Visions of nature: reviving Ruskin's legacy at the Oxford University Museum

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Introduction

The Oxford University Museum of Natural History, built from 1855 to 1860, is probably the best-known example of a Victorian building that was shaped by the ideas and interventions of John Ruskin.[1] Drawing on Ruskin's arguments in favour of Gothic art and architecture in *The Seven Lamps of Architecture* and *The Stones of Venice*, the architects George Edmund Street, who campaigned for the museum, and Benjamin Woodward, who built it, imagined a natural history museum that could represent the natural world itself in its forms and materials. The Oxford scientists John Phillips and Henry Acland, the latter an old Christ Church friend of Ruskin's, embraced this conception of the museum. They envisaged a building that would at once teach and model a scientific worldview. In its decorative art, much of it carved directly from botanical specimens, the museum epitomizes Ruskin's principles of truth to nature and the creative emancipation of the individual artisan. From the first, when he wrote to Pauline Trevelyan in December 1854 that 'Acland has got his museum – Gothic – the architect is a friend of mine – I can do whatever I like with it',[2] to the last, when he dismissed the museum as 'a very shabby bit of work of

[1] The museum has generated a good deal of scholarship and interpretation, much of it approaching the building through Ruskin. For successive accounts of its architecture, including Ruskin's contribution to it, see Eve Blau, *Ruskinian Gothic: The Architecture of Deane and Woodward 1845–61*, Princeton: Princeton University Press, 1982, 48–81; Michael W. Brooks, *John Ruskin and Victorian Architecture*, London: Thames and Hudson, 1989, 112–42; Birkin Haward, *Oxford University Museum: Its Architecture and Art*, Oxford: Oxford University Museum, 1991; Trevor Garnham, *Oxford Museum: Deane and Woodward (Architecture in Detail)*, London: Phaidon, 1992; John Illingworth, 'Ruskin and Tradition: The Case of Museums' in Michael Wheeler and Nigel Whiteley, eds, *The Lamp of Memory: Ruskin, Tradition and Architecture*, Manchester: Manchester University Press, 1992, 39–53; Frederick O'Dwyer, *The Architecture of Deane and Woodward*, Cork: Cork University Press, 1997, 152–283; Peter Howell,' "As beautiful as anything I know in civil Gothic', or 'a very shabby bit of work of mine': Ruskin and the Oxford Museum' in Rebecca Daniels and Geoff Brandwood, eds, *Ruskin and Architecture*, Reading: Spire Books, 2003, 56–85; Carla Yanni, *Nature's Museums: Victorian Science and the Architecture of Display*, New York: Princeton Architectural Press, 2005; John Holmes, *The Pre-Raphaelites and Science*, London: Yale University Press, 2018, 117-59; Emma Peacocke, 'William Paley, William Buckland and the Oxford University Museum', *Romanticism on the Net*, 70, Spring 2018, 26 pp.; and John Holmes, *Ruskin, the Pre-Raphaelites and the Oxford Museum*, York: Guild of St George, 2018.

[2] Virginia Surtees, ed., *Reflections of a Friendship: John Ruskin's Letters to Pauline Trevelyan 1848-1866*, London: Allen & Unwin, 1979, 94-5.

mine' in a lecture he gave in the museum itself in 1877,[3] Ruskin was inclined to overstate his role in its construction. He had a hand in the design and was instrumental in introducing the Oxford scientists to the Pre-Raphaelite artists who worked on the building and set the standard for its art, but the overall plan and schema were devised by Woodward, Acland and Phillips, not Ruskin, while the decorative art was the work of many hands, with only one window directly designed by Ruskin himself. Even so, the influence of his writing and ideas on the building was undoubtedly profound and it remains a vivid embodiment of his contribution to architecture and aesthetics.

The Oxford University Museum is not only a remarkable piece of Victorian architectural heritage. It remains a thriving museum of natural history. Since it reopened in 2014 after a year closed for roof refurbishment, it has seen its annual visitor numbers rise by 45% from around 550,000 before the museum closed to over 800,000 in the academic year 2018–19. This rise in visitor numbers has coincided with a sustained move by the museum to reinvigorate the synergy of art and science that was built into its fabric in the 1850s. The museum's decision to embrace the arts within an institution whose primary purposes is to educate the public about science was inspired by its heritage as an example of Ruskin's aesthetics and a unique contribution to the wider Pre-Raphaelite movement which he helped to foster. In this article, we consider how the lectures Ruskin gave at the museum as the first Slade Professor of Fine Art at Oxford in the 1870s can help to conceptualise a role for the arts in public engagement with science today, and how the use of the arts by the museum exemplifies his legacy in a way that offers a model for other science and natural history museums.

