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George Frederic Matthew's Contribution to Precambrian Paleobiology

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Article abstract

George Frederic Matthews description of the Precambrian stromatolite Archaeozoon acadiense, one of the first authentic, documented Precambrian fossils, is perhaps the most overlooked of his many accomplishments. It was the first Precambrian stromatolite to receivea Linnéan name and may have been the first photographed for a scientific publication. Matthew's contribution is recognized by experts in the field and inspecialized literature about stromatolites.However, it is rarely mentioned in the popular history of the search for Precambrian life which generally includes stories of Dawson's Eozooncanadense, and Walcott's Cryptozoon andChuaria. Although the American geologist Charles Doolittle Walcott is viewed as the founder of Precambrian paleobiology, Matthew deservesacknowledgment for his early recognition of Precambrian life. A well-known figure among specialists, Matthew never attained the status ofsome of his peers and is generally not known as an important Canadian geoscientist. Employed as a customs agent and not as a paleontologist, he was never able to pursue any single field of paleontology with the resources available to his colleagues.

Matthew described Archaeozoon acadiense in the Bulletin of the Natural History Society of New Brunswick. While the Bulletin had reasonable circulation among geoscientists in Matthew's day, it ceased publication in1917 and is rarely seen. Perhaps his choice of a journal to report the stromatolite contributed to his work not being widely acknowledged.

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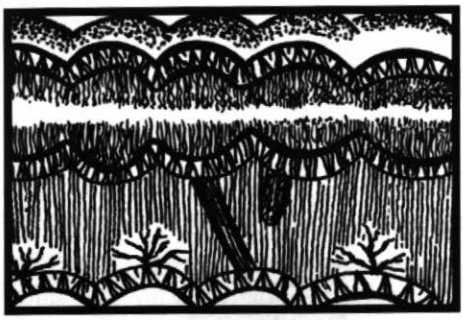

George Frederic Matthew's Contribution to Precambrian Paleobiology

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SUMMARY

George Frederic Matthew's description of the Precambrian stromatolite *Archaeozoon acadiense*, one of the first authentic, documented Precambrian fossils, is perhaps the most overlooked of his many accomplishments. It was the first Precambrian stromatolite to receive a Linnéan name and may have been the first photographed for a scientific publication. Matthew's contribution is recognized by experts in the field and in specialized literature about stromatolites. However, it is rarely mentioned in the popular history of the search for Precambrian life which generally includes stories of Dawson's Eozoon canadense, and Walcott's *Cryptozoon* and *Chuaria*. Although the American geologist Charles Doolittle Walcott is viewed as the founder of Precambrian paleobiology, Matthew deserves acknowledgment for his early recognition of Precambrian life. A well-known figure among specialists, Matthew never attained the status of some of his peers and is generally not known as an important Canadian geoscientist. Employed as a customs agent and not as a paleontologist, he was never able to pursue any single field of paleontology with the resources available to his colleagues.

Matthew described *Archaeozoon acadiense* in the Bulletin of the Natural History Society of New Brunswick. While the Bulletin had reasonable circulation among geoscientists in Matthew's day, it ceased publication in 1917 and is rarely seen. Perhaps his choice of a journal to report the stromatolite contributed to his work not being widely acknowledged.

RÉSUMÉ

La description du stromatolithe précambrien *Archaeozoon acadiense*, l'un des premiers fossiles précambriens documentés faite par George Frederic Matthew, est peut-être la plus méconnue de ces nombreuses réalisations. Ce fut le premier stromatolithe à être désigné d'un nom linnéen, et possiblement le premier dont une photographie a été présentée dans une publication scientifique. L'oeuvre de Matthew est bien connue des experts de la spécialité et bien présente dans la littérature traitant des stromatolithes. Cependant, on en fait rarement mention dans la documentation générale traitant des recherches sur la vie précambrienne et qui traitent généralement *l'Eozoon canadense* de Dawson ainsi que du *Cryptozoon* et de la *Chuaria* de Walcott. Quoique que l'on considère généralement le géologue étasunien Charles Doolittle Walcott comme le fondateur de la paléobiologie précambrienne, Matthew mérite d'être reconnu pour sa découverte précoce de la vie précambrienne. Bien qu'il soit bien connu chez les spécialistes, le renom de Matthew n'a jamais atteint celui de ces pairs et son nom n'apparaît pas dans la liste des géologues canadiens importants. Employé au titre d'agent des douanes, et non comme paléontologue, il n'a jamais eu l'occasion comme ses collègues paléontologues qui en avaient les moyens, de se consacrer sérieusement à quelque recherche paléontologique.

