GEOLOGY OF THE CARBONIFEROUS OF THE CODROY VALLEY AND NORTHERN ANGUILLE MOUNTAINS

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Introduction

Mapping at a scale of 1:50,000 of the Carboniferous rocks of the Codroy Valley and northern part of the Anguille Mountains that commenced in 1974 (Knight, 1975a) was completed during the 1975 field season. The major part of the mapping was in the Codroy Valley, where a tentative stratigraphic subdivision of the sequence was made. A number of stratigraphic problems still exist in the area but these may be resolved by paleontological studies.

General Geology

The Carboniferous rocks in this area were previously subdivided into three main groups (Bell, 1948; Baird and Cote, 1964). They are, in ascending order:

1. The Anguille Group, which underlies the Anguille Mountains and Bald Mountain in the north;

2. The Codroy Group, which underlies the low ground of the Codroy Valley and Round Valley, adjacent to the Anguille Mountains;

3. The Searston Beds, which occur along the coast between the Grand Codroy and Little Codroy Rivers.

Anguille Group

The Anguille Group includes four formations (units 1-4, Fig. 2) (Knight, 1975a). Map Unit 1 consists of green to grey, fine and very fine sandstones interbedded with red and green siltstones and mudstones. The sandstones are very hard and display crossbedding, lamination and ripple drift. Mudcracks and caliche occur in the siltstones.

Map Unit 2 consists essentially of black shales and sandstones. The sandstones are thin at first but increase in number, thickness and grain size up through the formation. Chaotic horizons of sedimentary deformation are common near the base of the formation and turbidity structures abound throughout.

The contact between Unit 1 and 2 is well exposed along the cliffs between Cape Anguille and Snakes Bight. The contact is a thrust fault throughout this cliff section, as suggested by Knight (1975a). Unit 2 was thrust northwestward over Unit 1.

