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“...a small fish in a small pond....”

The Reverend W.B. Clarke (1798-1878): What did he actually do?

Michael Organ

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Introduction

During a recent discussion with a Wollongong geologist / palaeontologist who is quite knowledgeable about the Reverend W.B. Clarke, and who had himself been investigating aspects of that gentleman's work for a number of years, the question was asked: '...Yes, but what did Clarke actually do?' This rather innocuous query arose in the context of a discussion concerning Clarke's place in the history of Australian geology. It followed revelation of the substantial body of work which he published in Sydney newspapers during the 1840s and 1850s¹ - an avenue Clarke was forced to make use of due to the absence of local journals of record and problems associated with securing publication overseas.

In trying to answer the question as posed, others came to mind, such as: What significant discoveries had Clarke made during his lifetime? What were his achievements - locally, nationally and internationally? Does he deserve the title 'Father of Australian Geology'? How did he go about his work, and what influenced him to take the path he did?

As we commemorate the 200th anniversary of the birth of William Branwhite Clarke in the village of East Bergholt, Suffolk, at 6pm on Saturday, 2 June 1798, many of the aforementioned questions remain unanswered. Clarke is therefore something of an enigma, at least in the mind of this author, despite the publication of numerous books and articles on him, most notably those by Tate (1894), Warung (1895), Jervis (1948) and Grainger (1982).² Unfortunately, many of these publications are deficient either in their analysis of Clarke's work as a scientist, or in failing to adequately address the many facets of his life. This latter task is no easy matter, for W.B. Clarke was a man of many talents: poet, journalist, reviewer, traveller, explorer, minister, museum curator, magistrate, school teacher & headmaster, meteorologist, palaeontologist, naturalist, anthropologist, geologist, artist, writer and critic. He was also a husband, father and grandfather.



The Reverend W.B. Clarke c.1840³

A prolific letter writer ('he wrote too much to write brilliantly'⁴) and stirring orator - at least from the pulpit - our surviving impression of the man is largely the result of what has come down to us from his pen, and less so due to reportage of his involvement in public affairs. These sources reveal W.B. Clarke not as a great leader or brilliant scientist, but more an indefatigable worker, playing an important role in the development of organisations such as the Australian Museum, the Free Public Library of Sydney, and the Royal Society of New South Wales; all the while carrying out a large body of original research - collecting, listing, describing, corresponding, reading, and writing for publication.

Self-opinionated and self-centred, upon his arrival in Sydney in 1839 Clarke immediately focused his energies on matters geological. Any research would, of course, have to fit in with his duties as a breadwinner and cleric. These latter two areas proved a constant distraction from scientific pursuits, causing him in 1842 to bemoan to his old friend, the Reverend Prof. Adam Sedgwick, that '...all I want is time and means and I would then do for Australia what you and Murchison have been doing for England.'⁵

Somewhat frail of health - rheumatic fever was one of the reasons for his travelling to Australia - Clarke suffered a mild stroke in 1856, and again in 1878, just two months prior to his death. Parishioners loved him, yet many in Sydney society loathed him for his outspoken self-righteousness. Despite being a minister of the Church and strong advocate for universal education - pronouncing shortly after his arrival in Australia that 'to deprive instruction ... is to neglect the commands of God'⁶ - in 1865 Clarke was nevertheless willing to throw a young school teacher (Eliza Davis) out in the cold when she dared set up a non-denominational school within the boundaries of his North Shore parish.⁷

Devoted to pursuing and promoting the earth sciences in Australia at every opportunity, Clarke at times saw fit to hinder the efforts of fellow workers in the field, most notably Samuel Stutchbury and Robert Brough Smyth.⁸ Acutely aware of his professional isolation in Australia - a land he referred to in 1840 as 'this wide and dreadful wilderness of sin'⁹ - Clarke sought out the visiting American geologist James Dwight Dana in 1839-40, yet was standoffish to the Polish scientist and explorer P.E. Strzelecki during the same period.

In W.B. Clarke we therefore have a puzzling figure - a man at once endearing and inspiring, yet also petty, small-minded, prickly, and prone to faults of temper and discretion. All in all, a most interesting character.

Life and Times

The basic details of W.B. Clarke's life are known from the work of previous biographers, yet many details remain hazy. For example: What precisely did his geological fieldwork entail? How did he maintain both parish responsibilities and scientific work? Who were his collaborators, his confidants, his friends and enemies?

At the end of the day, and two centuries on from his birth, no clear picture exists of Clarke's lifework and scientific legacy. Like so many scientists before and since, his discoveries were often outmoded, outdated, and forgotten within a generation. New researchers and workers in the field such as Richard Daintree, C.S. Wilkinson and Robert Etheridge Jnr. came along and either built upon the foundations already laid, or cast them aside as irrelevant or erroneous. For example, whilst he was able to prove the existence of Silurian formations in Australia during the 1840s, almost immediately there was the need to further subdivide that geological period. As a result, much of what Clarke revealed of a scientific nature during his lifetime has been subsumed within the general body of knowledge on the geology of eastern Australia, making the task of identifying exactly what he did all the more difficult. Clarke's many literary works - which mostly date from the 1820s and 1830s - are likewise little known.

What, then, is W.B. Clarke best remembered for? In Europe he maintains some claim to fame as inventor of the modern geological hammer, based on an article he wrote in 1828 describing and figuring such an instrument.¹⁰ By 1861 English geologist Sir Roderick Impey Murchison was citing Clarke as 'the experienced geologist of New South Wales.'¹¹ Upon his death in 1878, Ferdinand von Mueller labelled our subject 'the nestor of Australian philosophers,'¹² while Robert Etheridge Jnr. had no qualms in promoting him as the 'Father of Australian Geology'.¹³ This latter title has stuck, featuring in the two substantial biographies by Jervis and Grainger. However, geologists in States other than New South Wales now question the relevance of this accolade,

especially as the widespread network of geological workers in Australia during the nineteenth century is steadily revealed.