We live in a time of unprecedented and patently unsustainable human impact on the rest of the natural world, an impact which, as is increasingly evident, jeopardises not only many forms of non-human life but also the lives of millions of people and the well-being of billions more. The arts have a crucial capacity to engage and motivate which science on its own appears, on current evidence, to lack. They can stimulate an interest in new research and help to cultivate a care for nature, enhancing public receptiveness to science and thoughtful, critical engagement with it. In a society where educational structures continue to reinforce the divide between the 'Two Cultures' that C. P. Snow critiqued sixty years ago,[4] the arts can help to draw people into natural history museums who might be more usually inclined to visit galleries, theatres or concert halls. Most vitally, art in different forms can galvanize action by provoking responses to scientific data that are simultaneously emotional and intellectual. Where facts themselves may be dry or overwhelming or both, the arts enable people to realise them vividly for

[3] Edward Tyas Cook and Alexander Wedderburn (eds), *The Works of John Ruskin*, London: George Allen / New York: Longman, Green, and Co, 1903–12, 39 vols, digitized by the Ruskin Library and Research Centre, Lancaster University, XXII, 523 [https://www.lancaster.ac.uk/the-ruskin/research-and-collections/additional-resources/the-complete-works-of-john-ruskin/].

[4] C. P. Snow, *The Two Cultures*, with an Introduction by Stefan Collini, Cambridge: Cambridge University Press, 1998.

themselves but also to process them, to grasp the moral predicament, to grieve and to hope. Ruskin's own prose has this same capacity. In the first section of this article, we will trace how his thinking on the relationship between art and science developed through his connections with the Oxford museum, culminating in his critique of the museum when he taught art there in the 1870s. While Ruskin's growing hostility to science over that decade may seem to disqualify him as a model for enlightened science communication, his insistence on the need for the emotional and moral engagement of the arts to sustain life remains deeply pertinent. In the second section, we will explain how the museum has revisited and revived Ruskin's legacy in the six years since it reopened. Fulfilling his demands for art to be scientifically rigorous and for science to hold itself to the moral standard of art, the museum has hosted art exhibitions and residencies, incorporated the arts into its science programming, and partnered with activist groups who deploy the arts in campaigns against inaction on climate change and the catastrophic loss of biodiversity. Finally, we will reflect on what the museum has accomplished through this change in practice, demonstrating what a broad alliance of art and science can achieve when confronting together the most pressing political and moral questions of our time.

Ruskin on Science and Art at the Oxford Museum

From the outset, the Oxford University Museum was a site of education. Indeed, its architecture was an education in itself. For Acland and Phillips, it was an object lesson in science, with 'the pillars and columns around ... composed of variously coloured marbles, illustrating different geological strata and ages of the world,' while 'the capitals represented the several descriptions of floras' and the entire structure entailed an 'experiment ... to try how Gothic art could deal with those railway materials, iron and glass'.[5] For Ruskin, it was an object lesson in the three great principles of the Gothic Revival which he set out in a letter to Acland in May 1858, later incorporated into the museum's guidebook: 'that a given quantity of good art will be more generally useful when exhibited on a large scale, and forming part of a connected system'; 'that all art employed in decoration should be informative, conveying truthful statements about natural facts'; and 'that all architectural ornamentation should be executed by the men who design it'.[6] From 1870, Ruskin came to teach in the museum himself alongside Acland and Phillips. His inaugural lecture as Slade Professor, opening the series *Lectures on Art*, was due to be delivered on 8 February 1870 in the lecture theatre at the museum, but the crowds were too large and it had to be relocated to the Sheldonian Theatre next to the Bodleian Library in the centre of Oxford.[7] For the remaining six lectures, given over the course of the Hilary or spring term, he reverted to lecturing at the museum, which became the main site for his lectures on art to Oxford undergraduates.

[5] Report of a speech by Henry Acland, 13 June 1855, *Oxford Architectural Society: Reports of Meetings from July 1853, to May 31, 1856*, 70-71.
[6] *Works of John Ruskin*, XVI, 213-15.
[7] *Works of John Ruskin*, XX, xlvii.

Ruskin's brief was to teach fine art, but given their venue and his long-standing enthusiasm for the empirical study of nature, it is fitting that the relationship between art and science within education and at large should have become a key preoccupation of his lectures. He first addresses this question from his new vantage point as an academic in the fourth of his *Lectures on Art*, on 'The Relation of Art to Use'. He insists at the beginning of his lecture, delivered in the museum on 3 March 1870, that art 'exists rightly only when it is the means of knowledge, or the grace of agency for life.'[8] He goes on to make a case for how art can be a means to knowledge specifically. This argument has two steps. Initially art appears as the handmaiden to science through 'the endeavour to give more life and educational power to the simpler branches of natural science', which is necessary because 'the great scientific men are all so eager in advance that they have no time to popularise their discoveries.' In the second step of Ruskin's argument, however, it becomes clear that art has a more vital role than just to take the discoveries of science and communicate them to a public which is not scientifically literate. Science, he suggests, 'has suffered by her proud severance from the arts; and having made too little effort to realise her discoveries to vulgar eyes, has herself lost true measure of what was chiefly precious in them.'[9] The arts are a gauge of value for Ruskin, a reminder of what matters in life beyond the narrow academic sphere, as well as a means to express that value. Without them, the sciences are at risk of turning inward, judging themselves according to their own, at times reductionist, standards.

