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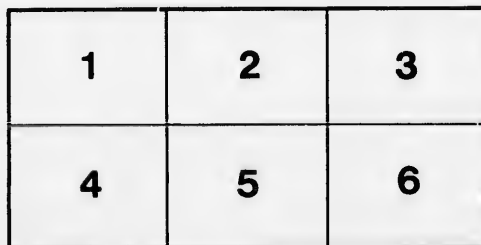
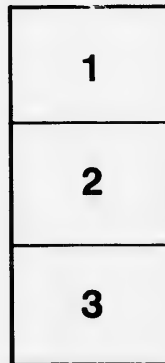
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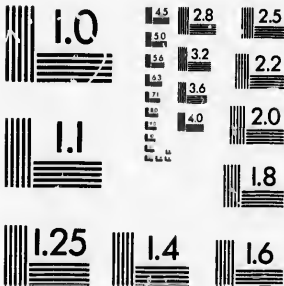
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SECOND SERIES—1896-97

VOLUME II

SECTION IV

GEOLOGICAL AND BIOLOGICAL SCIENCES

16

NOTES ON SOME OF THE
FOSSIL ORGANIC REMAINS
IN THE
GEOLOGICAL FORMATIONS AND OUTLIERS
OF THE
OTTAWA PALÆOZOIC BASIN

By HENRY M. AMI, M.A., D.Sc., F.G.S., Etc.



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1896

IX.—Notes on some of the Fossil Organic Remains comprised in the Geological Formations and Outliers of the Ottawa Palaeozoic Basin.

By HENRY M. AMI, M.A., D.Sc., F.G.S., Etc.

(Communicated by Dr. R. W. Ells, F.R.S.C.)

(Read May 19, 1896.)

That the old Palaeozoic seas which had invaded the territory now occupied by the Ottawa Valley were teeming with life of various kinds is evinced by the fact that the sedimentary formations which now cover the old Archæan floor in the various outliers referred to in Dr. Ells's paper (*vide supra*) contain abundance of fossil organic remains of great interest.

These fossil remains have received considerable attention on the part of the members of the Geological Survey of Canada since early in the fifties, and numerous reports and papers have appeared from time to time both in the "Reports of Progress" published by the Geological Survey of Canada and in the "Canadian Naturalist and Geologist." Sir Wm. Logan, E. Billings, James Richardson, J. W. Salter, Walter R. Billings, T. R. Jones and others besides the present writer, have contributed several reports and articles bearing upon the stratigraphy and palaeontology of the district under consideration.

It was the purpose of the present writer to prepare for the Transactions of the Royal Society an extensive series of classified lists of the fossil organic remains obtained from all the localities examined within the Ottawa Palaeozoic Basin, from Montreal Island to Lake Temiscaming. These lists have been carefully prepared, but are deemed rather voluminous, and accordingly a synopsis of the leading palaeontological characters of the various formations included in the basin are presented, in the hope that they will serve to illustrate the faunas which existed in those old Palaeozoic seas. It is by no means exhaustive, but will include the leading, best known and more truly characteristic species.

The geological formations included in the term Ottawa Palaeozoic Basin, from which fossil organic remains have been obtained, comprise the following, in ascending order:—

- I. Potsdam,
- II. Calciferous,
- III. Chazy,
- IV. Bird's Eye and Black River,
- V. Trenton,
- VI. Utica,
- VII. Lorraine, or "Hudson River" of some geologists.
- VIII. Niagara.

Of these the Niagara formation is referable to the Silurian System and the remainder to the Ordovician or Cambro-Silurian System.

THE POTSDAM SANDSTONE FORMATION.

The characteristic fossils of the Potsdam formation in the Ottawa Palaeozoic Basin comprise the following tracks or trails of marine organisms:—*Climactichnites Wilsoni*, Logan, *Protichnites octo-notatus*, Owen, *P. lineatus*, Owen, *Scolithus Canadensis*, Billings, *Ophileta complanata*, Vanuxem, *Lingulepis acuminata*, Conrad sp., together with *Palaephyucus Beverleyensis*, Billings, besides obscure remains of *Orthocera* have also been found in beds of this age. No truly *primordial* fossils have as yet been recorded from the Potsdam sandstone formation of the Ottawa Palaeozoic Basin such as have been found in the Potsdam of New York, Wisconsin and Minnesota. The Dikelocephalus and Conocephalites zones are not as yet known to exist anywhere in this basin.

