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Recollecting the Nineteenth-Century Museum

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Résumé de l'article

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William Paley, William Buckland and the Oxford University Museum

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Abstract
The Oxford University Museum of Natural History appears to be quintessentially Victorian, with its iron-and-glass architecture. It even bears the seal of approval of the great doyen of Victorian taste, John Ruskin (1819-1900). However, this museum also embodies William Paley's (1743-1805) Romantic-era Christian philosophy of divine design. Paley was the great synthesizer of the tradition of Natural Theology, which held that God's benevolence and ingenuity could be "read" from nature just as they could from the Bible. I argue that Paley's influence persisted long after the Romantic era and pervaded the Oxford University Museum (founded 1860) and its program of architectural decoration. To enter the museum, we walk under the arm of the carved angel who holds the book of nature. The teaching and popular writings of the clergyman and geologist William Buckland (1784-1856) also form a bridge between Paley and the Oxford University Museum. Buckland's pupils included Ruskin and Henry Acland, two of the great advocates of the Oxford University Museum. Buckland's popular Bridgewater Treatise (1836) exemplifies Natural Theology, and features an imaginary walk through the mineral deposits of Britain. Paralleling this imaginary walk, the Oxford University Museum had columns made from different kinds of British stone. In these ways—and in others that this essay explores—this groundbreaking Victorian building quite literally embodies a much older intellectual heritage.

Biographical Note
Emma Peacocke is a Banting Postdoctoral Fellow at Queen's University. Her research focuses on the image and perception around universities as institutions, as created by authors of 19th-century literature. Her research examines the representation of universities in literature, compared and contrasted with the realities of the time. By examining students' own writing and the university presses' publications, her work aims to separate fact from fiction, as well as determine how the mythos of the university influenced educational policy in Britain and Canada.

1. "I remember distinctly, the first (which also happened to be the last) conversation that I ever held with my tutor," reminisces Thomas De Quincey, writing thirty years later in *Tait's Edinburgh Magazine*. Certain that his tutor would be nonplussed to hear that he was reading Plato's *Parmenides*, De Quincey adroitly lied under questioning and claimed to be reading Paley (De Quincey 147). I would like to think that both de Quincey and his tutor had William Paley's *Natural Theology* in mind. The dates fit; *Natural Theology* was first published in 1802, and de Quincey matriculated at Worcester College in December, 1803, following his period of penury and vagrancy, and shortly before he became the consummate opium eater. "My tutor's rejoinder I have never forgotten," declares De Quincey: "'Ah! An excellent author; excellent for his matter; only you must be on your guard as to his style; he is very vicious *there*.' It struck [de Quincey] forcibly that more . . . absolute falsehood . . . could not . . . have been crowded into one short sentence. Paley, as a philosopher, is a jest, the disgrace of the age." De Quincey, looking back, reflects that "the name of Paley was the . . . great opprobrium" of Oxford and Cambridge, because the English universities included the philosophically lightweight Paley's works in "their official examinations for degrees." De Quincey, on the other hand, *was* all in favour of the "rustic vigour" of Paley's "homely, racy, vernacular English" (147), and while it would indeed be a "jest" to call him an original thinker, Paley was the able articulator of centuries of teaching in the natural sciences, which held that the beauty of nature was evidence of a benevolent, omnipotent Creator. Paley's influence—while uncertain in the case of De Quincey—extended deep into the Victorian age and directly into the fabric of the Oxford University Museum of Natural History.

2. *Natural Theology* was the culmination of an intellectual and theological tradition dating back, in Britain, to Francis Bacon (Peterfreund xi). Indeed, the idea of Natural Religion was stronger in the early than in the late eighteenth century. In an August, 1712 number of *The Spectator*, Joseph Addison avers that "the Supreme Being has made the best arguments for his own existence, in the formation of the heavens and the earth," and is moved to verse to hymn how, in "the spacious firmament on high," "th'unwearied sun, from day to day, / Does his Creator's power display, / And publishes to every land / The work of an almighty hand." In his *Essay on Man*, written in 1733 and 1734, Alexander Pope writes of Nature as providing a sure vision of God's benevolence in ordering the universe: to "look through Nature" is to look "up to Nature's God" and to perceive the "chain which links th'immense design, / Joins Heav'n and Earth, and mortal and divine" (Epistle IV, lines 332-34). Paley's "homely, racy" eloquence persuasively re-stated for the

Romantic age the idea that proofs of God's existence and his benevolence can be found in the ingenuity of his creation; it was Paley's encapsulation of 'Natural Religion' that would reach and inspire the Victorians.

3. Although the Oxford University Museum drew on the very latest technologies and architectural theories for its construction during the 1850s, Paley's much older Romantic natural theology is built directly into the design and the elaborate decorative program of the museum—in Bernard Lightman's phrase, this museum "embedded the principles of the natural theology tradition in its architecture" (42). As architectural historian Caroline van Eck writes of the carvings over the main door, "on entering the museum, the visitor" walks under the protective arm of "the angel of life holding the book of nature" and is thus "immediately shown the spiritual message of the building" (209). "The visitor is . . . expected to 'read' the museum in the same way as the Victorian reader was trained to read not only the Bible but also nature" (van Eck 209)—that is, like Paley, with an eye to discovering the beneficent care that God had lavished on an optimally designed Creation. Van Eck notes the use of the most "modern engineering and materials" available to the Victorians, yet persuasively argues that the Oxford University Museum building is the "culmination" of the earlier tradition of "romantic organicism" in architecture, with the capitals of stone columns and the tracery on iron supports mimicking botanical specimens (206, 203), as shown in Figure 1. Despite what could have been the relative obscurity of a university museum well outside the metropolis of London, this museum has been shaping ideas of what Victorian museums are and can be, from the time of its creation to the present. Its highly innovative layout—the "most striking" feature of which is its glass roof supported on Gothic arches (van Eck 206)—exerted an immense influence on the Natural History Museum in London, built "along similar lines" twenty years later (Lightman 42). As recently as 2016, the Oxford University Museum won the National Museums and Heritage "Best of the Best" Award,[1] and had a footfall of over 557, 644 visitors in 2011-2012;[2] its prominence and its popularity make the Museum a poster child for the soaring accomplishment and boldness of Victorian museum architecture.

