PLATFORMAL SEDIMENTS ON THE GREAT NORTHERN PENINSULA: STRATIGRAPHIC STUDIES AND GEOLOGICAL MAPPING OF THE NORTH ST. BARBE DISTRICT

by I. Knight

INTRODUCTION

1:50,000 mapping of the Flowers Cove, Eddies Cove, Big Brook and part of the Raleigh map sheets of the Great Northern Peninsula was partially completed during the summer of 1977. Detailed stratigraphic studies were conducted from Savage Cove south to Forresters Point (near St. Barbe) and reconnaissance studies quickly covered tha areas of St. Genevieve Bay, St. Margaret's and St. John's Bays.

These mapping and stratigraphic studies utilize and expand the stratigraphic subdivisions set up previously (Knight, 1977a, 1977b).

GEOLOGICAL SETTING

The map area (figure 2) is located in the north St. Barbe district (figure 1) and is underlain by Cambro-Ordovician Carbonates with some minor clastic sediments of Cambrian age. The oldest rocks are of the upper Lower Cambrian Hawkes Bay Quartzite formation and the sequence terminates in limestones of the Catoche formation of the Lower Ordovician St. George Group. The sequence is approximately 1000 m thick in the St. Barbe district. However, the thickness of the St. George Group would be increased by an additional 200 m if the stratigraphic units which overlie the Catoche formation in the Port aux Choix and Table Point areas were added (Knight, 1977). The subdivision of the sequence follows that of Knight (1977a) but has been modified to include a new map unit (unit 6, figure 2) which occurs between the Watts Bight and the Catoche formations.

DESCRIPTIONS OF FORMATIONS[1]

1. The Hawkes Bay Quartzite formation (upper Lower Cambrian) outcrops only in a few coastal exposures near Green Island Brook. Here it consists of 1-2 m thick quartzites, glauconitic sandstones, bioturbated dolomitic sandstones and platey micrites containing brachiopods. The same formation in the St. John's Highlands and Hawkes Bay area is 150 m thick and consists predominantly of quartzites of sublittoral and littoral origin.

2. The Micrite formation (upper Middle Cambrian), which is approximately 64 m thick[2], forms a rusty yellow weathering, dark gray, thin bedded, highly bioturbated, micrite that has been dolomitized at the base and top of the section. Pel-micrite, intra-bio-calcarenite and calcirudite beds are common. A shale occurs at the base of the micrite. Boyce (1977) using tribolites dates the formation as upper Middle Cambrian.

3. The Dolomite formation (lower Upper Cambrian) is composed of yellow weathering, pale gray dolostones, stromatolites, dolarenites (often oolitic), intraclastic breccias, some dark gray to black, usually stromatolitic, dolomites, gray, red and green shales and rare limestone beds. The formation has been subdivided into three members. The lower and upper members are composed predominantly of thin bedded dolostones, with beds of crossbedded dolarenite. Thick beds of mottled dolostone are common in the upper member and stromatolites are usually small in both members. Red and green shale units occur which contain inarticulate brachiopods. Predominantly intertidal and supratidal tidal flat deposition with some subtidal sediments is indicated by the mudcracks, tepee structures, mudflake

breccias, small stromatolites and crossbedded sand deposits.

Between the two members there is a distinctive member composed of thick beds of large domal stromatolites which have a distinctive morphology (Knight, 1977b). They are associated with reddish intraclastic breccias, oolite and intraclastic sands, thin bedded and ripple laminated dololutites and have reddish shaly caps. A green shale unit occurs near the top of the member near Deadman's Cove. The stromatolites are more abundant and thicker in the northeast of the area, e.g. near Watts Point. There, oolite deposits as beds and thick lenses are also common and interfinger with the stromatolites. These deposits in the northeast of the area indicate more active shoal areas influenced possibly by open marine conditions to the east. To the southwest near Flowers Cove, stromatolites are fewer and tidal flat sedimentation dominates. However, a remarkable bed of stromatolites occurs at Seal Ledges near Flowers Cove where the back edge of a stromatolite bank is seen. Channels between mounds on the edge of this bank lack any evidence of coarse channel fill. After the stromatolite growth ceased, a thin shale draped over the bank and into the channels. This shale is mudcracked on the top of the mounds and in the intervening channels. This indicates that the mounds probably formed in a tidal range of at least one metre. Once they grew to such a height, the growth of the mounds stopped. The deposition of a thin shale over the mounds and into the channel areas suggests that only minor fine carbonate mud then entered the depositional area. The mudcracking of this shale indicates that the shelf waters may have rapidly retreated off the shelf in this area, leaving the mounds stranded high and dry.

This member has been dated by Boyce (1977) as lower Upper Cambrian from trilobites found at Deadman's Cove[3].

4. The Unfortunate Cove formation and the position of the Cambro-Ordovician Boundary

Thin bedded dolostone deposition continues upwards into the Unfortunate Cove formation. The formation is yellow weathering and inland is usually observed as broken flaggy outcrops.

