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William Lonsdale and the first thin-section of a fossil bryozoan

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1. Introduction

The general adoption of thin-sections in bryozoan studies can be dated back to the 1880s when Henry Alleyne Nicholson (1844–1899) began to produce them for his work on Cincinnati and other bryozoans.¹ Soon afterwards Edgar Oscar Ulrich (1857–1944) and Ray Smith Bassler (1878–1961) first began to produce thin-sections of bryozoans in large numbers, and many of these they sold to augment their incomes. By 1890 the use of thin-sections in studies of bryozoans was routine. The first thin-section of a fossil bryozoan is thought to be that of a trepostome bryozoan collected from near St Petersburg in the early 1840s. It was described and illustrated in 1845 by William Lonsdale as the coral *Chaetetes Petropolitanus* in an appendix in Roderick Impey Murchison's *Geology of Russia in Europe and the Ural Mountains*. This specimen is now in the collections of the Natural History Museum, London.

2. Roderick Murchison, geologist

Roderick Impey Murchison (1792–1871) first became interested in the fledgling science of geology soon after he completed his career in the British Army.² He had seen action in the Peninsular War, and following his discharge his wife Charlotte urged him to find a new pastime, so he turned his attention to geology. In time he became a major force in the geological community in the British Isles being eventually appointed as Director of the Geological Survey of Great Britain in 1855. He was also honoured by being elected



Figure 1. R.I. Murchison: author of the Silurian and Permian and co-author of the Devonian.

President of the Geological Society of London twice and the Royal Geographical Society four times. On his death under the terms of his will he instituted the Murchison Medal which is still presented annually by the Geological Society of London.

Murchison was primarily interested in stratigraphy and early in his career was a close friend of Adam Sedgwick (1785–1873), Professor of Geology at the University of Cambridge, who had mentored Charles Darwin in geology. In the early 1830s Sedgwick and Murchison tackled the geological sequences exposed in Wales. Sedgwick studied the northern part of the principality which he placed in the a geological period, the Cambrian named in 1835. Murchison, working in the south, in the same year named the rocks mapped by him as belonging to the new period, the Silurian. In 1839 they described the sequences in Devon which they attributed to the new geological period, the Devonian. Shortly afterwards the two men fell out as Murchison began to encroach on the Cambrian much of which he argued belonged to his Silurian.³ This debate was resolved in 1879 shortly after the protagonists' deaths, when Charles Lapworth (1842–1920) delineated the Ordovician which he recognised lay between the Cambrian and the Silurian.

3. Travels in Russia

In 1840 Murchison visited Russia to examine its geology and the following year returned for the same purpose on the invitation of Tsar Nicholas I.⁴ Travel in the mid-nineteenth century was a difficult undertaking and Murchison ensured that he was well-

THE GEOLOGY OF
RUSSIA IN EUROPE
AND
THE URAL MOUNTAINS.

BY
RODERICK IMPEY MURCHISON,

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CORRESPONDENT OF THE ROYAL INSTITUTE OF FRANCE, ETC.

EDOUARD DE VERNEUIL.

V. PRES. GEOL. SOC. FRANCE, MEM. PHILOM. SOC. PARIS, HON. MEM. GEOL. SOC. LOND., ETC.

AND

COUNT ALEXANDER VON KEYSERLING,
GENTLEMAN OF THE CHAMBER OF H. I. M. THE EMPEROR OF ALL THE RUSSIAS, ETC.

