

**Trinity College Memorial Discourse
Monday 14th May 2007**

JOHN JOLY (1857–1933)

*Patrick N. Wyse Jackson FTCD
Department of Geology, Trinity College, Dublin 2, Ireland (wysjcknp@tcd.ie)*

Provost, Fellows, Scholars, Colleagues, Honoured Guests, and Friends

It gives me great pleasure to be here today as we honour a Trinity scientist and life-long servant, and remember him close to the 150th anniversary of his birth in a small rural rectory in what is now County Offaly.

I am also using the occasion to privately (and now that I mention it, publicly) remember another Trinity graduate, whose centenary his family will celebrate next year. On Trinity Monday, 67 years ago, my father Robert Wyse Jackson delivered the Memorial Discourse on Jonathan Swift.

John Joly whom we honour today was a scientist with a vivid and clear imagination, and his research led him into many varied disciplines. He was a physicist, engineer, geophysicist, and educationalist, but also researched in botany, medicine and on photography. He was also closely associated with a number of Dublin organisations most notably the Royal Dublin Society of which he was President for a time, and with Alexandra College of which he was Warden for many years.

This Discourse shall follow a broadly chronological sequence from his birth to death, and will examine various strands of his work and life either in depth to some degree, or else fleetingly. A bibliography of papers on Joly's life and work is appended to the end of this Discourse.



John Joly in 1903

In adulthood Joly Joly was very distinctive. He was tall with hair swept back off his forehead, and sported a great moustache. He wore pince-nez and spoke with a slight French accent. This wasn't due to his upbringing or family origin, but apparently a mechanism that allowed him to conceal a lisp. Although he never married he maintained a large circle of friends who included members of the Guinness family; he was Godfather to several children, while others were named after him. He was respected by his scientific peers, and late in life he received various honours including medals from the Royal Society and from the Geological Society and honorary degrees from three universities. Today he is remembered through the College Geological Society and through annual lectures in his name. In 1973 a crater was named for him on Mars. He is not the only Irish man so honoured: George Johnstone Stoney, who coined the term 'electron' and John Tyndall who explained why the sky is blue are similarly honoured. They too have lunar craters named for them.

Refugees and orphans

The Joly family came from Charneux, near Liege in Belgium. Jean Jasper Joly arrived in October 1769 and served as valet to the Duke of Leinster and soon after his arrival acquired land near present-day Harcourt Terrace that were subsequently known as 'Joly's Field'. He later purchased the office of Doorkeeper of the House of Lords on a salary of £100 per annum. It was he who appears in Francis Wheatley's painting of the Dublin Volunteers on College Green (4th November 1779)

The Joly family also acquired a moderate amount of land around Clonbullogue where the family seat 'Charneux' became located. They became well-known, respected, and produced clerics, bibliophiles, and an Astronomer-Royal for Ireland, John Joly's second cousin, Charles. His father's eldest brother was Jasper Robert Joly who essentially founded the National Library.

John's father, John Plunket Joly was Rector of Clonast (Clonbullogue). He married Julia, daughter of a Prussian Count, and they had three sons. Henry Edward (known as Guy) was the eldest, Frederick died young, while John, their youngest was born on 1st November 1857, only four months before the death of his father. This later led to some confusion over the date of birth of John Joly as the parish records indicated that he was born in 1858, but later research by the man himself led him to confirm that he appeared a year earlier. Having been forced through circumstance to vacate the Rectory, Joly's widow and three sons moved to Pembroke Road in Dublin where the boys were raised. Later they family moved to Wellington Road and later to Northbrook Road.

'The Professor'

In his youth Joly showed little academic promise. When he was only nine years old his maternal grandmother warned him in a letter that he should take more care with his written work.

Joly attended the celebrated Rathmines School between 1872-1875 when his Headmaster was the Reverend Charles William Benson, a good educationalist who also enjoyed teaching his pupils about Irish songbirds, and delighted in the number of bishops his school had produced. Joly was popular at school where in a coincidental foretaste of his career, he became known as the 'Professor' on account of his tinkering with chemical apparatus and other gadgets in his bedroom. His mother often complained about the smell coming from his bedroom, produced following experimentation with his chemistry set.