Figure 1: Oxford University Museum of Natural History, iron and glass roof, botanical capitals. Photograph by George Landow, 1977, courtesy of the *Victorian Web* at http://www.victorianweb.org/art/architecture/oxford/11.html

4. In this essay, I will trace the continuity between the Romantic and the Victorian in this exemplar of the highly influential Victorian natural history museum, and I will situate the University Museum within the teaching of science in early- and mid-nineteenth-century Oxford. Excellent, indispensable accounts exist of the choice of architects through a competition, of the planning, construction, setbacks in construction, and design of the Oxford University Museum. Carla Yanni, Trevor Garnham, Eve Blau, and Frederick O'Dwyer place the Museum primarily in the context of Victorian architectural and museological development and, as a secondary interest, of university administration. My approach here is to connect the pedagogy and writings of the great English geologist William Buckland (1784-1856) with the Museum, establishing a continuity of intellectual endeavor and pedagogical methods through the decades between Paley's 1802 publication and the museum's opening in 1860. Van Eck sees visitors to the university museum

as "read[ing]" the Bible and nature through the building; I suggest that the visitor-reader was also perusing Paley and the Paley-inspired works of Buckland.

5. William Paley (1743-1805) distinguished himself in mathematical examinations and in Latin disputations, graduating as Senior Wrangler from Christ's College Cambridge in 1763. Paley's clerical career and work as a magistrate meant that he engaged keenly with the concerns of the wider world, from arguing against slavery and against financial compensation for slave-owners, minimizing the harm wreaked by lax licensing laws, and advocating prison reform, through to ensuring the solvency and welfare of his curates (Crimmins). Paley showed a lifelong understanding of the combination of rigorous thought and lively style in lecturing and in writing that made two of his major works "readily suited for adoption as . . . textbook[s] at Cambridge . . . Paley's theological publications placed him at the forefront of Anglican apologetics during this period and guaranteed his writings a place in the Cambridge curriculum for several generations" (Crimmins). *Principles of Moral and Political Philosophy* (1785) and *A View of the Evidences of Christianity* (1794), unlike *Natural Theology* itself, were set texts for university and college examinations (Fyfe, "Reception" 321-22, 324).

6. *Natural Theology* did enjoy an extraordinary popularity, running through ten editions between its 1802 publication and 1806. "Its reputation is certainly merited," writes Aileen Fyfe: "It remained in print for a hundred years, and went through at least 57 editions in Britain alone . . . conservative estimates would suggest over 80,000 copies" were printed, "over half of which were published after 1835" ("Publishing" 737, 736). In Fyfe's eyes, *Natural Theology*'s ability to sustain the re-readings of generations of readers constitutes it as a classic work; indeed, the generation of Charles Darwin, John Ruskin, and Museum advocate Henry Acland found much to admire in *Natural Theology* even when Paley's very substantial scientific knowledge had become outdated. Paley is not one of the great Enlightenment philosophers, like Locke or Hume. However, his work engaged very observantly and astutely with theirs. Where Paley really comes into his own is as a clear synthesizer and explicator, often writing for an undergraduate audience—or, as his son said, making the most complex Christian theology instantly comprehensible "to the illiterate fisherman, or the ignorant natural man" (Crimmins). D.L. LeMahieu's opinion, published in 1976, perfectly conveys today's scholarly consensus: "Paley distilled and crystallized the strategic ideas of his predecessors into a philosophy whose very comprehensiveness justified its

modest claims to originality" (152). For example, borrowing from an obscure passage in the early eighteenth-century Dutch theologian, Bernard Nieuwentyt, William Paley made the watch analogy one of the most famous concepts in the history of science (LeMahieu 60-61). *Natural Theology* opens with a call on the reader's imagination:

> In crossing a heath, suppose I pitched my foot against a *stone*, and were asked how the stone came to be there. I might possibly answer, that, for any thing I knew to the contrary, it had lain there for ever . . . But suppose I had found a *watch* upon the ground, and it should be inquired how the watch happened to be in that place; I should hardly think of the answer which I had before given. (7)

Because "its several parts are framed and put together for a purpose," Paley argues, the watch must have been *designed*, by a Divine creator who had the purpose of every component in His mind (7).

7. To Paley, it is axiomatic that any complexity in anatomy and function proves the existence of a benevolent divine artificer. When he scales up his comparisons between anatomy and architecture and engineering, it is like a repetition of the watch analogy. Paley posits that, in examining glands, we are like "an un-mechanical looker-on" attempting to decipher the mechanisms of the Industrial Revolution, such as a "stocking-loom, a corn-mill, a carding-machine, . . . a threshing-machine at work," or even "Arkwright's mill:" what we see is "sufficient" to "abundantly testify" through its intricacy, functionality, and "utility" that "the hand and agency of a contriver" have been at work (52-53, 114).

8. As LeMahieu observes, Paley uses cumulative examples—the perfect adaptation of a butterfly's tongue to sipping nectar, how well the human epiglottis functions to keep us eating, drinking, breathing and laughing, but not choking, at banquets—and his cumulative examples suggest a beneficent Creator designing organisms with utmost care. Even pain, argues Paley, demonstrates the "goodness of the Deity" (237). "How many things must go right for us to be an hour at ease!" Paley exclaims, and finds a proof of a benevolent God in how our bodies, down to the minutest muscular contractions, generally do "go right" (72-73). And when they do not, pain has "the power of shedding a satisfaction over intervals of ease . . . which few enjoyments exceed. A man resting from a fit of the stone or gout, is, for the time, in possession of feelings which undisturbed health cannot impart" (257-58). We may be more inclined to give credence to Paley's rather

sanguine view of bodily pain when we learn that he had been suffering since 1800 from abdominal pain which he called "the Scorpion," and that he probably had the further affliction of a kidney stone (Crimmins). These ailments would kill the witty, sociable clergyman and intellectual "colossus" of Cambridge in 1805 (Crimmins).