"Ce temps qui nous manque ne manque point à la nature.....
Cet instant, la vie humaine étendue même autant qu'elle peut
l'être par l'histoire, n'est qu'un point dans la durée, un seul fait
dans l'histoire des faits de Dieu."—*Buflon, Théorie de la Terre.*

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Figure 2. Title-page of volume 1 of The Geology of Russia in Europe and the Ural Mountains (1845).

prepared. He had to bring all of his field equipment from England, and even went as far as purchasing a folding iron bed from a supplier in Bond Street, London so that he would be comfortable in the field! He was accompanied on both of the tours by a French lawyer and fossil collector Philippe Édouard Pouillet de Verneuil (1805–1873)⁵ and for a portion of the trips by Alexander Andreevich Keyserling (1815–1891), an employee of the Russian Mining Department.⁶ de Verneuil was an inveterate traveller who had visited north Wales in 1835 to examine the geology described by Murchison, and eleven years later was in the United States. He actively promoted Murchison's ideas in France, where he had some influence in the geological community—he served as President of the



Figure 3. Thin-section of Diplotrypa petropolitana illustrated in Murchison et al. (1845): the first thin-section of a fossil bryozoan. Natural History Museum, London. [Actual size]

Geological Society of France three times, in 1840, 1853 and 1867.

In 1844 Keyserling married the daughter of the Russian Minister of Finance and soonafterwards retired back to his estates in Estonia, from where he continued his career as a gentleman scientist.

On 19th May 1840 Murchison and de Verneuil embarked the *Caledonia* which steamed across the North Sea to the River Elbe and on to Hamburg. There Murchison purchased a calèche (a two-wheeled carriage drawn by horses in which he travelled throughout his 1840 tour) and in this the pair travelled to Berlin where they met with Alexander von Humboldt, Christian Gottfried Ehrenberg (who coined the term ‘Bryozoa’), and Gustav Rose, who together had travelled in Russia in 1829.⁷ Returning to Lubeck they loaded the calèche on board a steamer bound for St Petersburg. The 1840 tour took the party past Lake Ladoga and north to the shores of the White Sea, from there they travelled southwards along major rivers in a zig-zag pattern to Moscow, returning directly to St Petersburg.

The 1841 tour was more extensive and began in St Petersburg following an overland trip to the city through northern Europe. However, this time the tour was longer than that undertaken a year earlier and Murchison and his companions followed a longer looping

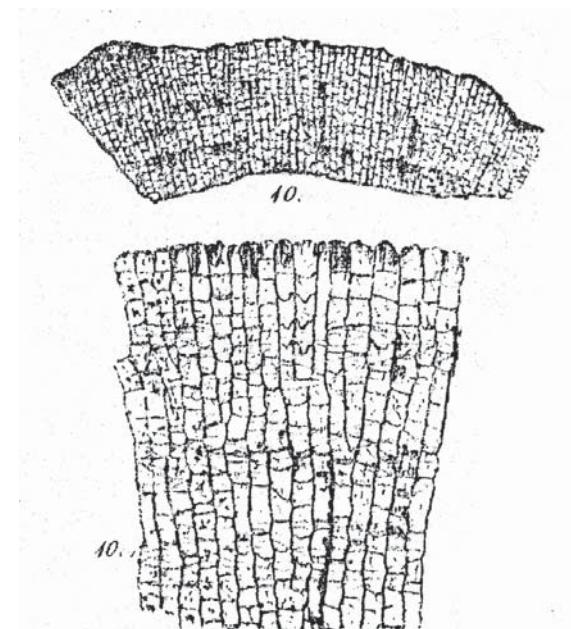


Figure 4. Figure 10 from Geology of Russia showing thin-section of 'Chaetetes Petropolitanus' (top) and enlargement (bottom). Note engraving is a reverse of the thin-section.

route that took them once they had reached Moscow directly east to the Urals. There Murchison discovered the sequences which he thought were distinctive, a conclusion reached by de Verneuil who was responsible for the identification and description of the fossils from these units which he correlated with the Zechstein in Germany and the Magnesian Limestone in northeast England. From the Urals the party moved southwards before returning along the River Volta where Keyserling made a special study of the geology of the Kirghiz Steppes, and the River Don to the Sea of Azof. They then travelled northwards to Moscow where they met the Tsar who awarded Murchison a diamond-encrusted Second-class Cross of St Anne (a major Russian decoration) while de Verneuil received a plain Cross. They then travelled to St Petersburg along a now familiar route.