THE CALCIFEROUS FORMATION.

The Calciferous fossils of the Ottawa Palaeozoic Basin are not numerous, but are of considerable interest and importance, and include the following:—*Metoptoma simplex*, Billings, *Pleurotomaria calcifera*, Bill., *P. Canadensis*, Bill., *Hormotoma Anna*, Bill., *H. Artemisia*, Bill., *Tarritoma Ada*, Bill., *Oxydiscus mucer*, Bill., *Ophileta complanata*, Vanuxem (= *O. compacta*, Salter, of Can. Org. Rem., Decade I.), *Ophileta disjuncta*, Billings, *Maclurea abdita*, Bill., *Lituites Apollo*, Billings, *Orthoceras veterator*, Bill., *O. Lamarecki*, Bill., *O. edax*, Bill., *O. Glaucus*, Bill., *Amphion Salteri*, Bill., *Bathyrurus Cybele*, Bill., *Dolichometopus rarus*, Billings, *Ribeira calcifera*, Bill., *R. longiuscula*, Bill. The best localities for collecting fossil organic remains in this basin are Lot 3, Con. IV., Oxford, Ont., near Merrickville, the counties of Leeds and Grenville, near Carillon, Que., and Lachute, Que. The fossil fauna of this formation in this basin is still very imperfectly known.

THE CHAZY FORMATION.

The fauna of the Chazy is readily distinguished from that of the Calciferous formation, and corresponds to the nature and conditions of sedimentation in those early Ordovician times. The lower beds of the Chazy are arenaceous, and hold the characteristic fossil *Scolithus*, probably a new form, in great abundance, also an extensive series of tracks and trails of marine organisms, some of which may have been made by gasteropoda, some by trilobites, others by annelids, and others by various other groups of molluscs. Most of these are undescribed.

The form *Rhynchotrema plena*, Hall, so abundant at Montreal and in the Lower Ottawa Chazy, has been but sparingly found in the Chazy

of the Ottawa Valley above I/Oriental. Other brachiopoda which are eminently characteristic are these:—*Lingula Belli*, Billings, *Orthis* (*Hebertella*) *borealis*, Bill., *O. imperator*, Bill.; then *Cyrtodonta breviuscula*, Bill., *Modiolopsis parviuscula*, Bill., amongst the lamellibranchiata; *Columnaria incerta*, Billings, representing the corals; whilst *Bolboporites Americanus*, Billings, *Blastoidocrinus carcharioidens*, Bill., *Palaeocystites tenuiradiatus*, Hall, *Malocystites Marchisoni*, Bill., and *M. Barrandei*, Bill., characterize the echinoderms of this age. *Bathyurus caudatus*, Bill., *B. Angelini*, Bill., *Ischilina Ottawa*, Jones, *Prioniodus radicans*, Hinde, and *Serpulites*, a species related to *S. splendens*, Billings, have also been recorded from the Ottawa Valley Chazy.

THE BIRD'S EYE AND BLACK RIVER FORMATION.

The most interesting and best preserved fossils from the Bird's Eye and Black River formation in the Ottawa Valley are those recorded from the limestones of Paquette's Rapids, the Bonnechère River above Eganville, and from the Petite Chaudière above Ottawa. From these outliers Messrs. E. Billings and J. W. Salter obtained the large amount of material, from which they described the species to be found in the Can. Org. Rem., Dec. I., III. and IV., and the Palaeozoic Fossils, vol. I.