It contains abundant chert, including chert breccias, and distinctly different stromatolite forms from those in the underlying Cambrian rocks. These include spectacular large mounds of digitate stromatolites. The stromatolites are usually preserved as gray to dark gray, medium to coarsely crystalline dolomite with abundant vugs and cavities which contain geopetal dolomitic muds, a feature also absent from the Cambrian forms.

It was previously suggested (Knight, 1977a) that this formation may overlie the base of the Ordovician. It is now considered more likely, however, that the boundary will occur somewhere within the unit since there is a large faunal gap in the sequence above the lower Upper Cambrian strata of Deadman's Cove and below rocks containing an Ordovician fauna in the Watts Bight formation.

A dolomitized, bioturbated gray to dark gray micrite occurs at the top of the formation. This unit has proved to be extensively distributed and has been mapped over much of the map area; it has also been recognized in the south near Pond Cove.

5. The Watts Bight formation is composed of predominantly dark gray to black, white mottled, coarsely crystalline and vuggy dolomite. It replaces large stromatolite mounds and bioturbated lime muds. In inland exposures the unit usually weathers to a distinctive blocky, dull brown rock; it has also been observed south of the map area at Pond Cove, Bird Cove, New Ferrole and just east of a major fault along the eastern side of St. John's Bay.

The formation consists of three lithofacies, lower and upper stromatolite mound facies separated by a middle burrowed limestone facies. The latter contains burrowed limestones and dolomites, calcarenites, some yellow dolostone and coarse crystalline, honey colored, vuggy dolomite. Large cephalopods and gastropods which are often silicified, occur in the formation indicating an Ordovician age. The lower mound facies is chert rich. The lower mound facies appears to be absent near Pond Cove, where burrowed dolomite predominates, but the mounds reappear again near New Ferrole. This may indicate that the mounds, which are thought to be subtidal, form a northeast trending facies which may have built up on the shelf margin. Behind and west of the shelf margin, quieter water shelf muds accumulated. Knight (1977b) has suggested that the position of the mound facies shifted in response to fluctuating depth of shelf waters as deposition of the formation proceeded.

6. Unnamed Unit

This unit includes rocks previously assigned to the Watts Bight formation and the Catoche formation at Boat Harbour (Knight, 1977a). The upper dolostone-limestone facies of the Watts Bight formation is now considered distinctive from the Watts Bight dolomites proper and was found to pass gradationally into bedded and stromatolitic limestones at Boat Harbour. These limestones were originally included in the Catoche formation and were mistakenly correlated with the rubbly limestones of the Catoche formation at Port au Choix. However, detailed study of the trilobite faunas by Boyce and comparison of the rock types at Boat Harbour and around Eddies Cove West (see figure 1) show that this is an older sequence of limestones with a distinct fauna from the younger Catoche formation.

The unit is divided into a lower and upper sequence.