While at school Joly also began his publishing career and contributed several interesting English essays and sonnets to the school magazine, including a piece on a hermit that lived in the Hartz Mountains in Germany. In 1875 after a bout of poor health John was sent to recover in the south of France – it must have been a difficult time for his mother. She generally suffered from ill-health herself (she later died aged 59), her husband and middle son Frederick had already died, and her youngest was poorly. However, John recovered and returned to Dublin in 1876, and that year he entered the sanctuary of Trinity where he was to remain for the rest of his life. There read English literature and Engineering - quite an unusual combination of subjects in a University whose strengths at that time lay in mathematics and the classics. It took Joly six years to graduate, and in 1882 he passed his final degree examinations with distinctions in experimental physics, mechanical engineering, and geology and mineralogy.

At about this time Joly was very friendly with J.M. Synge's brothers who were school friends, and later he was keen on their sister, but she married another of his friends.

Beginnings of an academic career and a life-long friendship

In 1882 Robert Crawford, the Professor of Civil Engineering in the College recognised that Joly had some ability – perhaps he recognised his inventive mind, and so appointed him as his assistant on a salary of £100 p.a. His duties were to teach some courses; in fact for two years he acted as interim Professor during Crawford's final illness; but he was also expected to do research. Working in the beautiful Museum Building whose opening in 1857 we hope to celebrate later this year, Joly produced a succession of wonderful scientific instruments. His photometer measured the relative strength of light from two sources, his steam calorimeter

was used to measure the specific heat of minerals, while his maldometer measured the melting points of minerals. All of these were ingenious pieces of apparatus that he built himself, and they later became available commercially through companies such as the Dublin opticians and instrument makers Yeates, or the Cambridge Scientific Company. His steam calorimeter continued to be used as a standard piece of equipment in Physics Departments until the 1960s. Professor Brian McMurry referred to it recently as ‘All string and sealing wax’.

For relaxation Joly was keen on hill-walking and would frequently be found on weekend traversing the Wicklow Mountains, over topography that inspired him to write poetry. In 1886 his mother died and this period proved to be difficult for her youngest son. To cope with his loss he decided to spend three months in the Swiss Alps and invited a young Trinity graduate to accompany him. This was Henry Horatio Dixon who ultimately became Professor of Botany in the College, and their friendship remained remarkably close for the rest of Joly’s life. For years Joly lived on Temple Road in Rathgar, and on his death bequeathed it to Dixon who lived on the other side of the road. Frank Mitchell later lived in a house close by on the road which had earlier been occupied by the Dixons.

Colour photography and the rise of sap

In 1891 Joly was appointed Assistant to George Francis FitzGerald, the Professor of Natural and Experimental Philosophy (and coincidentally nephew of George Johnstone Stoney). FitzGerald was an inspiring man, whose work heralded Einstein’s theory of Relativity. Joly’s period spent as FitzGerald’s assistant is note-worthy for three reasons: for their attempts to have good scientific laboratories provided in the College (to which I will return), for Joly’s invention of Colour Photography and for his work with Dixon on the Ascent of Sap in trees.

His 1894 method of colour photography allowed for the viewing of colour images from a glass plate for the first time, and this method is broadly the method later adopted by Kodak. What Joly did was to mark a glass plate with thin coloured lines of ink, alternating red, green and blue. Placed in the camera in front of a negative plate the photograph was taken. When developed the positive plate would be realligned with the original lined plate, and then the colour image could then be viewed.

Although Joly patented this invention he was sued by an American by the name of McDonagh who claimed priority using the principal of “swearing back” – a legal device which allowed someone to claim that they had invented something before someone else had, but hadn’t got around to taking out a patent. Following two court cases in New York that necessitated visits to the US, Joly’s priority was proved – McDonagh had little physical evident to prove his case. A business was established on what is now Pearse Street and Joly sold the North American rights to some Canadian businessmen. But his method was not a commercial success as producing prints proved difficult.

In 1894 Dixon and Joly published their solution to the ascent of sap problem which had perplexed botanists for some considerable time. How did water get to the top of large trees? The pair showed that the loss of water from the surfaces of leaves by the mechanism called transpiration set up a pressure gradient in the tree that pulled water upwards from the roots. I suspect that Joly contributed the theoretical physics behind the solution and that Dixon conducted the physical experiments that were necessary to demonstrate the path of fluid flow.

For his work Joly was awarded a Sc.D. in 1891, and was elected a Fellow of the Royal Society in 1892 (having been nominated by fellow TCD luminaries such as George Salmon and Samuel Haughton). Interestingly he was only elected as a Member of the Royal Irish Academy (the equivalent organisation in Ireland) six years later.