Matthew a décrit *Archaeozoon acadiense* dans le *Bulletin of the Natural History Society of New Brunswick*. Bien que ce bulletin ait eu une diffusion appréciable dans le milieu des géologues de l'époque de Matthew, sa publication a cessé en 1917 et il est rarement mentionné. Le médium de diffusion qu'il a choisi est peut-être l'un des facteurs expliquant la méconnaissance de son oeuvre.

INTRODUCTION

The Eozoon canadense controversy (Hofmann, 1982; Schopf, 1999) was still being debated, when, in an 1891 address to the Natural History Society of New Brunswick in Saint John (Matthew, 1890a), George Frederic Matthew (Fig. 1) proposed that structures he observed in the limestone of Saint John, New Brunswick provided yet more evidence of Precambrian life. Matthew, a friend and colleague of J.W. Dawson and C.D. Walcott, was no stranger to the debate. He had spent much of the previous decade describing some of the earliest Cambrian fossils (Miller, 1988), and he was among the first to recognize the nature of a small shelly fossil horizon at the base of the Cambrian (Matthew, 1899; Conway Morris, 1988). In the years before Matthew described his first Precambrian fossils, he had sent

J.W. Dawson samples of limestone containing possible Eozoon from the south side of Lily Lake in Saint John. In 1891 Dawson sent Matthew reference samples of Eozoon canadense, now in the collection of the New Brunswick Museum.

In his 1891 'President's Annual Address' to the Natural History Society of New Brunswick, Matthew began his discussion of Precambrian life with "*I would now ask your attention to another point of local geology which it appears to me fitting to bring first before this society, as the foster-mother of scientific investigation in our community*" (Matthew, 1890a, p. 28). With these words he introduced Society members to state-of-the-art Precambrian paleontology. In his lecture, and the publications that followed, Matthew was to describe and photograph the first authentic, Precambrian fossil (Cloud, 1983; Hofmann and Schopf, 1983) and the first Precambrian stromatolite to receive a Linnéan name (Hofmann, 1974, 1976). Matthew titled the second part of his address to the society 'On the existence of organisms in the pre-Cambrian rocks'. Cloud (1983, p. 16) described Matthew's paper as noteworthy "for the then-revolutionary concept expressed in his title". Before his presidential address left the cutting edge of science and moved on to other matters Matthew said to his audience: "*Lest I should weary you with the details of a subject which probably interests only a limited number, I now pass to another matter...*". One wonders if Society members knew they were on the leading edge of an exciting new field of science. Most likely they did. With lecturers and members like George Matthew, Loring Bailey (University of New Brunswick natural history professor), Robert Chalmers (Geological Survey of Canada geologist), and William Ganong (geographer, naturalist and botany professor at Smith College, Massachusetts) to name a few, meetings of the Natural History Society of New Brunswick must have been fascinating. Society members considered a wide range of topics. Shortly after Matthew informed his audience of the nature of Precambrian fossils, another lecturer, W.B. McVey, presented a talk on the 'Chemistry of the Six Days of Creation' (Bulletin of the Natural History Society of New Brunswick, vol. X, p. ix, 1892).

Figure 1 George Frederic Matthew, circa 1870, about the time he first saw the stromatolites while mapping with Loring Bailey.

THE DISCOVERY OF *ARCHAEOZOON ACADIENSE*

Loring Bailey and George Matthew observed the structures later described as *Archaeozoon acadiense* in 1870 or 1871 (Bailey and Matthew, 1872) (Table 1) while mapping the geology of southern New Brunswick (Hofmann, 1974). They described them in a section of the report titled 'Details of the Laurentian System', so the age of the rocks was known to them. In writing about the west side of the 'Narrows' along the Saint John River west of Swift Point and Deadman's Cove (Fig. 2), they described how "*At the Green Head quarry appear the dark grey limestones of the section, exposing a vertical wall of 100 feet. A short distance around and beyond that point, which forms the upper end of the Narrows on this side, are beds of limestone exposing, over a surface of nearly ten feet square, large numbers of concentric nodular masses, bearing much resemblance to some genera of corals, but apparently destitute of organic structure, and probably concretionary.*" (Bailey and Matthew, 1872, p. 39). This description suggests they probably saw the easternmost outcrop of the stromatolitic unit on Green Head Island where it outcrops on the west side of Green Head Cove (Fig. 2). A small exposure of *Archaeozoon acadiense* can still be seen here along the shore just west of Green Head Cove, as unconvincing today as it was in the 1870s.

