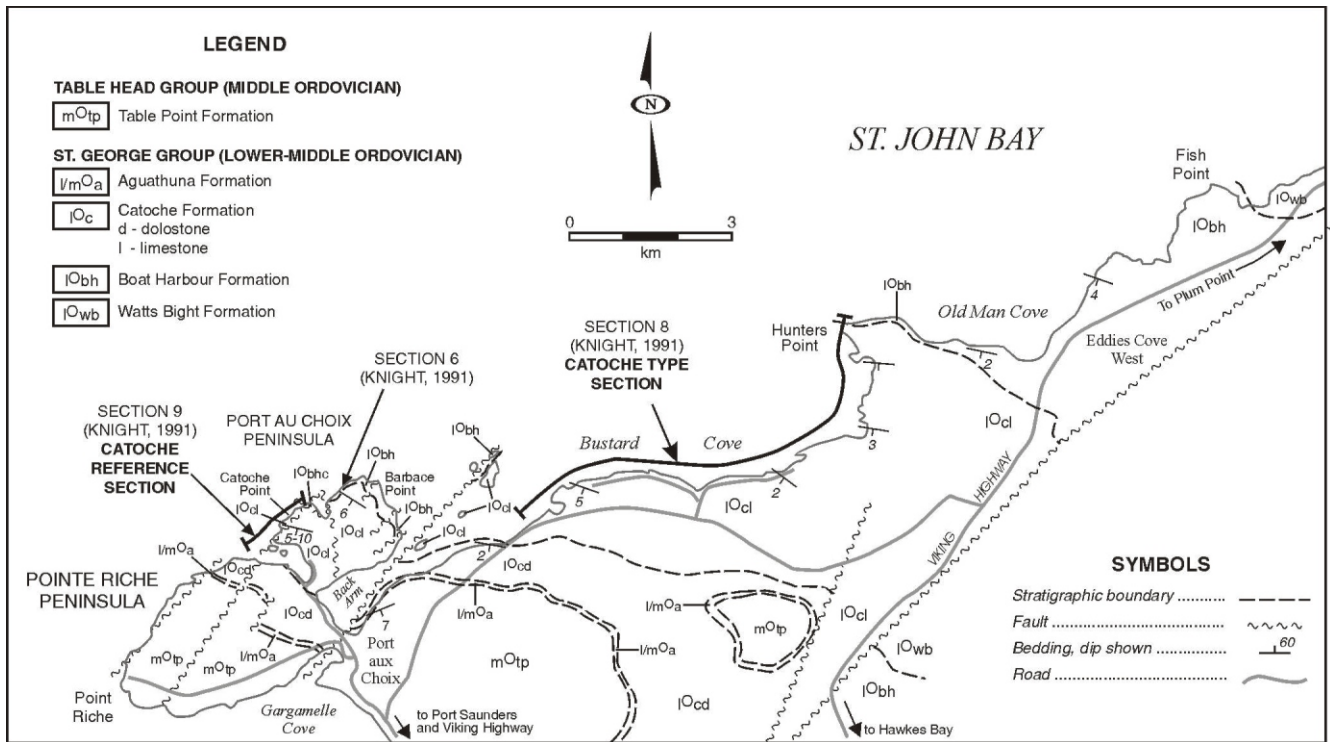
The specimens illustrated in this report are housed in the following institutions: NFM – Newfoundland Museum, St. John's, Newfoundland and Labrador and USNM – United States National Museum, Smithsonian Institution, Washington, D.C., USA.

### SYSTEMATIC DESCRIPTIONS

Family EUOMPHALIDAE de Koninck, 1881

*Discussion.* Ulrich and Bridge (in Ulrich *et al.*, 1931) placed *Euomphalopsis* in the Euomphalidae de Koninck, 1881, but Knight (1960) moved the genus to the Macluritidae Fischer, 1885, and made it into a subgenus of *Macluritella* Kirk, 1927. Yochelson (1987) returned *Euomphalopsis* to its original full status as a genus within the Euomphalidae. Yochelson (in Webers *et al.*, 1992) observed that while many mem-





**Figure 4.** Detailed geology and locations of upper St. George Group sections studied in the Eddies Cove West – Port au Choix area (map modified from Knight and James, 1988). Knight (1991) describes these sections in detail.

bers of the family have a distinct angulation, some have a circular profile.

