GEOLOGICAL MAPPING NORTHERN HALF OF THE ST. GEORGE'S BAY CARBONIFEROUS BASIN

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Introduction

Geological mapping of the northern half of the St. George's Bay Carboniferous Basin was commenced in 1973. The field survey was concluded in July, 1975 and geological maps, at the 1:50,000 scale, are currently being prepared for publication.

General Geology

Introduction

The map area is a NE-SW elongate, rolling, coastal lowland situated on the southeastern shore of St. George's Bay. It is bounded on the southeast by the Long Range Mountains. Two major divisions of rocks occur in the area: a pre-Carboniferous crystalline complex that forms the Long Range Mountains and a Carboniferous sedimentary sequence that covers the remainder of the map area (fig. 1). The Carboniferous sequence is divisible into three groups: the Anguille Group of Lower Mississippian age, the Codroy Group of Upper Mississippian age, and the Barachois Group of Pennsylvanian age.

Pre-Carboniferous Crystalline Complex

Pre-Carboniferous crystalline rocks (Unit 1) make up the Long Range Mountains along the southeastern edge of the map area. They are in fault contact with the Carboniferous sedimentary sequence there but are assumed to unconformably underlie Carboniferous rocks in the remainder of the map area.

Anguille Group

Anguille Group rocks (Unit 2) in the map area consist mainly of greenish-grey, coarse, sandy, polymictic conglomerate, and minor, purplish-red, arkosic sandstone. The conglomerate is best exposed in Fischells River where slightly over 100 m. of strata line the steep stream-cut gorge. Constituents of the conglomerate are cobbles, up to 35 cm. in diameter, of igneous and metamorphic origin as well as carbonates of the Ordovician St. George and Table Head Groups. Sandstone lenses, up to 1 m. thick, occur throughout the conglomerate. Most of these sandstone lenses are cross-bedded. The conglomerate decreases in thickness southward and grades laterally to a purplish, arkosic sandstone that forms a minor portion of the Anguille Group in the map area. The Anguille Group is disconformably overlain by the Ship Cove Formation of the Codroy Group.

Codroy Group

Codroy Group (Unit 3-5) rocks are divisible into three formations (Table 1). They form an anticlinal fold along the western half of the map area.

The Ship Cove Formation (Unit 3) comprises a sequence of black, laminated limestone in the southern part of the map area where it overlies purplish, arkosic sandstone of the Anguille Group, and a sequence of alternating black, laminated limestone and greenish-grey, muddy sandstone in the northern part of the map area where the underlying Anguille Group consists of coarse polymictic conglomerate. Limestone beds are oolitic, pisolitic and oncolitic with widespread occurrences of thin, laminated algal mats. Numerous rhombic shaped pits are present on the bedding planes of these limestone beds. The pits are presumed to have formed by solution of original minerals, probably gypsum or dolomite. The greenish-grey,muddy sandstone beds are thin bedded, commonly displaying sun-cracks and load casts.

The Ship Cove Formation is conformably overlain by rocks of Unit 4.

Unit 4 consists of huge evaporite bodies, great thicknesses of calcareous sedimentary rocks, and various types of carbonate. They include the Codroy Shale, Black Point Limestone and Woody Cove Beds of Hayes and Johnson (1938) and Bell (1948). Table 1 shows correlation of the present terminology with that used by previous workers.

Two complete sections of Unit 4 are present in the map area: in Fischells Brook from a point 1 km. upstream from the railway bridge westward to the mouth of the brook, and along the coast from Ship Cove to Plaster Cove. In the Ship Cove-Plaster Cove section, the lowest unit of Unit 4 is a 45 m.-thick sequence of red and grey gypsiferous shale followed by 10 m. of grey mudstone that contains rare marine fossils. Overlying this mudstone is a dark grey, black-weathering, very fossiliferous reef limestone, named the Cormorant Limestone by Bell (1948). This reef limestone attains a maximum thickness of some 12 m. but decreases laterally to 1.5 m. within a distance of 6 m. Wherever great thickness is attained the limestone exhibits a well developed reefoid structure. The Cormorant Limestone grades upward into an overlying gypsum deposit. The transition consists of alternating laminations of white gypsum and black carbonate. Thickness of the gypsum deposit is estimated to be 80 m. Overlying the gypsum is a thick sequence of red and green, well-bedded, rippled, cross-bedded, sun-cracked siltstone with numerous pseudomorphs of halite. Total thickness of the siltstone is at least 1000 m. This great thickness of siltstone is believed to be stratigraphically equivalent to a thick deposit of halite encountered in subsurface drillings (Fleming, 1974). At Plaster Cove the siltstone sequence is overlain by another gypsum horizon (30 m. thick), which is followed by another red, finely cross-bedded siltstone with pseudomorphs of halite (40 m. thick). From

PENNSYLVANIAN

BARACHOIS GROUP

6 Conglomerate, conglomeratic arkosic sandstone, sandstone, shale and thin coal seams; 6a - Conglomeratic, arkosic sandstone exposed as a lentil around Mt. Howley and Brow Pond

MISSISSIPPIAN

CODROY GROUP (3-5)

5 Red calcareous sandstone and siltstone, locally pebbly and bearing green reduction spots, cross-bedding, parting lineation well developed

4 Gypsiferous shale, evaporites, halite pseudomorph-bearing siltstone, fossiliferous reef limestone, algal limestone, dolomite, and algal reef

3 Ship Cove Formation. Laminated limestone, oncolitic, pisolitic and oolitic in part. Changes northward to alternations of laminated limestone and muddy sandstone

DISCONFORMITY ?