Based on their 1872 description, Bailey and Matthew certainly did not see the better exposure, now the *Archaeozoon acadiense* type locality, on the west side of Green Head Island (Fig. 2, 3) that Matthew (1890b) later described. Had they gone a little farther along the shore and seen the better exposure perhaps Bailey and Matthew would have come to a different conclusion and changed the study of Precambrian paleontology. Unfortunately, while they recognized the resemblance of the structures to corals, they were unable to make the leap to confirming the structures as having an organic origin. To be fair, remember that Eozoon canadense had only been named in 1865 (Dawson, 1865) and the term stromatolite did not come into use until 1908 (Kalkowsky, 1908). Charles Doolittle Walcott had found organic remains in Precambrian rocks in 1883 (Walcott, 1883), but did not complete his identification or confirm their age until 1899 (Walcott, 1899).

It is interesting that it was twenty years before Matthew reexamined the structures at Green Head (Fig. 4) and recognized them as organic in origin. Why did he not go back to look at the only structures he had seen in Laurentian rocks that might have had an organic origin? Matthew would have been well aware of the Eozoon canadense debate and questions surrounding the search for Precambrian life. In 1907 Matthew referred to the 1890 publications (Matthew 1890b, c) as having resulted from "*examples* [of *Archaeozoon*] *of which had then lately been brought to the writer's attention*"

Table 1 Time line of Matthew's stromatolite studies

fossils' reported, 1872	by L.W. Bailey and G.F. Matthew in GSC Report "large numbers of concentric nodular masses, bearing much resemblance to some genera of corals, but apparently destitute of organic structure, and probably concretionary", likely from Green Head Cove during 1870-71 fieldwork
specimens found, 1890	Wm. Murdoch brings fragments to the attention of G.F. Matthew
donated June 17, 1890	Donated to the NHS of NB museum by Wm. Murdoch, C.E. - Slab of marble, composed of crowded fossils (*Archaeozoon*). Green Head, St. John Co. (Bulletin of the Natural History Society of New Brunswick, vol. X, p. iv, 1892) (NBMG 3200)
site visit, 1890	field verification of fossil site by G.F. Matthew and description of *Archaeozoon* type locality on west side of Green Head Island
read Oct 7, 1890	Eozoon and other low organisms in Laurentian rocks at St. John (read before the Natural History Society of New Brunswick)
read Nov 3, 1890	On the occurrence of sponges in Laurentian rocks at St. John, N.B. (published by, but not read to the Natural History Society of New Brunswick)
read Dec 23, 1890	Supplementary note to article I. (published by, but not read to the Natural History Society of New Brunswick)
read January 1891*	President's annual address. 1. Introduction. 2. On the paleozoic Insects. 3. On the existence of organisms in the pre-Cambrian rocks. (read before the Natural History Society of New Brunswick)
publication, 1891	Matthew's descriptions of *Archaeozoon* published in the 1890 Bulletin of the Natural History Society of New Brunswick, No. 9
specimens found 1892	W.D. Matthew discovered another locality on the east side of the 'Narrows' (New Brunswick Museum, NBMG 3838, 3839)
specimens found 1893	G. Stead discovered another locality on Douglas Avenue
donated June 1893	Donated to the NAS of NB museums by Geoffrey Stead, Esq. - *Archaeozoon acadiense*, three specimens from Douglas Road, St. John, N.B. (New Brunswick Museum, NBMG 3840, 3841)
read Dec 4, 1906	Note on *Archaeozoon* (read before the Natural History Society of New Brunswick)
publication, 1907	Matthew's note about *Archaeozoon* published in the 1907 Bulletin of the Natural History Society of New Brunswick, No. 25.
publication, 1919	Bailey and Matthew, in their last paper written together, discuss the organic nature of *Archaeozoon acadiense* in the Transactions of the Royal Society of Canada

*published in Bulletin of the Natural History Society of New Brunswick No. 9, p. 25-35. Likely presented before the Society in early 1891 (see Matthew's 1907 paper where he says address was made in 1891) with the other papers 'read' during the previous year at society meetings Oct. 7, Nov. 3 and Dec. 23, 1890. Printed with the 'Address' in 1891.

