Walking in William "Strata" Smith's footsteps ~ a tribute by the MGS and CFDC

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Figure 2: *1838 engraved portrait of Dr. William "Strata" Smith (b. March 23, 1769, d. August 28, 1838), at the age of 69 years old, copied from an oil painting, made in London, by M. Fourau (Phillips, 1844).*

Introduction

The year 2015 marks the 200th anniversary of the release of the first paleontologically-controlled 1:316000 sale (hand-coloured) geological map of a nation, Great Britain (Figure 1). The map was compiled by William "Strata" Smith, L.L.D. (Figure 2) on the basis of geological field observations and fossil identifications carried out by him for over 28 years.

Due to a fortunate set of personal circumstances during June 2015, I had the honour of retracing a few of his "footsteps". I had first become acquainted with the geological exploits of Mr. Smith during a first year geology course at the University of Manitoba. At that time, I did not fully realize how much influence he had had on the geological methods that I would later use for the next 50 years of my career in Manitoba.

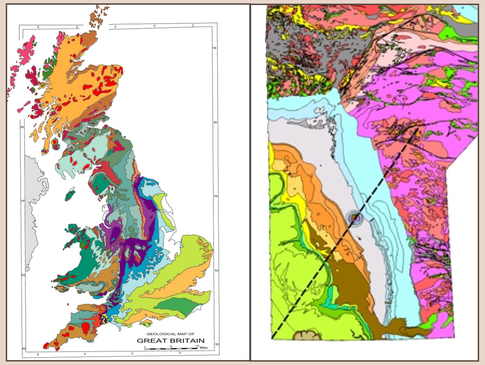

Figure 3: *Simplified bedrock geology map of Great Britain ('Reproduced with the permission of the British Geological Survey ©NERC. All rights reserved').*

Figure 4: *Simplified bedrock geology map of southern Manitoba.*

Great Britain and Southern Manitoba Bedrock Geology

The geological map of Great Britain (Figure 3) shows a succession of Phanerozoic rock overlying the Precambrian basement and occupying the southeastern part of the country with a generally shallow dip to the southeast towards the Paris Basin on the European continent. In comparison, it is interesting to note that the geological map of southern Manitoba (Figure 4) shows almost the mirror image with a succession of Phanerozoic rock overlying the Precambrian basement and occupying the southwestern part of the Province with a generally shallow dip to the southwest towards the Williston Basin, which is centred in North Dakota in the U.S.

It was Smith who first recognized that the regionally dipping outcrop belts of laterally continuous geological units in Great Britain could be depicted on a topographic map base (Figure 1), and on an accompanying cross-section (Figure 5, and inset on Figure 1). However, he found it difficult to separate and portray bedrock outliers and inliers (shown on Figure 3) from more recently deposited surface deposits (see: enlarged legend from "the map that changed the world", shown as Figure 6, which includes surficial deposits of Pleistocene and Recent clay, sand, gravel, and loam).

Figure 5: *"Sketch of the succession of strata and their relative altitudes" as shown on Smith's (1815) "map that changed the world" (Reproduction by permission of the Buffalo & Erie County Public Library, Buffalo, New York).*

Figure 6: *Enlarged legend from Smith's (1815) "map that changed the world" (Reproduction of the Buffalo & Erie County Public Library, Buffalo, New York).*

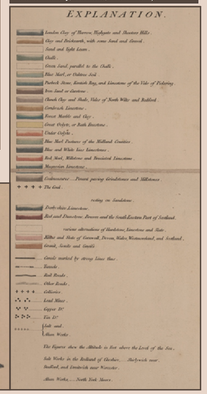

Figure 1: *"The map that changed the world", printed by John Cary (London, England) at a scale of 1:316000 with hand-coloured geology, as 15 large sheets, which together occupy an area 2.7 m in height and 1.9 m in width (Smith, 1815). The map shown in the figure is one of 40 surviving copies of about 400 printed, numbered and signed copies (Reproduction by permission of the Buffalo & Erie County Public Library, Buffalo, New York).*

Life and Times of William "Strata" Smith

In anticipation of my, then forthcoming, adventure to Great Britain, I realized that I had to reacquaint myself with Mr. Smith. I searched out the Internet, where I discovered that the Geological Society of London (https://www.geolsoc.org.uk/); the British Geological Survey (www.bgs.ac.uk/); University of New Hampshire (www.unh.edu/); the Earth Observatory of NASA (www.earthobservatory.nasa.gov/); and others (e.g. William Smith Online project at Oxford University Museum of Natural History, http://www.handwritteninstone.com/) had contributed numerous articles on the life and accomplishments of William Smith, on the occasion of the 200th anniversary of his map.

Another significant online discovery was the description of the life and times of William Smith (Figure 2), as contained in his memoirs by his nephew and "pupil", John Phillips, F.R.S., F.G.S., Professor of Geology and Mineralogy at the University of Dublin (Phillips, 1844).

Upon returning to Manitoba, I was fortunate to locate a copy of Simon Winchester's "The map that changed the world" (Figure 1; Winchester, 2001). This book provides the background to a turbulent and trying existence of a person trying to cope (near the end of the Industrial Revolution) with a then widely-accepted ~6000 year age of the Earth and Cosmos, while also trying to unravel a stratigraphic puzzle of continental proportions.