9. Paley's focus on examples drawn from human and animal anatomy is part of his departure from previous writers on the same subject. "Paley shows very little connection with" the two-hundred-year "continuity of natural theology in England . . . Although Paley is clearly writing in a tradition, those that he tends to cite are either not in it or are at its fringes" (Peterfreund 105). In his use of comparative anatomy, Paley is "carefully and undividedly attentive to science," unlike many of his predecessors (102).

10. Paley's careful attention to the detail of natural history often elicits favourable comparisons between God's handiwork and even the best human architecture and engineering. "I challenge any man to produce . . . a construction" that shows more careful contrivance than "the vertebrae of the *human neck*," whose "mechanism" partly "resembl[es] a *tenon and mortice*" (54, italics in the original). A whale's aorta, with its size and capacity, puts "the main pipe of the water-works at London Bridge" in the shade (85). "Every *feather* is a mechanical wonder," whose united "strength and lightness" are "not easily brought together" by human craftsmen, and whose shaft and interlocking barbules are a further wonder (116). This detail-oriented and architectural bent in fact foreshadows much of the Oxford University Museum's design and its construction history. For instance, the first design for the great glass roof proved not to have brought together the requisite strength with its lightness, and needed to be re-done (Blau 61-63). (Please see Figure 2 for the ultimate, successful roof design.) To the architects, Deane and Woodward, who designed the Museum, and to their idol and advisor John Ruskin, the Museum's internal decorative program of stone capitals, hewn into the exact shapes of botanical specimens, was one of the most important features of the Museum. To Paley, too, the "ornamental" nature of plants carried a vital message. "In plants, especially in the flowers of plants, the principle of beauty holds a still more considerable place in their composition . . . than in animals," and it seems to him the most "probable" explanation is that the Deity "calculated" plants "for beauty, intended" them "for display" (108). Paley also pays tribute to light, which, if it "had been made by a common artist," would surely not possess "that variety of colours, which is of such infinite use to us"—although

the very "clear and colourless" nature of "a beam of light . . . when received with the sun" impresses Paley with how "well mixed and blended" it must be (198). Admitting a great wash of clear light, through a roof made entirely of colourless glass, was an extraordinarily bold and original move on the architects', Deane and Woodward's, part, and one that created the visual signature for the great natural history museums of Victorian England. This natural light allowed professors, students, and visitors to, in Paley's phrase, "distinguish . . . objects" (198) and their salient features better than ever before in a museum setting.

Figure 2: Oxford University Museum of Natural History, iron and glass roof. Photograph by George Landow, 1977, courtesy of the *Victorian Web* at http://www.victorianweb.org/art/architecture/oxford/19.html

11. Where had research collections lived, and where had classes in the empirical sciences been held, before the Oxford University Museum was built? The original Ashmolean Museum was built in 1693—over the site of a collapsed privy and a ditch—and cost the University £4,500. This was so heavy an expense that the Bodleian Library had to place a moratorium on book-buying. The museum was well worth the money. This very handsome neoclassical building was divided into several spaces: (1) a repository for the Tradescant and Ashmole natural history and artefact collections; (2) a school of natural history; (3) a chemical laboratory (the first purpose-built teaching lab in England, located in the basement; phosphorus from the disused privy streaked its

walls and contributed to experiments); (4) two libraries; and (5) a study and anatomy theatre (Berry 16-19, 20-22). Sophie Forgan enjoins us to remember "the primacy of the lecture" in nineteenth-century science instruction, both for university students and for the general public (152). "Learning was obtained above all through the medium of lectures," and those lectures were increasingly being held in museums, which, in the early nineteenth century, would include lecture theatres as a matter of course (152).

12. William Buckland was appointed as Lecturer in Mineralogy in 1813—and mineralogy and lecturing at Oxford underwent an almost volcanic transformation. Buckland was a tremendous intellectual powerhouse. He worked innovatively to reconstruct ancient ecosystems as well as extinct creatures' anatomy, and was a dynamic lecturer. Ralph O'Connor conjectures that Buckland developed a captivating and flamboyant teaching style partly from necessity. Lectures on science were not at all compulsory in the 1820s, and to find students, and, indeed, to derive an income from students' course fees, a professor therefore had to lay himself out to draw a substantial, consistent audience. Buckland's field trips to quarries were particularly attractive to Oxford's young gentlemen, as Buckland provided them with a respectable, academic reason to saddle up and go for a cross-country ride (75). One particular mannerism of Buckland's encapsulates his whole character and career: he would mimic the gait or the bite of an extinct saurian—and would often use the long tails of his clerical coat to imitate a Pterodactyl in flight to illustrate his arguments while lecturing (Berry 41). It says everything about Buckland and about the position of mineralogy and geology that the lecturer clung to the coat that symbolized his clerical vocation and standing, wearing it even while excavating (Haile), and while leaping into the most animated and advanced reconstruction of an extinct species' anatomy and behaviour. Paley's *Natural Theology*, which combined astute scientific observation with faith in a recognisably Christian deity, made for a kind of "safe science" that need occasion no uneasiness; Buckland, alongside the other authors of Bridgewater Treatises on natural theology, was another whose work was felt to be "safe science" (Fyfe, "Publishing" 741). Martin Rudwick singles Buckland out as a geologist who "welcomed the opportunity to demonstrate to his [academic] colleagues" at Oxford "that the science of geology—new at least to them—was compatible with the scriptural foundations of their academic work" (*Bursting* 601).