Science and its provision in Trinity

In the 1890s emphasis was placed on the study of Classics, Mathematics and Theology. Science was not well provided for. In 1811 a lecturer in natural history had been appointed and later still Professorships in Geology, Physics, Chemistry and Botany had been established. However, most of the scientific subjects were taught to students without the benefit of laboratory training or demonstrations, and research facilities for the Professors were virtually non-existent. In London at University College Thomas Henry Huxley had advocated and promoted practical study of the sciences and in Dublin the newly established Royal College of Science contained state of the art facilities, but Trinity lagged behind.

Under the leadership of FitzGerald and assisted by Joly, a Trinity group set out to rectify this matter and following twelve years of prodding the College agreed to build the desired laboratories, provided that funding was available. Initially FitzGerald had asked for £57,000 for capital investment and an endowment of £4,000 a year. The Board asked that the figures be reconsidered, so FitzGerald returned with a figure of £250,000! In 1901 he died and the cause was taken up by Joly and his Committee who launched a public appeal which by 1903 had raised £19,000. Lord Iveagh then donated £24,000 which facilitated the building of the School of Botany and a Physical Laboratory. However, ironically Geology lost out, and it was only later in 1912 that Iveagh returned with a grant of £10,000 which allowed for the fitting-out of what a laboratory for Joly became known as the Iveagh Geological Laboratory, and for the employment of a research assistants.

Joly was also concerned with education for women and or the working classes, and he became Warden of Alexandra College for ladies in Dublin and was a frequent lecturer at the YMCA in Dublin.

The thorny subject of geological time

In 1897 Joly applied for the vacant Chair of Geology and Mineralogy in the College, and although he didn't have a large canon of geological work he was appointed, and retained the position until his death thirty-six years later. Joly's only geological research of any substance had comprised studies on minerals and volcanic ash from Krakatoa. Joly then migrated 200 yards back across College Park and returned to the Museum Building which he had left six years earlier.

Almost immediately he turned his attention to the question of geochronology. At that time many geologists and physicists believed that the earth was 20 million years old, a time-span proposed by the influential physicist William Thomson, Lord Kelvin. One day Joly and Dixon were sitting on his yacht collecting coccoliths from the waters of Killiney Bay when a novel idea came to him. He realised that one assumed that the water in the oceans was fresh when it first formed, and if one could calculate the rate at which sodium was carried into the oceans by rivers, then it was easy to compute the age of the earth. In 1899 Joly published his seminal paper on the subject in the *Scientific Transactions of the Royal Dublin Society*. In it he took oceanographic data that had been collected during a series of voyages that culminated

with those of the research ship *The Challenger*, and utilised data for the water discharge of over a dozen of the Earth's major rivers. He concluded that the oceans were 100 million years old, and that they acted as proxies for Earth. His conclusion remained in vogue for at least a decade, and helped consign Kelvin's ideas to the scientific waste paper basket.

The rise of radioactivity

In 1898 the Curies discovered the radioactive element Radium at much the same time that Rontgen discovered X-rays, and Joly quickly turned his attention to the study of radioactivity and geology. In this he was a pioneer and published a landmark book on the subject in 1911. He devised a method of measuring the amount of various radioactive elements in rocks and in a variety of terrestrial materials including deep-sea oozes and in sea water. He purchased minerals and rocks from North America (which he later bequeathed to the College together with the cabinet in which he arranged them), received specimens collected along the length of the Simplon Tunnel that had been cut through the Alps, and wrote to his former students who were working all across the globe asking them to mail him rock specimens that he might analyse.

One day in 1907 when examining a thin-section of granite from the Dublin Mountains he noticed an unusual feature in some of the mica crystals. They looked as if they had been burnt, and are called pleochroic haloes. They were produced by the decay of a small amount of radioactive material contained in a crystal of zircon itself trapped in the mica crystals. In 1913 working in collaboration with the great physicist Ernest Rutherford, they derived a date of 400 million years for the Leinster Granite, and Joly and considered that these pleochroic halos could be used to derive a date for the formation of the Earth. By determining the intensity and diameter of the rings he thought that a chronological sorting of the granites could be achieved. He knew from its geological relationships that the Mourne Mountain granite was younger than the Leinster Granite which was in turn younger than some Scandinavian granites, and he hoped that haloes from these would prove this. In 1922 he had showed that the haloes in the Mourne Granites were 7% smaller than in the Leinster Granite whose haloes were 10% smaller than in the older granites. Brilliant!!

