

The stories that she told: Mary Mulvihill (1959-2015)

Cormac Sheridan

Mary Mulvihill's career was shot through with a highly individual, distinctive quality, which had at its core an intellectual engagement with science with an almost moral force. The unifying principle that underpinned all of her work was a vocational commitment to science. It imbued her output in science journalism and science communication with a conviction and a sense of purpose that went beyond the immediate concerns of a given assignment or project.

Science pervaded her world-view. It was bound up in her sense of herself and in her relationship with the world around her. So, finding a place for science in Ireland's sense of itself was the thread that linked all of her efforts in print and broadcast journalism, in the books that she wrote or edited and in the radio programmes and documentaries she made, in her advocacy and in her later cultural work in scientific and industrial heritage. Allied to this was a rich talent for story-telling, in the spoken and written word, which made her the country's outstanding science communicator of her time. Her legacy extends beyond that professional accomplishment, however. Mary's personal commitment to Ireland's scientific heritage and to the many Irish women in science who had been written out of history transformed her from being a commentator to a custodian.

Mary's work evinced no particular intellectual allegiance to, or reliance on, genetics, the discipline she studied (with considerable academic success) at Trinity College Dublin. She roamed freely over – and delved deeply into – the earth sciences, astronomy, chemistry, physics, mathematics, biology, ecology, archaeology, medicine and engineering.

She first came to prominence through her regular contributions to the Irish Times from the late 1980s, after completing the Graduate Diploma in Journalism at the National Institute for Higher Education Dublin, later Dublin City University. Although never a member of The Irish Times's editorial staff, she had a career-long association with the paper, which was renewed in May 2014 by her appointment as a regular columnist. She developed a parallel career in broadcast media, producing and presenting science documentaries and series for radio. Her nine-year spell as co-editor with Tom Kennedy of the magazine, Technology Ireland, during the 1990s was less visible as her own by-line rarely appeared. But as a generous and supportive editor she played an influential role in encouraging the emergence of the next generation of science journalists.

Under her stewardship, the magazine functioned for a time as an open forum for debate on science and science policy in Ireland, frequently carrying critical opinion pieces from researchers and other commentators, but that latitude did not last long. The magazine's editorial brief narrowed during the several waves of restructuring that reshaped Ireland's science and enterprise support agencies during the 1990s, to the point where its eventual role was simply to amplify the core message of its ultimate publisher, Enterprise Ireland.

By then, Mary had already parted company with the publication. The move marked the beginning of the second phase of her career, in which she gave full voice to her own interests and concerns. Her real strengths lay in covering areas of her own choosing rather than working in domains that others defined. Around this time, she largely abandoned the routines of beat reporting, centred on the publication of scientific papers in high-impact (or 'prestigious') journals, the championing of successful Irish scientists or companies and debates on research funding and the convolutions of science policy development. Instead, she immersed herself in an extraordinary six-year research effort that led to her greatest achievement, *Ingenious Ireland*, the standard reference for any reader interested in the history of Irish science and technology (Mulvihill 2002).

Ingenious Ireland became the springboard for the final stage of her career, during which she mixed journalism and writing with other forms of communication, including her themed walking tours, apps and audio guides. These covered a broad range of topics, among them Dublin's

history of innovation, the geology of Dublin, the geography, history and ecology of the River Barrow, the Hill of Tara and the Botanic Gardens. Much of this work drew on the research effort she expended on the book. She applied new formats and new modes of communication to the wealth of material she had amassed and moved further away from conventional journalism. By this point, Mary embodied the old cliché of being ‘a walking encyclopaedia’.

