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PALAEONTOLOGY OF SUSPECT FIELD CORE COLLECTIONS,

Hudson Bay Area, 1963

by Samuel J. Nelson, P. Geol.

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INTRODUCTION

General Statement

During June, 1963, W. D. Johnson and the writer made a fairly detailed canoe study of the Ordovician and Silurian stratigraphy and paleontology along Severn River in the southern part of the Hudson Bay Lowland, Northern Ontario. The purpose was to obtain an idea of the rock types and ages which might be expected when drilling to the north in the Cape Itanau area.

Later during August, W. D. Johnson, W. J. Atkins and the writer made an aerial reconnaissance of Southampton, Coates and Havel Islands at the top of Hudson Bay, N. W. T. The object was to determine just what rock systems underlay these islands and to locate potential petroleum areas.

W. D. Johnson is submitting a report on the stratigraphy and petroleum possibilities of the above areas, and the reader is referred to his map showing position of fossil localities. The present report is concerned primarily with identification of the fossils, and the age determination.

Object of Study

The Severn River fossils have been intensely studied in an attempt to differentiate horizons, so that the results could be

applied when drilling in the Cape Horn area. Thus most time was spent on the common animal groups: those most likely to show up in drill cores. These were the Halysitid and Favositid corals, and the Stromatopora. Although the Ordovician fauna was found to be distinct and easily recognizable and correlatable, little results were obtained from the Silurian fauna. It is concluded that the three Silurian formations exposed on Severn River - Severn River, Ekwan River and Attawapiskat River formations - probably are about the same general age and have a small total thickness, in the order of several hundred feet or less.

Most fossil collections on Southampton, Costes and Mansel Islands were of Silurian age. The fossils were found to be very similar to those along Severn River, particularly from the Ekwan River formation, and it is concluded that the strata on these islands were part of the same Silurian blanket covering Severn River.

#### SEVERN RIVER

Four local corals formations are exposed along Severn River and are successively exposed as one proceeds down river. In ascending order they are the Ordovician Fort de Clute Formation; and the Silurian Severn River, Ekwan River and Attawapiskat River Formations. The first can be accurately correlated with the Dog Head member of the Red River Formation in southern Manitoba. The last three are correlated with the Middle Silurian Interlake Group, of the same age, although finer delineation is not certain.

Ordovician

The Fortage Gulte Formation is exposed at Jubilation Rapids as a thin limestone veneer resting unconformably upon Precambrian. Fossil collections SR1A, SR2A and SR3A are from this unit and bear a fauna consisting principally of Receptaculites sp., Laclurites manitobensis (Whiteaves) and Hormotoma winnipegensis Whiteaves, an association definitely relating the unit to the type Fortage Gulte Formation along Churchill River, Manitoba (Nelson, 1963). This is the same horizon as the Dog Head Member of the Red River Formation (see Figure 1). The age is considered low Upper Ordovician (Nelson, *ibid*).

Silurian

Below the Jubilation Rapids area no exposures occur for an 80 mile stretch, down to where the Severn River Formation outcrops. In this stretch collections SR6A and SR9A were taken from limestone rubble. These have yielded a meagre fauna consisting principally of pentamerid brachiopod fragments and Palaeofavosites, an association suggestive of the lower part of the Interlake Group of Southern Manitoba (see analysis of fauna).

The Severn River Formation contains collections SR10A, SR11A, SR12A, SR14A, SR15A and SR16A. This limestone unit is rather unfossiliferous, and the meagre fauna collected is typically poorly preserved and difficult to identify. The following is a composite of the fauna collected:

- Serranoceras sp.?
- Favosites manitobensis (Hall)

F. n. sp., nr. F. favosus (Goldfuss)

Camarotoechia winiskensis Whiteaves?

The overlying lim stones of the Kwan River Formation are the most fossiliferous rock in the Oluri n succession along the river. Eight fossil collections were made (SR12A, SR17A, SR18A, SR19A, SR19B, SR20A, SR20B, SR20C) of which the following is a composite list:

Clithrodictyon striatellum (D'Orbigny)

C. sp., cf. C. regulare Busen

C. sp.

Gynaplezoides variocostatus Stearn

Leptisolenia confluens Stearn

L. tortuosa Fritz

Favosites n. sp., nr. F. favosus (Goldfuss)

F. niagarensis Bell

F. gotthardicus Lamerck

F. hisingeri Blue-Edwards & Heime

Selysites brownportensis Amaden

H. magnitubus Buchler

H. latus Tchernychev?

Syringopora verticillata Goldfuss

Camarotoechia skvinnensis Whiteaves

Trachyporion paskoiacensis Stearn

B. paskoiacensis geniculatus Stearn?

B. acanthoporus (Whiteaves)

?Dolerorthis redcockensis Stearn

?Brooksina winiskensis Kirk

Stokesoceras skwanense Foerste & Savage

S. cylindricum Foerste and Savage

Donaceras sp.

