Jolly Good Fellows
UCL & The Royal Society
Dionysius Lardner
William Sharpey
Victor Alexander Haden Horsley
Ray Lankester
William Ramsay
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John Ambrose Fleming
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UCL Library Services
Special Collections
July–December 2010
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Dr. Jon Agar from Science & Technology Studies introduces this exhibition by discussing UCL’s long association with the Royal Society based on his own investigations and nine particular individuals from UCL’s past.
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Introduction

This is a tale of two institutions, both with a home in London but possessing global reach, and both charged with missions to gather, generate and transmit knowledge for a greater good.

The elder institution, celebrating its 350th anniversary this year, is the Royal Society, or to give it its full title, as named in a royal charter of 1663, the Royal Society of London for Improving Natural Knowledge. The fellows who met in the second half of the seventeenth century – including Robert Hooke, Christopher Wren and Isaac Newton – gathered to witness public demonstrations of the new experimental science, many of which were reported in the pioneering journal, the Transactions of the Royal Society. Through the eighteenth century the Royal Society served as the premier site for scholarly and genteel debate over natural science.

The younger institution is University College, London. Founded in 1826, the new university was designed as a progressive and secular alternative to Oxford and Cambridge, universities which demanded that students and faculty accept Anglican doctrine. UCL has taught across the humanities and sciences from its foundation, and soon developed a very strong medical school in association with its sister institution, University College Hospital, established in the 1830s.

The geography of London matters in understanding how the relations between the two institutions developed. UCL was built among the orderly new streets of Bloomsbury, near the British Museum, not far from the edge of London (Greenwood’s map of 1827 shows that you could walk from “London University” to green-space beyond Drummond Street in five minutes). The Royal Society on the other hand was located at this time in Somerset House, on the Thames, and moved even closer to the centres of political power – Whitehall, the heart of club-land - in 1877 when it relocated to Burlington House. The reason for this move was a desire to consolidate the Society’s power to influence decision making in the capital.

In the nineteenth century the Royal Society had struggled to contain the pressures caused by specialisation, professionalisation and popularisation in the sciences. New bodies, such as Humphrey Davy and Michael Faraday’s Royal Institution, had found new enthusiastic audiences for science, while a host of specialised disciplinary societies squeezed the venerable Royal Society from all sides. By mid-century it became possible to build a career in professional science, not least as new chairs were established in universities such as UCL. Yet the number of Fellows of the Royal Society elected each year remained restricted. Charles Babbage, whose politics were aligned to those of the circle of reformers who had founded UCL, in his Reflections on the Decline of Science in England and on Some of its Causes of 1830, had satirised the process of election:

“A.B. gets any three Fellows to sign a certificate, stating that he (A.B.) is desirous of becoming a member, and likely to be a useful and valuable one. This is handed in to the Secretary, and suspended in the meeting room. At the end of ten weeks, if A.B. has the good fortune to be perfectly unknown by any literary or scientific achievement, however small, he is quite sure of being elected as a matter of course. If, on the other hand, he has unfortunately written on any subject connected with science, or is supposed to be acquainted with any branch of it, the members begin to enquire what he has done to deserve the honour; and, unless he has powerful friends, he is sure of being blackballed.”

While standards had improved by the mid-nineteenth century, the restrictions on numbers of Fellowships had the direct result of maintaining, even increasing, the prestige attached. To be elected a Fellow it was still necessary to possess a network of influential backers, and, conversely, the status of being a Fellow of the Royal Society was invaluable in building careers in home institutions. This picture did not change radically in the twentieth century.
giants of turn-of-the-century British life and physical sciences, respectively. Ambrose Fleming, inventor of the thermionic valve, represents the links between academic research and industrial innovation. Flinders Petrie’s name is commemorated in UCL’s museum of Egyptology, a reminder of how deeply embedded object-based research is in the university.

We could have included Francis Galton to illustrate the controversial yet also central contributions of eugenics, but instead we have chosen Lionel Penrose, who purposefully redrew eugenics as human genetics after the Second World War. Kathleen Lonsdale, the X-ray crystallographer, exemplifies two themes. First, a striking feature of scientific research at UCL has been the strength of interdisciplinary research and industrial innovation. Flinders Petrie’s name is commemorated in UCL’s museum of Egyptology, a reminder of how deeply embedded object-based research is in the university.

We have made a survey of 115 UCL people who have had connections with the Royal Society which can be analysed to draw conclusions that are demonstrated in miniature by the lives and artefacts of our nine exhibited individuals.