Genus *Euomphalopsis* Ulrich and Bridge, 1931

*Type species.* *Euomphalopsis involuta* Ulrich and Bridge, 1931, from the Gasconade Dolomite of Missouri, USA.

*Euomphalopsis magnus*, new species

Figure 5.1-5.4; Figure 6.13-6.14

*Diagnosis.* Large, loosely coiled, discoid shell having a flat spire and wide umbilicus, rounded whorls, and U-shaped sinus above mid-whorl.

*Description.* Large (10.5 cm in diameter, 3 cm high) discoidally coiled dextral gastropods having a circular to laterally compressed oval cross section. Loosely coiled, deep sutures, flat spire and broad umbilicus; about 10 fine spiral lines on base of whorl, growth lines prosocline below mid-whorl; later whorls varicose. Growth lines indicate a broad U-shaped sinus above mid whorl.

*Discussion.* *Euomphalopsis* is a poorly known genus known from the Lower Ordovician rocks of eastern North America

and the Upper Cambrian of Antarctica. This species is much larger than any other species of *Euomphalopsis*. Other large gastropod shells found in the Lower Ordovician such as *Rhombella* Bridge and Cloud, 1947 do not have a circular or oval profile. The Upper Cambrian *Euomphalopsis splotstoesseri* Yochelson in Webers *et al.*, 1992, has a much greater rate of expansion than any of the Ordovician *Euomphalopsis* including those from Newfoundland.

*Types.* Holotype NFM F-415, paratype NFM F-416. Additional illustrated specimen NFM F-417.

*Etymology.* Specific name *magnus*, Latin for large.

*Occurrence.* Catoche Formation, localities 1996R017, 1996R019, and 2000RB11.