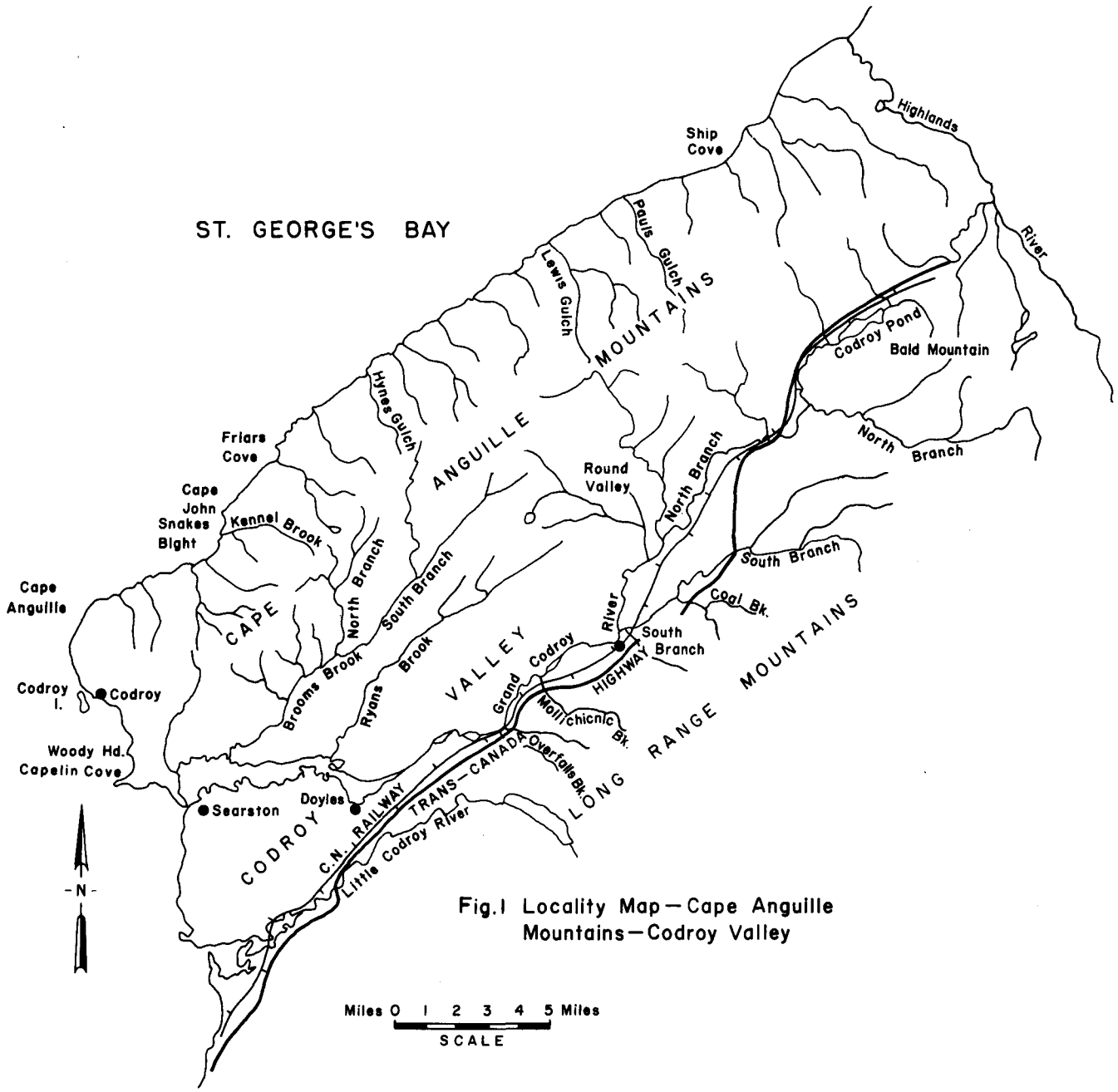

Fig.1 Locality Map—Cape Anguille Mountains—Codroy Valley

LEGEND

9 Woody Cove and Woody Head Beds; green-grey, grey and minor red mudstones and siltstones, green-grey sandstones; minor limestone

8 Searston Beds; green-grey and red sandstones, red, green and grey siltstones and mudstones, caliche and caliche conglomerates, pebble and intraformational conglomerates

CODROY GROUP (Units 5-7)

7 Brown to red, muddy conglomerates and sandstones, red siltstones and minor grey mudstone

6 Red and minor green siltstones, grey sandstones, caliche limestones, grey shales and mudstones, fossiliferous and dolomitic limestones, muddy conglomerates and red sandstones.

5 Grey, laminated limestone (Ship Cove Limestone), red, green, blue-grey, grey, and black siltstones and mudstones, thin sandstones, gypsum, black limestones, limestone breccia and yellow calcareous sandstones

ANGUILLE GROUP (Units 1-4)