Ruskin takes his own example from botany. The researches of botanists into the classification and anatomy of plants, while they may be 'subtle or successful' on their own terms, 'bear to the real natural history of plants only the relation that anatomy and organic chemistry bear to the history of men.'[10] Instead, Ruskin asserts, 'what we especially need at present for educational purposes is to know, not the anatomy of plants, but their biography—how and where they live and die, their tempers, benevolences, malignities, distresses, and virtues.' On one level, his terms seem antiquated and eccentric. His portrayal of plants is deliberately anthropomorphic and his account of scientific botany pointedly, if gently, satirical. Yet he does not reject the study of plant anatomy wholesale. He proposes using precise drawing to ensure that 'we might at once compare any given part of a plant with the same part of any other.' At the same time, through his anthropomorphic language he is able to articulate a way to study plants that is fully attentive to their ecology. If to speak of their 'malignities' and 'benevolences' is to use the obsolete moral language of the early modern herbal, to insist that 'We ought to see the various forms of their diminished but hardy growth in cold climates, or poor soils; and their rank or wild luxuriance, when full-fed, and warmly nursed' is to demand, rightly, that botany should not be idealized but should recognize the importance and consequences of environmental factors in the real lives of real plants.[11]

[8] *Works of John Ruskin*, XX, 96.
[9] *Works of John Ruskin*, XX, 100.
[10] *Works of John Ruskin*, XX, 100.
[11] *Works of John Ruskin*, XX, 101.

In *Lectures on Art*, Ruskin proposed that art could be at once a complement and a corrective to science. The implication was that a fully rounded natural history included both science and art. He developed this argument across a further series of lectures which he gave two years later in February and March 1872, once to Oxford students and once to the public, on the theme of 'The Relation of Natural Science to Art', published the same year as *The Eagle's Nest*. In the ninth lecture in particular, 'The Story of the Halcyon', Ruskin set out a programme for natural history on precisely these foundations. He insisted that the natural history 'of any creature' had 'three branches'. The second and third of these were conventionally scientific, covering 'the actual facts of its existence', as determined through the study of it 'in its actual state, with utmost attainable veracity of observation', and 'the physical causes of these facts', as determined by 'laws of chemistry and physics'. By contrast, the first branch was what Ruskin called 'the poetry of it', grounded in a study of 'traditions … so that we may know what the effect of its existence has hitherto been on the minds of men.' Ruskin admits that 'it is customary, and may be generally advisable, to confine the term "natural history" to the last two branches of knowledge only', yet he insists nonetheless that what he terms 'poetry' is an essential complement to the purely scientific study of natural history.[12] Ruskin's three branches of natural history do not necessarily form a hierarchy, let alone an opposition. The poetry still augments the science, although it is, he suggests, the first step towards understanding another living being. Looking back to his discussion of plants in *Lectures on Art*, it is clear too that, when he talks about studying a creature 'in its actual state', he means studying it alive, with our own eyes and, ideally, in situ.

Ruskin's inclusion of the arts within the methods and sources of natural history compounds the critique of reductionism implied in his earlier lecture. This critique developed into an increasing explicit hostility to the science of his own time, prompted in large measure by the publication in 1871 of *The Descent of Man* by Charles Darwin. In 1870, Ruskin had quipped that 'our artists are so generally convinced of the truth of the Darwinian theory that they do not always think it necessary to show any difference between the foliage of an elm and an oak.'[13] The implication was that Darwin's ideas, whether true or false, were a distraction from the proper business of natural history as well as art. By 1872, however, Darwinism had become, for Ruskin, a 'fallacy'. Ruskin professed to 'have never heard yet one logical argument in its favour' and to 'have heard, and read, many that were beneath contempt.'[14] In 'The Story of the Halcyon', he denied the variability of species to the extent required for natural selection to make a difference and rejected the theory of sexual selection as an explanation for the beautiful forms and colours of birds' feathers. But Ruskin was less troubled by the details of Darwin's theories than by his explanatory framework. Darwin's explanations of natural phenomena were exclusively materialist. For Darwin, these natural phenomena included human morality. Confronted with a science that had neither need nor use for the moral

[12] *Works of John Ruskin*, XXII, 244-45.
[13] *Works of John Ruskin*, XX, 101.
[14] *Works of John Ruskin*, XXII, 247.

logic of natural theology, Ruskin tried to shut it down. In an earlier lecture from the same series, entitled 'The Relation of Wise Art to Wise Science', he sought to reinstate the medieval term 'scientia', defined as 'knowledge of constant things', in place of what he called the 'error of supposing that science means systematization or discovery'. 'It is not the arrangement of new systems,' he insisted, 'nor the discovery of new facts, which constitutes a man of science; but the submission to an eternal system, and the proper grasp of facts already known.'[15]