Upwards of ninety species of fossils are recorded from the Black River formation of Paquette's Rapids alone. The following are among the most characteristic:—*Receptaculites occidentalis*, Salter, *Stromatocrinum rugosum*, Hall, *Tetradium fibratum*, Safford, *Catapaccia Canadensis*, Bill., *Columnaria Halli*, Nicholson, *Streptelasma profundum*, Hall, *Petraia aperta*, Billings, *Porambonites Ottawacensis*, Bill., *Solenopora compacta*, v. *Paquettiana*, nobis, *Eichwaldia subtrigonalis*, Bill., *Camarella Volborthi*, Bill., *C. Panderi*, Bill., *Diabobolus magnificus*, Bill., *Modiolopsis Nais*, Bill., *Ctenodonta astartiformis*, Bill., *C. gibberula*, Salter, *C. Logani*, Salter, *Conocardium immaturum*, Billings, *Cyrtodonta spinifera*, Bill., *C. Leucothea*, Bill., *Loxonema Murrayanum*, Salter, *Straparollina asperostriata*, Bill., *S. Circe*, Bill., *S. Eurydice*, B., *Holopea Nereis*, Billings, *H. Pyrene*, Billings, *Cyclonema Hallianum*, Salter, *Eunema cerithioides*, Salter, *E. strigillatum*, Salter, *Solenospira pagoda*, Salter, *Helicotoma planulata*, Salter, *H. larvata*, Salter, *Raphistoma lapicidum*, Salter, *R. apertum*, Salter, *Eotomaria Dryope*, Bill., *Liospira Vitruvia*, Bill., *Plethospira? Arachne*, Bill., *Omo-spiru Alexandra*, Bill., *Lophospira helicteres*, Salter, *L. serrulata*, Salter, *Chiton Canadensis*, Bill., *Metoptoma Erato*, Billings, *Srenella superba*, B., *Bellerophon Charon*, B., *Oxydiscus Argo*, B., *Maclurca Logani*, Salter, *Actinoceras Allumettense*, Bill., *Actinoceras Bigsbyi*, Bronn., *Orthoceras bilineatum*, Hall, *O. laqueatum*, Hall, *O. strigatum*, Hall, *O. arcuoliratum*, Hall, *O. hastatum*, Billings, *O. tenerum*, Billings, *Oncoceras constrictum*, Hall, *Cyrtoceras Billingsi*, Salter, *C. falx*, Billings, *C. regulare*, Bill., *Cyrtoceria*

typica, Billings, *Gonioceras anceps*, Hall, *Cytheropsis siliqua*, Jones, *Leperditia Canadensis*, v. *Paquetteana*, Jones.

All of the above were found at Paquette's Rapids, near Westmeath, Ont., whilst the fossiliferous limestones of "La Petite Chaudière," near Ottawa, have yielded the following:—*Strophomena incurrata*, Shepard, *Clathrospira subornica*, Hall, *Cyrtodonta subtruncata*, Hall sp., *Orthoceras decreescens*, Billings, *Gyroceras vagrans*, Bill., *Cyrtoceras sinuatum*, Bill., *Planus oratus*, Bill., *I. Conradi*, Bill., *Bathyurus extans*, Hall, *Leperditia Louckiana*, Jones, are also characteristic of the Black River formation in this basin.

Lots 3 and 4, Concession III. of the river front, Tp. of Gloucester, Co. of Carleton, Ont., have yielded an abundant harvest of Black River fossils to Mr. W. R. Billings, and in 1885 the latter published¹ an interesting article in which the forms there observed were listed.

THE TRENTON FORMATION.

The numerous outcrops of this formation in the Ottawa Valley, from L'Original to Mattawa, have been classic ground to the students of geology and palæontology ever since the publication of the memoirs by J. W. Salter and E. Billings in the "Decades" and "Palæozoic Fossils" of the Geological Survey of Canada. These contributions to our knowledge of the extinct and varied fauna of this formation, together with numerous writings by Mr. Billings in the "Canadian Naturalist and Geologist," form a mass of literature of unusual interest.

The limestones and shales of this formation teem with fossil remains, and have yielded upwards of 400 species in the Ottawa Palæozoic Basin. The following represent some of the more conspicuous and characteristic fossils of the Trenton as developed in this basin:—*Licrrophyrus Ottawaensis*, Billings, *L. minor*, Bill., *Palæophycus obscurus*, Bill., are the most conspicuous fossil ALGÆ; *Astylospongia parvula*, Billings, *Steliella Billingsi*, Hinde, *S. crassa*, Hinde, *Pasceolus globosus*, Bill., *Receptaculites lowensis*, Bill., represent the PROTOZOA; a *Climacograptus* resembling *C. typicalis*, Hall, and a *Dictyonema*, probably a new species, together with *Diplograptus amplexicaualis*, Hall, include the Graptolites common to the Trenton; whereas the POLYPT or Corals are represented by *Palæophyllum divaricans*, Nicholson, *Streptelasma cornicubum*, Hall, *Protarea vetusta*, Hall, *Petraia Ottawaensis*, Billings, and a species of *Columnaria* as yet undescribed.