First, there are those who have passed through UCL briefly but have gone on to scientific fame and fortune. Henry Dale, FRS (1914), who was President of the Royal Society during the Second World War, studied at UCL as an undergraduate. The co-discovers of the structure of DNA, Francis Crick, FRS (1959), was an undergraduate in the late 1930s and began a PhD at UCL before war work took him elsewhere. William Flower, FRS (1864), who was a medical undergraduate in the 1850s, was Lankester’s predecessor as Director of the Natural History Museum, and commissioned the statue of Darwin that greets visitors in the main hall. Rupert Billingham, FRS (1961), who helped unravel the intricacies of tissue rejection in organ transplantation, was a research fellow in the 1950s. The physiologist Michael Foster, FRS (1872) and the biochemist Frederick Gowland Hopkins, FRS (1905), two more giants of British science, both of whom built up highly influential research schools, were UCL undergraduates. This pattern of achievement continues to the present day: Charles Kao, FRS (1997), who was awarded a Nobel Prize in 2009 for the development of fibre optics, completed a PhD at UCL in the mid-1960s.

Among those who built a career at UCL, it is striking the number of scientists whose ascension to a professorship was very soon gilded by election to the fellowship of the Royal Society (16 in my database). Among them are our exhibits Sharpey, FRS (1839), Lankester, FRS (1875), and Ramsay, FRS (1888). Others include Thomas George Bonney FRS (1878), Goldsmid Professor of Geology and Mineralogy from 1877 to 1901, the physicist and target of Cold War anti-communism Eric Burhop, FRS (1963), the mathematician William Kingdom Clifford, FRS (1874), and J.J. Sylvester, FRS (1839), the Professor of Experimental Physics and later Principal of UCL, Carey Foster, FRS (1869), and Bernard Katz, whose extraordinarily long tenure as Professor of Biophysics, from 1952-1978, began in the same year as his FRS. Indeed, the relationship sometimes ran in families: William Ramsay’s uncle, Andrew Crumbe Ramsay was appointed Professor of Geology at UCL in 1848, one year before his election as a Fellow.

Conversely, several scholars became Fellows of the Royal Society just prior to becoming UCL professors. Examples include two Jodrell Professors of Physiology John Scott Burdon-Sanderson, FRS (1867) and George Lindor Brown, FRS (1946). Others are the mathematician Thomas Archer Hirst, FRS (1861) and UCL’s first Professor of Botany John Lindley, FRS (1828). Sometimes the election to the Royal Society’s Fellowships and the appointment to professorship seem part of one’s career progression, as was the case in the appointment of Ray Lankester’s successor in the Jodrell Chair of Zoology, Raphael Weldon. The prestige of one supported the recognition of the other.

Carey Foster had been a staunch supporter of women in higher education in the late nineteenth century. Indeed, Hertha Ayrton, the wife of one of Foster’s students, William Edward Ayrton, and an electrical engineer of considerable stature, was narrowly defeated in a campaign to elect her the first female Fellow. Instead, nearly half a century had to pass, scandalously, before the election of Marjory Stephenson and Kathleen Lonsdale in 1945. The botanist Agnes Arber followed in 1946. All three had UCL connections: Stephenson was a teaching assistant in the 1910s, Arber an undergraduate, and Lonsdale’s long career is illustrated in the exhibition. Others followed their path, including the biochemist and promoter of women in science Patricia Clarke, FRS (1976), who sadly passed away earlier this year. Others had to wait too long: Dame Sheila Sherlock, the first woman to hold a chair in medicine, at the Royal Free Hospital School of Medicine from 1959, was only made an FRS in 2001, also the year she died.
UCL’s Fellows have made many contributions to the political and cultural life of the nation and beyond. Ramsay advised on matters from sewage to radium, while both Horsley and George Buchanan, FRS (1882), served the Local Government Board on medical campaigns. Lardner, Ramsay and especially Ray Lankester, through his *Science from an easy chair* series published in the *Daily Telegraph* from 1907, brought science to a wider audience. Fleming’s research underpinned the new electrical technologies of communication that linked the capital to the empire. Fellows’ expertises helped build and maintain Imperial projects and others benefited in return. James Bell, FRS (1884), for example, was the consultant chemist to the Indian government, while Petrie’s Egyptology depended on Imperial access to sites and labour. And a remarkable number of UCL’s medical FRSSs were on hand as physicians and surgeons to the Empress herself: John Eric Ericsson, Wilson Fox, William Jenner, and the cousins Richard and Sir Richard Quain, all treated Queen Victoria.

Finally it is interesting to compare UCL’s Fellows on matters of political and religious commitments. Perhaps unsurprisingly UCL has been home to many scholars who have held progressive political views, of which their science has sometimes seemed part. Lankester, who attended Marx’s funeral, as an admirer if not as a Marxist, combated biologists who held that heredity determined individuals’ capacities. (His spirit lives on in UCL in the writings of Steve Jones.) Lankester railed against dogmatic theology. The reputation of UCL as the “godless university” perhaps encouraged such freethinking, although sometimes destructively. Dionysius Lardner, who took holy orders, as an admirer if not as a Marxist, combated biologists who held that heredity determined individuals’ capacities. (His spirit lives on in UCL in the writings of Steve Jones.) Lankester railed against dogmatic theology. The reputation of UCL as the “godless university” perhaps encouraged such freethinking, although sometimes destructively. Dionysius Lardner, who took holy orders, as an admirer if not as a Marxist, combated biologists who held that heredity determined individuals’ capacities. (His spirit lives on in UCL in the writings of Steve Jones.)