ANGUILLE GROUP

2 Polymictic conglomerate with sandstone lenses. Changes southward to arkosic sandstone

UNCONFORMITY

PRE-CARBONIFEROUS

1 Pre-Carboniferous crystalline complex

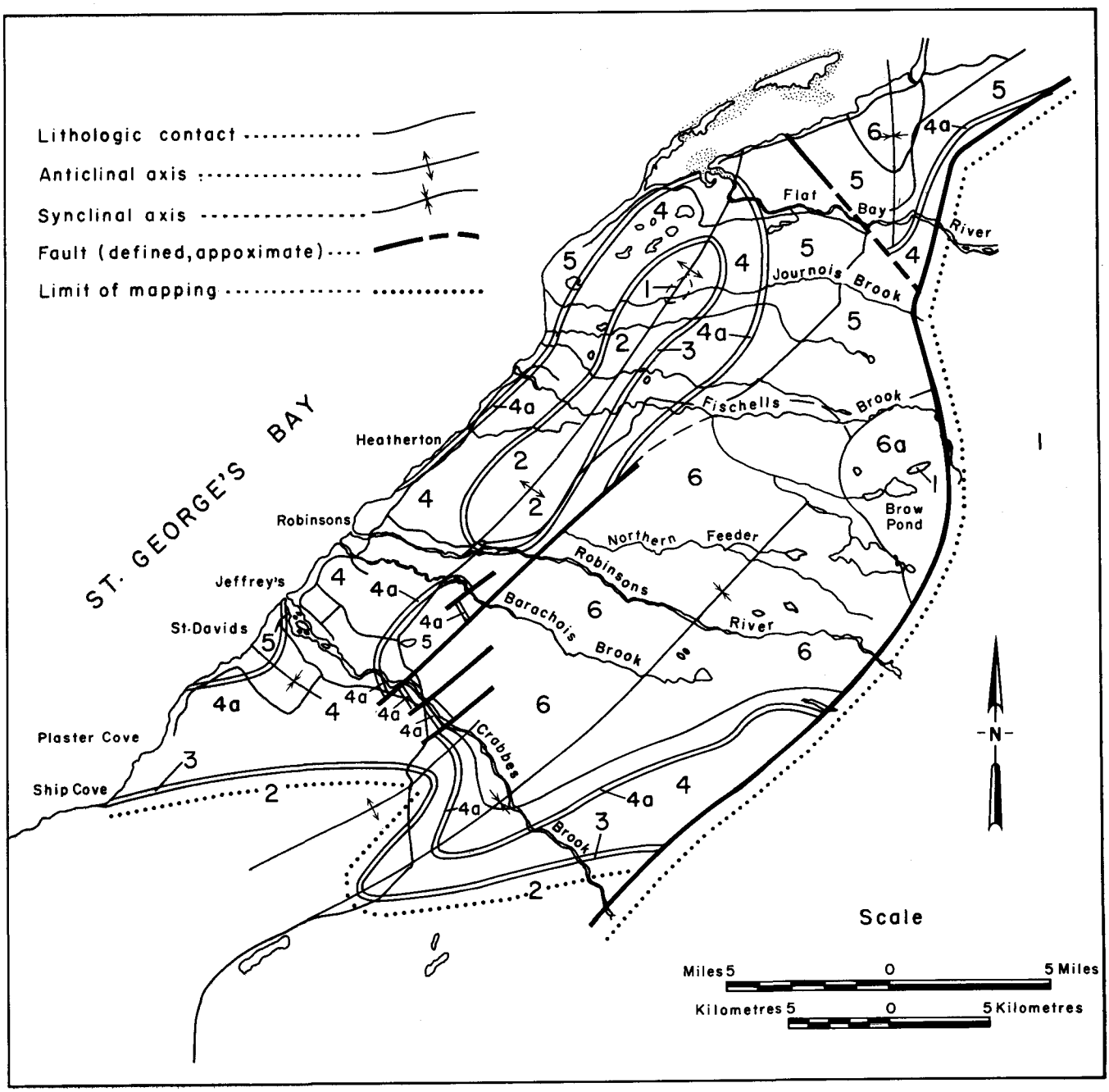

Fig. 1 - Geological map of the St. George's Bay area

this point up the section is covered. The overlying limestone beds that are well exposed in various localities in the northern part of the map area are thus concealed.