13. Buckland is probably best known for his decipherment of fossil bones in the Kirkdale Cave in Yorkshire, research which took place from late 1821 to early 1822. Buckland was able to show that the assorted fossil fragments there were *not* swept in during the Deluge, but were most likely to have been dragged by ancient hyenas into their den, reconstructing a "hyaena story" [sic] that intrigued everyone with an interest in the nascent science of geology (Rudwick, *Worlds* 73). Figure 3 shows the Rev. William Conybeare's light-hearted illustration of Buckland's research. While Buckland did make careful use of traditional stratigraphic techniques, using stalagmites, to "anchor" the hyena den to a particular period in "geohistory" (*Worlds* 74), he also displayed a great flair for methodological innovation. Buckland's ingenious methodology included offering "the shin bone of an ox" to "a Cape hyena in a travelling collection [that] happened to pass through Oxford" (Rupke, *Great Chain* 33). The live hyena left tooth-marks on the shin bone—which were identical to the marks on the fossil bones (Rudwick, *Bursting* 633). With his "robustly pre-Victorian sensibilities," Buckland made great use of the stones that he recognized as the fossilised fecal deposits of the hyenas. He had the stones analysed not only by "the distinguished London chemist" William Wollaston, but also by a zookeeper at the Exeter Change "commercial menagerie" (*Bursting* 628-629*; Great Chain* 33). Although Buckland's science remained very theologically safe and conservative, his unprecedented reconstruction of an ancient ecosystem showed the thrilling potential of geology. His contemporaries, including Sir Humphrey Davy, immediately recognised its significance and "innovative character" (Rudwick, *Bursting* 631).

Figure 3: The Rev. William Conybeare's drawing of his friend William Buckland in the Kirkdale Cave in 1821. Courtesy of http://www.oum.ox.ac.uk/learning/pdfs/buckland.pdf , p. 3.

14. What distinguishes Buckland in our study is the revolution he brought about in teaching geology in the university, his ongoing relationship with Paley's teachings, and how Buckland's writing and career are inextricable from the Oxford natural history museum. Buckland's teaching relied on visual aids and on actual specimens (O'Connor 75). As Figure 4 shows, Buckland used landscape engravings, stratigraphic sections, and geological maps to convey a sense of the landscape's history—and illustrations reconstructing the physical appearances of extinct species, often within reconstructions of their habitats, including Henry de la Beche's 1830 *Duria Antiquior*, a scene of ichthyosaur and plesiosaur predation in shallow prehistoric seas.[3] Buckland even made the encounter between "Regency gentleman" and "antediluvian" beast more immediate by "enliven[ing]" his lectures with a few depictions of geologists encountering extinct species, as in his own sketch of the fossil bears of Gailenreuth, Germany[4] or perhaps even his fellow-geologist friend the Rev. Conybeare's own drawing of Buckland himself, crawling on all

fours with hair bristling, encountering the prehistoric hyenas in their Yorkshire den (Figure 3). Perhaps the importance that Buckland attached to visual aids is best conveyed through the knowledge that he married Mary Morland, the gifted illustrator of some of his works (Haile). Buckland relied much more heavily than Paley on the visual aid; where Paley's *Natural Theology* originally had no illustrations, his contemporaries found that Buckland's Bridgewater Treatise (to which I will return below) had a noteworthy "pictorial beauty" in its illustrations and fold-out charts (Fyfe, "Publishing" 740-741; Rupke, *Great Chain* 20).

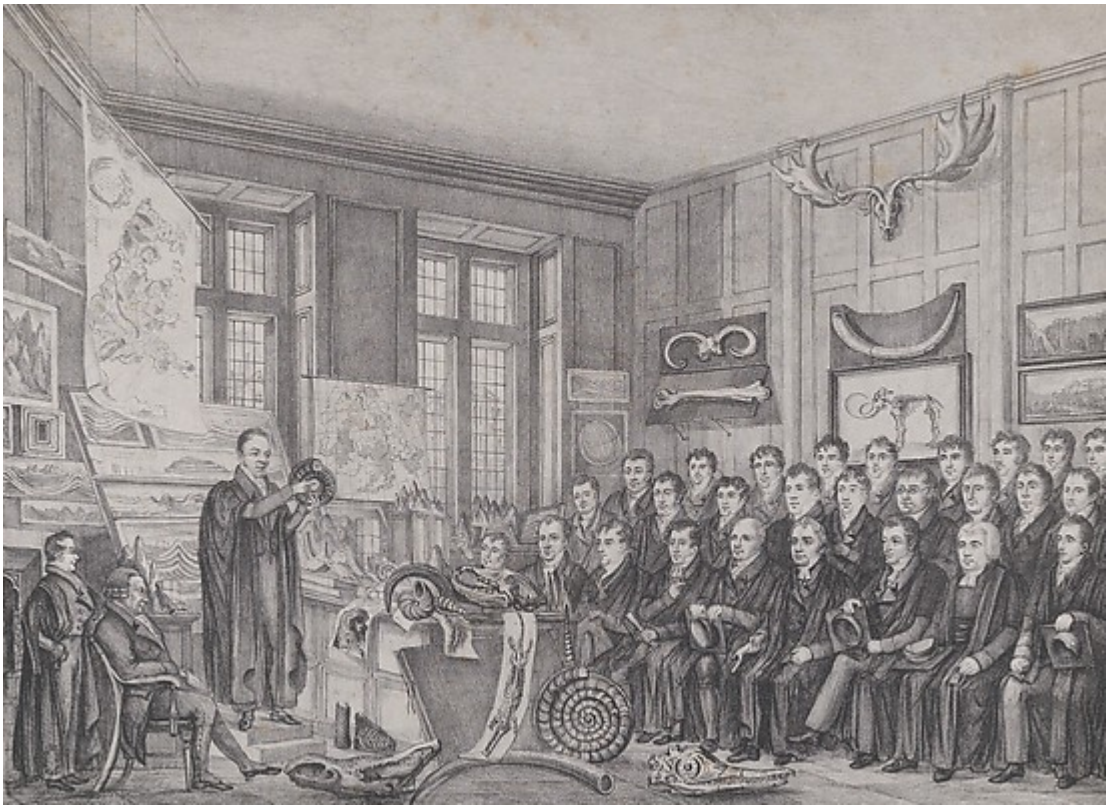

Figure 4: Nathaniel Whittock's *The Geological Lecture Room, Oxford: Dr. William Buckland Lecturing on February 15, 1823*.
Courtesy of http://www.oum.ox.ac.uk/learning/pdfs/buckland.pdf , p. 2.