Clarke is frequently mentioned in works which discuss the discovery of gold in Australia, though E.H. Hargraves remains holder of that title in the mind of the general public, and in the history books. Clarke is also remembered by the Anglican Church of New South Wales as one of its pioneer clergy. Beyond this, his star has waned in recent years. Even New South Welshmen such as the late T.G. Vallance have cast doubts on his scientific reputation.¹⁴ As a result, W.B. Clarke is now regarded by many as a 2nd level geologist - competent and skilful, though intellectually limited. The claim by Price Warung in 1895 that, if he had of stayed in England, Clarke would have gone on to stand beside Sir Roderick Murchison, Adam Sedgwick and J.B. Jukes as a 1st rate geologist, is now treated with some scepticism.

The passage of time can tarnish the reputation of any public figure, and W.B. Clarke is no exception. For example, his promotion during the 1850s of the theory that gold was to be found on the edges of north-south trending mountain ranges is shown as an example of his intellectual limitations, though his statements regarding the effects of forest vegetation upon climate - dating from the 1830s and reiterated during the 1870s¹⁵ - ring true to this day. As a geologist, Clarke had real difficulties in sorting out the true age of the New South Wales coal measures, though with persistence and the help of colleagues such as James Dwight Dana, Richard Daintree, and palaeontologists Frederick McCoy, L.G. de Koninck and O. Feistmantel, he was able to get it right in the end.¹⁶ Whilst this may be seen as a failing on his part, others could suggest that it reveals his willingness to work collaboratively and to accept rational argument, even if it should prove him wrong along the way.

History will eventually be the judge, but as historians what will we use to judge W.B. Clarke's life and work? The answer is obvious - look to the primary sources: the manuscript diaries and letters, maps and plans, drawings, collections of rocks and fossils, published works such as books, pamphlets and articles in scientific journals and newspapers of the day. Consider the opinions of peers, fellow workers in the field, and contemporaries. Take on board assessments made since his death by biographers and commentators.

It could be argued that all of this has been done, and that the judgments have been made, based on the wealth of material available on Clarke since the time of his death in 1878; that his life is an open book, with little of interest left unrevealed. Yet, just as the Charles Darwin industry continues to rewrite the biography of that famous scientist on what seems like a yearly basis, so too it could be said that the full story of the life and times of the Reverend W.B. Clarke is yet to be told. Why? you may ask. This author would suggest that, known or unknown to previous biographers and discussants, there are many pieces missing from the puzzle which is the life of the Reverend W.B. Clarke, and it will be many years to come before all those extant fragments are readily accessible to interested researchers.

Missing Links - Letters, Maps & Newspapers

In studying the life of any scientist, we look to the details of their everyday existence - we seek out biographical information, attempt to understand the day-to-day methods of their profession, the environment in which they worked; assess individual knowledge base and technique, review the results of their endeavour. Fortunately, in the case of W.B. Clarke, much of this detail may be gleaned from his extant correspondence, a large collection of which is located in the Mitchell Library, Sydney.¹⁷ His many publications are also strongly autobiographical.

The correspondence collection provides a rich source of information on Clarke and his colleagues, however it has its limitations. The Mitchell Library material has only been consolidated and available to researchers since the 1960s, whilst a concise listing did not appear until the 1980s. The correspondence therein is mostly inwards, with those important letters Clarke wrote to colleagues such as Roderick Murchison and Adam Sedgwick remaining largely unknown and inaccessible in overseas collections until recent years.¹⁸ Furthermore, we still await 'translation' (Clarke's handwriting is very difficult to read) and publication of the more significant items from this important archive. His few books, most notably Researches in the Southern Goldfields (1860) and Remarks on the Sedimentary Formations of New South Wales (1878), are scarce and barely reveal the true extent of his writing, though all are significant in recording the Reverend gentleman's exploits and presenting his findings. The large corpus of Clarke-

related material located in Australian newspapers such as the Sydney Morning Herald and the Australian has also been neglected in the past.¹⁹ Lord Macaulay's famous statement that 'the only true history of a country is to be found in its newspapers', can here be applied to the life of the Reverend W.B. Clarke, at least in part.

Perhaps of most significance in our study is the Garden Palace fire of 22 September 1882. This catastrophe resulted in the destruction of a significant archive, including Clarke's personal collection of rocks, fossils, minerals, geological maps and library, all of which had been purchased by the New South Wales government in 1879 for £7000. The loss of this material undoubtedly affects our current view of Clarke, making it all the more difficult to appreciate the many accolades he received during his life and upon his death. The true scale of this loss are revealed if we look, for example, at Clarke's collection of geological maps, and to other evidence of his work in this area, such as field notes and stratigraphic columns.

Any geologist worth his or her salt knows the importance of detailed mapping and the compilation of accompanying notes in order to develop a stratigraphic profile for an area under investigation. Yet, as T.A. Darragh noted in his 1977 paper on 'The First Geological Maps of the Continent of Australia',²⁰ there are no significant geological maps in Clarke's Mitchell Library collection, or anywhere else for that matter. How can we reconcile this with the fact that, during his lifetime, Clarke was labelled the 'William Smith of Australian Geology', in reference to that great British field geologist and pioneer of biostratigraphy and the stratigraphic column?²¹ We know Clarke placed due importance on field data, and was openly critical of 'closet geologists' such as Frederick McCoy who, in his opinion, relied too heavily on palaeontological findings when making age determinations, often disregarding relevant stratigraphic information.²² It therefore seems logical that Clarke would have built up a substantial collection of geological maps and stratigraphic columns during his more than six decades as a worker in the field. Yet such a collection does not appear to exist, with Darragh suggesting it may never have existed in any substantial form, 'in part owing to the reconnaissance nature of much of [Clarke's] work.'²³ Such an assessment does not sit easy with this author.