Jon Agar

1. Listen to the four-part BBC Radio 4 series *In Our Time: the Royal Society and British Science*, available via [http://www.bbc.co.uk/programmes/b00pk7jt](http://www.bbc.co.uk/programmes/b00pk7jt), to which the author contributed.

2. The starting point for this database was the Royal Society’s Raymond and Beverly Sackler Archive Resource.


**Nine Fellows**

Dionysius Lardner
William Sharpney
Victor Alexander Haden Horsley
Ray Lankester
William Ramsay
William Matthew Flinders Petrie
Petrie
John Ambrose Fleming
Kathleen Lonsdale
Lionel Sharples Penrose
1. Sketch of Dionysius Lardner | Special Collections : College Archives Photographs

Dionysius Lardner was born in Dublin in 1793 and received his BA, MA, LLB and LLD from Trinity College. However, despite studying for the Law, and taking holy orders, he then turned his hand to writing and lecturing on scientific matters.


Throughout the 1820s Lardner continued to produce monographs such as this and articles for the Edinburgh Review.

3. Letter of Application to the University of London Special Collections : College Applications - Mathematics (Illustrated overleaf)

Lardner moved to London in 1827 when he became one of the first professors to be appointed at the new University which later became University College London. One of the reasons that his application was successful may have been because Henry Brougham, one of the founding members, was so impressed with his scientific writing.

4. Registration card for a class in Natural Philosophy

The Chair of Natural Philosophy encompassed Physics, Astronomy and Applied Mathematics and Lardner proved to be a very gifted teacher. As Hugh Hale Bellot put it, “his apparatus won favour where the more austere learning of some of his colleagues failed”. The same historian also stated that “he moved more freely than any other of the professors in the fashionable literary society of his time” and was often in company with the aristocracy. His public lectures were particularly well attended and he was good friends with Charles Babbage, another great populariser of science. However, not everyone was impressed by him; Charles Dickens described him as the “prince of humbugs” in personal communications and he was lampooned mercilessly by William Makepeace Thackeray in one of his works.

Dionysius Lardner (1793–1859)
Professor of Natural Philosophy & Astronomy 1828-1831
He was elected Fellow of the Royal Society in 1828 and his work *The Steam Engine Explained and Illustrated*, which really captured the spirit of the time, was first published in the same year. It subsequently appeared in seven editions in seven years, was translated into various languages and is still in print today. He had a difficult relationship with some pioneers of steam transportation but he wrote extensively on such matters and is now thought by some to have played a very important role in regulation of the railways.

He edited the 133 volume work the *Cabinet Cyclopaedia* from 1830 to 1844 and commissioned works from Walter Scott on the history of Scotland and Robert Southey on naval history as well as contributions from many other famous writers of the day. He resigned from his professorship in 1831, and made his living from writing and lecturing for the public all over the world thereafter. In 1834 a lecture at the London Mechanics’ Institution attracted one of the largest crowds of the decade, and in the same year he gave a well attended talk on Babbage’s calculating machines to the British Association, later writing a treatise on them for the *Edinburgh Review*. Lardner died in Naples in 1859.

Sources


Transcript of Dionysius Lardner’s Letter of Application (pictured above)

Sir,

I beg to offer myself to the attention of the council of the London University as a candidate for one of the professorships of the mathematical sciences. The situation in which my exertions would be most serviceable to the University and creditable to myself would be that of the professor of mechanical philosophy. I should not however decline accepting the chair of elementary mathematics or that of the higher mathematics or astronomy. The grounds on which I would wish to found my pretensions are those of general reputation in the scientific world. I shall have the honour of laying before the council in a few days, some facts from which, they will be enabled to estimate my claims to their notice. I have the honour to be Sir your obedient servant Dion. Lardner
William Sharpey (1802–1880)
Professor of Anatomy & Physiology 1836-1874

William Sharpey was born in Arbroath in 1802 and was educated locally before going on to study Greek and Natural Philosophy at the University of Edinburgh in 1817. However, in 1818 he switched to Medicine and gained the diploma of the Royal College of Surgeons of Edinburgh in 1821. He then spent a lot of time in Paris and worked with some important people there such as the famous Edinburgh surgeon Professor James Syme, with whom he maintained a lifelong friendship. He graduated as MD from Edinburgh in 1823 and returned to Paris to resume his studies there. He later travelled through Italy and Germany devoting himself to anatomical research. In 1829 Sharpey returned to Edinburgh and engaged in microscope research which he continued for some years. In 1830 he obtained Fellowship of the Royal College of Surgeons of Edinburgh which he needed in order to become a teacher. In the same year while teaching at the University of Edinburgh he published a paper on ciliary movement which became the basis for further research, and which led to his election to the Royal Society of Edinburgh in 1834. He later translated the key 1834 paper on the subject by Purkinje and Valentin into English for the Edinburgh New Philosophical Journal in 1835 and added his own observations to the work. In 1836 he wrote a scholarly review of the subject for the Cyclopaedia of Anatomy and Physiology and in the same year became Professor of Anatomy and Physiology at University College London. This offered him the chance to teach the first ever course on physiology offered at an English university.