15. The great professor carried an old, blue, leather bag with him at all times—and, like a conjurer, he would always produce some entrancing object from it: a coprolite, a new fossil, an impression of a dinosaur's footprint (Haile). Unsurprisingly, Buckland's ground floor teaching room in the Ashmolean became so crammed with specimens that, in the 1830s, he was obliged to move them to the Clarendon building. His compelling, imaginative pedagogy made several of Buckland's

students into his friends for life—and among their number were two embryonic Victorian public intellectuals, Henry Acland (O'Connor 76-77) and John Ruskin (*Great Chain* 230), who would be powerful advocates for the Oxford University Museum. Indeed, Ruskin fondly hoped that Mrs. Buckland would design and execute what he jestingly called her "dabby things" as wall paintings in the Oxford University Museum (Clark 205).

16. Buckland, effectively, made himself over into a mobile natural history museum—and continued the legacy of Paley within Oxford's collections of specimens for teaching and research. According to a contemporary wit, to enter the Lecturer in Mineralogy and Geology's rooms at Corpus Christi was to "see the wrecks of beasts and fishes, / With broken saucers, cups, and dishes" (O'Connor 75). Because Buckland, among others, was doing so much to reanimate Oxford's interest in the sciences, it seemed like a good idea to rearrange the collections of natural specimens, which, by the 1820s, were showing some wear and tear.

17. Two 1820s curators gave the Ashmolean's natural history collections a deliberately Paleyan arrangement: John Shute Duncan (Keeper from 1823-1829) and his successor and younger brother Philip Bury Duncan (Keeper from 1829-1854) (Macgregor and Headon 369-70). "The Duncan brothers' primary inspiration . . . came . . . from the tracts of" none other than William Paley (Macgregor and Headon 372). As Keeper of the Ashmolean, Philip Bury Duncan determined in 1823 to re-organize the natural history collections according to Paley (Fyfe 739). The hand-written notes for a catalogue of what Duncan called the "Paleyian Museum" tell us that the museum shares Paley's "object . . . to point out in the plainest manner the most remarkable instances of design," and most of the specimens' new labels included direct quotation from Paley's *Natural Theology* (Berry 46).

18. In "Reinventing the Ashmolean," Arthur Macgregor and Abigail Headon do an extraordinary job of reconstructing this "Paleyian Museum." Three of their examples in particular show how *Natural Theology* shaped the Ashmolean's presentation of natural history. William Paley opened *Natural Theology* with the contrast between a watch and stones; Philip Duncan therefore reified Paley's thought experiment, and filled "Press I" in the Ashmolean with "Stones" and "Minerals," and with a watch and "a clock displayed under a glass bell in order to reveal its workings" (Magregor and Head 376). According to the 1836 catalogue, the explanatory text of "Tablet II"

quoted Paley on the optimal design of the sense organs: "The Eye, Ear, &c." In display cases, models made of glass, crystal, or wax showed these anatomical structures clearly and larger than life. Where Paley invites his readers to compare God's "contrivance" in creating the eye with the ingenious mechanism of a telescope, Philip Duncan included a "drawn section of a double microscope" so that visitors could compare Divine and human designs (375, 378-80). Tablet IX and Tablet X, which refer to "Zoology" and "Botany" respectively, also both "relate" directly to specific chapters and passages in Paley's *Natural Theology*, and borrow Paley's Linnaeus-based system for organizing animals and plants (380-81). Although the specimens were displayed according to a new organization when the natural history collections were moved to the University Museum in 1858 (Macgregor and Headon 370, 371), the Paleyan nature of the Oxford University Museum building itself ensured that the collections, in their new home, continued to transmit the same message of strong support for natural theology.

19. It may come as a surprise to learn that, in 1847, Buckland declined to promote plans for an Oxford University Museum to be dedicated to natural history (Rupke, *Great Chain* 273). Buckland described himself as no longer "sanguine," but "hopeless," that there was even a "possibility of Natural History making some progress in Oxford" (as quoted in *Great Chain* 273-74). In the 1830s and 1840s, religious fervour at Oxford once again made the association between geology and religious dissent appear highly suspect. Even Paleyan natural theology seemed simply too close to deism to satisfy the rising generation. When Buckland "presided" over "the first full meeting" of the interdenominational, intellectual British Association, its meeting in Oxford and Buckland's prestige made the opening of the ancient universities to Dissenters seem entirely within reach—a prospect which the increasingly powerful Tractarians regarded "with shock and horror" (*Great Chain* 267-269), in a reprise of 1790s fears of godless materialism.

20. Where Rupke believes that "attendance at science lectures dropped" partially *because* "that at Newman's sermons soared" (273), Buckland himself adopted a more structural explanation founded in academic curricula and examinations: "Idle . . . young men" would never have taken an interest in geology or the other sciences in the first place—and "studious" ones would naturally "channel" their energies into "the staple subjects of examination for degrees and fellowships" that "alone" offer "honours" for academic accomplishment and recognition that will bring "profits" in a post-University career. As things were, becoming distracted by the study of "natural

history in any of its branches" could act only to the "detriment" of an undergraduate (as quoted by Rupke, *Great Chain* 273-74). Disillusioned, Buckland transferred his vast energies to the office of Dean of Westminster, where he made a considerable impact, including on sanitation (Haile).