Obviously part of the answer to this mystery lies with the Garden Palace fire of 1882. The geological maps destroyed in that inferno, and of which no detailed listing is known,

most likely formed the bulk of Clarke's collection. As a result, we are only able to assess his work in this area from the few maps he had published during his lifetime, and his geological map of New South Wales issued in 1880, two years after his death.²⁴ Even that significant work gives a distorted view, for it was seen through the press with the assistance of C.S. Wilkinson, New South Wales Geological Surveyor, and incorporated the work of other geologists associated with the Survey. Apart from this latter item, the extant manuscript and published material does not provide much of a picture of Clarke's skills in mapping, or enthusiasm for the task. Without his manuscript map collection to work on, we are left with precious little evidence to support his claim to having geologically investigated more than 100,000 square miles of eastern Australia between 1839-78. The loss makes it difficult to trace with any precision the actual extent of Clarke's fieldwork, to locate specific fossil localities, and to analyse the ongoing development of his understanding of the geological formations of New South Wales.

What Did Clarke Actually Do?

Though there are significant gaps in the Clarke archive, a great deal nevertheless survives, and, as a result of research to date, we can roughly divide his life into two phases: 1798-1839 - life in England and Europe; 1839-78 - life in the Colony of New South Wales. During the first period Clarke was raised and educated, growing up in the village of East Bergholt, Suffolk, the son of the local schoolmaster. The Clarke family lived just round the corner from the ancestral house of the great British landscape artist John Constable (1776-1837), with the Constables remembering him in later life as the 'young Billy Clarke.'²⁵

After leaving school, William worked as a teacher and school master, before accepting a ministry in the Church of England. He simultaneously pursued an interest in the arts and literature, publishing a number of collections of poetry during the 1820s.²⁶ Whilst at Cambridge University (1817-21) he studied under Dr. E.D. Clarke and attended the lectures of Professor Sedgwick, therein developing a passion for natural history and the new science of geology. His initial focus on meteorology and zoology was replaced by geology and palaeontology during the 1830s.

From the early 1820s Clarke had carried out fieldwork in England and on the Continent, slowly developing his skills in this area. During that decade he visited the coalfields of Staffordshire and Derbyshire (1821); the Chalk, Oolitic and Tertiary districts of Yorkshire and Lincolnshire (1823); the Chalk districts of Sussex and Normandy (1824); southern France, the Alps and northern Italy (1825); the Netherlands (1826-7); Prussia and Holland (1827); Belgium, the Ardennes and the Tertiary districts of Nassau (1828); the volcanic districts of the Rhine and Moselle (1829); and the Chalk and older formations of the frontiers of France and Belgium (1830). With the coming of the new decade he fell in love, was scorned, and later married another. He began to raise a family, and after 1833 developed his parish of St. Mary Longfleet, Poole, Dorsetshire.

From 1828 through to 1839 Clarke was a prolific contributor to journals such as the Magazine of Natural History, and began submitting pieces to the Geological Society of London in 1837. Whilst he continued to visit the continent during the 1830s, his geological investigations were mainly centred on England. A major study of the geology of southeastern Dorsetshire was published in the Magazine of Natural History at the beginning of 1839.

These early geological treatises reveal Clarke as an active member of that distinctly English school of historical geology which, by 1830, was primarily interested in palaeontology and stratigraphy. Those other branches of the science such as mineralogy, igneous petrology and economic geology were of secondary concern only, and in some instances even considered below the dignity of real geologists and best left to local mineral surveyors.²⁷ Individuals such as William Buckland at Oxford University and Adam Sedgwick at Cambridge were at the head of this movement. Both were Church of England ministers, reflecting 'the indigenous tradition of Anglican learning in which natural and revealed religion were intimately interwoven with the form and substance of science.'²⁸ The new field of geology therefore sat easy with clerics such as W.B. Clarke, and was in many ways enthusiastically embraced by them. This is evidenced by the large network of scientifically literate local parsons which sprang up throughout England during the first half of the nineteenth century.

By the end of the 1830s the die had been cast with regards to W.B. Clarke - his life had settled into a pattern of carrying out scientific researches and writing, whilst raising a

family and fulfilling his duties as a cleric. When he arrived in New South Wales on 27 May 1839 he was no longer a young man. Entering his forties, and with a young family to support, Clarke was somewhat settled in his ways. Yet, with the knowledge gained from some twenty years experience as a geologist behind him, he enthusiastically took to the task assigned him by the Rev. Prof. Sedgwick the previous year, namely, to delineate the sedimentary formations of the Colony and report back to England. Though often sidetracked over the next forty years by family and clerical duties, he saw to it that the task given was completed to the best of his abilities by the time of his death in 1878, during his eightieth year.

Australia and the Bush

Ever the man with a mission, W.B. Clarke, as soon as he was able upon arrival in the Colony, began field work about Sydney. He travelled south to Illawarra in 1839-40 with American J.D. Dana, westward over the Blue Mountains the following year, and further afield as the decade progressed. His letters to Sedgwick and Murchison from this period describe the activities of our travelling parson as he built up his knowledge of the local geology, collected numerous rocks and fossils, and consolidated his thoughts in the light of overseas developments. A list of localities associated with the 2673 fossils Clarke sent to Sedgwick in November 1844 points to the extent of these initial excursions (Table 1).²⁹

It was between the years 1840-56 that the Reverend W.B. Clarke was most active in the field. Not only did he walk over and travel through a large part of eastern New South Wales, but he was also involved in official government surveys of the goldfields to the north and south of Sydney between 1851-6, and visited Tasmania, Victoria and southern Queensland on a number of occasions. All of this work added to his store of local knowledge, and though precise ages for individual formations would as ever prove elusive and cause him to reply upon the opinions of overseas experts, he nevertheless quickly developed an understanding of the basic geological structure of the settled portions of the Colony. This was achieved through collecting rocks and fossils and studying the publications of previous workers in the field, finding much of relevance in the journals of explorers such as T.L. Mitchell and Ludwig Leichhardt. Clarke also built up a network of associates - mostly interested amateurs - who would provide him with

specimens and information. In some instances he employed them to search for fossils in inaccessible areas such as southern Queensland.³⁰