Arising out of this work Murchison was able to prove for himself the occurrence of Devonian rocks in Russia, but was also able to define the succession around Perm near the Ural Mountains which he placed into its own geological period, the Permian. One can make a strong case for including de Verneuil as a co-author of the Permian, but he is rarely placed alongside Murchison for this achievement. In 1845 the three geological explorers published a large format two volume *The Geology of Russia in Europe and the Ural Mountains* (Figure 2). Shortly after his return the ambitious Murchison crowned his career when he was ennobled by Queen Victoria on 11th February 1846 when he was made a Baronet.

4. William Lonsdale, palaeontologist

William Lonsdale⁸ was born in Bath in 1794. He joined the army and like Murchison served during the Peninsular War, but unlike Murchison also saw action at the Battle of Waterloo in 1814. The following year he resigned as Lieutenant on half salary and began to study fossils. In 1825 he was appointed as Honorary Curator to the newly established Bath Royal Literary and Scientific Institution and rapidly built up a sizeable collection. In 1829 he moved to London on his appointment as Curator and Librarian (later Assistant Secretary and Librarian) of the Geological Society on a salary of £125 per annum,⁹ and he remained in this post until 1842 when ill-health forced his retirement. On leaving the Society his friends presented him with the large sum of £600 which they had placed into a silver vase.¹⁰

Lonsdale never married, and suffered from poor health for some considerable time, although he did live for nearly thirty years after leaving the employment of the Geological Society. He cannot have found life easy and a measure of his character was given by Charles Darwin in a letter addressed to Charles Lyell: 'I had long talk with Lonsdale on Friday. I have not for years seen him so cheerful, or I might say I never saw him really cheerful before. ... He is evidently deeply gratified by the Present.'¹¹

Following retirement Lonsdale carried out palaeontological work for his peers, and it is probably that he received some payment from them for this. He undertook work for Charles Lyell, and was responsible for taxonomic accounts in books by Charles Darwin,¹² the Polish explorer Paul Edmund de Strzelecki (1793–1873),¹³ and Roderick Murchison.

The latter two comprised descriptions of corals and what are now known to be bryozoans collected in Australia, of which for several species he erected the genus *Stenopora*.

Lonsdale received the Wollaston Medal of the Geological Society in 1846 and was also the recipient of their Wollaston Fund on four occasions. This funding partially allowed him to continue his studies on Devonian and other corals. He died in Bristol in 1871 and is buried in Arno's Vale Cemetery in the city.¹⁴

Today Lonsdale is not immediately recognised as being among the top-rank of British scientists of his time, although this due to the failure of modern commentators to fully appreciate his achievements. His research also helped provide some evidence for Darwin's theories of evolution, in that he recognised that many fossils in older beds were of organisms clearly more primitive than those found in younger beds. He was also instrumental in providing evidence for the distinctive nature of the fossil succession in north Devon.¹⁵ It was this evidence that helped provide Sedgwick and Murchison with the means for the establishment of the Devonian Geological Period, so perhaps Lonsdale deserves at least co-authorship of the Period.

Fossil and petrological material collected by Lonsdale is in the Bath Royal Literary and Scientific Institution collections, while some fossil material collected by others (including Charles Darwin) but described by Lonsdale is in the Natural History Museum, London.

5. First thin-section of a fossil bryozoan

The first thin-sections made of any fossil are thought to be those produced of petrified wood in 1828 by the Scotsman William Nicol (c. 1768–1851) who invented the prism that carries his name and which is an essential component of the petrological microscope.¹⁶

During Murchison's trip bryozoan specimens (considered at the time to be corals) were collected from various localities, including the River Volkof, the ravines of Pulkovka and Popovka south of St Petersburg, and the River Sias south of Lake Ladoga which the group visited on 19th June 1840.¹⁷ It was one of the specimens collected on this date that was later cut and mounted as a thin-section illustrated here (Figure 3). This is almost certainly the first ever bryozoan thin-section produced.