The ECHINODERMATA are of special interest, and abound in the more shaly and thin-bedded portions of the Lower Trenton of Hull and Ottawa. The Crinoidea include the following:—*Archæocrinus lacunosus*, Bill., *A. marginatus*, B., *A. microbasalis*, Bill., *A. pyriformis*, B., *Calceocrinus*

¹Trans. Ottawa Field Nat. Club, vol. 2, No. II., 1885, p. 260.

articulosus, B., *C. inaequalis*, B., *Cleioerinus magnificus*, B., *C. regius*, B., *Dendroerinus gregarius*, B., *D. humilis*, B., *D. proboscidiatus*, B., *D. rusticus*, B., *D. similis*, Bill., *Glyptocrinus purreus*, Bill., *G. quinquepartitus*, Bill., *G. ramulosus*, Bill., *Heterocrinus Canadensis*, Bill., *H. tenuis*, B., *Hybocrinus conicus*, Bill., *H. tumidus*, Bill., *Iocrinus subcrassus*, Meek and Worthen, *Taxocrinus elegans*, Billings, *T. levis*, Bill., *Palaeocrinus angulatus*, Bill., *P. pulchellus*, B., *P. rhombiferus*, B., *Periglyptocrinus Billingsi*, Wachsmuth, *Porocrinus conicus*, B., *Retrocrinus stellaris*, Bill.

Of the CYSTOIDEA we note the following:—*Amygdalocystites floralis*, Billings, *A. floralis*, v. *levis*, W. R. Billings, *A. radiatus*, Bill., *A. tenuistriatus*, Bill., *Atelecystites Hurleyi*, Bill., *Comarocystites punctatus*, Bill., *Glyptocystites multiporus*, B., *Lichenocrinus crateriformis*, Hall, *Pleurocystites elegans*, B., *P. filitectus*, B., *L. squamosus*, B., and *L. filitectus*, Bill.

The ASTEROIDEA comprise:—*Agelacrinites Billingsi*, Chapman, *A. Dicksoni*, Bill., *Cycloastoïdes Halli*, Bill., *Edrioaster Bigsbyi*, Bill., *Palasterina stellata*, Bill., *Petraster rigidus*, Bill., *Stenaster pulchellus*, B., *S. Salleri*, Bill., *Taniaster cylindricus*, Bill.

The BRYOZOA are very abundant and comprise, probably, not less than 100 species. Of these some fifty have already been identified and recorded, and amongst others include:—*Amplexopora discoidea*, James sp., *Arthroclema pulchellum*, Bill., *Asteroporites Ottawænsis*, Lambe, *Batosstoma Ottawænsis*, Foord, *Constellarina florida*, v. *plana*, Ulrich, *C. antheloidea*, Hall, *Diplotrypa regularis*, Foord, *D. Whitcressii*, Nicholson, *Heterotrypa solitaria*, Ulrich, *Homotrypa similis*, Foord, *Monctypella Trentonensis*, Nich., *Monticulipora Billingsi*, Foord, *M. Westoni*, Foord, *M. parasitica*, Ulrich, *Prasopora Schwydi*, Nich., *P. affinis*, Foord, *P. oculata*, Foord, *Pachydictya acuta*, Hall, *Ptilodictya falciformis*, Nicholson, *P. parvonia*, d'Orbigny, *Escharopora Trentonensis*, Hall, *Spatiopora areolata*, Foord, *Rhinodictya paupera*, Ulrich, *Solenopora compacta*, Billings.

BRACHIOPODA. These, for the most part very minute fossil remains, are very abundant throughout the Trenton formation, and besides the three eminently characteristic as well as prolific forms, viz.:—*Orthis (Dalmanella) testudinaria*, Dalman, *Leptæna (Plectambonites) sericea*, Sowerby, and *Strophomena (Rafinesquina) alternata*, Conrad, we have the following forms of brachiopoda noticed and identified from various localities in the Ottawa Paleozoic Basin:—*Orbiculoidea lamellose*, Hall, (= *Discina Cree*, Billings), *Schizotreta Pelopæ*, Billings sp., *Lingula Philomela*, Billings, *L. (Glossina) riciniiformis*, Hall, *L. attenuata*, Hall, *Trematis Ottawænsis*, Billings, *Pholidops subtruncatus*, Hall, *Rafinesquina deltoidea*, Con., *Strophomena plumbona*, Billings, *S. Thaliæ*, Billings, *Stroph. Billingsi*, W. & S. (= *S. recta*, Bill.), *Skenidium Merope*, Billings, *Orthis (Plesiomys) Iphigenia*, Bill., *Orthis (Plesiomys) subquadrata*, Hall, *Orthis (Hebertella) occidentalis*, Hall, *O. (H.) Laurentina*,

Bill., *O. (H.) insculpta*, Hall, *O. (Dinorthis) pectinella*, Emmons. *Parastrophia hemiplicata*, Hall, *Cyclospira bisulcata*, Emmons, sp., *Clitambonites diversa*, Shaler, *Rhynchotrema iniquicaltris*, Castelnau, *Zygospira recurvirostra*, Hall.