Locality	No.	Type
Hawkesbury District	115	c
Wianamatta District	271	c
Prospect	22	c
Matavai	5	c
Piakibaba	33	c
Maroota	16	c
Illawarra	588	c
Stonequarry	6	c
Awaaba	31	c
Hartley, Cox's River, &c.	34	a
Arriwa and Irrawang	38	c
Harpur's Hill	5	c
Mudgee	33	c
North of Liverpool Range to Peel	54	a
Clarence River, and north of	18	c & a
Argyle	145	a
Murrumbidgee	71	a
Murray	119	a & t
Port Stephens	55	c
Norfolk I.	6	v
Windsor	1	c
Muswellbrook	47	c
Cedar brush	23	c
Mt. Wingan	34	c
Gill's Cliff	18	c
Bathurst Section	79	
Sutton Forest and Mittagong	24	c & t
Mount York	2	c
Upper Hunter	19	c
Twofold Bay and Maneroo	16	a
Page	24	c
Wollombi G. Plains, &c.	10	c
Mudgee, &c.	47	a
Newcastle and up to Loder's Creek	111	c
Paterson District and Stroud	12	c
Lewin's Brook	18	c
Williams River	65	c
Hunter River	34	c
Binjaberri	44	c
New England	33	a
Harpur's Hill	20	c
Darlington	16	c
Mitchell's River, Glendon, &c.	75	c
Korinda	38	c
Segenhoe	33	c
Richmond and Moreton Bay	51	c
Total	2,673	

This somewhat frantic pace of collecting was perhaps motivated by the thought that he would return to England in the short term. Of course, this was not to be the case. The first few years in the Colony also proved somewhat turbulent for Clarke - the effects of economic depression were widespread, he worked briefly as headmaster of the King's School, Parramatta, and his family sailed for England at the beginning of 1842, not to return until 1856. By 1843 his life had settled into a pattern of exchanging parishes to facilitate fieldwork, collecting specimens for dispatch to England, and publishing his findings in local newspapers such as the Sydney Morning Herald. Articles also appeared in overseas journals during this period, however they were often edited down, omitting illustrations (maps and drawings) or substantial sections such as listings of individual fossils. They often took months, or even years, to get to press, relying on the goodwill of Clarke's correspondents in presenting them to bodies such as the Geological Society of London.

By the end of 1854 Clarke was able to mount an exhibition of New South Wales rocks and fossils in the newly opened Australian Museum building. For the first time, a detailed stratigraphic column revealing the geological history of the Colony was laid out for all and sundry to view, by way of 435 individual rock, fossil and mineralogical specimens, while a brief catalogue of the material contained therein was also published.³¹ Unfortunately the collection and its accompanying catalogue largely went unnoticed, despite travelling to the Paris International Exhibition the following year.

Throughout his time as a resident of New South Wales, W.B. Clarke played an important role as a focus for all matters geological, acting as a publicly accessible storehouse for information and collections. Rocks and fossils would be sent to him from also parts of the Colony for identification, or to be dispatched to Europe for further study. We can garner an idea of the way Clarke worked by looking at his treatment of Trilobite fossils.

The Trouble with Trilobites

Trilobites are a well known fossil class of marine arthropod, with distinct 3-part outer shell (carapace) composed of the head (cephalon), body (thorax) and tail (pygidium). They are a Palaeozoic marker, and especially common in the Silurian. When W.B.

Clarke arrived in New South Wales in 1839 local specimens were unknown. Therefore, spurred on by the publication that year of the first edition of Murchison's The Silurian System,³² he set about the task of identifying these important fossils locally. This would not only assist Murchison in proving the global extent of the Silurian, but also substantiate the existence of Palaeozoic formations in Australia.

On 2 December 1842 Clarke discovered numerous casts of Trilobites (genus *Trinuclei*) at two localities in the upper Hunter region - within a sandy micaceous mudstone at Burragood on the Paterson River, and in a limestone on the left bank of Binjaberri Creek, a tributary of the Allyn River. Reference to these discoveries was made in an article published in the Sydney Morning Herald on 6 April 1843.³³ In November 1844 Clarke despatched to Sedgwick his consignment of some 2673 fossils for identification and deposition in the Woodwardian Museum, Cambridge. Included amongst the collection were Trilobite specimens from the shale of Dunvegan, along with material from Burragood and Binjaberri Creek. Clarke returned to the upper Hunter region in January 1845 and located further *Trinuclei*, along with species of *Asaphus* at Trevallyn on the Paterson River and Colo Colo on the Allyn. W.S. Macleay subsequently named *Trinucleus clarkii* after its discoverer.

Meanwhile, during January-February 1840 the visiting Polish scientist and explorer Count P.E. Strzelecki had found 'small oblong impressions resembling Trilobites' in the Yass Plains area, whilst travelling overland from Sydney to Port Phillip. Following the Count's return to England in 1843, fossils associated with these Trilobite casts were studied by English palaeontologists J. Morris and W. Lonsdale. They were allocated a Devonian age, though the individual Trilobite species were not identified. This information was published in Strzelecki's Physical Description of New South Wales and Van Dieman's Land which appeared in London during the middle of 1845.³⁴ The author eventually sent a copy to Clarke, and he reviewed it warmly within the Sydney Morning Herald during March 1846. Two months later (May 1846), Strzelecki's friend P.P. King showed Clarke examples of Trilobites (*Trinuclei* and *Asaphus*) collected by T.A. Murray from Yarralumla near Canberra, on the northern bank of the Murrumbidgee River. Strzelecki's Yass Plains were located just 32 miles to the north-west, and most likely associated with the same formation.

These southern district discoveries stirred Clarke into action. He immediately set about consolidating the information then available, and on 26 May 1846 sent off an article 'On the Occurrence of Trilobites in the Protozoic Rocks of New South Wales' to the Tasmanian Journal of Natural Science. This was subsequently rewritten early in 1847 and sent off to the Geological Society of London. It was presented to that learned body on 16 June 1847 and published in its Quarterly Journal the following year.³⁵ Therein Clarke went beyond merely announcing the discovery of Australian trilobites. He suggested that 'the beds furnishing the Trilobites of the Paterson and Murrumbidgee are related more nearly to the Silurian than to the Devonian rocks of Europe.' This was in opposition to the age given in Strzelecki's book (Devonian) for the Yass Plains material. Clarke also mentioned Ludwig Leichhardt's discoveries of Silurian fossils in the Burdekin River area of Queensland during 1842-3, thereby indicating the presence of the formation along the entire length of the Australian cordillera (Great Dividing Range).³⁶ Such information was gratefully received by Roderick Murchison, and eventually incorporated within the later editions of his book on the Silurian.