Professor Sharpey was elected Fellow of the Royal Society in 1839, became a member of the Royal Society’s council in 1844 and then Secretary from 1854 to 1872. As well as supervising a major move of the Society from Somerset House to Burlington House he also oversaw the publication of the Society’s
Catalogue of Scientific Papers. Over the years he also made many communications on behalf of non-fellows and significant contributions to further research particularly as he had such extensive knowledge from his travels abroad.

7. Students' notes and diagrams on Sharpey's lectures on Anatomy and Physiology
Special Collections: MS ADD 238

While at the University of Edinburgh numbers in Sharpey's classes rose year on year as he was extremely popular with his students. As well as being thorough and accurate in his research he also had many a tale to tell; his Royal Society obituary noted that many of his journeys around the Continent were made on foot, "with his knapsack on his back, picking up acquaintance with fellow travellers as he went, mixing with the natives of the several places he visited, and storing up in his wonderfully tenacious memory that fund of observation, anecdote and incident, which always surprised and delighted those who afterwards heard him narrate his travels." He was one of the first teachers to make use of a microscope which sat on a revolving table so each student could look at the subject matter in turn. During the time that he spent teaching at University College London this "father of modern physiology", as he became known, greatly influenced many students who went on to become medical professionals, scientists and teachers themselves. These included Joseph Lister and Edward Sharpey Schafer who even went so far as to take his name from his mentor. In 1871 friends and former pupils set up the Sharpey Memorial Scholarship and when he died in 1878 a huge number of them accompanied his coffin to Euston for its onward journey to Arbroath.

Sources

Proceedings of the Royal Society of London 31 (1880-1881), x-xix
Professor of Clinical Surgery 1900-1907

Victor Alexander Haden Horsley was born in Kensington and is said to have been named by Queen Victoria.

His father, John Callcott Horsley, was an artist who produced the first commercial Christmas card and throughout his early life he was surrounded by many other artists such as Edward Lear and William Holman Hunt. He went to school at Cranbrook Grammar in Kent and lived in the family’s country house there where his father was one of the Cranbrook Colony of artists. However, he did not follow in his father’s footsteps and in 1880 he qualified in Medicine at University College Hospital Medical School. Thereafter he spent four years in junior surgical posts, while at the same time studying the effects of anaesthetics on his own brain by administering chloroform, gas or ether to himself and having colleagues record his gradual loss of function.

He was appointed to the post of Assistant Professor of Pathology at University College London in 1882 and then full Professor between 1886 and 1896. In the meantime he became Professor-Superintendent of the Brown Institution in 1884 where he focused on the action of the thyroid gland, rabies prevention, and the localisation of function in the brain.

He was appointed Assistant Surgeon at University College Hospital in 1885 and in 1886 he became Surgeon to the National Hospital for the Paralysed and Epileptic, Queen Square, which resulted in him becoming a leading cerebral surgeon of his time.

In June 1887 Horsley removed a tumour from a spinal cord, the first operation of this kind ever performed. Some years later in 1900 he became Professor of Clinical Surgery.

Horsley had been admitted to the Royal College of Surgeons in 1883 and was elected to the Royal Society a few years later, in 1886. He wrote hundreds of papers and was knighted for his contribution to Medicine in 1902. He was also awarded a Royal Society gold medal for his "investigations relating to the physiology of the nervous system, and of the thyroid gland, and to their applications to the treatment of disease". One of the later papers that he presented to the Royal Society was about the brain of Charles Babbage which he had examined and described in great detail.
Horsley studied the effects of death from intracranial pressure for some years and presented a paper to the Royal Society in 1894 about the effects of bullet wounds on the brain. He expanded on this work over the next twenty years and published a lot more on the subject during the First World War before he died of heat exhaustion and intestinal infection in 1916 while serving with the Mediterranean Expeditionary Force near Baghdad.

**Sources**


Edwin Ray Lankester was born in London in 1847. His father was a surgeon, coroner and a scholar in microscopy and his mother wrote books on natural history. Visitors to his home included Charles Darwin and Thomas Huxley and he was introduced to many eminent scientists from a very early age.

On leaving school at St. Paul’s he went to Cambridge and graduated with a first class degree in Natural Sciences in 1868. He had first started writing about protozoa in 1863 but in 1871 he was among the first to describe protozoan blood parasites which led to him becoming a member of the Royal Society’s tropical diseases committee.