4 Grey and red sandstones, red siltstones, some grey mudstone

3 Grey conglomerates, grey sandstones, grey mudstones, minor limestones

2 Black shales, grey sandstones, slump deposits, dolomitic limestone concretions, minor conglomerates

1 Green-grey and red sandstones, minor conglomerate, red and green siltstones and slates

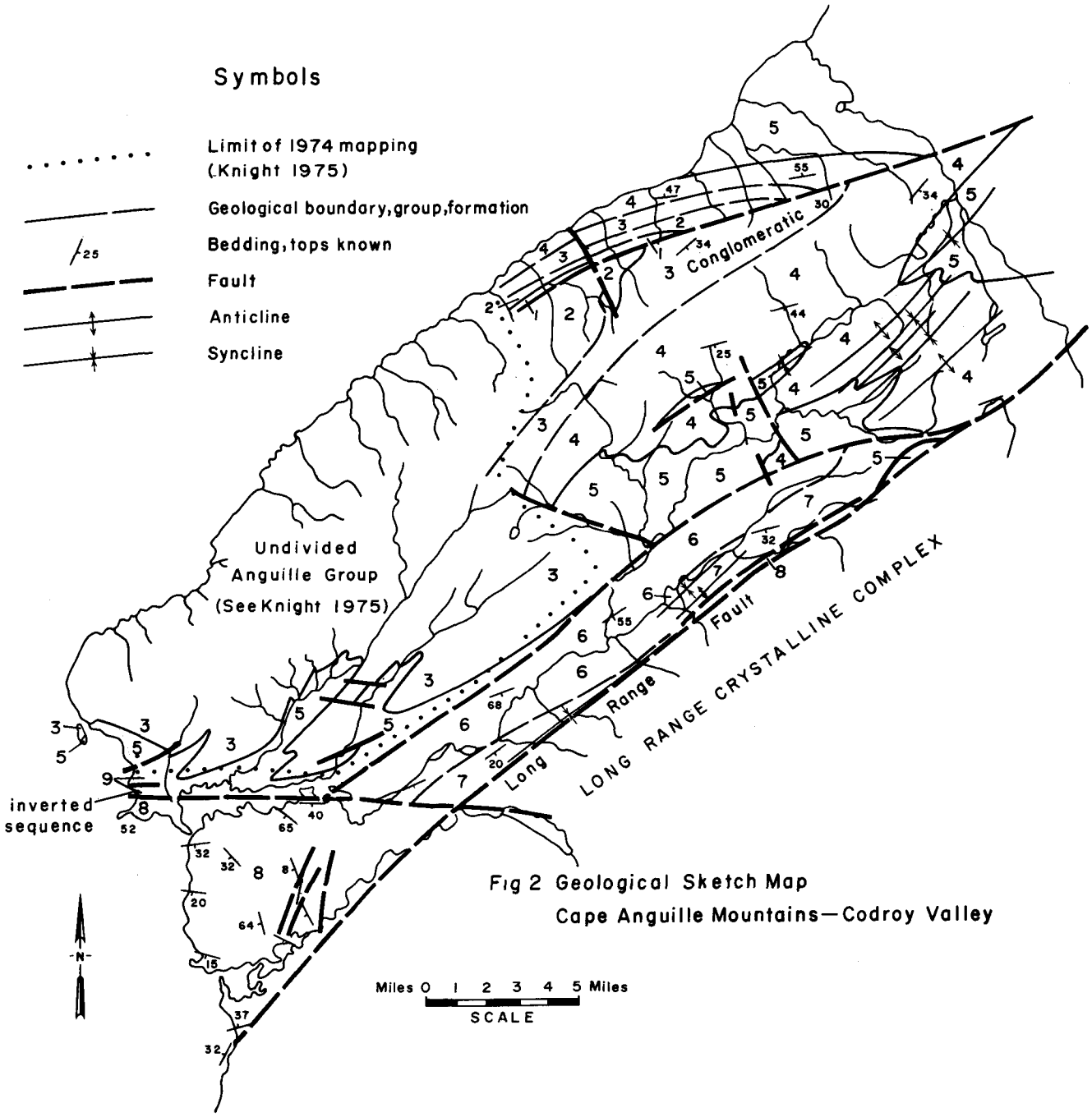

Fig 2 Geological Sketch Map
Cape Anguille Mountains—Codroy Valley

Map Unit 3 consists of a basal conglomeratic member overlain by grey sandstones and shale with rare horizons of red sandstone or siltstone. The basal conglomerate usually conformably overlies Unit 2 but locally the conglomerate overlies an erosional disconformity.

Unit 3 is thicker and more widespread in the south of the mountains where it forms the uppermost formation of the Anguille Group. Northwards, it thins and also becomes very conglomeratic.

Map Unit 4 consists of green-grey and red sandstones and siltstones which display abundant features of subaerial fluviatile deposition. They overlie conformably the sediments of map unit 3 in the north but are absent in the south of the Anguille Mountains.

Most of the area mapped in the northern part of the Anguille Mountains and on Bald Mountain was underlain by map units 3 and 4.