Clarke's concise 1847 article on Australian Trilobites was typical of the way he wrote - it was introduced by an historic summary of what had been published to date on the topic, followed by the presentation of precise information on his own discoveries and a discussion of the significance of the find in regards to the ongoing researches into the age of the local strata. Both lithological and stratigraphic information was also supplied. A list of some 240 fossil species associated with the Burragee trilobites and included with the original manuscript was not published. Only lacking were precise palaeontological descriptions of the various Australian trilobites.

Whilst Clarke was consolidating his thoughts on these local fossils and their place within the Palaeozoic formations of eastern Australia, back in England work had begun on describing some of the 2673 fossils sent there by Clarke in 1844. The task went to Sedgwick's palaeontologist Frederick McCoy. He identified a new Trilobite genus and species which he named *Brachymetopus Strzelecki*, along with two species of *Philipsia*. McCoy's findings were published in the Magazine of Natural History at the end of 1847,³⁷ and reached Australia by the middle part of the following year. Clarke saw to it that this material was then made known, via the columns of the Sydney Morning Herald (21 December 1848 - 16 March 1849), the Tasmanian Journal of Natural Science

(1849) and the Proceedings of the Royal Society of Van Dieman's Land (1851). Though the descriptions were detailed and revealed McCoy's skill as a palaeontologist, Clarke was somewhat miffed at his ascription of a Carboniferous (Oolitic) age to some of the material, in opposition to stratigraphic and field evidence which was suggestive of a much older time period.

Having brought Australian trilobites to the notice of European geologists during 1847-8, in 1849 Clarke sent a small box of specimens from Yarralumla, Colo Colo and the Paterson River to Sedgwick for identification.³⁸ Apparently they were set aside upon receipt. In 1853 Murchison asked Clarke to send some Australian Silurian fossils to England, and as a result a further collection arrived there in 1855. They were subsequently described by J.W. Salter in 1858, though the results were never published. On other fronts, Upper Silurian Trilobites were located in Tasmania during 1860 by Charles Gould and described the following year, whilst Prof. McCoy also identified various Victorian species.³⁹

By the end of the 1850s Clarke was rightly frustrated at the lack of detailed palaeontological study of the some 3000 fossils he had despatched to Sedgwick and Murchison in England between 1844-55, whilst his cool relationship with McCoy, now resident in Melbourne, meant that he could not rely to any degree on that palaeontologist for assistance. Their relationship was largely one of conflict rather than collaboration, primarily centred around a disagreement on the relative ages of the Australian coalfields.

The frustrations over the palaeontological study of Australian fossils was not all one-sided. Clarke's frequent requests for results caused J.W. Salter to note in a letter to Sedgwick of 25 May 1856, that Clarke was 'a troublesome correspondent' and that 'Murchison is heartedly sick of it.' Furthermore, he, Salter, '...did not mean to be bullied by any Australian into doing more until I have Wales out of hand.'⁴⁰

As a result of these delays and lack of cooperation by his English associates, Clarke turned to L.G. de Koninck at the University of Liege, and between 1864-76 forwarded to him a collection of some 1000 Palaeozoic fossils from New South Wales, including various Trilobite specimen. De Koninck's palaeontological descriptions were eventually

published in Brussels during 1876-7, with financial support from Clarke.⁴¹ The resultant text was accompanied by finely detailed lithographic plates and proved a landmark in the history of Australian palaeontology, standing alongside Ottokar Feistmantel's work on the coal and plant-bearing beds of eastern Australia⁴² as testament to Clarke's perseverance and skills in this field. Both works were subsequently translated into English and published by the Geological Survey of New South Wales during 1890 and 1898.⁴³

Clarke was never one to rest on his laurels. During 1876 he once again visited the Yass Plains area and located further trilobite specimen, working upon them right up to the time of his death. His catalogue of involvement in the discovery of various Australian Trilobites is therefore substantial (Table 2). The 4th edition of his Sedimentary Formations of New South Wales, completed on 2 June 1878, also contains an impressive set of appendices which bring together the major palaeontological discoveries of his time relating to eastern Australia.

Name	Location	Reference
<i>Asaphus</i>	Burragee, Paterson River	Clarke 1847, 64
<i>Brachymetopus Strzelecki</i>	Burragee, Paterson River	McCoy 1847, 229-31
	Glen Williams	De Koninck 1898, 280-1
<i>Bronteus Goniopeltis</i>	Rock Flat Creek	De Koninck 1898, 46-7
<i>Bronteus Partschii</i>	Boree Cavern, Wellington	De Koninck 1898, 45-6
<i>Calymene Blumenbachii</i>	Bowling, Yass	De Koninck 1898, 44
	Yarralumla	Salter 1856
	Yarralumla	De Koninck 1898, 44
<i>Calymene Macleayi</i>	Yarralumla	Salter 1856
<i>Cheirurus Insignis</i>	Yarralumla	De Koninck 1898, 38
<i>Cromus Bohemicus</i>	Yarralumla	De Koninck 1898, 42-3
<i>Cromus Murchisoni</i>	Quedong	De Koninck 1898, 43
	Yarralumla	De Koninck 1898, 43
<i>Encrinurus Barrandei</i>	Yarralumla	De Koninck 1898, 40-2
<i>Encrinurus Punctuas</i>	Duntroon	De Koninck 1898, 39-40
	Yass	De Koninck 1898, 39-40
<i>Griffithides Eichwaldi</i>	Upper Williams River	De Koninck 1898, 278-80

Clarke's work with Trilobites therefore extended throughout the length of his time in the Colony. From this brief study we see that by the 1840s he had developed the skills to locate and identify Trilobite species, make appropriate lithological and stratigraphic records to assist in the dating process, and consult the literature to ensure priority of discovery. He was also adept in writing up his findings in a precise scientific manner, and presenting them for publication. Manuscript sketchbooks in the Mitchell Library also suggest he was no deft hand at scientific illustration either.⁴⁴ As such, Clarke was an important asset to the Colony of New South Wales and the ongoing process of scientific discovery. Of course he was not alone in this task of collecting and expanding the geological frontiers, being ably assisted by local colleagues such as W.S. Macleay, however he did bring a decided professional edge to the task, coming as he did from an environment (England in the 1820s and 1830s) where geological discoveries were commonplace, the geological timetable was still evolving, and there was much spirited debate in the area. The Devonian controversy and the eventual rift between Murchison and Sedgwick is clear evidence of this.