After spending time in Vienna and Leipzig, supported by the Radcliffe Travelling Fellowship, he studied Marine Biology in Naples and after a few years lecturing in Exeter College Oxford he was appointed Professor of Zoology and Comparative Anatomy at University College London in 1875. In the same year he was elected to the Fellowship of the Royal Society and he later became its Vice President in 1883 and again in 1896. He was awarded a Royal Society Medal in 1885, and the Copley Medal in 1913.

He left University College London in 1872 to take up the Chair of Natural History at Edinburgh but resigned from the post within a fortnight and returned to his previous position where he stayed until 1891. He later held appointments at Oxford and the British Museum and retired in 1907.

Professor Lankester wrote prodigiously and in 1869 he became co-editor of the Quarterly Journal of Microscopical Science which his father had founded. From 1878 to 1920 he was the editor, and under his leadership it became one of the country’s leading scientific journals. As well as publishing hundreds of academic works on Biology and Geology and even Archaeology, Lankester also wrote for the lay-person and his Science From an Easy Chair, which began in The Daily Telegraph in 1907,
was later published in one volume by Methuen. He also wrote many articles on zoological topics for the Encyclopaedia Britannica, some of which were collected into a separate volume in 1891.

Lankester is thought to have influenced works by other writers of his time and some of his ideas appear in The Time Machine written by his friend H.G. Wells. They also collaborated on the early chapters of Wells’ Outline of History (1920) which concentrates on the origins and evolution of humans. As well as authors and academics Lankester knew many celebrities of his time and these included the Pre-Raphaelite painters, Auguste Rodin, and Anna Pavlova.

According to his obituary by E.S. Goodrich Lankester’s time at University College London was his “best period, remarkable both for his success as a teacher and for the output of important original researches carried out in his laboratory by himself and his pupils.” Lankester did a lot of work on marine invertebrates and he was the first person to note that the horseshoe crab Limulus is a member of the arachnid family and not a crustacean.

Sources


William Ramsay was born in Glasgow in 1852 to a family long associated with chemistry on both sides, his grandfather having been president of a chemical society founded in Glasgow in 1798 which was later absorbed by the larger Philoscopical Society in 1801.

In 1866 he began his studies at the University of Glasgow where he followed a standard course in Classics, General Literature, Logic, and Mathematics. In 1869 he went to work in a city chemical laboratory and continued his academic studies the following year attending classes in Physics, Chemistry and Anatomy while working in Lord Kelvin’s laboratory. He did not take a degree but went straight on to gain a PhD at the University of Tübingen in 1873. He returned to the University of Glasgow in 1874 and continued his research into many different aspects of Chemistry while teaching large groups of medical students. He stayed at Glasgow until he took up the post of Professor of Chemistry at the University of Bristol in 1880, where he also became Principal the following year.

In 1887 he was appointed to the Chair of Chemistry at University College London where he stayed for twenty five years. He was very popular with his students at University College London and one of them, Morris W. Travers, went on to help him with some of his most important scientific discoveries. As well as being meticulous in their research, Ramsay and Travers were skilled enough in glass-blowing to make their own apparatus, which enabled them to measure very small quantities of material and rule out anomalies such as dirt in spectrum tubes.

A year after his appointment at University College London in 1888 he was elected to the Fellowship of the Royal Society and awarded its Davy medal in 1895. Meanwhile he worked hard to reorganise the University of London and advocated a more practical approach to the teaching of Chemistry.

In 1894 William Ramsay and Physicist Lord Rayleigh announced to the British Association for the Advancement of Science that they had discovered a new gas which they called Argon, from the Greek word for “idle”. They published their research in the Proceedings of the Royal Society in 1895 and were awarded the Smithsonian Institution’s Hodgkins prize for their work later that year. Soon after this Ramsay announced his discovery of terrestrial Helium which had only previously been observed in the spectrum of the sun. In his book The Gases of the Atmosphere published in 1896 he drew the periodic table with spaces reserved for several new elements. At another meeting of the British Association in 1897 Ramsay predicted that at least one other gas awaited discovery and he and Travers found Krypton fairly soon afterwards, later followed by Xenon and Neon. Ramsay’s other key assistant in this period was Norman Collie who took the first X-ray in Britain to be used for clinical purposes in 1896.
In 1904 William Ramsay won a Nobel prize for his discovery of the inert gases and these pictures were possibly taken around the time that he collected it. He also received many other awards throughout his career and acted as advisor on many boards and committees until his retirement in 1912. He was still working when he died at home in Buckinghamshire in 1916.

Sources


19. Flinders Petrie photographed in 1921 with exhibits in the College’s Egyptology collection which he helped to build up. Special Collections - College Archives Photographs

William Matthew Flinders Petrie (1853–1942)
Professor of Egyptology 1892-1933

Flinders Petrie was the founder of the scientific method of archaeological investigation that is still practised in Egypt today.