In his first series of lectures at Oxford, Ruskin had advocated art as a means to communicate scientific discovery. Only two years later, confronted with Darwin's discoveries, he redefined science itself so that discovery was no longer its role. Within Ruskin's Oxford lectures, art is increasingly enrolled in opposition to modern and, in his view, misguided science, in particular science as it was taught at the museum which he had helped to build and where he himself taught art. In a series of lectures on 'Readings in *Modern Painters*', delivered in the museum in the autumn of 1877, he set up a Manichean struggle between life and death, God and the Devil, art and science, all taking place within the museum. In the fourth lecture in the series, he declares:

> as the colleges of this University were founded to bring the music of the Word of God to the ears of the youth of England, so the museum of this University was founded to bring the light and beauty and life of the works of God to their eyes.
>
> Instead of which, while its whole space would not be enough to show the twentieth part of what it ought to show of the life of this world, half of that narrow space is given to display, and recommend to contemplation, the Devil's working in it through disease, and his triumph over it in death.[16]

As Slade Professor, Ruskin launched several attacks on how his colleague George Rolleston displayed the anatomy and physiology collections at the museum. In an article for the *Nineteenth Century* published in 1880, he satirized Rolleston with a quotation from Wordsworth, remarking that 'his professorial manner of "from pastoral graves extracting thoughts divine" was to fill the Oxford Museum with the scabbed skulls of plague-struck cretins.'[17] He repeated the same charge after Rolleston's death in his now-famous lecture on climate change, *The Storm-Cloud of the Nineteenth Century*, delivered in February 1884 shortly before he resigned his second tenure as Slade Professor over his opposition to vivisection. Again he remarked how, 'in the natural history museum of Oxford, humanity has been hitherto taught, not by portraits of great men, but by the skulls of cretins.'[18] In his 1877 lectures too, Ruskin had commented of Rolleston that 'his work, without his meaning it, paralyses mine.'[19]

[15] *Works of John Ruskin*, XXII, 150.
[16] *Works of John Ruskin*, XXII, 517.
[17] *Works of John Ruskin*, XXXIV, 349.
[18] *Works of John Ruskin*, XXXIV, 72-73.
[19] *Works of John Ruskin*, XXII, 518.

As well as being a response to Rolleston's well-known endorsement of Darwin's theories, Ruskin's repeated attacks on his work at the museum suggest intense squeamishness. He arbitrarily sets a limit to science, refusing to allow it to address death and disease by declaring them to be the Devil's work. His squeamishness is moral as well as aesthetic. Theologically, he chooses to follow Christ, identified in his own words as 'the way, the truth, and the life', while repudiating firmly the sin by which death was deemed to have come into the fallen world.[20] But scientifically he circumscribes the field of legitimate knowledge and teaching, and not only in the realm of knowledge for its own sake but practically, in asking students to turn away from diseases which, as medics, they might eventually be able to cure. Another way of looking at this, however, is to say that what Ruskin is objecting to is a natural history, and by extension a science education, which, in directing the eye on dead things, does not set enough store by life. In opposition to such morbid science, Ruskin proposes a natural history of living things conducted through art. After asking his students 'Did you ever see a water-rat swim in clear water, and not want to see him do it again, nor wonder how he did it?' and 'Did you ever see a field-mouse balance itself on a stalk of wheat, above its nest?' he closes the fourth lecture of his series on 'Readings in *Modern Painters*' with an outrageous provocation. Pitting art against science, he declares, 'I could fill all this museum with studies of a duck and drake, and a hen and chickens, and it should be more educationally useful than it is now.'[21]

Ruskin's rage against Darwinism and his attempts to curtail science were Quixotic. In his model of a natural history that includes the arts, however, it is possible to see both the deeper motivations of his critique of science at the museum and its on-going relevance to the role of natural history museums. In his lecture on 'The Relation of Art to Use', Ruskin remarked that his students could study the natural world at their leisure as 'there is no immediate fear of the extinction of many species of flowers or animals.'[22] Only two years later, in a lecture 'Of Wisdom and Folly in Science' for his series *The Eagle's Nest*, he was warning his audiences of Oxford students and the wider public that 'the misuse we made of our discoveries will be remembered against us, in eternal history,' and predicting that 'our ingenuity in the vindication, or the denial, of species, will be disregarded in the face of the fact that we destroyed, in civilized Europe, every rare bird and secluded flower.'[23] As early as 1872, the reality of anthropogenically induced extinction had begun to bite for Ruskin. Darwin's theories of evolution were, in the final reckoning, trivial when set against the appalling reality of humanity's destruction of the natural world.

When the museum had opened back in June 1860, it had hosted the British Association meeting at which T. H. Huxley and Bishop Wilberforce, among others, crossed swords in a famous debate over the validity and implications of Darwin's

[20] John 14.6.
[21] *Works of John Ruskin*, XXII, 520.
[22] *Works of John Ruskin*, XX, 105.
[23] *Works of John Ruskin*, XXII, 147.