Clarke learnt his geology in the shadow, if not the actual company of, Sedgwick and Murchison, and perhaps tried to bring to the Colony some of the excitement then surrounding this rapidly advancing branch of science. The solid grounding in geology which he had attained prior to coming to Australia held him in good stead for the task ahead. It was noted by Prof. Smith in 1879 that '...his faculties remained unclouded to the end.'⁴⁵ During Clarke's last few weeks, and despite suffering the effects of a stroke on 6 March 1878, he was able to complete the 4th edition of his Sedimentary Formations, put the finishing touches to his geological map of New South Wales, arrange his fossil collection, and write a letter to palaeontologist L.G. de Koninck on 15 June. The evening of the following day he passed away.

Critics

Over the years much had been written which is praiseworthy of Clarke, though in recent times more critical assessments have also appeared. From the earliest days of his residence in Australia, Clarke came into conflict - and initiated conflict - with members of local society, largely as a result of his power and influence as a writer and commentator for the Sydney Morning Herald. Using anonymity as a protection against litigation, he

could be scathing in his criticism of authority or individuals, stirring up debates on religion, education, science, and exploration. For example, he was a strong defender of the German explorer and scientist Ludwig Leichhardt, which brought him into conflict with the Colony's official explorer and Surveyor General T.L. Mitchell.⁴⁶ The 'intellectual barrenness of the Colony' was also a common theme of his tirades in the press.⁴⁷

The ability to give vent to his often petty opinions via virulent, intemperate articles in the Herald, caused some damage to Clarke's scientific reputation. W.S. Macleay took him to task on a number of occasions, both publicly and privately, as a result of statements made in the Sydney journals. It could be said that his intemperance also hindered efforts to obtain government support in developing a geological survey for the Colony - this did not occur until the 1870s, some twenty years after the Victorian equivalent had been set up.



Samuel Stutchbury 1851

When Samuel Stutchbury was appointed Colonial Geologist in 1851, Clarke published a number of critical articles in the Herald. Stutchbury, on reading these, noted '...the bitter and disappointed feelings of the writer (Clarke) at his application for the appointment (of Colonial Geologist) not having been complied with.'⁴⁸ When Stutchbury left the Colony in 1855 he was not replaced, in part due to the feeling among local politicians that the

Reverend Clarke could adequately serve as defacto Colonial Geologist, whilst mineralogical surveyors such as William Keene could cover specific areas such as coal mining, in lieu of an official Geological Survey establishment.

When Clarke claimed the 'scientific' discovery of gold in Australia, following E.H. Hargraves' discovery in 1851, numerous forces railed against him. It was an argument he ultimately lost, though in the fight he was able to bring to the attention of government and the public at large his services to science and claim as 'scientific' discoverer of gold and other assorted minerals.⁴⁹

Clarke was a manipulator of both people and the press. As Geoffrey Blainey pointed out in 1961, '...A man who twists the written record as often as Clarke twists it probably has a flexible memory.'⁵⁰ Blainey was here referring to that famous quote by Governor Gipps to the Reverend gentleman on being shown a specimen of gold on 9 April 1844: 'Put is away, Mr. Clarke, or we shall all have our throats cut!'. Blainey argued that Clarke, '...with his patriarchal air and prehistoric profile', changed the actual quote to enhance his own case before the committee investigating his role in the recent gold discoveries.

In recent time Clarke's critics have become more common. The old New South Wales versus Victoria rivalry - which was reflected in Clarke's own battles with Frederick McCoy - is perhaps seen in Darragh's comment that '...Clarke's work has been much overrated by many writers, particularly after his death.'⁵¹ With reference to geological mapping, Darragh was critical of his behaviour during the 1870s, suggesting that '...jealousy and possibly frustration' on the part of the Reverend gentleman led him to forestall assisting R.B. Smyth in a project to construct a geological map of Australia.⁵² This assessment is obviously close to the mark, and reinforced by Clarke's scathing criticism of Smyth's work in an anonymous Sydney Morning Herald article of 15 May 1874. However, in his defense, it should be pointed out that Clarke had been working on a detailed geological map of New South Wales for a number of years, and was unable to get any government funding or support to publish it. The fact that there was no official Geological Survey in New South Wales or widespread land survey program by the Surveyor General's Department during the 1850s, as had occurred in Victoria, was also a major hindrance. When the issue of a continental map was raised in the early 1870s, Clarke had real doubts about the practical worth of producing any such large scale map,

especially when so little was known geographically and geologically of areas located away from coastal and settled areas. Clarke's failure to initially pass this work on to his Victorian colleagues is in many ways understandable, though not necessarily in the true spirit of scientific endeavour and collaboration. It appears that he was eventually forthcoming, as Smyth's map of 1875 includes much of what subsequently appeared in the 1880 geological map of New South Wales.

The late Tom Vallance, in correspondence with this author during 1990, perhaps summed up much of the criticism when he wrote:

Clarke undoubtedly had a very high opinion of his own talents, and took every opportunity to advise anyone who would harken. I find it impossible to go beyond regarding the man as a small fish in a small pond. What makes him interesting is that it was practically a one-fish pond.⁵³

Branagan, in discussing Clarke's treatment of Stutchbury, observed: 'While Stutchbury was in Australia, Clarke felt that his position as spokesman on geological matters was threatened. Later, when Stutchbury had departed, we find Clarke acknowledging the value of Stutchbury's work.'⁵⁴ These criticisms point to obvious flaws in Clarke's character, and in many ways make him all the more interesting as a subject for study.