Earlier archaeologists had simply dug the objects out of the ground. His principal contributions lay in the recognition of the fundamental importance of the find-group, rather than the individual find. This was recognised by others, but not in combination with Petrie’s immense labour of systematising all the information on forms of finds into typologies. There is no comparison for his production of typologies in the late nineteenth to early twentieth centuries.

Petrie was introduced to Amelia Edwards (1831-1892), a Victorian travel writer, in 1884. They created a teaching collection of ancient Egyptian artefacts that was the basis for the Museum formed by her bequest in 1892. In the same year he was elected the first Edwards Professor of Egyptian Archaeology and Philology, the Chair named after Amelia Edwards.

Petrie became a Fellow of the Royal Society in 1902. His election was not without controversy; Sir John Evans (1823-1908) had favoured Sir Ernest Alfred Wallis Budge (1857-1934). However, Sir Francis Galton (1822-1911), who was on the Council of the Royal Society, had been strongly in favour of Petrie whose name went forward unopposed. With the sole exception of Sir Robert Eric Mortimer Wheeler (1890-1976) in 1968, Flinders Petrie was the last archaeologist to be so honoured. After 1901 the British Academy fulfilled the same role for the Humanities as the Royal Society did for the Sciences.

Besides the survey and measurements of the pyramids, Petrie also examined the methods of their construction. The drill core was one of the first objects he discovered during his 1881 season at Giza. The tube drill, with the core still present in its hole, demonstrated that the theories about the use of iron tools were wrong. The core was the by-product of a copper drill, a tool that was only able to cut through granite with the use of quartz sand abrasives. (Trope, 2005, 44)
“On the granite core, broken from a drill-hole, other features appear, which also can only be explained by the use of fixed jewel points. Firstly, the grooves which run around it form a regular spiral, with no more interruption or waviness than is necessarily produced by the variations in the component crystals; this spiral is truly symmetrical with the axis of the core. In one part a groove can be traced, with scarcely an interruption, for a length of four turns. Secondly, the grooves are as deep in the quartz as in the adjacent feldspar, and even rather deeper. If these were in any way produced by loose powder, they would be shallower in the harder substance – quartz; whereas a fixed jewel point would be compelled to plough to the same depth in all the components....That the blades of the saw were of bronze, we know from the green staining on the sides of saw cuts, and on grains of sand left in a saw cut.” (Petrie, 1883, 174)

This hollowing out by tube drilling was a surprise at the time of the discovery. Tubular drills were mostly used for hollowing out stone vases and for boring plug-holes for sarcophagi.

The publication of Petrie’s book The Pyramids and Temples of Gizeh was financed by a grant of £100 from the Royal Society at the recommendation of Sir Francis Galton. The Society made a grant for the expense of a survey by the Royal Engineers, but Flinders Petrie had already done the survey.

“A base-line (A-Z) south of the Great Pyramid was very carefully measured, and observation points, A, K, L, M etc. were established in relation to this line by theodolite (an instrument for measuring both horizontal and vertical angles), until the triangulation was complete.

“For one season, the laying out of the triangulation, and getting fixed points marked all over the pyramid sites, was as much as I could manage, along with measurements of the inside of the pyramids”.

“The beginning of the survey of the Gizeh pyramids was the selection of points which should be in sight of each other and form good triangles. A single large triangle could just be arranged to encompass the Great Pyramid, and another around the second pyramid, so avoiding reliance on any chain of triangles”. (Petrie 1931, p. 21-22)

Sources
Drower, Margaret, S. Flinders Petrie : A Life in Archaeology. London: Gollancz, 1985
Newberry, Percy E., William Matthew Flinders Petrie, Kt., F.R.S., F.B.A. Journal of Egyptian Archaeology, 29 (Dec., 1943) 67-70
Petrie, W. M. Flinders, Seventy Years in Archaeology. London: Sampson Low, Marston, [1931]
Trope, Betsy Teasley, Excavating Egypt : Great Discoveries from the Petrie Museum of Egyptian Archaeology. Atlanta: Michael C. Carlos Museum, Emory University, 2005
John Ambrose Fleming
(1849–1945)
Professor of Electrical Engineering 1885-1926

John Ambrose Fleming was born in Lancaster in 1849 but the family later moved to London in the early 1850s. His grandfather John Bazley White was a manufacturer of Portland Cement and was fairly unusual in having constructed his house from this material in the early 19th Century.

So from very early on in his life Fleming was exposed to innovative thinking, and at eleven years of age he set up a workshop at home where he made models of ships and engines and experimented with photography. From 1863 he attended University College School and had hopes of becoming a practising engineer although the family were not in a position to support him financially so he registered for a BSc at University College London with the intention of teaching Science instead. However, further financial difficulties forced him to give up his studies in 1868 and he went to work in a shipbuilder’s office in Dublin, although he left after four months as he was not allowed to be involved in workshop activity. He secured a job back in London at a City stockbroker's and this allowed him to continue his studies part-time until he graduated in 1870 with first-class honours along with only one other student that year.

