

# Two Hundred Proud Years – the Bicentenary of Johnson Matthey

## Origins of the company and of today's research activities in science and technology

### W. P. Griffith

Department of Chemistry, Imperial College, London  
SW7 2AZ, UK

Email: [w.griffith@ic.ac.uk](mailto:w.griffith@ic.ac.uk)

The story of the first 200 years of Johnson Matthey is told. The firm was started in 1817 by Percival Johnson, but in 1851 George Matthey became a partner and the present name was derived from these two partners. A number of milestones in its illustrious history are reviewed, and some of the current activities of the company are brought up to date, in this short article.

### Introduction

Thirty-five years ago a magisterial volume was published by Johnson Matthey on "A History of Platinum and its Allied Metals", but despite its title that book is also a history of the firm itself from 1817 to 1982 (1). The present account marks Johnson Matthey's bicentenary, and is much indebted to that volume; many aspects of the story have also been chronicled by *Platinum Metals Review* and its 2014 successor, the *Johnson Matthey Technology Review*. Appropriate references to these journals are given wherever possible. A *Platinum Metals Review* paper marking the firm's sesquicentenary was published in 1967 (2), and a recent paper notes that Johnson Matthey is one of the oldest British chemical firms still in existence (3). In this survey we concentrate on the firm's formative years and, while highlighting its activities with platinum group metals (pgms), include

some of Johnson Matthey's considerable recent non-pgm activities.

### The Johnsons of Maiden Lane

The forebears of Percival Norton Johnson, who in 1817 became the founder of the precursor of Johnson Matthey, came from a family well acquainted with metal assaying and refining (4, 5). His grandfather John Johnson (1737–1786) had since 1777 been an assayer of ores and metals, mostly silver, gold and some base metals, at No. 7, Maiden Lane (now part of Gresham Street between Wood Street and Foster Lane, London EC2). His son, also John Johnson (1765–1831) was apprenticed to him in 1779, and on his father's death took over his business, becoming the only commercial assayer in London. Around 1800 he became involved with the rapidly developing platinum metals industry, using crude 'platina' smuggled to Britain via Jamaica from what is now Colombia. His biggest early customer was probably William Hyde Wollaston (1766–1826) (6), who made many purchases of platina between 1802–1819 from Johnson. Wollaston developed a secret process for isolating platinum so pure that it could be fashioned into crucibles, chalices and other vessels and drawn into wires much thinner than a human hair; this business made him wealthy. In addition to isolating rhodium and palladium in 1802 (6, 7), he sold to his friend and partner Smithson Tennant some ore from which Tennant in 1804 isolated iridium and osmium (8, 9).

Percival Norton Johnson (1792–1866), was born on 29th September 1792 at 6–7 Maiden Lane and was

apprenticed to his father John Johnson. In 1812, aged only 19, he established his scientific credentials in a paper showing that platinum alloyed with silver and gold would dissolve in nitric acid (10, 11).

### The Early Years of Percival Johnson's New Firm

The date of foundation of what 34 years later would be called Johnson Matthey is established as January 1st 1817 (1, 2). On that day Percival Johnson left his father's business and set up his own business as an 'Assayer and Practical Mineralogist' with his brother John Frederick as assistant, although he would later collaborate with his father (2). The year 1817 was also that in which Humphry Davy showed that a platinum wire (almost certainly provided by Johnson) would catalyse the combination of oxygen and hydrogen – the first demonstration of heterogeneous catalysis (12, 13).

In 1818 Percival moved to 8 Maiden Lane and in 1822 to 79 Hatton Garden, the latter being expanded in 1850. In 1826 he brought in another talented assayer, John Stokes, renaming the firm Johnson and Stokes in 1832. When Stokes died in 1835, William John Cock (1813–1892), like Percival Johnson a founder member of the Chemical Society in 1841 (14), joined Percival in the firm which was now called Johnson and Cock. William was the son of Thomas Cock (1782–1842), Percival's brother-in-law, also an assayer.