On the Origin of Species.[24] Ruskin's essays on political economy, *Unto This Last*, began to be serialized in the *Cornhill Magazine* that very month. Ruskin had been attacking industrialised labour relations for some years, including in his 'Address to the Workmen Employed on the Oxford Museum', delivered on 18 April 1856.[25] By the time the museum opened, his position had developed into a trenchant critique of capitalism. Ruskin's most famous adage from *Unto This Last* – 'THERE IS NO WEALTH BUT LIFE'[26] – is a reminder of what is at stake when he talks ten years later about art possessing 'the grace of agency for life' or proposes that it can help us to understand the 'biography' of a plant.[27] His increasingly demanding insistence that science needs to take account of life was predicated in part on a conflation of three quite different kinds of materialism: the methodological materialism of science, the materialist assumptions of classical economics and the philosophical materialism of atheism. Neither Rolleston nor Acland would have made the same assumption that these three materialisms were one and the same. But Ruskin was also responding to the demonstrable threat posed by rapacious industrial capitalism to the lives of people, animals and plants.

Unlike most of his contemporaries, Ruskin was painfully aware of the beginnings of today's environmental crises – habitat loss, climate change, anthropogenic extinction – unfolding before his uniquely attentive eyes. Science, far from challenging this process or drawing it out, appeared to him to be allied to the economic interests that were set upon beguiling people into believing that wealth could exist in forms that were destructive of life itself. Hence the scathing reference to the Oxford museum in *The Storm-Cloud of the Nineteenth Century*. Returning to his critique of science and his prescription – that what science needs is more input from the arts – it is clear that in Ruskin's own mind these were closely connected both with the museum itself and with the impact of industrial capitalism and consumer demand on the environment. As he remarked in *Unto This Last*, 'wise consumption is a far more difficult art than wise production.'[28] The economic and environmental trends that Ruskin identified have intensified to an extent that, while it would have appalled him, sadly might not have surprised him. It is now widely recognized that we are well into a sixth mass extinction, this time of our own causing, and that our climate has changed and will continue to change without dramatic cuts in the burning of fossil fuels and the clearing of forests for ranching and plantations. Ruskin misjudged and misunderstood Darwin and Rolleston, but his recognition that science is at risk of becoming isolated and ignored if it focuses too narrowly on reductionist methods and the specificities of its claims was astute and prescient. As he argued, the arts have the potential to engage people with science and to make them realize for themselves the implications of what science is telling us. We need

[24] For a comparison of contemporary accounts of this debate showing what was said by whom, see Richard England, 'Censoring Huxley and Wilberforce: A New Source for the Meeting that the *Athenaeum* "Wisely Softened Down"', *Notes and Records*, doi:10.1098/rsnr.2016.0058.
[25] *Works of John Ruskin*, XVI, 431-36.
[26] *Works of John Ruskin*, XVII, 105.
[27] *Works of John Ruskin*, XX, 96, 101.
[28] *Works of John Ruskin*, XVII, 98.

science more than ever to tell us what is happening to our world and why, but we also need art in all its forms to enable us to preserve life, in the full sense that Ruskin meant it, through the transition from our current world to the world we need to make if we are to survive this crisis with our civilizations intact.

Reuniting Art and Science

Ruskin was critical of the severance of science from the arts at the Oxford University Museum in the 1870s. In recent years, conscious of the need to bridge different types of audiences, and of its Ruskinian heritage, the museum has been striving to bring the two back into a creative and constructive dialogue. Revisiting Ruskin's lectures at the museum reveals how far this new practice chimes with his ambitions for natural history and his concern over human impact on the environment, even as it rejects his own rejection of modern science. In 2016, the museum embarked on an experimental year to explore the interfaces of arts and science, entitled *Visions of Nature*.[29] Paralleling Ruskin's proposals in his lectures, the aim was to engage the widest possible audiences with contemporary natural sciences and, importantly, with the challenges surrounding human impact on the environment. The fusion of arts, science and nature that informed the architecture and decoration of the museum under Ruskin's critical eye provided the inspiration for the year, with multiple strands that ranged across four visual art exhibitions, three poets-in-residence and a rich programme of public events. Throughout the *Visions of Nature* year, the museum also aimed to broaden its audience by presenting different perspectives on natural history. The target audiences were adults and young adults, including those who would actively engage with the arts but who were unlikely to visit a science or natural history museum.

The first exhibition to open was Kurt Jackson's *Bees (and the Odd Wasp) in my Bonnet* (18 March – 2 October 2016), which featured a new body of work that ranged across large-scale paintings, print making, sculpture and mixed media created specifically for the project.[30] Jackson trained as a zoologist in Oxford before moving to art and had even donated a wasp collection to the museum as a student. He was keen to return to those roots, so the artworks were interspersed with insects from the collections, including a single panel displaying all 270 species of British bees, and information on bee ecology. In addition to biodiversity and ecology, the exhibition explored the varied causes of bee population decline, including pesticide use, disease and habitat degradation, and provided visitors with interventions that could be made on a small-scale and individual basis, such as bee-friendly planting and the use of nest boxes in gardens. *Microsculpture*, by the photographer Levon Biss, was an exhibition that again centred on insects (27 May – 29 January 2016).[31] Biss produced a series of large-scale insect portraits up to four metres across, using a