The LAMELLIBRANCHIATA are not very abundant in our Trenton formation in the Ottawa Valley, but deserve more careful study and attention than has been given to them heretofore. The following are some of the better-known species:—*Ambonychia amygdalina*, Hall, *Modiolopsis (Endodesma) Gesneri*, Billings sp., *Goniophora carinata*, Bill. sp., *Proboscilla Trentonensis*, Conrad, *Otenolonta gibbosa*, Hall, *C. lerata*, Hall.

Of the PTEROPODA we have two species of which *Conularia Trentonensis*, Hall, is the more abundant and characteristic.

The GASPEROPODA are eminently characteristic, and abound at certain horizons in this formation. *Cyrtoneura Montrealeuse*, Billings, *C. billi*, Hall, abound in the lower Trenton of Hull, Que., whereas *Marchisonia (Hormotoma) bellicincta*, Hall sp., *Eccylopterus Ottawaensis*, Billings, *Subulites (Fusispira) Richardsoni*, Billings, *S. (Fusispira) subfusiformis*, Hall, occur more abundantly in the upper measures of the Trenton. *Bucania (Tetranota) bidorsata*, Hall, *Bucania sulcatina*, Emm., *Eccylomphalus Trentonensis*, Conrad sp., *Pleurotomaria (Liospira) Progne*, Billings, and *Trochonema umbilicatum*, Hall, are also found everywhere in the Trenton.

The CEPHALOPODA include:—*Orthoceras Ottawaense*, Billings, *O. Xiphis*, Bill., *O. Python*, Bill., *O. vulgatum*, B., these are eminently characteristic species of this Ottawa Valley, and occur associated with the ubiquitous *Cameroceras proteiforme*, Hall, and *Orthoceras amplicameratum*, Hall.

VERMES are represented by *Conchicolites flexuosus*, Hall, *Serpulites dissolutus*, Billings, and several obscure conodonts abound in a certain band of limestone in Hull.

TRILOBITA. From the Ottawa Trenton beds was found the first trilobite which showed calcified arches or supports for limbs, and in 1861 Mr. Billings drew the attention of the geological world of that day to the fact. *Isotelus gigas*, deKay (= *Asaphus platycephalus*, Stokes), is eminently characteristic of the Trenton of the Ottawa Palaeozoic Basin, as elsewhere, and with its contemporary, *Calymmene senaria*, Conrad, were rivals as far as numbers are concerned.

Other species of trilobites in the Trenton of the Ottawa Palaeozoic Basin were:—*Bronteus lunatus*, Billings, *Ceraurus pleurexanthemus*, Green, *Dalmanites Achates*, Billings, *D. Bebryx*, Bill., *Pterygometopus callicephalus*, Green, *Enerinurus vigilans*, Hall, *Harpina Ottawaensis*, Bill., *H. Dentoni*, Billings, *Ilænus Americanus*, Billings, *I. Milleri*, Billings, *I. Trentonensis*, Emmons, *Proëtus parriusculus*, Hall, besides numerous Ostracoda which require further study.

THE UTICA FORMATION.

Stephanella sancta, Hinde, characterizes the Middle Utica of the Ottawa Valley, and represents the PROTOZOA.

A few GRAPTOLITES occur in this formation, prominent amongst which are:—*Leptograptus flaccidus*, Hall, *Orthograptus quadrimeronatus*, Hall, *Cimacograptus*, like *C. typicalis*, H., and a *Diplograptus*, usually referred to *D. pristis*, Hisinger, possibly also *D. Putillus*, H.

BRACHIPODA abound in the lower measures of this formation.

Leptobolus insignis, Hall, *Schizambon fissus*, var., *Canadensis*, Ami. *Lingula Proque*, Billings, *Schizocrania filosa*, Hall, are eminently characteristic of the Utica shales and associated limestones. Besides these, *Dalmanella testudinaria*, Dalman, *Rafinesquina alternata*, Emmons, and *R. deltoidea*, Conrad, together with *Plectambonites sericea*, Sowerby, *Lingula elongata*, Hall, *L. Cobourgensis*, F., *L. quadrata*, Eichwald, are also found at this horizon in the Ordovician System.