Mary’s career in journalism followed four years as a research officer at the state agricultural research institute An Foras Talúntais, now Teagasc. She very soon found a voice, an inimitable way of writing and of speaking that lent her work in print and in broadcast media a very particular style. It was assured and authoritative without being didactic or dogmatic. She had a learned curiosity about – and an enthusiasm for – science that readers and listeners found inviting and engaging. The Irishwoman’s Diary slot in the Irish Times was particularly suited to her talent for reflection, for spotting a quirky connection or for simply remembering. She had a real gift for seeing old discoveries with a fresh eye, as in a piece to mark the centenary of the discovery of X-rays:

“The spring of 1896 must have been an extraordinary time. The world was still reeling from the news of Mr Roentgen’s mysterious X rays, which could apparently see through skin, when Henri Becquerel announced in Paris that he had discovered radioactivity. Matter could now change from one element to another – it must have sounded like alchemy” (Irish Times, 15 February 1996).

In another diary piece, she links a vivid account of the 19th century engineering marvel that is the sewers of Paris (*les égouts*) with plans to lay fibreoptic cable in Dublin’s sewers, memorably referencing Victor Hugo, who called the Parisian network “the city’s conscience” (Irish Times, 16 January 2001). In a piece to mark Darwin Day, an annual celebration of Charles Darwin on the anniversary of his birth, Mary captures with elegant concision Darwin’s key insight, that natural selection drove evolution:

“The core of his theory was simple: if chance variation gives an individual some advantage over its neighbours – a slightly better eye, for instance – then that individual is more likely to survive and pass the advantage to the next generation. Run this simple algorithm over countless generations, and eventually populations will diverge, new

species emerge and some old species disappear” (Irish Times, 10 February 2005).

In advance of St. Patrick’s Day, she informed readers that the tradition of wearing of shamrock is “all a bit of a sham because – whisper it – botanically speaking, there is no such species as shamrock” (Irish Times, 12 March 2012). Five species – three different types of clover, a wood sorrel and a herb known as black medic – are most commonly used, according to a survey carried out in the late 19th century and a similar undertaking repeated a century later.

Fittingly, her final column in the Irish Times (9 April 2015) touched on one of her great concerns, which was to restore women scientists to their rightful place in the history of their discipline. It commemorated the work of Annie Russell, the Irish solar astronomer who came to prominence early in the 20th century. Russell had studied mathematics at Cambridge University and came top of her class in her final exams but she left without a degree, as women were not permitted to graduate in those days. When she married her husband (and boss) Walter Maunder in 1895 she had to relinquish her job at the Greenwich Observatory in London. But she continued to collaborate with her husband over several decades, even though their joint achievements in the study of sunspots and solar storms were solely credited to Walter initially. “Such were the restrictions facing women scientists then, but today there’s a crater on the moon named after her,” Mary writes. Achieving true gender equality in science remains very much a work in progress, an effort to which Mary’s contribution, particularly through her founding of WITS (Women in Technology and Science) in 1990, has been seminal and substantial.

Mary’s penultimate column in the Irish Times (12 March 2015) had touched on another key concern, the neglect of science in Ireland in the decades after independence. Here she finds a fresh angle on the ‘two cultures’ debate, which was another of her ongoing preoccupations (she steered clear of the science wars that followed). She deploys a quotation from William Butler Yeats (1889) to suggest the literary revival of the late 19th century may have contributed to the marginalisation of science in post-independent Ireland:

“There are two boats going to sea. In which shall we sail? There is the little boat of science. Every century a new little boat of science

starts and is shipwrecked; and yet again another puts forth, gaily laughing at its predecessors. Then there is the great galleon of tradition, and on board it travel the great poets and dreamers of the past.”

“With partition,” Mary notes, “Ireland’s two-culture divide was hardwired into the island. When VS Pritchett visited Belfast in 1923, he discovered that Dublin was a town of poets, but that in industrial Belfast ‘poetry don’t drive many rivets’.” That neglect, Mary argues, has had implications for “our history and heritage, our sense of identity, and the options we might envisage for the future of the country at the start of our second century, including relations with Belfast and the Northern riveters.”