[29] An overview of the *Visions of Nature* project is available at: https://oumnh.ox.ac.uk/visions-nature

[30] The exhibition catalogue is available at: http://www.kurtjackson.com/Catalogues/KJ-Bees-web.pdf

[31] Levon Biss, *Microsculpture*: *Portraits of Insects*. New York: Abrams, 2017.

photographic technique developed specially for the project and with the museum's entomology collections as subject matter. Each of the prints was a composite of up to 10,000 carefully lit images that enabled them to be printed at very large size without grain or loss of focus, and they were displayed alongside the original specimen, often less than a centimetre long. A review in *The Guardian* noted that the exhibition 'opened up a miniature world in which art meets science to dazzling effect'.[32] The final two exhibitions were *Arctic Artweeks* (10 November – 29 January 2016), an exhibition of work by multiple artists in a variety of media inspired by Arctic environments in partnership with Oxfordshire Artweeks, and *The Natural World*, by Oxford Photographic Society. Through state-of-the-art technology, *Microsculpture* exemplified Ruskin's vision of truth to nature through art, while the other three exhibitions all highlighted aspects of human impact on the environment.

In his *Lectures on Art*, Ruskin proposed that art had a role to play in science communication. The success of these exhibitions at the museum, and subsequently, confirms this expectation. Jackson's exhibition was seen by over 100,000 visitors to the museum and then toured to St Just in Cornwall. The video trailing Biss's exhibition was viewed over seven million times in one week, and received national publicity on BBC TV and in print media ranging from the *New Scientist* to the *Observer*, the *Guardian* and the *Daily Telegraph*. The exhibition itself received 443,000 visitors over its eight-month run in the museum and has since gone on to tour to ten countries in Asia, Europe and North America. Evaluation of *Visions of Nature* throughout the year showed that the starting premise – that art inspired by science could engage new visitors with science and contemporary environmental issues – was correct. In the opening two months of *Microsculpture* visitor numbers to the museum increased by 15% and in the opening month of *Bees (and the Odd Wasp) in my Bonnet* they increased by 10%. Furthermore, audience surveys in *Microsculpture* showed that 44% of those sampled had not previously visited the museum and 45% had come specifically to see the exhibition.

The museum was keen to explore the arts–science interface via the written and spoken word as well as through visual art. It developed a residency scheme for three poets-in-residence to work interactively with one another and the museum as part of *Visions of Nature*. John Barnie, Steven Matthews and Kelley Swain all had established interests in the poetry of nature and the natural world, and tours of the museum during their inductions introduced them to the Ruskinian context of the building. Over the course of the year, they worked behind the scenes with sixteen of the researchers and curators in the museum. The resulting body of work, comprising twenty-four poems, was brought together with nineteenth-century poetry linked to the museum and published as an anthology under the title *Guests of Time*, drawn from a poem by the Victorian art critic, poet and Oxford student John Addington Symonds.[33] During the year, the poetry was performed and sixteen additional poems were contributed by poets across the UK to a poetry tree

[32] https://www.theguardian.com/environment/2016/may/08/microsculpture-exhibition-insects-photography-levon-biss

[33] John Holmes (ed.), *Guests of Time: Poetry from the Oxford University Museum of Natural History*, with photographs by Scott Billings, Scarborough: Valley Press, 2016.

displayed in the museum court. Museum visitors were also invited to contribute to the poetry tree on National Poetry Day, which generated a further fifty additional pieces of work. The poetry project has been one of the longest lived components of *Visions of Nature*. Most recently, a selection of poems from *Guests of Time* was used in the libretto for a song cycle composed by Cheryl Frances-Hoad that premiered in the museum in October 2019. The solo soprano for the first performance, which received national reviews, was Carola Darwin – a great-great-granddaughter of Charles Darwin.

The success of *Visions of Nature* has led to a significant change in exhibition practice within the museum, particularly in its approach to the temporary exhibition series entitled 'Contemporary Science & Society'. As part of the drive to provide more programming for adult audiences to the museum, this series was created to look at aspects of contemporary science in a transdisciplinary way and to enable debate and discussion around their societal relevance. Each exhibition runs for six to eight months. To date, they have examined subjects as varied as biological sensing (*Biosense*, 2015); the art, science and utility of geological maps (*Handwritten in Stone*, 2015–2016); the development and function of the human brain (*Brain Diaries*, 2017–2018); the genetics and geography of migration to the British Isles from the last Ice Age to the modern day (*Settlers*, 2018); the natural history of bacteria (*Bacterial World*, 2018–2019); and the evolutionary origin of animals (*First Animals*, 2019–2020). The experience of the *Visions of Nature* year has had a direct influence on the way that these exhibitions are conceived and executed. After *Visions of Nature*, a decision was taken that contemporary art should be integrated into all future 'Contemporary Science & Society' exhibitions. For *Settlers*, a large piece entitled *Where Do We Come From? What Are We? Where Are We Going?* was commissioned from Ian Kirkpatrick, a Canadian contemporary artist and graphic designer based in Leeds.[34] For the succeeding exhibition, *Bacterial World*, the museum installed a large artwork by the sculptor Luke Jerram – a 28 m long sculpture of the bacterium *Escherichia coli* that was suspended from the glass roof of the museum.[35] The exhibition also incorporated glass sculptures of *E. coli* and *Salmonella*, again by Jerram, and crocheted Petri dishes of bacteria by the textile artist Elin Thomas. The latter were developed by asking visitors to the museum to impress an object of sentimental value into growth medium contained in a Petri dish. The bacteria transferred from the object were then incubated and the resulting bacterial cultures were captured in crochet by Thomas.[36] *Bacterial World* was seen by 175,000 visitors in its seven-month run, equating to an average of 787 per day, the highest attendance of all exhibitions held in that space to date. During evaluation interviews, the large suspended *E. coli* sculpture was the component of the exhibition mentioned most frequently, often eliciting feelings of amazement and interest, and many people had come specifically