The specimen was illustrated in Plate A, Figure 10, by Lonsdale as the coral *Chaetetes Petropolitanus* from the Lower Silurian (= Ordovician) and described in an appendix in the volume *The Geology of Russia in Europe and the Ural Mountains* (Figure 4): 'Globular, hemispherical or inversely conical; tubes polygonal, irregularly arranged; diaphragms not in bands but unequally distributed throughout the tubes.' It was the only sectioned material illustrated, and if other thin-sections were available to Lonsdale they have not come to light. There is little doubt from the description and illustration that Lonsdale was reporting on the nodular trepostome bryozoan now called *Diplotrypa petropolitana* Nicholson, 1879.¹⁸ This is one of several nodular bryozoans from the Lower Palaeozoic of the Baltic region¹⁹ which require thin-sectioning before they can be identified with confidence. Lonsdale noted that the Russian material was identical to specimens from near Oslo in Norway.

This thin-section was originally deposited in the Museum of Practical Geology in London ('M.P.G.' is written on the label) which had been established by Henry De la Beche in 1837. The Museum was located for many years at Jermyn Street but following structural damage caused by a bomb in 1917 the premises were closed in 1923 and the collections were moved four years later to a new museum on Exhibition Road, South Kensington,²⁰ adjacent to the British Museum (Natural History) now the Natural History Museum.

Murchison and Lonsdale's thin-section of a fossil bryozoan is now in the palaeontological collections of the Natural History Museum, London.

6. Acknowledgment

I am grateful to Paul Taylor (NHM) for permission to examine and photograph the thin-section.

7. Dedication

This short paper is fondly dedicated to the memory of Nils Spjeldnaes who first discussed the antiquity of this thin-section with me.

Notes

- 1 See paper by Richard S. Boardman, this volume.
- 2 For further information on Murchison see M. Collie, 'Roderick Impey Murchison (1792–1871)', In B. Lightman (ed.) *Dictionary of British Nineteenth Century Scientists*, Volume 3 (Thoemmes Continuum, Bristol, 2004), pp. 1442–1446; A. Geikie, *The Life of Sir Roderick I. Murchison*, 2 volumes (John Murray, London, 1875).
- 3 A scholarly account of the stratigraphical arguments between Sedgwick and Murchison is given in J. Secord, *Controversy in Victorian Geology: the Cambrian-Silurian Dispute* (Chicago University Press, Chicago and London, 1986).
- 4 Murchison's account of his travels in Russia has been recently published in M. Collie and J. Diemer, *Murchison's wanderings in Russia* (British Geological Survey, Nottingham, 2004) from where I have derived most of these details.
- 5 For further information on de Verneuil see R.C. Tobey, 'Verneuil, Philippe Édouard Pouletier de', *Dictionary of Scientific Biography* 13 (1976), 620–621.
- 6 For further information on Keyslering see V.V. Tikhomirov, 'Keyslering, Alexandre Andreevich', *Dictionary of Scientific Biography* 7 (1973), 319–320. See also Collie and Diemer, note 4, pp. 436–437.
- 7 F. Naumann, 'Alexander von Humboldt in Russia: the 1829 expedition'. In P.N. Wyse Jackson (ed.), *Four Centuries of Geological Travel: the search for Knowledge on Foot, Bicycle, Sledge and Camel*. Geological Society Special Publications 287 (2007), 161–175.
- 8 For more on Lonsdale and his palaeontological work see P. Tasch, 'Darwin and the forgotten