William Cock was a considerable chemist and metallurgist, devising a new procedure for increasing the malleability of platinum, and published 'On Palladium – Its Extraction, Alloys &c.' (15, 16) in one of the earliest of the Chemical Society's papers. Johnson and Cock produced a platinum medal for Queen Victoria's coronation in 1838, and in 1844 made the platinum from which the standard pound weight was made. Cock resigned in 1845 from ill-health, but continued collaboration; Johnson's firm was now called P. N. Johnson & Co (1).

### Johnson's Firm Renamed Johnson and Matthey

In 1838 Johnson and Cock apprenticed the second person commemorated in the present firm's name, George Matthey (1825–1913) (17). Just thirteen when they first employed him, he quickly became interested in platinum and Cock took him under his wing. Matthey had a shrewd business mind as well as an excellent knowledge of chemistry and metallurgy, and he

persuaded a reluctant Johnson to exhibit samples of platinum, palladium, rhodium and iridium at the Great Exhibition of 1851, for which they were awarded a prize. Johnson took him into partnership in the same year and renamed the firm Johnson and Matthey. In 1846 Percival Johnson was elected a Fellow of the Royal Society (FRS), his election being supported by Michael Faraday (to whom the firm had given an ingot of platinum and some platinum wire for a famous Royal Institution discourse).

In 1852 Johnson Matthey was appointed official assayer to the Bank of England followed by official refiner in 1861. A key event in the firm's history was Matthey's collaboration with Jules Henri Debray (1827–1888) for melting platinum on a large scale (18). At the Paris Exhibition of 1867, Johnson Matthey was awarded two gold medals for its fine display of some 15,000 ounces of pgms in many forms, and as a result George Matthey became a Chevalier of the *Légion d'Honneur*, one of France's highest honours. In 1874 the firm made the first standard metre and standard kilogram in 10% iridium-90% platinum alloy for the International Metric Commission. This kilogram is still the standard measure and will be so until late 2018 when it will be defined using a more modern technique. It is now held in the the *Bureau international des poids et mesures* in Sèvres (19). In a rare departure at the time from pgms, Johnson Matthey almost certainly provided the high purity aluminium for the statue known as Eros, erected in 1892 in Piccadilly Circus (20).

In 1879 Matthey was awarded an FRS: like Johnson and Cock he had published several papers, including an important one on the removal of rhodium and iridium from platinum, and the preparation of a platinum-iridium alloy (21). Both he and Johnson are commemorated in the new "Oxford Dictionary of National Biography" (22, 23). Like Johnson, George Matthey was a great supporter of the Chemical Society, thus continuing a long and still current association between the Society (now the Royal Society of Chemistry) and Johnson Matthey (14).

In 1860 George Matthey's brother Edward (1836–1918) was appointed a junior partner: he had studied under Hofmann at the Royal College of Chemistry. Another partner was John Scudamore Sellon (1836–1918), a nephew of Johnson's wife, who had commercial experience; the firm was now renamed Johnson Matthey and Co (1). On 1st June 1866 Percival Johnson died (22); George Matthey wrote an obituary (published in the Anniversary meeting

of the Chemical Society, March 30th, 1867, page 392 (24)). George Matthey retired in 1909 after a 70-year career; and died on 14th February 1913 (23, 25). John Sellon replaced him as chairman, but died in 1918 as did Edward Matthey. The Matthey succession on the company's board was secured by George's son Percy St. Clair Matthey (1862–1928) and, from 1928, by Edward Matthey's son Hay Whitworth Pierre Matthey (1876–1957), chairman until 1957 (1).

Johnson Matthey became a limited company in 1891 and its ordinary shares were first listed on the London Stock Exchange in 1942. It subsequently opened businesses in the USA (1927); Australia and New Zealand (1948); across Europe (in the 1950s); India (1964); Japan (1969); Mexico and Malaysia (1995) and in China (2001). There are now Johnson Matthey operations in over 30 countries.