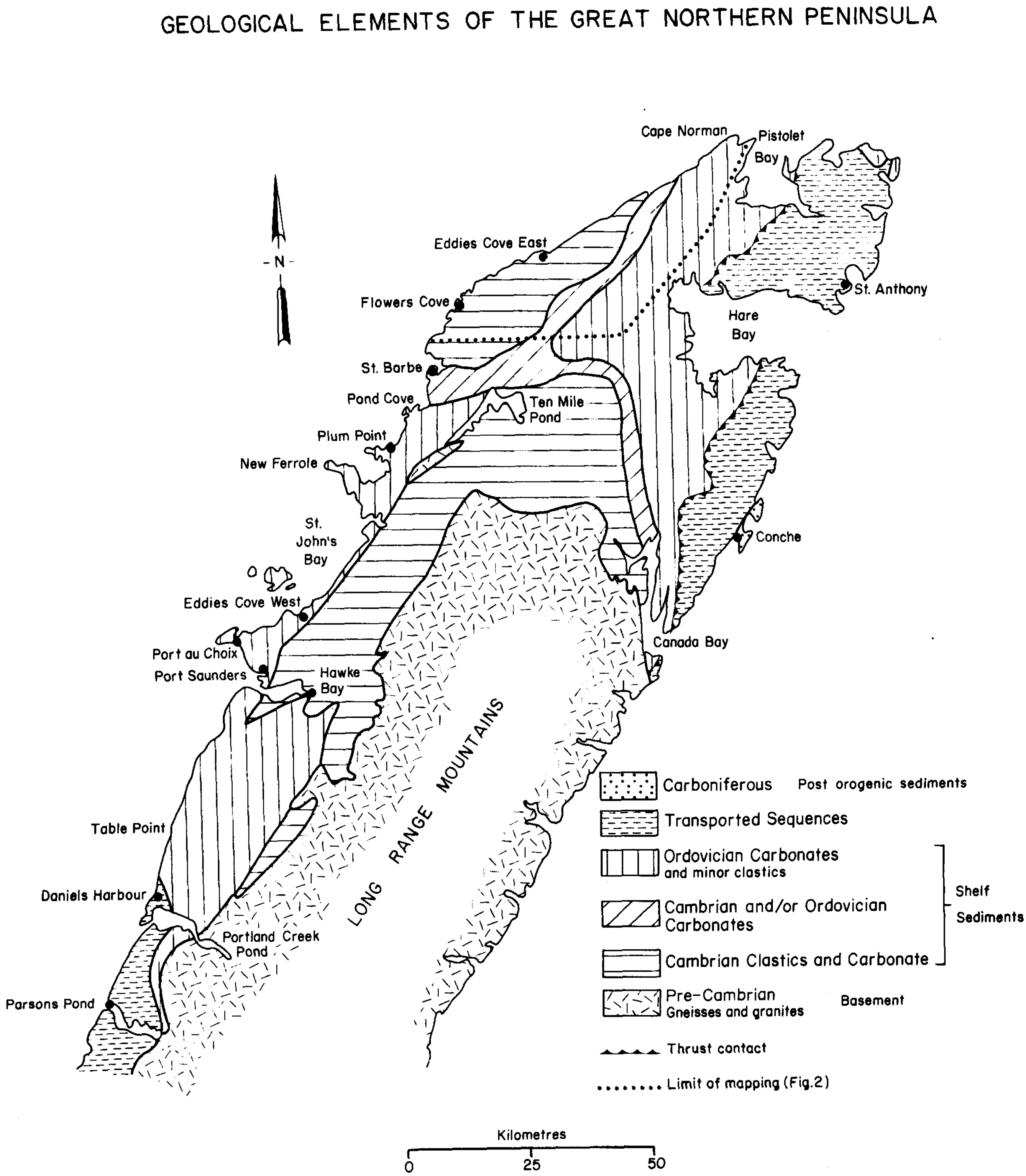

GEOLOGICAL ELEMENTS OF THE GREAT NORTHERN PENINSULA
N
Cape Norman
Pistolet Bay
Eddies Cove East
Flowers Cove
St. Anthony
Hare Bay
St. Barbe
Pond Cove
Ten Mile Pond
Plum Point
New Ferrole
St. John's Bay
Conche
Eddies Cove West
Port au Choix
Port Saunders
Hawke Bay
Canada Bay
LONG RANGE MOUNTAINS
Table Point
Daniels Harbour
Portland Creek Pond
Parsons Pond
Carboniferous
Post orogenic sediments
Transported Sequences
Ordovician Carbonates and minor clastics
Cambrian and/or Ordovician Carbonates
Cambrian Clastics and Carbonate
Shelf Sediments
Pre-Cambrian Gneisses and granites
Basement
Thrust contact
Limit of mapping (Fig.2)
Kilometres
0
25
50

Figure 1.

The lower sequence (originally the upper lithofacies of the Watts Bight formation) consists of thin bedded and laminated dolostones, vuggy, coarsely crystalline, honey coloured dolomite, honey coloured and gray limestones, pseudobreccia often seen replacing burrowed micrite and an occasional bed of Watts Bight type dolomite.

The overlying sequence is much thicker and composed of thin bedded and laminated limestones with dolomitic laminae, stromatolitic micrites, bioturbated rubbly, often fossiliferous micrites, some dololutite and pseudobreccias (see later). This sequence contains a variable and fairly abundant fauna. The tribolite fauna compares with zones D and possibly E of Ross, 1951, Hintze, 1953 (Boyce, personal communication). The fauna continues in the formation until a bed rich in gray to black chert and white vug quartz clasts, 1-3 cm in diameter, is encountered about 10 m below the first rubbly limestone beds of the Catoche Formation. Dolomitization of a few limestone beds has occurred below the horizon and an irregular, pitted, and pot holed surface occurs a few centimetres above. The clasts show no evidence of sorting or movement by currents and "pebble" density is variable within the horizon. The siliceous clasts are thought to represent an insoluble lag deposit of chert concretions and vug fillings left by solution of the limestones during a period of subaerial exposure. Dolomitization of the limestones occurred below the horizon. The lithological break also appears to coincide with an abrupt change in the trilobite faunas of the lower Ordovician to those of zone G and also the absence of trilobite zone F and possibly E of Ross, 1951, and Hintze, 1953 (Boyce, personal communication). This "pebble" bed and solution surface thus is thought to be a "disconformity". Kindle and Whittington (1958) record a similar faunal break and the absence of trilobite zone E and F in the Cow Head Breccia, suggesting that an important break in the stratigraphy may be represented at this horizon.

Above the pebble bed, shallowing upward sequences of biointramicrites with some stromatolites and laminated, often mudcracked dololutite occurs. A prominent, mudcracked, laminated limestone with yellow dololutite laminae and flaser marks the top of the formation at Boat Harbour. It occurs about 10 m above the "disconformity". This bed may be equivalent to the mudcracked, platey, laminated dolomitic limestone at Barbace Point (Knight, 1977b) and both units underlie the first beds of rubbly Catoche Limestone.

The formation is also well exposed along the shore at Eddies Cove West and the top of the formation is exposed at Barbace Point where it is called the Barbace Point formation (Kluyver, 1975).

The top of the formation at Boat Harbour is about 10 m above the "disconformity" and is located at a prominent, mudcracked, laminated limestone with yellow dololutite laminae and flaser. This may be equivalent to the mudcracked, platy, laminated dolomitic limestone at Barbace Point (Knight, 1977b). Both units underlie the first beds of rubbly Catoche limestone.