Walking in William Smith's Footsteps

At the February 18, 1831 meeting of the Geological Society of London, Professor Sedgwick spoke of the practical lessons he learned by tracking William Smith's "footsteps" by following his maps (Phillips, 1844, p. 115). This process of following in the "footsteps" of William Smith was reinforced in 1844 by John Phillips, his adopted nephew (Phillips, 1844, p. 143). In his book "The map that changed the world", Simon Winchester acknowledges the time he spent walking in William Smith's footsteps, first as a child in the 1950s and again about 40 years later within the Jurassic outcrop belt of Great Britain (with Bath, Figure 7, at its centre) (Winchester, 2001).

As a consequence of reading the above two works and my web-based research into the details of the life and geological prowess of William Smith, I now realize that I also have been figuratively walking "in his footsteps" for almost 25 years, while conducting field and office investigations for the Manitoba Geological Survey, as an Industrial and Specialty Minerals Geologist. In addition, I am now aware of the many similarities of my daily geological work for the Province, with that undertaken by William Smith as an independent engineering and geological contractor 200 years ago. However, there are still many differences in his career from mine.

Figure 7: *a) 2015 road sign indicating Bath Road, situated to the north of Heathrow Airport; b) View looking west on the road to Bath (June 2, 2015), often travelled on by William Smith on his carriage trips to and from London.*

Figure 8: *a) Pillow lava in Edinburgh Castle, Scotland (June 6, 2015); b) Pillow lava, south of Star Lake, in Whiteshell Provincial Park, Manitoba (May 23, 1993).*

Observations and Conclusions

- It should be recognized that the same biostratigraphic procedures, implemented by Smith, are used by most fossil collecting organizations, including the Manitoba Geological Survey and the Canadian Fossil Discovery Centre in Morden, Manitoba. In addition, William Smith's recognition that Phanerozoic outcrop belts are usually laterally continuous on strike, and unless disturbed by later events they also dip shallowly and generally in one direction with the youngest beds overlying the oldest. This concept is critical to the geoscientific understanding of all stratigraphic framework around the world.
- The geoscientific work carried out by William Smith, beginning in 1800, was that of a (wholly-funded) one-man "geological survey" before such a concept had been formally put in place. Although British Government geological investigations had begun as early as 1832, it was not until 1845 that the Geological Survey of Great Britain and Ireland was set up by Act of Parliament.
- Although never formally trained in the then fledging science of geology, William Smith acquired his extensive geological and paleontological knowledge during a succession of careers, which included land surveying, colliery projects, canal building and land reclamation. In some years he travelled up to 16 000 km carrying out this work, which provided him with the opportunity to add to his extensive collection of detailed geological observations. The non-geological careers provided a basic income, but in order to publish the results of his findings, William Smith had to cover the costs himself or to request funds from a variety of established individuals who saw a value in his work. In fact, the cost of publishing his greatest achievement (Figure 1) resulted in him being thrown into debtors prison.
- The attached photographs (Figures 7 to 11), which I took during my trip to Great Britain, the Republic of Ireland and France from June 2 to 13, 2015, and also during the past 50 years of my geological career in Manitoba, are a simplistic attempt to document some of the geology I've seen while "walking in William Smith's footsteps". As a direct result of doing so, and also in recognition of his achievements, which included the bicentennial anniversary of the release of the first paleontologically-controlled geological map of a nation state, I propose that the Manitoba Geological Survey and the Canadian Fossil Discovery Centre acknowledge William "Strata" Smith as the Father of Industrial and Specialty Minerals Geology and of Biostratigraphic Correlation.

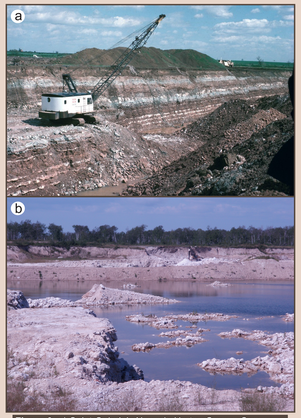

Figure 9: *a) Saint-Gobain's Newark, Horton Grange Quarry, Great Britain gypsum pit showing dragline (1977, Courtesy of British Geological Survey, P550365); b) Saint-Gobain's Harcus Manitoba gypsum quarry (August 20, 2015).*

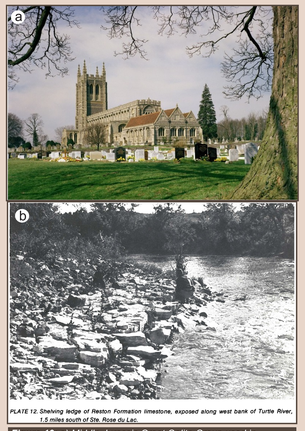

Figure 10: *a) Middle Jurassic Great Oolite Group used in construction of Holy Trinity Church, Long Melford, Suffolk, Great Britain (1979, Courtesy of British Geological Survey, P212347); b) Middle Jurassic Reston Formation outcrop on Turtle River, south of St. Rose du Lac, Manitoba (1971).*

Figure 11: *a) Remains of lime kiln on grounds of Blarney Castle, Ireland (June 4, 2015); b) Graymont's Faulkner lime plant in Manitoba (September 3, 2014).*

References

Phillips, J. 1844: Memoirs of William Smith, L.L.D.; author of the "Map of the strata of England and Wales"; John Murray, London, England, 150 p. (Digital copy available at: https://archive.org/details/memoirsofwilliam00philrich).

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Acknowledgements

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