[34] The complete exhibition with an image of the Ian Kirkpatrick artwork is available at: http://www.oum.ox.ac.uk/settlers/

[35] The exhibition content and images of Luke Jerram's *E. coli* installation are available at: http://www.oum.ox.ac.uk/bacterialworld/

[36] Images of Thomas's work for this exhibition are available at: https://morethanadodo.com/2018/11/01/bacteria-captured-and-cultured/

to see it. The artwork proved a particular success on social media and was the museum's most popular post on Facebook in 2018, as well as its most popular post ever on Instagram. It was thus responsible for significantly increasing the demographic reach of the exhibition. Evaluation confirmed too that the art components were key in conveying the scale and pervasiveness of bacteria in the natural world.

The philosophy behind *Visions of Nature* has thus had an enduring legacy for Oxford University Museum of Natural History. It has been responsible for a strategic shift in the way that the museum approaches engagement with the sciences of the natural environment and the societal issues that they address, evidenced by the integration of art into the contemporary science exhibitions *Bacterial World* and *First Animals*, and a partnership with the environmental activist group Extinction Rebellion in a day-long festival of art and science. *Microsculpture* continues to tour, with a follow-up project underway, and the three poets-in-residence have established a long-term relationship with the museum. Most importantly, *Visions of Nature* has become incorporated into the approach that the museum takes to engaging its audiences with major societal challenges such as the climate crisis, biodiversity loss, biotic abundance decrease and habitat degradation. As the museum has increased the volume of its voice and actions in relation to these issues, it has adopted a fusion of arts and science to communicate and engage its audiences in line with Ruskin's own principles. The museum celebrated the bicentenary of Ruskin's birth in 2019 with a second year-long programme of arts activity connected explicitly to his legacy. Alongside drawing competitions, exhibitions and other events, 'An Evening with John Ruskin', held in November 2019, made the connection between Ruskin's concerns with art, science and the environment and his role in helping to found the museum explicit. In a more practical manifestation of his legacy, the 'Arts/Science Extravaganza' with Extinction Rebellion in September 2019, attended by around 6,000 people, featured music and dance alongside lectures and workshops that highlighted the science of the climate crisis and biodiversity loss. As a direct legacy of *Visions of Nature*, the three poets-in-residence from 2016 returned to the museum for a recital of poems they had written during and since their residency on extinction and human impact on the environment, calling for a change in the ethics of our relationship to the wider natural world.

Ruskin's Legacy? Arts/science fusion in contemporary museums of the natural sciences

In an 'alternative fact', 'post-truth' world, museums have a critically important role as a trusted voice for the communication of information within society, which is not the case with print or broadcast media.[37] Natural history museums have begun to

[37] See Michael J. Novacek, 'Engaging the public in biodiversity issues', *Proceedings of the National Academy of Sciences*, 105: supplement 1, 2008, 11571–1578; Rusi Jaspal and Brigitte Nerlich, 'Fracking in the UK press: Threat dynamics in an unfolding debate', *Public Understanding of Science*, 23: 3, 2014, 348-363; Sonia Parratt, 'Public media and climate change:

realize the significance of this position, together with the responsibility implicit within it. In particular, there has been a rapidly accelerating awareness of the need not just to communicate the climate crisis and the scale of potential biodiversity losses but to encourage societies and governments to confront these issues through policy and remediation. In 2017, the Muséum National d'Histoire Naturelle in Paris (MNHN) published its manifesto *Quel future sans nature?* In its 'Déclaration', the MNHN manifesto urges its readers to recognize that:

> Natural history contributes to defining ethical principles that provide guidelines for human conduct and the future of our societies. It informs independent decision making and contributes to making science a part of culture.
>
> Without natural history, humans could not build a sustainable, balanced future on a planet with limited resources that is subject to climate hazards.[38]

For the authors of this manifesto, 'the world as a whole needs to work towards making the sciences, and natural history in particular, part of its culture'.[39] It is increasingly evident that the arts have an important role in establishing these cultural links and in working with natural history and the natural sciences to build this sustainable future.