Finding the stories in stones

Mary had a particular facility for geology. She was adept at compressing millions of years of geological time – and unwieldy mouthfuls of geological jargon – into gems of insight. A capacity for synthesis as well as analysis may be the key to understanding her grasp of the subject. Geology, according to the US philosopher (and former geologist) Robert Frodeman (1995), “is a pre-eminent example of a synthetic science, combining a variety of logical techniques in the solution of its problems”; it relies both on hermeneutic or interpretative reasoning and on historical exposition:

“Unlike the experimental sciences, where predictions are made by combining general laws with a description of initial conditions (the deductive-nomological model), the historical sciences are not primarily in the business of making predictions. Historical narratives do not explain an event by subsuming it under a generalization, but rather by integrating it into an organized whole”.

The radio documentary, *Pedals and Pebbles*, first broadcast in March 1995, conveys Mary’s enthusiasm for the subject. It was awakened by her love of hill-walking and a realisation that, despite the proximity to rock that hill-walking brings, she knew nothing about geology. “You walk over all this rock, and you never notice it, and you never learn from it, yet it has so much to say – it has history written in it, it is time captured in a kind of a capsule,” she states, by way of introduction. Produced by Dick Warner, the piece follows Mary as she cycles (a favoured mode of transport) in and

around Dublin, to sites and to buildings of geological interest and describes what she sees in a fluid, conversational style. We begin at Dalkey Hill, where, about 200 years earlier, granite was quarried to build Dun Laoghaire pier and harbour and later the seawall that protects the railway line to Dublin. She later inspects that seawall at Booterstown Marsh – the last remains of a large lagoon formed by the wall’s construction – and finds incorporated into the wall’s structure what may be a discarded granite sleeper used during the early life of the railway line. Here too the limestone from which much of Dublin is built is visible. The sedimentary rock, she notes, is “built up over the years as the sediment is laid down, almost like growth rings in a tree”.

In Dublin, she visits Christchurch Cathedral, which was originally built from wood in the 11th century, but which the Normans started to rebuild in stone from the 12th century. We are taken to the corner of Dame Street and Foster Place to learn about a very particular type of Welsh green slate, made from what was once volcanic ash, in the building once occupied by Riada Stockbrokers, and now housing a branch of Starbucks. The road surface of Foster Place is also noteworthy. It is paved with setts – not cobblestones – that are rectangular pieces of stone from a quarry in Co. Wicklow once owned by Charles Stewart Parnell. These are made from diorite, an igneous rock, formed from cooling lava or magma. “Most of Dublin is actually paved with these sett stones – you don’t see them now, because they are lying under the tarmac,” Mary notes. Actual cobblestones are irregular, naturally rounded, stones, which were often taken from beaches; Front Square in nearby Trinity College Dublin offers a good example. Mary also considers the old library building in Trinity, which is made from calp, a widely used type of local limestone that has a muddy appearance. “So much of Dublin was built over the years with this dirty, muddy limestone that it earned the title ‘dear old dirty Dublin’”.

The programme ends at Mount Jerome cemetery in Harold’s Cross, where many notable figures from Ireland’s scientific and cultural history are buried. “A veritable forest of stone,” Mary calls it, as she wanders among the headstones, observing their geological and biographical details. She finally alights on the grave of Thomas Drummond, a Scots-born engineer and surveyor who developed a powerful form of pre-electrical lighting based on limelight, which is generated by exposing quicklime

(calcium oxide) to an oxyhydrogen flame. It was first used in 1825 on Slieve Snaght, in Co. Donegal, during the first ordnance survey of Ireland. “It’s curious the things that endure. Thomas Drummond’s name is all but forgotten, his limelight is gone. We remember just the phrase, ‘in the limelight’. And so many of the stones around me, their inscriptions are illegible, they no longer tell the story of the person they commemorate, the person they remember. But stones themselves endure; and they remain, and they tell their own story.”