The LAMELLIBRANCHIATA are represented here by *Tyrodosma pulchellum*, Hall, *Orthodesma parallelum*, Hall, *Pterinea insueta*, Conrad, *Prolobella Trentonensis*, Conrad, and *Modiolopsis modiolaris*, Hall, besides other rarer and less characteristic species.

The PTEROPODA yield two species:—*Conularia Trentonensis*, Hall, and *C. Hudsonia*, Emmons.

Of the GASTEROPODA the following have been recorded from the Utica of this basin:—*Bellerophon bilobatus*, Sowerby, rather abundant, *Clathrospira*, Hall, less frequent, *Trocholites ammonius*, Conrad, most abundant, and *Lophospira bicincta*, Hall, rarely found.

The class CEPHALOPODA have afforded innumerable shells of the genus *Cameroceras*, probably *C. proteiforme*, Hall, *Orthoceras tennis-triatum*, Hall, *Orthoceras amplicameratum*, Hall, *O. lamellosum*, Hall, etc.

The class ANNELIDA is represented by *Serpulites dissolutus*, Bill., and a pretty little Conodont as yet undescribed.

The class TRILOBITA has yielded the following species:—*Triarthrus Becki*, Green, *T. spinosus*, Bill., *T. glaber*, B., *Ceraurus pleuracanthemus*, Green, *Asaphus latimarginatus*, Hall (= *A. Canadensis*, Chapman), and *Calymmene senaria*, Conrad.

SILURIAN.

The Lake Temiscaming outlier of the Ottawa Palæozoic Basin consists for the most part of Silurian rocks. From collections made by the Geological Survey of Canada previous to 1863, and from collections made by Dr. Bell in 1887 and by Mr. A. E. Barlow in the years 1893

and 1894, both Cambro-Silurian (Ordovician)¹ and Silurian rocks were found to occur, as characterized by the fossil organic remains of these two distinct systems.

The *Silurian* fossils are exceedingly numerous, and for the most part well preserved and silicified.

The most abundant species are the chain coral *Hyalysites catenulatus*, Linneus, the stromatoporoid *Clathrodictyum fastigiatum*, Nicholson, and the honey-comb coral, *Favosites Gothlandicus*, Lamarek. *Syringopora verticillata*, Goldfuss, is comparatively abundant, so also is *Zaphrentis Stokesi*, Edwards and Haime. Besides these, Mr. Lambe has recognized *Alveolites Niagaraensis*, Rominger, *Limaria (Canites) crassa*, Rominger, *Lyellia Americana*, Edwards and Haime, and *Heliolites affinis*, Billings.

The CRINOIDEA are not numerous, but require further study, but appear to be referable to the genera *Thysanocrinus*, *Tuocrinus* and *Deudrocrinus*.

Of the BRYOZOA, *Lichenalia concentrica*, Hall, *Phaeopora expansa*, Hall, both appear to be represented.

The Brachiopoda are very numerous, especially such forms as *Atrypa reticularis*, Linneus, and *Pentamerus oblongus*, Sowerby.

The GASTEROPODA are mostly referable to the genera *Loxonema*, *Marchisonia* and *Euomphalus*, whilst the CEPHALOPODA are represented by *Discosorus conoides*, Hall, *Orthoceras*, cf. *O. Cadmus*, Billings, *Actinoceras vertebratum*, Hall, cf. *A. Becki*, Stokes, and *Orthoceras virgulatum*, Hall.

The TRILOBITA are represented by a single species, the *Calymene Blumenbachii*, Brongniart, which is probably identical with *Calymene Niagaraensis*, Hall, or *C. tuberculata* of European writers.

¹ So far, the Ordovician fossils from this outlier were not found in place, but indicate conclusively that species of Trenton or Bird's Eye and Black River age occur in the loose angular blocks of limestone examined, as noted by Sir Wm. Logan and Mr. A. E. Barlow. The following are the species recorded:—*Rafinesquina alternata*, Emmons, *Maclurea* cf. *M. magna*, Lesueur, *M. Atlantica*, Billings, *Gonioceeras anceps*, Hall, and *Cameroceeras proteiforme*, Hall. As remarked in the Geol. of Canada, 1883, p. 335, "the source of these fragments has not yet been ascertained."

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