Codroy Group

The Codroy Group has been subdivided stratigraphically in numerous ways (Hayes and Johnson, 1938; Bell, 1948; Baird and Cote, 1964; Fong, 1975; Knight, 1975a). In the Anguille Mountain - Codroy Valley areas, the lack of observable continuity of stratigraphy due to faulting and poor exposure makes understanding of the internal stratigraphy uncertain. This results in two unresolved stratigraphic problems in the map area:

1. The relation of the Woody Cove and Woody Head Beds to the surrounding rocks;

2. The stratigraphic position of the Searston Beds.

The Codroy Group consists of three map units, (units 5-7, Fig. 2). Map unit 5 consists of three parts. The base of the unit is composed throughout the area of a grey, laminated and pelleted algal limestone previously called the Ship Cove Limestone (Bell, 1948). It lies apparently conformably upon well sorted, marine sandstones and siltstones. These marine sediments are only a thin development above fluviatile red beds in the north of the Anguille Mountains, suggesting that marine reworking of the very top of the red beds took place prior to deposition of the limestone.

A sequence of multicoloured siltstones, mudstones and thin sandstones, interbedded with three gypsum horizons and capped by a black micritic to shelly limestone (the Black Point Limestone, Bell, 1948) occurs above the basal limestone. The black limestone usually caps a gypsum horizon and is often associated with a yellowish, muddy, dolomitic limestone. Fossils, including brachiopods, stromatolites and an occasional gastropod and goniatite, occur within the black and yellow limestones, which frequently are bioturbated. A patch reef of black limestone was found within a gypsum horizon on the North Branch of the Grand Codroy River close to Round Valley.

Red siltstones, yellow calcareous sandstones and limestone breccias called the Codroy Breccia (Bell, 1948) form the top of the map unit and overlie the Black Point Limestone. The limestone breccias have been mapped in Round Valley and just north of the Anguille Mountains on the northern limb of a faulted anticline (Fig. 2). Because of faulting, folding and limited outcrop, their relationship to map unit 6 is not clear although it is believed that map unit 6 represents a stratigraphically higher sequence.

Map unit 6 consists of a sequence of red and minor green siltstones, containing thin, very fine to fine grained, grey sandstones, minor grey shales, several fossiliferous and unfossiliferous limestone and dolomitic limestone horizons and a number of horizons of conglomerate and sandstone closely resembling the sediments of the overlying map unit 7. In the upper part of the map unit thick, massive, caliche or cornstone limestones occur. The map unit occurs along the inner Codroy Valley (Fig. 2) where it is bounded by faults.

Map unit 7 lies adjacent to the Long Range Mountains and was mapped from Overfalls Brook northeast to the North Branch of the Grand Codroy River. The map unit consists of dark red, muddy conglomerates and muddy, micaceous, coarse-grained sandstones with occasional red siltstone and grey mudstone horizons. The pebbles of the conglomerate consist of granite, acid volcanic, basic igneous and metamorphic rocks, lithologies typical of those found in the adjacent Long Range Mountains.

The Searston Beds (Map unit 8)

The Searston Beds were originally defined as the upper sequence of the Carboniferous in the area (Bell, 1948). They consist of thick, fining-upward cycles of grey and red, arkosic and micaceous sandstones, and red and minor green siltstones and mudstones with abundant features indicating subaerial deposition. Grey shales and mudstones frequently occur in the sandstones but lack fossils. Thick pebble and cobble fanglomerates of probable equivalent age occur adjacent to and unconformable on the Long Range Mountains south of the mouth of the Little Codroy River.

The Searston Beds may be in part equivalent to the upper part of map unit 6 and map unit 7 of the Codroy Group or may be later than both formations.

The Problem of the Woody Cove and Woody Head Beds (Map unit 9)

The Woody Cove and Woody Head Beds are a distinctive sequence of lithologies bounded by faults in the vicinity of Woody Head and Capelin Cove. The basal Woody Cove Beds consist of bedded grey and green mudstones

and siltstones containing marine fossils. They pass transitionally upwards into the Woody Head Beds which consist of thick cycles of cross-bedded sandstones, bedded siltstones and mudstones and minor muddy limestones. Because the sequence is in fault contact with the Codroy Group to the north and the Searston Beds to the south, is internally cut by a number of faults, includes inverted sequences and does not resemble any sequence found inland along the Codroy Valley, its age has not been determined. Bell (1948) logged them as upper Codroy Group, but did not recognize folding and inverted sequences in the nearby Codroy Group and in the Woody Cove and Woody Head Beds. Knight (1974, 1975a) working from the structural relationships of the area, suggested the beds may be equivalent to map unit 3 of the Anguille Group. A number of fossiliferous marine beds containing brachiopods, bivalves and gastropods, discovered in Capelin Cove during the past season, should help to solve the age problem of these beds.