It was in her magnum opus, *Ingenious Ireland* (2002), that Mary really found her voice. It’s a book with an extraordinary scope and sweep, a *sui generis* publication. It combines the range and authority of an encyclopaedia with the intimacy that comes with a single authorial voice. County by county, Mary mined the rich seam of Ireland’s scientific, industrial, geological, ecological and archaeological heritage. From it, she extracted a rich repository of historical understanding and insight. Each entry is written as a brief stand-alone article, but the whole is richly indexed and cross-referenced to capture the connections between the people, places and ideas the book covers.

Mary was not the first to attempt to reclaim Ireland’s discarded scientific legacy, but no one had previously done so on such a scale or with such panache. The book appeared just as the country had begun to re-embrace science, albeit with what was often quite a narrow, largely enterprise-led agenda. *Ingenious Ireland* is, by its nature, a capacious, baggy undertaking with no single message or argument to be distilled. In its totality, however, it can be taken as a reminder that the influence of good science may endure over time-scales that extend far beyond those contemplated by immediate policy objectives or the perceived needs of industry or the economy.

The opening section, *In the Beginning*, works well as a stand-alone essay. It describes how the island of Ireland comprises northern and southern halves, which originated in the ancient continents of Laurentia and Avalonia, respectively. Some 400 million years ago the two collided, to form a single landmass, Pangaea. That part of it that would eventually give rise to Ireland contains a remnant of this event, a seam consisting of a 60-kilometre impact zone extending from Limerick to Clogher Head, Co. Louth, as well as a massive, and since greatly eroded, mountain range in

the north-west. Mary traces the emergence of Ireland's present-day mountain ranges, linking the geological evidence with the fossil record and taking account of the ever-changing latitude, due to continental drift.

She discusses the variations in Ireland's climate over the past 500,000 years, during which four separation glaciations are thought to have occurred. She considers the natural history of the island from prehistoric times, when a land-bridge with Britain still existed, to the present time, which follows the extinction of many native plant, invertebrate and animal species and the introduction, deliberate and accidental, of many others. Apart from salmon, eel and trout, which migrate between river and sea, Ireland has, she notes, only three native freshwater fish: pollan, char and Killarney shad. Pike, carp, roach and dace were all introduced in the last 500 years. She writes expertly about Ireland's bogs, how they developed and how they sustain themselves as intricate ecosystems. She also assesses the country's natural resources, terrestrial and marine, noting that as far back as the 1550s, the Spanish were paying the English crown £20,000 a year for fishing rights. By 1600, she adds, "the Dutch were paying £30,000 for similar access".

Her account of Dublin's gradual physical development over 1,000 years further illustrates her great talent for visualising a vanished past, as well as her extraordinarily detailed understanding of historical construction methods. Her description of the eastward spread of the city from Wood Quay, which the Vikings built around 900 AD, is deft: "The city and bay looked very different then: the mouth of the Liffey was more or less at Wood Quay; there was no North Bull Island; high tides washed in as far as Merrion Square in the south and Ballybough to the north; the north, east and south dock walls had not been built; and much of the North Lotts and Ringsend was still underwater." The gradual construction of quay walls to contain the Liffey, coupled with the building of the Great South Wall and the North Bull Wall to provide navigable shipping channels, shaped Dublin port as we know it today. North Bull Island, now an important bird sanctuary, emerged as an accidental by-product, shortly after the completion of the North Bull Wall in 1825. (William Bligh, a noted marine surveyor and the even more noted skipper of the ill-fated HMS *Bounty*, contributed to the consultation process that preceded its construction.) The altered currents in the bay changed the patterns of sand

deposition on a pre-existing sandbank, giving rise to a series of sand dunes that continue to develop to this day.