Family HELICOTOMIDAE Wenz, 1938

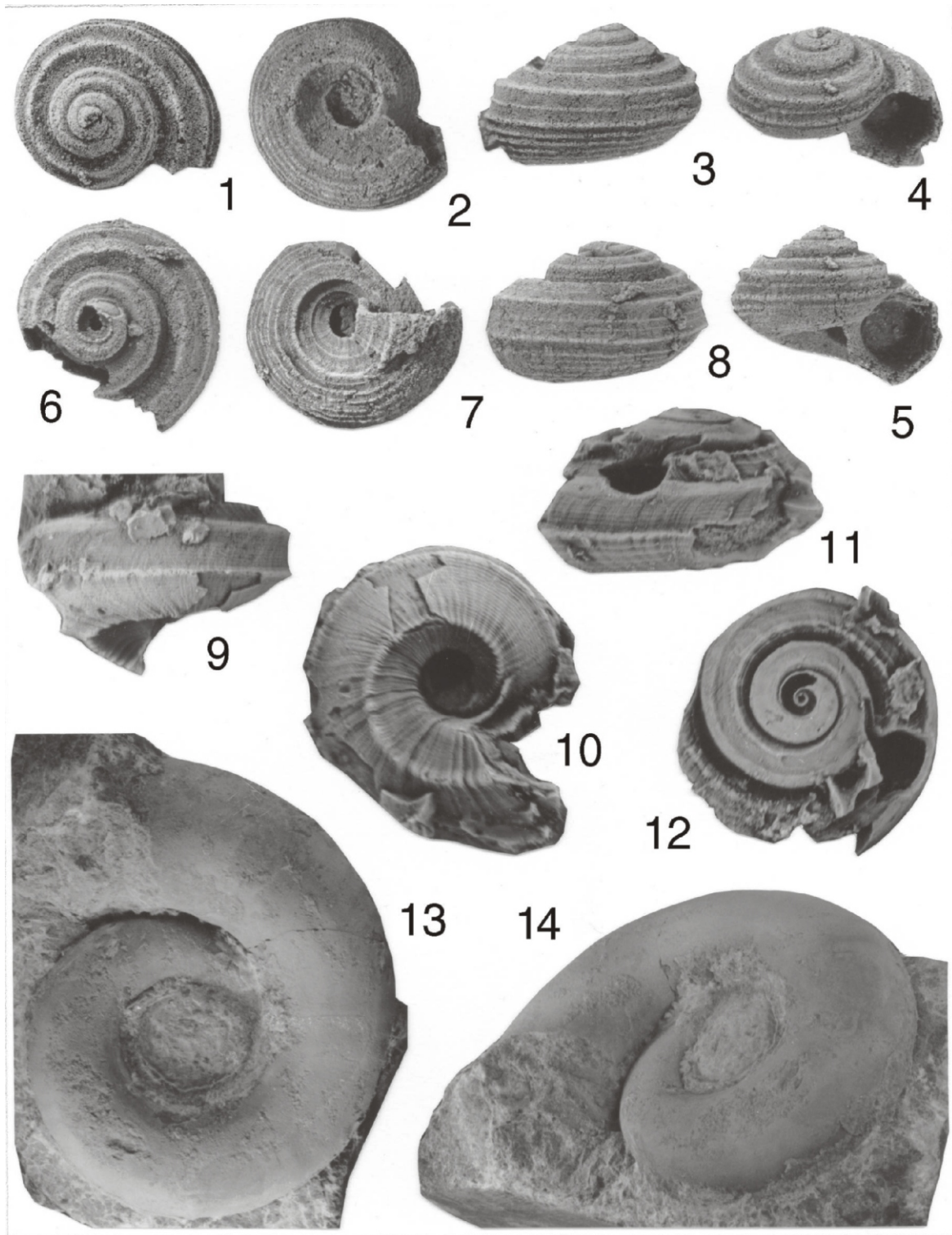
Genus *Polhemia* Cullison, 1944

*Type species.* *Polhemia taneyensis* Cullison, 1944, from the lower part of the Cotter Dolomite of Missouri, USA., according to Thompson (2001, page 179)<sup>2</sup>.

<sup>2</sup> Cullison (1944, page 55) identified the horizon as the basal portion of the Lutie member of the Theodosia Formation (Jefferson City Group).



**Figure 5.** *Euomphalopsis magnus* n. sp., all actual size, Catoche Formation. 1-3. Top, side, and basal views; on side view, base is to the left, holotype specimen NFM F-415. 4. Basal view of two paratype fragments NFMF-417 preserving the apertural margin.



**Figure 6.** *Polhemia taneyensis* Cullison, 1944. 1-5. Apertural, umbilical, side, oblique apertural view, and apertural views, all x3, Catoche Formation, locality 1999R005, specimen NFM F-418. 6-8. Apical, and side views all x3, Catoche Formation, locality 1999R003, specimen NFM F-419. 9, 10. Side and umbilical views with growth lines, x5, Cotter Formation, specimen USNM 518283. 11-12. Side and apical umbilical views, x5, Cotter Formation, specimen USNM 518284. 13, 14. Internal mold of *Euomphalopsis magnus*, umbilical and oblique umbilical views, actual size, Catoche Formation, locality 2000RB11, specimen NFM F-416.



*Discussion.* Knight *et al.* (1960) noted that the poorly known *Lophonema* Ulrich in Purdue and Miser, 1916, may be a senior synonym of *Polhemia* Knight (*op. cit.*) implied that *Polhemia* had an operculum because it was closely related to *Orospira* Butts, 1926. *Walcottoma* Rohr, 1990, from the Whiterockian (upper Arenig) of Nevada and Alabama is a similar (but larger) genus.