(Matthew, 1907, p. 547). As Matthew described, he first became interested in samples brought to him for identification. He wrote, "*Some months since the attention of the writer of this communication was called by Mr. Wm. Murdoch, C.E., of St. John, to the appearance of some fragments of crystalline limestone which were thought to be pieces of petrified wood. The fragments had been broken from ledges at a locality ('Green Head') in the Upper Series of the Laurentian area (of rocks) near St. John, N.B.*" (Matthew, 1890b, p. 38). A large slab of *Archaeozoon acadiense* (Fig. 5) was donated to the Natural History Society of New Brunswick on June 17, 1890 by William Murdoch. Matthew soon visited the site and "*The visit resulted in the discovery of an extensive reef of limestone, in which immense numbers of these peculiar fossils are preserved in remarkably perfect condition.*" (Matthew, 1890b, p. 38). At this time he certainly saw the section on the west side of Green Head Island (Fig. 3) as he described "*This reef of calcareous columns was about one hundred and fifty feet deep,...*" (Matthew, 1890b, p. 39). Not only was this significantly greater than the "*ten feet square*" (Bailey and Matthew, 1872, p. 39) he had seen before, he reported the specimens of Murdoch "*had apparently a concretionary structure, but differed from any concretionary limestone the writer had seen before.*" (Matthew, 1890b, p. 38).

Apparently, Matthew did not initiate a renewed search for the structures he had seen in the 1870s; it seems as though he had forgotten about them entirely. Once the significance of the structures was recognized, additional discoveries followed. In 1892 George Matthew's son, William Diller Matthew, discovered another locality on the east side of the 'Narrows' while mapping in Saint John. The next year Geoffrey Stead, another member of the Natural History Society of New Brunswick, found specimens on Douglas Avenue, a main street of Saint John (Matthew, 1907; Hofmann, 1974).

An interesting footnote to this story concerns the description of the structures in the Bailey and Matthew