7. The Catoche formation is a well bedded, rubbly weathering, blue-gray limestone rich in a diverse fauna (Knight, 1977). Biointramicrites and calcarenites are very common and biomicrite mounds containing sponges occur at Port au Choix. The sequence preserved at Port au Choix is about 150 m thick but at Boat Harbour dolomitization replaces the limestones after about 40 m. Silicified fossils including sponges have been recognized in this dolomite (unit 9) at Cape Norman and near Whale Point suggesting that originally there were close similarities to the Port au Choix section.

8. To the east and above the dolomites at Boat Harbour (unit 9, figure 2), limestones occur which are sheared and fractured. This is probably due to faulting related to emplacement of the Taconic Hare Bay Allochthon to the east and because of a major fault zone that trends inland southwest from Cape Norman Bay. These limestones (unit 8, figure 2) were previously assigned to the Middle Ordovician Table Head Formation by Tuke (1968). However, no certain paleontological evidence is available and since the lithologies compare favourably with those of the Catoche formation, including beds of large mounds mapped approximately 10 km northwest of Hare Bay, it is suggested the limestones may belong to the Lower Ordovician St. George Group

These limestones are the uppermost strata of the Boat Harbour area. They would underlie the sequence of the cyclic "Diagenetic Carbonates" and Siliceous Dolomite formation of the top of the St. George Group and the overlying Middle Ordovician Table Head Formation which occurs in the Port aux Choix and Daniel's Harbour area (see Knight, 1977a, 1977b, for descriptions).

9. Diagenetic Carbonates

Dolomitization of the limestones of the Catoche formation in the map area—has produced a mappable unit refered to as "Diagenetic Carbonates" (see Knight, 1977b). In the map area, the unit is a vuggy to tight, coarse to medium crystalline, massive bedded, often bituminous, dark gray to black, dolomite. Minor, yellow weathering chert and some silicified fossils occur. The dolomite is also locally crisscrossed by sparry dolomite filled fractures. The base of the dolomite is conformable and transgressive to the bedding of the underlying unaltered Catoche formation. The uppermost limestones of the Catoche formation are increasingly dolomitized just below unit 9. This dolomitization affects the top few centimetres and the abundant burrows of each bed for at