*Polhemia taneyensis* Cullison, 1944  
Figure 6.1-6.12

1944 *Polhemia taneyensis* Cullison n. sp.; Cullison, page 55; Plate XXVI, figures 6-10.

2001 *Polhemia* sp. Rohr *et al.*, page 120.

*Description.* Moderately small (up to 8 mm in diameter), low-spired (apical angle 120 to 125°), phaneromphalous gastropods, sub-hexagonal cross section, with multiple spiral angulations and cords. Four angulations present: at whorl crest, at outer shoulder, at midwhorl and around base of whorl; one or two spiral cords between middle angulations, five or six cords below midwhorl and base, and one or two cords in umbilicus. Growth lines weak but curving strongly backward at upper angulation; growth lines in umbilicus orthocline.

*Discussion.* The Newfoundland specimens of *Polhemia* appear to be nearly identical to the only known species, *P. taneyensis* (Figure 6). The latter specimens are about the same size and have the same angulations, and spiral cords as the Newfoundland specimens. Because Cullison's (1944; Plate XXVII, Figures 6-10) illustrations are not clear, specimens from the same stratigraphic horizon in the Cotter Dolomite, collected by E.O. Ulrich about 3 km from Cullison's (1944) type locality in Missouri are illustrated here (Figure 6.9-6.12).

*Illustrated specimens.* NFM F-418 and NFM F-419.

*Occurrence.* It occurs throughout the Catoche Formation. Illustrated specimens are from 1999R003 and 1999R005.

## ACKNOWLEDGMENTS

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## APPENDIX – Lower Ordovician Gastropod Localities

### **1996R017=Boyce 1996F011**

Garden Hill, western Port au Port Peninsula, east of Hunt–Pan Canadian Petroleum Port au Port No. 1 Well Head. Lower part of Catoche Formation, beds dipping about 10° W. UTM Zone 21, 335490E, 5372856N (NAD 27). Canadian Series, Cassinian Stage, *Strigigenalis caudata* Zone.

### **1996R019 =Boyce 1996F018**

Western Port au Port Peninsula, east of Cape St. George–Mainland road (Route 463). Beds above quarry. Approximately 35 metres above the base of the Catoche Formation. UTM Zone 21, 337200E, 5377800N (NAD 27). Canadian Series, Cassinian Stage, *Strigigenalis caudata* Zone.

### **1999R003=Boyce 1999F082**

Western Port au Port Peninsula, east side of Cape St. George–Mainland road (Route 463). Thick beds near top of ridge. UTM Zone 21, 337409E, 5377673N (NAD 83). Canadian Series, Cassinian Stage, *Strigigenalis caudata* Zone.

### **1999R005**

Western Port au Port Peninsula, east side of Cape St. George–Mainland road (Route 463), about 35 m above base of Catoche Formation. UTM Zone 21, 337188E, 5377948N (NAD 83). Canadian Series, Cassinian Stage, *Strigigenalis caudata* Zone.

### **2000RB09=Boyce 1982F022D=1986F121=2000F039=ECW-058 of Boyce and Stouge (1997)**

Bustard Cove, St. John Bay. Unit 9 of Knight (1991, page 124), base at UTM Zone 21, 473940E, 5619101N (NAD 27). Small cross-sections. Canadian Series, Cassinian Stage, *Benthamaspis gibberula* Zone.

### **2000RB11=Boyce 1982F034=1985F214=1986F113=2000F040=ECW-084 of Boyce and Stouge (1997)**

Bustard Cove, St. John Bay. Top of Unit 11 of Knight (1991, page 123), 85 metres above the base of the Catoche Formation. UTM Zone 21, 478938E 5619587N (NAD 27). Canadian Series, Cassinian Stage, *Benthamaspis gibberula* Zone.

### **Locality 101E**

Lower part of the Cotter Formation near Armstrong Mine, 9 km WSW of Chadwick, Missouri. SW 1/4 sec. 32, T 26 N, R 20 W. Collected by E.O. Ulrich, 1924(?). Canadian Series, Jeffersonian Stage.