21. The eventual construction of a natural-history-focused University Museum came as part of a conscious effort on Oxford's part to regain the lead the university had enjoyed in the sciences when the Ashmolean was first built. In the late 1850s, scientists were still fighting to find an undergraduate audience at Oxford. Underfunding of science positions meant that many professors continued to charge lecture fees to stay solvent (Rupke, "Scientific Awakening" 546). Oxford was in danger of being overtaken in scientific education by Cambridge—and was already lagging behind Glasgow, the University of London, and the research powerhouses of German universities. Daubeny, Acland, and Ruskin, among others, believed that a University Museum would greatly help to rectify the situation; it would, they believed, provide a focus for all the different departments within a new School of Natural Science that would have the ability to set examinations, and therefore offer the "honours and profits" that Buckland astutely saw as motivating conscientious young undergraduates. In 1850, supported by a Royal Commission, Oxford decided to institute the new, examination-setting Honour School in Natural Science (Fox 642-43). Oxford scientists were unified in asking for a museum that would not only showcase collections, but would unify geology, biology, chemistry, and physics and provide teaching facilities—including laboratories—as well as research space. As Sophie Forgan reminds us, in the nineteenth century, museums had a significantly larger role in research and in teaching than today. Even if "in Oxford[,] the museum had" not "always been the central organizing principle for science teaching since the foundation of the Old Ashmolean," it was the era when "proximity to a museum was a necessity" for "any sort of higher education" in the sciences (142-43).

22. The museum's supporters carefully pitched their arguments to chime well with most readers' religious sensibilities. In 1853, the Reverend Richard Greswell wrote in a pamphlet that it was "the final end and purpose of [the] museum" to show "that uniformity of plan, which every principle of sound reasoning convinces us most belong to the system of creation" (as quoted by Yanni, 64-65)—Paleyan language for a Paleyan Museum. While the building was still under construction, in 1859, Dr. Henry Acland—by now Regius Professor of Medicine, as well as a

keen supporter of the Museum, and former pupil of Buckland—and John Ruskin joined forces to publish their correspondence in *The Oxford Museum*. Although Ruskin's own faith had, at times "faltered as a result of encounters with geological discoveries and new scholarly interpretations of Biblical authority" (Birch xi), that is hardly the impression that this pamphlet conveys. "How strange it seems," wrote Ruskin in one of his sections, "that physical science should ever have been thought adverse to religion" (Acland and Ruskin 64). Indeed, Ruskin was a keen advocate for statues of great thinkers from across the ages to adorn the Oxford University Museum, establishing a continuity between the past and present and negating the idea of a sharp rupture between the faith of the past and the scientific revelation of the present (Fara 47-48). Acland believes that studying Nature ultimately brings into focus "the relations which all those facts and laws bear to each other, in one harmonious whole," which allow us to see "darkly as in a mirror . . . the unexpressed Art of the Great Artificer" (Acland and Ruskin 18).

23. Not only did Buckland revolutionize geology at Oxford, and contribute many specimens to the Oxford University Museum, his popular writing also does much to elucidate the Museum's richly meaningful architecture. Despite his loss of faith in Oxford's capability for natural history, Oxford's Ashmolean Museum received Buckland's fossil collection after his death in 1856; his collection was then "deposited in the new University Museum in the early 1860s" (Berry 44). One striking passage from his writing helps us to understand the Museum's architectural program more fully in an academic context. Buckland was one of eight authors commissioned by the Royal Society, between 1833 and 1836, to contribute to the Bridgewater Treatises mentioned above, a series of works aiming to demonstrate "the Power, Wisdom and Goodness of God, as manifested in the Creation" (McGrath 119). The Bridgewater Treatises were the "last hurrah" of the natural theology tradition; indeed, to some readers, the project seemed so outmoded that they referred to the series as the "Bilgewater Treatises" (Harrison as quoted by Peterfreund xv; Peterfreund 118-19). Nonetheless, Buckland's 1836 *Geology and Mineralogy* Treatise sold out its "initial print-run" of at least 5,000 copies, went into a "second printing" of its first edition, and achieved a second edition in 1837 (Rupke, *Great Chain* 19).

24. It was Buckland's Treatise's mission to show how Paley's thinking could indeed extend back into the geological record, and it begins, like Paley's *Natural Theology*, with an imagined walk. Buckland states that his aim was "to show that the extinct . . . fossil . . . species of Animals and

Vegetables [from] former periods . . . afford . . . the same evidence of contrivance and design that have been shown by Ray, Derham, and Paley" (Buckland 107). By 1836, the opening analogy of Paley's *Natural Theology* had become "outdated" (Fyfe, "Publishing" 741). Thanks to Buckland and his geological colleagues, a stone no longer seemed likely to have lain for ever, unchanging, in one place. Buckland's opening argument shows the profound influence of mineralogy and geology on human life—an influence which, he assures us, stems ultimately from God's providential care, His long-term "prospective view to the future uses of mankind" which guides His "design" in making fossil fuels like coal accessible "in a manner so admirably adapted to the benefit of the Human Race" (538). Here is how Buckland takes up the baton of natural theology where Paley had lain it down:

> If a stranger, landing at the extremity of England, were to traverse the whole of Cornwall and the North of Devonshire; St. David's . . . all North Wales . . . through Cumberland . . . to the south-western shore of Scotland . . . he would conclude from such a journey of many hundred miles, that Britain was a thinly peopled sterile region, whose principal inhabitants were miners and mountaineers.
>
> Another foreigner, arriving on the coast of Devon, and crossing the Midland Counties . . . would find a continued succession of fertile hills and valleys, thickly overspread with towns and cities, and in many parts crowded with a manufacturing population, whose industry is maintained by the coal with which the strata of these districts are abundantly interspersed.
>
> A third foreigner might travel from the coast of Dorset to the coast of Yorkshire, over elevated plains of oolitic limestone, or of chalk; without a single mountain, or mine, or coal-pit, or any important manufactory, and occupied by a population almost exclusively agricultural. (1-2)

From 1860, foreigners (and Britons) could save their shoe-leather by visiting the Oxford University Museum, where each column is fashioned from a different British stone—not coal or chalk, perhaps, but certainly the oolitic limestone which Buckland mentions, as Figure 5 shows.