At this time new radioactive elements were being discovered and Joly described Hibernium as one such new element, on the basis of the halo that it produced. Again unfortunately, especially for all ardent nationalists present, Hibernium proved to be the previously discovered element Samarium.

In time even Joly's ideas and chronologies, like those of Kelvin, were rejected. His novel sodium method was shown to have been devised earlier in 1715 by Edmund Halley (although to be fair no-one else had remembered this work either). By the 1920s Joly's conclusions drawn from radiometric studies were invalidated by the discovery of further radioactive elements and isotopes. It was shown that his halo method was flawed, and therefore unreliable.

By 1913 Arthur Holmes, the English geologist, had showed that some rocks in Ceylon were 1,640 million years old through using the decay rates of radioactive elements. Radiometric dating examines the proportions of the original radioactive material and its daughter stable products. Given the rate of decay is known it is easy to use the method to date rocks. For some reason Joly distrusted the method, and he never wavered from his belief that the Earth was approximately 300 million years old.

The melting crust of the Earth and Joly's work on global tectonics

Joly's final major work was concerned with the formation of the Earth's great mountain belts, which form the Appalachians, the Rockies, the Alps, the Himalayas, and the Scottish Highlands, although the latter have been much reduced in elevation since their formation. Joly knew that radioactive decay of elements within the Earth created heat and he postulated that once every 50 million years a build-up of heat beneath the Earth's continents and oceanic crust caused the outer rocks to melt. As they cooled back down again shrinkage caused the mountain belts to form. By this method Joly suggested that the Earth was only 150 million years old, but this was at variance with the then accepted date of 3,000 million years. Joly formulated his ideas during several holidays spent at Dooks in County Kerry where he stayed in a seaside hut that he had constructed in the sand-dunes close to Dixon's holiday home. Joly published his ideas in 1925 in the book *The Surface History of the Earth*, which unknown to him as translated into Russian and published in Moscow four years later. Although his chronology was incorrect Joly's work on tectonics and geophysics was a very important contribution to the debate pertaining to continental drift, a mechanism that explained how continents moved during the past. This idea was propounded by the German geologist Alfred Wegener in 1911 and was accepted in Europe but rejected by the American geological community, perhaps because they were suspicious of Germans at that time.

The sailing geologist

By the 1890s sailing had replaced hill-walking as Joly's main mode of relaxation. As a reward when he was appointed Professor of Geology he purchased a yacht for himself, but soon decided that it was too small and so purchased another called *Woodcock*. He was an avid and skilled sailor who made many voyages around Ireland and Britain during vacations from College. Time, I suspect, that he would have spent thinking about many scientific problems. Joly was appointed a Commissioner for Irish Lights, like Trinity House in Britain, the body responsible for the running and upkeep of the lighthouses around the country. His duties included an annual tour of inspection.

Perhaps his greatest maritime voyage was that of August 1907 when he hired a team of six fishermen and a currach and headed north-westwards out into the Atlantic Ocean. This took some courage. Joly's party departed from Valentia Island in County Kerry, a location associated with the Trans-Atlantic Cable, and rowed towards two tiny rocks that formed the most westerly part of Europe. Joly simply wanted to know what they were formed of and wished to collect some samples! They rowing for seven hours through fog, and much of his time was spent persuading the worried fishermen to keep going. They thought that they heard banshees but the wailing turned out to be from calling seals. Eventually Joly spied the Great Foze Rock. This and the Lesser Foze are small specks of rock off the end of the Dingle Peninsula, and were once considered as possible sites for a lighthouse. With some difficulty Joly managed to get onto the Rock and brought a fisherman with him as insurance that his companions would not depart. The rocks proved to be composed of lava formed during the Silurian Period and now known to be 420 million years old, and they were contributed to his work on geology and radioactivity. It was one of the most daring geological voyages even undertaken.

The cancer scare and the establishment of the Irish Radium Institute

Joly once suggested that drinking too much tea could cause cancer. This remark was picked up by the popular press and it was widely reported in Britain and further afield. It took a while for this storm in the teacup to blow itself out.