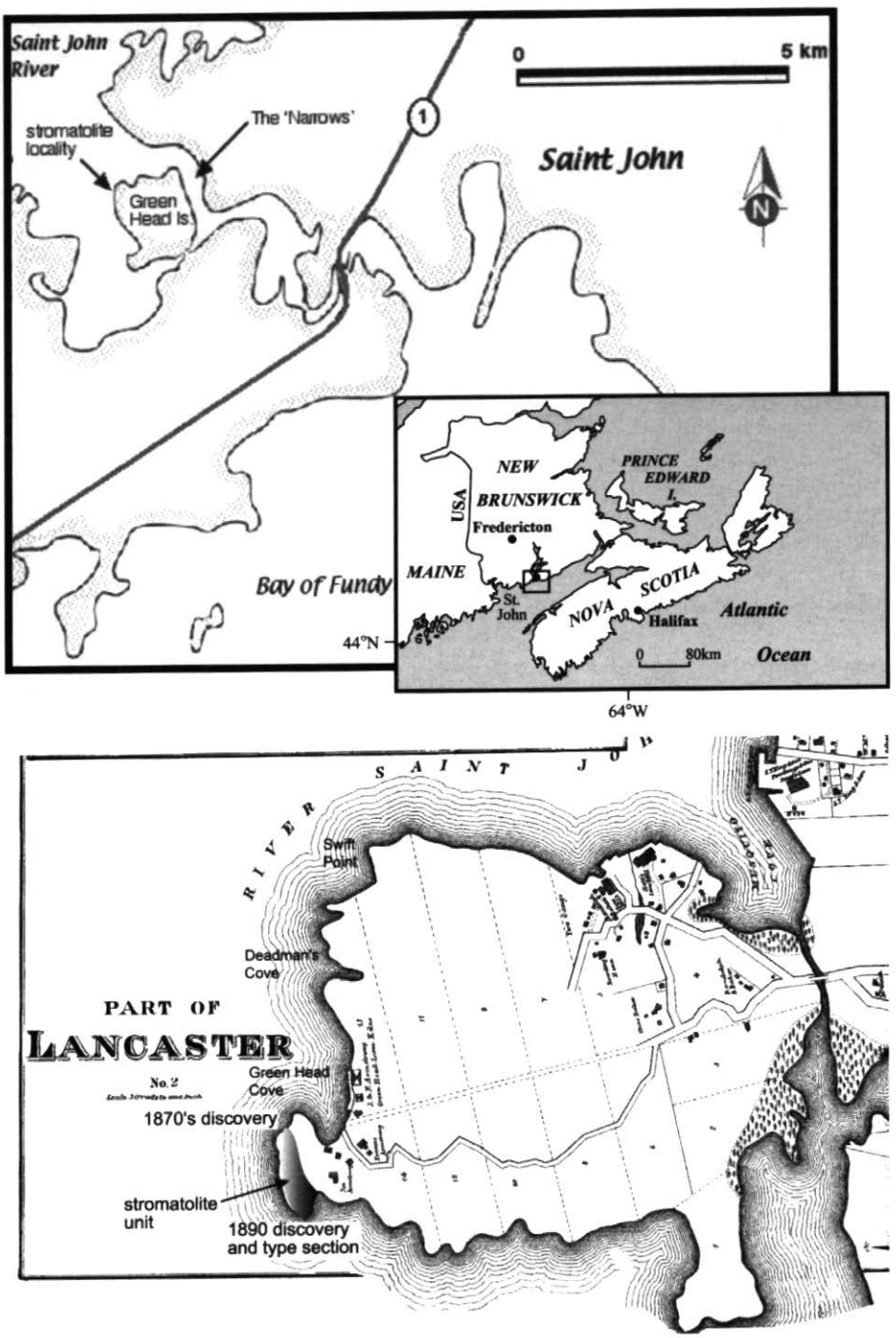

Figure 2 Location of Green Head Island, Saint John, New Brunswick with an annotated map of Green Head Island from 1875, showing active quarries, and stromatolite outcrop at Green Head Cove (from Roe and Colby, 1875). North to the left on annotated map.

(1872) report and William Francis Ganong, a noted geographer, botanist, naturalist, and member of the Natural History Society of New Brunswick (Clayden, 1991). In the 'Ganong Library' of the New Brunswick Museum Archives, W.F. Ganong's copy of the Bailey and Matthew (1872) report is dated by Ganong as belonging to him in February 1884. In the margin beside the description of the "*concentric nodular masses....*" is penciled 'Eozoon?' This was probably written by Ganong, likely sometime between 1884 when he acquired the copy and 1890. By 1890 Ganong would have known about Matthew's identification of the structures as *Archaeozoon acadiense*, in as much as he published the paper immediately following Matthew's in the same 1890 Bulletin. Perhaps Ganong read the report by Bailey and Matthew and concluded that the structures were related to Eozoon before Matthew was shown the fossil by Mr. Murdoch in 1890.

THE NAMING OF *ARCHAEOZOON ACADIENSE*

Hofmann (1974) credited Matthew with describing the first Precambrian stromatolite to receive a Linnéan name and as having described one of the first authentic, documented Precambrian fossils. Unfortunately Matthew's naming of the fossil is a bit confusing. Hofmann (1974) correctly recorded that the first printed reference to the fossil, as a footnote in the 'President's Annual Address' to the Natural History Society of New Brunswick, placed it in the genus Eozoon ("*Described further on as Eozoon Acadiense*", Matthew, 1890a, p. 32). In print this occurs before he provides the formal description of *Archaeozoon acadiense* later in the same volume as the 'Supplementary Note to Article I' (Matthew, 1890c, p. 67). Interestingly, numerous copies of the Bulletin belonging to the Society and inherited by the New Brunswick Museum have all had the above mentioned footnote edited by hand to read "*Described further on as Archae ~~Eozoon~~ Acadiense*". The name Eozoon acadiense was possibly a lapse on Matthew's part or a typographical error. Even though the presidential address was printed in the 1890 issue of the Bulletin (Matthew 1890a), it was likely read before Society members in mid-January 1891. It was the custom for the Society President to deliver the annual address in the middle of January to summarize the previous year's work. The 1890 issue of the Society bulletin must have been printed early in 1891 following Matthew's address. In the address he refers to the last article in the 1890 volume which is dated as read December 23, 1890 (Matthew 1890c). It is doubtful Matthew would have called the new fossil '*Eozoon acadiense*' in the January 1891 address since he