Discoceras parksi Foerste & Savage

?Dinogysocliina ladinarginata (Jones)

It is thought that this fauna relates the skwan River Formation to the middle beds of the Interlake group of southern Manitoba (see below).

The Attawapiskat River Formation is considered the youngest Silurian unit outcropping along the Severn River. It is almost entirely reefal limestone comprising stromatopora in large part, cementing in biostromal to biohermal shapes. The smothering effect of stromatopora on other fossils has made it extremely difficult to get diverse collections, so although the unit is almost entirely fossil, it has yielded an unacceptably low faunal list. Fossil collections R211, R221, R231, R241 and R261, from the Attawapiskat have yielded the following:

Clathrodictyon drummondense Parks?

C. sp.

Favosites gothlandicus Lambeck

F. n. sp., nr. F. favosus (Goldfuss)

F. nigrensis Hall?

Helyxites brownportensis Madden

H. magnitubus Buxton forma 1 Hall?

Helicites interstinctis (Linnaeus)

Pycnostylus guelphensis Whiteaves

?Pentamerus sp.

Scutellum sikowensis (Whiteaves)?

This fauna, as will be explained below, suggests that the Attawapiskat Formation correlates with the reefed Cedar Lake Formation of the Interlake group, in southern Manitoba.

#### ANALYSIS OF FAUNA

The fauna of the Portage Chute formation exposed in the Jubilation Rapids area, leaves little doubt as to its stratigraphic position. Such species of Receptaculites sp., Naclurites manitobensis (Whiteaves) and Horvotoma winnipegensis Whiteaves definitely relate it to the Portage Chute Formation of the Bad Cache Rapids Group along Churchill River Manitoba, and to the coeval Dog Head member of the Red River Formation, southern Manitoba. These units are considered to be of early Upper Ordovician age.

A study of the limestone rubble downstream from the Portage Chute area, yielded not a trace of the higher Ordovician formations which occur to the north, viz, Surprise Creek, Caution Creek, Chasm Creek and Red Head Rapids Formation (see Nelson 1963). These formations usually carry both an abundant and easily recognizable fauna. Absence of these fossils in the rubble suggests the possibility these units are not present along Severn River, and that Silurian strata may rest unconformably upon the Portage Chute Formation.

The geographic position of the Silurian fossils in rubble from BR5A, BR5A, BR7A and BR9A, upriver from the first outcrops of the Severn River Formation suggests that this rubble may be strati-



graphically lower than this formation. Few fossils were found. They consisted principally of Lacofavosites and pentamerid brachiopods which may belong in Virgiana decussata (whiteaves). The latter in southern Manitoba is diagnostic of the Fisher Branch Formation, the basal unit of the Interlake Group (see Fig. 1), and suggests that the Silurian along Severn River is part of the same blanket covering southern Manitoba.

The Severn River formation has not yielded any species diagnostic in correlation. However, the meagre favositid coral fauna is rather similar to that of the overlying Kwan River Formation and suggests a close temporal relationship between the units. The fauna of the Kwan River Formation is very closely related to that of the Interlake group in southern Manitoba, but exact correlation is difficult because many of the species are long ranging. In the overlying Attawapiskat, however, the easily recognizable Microstylus guelphensis is also found in the basal Cedar Lake Formation, the highest unit of the Interlake Group. This suggests the coevality of the Cedar Lake and Attawapiskat. Hence on stratigraphic position, the Kwan and Severn River Formations, as well as the rubble from BR5A to BR9A, may correlate with the interval occupied by the Fisher Branch to West Arm Formations of the Interlake Group (see Figure 1).

#### CONCLUSIONS

On the basis of the faunal content, no great thickness of sediment is indicated along Severn River. The Ordovician is represented by only 4 feet of beds, belonging to the basal unit

in the northern lowland - the Portage Chute Formation. Rubble studies have not indicated the presence of higher Ordovician.

Although Silurian strata are better exposed and more complete, accurate thicknesses could not be calculated. The faunal content, however, suggests that these strata are correlative with most of the Interlake Group of southern Manitoba, a dolomite-limestone sequence about 350 feet thick. Thus a similar thickness might be indicated for the Severn River to Attawapiskat River interval.

SOUTHAMPTON, CORTES AND GANSEL ISLANDS, N. B. I.