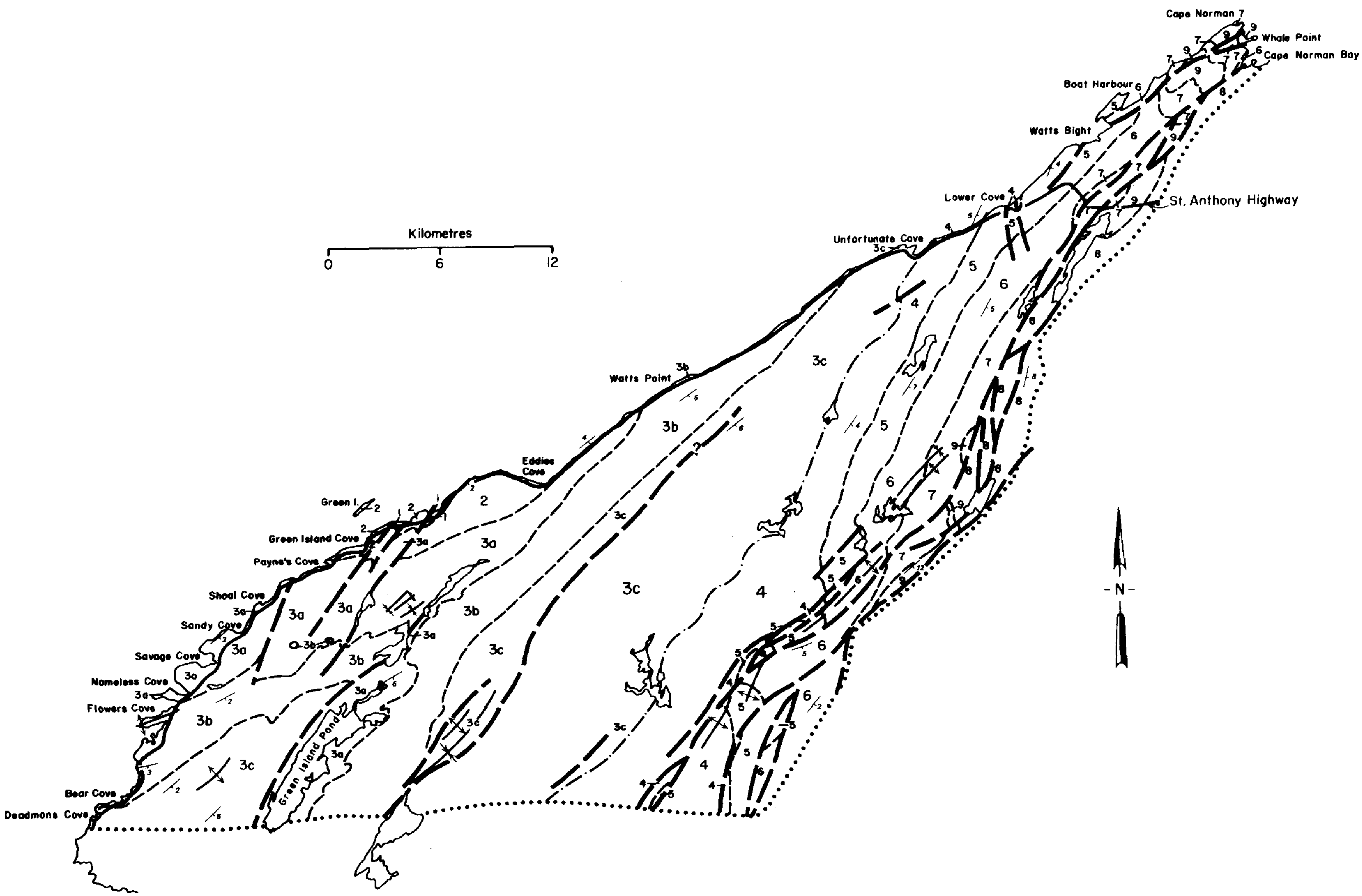

Kilometres
0
6
12
Cape Norman
Whale Point
Cape Norman Bay
Boat Harbour
Watts Bight
St. Anthony Highway
Lower Cove
Unfortunate Cove
Watts Point
Eddies Cove
Green I.
Green Island Cove
Payne's Cove
Shoal Cove
Sandy Cove
Savage Cove
Nameless Cove
Flowers Cove
Bear Cove
Deadmans Cove
Green Island Pond
N

Figure 2.

LEGEND

LOWER ORDOVICIAN

ST. GEORGE GROUP

9	**DIAGENETIC CARBONATE** *(replacing unit 7)*
8	*Fractured and cleaved limestone (probably equivalent to upper part of Catoche formation (originally mapped as Table Head Formation).*
7	**CATOCHE FORMATION**
6	*Unnamed unit.*
5	**WATTS BIGHT FORMATION**

CAMBRIAN AND/OR ORDOVICIAN

4	**UNFORTUNATE COVE FORMATION**

CAMBRIAN

3	**DOLOMITE FORMATION: 3a,** *Lower dolomite-limestone member;* **3b,** *middle stromatolite member;* **3c,** *upper dolostone member.*
2	**MICRITE FORMATION**
1	**HAWKES BAY QUARTZITE FORMATION**

SYMBOLS

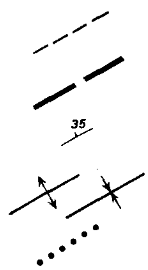
Geological boundary ....

Faults ....

Bedding (dip shown) ....

Anticline and syncline ....

Limit of mapping, 1977 ....