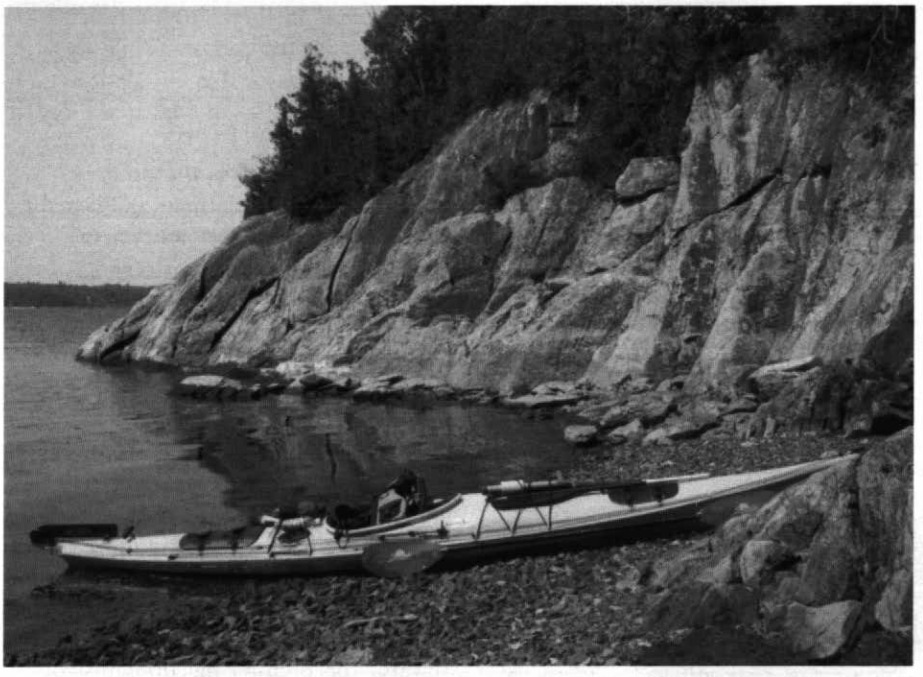

Figure 3 Type locality for *Archaeozoon acadiense* Matthew in the Green Head Group, Green Head Island, Saint John, New Brunswick. Outcrop composed of crowded fossils of *A. acadiense* Matthew. Photographed in July, 2002. Kayak length 4.4 m.

Figure 4 *Archaeozoon acadiense* Matthew at the type locality, Green Head Group, Green Head Island, Saint John, New Brunswick. Compass length 10 cm.

had already read the paper formally naming the fossil *Archaeozoon acadiense* the previous year in December of 1890. In spite of how it looks, Matthew probably never intended to place the fossil into the genus Eozoon.

Not all of Matthew's attempts to describe Precambrian fossils were successful. In the same volume following his printed address, Matthew described three Precambrian organisms (Matthew, 1890b, c, d). Of the three fossils described in the 1890 papers, only *Archaeozoon acadiense* has withstood scrutiny. Sponge fossils, *Halichondrites graphitiferus* and *Cyathospongia eozoica* (Matthew, 1890d) have turned out to have inorganic origins (Miller, 1987, 1990). Although the three papers (Table 1) are listed as 'read' before the society, only the Oct 7, 1890 paper 'Eozoon and other low organisms in Laurentian rocks at St. John' appears to actually have been publicly presented to society members (Appendix for Bulletin No. X, 1892, p. i).

REACTION TO MATTHEW'S DISCOVERY

"*The constant recession of the beginning of life to lower and lower horizons, is like the constant retreat of the rainbow before the boy who follows it in the hope of finding the promised pot of gold*" (Anonymous, 1892, p. 53). This is how the editors of 'American Geologist' summed up the search for Precambrian life as they began a review of Matthew's new discovery. In spite of this fanciful metaphor for Precambrian paleontology the editors concluded "*The importance and interest of these venerable fossils it is difficult to overestimate.*" and "*We can no longer say that Eozoon stands alone a solitary relic, and scepticism on this ground has no longer any logical standing-place.*" (Anonymous, 1892, p. 55). Obvious supporters of Eozoon canadense, the editors of 'American Geologist' seemed pleased to embrace the importance of Matthew's new Precambrian fossils. Even so, Matthew thought the editors may have doubted the age of *Archaeozoon acadiense* and he quickly responded with a reply (Matthew, 1892) to confirm the rocks were indeed Precambrian.

Precambrian paleobiology moved along slowly following Matthew's description of *Archaeozoon acadiense*. Although the debate over Eozoon canadense was put to rest in 1894 with the discovery of Eozoon structures in young volcanic rocks, Eozoon only truly died with Sir William Dawson in 1899. Shortly before his death Dawson (1897) reviewed the status of *Cryptozoon* and other fossils. He referred to Matthew's *Archaeozoon* as a Precambrian fossil, and the oldest known of its type. As noted by Hofmann (1971), Dawson believed *Archaeozoon* was possibly another giant foraminifer, like Eozoon.