### Sources of Platinum Group Metals

John and Percival Johnson used platina smuggled into Britain by speculators from the Choco district of what is now Colombia from ca. 1780–1830. After Colombia became independent of Spain less platina found its way to Europe and Johnson Matthey seems to have used Russian supplies from around 1850 (1) and, early in the 20th century, Canadian sources from Ontario (2). Everything changed though with the discovery of huge reserves of pgm-bearing ore in South Africa, first found there in 1906 (26). In 1925 the huge South African Merensky Reef which contains some 80% of the world's reserves of pgms was discovered, and by 1931 Johnson Matthey took and continued to take pgms from the mines in the Rustenburg region, 100 km west of Pretoria (27), for many years. In 1925 the groundbreaking Powell-Deering smelting and refining process for Rustenburg ore was developed by Johnson Matthey. A refinery was set up in Brimsdown, near Enfield, UK, in 1928. This is still in use, though primary refining of South African pgm-containing ores is done in South Africa. Some primary refining is carried out by Johnson Matthey. However the company remains the world's largest secondary refiner of pgms, with refineries in Royston and Brimsdown in the UK, West Deptford in the USA and in China.

### Johnson Matthey in the 20th and 21st Centuries

Until the late 19th century Johnson Matthey was mainly concerned with relatively small-scale applications

of platinum and other pgms, and though admired, particularly in France, was relatively little known abroad. It is now a major international company dealing with many aspects of pgm and non-pgm technologies. Major factors leading to this were the establishment of a plentiful source of pgms, the foundation of an outstanding research department, and its later diversification with non-pgm technology.

### Johnson Matthey's Research Department, and Collaboration with Academic Institutions

In 1918 Alan Richard Powell (1894–1975) established a research department at Johnson Matthey and was for 36 years its Research Manager; he was awarded an FRS in 1953 (28). The department initially occupied two rooms at Hatton Garden but in 1938 moved to Wembley, and then in 1976 to its present location at Sonning Common, near Reading (29). Powell wrote an account of the first fifty years of his department (30).

Early in the 20th century Johnson Matthey launched an unusual initiative, later called the Johnson Matthey Loan Scheme, of which the author was for many years a beneficiary, as were many others in university and other departments worldwide. Compounds of rare materials, mainly pgms, were given, without charge, to *bona fide* researchers for work on innovative science. Researchers were free to publish their material, the only stipulation being that the residues of material used were returned to Johnson Matthey (31). Much useful work resulted from this; a good example being that of the late Sir Geoffrey Wilkinson (FRS and Nobel laureate) whose extensive work on synthesis and homogeneous catalysis by pgm complexes would have been impossible without the scheme (32, 33). The scheme has been replaced by one in which Johnson Matthey continues to collaborate with universities and others, and often provides research materials.

In 1957 the quarterly *Platinum Metals Review* was founded by Johnson Matthey; after 58 years of production it became the *Johnson Matthey Technology Review* in mid-2014, partly to signal that much of the company's current research and applications are no longer pgm-based. Volume numbers remain as for *Platinum Metals Review*.

### Areas of Prime Development in Johnson Matthey

The company is actively involved with many areas

including automotive emission control catalysts, homogeneous and heterogeneous catalysis for petroleum refining, oxidation of ammonia to nitric acid, manufacture of active pharmaceutical ingredients, components for glass manufacture, thermocouples and advanced battery materials, fuel cells and water purification, and much more. Johnson Matthey states that its focus today as it celebrates its 200th year is on the global priorities of cleaner air, the efficient use of natural resources and improved health (34, 35). Here we briefly note some aspects of Johnson Matthey's research and production in these areas.