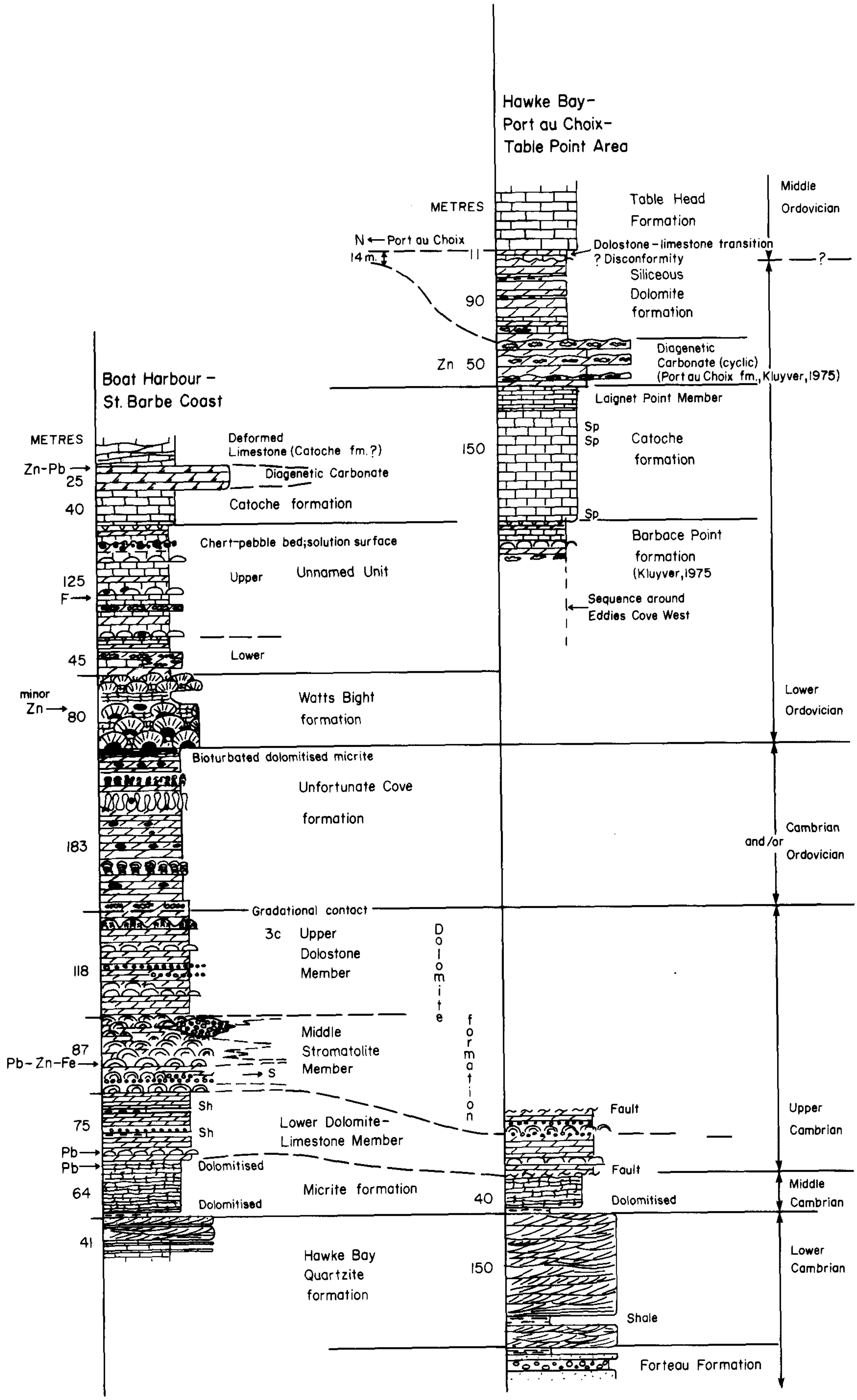

Hawke Bay-
Port au Choix-
Table Point Area
METRES
Table Head
Formation
Middle
Ordovician
N ← Port au Choix
14 m.
11
Dolostone-limestone transition
? Disconformity
?
Siliceous
Dolomite
formation
90
Diagenetic
Carbonate (cyclic)
(Port au Choix fm., Kluyver, 1975)
Zn 50
Laignet Point Member
Sp
Sp
Catoche
formation
150
Sp
Barbace Point
formation
(Kluyver, 1975
Sequence around
Eddies Cove West
Boat Harbour -
St. Barbe Coast
METRES
Deformed
Limestone (Catoche fm.?)
Zn-Pb
25
Diagenetic Carbonate
40
Catoche formation
Chert-pebble bed; solution surface
Upper
Unnamed Unit
125
F
Lower
45
minor
Zn
80
Watts Bight
formation
Lower
Ordovician
Bioturbated dolomitised micrite
Unfortunate Cove
formation
183
Cambrian
and/or
Ordovician
Gradational contact
3c
Upper
Dolostone
Member
118
Dolomite formation
Middle
Stromatolite
Member
87
Pb-Zn-Fe
S
Sh
75
Sh
Lower Dolomite-
Limestone Member
Fault
Upper
Cambrian
Pb
Pb
Dolomitised
Fault
64
Micrite formation
40
Dolomitised
Middle
Cambrian
41
Hawke Bay
Quartzite
formation
150
Lower
Cambrian
Shale
Forteau Formation

Figure 3.

LEGEND

Massive, coarsely crystalline dolomite

Pseudobreccia

Dolostone

Limestone

Shale

Mudcracks

Stromatolite

Domal stromatolite

Large stromatolite mounds

Digitate stromatolite

Conophyton-like stromatolite

Large mound of digitate stromatolite

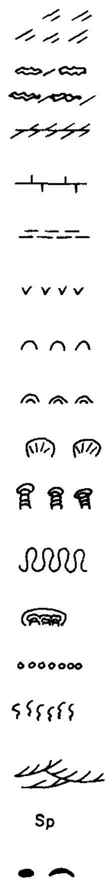
Ooliths

Bioturbation

Cross-beds

Sponge

Chert



least 20 m below the dolomite unit. Vertical, cylindrical shaped deposits of pseudobreccia (see Cumming, 1968; Knight, 1977b), 30-300 cm in diameter, are also present in the immediately underlying limestones. The structures may crosscut one or more beds of limestone.

These "Diagenetic Carbonates" have obvious differences from those of the Port aux Choix and Daniel's Harbour area. The latter consist of 1 to 2 metre cyclic couplets of tight, gray, finely crystalline dolomite, overlain by very vuggy, bituminous, black to dark gray, coarse crystalline, dolomite rich in white sparry dolomite (the pseudobreccia of Cumming, 1968; Knight, 1977b). The two "Diagenetic Carbonate" units are not stratigraphically equivalent to each other; unit 9 (figure 2) in the St. Barbe area, lies within the Catoche formation whereas the cyclic unit of Port aux Choix overlies the Catoche formation (Knight, 1977b).