Walking in the footsteps of others

In its geographic sweep, *Ingenious Ireland* deserves to be considered alongside two other classic odysseys around Ireland, Robert Lloyd Praeger's *The Way That I Went* (1937) and Frank Mitchell's *The Way That I Followed* (1990). It differs from these, however, in both scope and style. Praeger (1865–1953) and Mitchell (1912–1997), each the outstanding naturalist of his generation, wrote in a strongly autobiographical vein from the perspective of men who had completed their formal professional careers. Mary was very much in mid-career when she completed *Ingenious Ireland*. Her tone is more neutral and eschews the anecdotal. The range of material she considers is, of course, far broader, given the different ambitions attached to the work. In it can be found accounts of the oldest footprints in the northern hemisphere – the fossilized trace of an early amphibian that lived on Valentia Island, Co. Kerry, 385 million years ago – also accounts of ice-houses built to preserve food on the great estates of the 18th century, and of the intrepid career of the engineering genius from Co. Down, Harry Ferguson, Ireland's first aviator and an innovator in the design of ploughing systems and of the iconic tractor that bears his name.

Here too is a colourful account of the career of Sir Peter Freyer, the flamboyant urological surgeon from Co. Galway, who worked in India and Britain and who, Mary notes, “first came to prominence in 1888 when he successfully removed a bladder stone from the Rajah of Rampar, who gratefully paid him £10,000”. He later developed a prostatectomy procedure that remained the standard for the next 50 years and was known to provide a running commentary in both French and Hindustani when demonstrating the technique in front of an audience of his professional peers.

She writes about the self-taught marine biologist Maude Delap, who made significant contributions to the study of jellyfish from her home-built laboratory on Valentia. She details the achievements of Kildare-born chemist and crystallographer Kathleen Lonsdale, who showed that benzene, an important petrochemical, had a flat, hexagonal ring structure

and in 1945 became the first woman to be elected a fellow of Britain's Royal Society since its foundation in 1660. She covers the career of Kathleen Lynn, one of Ireland's first women doctors, who was chief medical officer of the Irish Citizen Army during the 1916 Rising and who later led the all-female staff at Teach Ultan or St. Ultan's Clinic, in Dublin, Ireland's first hospital dedicated to children (see also Mulvihill 1997, 2009).

She writes about notable ecosystems, such as Pollardstown Fen in Co. Kildare, the Burren in Co. Clare and Strangford Lough, in Co. Down, the largest sea lough in the British Isles and one of Europe's most important marine nature reserves. She writes evocatively about Lough Hyne in west Cork, "probably the biggest, richest rock-pool in the world". Not only is it a unique biodiversity hotspot, it is also a geological mystery: "This is arguably the world's most intensely studied square kilometre of sea, yet scientists still do not know how the rock basin formed."

In its depiction of Dublin, in particular, as a full participant in the emergence of a professional scientific and technological elite in the United Kingdom during the 19th century, *Ingenious Ireland* offers an intriguing counter-narrative to the more familiar nationalist narratives of that time. Ireland was, obviously, the location for Daniel O'Connell's campaigns for Catholic emancipation and repeal of the Act of Union, the Great Famine and the post-famine push for land reform and Home Rule. At the same time, Mary reminds us, it was also the place where William Rowan Hamilton carved his famous equation for multiplying four-dimensional complex numbers he called quaternions ($i^2 = j^2 = k^2 = ijk = -1$), on Broombridge, on the Royal Canal; where George Francis FitzGerald proposed that nothing could travel faster than the speed of light and whose work on the Lorentz-Fitzgerald contraction was a cornerstone of Einstein's theory of relativity; and where the Offaly-born, Galway-based scientist George Johnstone Stoney proposed the concept of the 'electrine' (which he later revised as 'electron') to describe the fundamental unit of electricity.