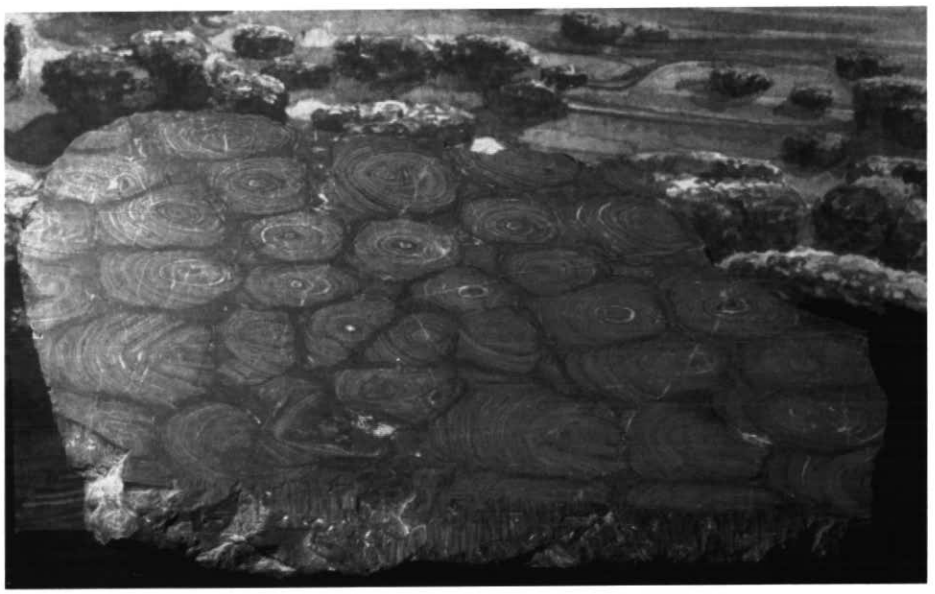

Figure 5 New Brunswick Museum specimen (NBMG 3200) of *Archaeozoon acadiense* Matthew. Donated to the Natural History Society of New Brunswick, June 17, 1890 by Wm. Murdoch, C.E., with the published notation "Slab of marble, composed of crowded fossils (*Archaeozoon*). Green Head, St. John Co." Slab 124 cm wide.

C.D. Walcott, the father of Precambrian paleobiology (Schopf, 1999) noted fossils in the Precambrian strata of the Grand Canyon in 1883 (Walcott, 1883), but it was 1886 before he would place the rocks in the Precambrian (Walcott, 1886). Not until 1899, the same year Dawson died and nine years after Matthew's description of *Archaeozoon acadiense*, did he publish his first convincing evidence of Precambrian fossils (Walcott, 1899). Walcott initially placed the Grand Canyon fossils in the Cambrian (Walcott, 1883). His first description of the fossils, including "*an obscure Stromatopora-like group of forms*" (Walcott, 1883, p. 441) is reminiscent of the 1872 Bailey and Matthew report where they could only recognize in the structures a "*resemblance to some genera of corals*" (Bailey and Matthew, 1872, p. 39). Neither Bailey and Matthew nor Walcott seemed too certain of the fossil evidence. Walcott later recalled he recognized some of the fossils as resembling *Cryptozoon*, "*When collecting material in the Chuar terrane in 1883 I was strongly impressed with their resemblance to the forms occurring in the Upper Cambrian rocks of Saratoga county, New York, which Professor James Hall subsequently described as Cryptozoon proliferum*" (Walcott, 1899, p. 234). Even though Walcott had likely seen *Cryptozoon proliferum* while working for Hall, he did not provide a description of the Grand Canyon fossils and confirm their Precambrian age until 1899 (Walcott, 1899). According to Yochelson (1998, p. 354) "*One result of the 1899 paper was that this Grand Canyon material became the first authentic Precambrian fossil to be generally accepted*".

Whatever happened to *Archaeozoon acadiense*? Matthew may have wondered also. Although it took him a while, Matthew eventually wrote another paper about *Archaeozoon acadiense* (Matthew, 1907) prompted by Walcott's publication of Precambrian fossils in the Bulletin of the Geological Society of America (Walcott, 1906). In his 1907 paper Matthew provided additional photographs of *Archaeozoon acadiense* and additional localities found by his son William and Geoffrey Stead (Table 1). Again Matthew chose the Bulletin of the Natural History Society of New Brunswick to report *Archaeozoon acadiense*. Perhaps he did this because, as has he said in his lecture concerning the discovery, that he should bring his discovery first to the Society, "*as the foster-mother of scientific investigation*" in the community (Matthew, 1890a, p. 28). While the Bulletin had reasonable circulation among geoscientists in Matthew's day, it ceased publication in 1917 and was never as prestigious as the other journals in which Matthew published. Had he chosen another journal to report his findings *Archaeozoon acadiense* and Matthew's contribution to Precambrian paleobiology might have been better known.