- Mr. Lonsdale'. *Geological Magazine* **87** (1950), 292–296; J.R. Cribb, 'William Lonsdale (1794–1871)', In B. Lightman (ed.) *Dictionary of British Nineteenth Century Scientists*, Volume 3 (Thoemmes Continuum, Bristol, 2004), pp. 1261–1262
- 9 M.J.S. Rudwick, *The Great Devonian Controversy* (Chicago University Press, Chicago and London, 1985).
- 10 Geikie, note 2, volume 1, p. 372; G.L. Herries Davies, *Whatever is under the Earth. The Geological Society of London 1807 to 2007* (Geological Society of London, London, 2007), p. 73. Darwin contributed £10 to this fund (see <http://www.darwinproject.ac.uk/darwinletters/calendar/entry-648.html>).
- 11 Letter from Charles Darwin to Charles Lyell, 5th and 7th October, 1842 (See: <http://www.darwinproject.ac.uk/darwinletters/calendar/entry-649.html>).
- 12 William Lonsdale, 'Description of six species of corals, from the Palaeozoic formation of Van Diemen's Land'. In C. Darwin, *Geological observations on the volcanic islands visited during the voyage of H.M.S. Beagle, together with some brief notices of the geology of Australia and the Cape of Good Hope. Being the second part of the geology of the voyage of the Beagle, under the command of Capt. Fitzroy, R.N. during the years 1832 to 1836* (Smith Elder and Co., London, 1844), pp. 161–169.
- 13 Strzelecki, P.E. de, *Physical Description of New South Wales. Accompanied by a Geological Map, Sections and Diagrams, and Figures of the Organic Remains* (Longman, Brown, Green and Longmans, London, 1845), 462 pp.
- 14 Cribb, note 8, p. 1262.
- 15 W. Lonsdale, 'On the age of the limestones of South Devon', *Proceedings of the Geological Society* **3** (1840), 281–286. Also see Tasch, note 8 and Rudwick, note 9.
- 16 L.V. Pirsson, 'The rise of petrology as a science', *American Journal of Science* **46** (1918), 222–239. However, it has been suggested elsewhere that Nicol's priority is unproven and that the production of thin-sections of minerals and of teeth and bones had been carried out by various people in Edinburgh in the second decade of the 1800s. See J.W. Judd, 'Henry Clifton Sorby, and the birth of microscopical petrology', *Geological Magazine* **55** (1908), 193–204.
- 17 See Collie and Diemer, note 4, p. 45.
- 18 Complexities have surrounded the nomenclature and authorship of *Diplotrypa petropolitana* which have recently been resolved through intervention to, and the opinion of, the International Commission on Zoological Nomenclature. For the issues see: P.N. Wyse Jackson, C.J. Buttler, and M.M. Key, Jr., 'Dianulites petropolitana Dybowski, 1877 and *Diplotrypa petropolitana* Nicholson, 1879 (Bryozoa): proposed conservation of the specific names', *Bulletin of Zoological Nomenclature* **58** (2001), 215–219; N. Spjeldnaes, 'Comments on the proposed conservation of the specific names *Dianulites petropolitana* Dybowski, 1877 and *Diplotrypa petropolitana* Nicholson, 1879 (Bryozoa)', *Bulletin of Zoological Nomenclature* **59** (2002), 40–42; and P.N. Wyse Jackson, C.J. Buttler, and M.M. Key, Jr., 'Comments on the proposed conservation of the specific names *Dianulites petropolitana* Dybowski, 1877 and *Diplotrypa petropolitana* Nicholson, 1879 (Bryozoa)', *Bulletin of Zoological Nomenclature* **59** (2002), 42–44. For the resolution see: International Commission on Zoological Nomenclature, 'Opinion 2042 (Case 3160). *Dianulites petropolitana* Dybowski, 1877 and *Diplotrypa petropolitana* Nicholson, 1879 (Bryozoa): conserved', *Bulletin of Zoological Nomenclature* **60** (2003).
- 19 The classic study of such bryozoans is that by R.S. Bassler, 'The early Paleozoic Bryozoa of the Baltic Provinces', *Bulletin of the United States National Museum* **77** (1911), 1–382.
- 20 See Herries Davies, note 10, p. 266.