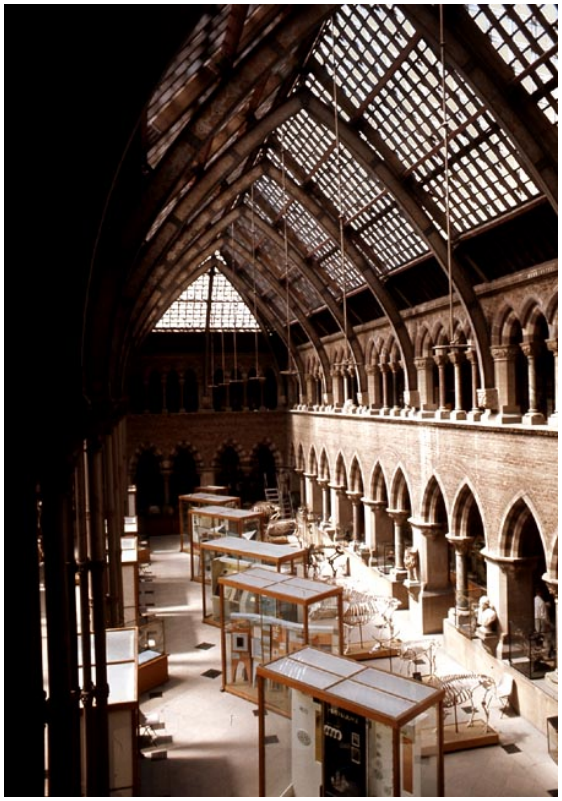

Figure 5: Upper- and lower-storey columns, each constructed from a different British stone, in the Oxford University Museum of Natural History. Photograph by George Landow, 1977, courtesy of the *Victorian Web* at http://www.victorianweb.org/art/architecture/oxford/10.html

25. Using the fabric of the museum to illustrate its subject was not unique to the University Museum; the Museum of Practical Geology in Jermyn Street, opened in 1851 by Prince Albert, had a "portal . . . built out of a wide selection of English polished specimen stones," and "the interior continued this didactic effort, with polished column shafts made of indigenous stones ringing the entrance hall" (Yanni 52-55). Professors could teach a geology lesson on the "basis" of the Museum of Practical Geology's own architecture (54). "As Prince Albert explained, the museum would serve as evidence that God was smiling on the British Isles when He deposited all that coal in the midlands" (Yanni 52)—a very similar perspective indeed to Buckland in his Bridgewater Treatise.

26. As Buckland also observed, "the great iron foundries of Derbyshire, Yorkshire, and the South of Scotland, afford . . . examples of the beneficial results of [the] juxtaposition, of rich argillaceous

iron ore and coal" (531). The iron that supports the glass roof and that arches in graceful, botanically ornamented Gothic forms is crucial to the museum. Following the Crystal Palace's construction out of cast-iron and glass in 1851, ferrovitreous architecture came to define Victorian building practices and style. Paul Dobraszczyk writes incisively of the challenges it threw up in the minds of architects and critics: "Victorian architecture was driven by two powerful but contradictory impulses" (5). First, a "new science of history" had given an "unprecedented accumulation of knowledge about the past," which architects were expected "to draw upon;" in bestowing a Gothic form on the Oxford University Museum, architects were certainly drawing upon a historicist model. Second, a "critical category of truth", especially to do with "structural and material integrity in architecture," enjoined architects to treat every material differently and thoughtfully. Iron "intensified and further problematised the relationship between history and truth in architecture, for not only was iron a new constructive material" with "revolution[ary] potential," "demanding a new kind of 'truth to material,' but it had no historical precedent" in decorative motifs, and therefore "lack[ed] associative meanings" (5). By using cast-iron as a strong and graceful support, and for botanical ornament, Deane and Woodward were being true to iron's strength and ductility, and creating their own precedents for decorative motifs.

27. Lecturing in Tunbridge Wells in 1859 on "The Work of Iron," Ruskin dazzlingly delineated the material qualities and the artistic potential of the material. He situates iron in the local soil conditions and geology of Tunbridge Wells, and, like Buckland, writes of how iron serves human purposes: "the main service of this metal . . . to us, is not in making knives, and scissors, and pokers, and pans, but in making the ground we feed from, and nearly all the substances first needful to our existence" (106). Ruskin praises iron's oxidation, and the "warm" tints that it confers, in conjunction with Nature making "picture-books for us of limestone and flint; and tempts us, . . . to read her books by the pretty colours in them," like the "lovely vermilion" of iron's oxidation (106, 108-09, 110-11). To Ruskin, both nature and the successful natural history museum can be perused by an informed observer. Making it a "law" that, "whatever the material you choose to work with," you must "bring out the distinctive qualities of that material," Ruskin adjures the audience "if you don't want transparency, let the glass alone," then launches into a paean on how "iron is eminently a ductile and tenacious substance" (114). "Only let me leave you with this," Ruskin enjoins his hearers, "the quaint beauty and character of many natural objects, such as intricate branches, grasses, foliage . . . is sculpturally expressible in iron only"

(121). Ruskin's lecture moves to "Iron in Policy"—on the subject of morality, and of the "oppression of the poor," in which he "trace[s] a few Bible sentences to their practical result" (127, 124). As the Oxford University Museum was to open in 1860, perhaps in this mid-1859 lecture Ruskin had the Museum's concerns on his mind—for this union of Christian teaching with a sense of God's design in geology, and of the components of ferrovitreous architecture, coalesces both in Ruskin's talk and in Deane and Woodward's building.