### Clean Air: Automotive

Johnson Matthey was and is a leader since the 1960s in conversion of the toxic components of vehicle exhaust gases – hydrocarbons, carbon monoxide and oxides of nitrogen (NO<sub>x</sub>) – to carbon dioxide, water and nitrogen; there has also been much progress with diesel emissions and particulates (36–38) and with removal of alkenes and alkynes from automotive emissions. In 1977 Johnson Matthey was presented with the Queen's Award for Technological Achievement for its pioneering work in emissions control (39). The company now accounts for one in three of the catalysts on cars around the world.

A non-pgm area of research and production is the design and manufacture of low-power low-capacity batteries for industrial and leisure uses and high-power high-capacity batteries for automotive applications, such as high performance hybrid and plug-in hybrid vehicles. Most of these are lithium-ion based. The first themed issue of *Johnson Matthey Technology Review* in 2015 was devoted to battery technologies (40, 41).

### Efficient Use of Natural Resources

In 2002 ICI sold its Syntex process catalysts business along with its Tracerco subsidiary to Johnson Matthey. The process catalysts business provided Johnson Matthey with a strong global position in non-precious metal catalysts used in a wide range of major chemical manufacturing processes, an area that has been strengthened by further acquisitions. In 2006 Johnson Matthey bought Davy Process Technology (DPT), thus strengthening its position as a catalyst and technology supplier to the world's chemical and energy industries. Some of the many processes involved include the catalysed conversion of syngas (carbon monoxide,

carbon dioxide and hydrogen) to methanol; oxo alcohols from hydroformylation reactions involving alkene oxidations with syngas; and the production of biodiesel.

### Health: Chemotherapy

Another area in which Johnson Matthey played an important early and continuing part was the use of pgm complexes, particularly of platinum, in the treatment of malignant cancers, starting in 1983. First-generation (cisplatin), and many second- and third-generation drugs have been made and investigated by the company, and very recently reviewed (42). In 1993 Johnson Matthey bought Meconic, a holding company for the pharmaceutical company MacFarlan Smith, and this became part of Johnson Matthey; a major interest now is the synthesis of pharmaceuticals often without pgm-based technology.

### Conclusions

The origins of Johnson Matthey – founded in 1817 by Percival Johnson and later strengthened by the appointment of George Matthey – have been described with some of its principal achievements over the last two centuries. The focus of the company in the 21st century which has grown to include many non-pgm technologies has been highlighted.

### Acknowledgement

The author thanks Dan Carter and Ian Godwin for their help in providing information on some of the latest initiatives at Johnson Matthey.

### References

1. D. McDonald and L. B. Hunt, "A History of Platinum and its Allied Metals", Johnson Matthey, London, UK, 1982, pp 450
2. D. McDonald, *Platinum Metals Rev.*, 1967, **11**, (1), 18
3. A. Extance, *Chemistry World*, 2017, **14**, (5), 22
4. D. McDonald, "The Johnsons of Maiden Lane", Martins Publishers Ltd, London, UK, 1964, 180 pp
5. D. McDonald, "Percival Norton Johnson, the Biography of a Pioneering Metallurgist", Johnson Matthey, London, UK, 1951, 224 pp
6. M. C. Usselman, "Pure Intelligence: The Life of William Hyde Wollaston", The University of Chicago,