Ideas and personnel flowed between Ireland and Britain prior to and after independence. Prominent scientific 'imports' included George Boole and the chemist Edmund Davy, who discovered acetylene, a scientifically and industrially important hydrocarbon, while notable exports included

John Tyndall and JD Bernal, major figures in British science in the 19th and 20th centuries, respectively. Mary does not seek to privilege one narrative over the other – at the time of her death she had been planning a book on the Great Famine – but she demands that we take ownership of the full complexity of Ireland’s history and include in it the great Anglo-Irish scientific tradition. In scale and impact, it was arguably just as significant as the Irish language and literary revivals, with which it partially overlapped. Her argument is implicit rather than explicit – she makes no grand rhetorical claims in the book. She simply sets out, entry after entry, to show that this island has a rich history in science and engineering, as well as precious ecological and archaeological riches and, in so doing, she deepens and enriches our understanding of Ireland.

Her account of the Pigeon House power plant is a case in point. Built by Dublin Corporation in 1903, it was Ireland’s first major electricity generating station, with a capacity of three megawatts (MW). It was also the first power plant in the world to generate three-phase electricity, which was technically and economically more efficient than single-phase electricity, the prevailing standard at the time. The plant, therefore, became a model for many others that followed, but its history has been largely overlooked in this country, given the totemic status attached to the Shannon hydroelectric scheme. This 85 MW plant, at Ardnacrusha, Co. Clare, is rightly celebrated for its significance both as an epic engineering feat and as confirmation that the fledgling Irish Free State could manage large-scale infrastructural investment projects. *Ingenious Ireland* deals with Ardnacrusha at considerable length, but by also according the Pigeon House plant (which remained in operation into the 1970s) its place in history, Mary separates, partly at least, the practice of electricity generation in Ireland from the theory of nation-building.

The great astronomical telescope at Birr Castle, Co. Offaly, further demonstrates that 19th century Ireland was, in current parlance, internationally competitive in terms of its capabilities in science and technology, even while much of its population suffered from grinding poverty and lack of opportunity. Helped by the great wealth of his wife, Mary Field, William Parsons, the third Earl of Rosse, spent over two decades perfecting the creation of large-scale mirrors before building the world’s largest telescope in 1845. The Leviathan, a reflecting telescope,

superseded an instrument installed at Greenwich Observatory in London in the 1780s. It was based on a highly polished mirror, measuring six feet in diameter and cast from four tonnes of molten alloy. The metal took four months to cool in an oven specially built to prevent it from cracking. The mirror was encased in a wooden tube, 54 feet long, and the entire apparatus weighed 12 tonnes.

Within a month of its completion in March 1845, Parsons made his first and, Ingenious Ireland notes, only, significant discovery of a spiral-shaped cluster of stars he called the Whirlpool Nebula. The vast bulk of the instrument made it difficult to manoeuvre and its location in the damp, boggy midlands was not ideal. Clear skies were not very frequent and the mirror was prone to tarnishing. But here the trajectory of mid-19th century scientific and technological innovation in Ireland collides directly with the immense upheavals of the Famine. Astronomical research was abandoned at Birr just a few months after it started, and the Parsons family concentrated on famine relief works for a number of years. Research was resumed in 1848 and Birr became an important training ground for Irish astronomers over several decades and a magnet for overseas visitors.

Other members of the Parsons family, Mary notes, were also innovators: Charles Parsons, youngest son of William, invented the modern steam turbine; his mother Mary Field was an early pioneer of photography; the fourth Earl, Laurence Parsons, together with his collaborator Otto Boeddicker, devised a method for measuring the temperature of the moon. Although The Leviathan remained the world's largest telescope until 1917, it had become derelict by then. Its renovation in the 1990s as the centrepiece of a science heritage centre at Birr Castle enables visitors to train their perspectives anew on some of Ireland's forgotten achievements in science, technology and engineering.

On a larger scale, that too is Mary's enduring legacy. By her close application of a scientific lens to Ireland's history and its natural history, she uncovered or recovered many layers of knowledge that had been forgotten or discarded. In restoring that knowledge to the present era, her work invites us to consider or reconsider the stories Ireland tells about itself and to itself – what it values; what it neglects; and, most of all, what other stories it might include.

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