The controls of such pervasive dolomitization are poorly understood. Diagenesis, producing similar dolomites, commonly affected individual, bioturbated limestone and stromatolite beds in unit 6, in the upper member of the Dolomite formation and in the Unfortunate Cove formation. Abrupt dolomitization fronts occur at Boat Harbour and near Eddies Cove West which indicate that usually the dolomitizing solutions passed laterally along the beds. The Eddies Cove West example indicates that the solutions which affected a single stromatolite bed originated in a nearby, major fault zone. However, this small scale dolomitization contrasts sharply with the widespread dolomitization that produced thick stratigraphic units such as the Watts Bight formation and the cyclic "Diagenetic Carbonates" of the Port aux Choix area. Similarly, the dolomites of unit 9 were probably originally much more extensive than the small, isolated, fault bounded exposures now suggest. However, a genetic relationship between dolomitization and faulting may exist. It can be concluded that regional, environmental and lithological controls probably governed the dolomitization. Some common features are present:

(a) All three dolomitized units were originally deposited in a subtidal environment. In the case of the cyclic "Diagenetic Carbonates", the cyclic couplets may indicate a fluctuating environment reflecting a shelf in a transitional state between the subtidal shelf micrites of the Catoche formation and the dominantly intertidal-supratidal environment of the overlying Siliceous Dolomite formation (Knight, 1977b).

(b) Bioturbated limestones which were originally abundant in the units are the most extensively altered.—Bioturbated limestones (Collins and Smith, 1975) in the cyclic "Diagenetic Carbonate", have been most extensively dolomitized to produce "pseudobreccia" whereas unburrowed limestones or dolostones (?) were only recrystallized to nonporous, fine dolomite.

(c) The Watts Bight formation and the cyclic "Diagenetic Carbonates" of the Port aux Choix area are overlain by shallow water intertidal and supratidal deposits. Differing salinity conditions probably prevailed at these times and may possibly have affected pore fluids in the underlying strata. It is worth noting that the Siliceous dolomite formation at the top of the St. George Group probably was deposited in a much more restricted, hypersaline environment than the sediments of unit 6 which overlie the Watts Bight formation. It is beneath the Siliceous Dolomite formation that the most intensively dolomitized "Diagenetic Carbonates" occur.

PALEOGEOGRAPHY

The Cambro-Ordovician carbonates lying above the Hawkes Bay Quartzite formation appear to form four main depositional 'lithotopes". These are:

Lithotope I - Subtidal shelf limestones typified by the Micrite formation, Catoche formation and Table Head Formation. They are well bedded, highly bioturbated and contain an abundant fauna.

Lithotope II - Subtidal stromatolite bank complexes such as the Watts Bight formation and shelf margin mound complexes described by James and Stevens (1976) and Levesque *et al.* (1977) are probably lateral facies equivalent of lithotope I and III. Lithologies consist of large stromatolite and possibly sponge mounds (James and Stevens, 1976) and burrowed limestones. The fauna is dominated by robust organisms such as cephalopods and gastropods.

Lithotope III - Fluctuating subtidal-intertidal shelf sedimentation represented by unnamed unit 6, and in part by the stromatolite member of the Dolomite formation and possibly by the original lithologies of cyclic Diagenetic Carbonates of the Port aux Choix - Daniel's Harbour area. This lithotope includes subtidal bioturbated limestones, stromatolite mounds, thin bedded and laminated tidal flat limestones and dolostones, and some bioclastic and oolitic carbonate sands.

Lithotope IV - Intertidal-supratidal flats represented by the Dolomite formation, Unfortunate Cove formation and the Siliceous Dolomite formation. They consist of bedded tidal flat sediments with abundant evidence of subaerial exposure, including algal mats, small stromatolites, carbonate sands and some shallow water subtidal carbonates. This last type is quantitatively the most abundant lithofacies, forming just less than half of the carbonate sequence.

Three megacycles formed of these lithotopes occurred after the end of clastic sedimentation in the Lower Cambrian. These cycles begin with transgression, which initiates the deposition of subtidal limestones (lithotopes I and II), followed by progressive shallowing of the shelf seas probably related to sedimentation outstripping erosion and subsidence. The shelf subsequently became very shallow with the development of intertidal stromatolites, tidal flats and some very shallow subtidal carbonates and frequent periods of subaerial exposure (lithotope IV and/or lithotope III).

Transgressions which initiated the cycles appear to have been rapid events exemplified by the subtidal Catoche limestones overlying mudcracked laminated limestones or dolomites of Unit 6 and the subtidal Watts Bight Formation, overlying burrowed micrite of the unfortunate Cove formation. More gradual transgressions are represented by the shale at the base of the Micrite formation and the transition from the Siliceous Dolomite formation to the Table Head Formation limestones. (Knight 1977b)

STRUCTURE

The gently southeastward dipping, north-northeast to northeast trending sequence is complicated by a number of important fault zones. The faults trend northeast obliquely or subparallel to the bedding. The faults are predominantly high angle normal faults with downthrow most commonly to the northwest. Major repetition of the sequence often occurs such as where Cambrian rocks are downthrown, and bedding trends are reorientated west of the major fault passing west of Green Island Pond and Brook. Another major fault zone cuts Ordovician rocks in the east of the map area where many faults affect a flexure of the strata. Both normal and wrench movements may have occurred along these faults as drag folds trending obliquely and parallel to the faults occur. This fault zone most likely continues to the southwest to link with the Ten Mile Lake Fault, which brings Ordovician against Lower Cambrian sediments. Minor faults commonly splay off the main faults, and these main faults appear to diverge when traced northeastwards. The main fault bounding the northwest side of the zone swings into parallelism with the north-northeast trends of the strata and continues northwards into Cape Norman Bay. The main fault bounding the southeast side of the zone continues northeast towards Pistolet Bay. The rocks in the block between these two faults are sheared and fractured and in places contain a good cleavage. This deformation is thought to be related to the westward emplacement of the Hare Bay Allochthon, which is exposed only 14 km to the east.