From the limited aerial reconnaissance the Phanerozoic rocks of Southampton, Cortes and Gansel Islands appear to be mainly flat lying or gently dipping, and to belong to the Ordovician and Silurian systems. Ordovician strata appear to be serially restricted and have been recognized only on Southampton Island. Silurian appears to cover much of Southampton Island and (excluding Precambrian) all of Cortes and Gansel Islands.

Ordovician

Ordovician rocks were found along Sutton River on Southampton Island. The lowest occur at the Precambrian contact (Fossil collection S3A) and belong to the horizon of the Red Cache Rapids Group of the Hudson Bay Lowland (Nelson, 1963). Their age is thus early Upper Ordovician. Down river at locality S1A another Upper Ordovician suite was recognized but could not be accurately correlated. It is thought most likely to be coeval with the Churchill River Group. If so then a fairly complete Upper Ordovician succession

may be present on Southampton Island.

#### Silurian

Except for the questionable Ordovician rubble collections S2A and S2B at Coral Harbour, Southampton Island all of the other fossil collections from Southampton, Coates and Munnell Islands are Silurian. The few fairly complete collections that have been made have suggested a correlation with the Middle Silurian Skwan River and Attawapiskat Formations of the Hudson Bay Lowland.

REFERENCES

- Melton, J. S., 1963, Ordovician Paleontology of the Northern Hudson Bay Lowland: Geol. Soc. America Mem. 90, 145 p.
- Norford, B. S., 1962, Illustrations of Canadian Fossils Cambrian, Ordovician and Silurian of the Western Cordillera: Geol. Survey Canada Paper 62-14, 25 p.
- Stearn, C. W., 1956, Stratigraphy and paleontology of the Interlake Group and Stonewall Formation of southern Manitoba: Geol. Survey Canada Mem. 281, 162 p.

Ordovician and Silurian of Southern Manitoba		Composite Ordovician of Northern Hudson Bay Lowland		Severn River, Ontario	Southampton, Coates & Mansel Islands	
Middle Silurian	Interlake Group	Cedar Lake Formation		Attawapiskat Formation SR21A, SR22A, SR23A, SR24A, SR26A	?	
		East Arm Formation			S4A, S6A, S10A, S16A, S17A	
		Atikameg Formation		Ekwan River Formation SR12A, SR17A, SR18A, SR19A, SR19B, SR20A, SR20B, SR20C	?	
		Moose Lake Formation				
		Inwood Formation		Severn River Formation SR10A, SR11A, SR13A, SR14A, SR15A, SR16A		
		Fisher Branch Formation		Rubble collections SR6A, SR9A		
Late Upper Ordovician	Stonewall Form.	Red Head Rapids Formation		No fossils found		
	Stony Mountain Formation	Churchill River Group	Chasm Creek Formation			S1A ?
			Caution Creek Formation			
Early Upper Ordovician	Red River Formation	Cat Head Member	Surprise Creek Formation	SR1A, SR2A SR3	S3A S2A S2B	
		Dog Head Member	Portage Chute Formation			
	Winnipeg Formation		Precambrian	Precambrian	Precambrian	
	Precambrian					

Figure 1. Correlation of Severn River, Southampton Island, Coates Island and Mansel Island fossil collections.

APPENDIX

Fossil Identifications

SEVERN RIVER, ONTARIO

SR1A - Portage Chute Formation - Ordovician

Receptaculites sp.  
Strophomena sp., cf. S. lenta Thorsson  
Thurodonta sp.  
Homotoma winnipereensis Whiteaves  
Michelinoceratid cephalopod

This association is typical of the Portage Chute Formation of the Red Cache Rapids group in the northern Hudson Bay Lowland (Nelson, 1963). This is the same horizon as the Dog Head Member of the Red River Formation in southern Manitoba. The age is considered low Upper Ordovician.

SR2A - Mainly Rubble - Portage Chute Formation - Ordovician

Receptaculites sp. (in place)  
Leclerites manitobensis (Whiteaves)  
Michelinoceratid cephalopod

This is same horizon as SR1A.

SR3A - Portage Chute Formation - Ordovician

Receptaculites sp.

This is same horizon as SR1A.

SR6A - Millurina Rubble

Pentamerid brachiopod fragment  
Brachiopod fragments in matrix - not identified

Both SR6A and SR9A may correlate with the Fisher Branch formation of the Interlake group in southern Manitoba. The Fisher Branch is variously considered Middle (Stearn, 1956) or Lower Millurina (Norford, 1962).