28. I will give the last words to Paley and to Ruskin together. Paley had written with extraordinary observation of butterfly tongues, and how they were perfectly "designed" to fit into flowers. Ruskin praises the astonishing work of the O'Shea brothers, John and James, while they were carving a unique botanical capital for each column in the Museum; their absorbed attention to detail parallels Paley's. "The picture" of medieval artisans "that Ruskin painted was infinitely alluring"; Ruskin envisioned "a medieval sculptor picking wildflowers from a field, arranging them on his sturdy table until the pattern pleased him and then taking up the chisel to immortalize them in stone" (Lewis 115). The O'Shea brothers, borrowing potted plants from the Botanic gardens every morning to use as models (O'Dwyer 230), surely met Ruskin's ideal of fully engaged, creative, fulfilled artisans (see Figure 6 for one of the O'Shea brothers at work). Indeed, Trevor Garnham suggests that these highly creative and gifted stone carvers moved Ruskin's complex religious feelings (13). For at least one moment in his life, Ruskin had sensed that God "'made everything'" in nature "'beautiful in his time.'" According to Garnham, this moment was both "mystical" and quintessentially Romantic in its "notion of the bond between man and nature." The O'Sheas' "rare ability" to convey "a sense of the general principle of energy flowing through all plant life" communicates that same sense of communion with the divine in nature (13). To Paley and Ruskin alike, divine favour is legible through the natural world of plants, animals, and stone.

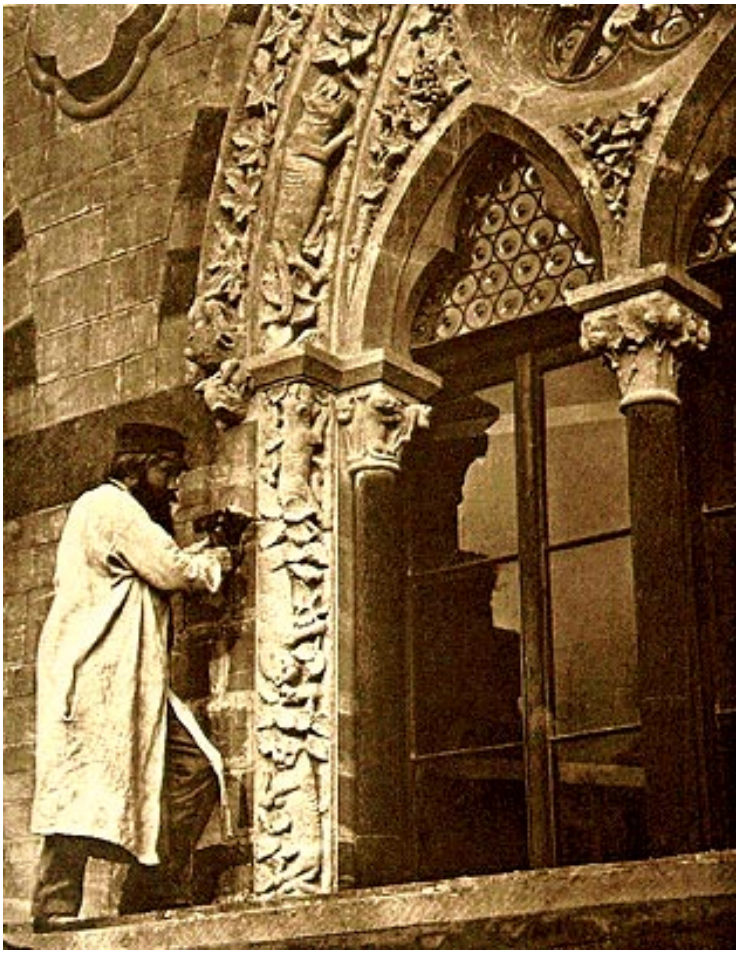

Figure 6: Photograph by Hills and Saunders of *The Sculptor O'Shea at Work on a Window of the Oxford Museum*, 1858. Courtesy of the *Victorian Web*, at http://www.victorianweb.org/art/architecture/oxford/17.html

29. At the famed medieval site of Melrose Abbey, Ruskin writes, every educated "Englishman or Englishwoman" feels a triple beauty: Sir Walter Scott's poetic description of "herb[s]" and "floweret[s]", the beauty of the plants themselves, and the beauty of the carved flowers in the cloister arches. "Your Museum at Oxford," writes Ruskin, "is literally the first building raised in England since the close of the fifteenth century, which has fearlessly put to new trial this old faith in nature" (Acland and Ruskin 83). In the Oxford University Museum, the natural world, the written word, and the architecture were all coming together once more with a potent message of beauty and blessedness. Ruskin's sensitivity to the geological and artistic meaning of stone and iron materials, his keen aesthetic intelligence, and his sense of the inextricability of Christian tradition from what he and the architects were about make him the best spokesman for the Oxford

University Museum, voicing the ideas of Paley and of Buckland that were built into the museum's very stones.

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[1] http://www.ox.ac.uk/staff/news-listing/2016-05-19-museum-natural-history-rated-%E2%80%98best-best%E2%80%99.

[2] http://www.oum.ox.ac.uk/about/2011-12.pdf.

[3] O'Connor 75-78; for an image of *Duria Antiquior*, please see https://museum.wales/articles/2009-04-20/The-De-la-Beche-archive-at-Amgueddfa-Cymru/.

[4] Rudwick, *Bursting* 608; for Buckland's image of the Gailenreuth fossil bear, please see http://www.oum.ox.ac.uk/learning/pdfs/buckland.pdf, p. 3.