Accolades

Amongst the many criticisms, accolades exist in equal if not greater number. English geologist J.B. Jukes, in a letter to his sister Amelia in England during 1842, referred to Clarke as one of the many 'pleasant acquaintances' he had made whilst visiting the Colony.⁵⁵ Though Clarke's eligibility for the title 'The Father of Australian Geology' remains open to debate, when we look back to his contemporaries we find commentators such as Prof. Smith, President of the Royal Society of New South Wales in 1879, noting how Clarke's 'cheery voice [was] ever ready with a kindly greeting for his fellow members and friends.' Smith has no qualms in citing Clarke as 'the discoverer of gold in Australia', whilst in reference to the 4th edition of Sedimentary Formations he states that it is 'the most valuable portion of Mr. Clarke's labours, and represents in epitome the results of the work of his life.'

In presenting the Murchison Medal to Clarke in 1877, the president of the Geological Society of London commented on his 'remarkable services in the investigation of the older rocks of New South Wales, - services which have led to a correct knowledge of the succession of the formations in that country.' Even a recent critic such as Darragh recognised that Clarke was 'virtually the only active worker there [in New South Wales] between 1856 and 1873,'⁵⁶ even though his presence is also cited as one of the reasons for the failure of the New South Wales government to set up a geological survey during the 1850s, as had occurred in Victoria.

During his lifetime Clarke led a busy public life, and received numerous honours as it drew to an end. Most notably, he was one-time Secretary and long-time Trustee of the Australian Museum, Trustee of the Free Public Library, Sydney (later State Library of New South Wales), and a Fellow of St. Paul's College, University of Sydney. He was offered a seat on first University Senate in 1850, along with a Chair in Mineralogy and Geology in August 1853 - both of which he turned down due to his commitment to his clerical duties and objections from the local Archbishop. He was a founding member and staunch supporter of the Australian Philosophical Society, which became the Philosophical Society of New South Wales and later Royal Society of New South Wales. He was a member of the Geological Society of France, the Geological Society of London - receiving its Murchison Medal in 1877, the Royal Geographical Society, the Royal Geological Institute of Austria, the Royal Society of London - made a Fellow in 1876, the Royal Society of Literature, and the Zoological Society of London. Clarke served as a member of the New South Wales Commission for the Paris Exhibition of 1867, the Intercolonial Exhibition of 1870 and the Philadelphia Exhibition of 1877.

It can be seen from the above that W.B. Clarke was, to quote L.G. de Koninck and R.I. Murchison, an 'indefatigable pioneer of civilisation and science' and 'persevering geologist'⁵⁷ who played a significant role in the correlation of the Australasian formations with those of Europe and the rest of the world during the nineteenth century. His major accomplishments locally were in delineating the geological timetable of eastern Australia over a period of some forty years from 1839-78, through palaeontological and stratigraphic investigations, and in acting as a promoter of past and ongoing discoveries in the fields of natural and earth sciences. Primarily a scientist, his various mineral

discoveries were ancillary to his ongoing work, though he did seek recognition and acknowledgment of the role he played in assisting miners.

Clarke played a role in the development of Palaeozoic and Mesozoic global stratigraphy during the nineteenth century. He worked systematically on providing a chronology of the earth history of eastern Australia, slowly developing the basic stratigraphy so that at the end of the day a geological map of the Colony could be published, based on biostratigraphic knowledge.

If, after some 120 years, his reputation as a scientist is somewhat tarnished, he nevertheless remains an interesting historical figure. Perhaps 'a big fish in a big pond' would be a more appropriate epitaph.

Endnotes

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³ Rev. Robert Lethbridge King, 'Rev. W.B. Clarke', pencil sketch, King Papers, Mitchell Library MSS673, 77.

⁴ Warung, op cit., n.2, 538.

⁵ W.B. Clarke to Adam Sedgwick, 2 February 1842, Cambridge University Library, Add 7652. Quoted in A. Moyal, "'With Pen and Hammer.'" The Correspondence of Rev. W.B. Clarke', in D.F. Branagan & G.H. McNally (eds.), Useful and curious geological enquiries beyond the world. Pacific-Asia historical themes, Proceedings of the 19th International INHIGEO Symposium, Sydney, Australia, 4-8 July 1994, Sydney, 1994, 172-80.

⁶ W.B. Clarke, A Sermon preached in the Church of St. James, at Sydney; on Thursday, 24th June, 1840, at the Anniversary of the Diocesan Committee of the Societies for the Propagation of the Gospel in Foreign Parts, and for Promoting Christian Knowledge, Sydney, 1840, 12.

⁷ B. Ward, A Lady in a Thousand - Eliza Davis, Glebe, 1994, 102-3.

⁸ D.F. Branagan, 'Samuel Stutchbury and Reverend W.B. Clarke- Not Quite Equal and Opposite', in P. Stanbury (ed.), 100 Years of Australian Scientific Exploration, Sydney 1978, 89-98; 'Samuel Stutchbury and the Australian Museum', Records of the Australian Museum, Supplement 15, 1992, 99-110; T.A. Darragh, 'The First Geological Maps of the Continent of Australia', Journal of the Geological Society of Australia, 24(5), September 1977, 279-305.

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¹⁰ W.B. Clarke, 'Geological Hammer', Magazine of Natural History, II, 1828, 247.

¹¹ R.I. Murchison, 'Address to the Geology Section', Report of the 31st Meeting of the British Association for the Advancement of Science, held at Manchester in September 1861, London, 1862, 106.

¹² Warung, op cit., n.2, 532.

¹³ Robert Etheridge Jnr., [Rev. W.B. Clarke - Obituary Notice], Geological Magazine, London, III, 1878, 79-82.

¹⁴ T.G. Vallance, 'The Fuss about Coal', in D.J. & S.G.M. Carr (eds.), Plants and Man in Australia, Sydney, 1981, 136-76.

¹⁵ W.B. Clarke, 'Effects of Forest Vegetation on Climate', Journal of the Royal Society of New South Wales, X, 1877, 179-235. Read to the Society on 1 November 1876, with a follow-up discussion on 6 December. An earlier paper on this topic was published in the Magazine of Natural History during 1835.

¹⁶ For an outline of Clarke's role in the ongoing task of identifying the ages of the Australian coalfields, refer Vallance, op cit., n.14.