After teaching for eighteen months Fleming registered as a student of Chemistry at the Royal College of Science in South Kensington and quickly moved on to assist the masters in their research with the result that he was encouraged to give a paper on electromotive force at the inaugural meeting of the Physical Society in 1874. However, despite having saved up enough money to give up his first teaching post to return to his academic studies he ran out of funds again after two years and took up another post at Cheltenham College. After three years he had enough money saved and obtained a bursary to study Natural Sciences at St. John’s College, Cambridge where he again received first-class honours in 1880. Fleming worked in the University’s workshop for a while as well as teaching mechanical engineering. He was then appointed to the Chair of Physics & Mathematics at the new University College Nottingham in 1881, but resigned the following year when he was elected a Fellow of St. John’s and offered the chance to work as a scientific consultant to the National Telephone Company and the Edison Electric Light Company in London. In 1884 he was invited to lecture on electrical technology at University College London and was appointed as the first Professor of Electrical Engineering in 1885.

When Fleming started to teach at University College London he found facilities quite basic so he created a laboratory and acquired apparatus through friends in electrical companies. While lecturing to students and the general public he also acted as consultant to new industries and utility companies and his students benefited greatly from visits to their workshops. In 1889 he published an important book entitled The Alternate Current Transformer in Theory.
and Practice which was the standard text on the subject for some years. Fleming was elected as Fellow of the Royal Society in 1892 for his paper On Electric Discharge between Electrodes at Different Temperatures in Air and in High Vacua. Many accolades were bestowed on him in the 20th Century starting with the Hughes Medal in 1910, the Albert Medal of the Royal Society of Arts in 1921, and the Faraday Medal of the Institution of Electrical Engineers in 1928. He was knighted in 1929 and was awarded the Duddell Medal of the Institute of Radio Engineers in 1931 and the Gold Medal of the Institute of Radio Engineers in 1933.

In 1899 Fleming became scientific adviser to Guglielmo Marconi’s Wireless Telegraph Company and helped to scale-up Marconi’s apparatus to allow for communications to travel across the Atlantic. The result of this work was the installation of the world’s first long-distance wireless station at Poldhu in Cornwall in 1901 which sent signals to Newfoundland, over 1800 miles away, at the end of that year.

In his laboratory at University College London Fleming carried out experiments in radiotelegraphy over many years, and in 1904 he patented his thermionic valve. This device detected high-frequency electro-magnetic waves and was the first electronic device making radio and much of the electronics we enjoy today possible. Fleming became Emeritus Professor when he retired in 1926 but he continued to write and lecture almost until his death at 95 in 1945. During his career he published over a hundred important papers and made significant contributions to the teaching of Electrical Engineering in universities.

**Sources**


Kathleen Lonsdale was born in 1903 in Newbridge in what is now the Republic of Ireland, and was the youngest of ten children of the local postmaster Harry Frederick Yardley and his wife Jessie, who had moved with him from London.

In 1908 her mother, being very worried about Irish unrest, left her husband and took her children to the small town of Seven Kings in Essex and Lonsdale won a scholarship to the County High School for Girls in Ilford in 1914. Two years later she became the first girl to attend classes in Physics, Chemistry and Higher Mathematics at the County High School for Boys as no such subjects were offered at the girls’ school. At the age of 16 Lonsdale decided to leave school, despite hopes of her getting into Cambridge following phenomenal success in her scholarship exams, and went to study Mathematics at Bedford College, although she later changed to study Physics and achieved the highest score for the subject within the University of London at the age of 19. One of her University of London examiners was the Nobel prizewinner William H. Bragg and he invited her to join his research team studying X-Ray Crystallography at University College London.

In 1923 the team moved to the Royal Institution and Kathleen continued her work with them until she moved to Leeds with her husband after she got married in 1927. With some help from Professor Richard Whiddington in the Physics Department at the University of Leeds, some scholarship money and a grant of £150 from the Royal Society, Lonsdale set up equipment to continue her research. Work on the crystal structure of hexamethylbenzene initiated by Professor Christopher Ingold, who then held the Chair of Chemistry at Leeds, led to some of her most important discoveries. Preliminary results on this work were published in a 1928 issue of Nature and her full report in 1929 in the Proceedings of the Royal Society of London.

When the family returned to London Lonsdale went back to work at the Royal Institution and stayed there for the next fifteen years until she was appointed Reader of Crystallography at University College London in 1946, and subsequently Head of Department and Professor of Chemistry in 1949. From this time onwards much of her time was taken up with teaching and working on the International Tables for X-Ray Crystallography which were published from 1952.