In the Fischells Brook section the stratigraphic succession is slightly different. There the lowest unit is a thick (approximately 50 m.) gypsum deposit. This gypsum is considered to be the lateral equivalent of the basal gypsiferous shale in the Ship Cove-Plaster Cove section. A greenish-grey siltstone overlies the gypsum. It is believed to be stratigraphically equivalent to the fossil-bearing mudstone and the Cormorant Limestone of the Ship Cove section. The siltstone is succeeded by 120 m. of white gypsum and light blue anhydrite, which is overlain in turn by a sequence of red and green, well-bedded, rippled, crossbedded, sun-cracked siltstone and sandstone with many halite pseudomorph-bearing horizons. Total thickness of this sequence is estimated to be close to 1000 m. The sandstone-siltstone beds are followed by a sequence of carbonate beds that make up the limestone member (Unit 4a) of Unit 4. In Fischells Brook the limestone member contains, in ascending order: i) fossiliferous limestone, ii) fossiliferous fucoidal limestone, iii) fossiliferous algal limestone and dolomite, iv) algal limestone and red dolomite, v) algal mat limestone and red dolomite, and vi) stromatolite reef and red dolomite. A sequence of brick red, green reduction-spot-bearing, platy, calcareous sandstone and siltstone beds, identical to overlying Unit 5 rocks, is intercalated with these carbonate beds and possibly represents interfingering of the two units. The limestone member marks the top of Unit 4 and passes without apparent break into overlying red clastic rocks of Unit 5.

Unit 5 rocks comprise a thick sequence of brick red, calcareous clastic rocks. At St. Davids the sequence consists of calcareous arkosic sandstone with pebbly horizons, fine siltstone with mud pebbles, and mudstone with kunkurs. Cross-bedding and green reduction spots are common. Total thickness of this sequence is estimated to be close to 1300 m. In the upper reaches of Crabbes Brook a thick sequence of red, calcareous, polymictic conglomerate with minor siltstone is exposed along the steep river banks. Conglomerate clasts are derived from quartzite, gneiss, schist, granite, diabase, rhyolite, chert and Ordovician carbonates. This sequence is considered to be the lateral equivalent of the thick sequence of red sandstone and siltstone at St. Davids.

Contact relationship between Unit 5 and the overlying Barachois Group was not observed in the map area.

Barachois Group

Rocks of the Barachois Group (Unit 6) crop out in two synclinal basins: in the northern part of the map area underlying the town of St. George's, and along the eastern half of the map area. Rocks of this group consist of a lower sequence of thick, massive, coarse-grained, mica-rich,

Hayes and Johnson 1938		Bell 1947		Baird 1958		Fong 1974		This Report	
Codroy Series	Woody Point Sandstone	Codroy Series	Woody Head Beds	Codroy Group	5	Codroy Group	Unit C	Codroy Group	Formation 3 (Unit 5, Fig. 1)
	Woody Cove Shale		Woody Cove Beds				Unit B		Formation 2 (Unit 4, Fig. 1)
	Black Point Limestone		Black Point Limestone				Unit A		
	Codroy Shale		Gypsiferous Zones		4				
Anguille Series	Anguille Rocks Undivided		Ship Cove Limestone				Ship Cove Limestone		Ship Cove Formation
		Anguille Series	Anguille Rocks Undivided	Anguille Group	Anguille Rocks Undivided	Anguille Group	Anguille Rocks Undivided	Anguille Group	Anguille Rocks Undivided

Table 1

sandstone, quartz-pebble conglomerate and silty sandstone, and a higher sequence of finer grained clastic rocks with common caliches and calcareous concretions. Coal seams, coalized plant fossils with malachite stains and petrified wood are common throughout the group.

A lentil of arkose (Unit 6a), outcropping around Mt. Howley and Brow Pond along the eastern margin of the Carboniferous basin, is mapped as a separate (and the youngest) unit in the Barachois Group. It is a coarse, pebbly arkose containing clasts of K-spar, quartz, mica and lithic clasts of metamorphic and igneous origin. Occasional pebbles of red siltstone, apparently from underlying Unit 5, are also recognized. This lenticular body was included in the Codroy Group by previous workers in the area (Baird, 1959; Riley, 1962). The unit is assigned to the Barachois Group because air photo observation suggests that it may rest on both the Codroy and Barachois Groups and because of the presence of Codroy Group pebbles in the arkose.

Structural Geology

Carboniferous rocks are in fault contact with the pre-Carboniferous terrane along the eastern margin of the map area. West of this fault the Carboniferous rocks are folded into two northeast-southwest trending open folds. An open anticline extends from the Anguille Mountains along the shore of Bay St. George and terminates at Flat Bay, and an open syncline extends from the Highland River along the eastern half of the area to the town of St. George's. A major fault, running parallel to the folds, cuts these structures at their southern ends. Another fault, extending in and NW-SE direction, displaces the northern end of the synclinal fold.

Economic Geology

Economic geology of the map area was described in a previous report (Fong, 1975). No new discovery was made during the 1975 field season.

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