In 1914 Joly gave Walter Stevenson a medical friend a small quantity of radium bromide which was highly radioactive, and this was used to treat some surface skin cancers. Apparently the results were good, and so Joly together with Stevenson persuaded the Royal Dublin Society to give them £1,000 so that they could purchase more radium bromide. Further fund-raising yielded an addition £2,300 and with this money the Irish Radium Institute was established. It remained in operation until 1952 when the remaining radioactive material was passed to a Dublin Cancer Hospital where it continued to be used to treat patients. Rather than use the radium for treating only surface cancers Joly and Stevenson pioneered the use of needles filled with the radioactive material that could treat internal tumors. This was a major medical breakthrough and the 'Dublin method' formed the basis of some modern cancer treatments.

In September 1932 Joly began experimenting on himself in an attempt to discover the effects that radioactivity might have on the memory. He put small packets of radium inside the lining of his hat, but he failed to report on the results of this study! Frank Mitchell attended Joly's lectures when the great man was in his mid-70s and said that the lectures were an embarrassment. Could this be due to age or the effects of radioactive bombardment, or should he just have retired from lecturing earlier?

The 'armchair' and active soldier

In 1914 the First World War broke out in Europe and although too old to be called up for active service, John Joly did contribute to the war effort in the only way possible to him. He bombarded the Admiralty with ideas for munitions, mines, boats and other devices that might aid the war. Amongst the most fanciful included a shell containing barbed wire, and bombs that could be suspended from an airplane and used to destroy the zeppelins employed by the Kaiser's army. In the event of them missing their intended target Joly employed a safety device which caused them to detonate at a safe distance above the ground surface. He also suggested methods of signalling at sea, and proposed building earthworks around ships to protect them from submarines. It is unknown if any were actually developed and used in action.

Shortly after the start of the 1916 Rising in the centre of Dublin during Easter week troops were dispatched to Dublin to quell the insurrection, and 4,000 men were billeted in Trinity. The College authorities were worried that the campus would be a target, so the College Officer Training Corp quickly organised to defend the College, and Joly volunteered to help. Another volunteer was his research assistant Louis Smyth, who afterwards was rewarded with the presentation of a ceremonial sword. It is said that he put it into a cupboard in the Geological Museum and it was never seen again.

In an autobiographical essay published four years later Joly recalled spending long hours training his rifle on a distant street with the clear instruction to shoot anyone who came within view. He doesn't mention if he actually used the weapon! At one point during this tense time Joly requisitioned a bicycle and headed towards the south Dublin suburbs to buy

cigarettes for some of the men, and to return home for a bath. This was a dangerous thing to do, as road-blocks had been set up throughout the city and one never knew the loyalties of men that might stop the traveller. Another Trinity academic John Leighton Synge, the son of one of Joly's school friends apparently smuggled a rifle out of College and passed it over the barricades to someone in the GPO.

Joly's role in promoting education: the British Educational Mission and internal College questions

Let me tack back a bit in time in my chronology, from 1916 to 1907, to approximately 100 years ago and examine Joly's role in educational matters. Trinity was undergoing a period of reevaluation, and various commissions had, or were looking into the matter of University Education in Ireland. In Trinity non-Fellow Professors were lobbying the Board for greater say in College matters, and the Fry Commission was deliberating. In late 1906 Joly petitioned the Board seeking change and he drew up a memorandum to the Fry Commission which outlined how Trinity could be made more acceptable to Roman Catholics, and what internal changes could be made regarding election to Fellowship, and the government of TCD.

The findings of the Fry Commission were then masticated by James Bryce, Under-Secretary for Ireland and he suggested that the University of Dublin be reconstituted with four colleges: TCD, Queen's Belfast, Queen's Cork and a new Roman Catholic University in Dublin. Trinity folk were appalled and Joly embarked on a tour of Oxford, Cambridge and London to gather support against these proposals, and published a long pamphlet setting out the arguments on both sides. By 1907 Bryce had been replaced by Augustine Birrell who was sympathetic to Trinity and the plans for a four college University of Dublin were dropped.

Regarding internal TCD matters, in 1911 the Board finally accepted non-Fellow Professorial representation, and Joly was elected to the Board on June 4th of that year, and finally in 1919 he was admitted to Fellowship.

On a lighter note, Joly was sympathetic to the needs of students. He was popular with them, and enjoyed some notoriety as President of the Dublin University Motorcycle Club. Well into his late 60s he rode a motorcycle festooned with mirrors and other pieces of kit, and would be found speeding around the narrow roads of Brittany, Britain, and Ireland. Returning from Kerry one mid-September day in 1925 he fell off the motorbike and damaged his leg and ankle, and had to return to Dublin by train. Three weeks later he purchased his first car – a Morris Oxford.