After witnessing the effects of Zeppelin raids on London and the surrounding area during the First World War and having become a Quaker in 1935, Kathleen Lonsdale became a pacifist. During the Second World War she was imprisoned in Holloway for refusing to register for civil defence duties. Throughout her one month incarceration she was sent papers and instruments by colleagues which allowed her to continue with her scientific work. After she was released Lonsdale became a Prison Visitor, wrote about her experiences and worked hard for the reform of penal institutions for the rest of her life.
32. Diffuse spots - Sodium Nitrate
Special Collections : Lonsdale Papers C.374-375

33. X-Ray Photograph of diamond structure
Special Collections : Lonsdale Papers C.365
illustrated on page 38 (lower image)

34. Tercentenary of the Foundation of the Royal Society: Invitation
Special Collections : Lonsdale Papers G.390

In 1945 Kathleen Lonsdale and the biologist Marjory Stephenson were the first women elected to the Fellowship of the Royal Society of London. Then in 1956 Lonsdale became a Dame of the British Empire and a year later received the Royal Society’s Davy Medal, another significant achievement as this made her the first female recipient of the award since it was bestowed on Marie and Pierre Curie in 1903. During the period 1960-1961 she was Vice-President of the Royal Society and yet another first was achieved in 1967 when she was elected the first female president of the British Association for the Advancement of Science. She travelled widely as an academic but also for her peace and prison work and she continued to commute to her laboratory from home in Sussex right up until she died in University College Hospital in 1971.

Sources

Baldwin, Melinda, Where Are Your Intelligent Mothers to Come From? Notes and records of the Royal Society 63 (1) (20 March 2009), 81-94


Hodgkin, Dorothy M. C., Kathleen Lonsdale, 28 January 1903 -- 1 April 1971 Biographical Memoirs of Fellows of the Royal Society, 21 (Nov., 1975), 447-484

Lionel Sharples Penrose
(1898–1972)

Galton Professor of Eugenics, 1943-1963, and of Human Genetics 1963-1965

Lionel Sharples Penrose was born in London in 1898 to strict Quaker parents who adhered to rules such as not allowing the reading of fiction or the playing of games on Sundays, although the latter didn’t stop him from deriving much pleasure from creating games and puzzles in later life.

On leaving school he studied Moral Sciences at Cambridge where he obtained his BA in 1921 and then went on to study Psychology at postgraduate level there. After a couple of years at a centre for psychiatric research in Vienna he decided he needed a medical degree to continue his work in abnormal psychology and returned to Cambridge for his pre-clinical studies. He moved to St. Thomas’ Hospital in London for the clinical part of his degree and he qualified in 1928. He completed his MD thesis on schizophrenia in 1930 while working at Cardiff City Mental Hospital. In 1931 he moved to Colchester where he spent the next eight years studying the causes of mental defects, particularly within families. During this time he interviewed over a thousand patients and their relatives and published some of this research in his book Mental Defect in 1933.

From 1939-1945 Penrose worked on mental disease and the effects of shock therapy in Ontario, Canada, and then returned to London to take up the Galton Chair of Eugenics at University College London where he stayed until he retired in 1965. He never liked the name of the Chair and attempted to change it for some time, but this proved difficult due to the terms of Francis Galton’s will. He worked around it for many years by simply using Galton Laboratory on the letterhead, but then in 1963, it finally became the Chair of Human Genetics. Penrose had succeeded in changing the journal title that came with the Chair from Annals of Eugenics to Annals of Human Genetics almost ten years earlier.

In the course of his research into mental deficiency Penrose made many studies of dermatoglyphs, that is the patterns on the palms of the hands and the soles of the feet, as certain characteristics were thought to be indicative of particular mental conditions. He was often sent examples of this sort of data by doctors keen to get his opinion on their patients. Dermatoglyphs also featured in his lifelong research on chromosomal abnormalities, particularly the condition that he named Down’s Anomaly which later became Down’s Syndrome. Other areas of his research included the incidence of breast cancer amongst relatives by looking through huge numbers of death certificates. He also...
applied the same rigour to what was thought to be a hereditary skin condition in a Suffolk family by thoroughly examining parish records for generations which led to previously accepted knowledge being discounted.

37. Royal Society election certificate
Special Collections: Penrose Papers 17/7

Lionel Penrose was elected to the Fellowship of the Royal Society in 1953 and garnered many other awards from prestigious organisations from all over the world throughout his life until he died in 1972.

38. Continuous staircase images
Special Collections: Penrose Papers 7/1

In 1958 Professor Penrose and his son Roger published a paper on impossible objects and it is thought that M. C. Escher used this as the basis for his lithograph Ascending and Descending in 1960.

Sources


Draper, Stephen W., The Penrose Triangle and a Family of Related Figures Perception 7 (1978), 283-296

Harris, Harry, Biographical Memoirs of Fellows of the Royal Society, 19 (Dec., 1973), 521-561

Penrose, Lionel Sharples and Penrose, Roger, Impossible Objects: a special type of visual illusion British Journal of Psychology, 49:1 (Feb. 1958) 31-33
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