Most faults are usually sharp, clean breaks, but narrow to broad zones of brecciation are present locally. Dolomitization is frequently associated with them and some faults have become sites of solution and partial collapse.

Minor local warping of the strata also occurs in the map area; most fold axes trend northeast.

MINERALIZATION

Both lead and zinc mineralization occur in the map area. The following observations can be made:

(a) Lead with traces of zinc mineralization occurs above and below the contact of the Micrite and Dolomite formations (units 2 and 3) of the Cambrian sequence near Eddies Cove East. It occurs in joints, vugs and cavities in bedded dolostones and dolomitized micrites and as clots and stringers in original porosity in both gray and dark gray stromatolitic beds.

(b) Lead, zinc and pyrite occur in the stromatolite member near Watts Point; pyrite is especially common in this member south of Flowers Cove. As lead showings are found in the Canada Bay area in similar stratigraphic units, it appears possible that these Cambrian rocks may host widespread stratabound lead mineralization.

(c) Zinc and lead mineralization are found in the map area in the "Diagenetic Carbonates" near major fault zones. This spatial relationship of the faulting and mineralization in the St. George Group in the map area is supported by small showings of zinc and pyrite along or near faults in sediments of the Watts Bight formation and also in Catoche formation limestones. This indicates that the faults may have formed the ore fluid channelways and that on intersecting suitably prepared lithologies such as the "Diagenetic Carbonates" mineralization passed laterally into the country rock.

(d) The zinc-lead mineralization of the St. George Group of the St. Barbe map area (figure 2) is thought to be hosted by rocks which are older and at a lower stratigraphic level than those of the Daniel's Harbour area (figure 3) which host the Daniel's Harbour zinc mine.

(e) Disseminated fluorite mineralization occurs in stromatolitic limestones of Unit 6 in both Boat Harbour and Eddies Cove West.

Acknowledgements: *The author wishes to acknowledge the dedicated work of L. J. Edwards and C. Patey, who assisted in the mapping, and D. Boyce, who patiently collected fauna and identified trilobites; without* *their help many of the results reported here could not have been produced. Thanks also to N. P. James for many informative discussions.*

Footnotes

[1]All names are temporary and informal and may be discontinued.

[2]Previously, it was considered that the formation had been thickened by faulting and the thickness was estimated at 46 m (Knight, 1977). However, trilobites found this summer (Boyce, personal communication) in the unit indicate that a continuous stratigraphic sequence is exposed.

[3]This locality was previously thought to occur in the lower member of the formation (Knight, 1977a, 1977b).

REFERENCES

Boyce, W. D.
1977: New Cambrian trilobites from western Newfoundland; B.Sc. Thesis, Memorial University of Newfoundland, St. John's.

Collins, J. A. and Smith, L.
1975: Zinc deposits related to diagenesis and intrakarstic sedimentation in the lower Ordovician St. George Formation, western Newfoundland; Bulletin, Canadian Society of Petroleum Geology, Volume 23, pages 393-427.

Cumming, L. M.
1968: St. George - Table Head disconformity and zinc mineralization, western Newfoundland; Canadian Institute of Mining and Metallurgy, Bulletin 61, pages 721-725.

Hintze, L. F.
1953: Lower Ordovician trilobites from western Utah and eastern Nevada; Utah Geological and Mineralogical Survey, Bulletin 48, page 249.

James, N. P. and Stevens, R. K.
1976: Large spongelike reef moulds from the Lower Ordovician of west Newfoundland; Abstract, Annual Meeting, Geological Society of America, Denver, Colorado, page 1122.

Kindle, C. H. and Whittington, H. B.
1958: Stratigraphy of the Cow Head region, western Newfoundland; Geological Society of America Bulletin, Volume 69, pages 315-342.

Knight, I.
1976: The Cambro-Ordovician platformal rocks of the Northern Peninsula; *in* Report of Activities for 1976, R.V. Gibbons (Editor); Newfoundland Department of Mines and Energy, Mineral Development Division, Report 77-1, pages 27-34.
1977: Cambro-Ordovician rocks the Great Northern Peninsula, Newfoundland; Newfoundland Department of Mines and Energy, Mineral Development Division, Report 77-6.

Levesque, R., James, N. P. and Stevens, R. K.
1977: Facies anatomy of Cambro-Ordovician shelf carbonates, northern Maritime Appalachians; Abstract, 12th Annual Meeting, Northeastern Section, Geological Society of America, Binghamton, New York, pages 293-294.

Ross, R. J.
1951: Stratigraphy of the Garden City Formation in northeastern Utah and its trilobite faunas; Yale University, Peabody Museum of Natural History, Bulletin 6, page 161.

Tuke, M. F.
1968: Authochthonous and allochthonous rocks of the Pistolet Bay area in northernmost Newfoundland; Canadian Journal of Earth Sciences, Volume 5, pages 501-513.