Concerned for the welfare of the students in 1906 he called for the establishment of a register of good accommodation that would be available for students to rent, and he also successfully lobbied the Librarian to extend the opening hours of the Library to include the evenings,

In 1918 Joly was appointed a member of the British Educational Mission that was sent by the Government to the United States to inspect various educational establishments there. The Mission was to report back and inform the new proposals then being considered for the University sector. In the American press Joly was hailed for his scientific work and received an honorary Doctorate of Literature from the University of Michigan.

One of Joly's great talents was that he was able to see through the often difficult complexities that typified Trinity's internal affairs, and he was generally respected by his College colleagues because he was usually non-confrontational and considered in his views. He didn't have an axe to grind. It is therefore not surprising that petitions to Lloyd George on either side of the Irish Sea urged that he be appointed Provost in succession to John Pentland Mahaffy. It was not to be and John Henry Bernard, the Archbishop of Dublin, was appointed instead.

A life well spent

John Joly never retired and continued travelling to Kerry, around Ireland inspecting the lighthouses or on the Continent up until close to his death. Indeed he gave his last lecture to the Engineers only six days before he died, although as we have heard his lectures had in his final years fallen into farce.

For at least five years before his death he suffered from haemorrhoids but refused surgical intervention. In the last two weeks of his life he sat for a portrait by Leo Whelan but latterly could not sit. On 4th December 1933 he was admitted to a nursing home at 40 Leeson Street, and he died there on the 8th at 1 o'clock in the morning. He wished to be buried in the family vault close to his birthplace but instead Dixon arranged for him to be buried in Mount Jerome Cemetery in Dublin. John Joly lies in a grave that he now shares with Dixon who died in 1952, and with Dixon's wife Dorothea.

In his long career John Joly published 269 scientific papers and several important books, and he made important contributions in the fields of engineering, physics, thermodynamics, colour photography, botany, mineralogy, geology, geophysics and tectonics, radioactivity, and geochronology.

Soon after his death a memorial fund was established and it was highly appropriate that his friend and collaborator Ernest Rutherford delivered the first Joly Memorial Lecture in 1935. This lecture series continues to this day.

We can be proud of John Joly. Proud of his fertile mind that tackled many questions, except perhaps that of religion. He once told Newport White that in being forced to study first aid the students in the School of Divinity were at least learning one useful thing.

I will end by recalling the assessment of Joly written by the College historians David Webb and R.B. McDowell: "He was a remarkable man: certainly the most versatile and productive, and perhaps the greatest of the scientists that the College has ever produced"

Some papers on the life and work of John Joly

- Stephen Coonan, 'John Joly's Irish Tricolour', *Technology Ireland* **23**(6) (1991), 18–19.
- Henry Horatio Dixon, 'John Joly 1857-1933', *Obituary Notices of the Royal Society*, **3** (1934), 259–286.
- John R. Nudds, 'The life and work of John Joly (1857-1933)', *Irish Journal of Earth Sciences*, **8** (1986), 81–94.
- Denis Weaire and Stephen Coonan, 'The parrot, the pince-nez and the pleochroic halo', *Europhysics News* (2001) **32**(2).
- Denis Weaire and Stephen Coonan, 'John Joly 1857-1933', in *Physicists of Ireland: passion and precision*, eds Mark McCartney, Andrew Whitaker, Bristol and Philadelphia, Institute of Physics Publishing (2003), 143–150.
- Patrick N. Wyse Jackson, 'A Man of Invention: John Joly (1857-1933), engineer, physicist, and geologist', in *Treasures of the Mind: A Trinity College Dublin Quatercentenary Exhibition*, ed. D.S. Scott, London, Sothebys (1992), 89–96; 158–160.
- Patrick N. Wyse Jackson, 'John Joly (1857-1933) and his determinations of the age of the Earth', *Geological Society Special Publication*, **190** (2002), 107–119.
- Patrick N. Wyse Jackson, 'Classic Paper in the History of Geology: John Joly's paper: "Uranium and Geology"' (1908). *Episodes* **25** (2002), 258–263.
- Patrick N. Wyse Jackson, 'An account of a geological visit to the Foze Rocks (near the Blaskets) by John Joly in August 1908', *The Kerry Magazine*, **16** (2006), 28–31.
- Patrick N. Wyse Jackson, 'Irish Rock Stars: John Joly (1857-1933)', *Earth Science Ireland*, **2** (2007) 11.