By 1914 Walcott understood the microbial origin of *Cryptozoon*-like structures. He was the first to interpret *Archaeozoon acadiense* as having a microbial origin (Walcott, 1914), although he had yet to examine specimens for himself. (The 1901 date for Matthew's paper in Walcott's synonymy is incorrect). Albert Charles Seward, the premier paleobotanist of the early 1900s did not think much of Walcott's interpretation of the organic nature of *Cryptozoon* (Seward, 1931; Schopf, 1983, 2000). As Schopf (2000) described, a '*Cryptozoon* controversy' erupted and lasted for decades. Of course, Walcott was correct and his insight and persistence earned him the honour of being the founder of Precambrian paleobiology.

The story of Matthew's contribution to Precambrian paleobiology began with Loring Bailey and George Matthew in the early 1870s, so it is fitting that it end with them also, almost fifty years after they first observed *Archaeozoon* on Green Head Island. The last paper these two old friends wrote together, published in the Transactions of the Royal Society of Canada for 1918 (Bailey and Matthew, 1919), dealt with some outstanding problems in the understanding of New Brunswick geology. Following a brief introduction they began by defending their view of the age of Precambrian rocks around Saint John, responding primarily to contrary interpretations by R.W. Ells of the Geological Survey of Canada (Ells, 1906). In defending their position they referred to evidences of life in the local Precambrian rocks. Of *Archaeozoon* they said "*The only form, however, excepting sponges, as yet met with to which an organic origin has been definitely assigned is one to which*

Matthew has given the generic name of Archaeozoon." Still sounding a little uncertain they continued "*If really organic it would seem to be of rhizopodan or foraminiferan origin...*" and "*If we admit their organic derivation still another supposition is possible, viz, that the limestones are due to the growth and accumulation of certain types of seaweeds, as is now believed to have been the case with the limestones of the Grenville series.*" They concluded on the right track stating "*The fossil alga (Newlandia) described and pictured by Walcott as found in Algonkian rocks of Montana, bears in outward appearance, great resemblance to the Archaeozoon of St. John.*" (Bailey and Matthew, 1919, p. 112-113).

Cassidy (1988) suggested the uncertainty about the organic nature of *Archaeozoon* in the Bailey and Matthew (1919) paper expressed doubts harboured by Bailey, but Matthew co-authored the paper and displayed no indication he disagreed with his friend. As Cassidy also points out, in lectures delivered in 1928 George Matthew's son, the paleontologist William Diller Matthew, was still referring to "*doubtful remains of organisms, Archaeozoon, Eozoon, and others supposed to be related to calcareous sponges or algae*" stating "*they may be merely peculiar types of concretionary formations...*" (Matthew, 1980, p. 119-120). Will Matthew was close to his father and well acquainted with his thoughts on geology (Miller, 1994). Perhaps he was reflecting upon his father's doubts.

CONCLUSION

In 1894, three decades after Dawson had first seen Eozoon canadense, the debate concerning its origin was finally put to rest (Hofmann, 1982; Schopf, 1999, 2000). Only four years before the demise of Eozoon, Matthew made his lasting contribution to the search for Precambrian life by correctly recognizing the organic origin of structures later identified as stromatolites. In the big picture *Archaeozoon acadiense* is a Neoproterozoic stromatolite, barely a billion years old, in some ways unremarkable. It remains special however as one of the first authentic, documented and named Precambrian fossils and the first Precambrian stromatolite to be formally named. Unfortunately Matthew's contribution is not part of the popular history of the search for Precambrian life. The occasional modern references to it are found in the early chapters of books about stromatolites, especially where we are reminded that the first Precambrian stromatolite to be described was discovered in Canada (Hofmann 1974; 1976).

Why is George Matthew not the founder of Precambrian paleobiology? Matthew never did attain the status of some of his peers. His lack of full-time employment as a paleontologist and his career as a customs agent (Miller 1988) meant he could not pursue any single field with the resources available to someone like Walcott. He spent most of his time working near his home in Saint John, New Brunswick. When Matthew described *Archaeozoon acadiense* he exhausted the Precambrian fossils within his reach, ending his journey into that field of study. He still had a wealth of Cambrian to Late Carboniferous fossils in his backyard. His studies of the fossil-rich Cambrian rocks of Saint John led him to become known as the Cambrian expert for Canada (Miller, 1988). His work on the Precambrian rocks near his home has also earned him a place in the search for the oldest fossils.

ACKNOWLEDGMENTS

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