SR9A - Silurian rubble

Clithrodictyon cytosum Parks?  
Palaefavosites sp., cf. P. prolificus Billings  
Virgiana decussata (Whiteaves)  
Ostracodes

See RB3 for discussion.

SR10A - Severn River formation - Silurian

Possible algal structures - not identifiable

SR12A - rubble, Ewan River formation - Silurian

Multicolenia tortuosa Pritz

SR15A - Severn River formation - Silurian

Carrugopora sp.?

SR16A - Severn River formation - Silurian

Favosites nigarensis Hall  
Favosites n. sp., nr. F. favosus (Goldfuss)  
Gamaratoechia winickensis Whiteaves?

SR17A - Ewan River formation - Silurian

Favosites n. sp., nr. F. favosus (Goldfuss)  
F. nigarensis Hall  
F. gotthardicus Lohrck  
Brachyurion paskoiacensis geniculatus Stearn?  
B. paskoiacensis Stearn  
Homococeras sp.  
Dinococcolina latimarginata (Jones)

SR18A - Ewan River formation - Silurian

Clithrodictyon strictellum (D'Orbigny)  
Favosites n. sp., nr. F. favosus (Goldfuss)  
F. Hisingeri Milne-Edwards & Haime  
Stokesoceras cylindricum Forster & Savage

SR19A - Kwan River Formation - Silurian

Clathrodictyon striatellum (D'Orbigny)?  
Multisolenia tortuosa Fritz  
Halysites magnitubus Buchler  
H. brownportensis Asnden  
H. latus Tchernychev?  
Stokesoceras ekwanense Foerste & Savage

SR19B - Kwan River Formation - Silurian

Brachyprion parkoiacensis geniculatus Stearn?  
?Brooksina alaskensis Kirk

SR20A - Kwan River Formation - Silurian

Clathrodictyon striatellum (D'Orbigny)?  
Syringopora verticillata Goldfuss  
Multisolenia confuens Stearn  
H. tortuosa Fritz  
Favosites n. sp., nr. F. foveus (Goldfuss)  
F. gothlandicus Lesarck  
F. hisingeri Blue-Stwards & Irime  
F. niagarensis Hall  
Halysites brownportensis Asnden  
Camerozocia ekwanensis Whiteves  
Brachyprion parkoiacensis geniculatus Stearn  
?B. acanthoaterus (White ves)  
?Dolerorthis redrockensis Stearn  
Discosorus parksi Foerste & Savage

SR20B - Kwan River Formation - Silurian

Brachyprion acanthoaterus (White ves)  
Crinoid stem

SR20C - Kwan River Formation - Silurian

Clathrodictyon sp., cf. C. regulare Asnden  
?C. sp.  
C. striatellum (D'Orbigny)?  
Synsaxoides varicosatus Stearn  
Multisolenia tortuosa Fritz  
Favosites n. sp., nr. F. foveus (Goldfuss)  
F. gothlandicus Lesarck  
F. niagarensis Hall  
Halysites brownportensis Asnden  
Brachyprion acanthoaterus (White ves)



SR21A - Attawapiskat River Formation - Silurian

Clathrodictyon drummondense Parks?  
Favosites halsingeri Milne-Edwards & Haime  
F. niagarensis Hall  
F. n. sp., nr. F. favosus (Goldfuss)  
Halysites browniortensis Wassen  
H. browniortensis Wassen?  
H. magnitubus Buckler forma 1 Jull?  
?Pentamerus sp.

SR22A - Attawapiskat River Formation - Silurian

Clathrodictyon drummondense Parks  
Heliolites intertinctus (Linnaeus)  
Favosites gotthardicus Lamarck  
F. gotthardicus Lamarck?  
F. n. sp., nr. F. favosus (Goldfuss)  
Scutellum elanensis (Whiteaves)?

SR24A - Attawapiskat River Formation - Silurian

Clathrodictyon sp.  
Favosites gotthardicus Lamarck  
F. niagarensis Hall?

SR26A - Attawapiskat River Formation - Silurian

Lynostylus justicensis Whiteaves  
Favosites gotthardicus Lamarck

SOUTHAMPTON ISLAND, N. S. T.

31A - Southampton Island - Ordovician

"Trochanema" sp.  
Biliuolites sp., cf. B. lauderense Forster  
Michelinoceratid cephalopod  
?Winnipegoceras contractum Forster & Savage

This fauna is Upper Ordovician but it is not certain whether it belongs to the horizon of the Middle Cambrian Group (lower Upper Ordovician) or the Churchill River Group (high Upper Ordovician). I favour a correlation with the latter horizon.

32A - Southampton Island - Ordovician?