- Chicago, USA, 2015, pp 424
7. W. P. Griffith, *Platinum Metals Rev.*, 2003, **47**, (4), 175
  8. W. P. Griffith, *Platinum Metals Rev.*, 2004, **48**, (4), 182
  9. L. B. Hunt, *Platinum Metals Rev.*, 1987, **31**, (1), 32
  10. P. Johnson, *Phil. Mag.*, 1812, **40**, (171), 3
  11. D. McDonald, *Platinum Metals Rev.*, 1962, **6**, (3), 112
  12. H. Davy, *Phil. Trans. R. Soc. Lond.*, 1817, **107**, 77
  13. L. B. Hunt, *Platinum Metals Rev.*, 1979, **23**, (1), 29
  14. W. P. Griffith, *Platinum Metals Rev.*, 2013, **57**, (2), 110
  15. W. J. Cock, *Mem. Chem. Soc., Lond.*, 1843, **1**, 161
  16. L. B. Hunt, *Platinum Metals Rev.*, 1983, **27**, (3), 129
  17. L. B. Hunt, *Platinum Metals Rev.*, 1979, **23**, (2), 68
  18. W. P. Griffith, *Platinum Metals Rev.*, 2009, **53**, (4), 209
  19. T. J. Quinn, *Platinum Metals Rev.*, 1986, **30**, (2), 74
  20. D. McDonald, "The History of Johnson, Matthey & Co. Limited", Volume 1, Johnson Matthey, London, UK, 196X
  21. G. Matthey, *Proc. R. Soc. Lond.*, 1878, **28**, (190–195), 463
  22. I. E. Cottington, 'Johnson, Percival Norton (1792–1866)', "Oxford Dictionary of National Biography", Oxford University Press, Oxford, UK, 2004
  23. I. E. Cottington, 'Matthey, George (1825–1913)', "Oxford Dictionary of National Biography", Oxford University Press, Oxford, UK, 2004
  24. *J. Chem. Soc.*, 1867, **20**, 385
  25. L. W. Stansell, F. S. Kipping, A. G. Perkin, C. A. Keane, A. P. Laurie, A. R. Ling and T. K. Rose, *J. Chem. Soc., Trans.*, 1914, **105**, 1189
  26. R. G. Cawthorn, *Platinum Metals Rev.*, 2006, **50**, (3), 130
  27. J. T. Bruce, *Platinum Metals Rev.*, 1996, **40**, (1), 2
  28. G. V. Raynor, *Biogr. Mem. Fell. R. Soc.*, 1976, **22**, 307
  29. I. E. Cottington, *Platinum Metals Rev.*, 1976, **20**, (3), 74
  30. A. R. Powell, *Platinum Metals Rev.*, 1968, **12**, (1), 22
  31. D. T. Thompson, *Platinum Metals Rev.*, 1987, **31**, (4), 171
  32. M. L. H. Green and W. P. Griffith, *Platinum Metals Rev.*, 1998, **42**, (4), 168
  33. H. Gay and W. P. Griffith, "The Chemistry Department at Imperial College: A History 1845–2000", World Scientific Publishing Europe Ltd, London, UK, 2017, 584 pp
  34. 'Johnson Matthey at 200 – Aligned for Growth', Johnson Matthey, London, UK, 20th April, 2017
  35. 'A New Brand, 200 Years in the Making: Johnson Matthey Reveals Refreshed Identity', Johnson Matthey, London, UK, 8th May, 2017
  36. A. Raj, *Johnson Matthey Technol. Rev.*, 2016, **60**, (4), 228
  37. C. Morgan, *Johnson Matthey Technol. Rev.*, 2014, **58**, (4), 217
  38. M. V. Twigg and P. R. Phillips, *Platinum Metals Rev.*, 2009, **53**, (1), 27
  39. *Platinum Metals Rev.*, 1977, **21**, (3), 84
  40. M. Green, *Johnson Matthey Technol. Rev.*, 2015, **59**, (1), 2
  41. P. Miller, *Johnson Matthey Technol. Rev.*, 2015, **59**, (1), 4
  42. C. Barnard, *Johnson Matthey Technol. Rev.*, 2017, **61**, (1), 52

---

## The Author



Bill Griffith is an Emeritus Professor of Chemistry at Imperial College, London, UK. He has much experience with the platinum group metals, particularly ruthenium and osmium. He has published over 270 research papers, many describing complexes of these metals as catalysts for specific organic oxidations. He has written eight books on the platinum metals, and has published, with Hannah Gay, a history of the 170-year old chemistry department at Imperial College (33). He is responsible for Membership at the Historical Group of the Royal Society of Chemistry.

---