¹⁷ The Clarke collection at the State Library of New South Wales is to be found catalogued in a number of localities, with the majority of the correspondence and diaries consolidated at ML MSS139. Refer Moyal, op cit.; M.K. Organ, 'Reverend W.B. Clarke (1798-1878). Chronology and Calendar of Correspondence', unpublished manuscript, 1 August 1997.

¹⁸ The Australian Joint Copying Project has remedied much of this by identifying overseas collections of relevance to Australia, and making copies available for deposit in local libraries and archives. Some of Clarke's correspondence has been copied as part of this scheme.

¹⁹ M.K. Organ, 'W.B. Clarke as Scientific Journalist', Historical Records of Australian Science, 9(1), 1992, 1-16.

²⁰ Darragh, op cit., n.8, 288. Refer also D.F. Branagan, 'The History of Geological Mapping in Australia', in D.H. Borchardt (ed.), Some Sources for the History of Australian Science,

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²¹ William Smith, between 1816-19, revealed how the use of fossils allows formations to be mapped across large areas, and that fossils hold a prime position over lithologies as a means of correlation. Refer W.S. McKerrow, 'The development of Early Palaeozoic global stratigraphy', Journal of the Geological Society, 150, 1993, 21-8.

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²⁴ Geological Sketch Map of New South Wales. Compiled from the original map of the late Rev. W.B. Clarke, M.A., F.R.S., F.G.S., &c., by C.S. Wilkinson, L.S., F.G.S., Government Geologist. Scale: 1 inch = 32 miles. Inscriptions: 'Department of Mines, New South Wales, Office no.997. Lithographed and printed at the Surveyor General's Office 1880. Recent surveys by Messrs. E.F. Pittman Assoc. R.S.M. and Lamont H.G. Young Assoc. R.S.M., F.C.S. of the Geological Survey Staff, have been inserted on this map.' Coloured map 55.9 x 66.1cm on sheet 62.4 x 78.4 cm. Published as an Appendix to the Annual Report of the New South Wales Department of Mines for 1880, Government Printer, Sydney, 1881.

²⁵ Letter from Abram Constable to John Constable, 23 April 1835. Quoted in R.B. Beckett, John Constable's Correspondence. The Family at East Bergholt 1807-1837, HMSO, London, 1962, 288-90.

²⁶ Organ, op cit., n.1.

²⁷ N.A. Rupke, The Great Chain of History. William Buckland and the English School of Geology (1814-1849), Oxford, 1983, 322p.

²⁸ Ibid., 5.

²⁹ This table was reproduced in W.B. Clarke, op cit., n.21, Appendix III, 118.

³⁰ W.B. Clarke, Recent Geological Discoveries in Australia, J. Cook, Sydney, 1861, 28.

³¹ W.B. Clarke, 'Catalogue of Geological Specimens illustrating the Succession of the Rock Formations in New South Wales', in Catalogue of the Natural and Industrial Products of New South Wales, Sydney, 1854, 41-51.

³² R.I. Murchison, The Silurian system: founded on geological researches in the counties of Salop, Hereford, Radnor, Montgomery, Caermarthen, Brecon, Pembroke, Monmouth, Gloucester, Worcester, and Stafford : with descriptions of the coal-fields and overlying formations, J. Murray, London, 1839, 2 vols.

³³ "We are also informed that *Trilobites* ... have since been discovered in this colony by the Rev. W.B. Clarke, and that two or three species associated with other undoubted Silurian fossils have been made out by him. That gentleman has, therefore, the good fortune of having detected the first actual proof of the relative age of the Australian series of rocks, and of satisfactorily

determining that they are of the palaeozoic era..." in 'Progress of Scientific Enquiry in Australasia', Sydney Morning Herald, 6 April 1843.

³⁴ P.E. Strzelecki, Physical Description of New South Wales and Van Dieman's Land, London, 1845, 92, 268.

³⁵ W.B. Clarke, 'On the occurrence of Trilobites in New South Wales, with remarks on the probable age of the formation in which they occur', Quarterly Journal of the Geological Society of London, IV, 1848, 63-6.

³⁶ Clarke, op cit., n.21, 120.

³⁷ F. McCoy, 'The Fossil Botany and Zoology of Rocks associated with the Coal of Australia', Magazine of Natural History, Series 1, XX, 1847, 145-57, 226-36, 298-319.

³⁸ A.J. Wright, 'Notes on the 1849 and 1855 W.B. Clarke Collections in the Sedgwick Museum, Cambridge', in Branagan & McNally, op cit., n.5, 181-91.

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⁴⁰ Quoted in Wright, op cit., n.35, 184.

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⁴⁴ W.B. Clarke, 'Geological Sketchbooks [1843-7]', 4 vols., ML MSS5698.

⁴⁵ Professor John Smith, 'Anniversary Address', Journal and Proceedings of the Royal Society of New South Wales, XIII, 1879, 4-23.

⁴⁶ E.M. Webster, Whirlwinds in the Plain: Ludwig Leichhardt - Friends, Foes and History, Melbourne University Press, 1980, 462p.

⁴⁷ Organ, op cit. n.18.

⁴⁸ Samuel Stutchbury, 12 November 1851. Quoted in Branagan, op cit. n.8, 104.

⁴⁹ 'Claims of the Reverend W.B. Clarke. Report from the Select Committee on the Claims of Reverend W.B. Clarke, together with the Proceedings of the Committee, Minutes of Evidence, and Appendix, 3 May 1861 & 18 October 1861.' Votes & Proceedings of the New South Wales Legislative Assembly, 2, 1861, 50, 5p.

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⁵¹ Darragh, op cit., n.8., 288.

⁵² Ibid.

⁵³ T.G. Vallance to the author, 7 August 1990.

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⁵⁵ C.A. Browne, Letters and Extracts from the Addresses and Occasional Writings of J. Beete Jukes, M.A., F.R.S., F.G.S., Chapman & Hall London, 1891, 161.

⁵⁶ Darragh, op cit., n.8, 288.

⁵⁷ De Koninck, op cit. n.40, 38; Murchison, op cit., n.11, 107.