Structure

The main structural features of the Anguille Mountain area were described in a previous report (Knight, 1975a). In the northern part of the mountains, the structure is a simple northeast-trending, asymmetrical anticline whose axis is replaced by a major reverse fault.

In the inland part of the Codroy Valley, the structure of map units 6 and 7 of the Codroy Group is simply a monoclinal sequence striking northeast, dipping steeply between 45° and 81° near the Anguille Mountains but decreasing to 20° to 30° close to the Long Range Mountains. Within 300 meters of the Long Range crystalline complex, the beds of map unit 7 of the Codroy Group are folded into a tight, asymmetrical syncline which plunges southwest and strikes parallel to the Long Range Fault, with which it is associated. Sediments within the steep southeastern limb of the syncline are heavily sheared and fractured and cut by numerous parallel and sub-parallel bedding plane faults.

In the southwest, between the mouths of the Grand Codroy and Little Codroy Rivers, a major, southwesterly plunging, open syncline occurs within the Searston Beds.

Major faults occur within the area, often separating map units. Reverse faults, which strike approximately east-west, separate the base of the Searston Beds from overturned Woody Head Beds in Capelin Cove. The same fault is postulated to terminate the south end of the northeast trending monoclinal sequence within the inner Codroy Valley. This fault may also truncate a northeast trending fault which cuts out map unit 5 of the Codroy Group and brings rocks of map unit 6 adjacent to sandstones of the Anguille Group. The northeast trending fault strikes subparallel to the monoclinal sequence of the inner Codroy Valley.

The Long Range Fault was observed at two localities. It strikes between 035 and 045 and dips between 60 and 70° southeast. An intense shear zone 2-3 m. wide occurs in the sediments immediately beneath the

hanging wall of the fault, which is composed of crystalline rocks of the Long Range Complex. The latest movement along the fault is a reverse displacement with the metamorphic and igneous rocks of the Long Range Mountains overriding the sediments. However, numerous dextral wrench faults occur within gneisses close to the fault suggesting an earlier strike slip movement.

Numerous small normal faults trending northwest and dipping northeast are found cutting map units 6 and 7 of the Codroy Group.

Economic Geology

Widespread minor base metal mineralization is known from the Anguille Group and Codroy Group (Knight, 1975a). Malachite was found coating bedding surfaces of green-grey sandstones of map unit 4 of the Anguille Group close to Bald Mountain. Minor Cu-Pb-Zn mineralization associated with baryte occurs in outcrops near the North Branch of the Grand Codroy River, within the basal limestone of the Codroy Group and in sandstones beneath the limestone.

A scintillometer survey was made of map unit 6 of the Codroy Group using a gamma ray scintillometer (Exploranium model GRS101). A ten mile zone of high radioactivity was found along the Grand Codroy River from South Branch to Doyles. Radioactivity within the zone is 5 to 6 times greater than the background of associated rock types. The radiation is associated with grey, thin bedded and laminated, fine-grained sandstones which form 1-2 m. units within red siltstones. The high radiation counts occur within the sandstone beds but are also associated in some cases with irregular scours at the base of the sandstones, especially where the scours erode into grey shales. Malachite was found associated with one radioactive sandstone. Rock chips from the radioactive sandstones were analysed for U and Cu and indicate up to 34 ppm of U and 3000 ppm of Cu whilst associated clastic rocks assayed at 0.5 ppm of U and averaged about 25 ppm of Cu.

Map unit 7 of the Codroy Group was also surveyed and had a consistent radiation count about 3 times higher than background. However, since these beds are very arkosic and micaceous, most of the radiation is probably due to potassium.

A number of malachite occurrences were found in the coastal section of the Searston Beds.

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