?Billiceras sp.  
Michelinoceratid cephalopod (Whiteaves)?

The age of S2a and S3a is uncertain - it is either Ordovician or Silurian. I favour the Ordovician assignment and suggest a correlation with the Red Cache Rapids Group (lower Upper Ordovician).

S2a - Southampton Island - Ordovician?

Unidentified strophomenid brachiopods See S2a.

S3a - Southampton Island - Ordovician

Receptaculites sp.  
Saffordophyllum? portageense Wilson (not collected)  
Antipora feildeni (Etheridge)  
Antipora robusta (Wilson)  
A. robusta (Wilson)?  
A. rubra Sinclair & Bolton  
Trilobites manitobensis (Whiteaves)  
Fusispira sp.  
Hormotoma winnipegensis Whiteaves?  
Cyrtogoniatoceras lecocki Wilson  
Goniatoceras carolinicum Forster & Savage?  
Heterogoniatoceras litum (Forster) (not collected)  
Wilsonoceras manitobensis Miller (not collected)

Collection S3a is definitely related to the Portage Chute formation of the Red Cache Rapids Group. Its age is low Upper Ordovician. This is the same horizon as S2a to S3a (Severn River).

S4a - Amble - Southampton Island - Silurian

Clathrodictyon striatellum (D'Orbigny)?  
C. drummondense Parks?  
Favosites niagaraensis Hall  
Helysites brownspottensis Amaden  
Lyellia affinis (Billings)  
Pentamerid brachiopods: unidentified.

Middle Silurian - this suite is closest to that occurring in the Skwan River and Ottawa-Rasket River formations of Severn River, Ontario.

S5a - Southampton Island - Silurian

Favosites niagaraensis Milne-Edwards & Haime  
Crinoidella retica Poulsen?

Silurian - Their correlation not possible. (Note: this suite was thought to have possibly been Devonian, during outcrop studies.)

S6A - Southampton Island - Silurian

Clathrodictyon striatellum (D'Orbigny)?  
Favosites n. sp., nr. F. favosus (Golufuss)  
Helydites brownportensis Madden  
Stokesoceras sp., cf. S. serobliquum Forster

Middle Silurian. This suite is closest to that of the  
Lawn River and Attawapiskat River formations on Severn River,  
Ontario.

S6B - Southampton Island - Silurian

Favosites gotlandicus Lamarck

Silurian - finer correlation not possible.

S10A - Southampton Island - Silurian

Clathrodictyon sp.  
Ecnostylus sullhensis Milne-Edwards?  
Favosites hisingeri Milne-Edwards & Haime  
Palaeofavosites transiens Stearn  
Pentamerus sp., cf. P. laevis Lowerby

Middle Silurian: This suite is closest to the Lawn  
River and Attawapiskat River formations (particularly the latter)  
on Severn River, Ontario.

COTES ISLAND, N. W. T.

S12A - Cotes Island - Silurian

Clathrodictyon striatellum (D'Orbigny)?  
Favosites n. sp., nr. F. favosus (Golufuss)  
Internal mould of pentamerid brachiopod  
Encrinurus sp.  
Possible pentamerid brachiopod fragment  
Lowoceras southamptonense Forster & Savage

Silurian - no finer correlation possible.

S19A - Cotes Island - Silurian

Favosites hisingeri Milne-Edwards & Haime?

Silurian - no finer delimitation possible.

S20A - Coates Island - Silurian?

Dolomitised remnants of stromatoporoids  
Trachyarion acanthoaterus (Whiteaves)  
F. parkolacensis Stearn

?Silurian

COATES ISLAND, N. S. P.

S16A - Mansel Island - Silurian

Clathrodictyon striatellum (D'Orbigny)?  
Multisolenia tortuosa Fritz  
Favosites n. sp., nr. F. favosus (Goldfuss)  
F. niagarensis Hall

Middle Silurian: This suite is closest to that in the  
Lawson River Formation, Severn River, Ontario.

S17A - Mansel Island - Silurian

Clathrodictyon striatellum (D'Orbigny)?  
C. osteolatum Nicholson?  
Heliolites magnum (McCoy)  
Coenites rectilineatus (Milne)?  
Syringopora verticillata Goldfuss  
Favosites hisingeri Milne-Edwards & Haime  
F. hisingeri Milne-Edwards & Haime? (intermediate between  
F. hisingeri & F. niagarensis)  
F. niagarensis Hall  
Helysites brownportensis Gooden  
Scutellum sp.?

Middle Silurian - this suite is closest to that in the  
Lawson River Formation, Severn River, Ontario.