The role of different disciplines in engaging publics with urgent societal challenges relating to the natural world is a recurrent theme in a recent collection of papers by museum professionals addressing the future of natural history museums.[40] In this volume, Kara Blond from the Smithsonian's National Museum of Natural History notes that 'This interdisciplinary emphasis will also likely veer out of the sciences and into the arts – featuring exhibitions that combine both areas to craft a more impactful narrative and reach a broader audience.' As Blond observes, 'Museums are no longer attempting to avoid this potentially charged content, or maintain a neutral tone in the face of conversations regarding climate change.' She predicts 'new takes on the Anthropocene in natural history museums around the world' including 'projects that allow artists to provide their take on climate change themes.'[41] While the Oxford University Museum's practice since *Visions of Nature* is certainly in line with these predictions, it aims for a more transdisciplinary, rather than multi- or interdisciplinary, approach. Bernard Choi and Anita Pak have drawn a useful distinction in which multidisciplinarity may be considered to draw on knowledge from different disciplines but stays within their boundaries, and interdisciplinarity analyses and synthesises links between disciplines into a

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Ethical standards and codes in the BBC treatment of environmental information', *Interactions: Studies in Communication & Culture*, 5: 1, 2014, 127-140.

[38] Luc Abbadie *et al.*, *Manifeste du Muséum: Quel future sans Nature?* Paris: Reliefs Éditions, 2017, 63.

[39] Abbadie *et al.*, *Manifeste du Muséum*, 78.

[40] Eric Dorfman (ed.), *The Future of Natural History Museums*, Abingdon: Routledge, 2018.

[41] Kara Blond, 'Imagining the future of natural history museum exhibitions' in Dorfman, *The Future of Natural History Museums*, 110-11.

coordinated and coherent whole. In contrast, transdisciplinarity integrates the natural, social and health sciences in a humanities context, and transcends the boundaries between them. In this sense, multidisciplinarity may be thought of as additive and interdisciplinarity as interactive, whereas transdisciplinarity is holistic. [42] In this spirit, the museum has been pursuing a fusion of science and art in which each contributes to our understanding and appreciation of the other. Like Ruskin, we propose that such an approach is more effective in engaging people, in terms of both reach and power, than merely combining individual disciplinary responses. In this we agree with the view of Emlyn Koster, Eric Dorfman and Terry Nyambe, who suggest in the same volume that:

> The drawback of so-called Science, Technology, Engineering and Mathematics (STEM) (…) is that it emphasizes separate traditional disciplines while excluding others that are also fundamental (for example, art, the humanities, medicine), rather than innovative pedagogies toward realizing an encompassing purpose.

They quote David Skorton, former Secretary of the Smithsonian Institution, who remarked in 2016 that 'It has been said that science helps us understand what we can do; the arts and humanities – our culture and values – help us decide what to do.' Skorton's compelling insistence on the need for the arts and humanities to join the sciences in addressing 'society's more complex and seemingly intractable problems' resonates with the programme articulated 150 years ago by Ruskin in his lectures at Oxford University Museum and implemented by the museum itself since 2016. [43]

As one of the first prophets of the Anthropocene, Ruskin's voice needs to be heard now, more urgently than ever, and in spite of his mistrust of the science that is the only impartial measure of what is happening to our planet. Activists have converged on the guiding principle that political leaders should listen to the scientists and tell the truth. Ruskin's lifelong commitment to truth to nature in art as well as science is a reminder of the need to resist the idea that politics and ideology can be divorced from scientific fact. In his Oxford lecture 'On Wisdom and Folly in Science' from *The Eagle's Nest*, Ruskin challenged his audience to reflect on the need for moral engagement with scientific knowledge:

> Yes, believe me, in spite of our political liberality, and poetical philanthropy; in spite of our almshouses, hospitals, and Sunday-schools; in spite of our missionary endeavours to preach abroad what we cannot get believed at

[42] Bernard Choi and Anita Pak, 'Multidisciplinarity, interdisciplinarity and transdisciplinarity in health research, services, education and policy: 1. Definitions, objectives, and evidence of effectiveness', *Clinical and Investigative Medicine*, 29: 6, 2006, 351-364.

[43] Emlyn Koster, Eric Dorfman and Terry Simioti Nyambe, 'A holistic ethos for nature-focussed museums in the Anthropocene' in Dorfman, *The Future of Natural History Museums*, 37.

> home; and in spite of our wars against slavery, indemnified by the presentation of ingenious bills,—we shall be remembered in history as the most cruel, and therefore the most unwise, generation of men that ever yet troubled the earth:—the most cruel in proportion to their sensibility,—the most unwise in proportion to their science. No people, understanding pain, ever inflicted so much: no people, understanding facts, ever acted on them so little.[44]

This paragraph, and in particular its last sentence, carries a tragic irony for our own generation. Ruskin's warnings, in this regard at least, have gone unheeded. Natural history museums have the trust, capacity and responsibility to present the facts of the case so that they may be understood and acted on. As Ruskin himself proposed, the arts have a fundamental and potentially transformative role to play in this engagement.

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[44] *Works of John Ruskin*, XXII, 147-48.