Shifting Foundations: Architecture and Geology in Britain, 1750-1890

Shifting Foundations: Architecture and Geology in Britain, 1750-1890

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Abstract

In the late eighteenth and early nineteenth centuries, discoveries across the earth sciences contributed to a new and deeply challenging picture of the earth as an entity with a history of its own – one that dwarfed both human history and that of all life forms. These developments had a profound impact on architecture, which shared the same physical landscape, inorganic spectrum of materials, and representational conventions with the nascent science. Conversely, such overlapping areas of expertise and concern allowed architecture to play a privileged role in both counteracting and assimilating geology's decentering effects. While geological theorists used architectural metaphors to highlight the connections between natural processes and human endeavors, architects engaged with the philosophical and material ramifications geology presented to the Enlightened gaze. This dissertation focuses on this exchange in Britain, where the intensive exploitation of mineral wealth simultaneously contributed to the rapid development and popularization of geology and furnished capital for major architectural commissions. Although scholars have examined its influence on literature and art, little attention has been paid to geology's encounters with architecture. Here these engagements are explored in a series of chronologically organized case studies that chart architecture's fundamental shift from a cultural practice predicated on its own historical codes to one forced to reckon with the external and often deeply alien models established by the earth sciences. In the process, a sense of architecture as capable of resisting the inhospitable aspects of the natural world was undermined in favor of a view that treated architecture itself as a natural production.

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Introduction

Prelude: Herculaneum

In the spring of 1755, the young Scottish architect Robert Adam was in Naples with his drawing tutor, Charles-Louis Clérisseau. After a day spent viewing the volcanic moonscape of the Campi Phlegraei, they arrived at Herculaneum, where they were given a thorough tour of the active excavation. The inspection produced relatively detailed remarks from a young man whose Neapolitan letters home generally indicate boredom and heat-induced inertia.[1] "This subterranean town, once filled with temples, columns, palaces and other ornaments of good taste is now exactly like a coal-mine worked by galley-slaves," Adam reported to his family, adding:

> who fill up the waste rooms they leave behind them according as they are obliged to go a-dipping or strikeways. I soon perceived that the vulgar notion of its being swallowed up by an earthquake was false, but it was still worse. It was quite overcome with a flood of liquid stone from Mount Vesuvius which runs out upon an eruption, is called lava and when cool is as hard as our whinstone.[2]

This seemingly casual series of comparisons and observations would have been unthinkable for the majority of Adam's predecessors on the Grand Tour. Adam was able to make his initial connection to a coalmine because his family in Scotland had invested in this lucrative fossil fuel. He was thus equipped to use the technical mining terms "strike" and "dip," which were just then coming into circulation, because he had firsthand knowledge of the three-dimensional meander of coal seams underground.[3] It was not typically this easy to gain such access to Herculaneum, which was tightly controlled by Naples' Bourbon monarchs. Adam's visit was facilitated by the painter Allan Ramsay,

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[1] John Fleming, *Robert Adam and His Circle, in Edinburgh and Rome*, (London: J. Murray, 1962), 156.

[2] Quoted in Fleming, 155.

[3] For example, his father William Adam earned capital from the Pinkie coalfields, and both coal and marble works were listed among the family's enterprises by a contemporary observer. Fleming, 3, 7. The Oxford English Dictionary does not record the emergence of this meaning of the term "strike" until the nineteenth century. *OED Online*, March 2017 edition, s.v. "strike, n.8".

a family connection who was friends with Camillo Paderni, keeper of the "Musaeum Herculanei."[4] Adam's cursory education on "liquid stone," probably provided by Paderni on the spot, was advance preparation for the discursive context generated by the publications of Sir William Hamilton, Envoy Extraordinary at Naples from 1764 to 1800 and a pioneering volcanologist. Before Hamilton's lavishly illustrated *Campi Phlegraei* (1776) brought the volcano of Mount Vesuvius to widespread attention in Britain, Paderni's account of the "discovery" of Herculaneum in 1739, as translated and relayed in the *Transactions* of the Royal Society of London by Ramsay, provided one of the few references to "lava" in English-language scientific literature.[5] Furthermore, the parallel Adam drew between Italian lava and Scottish whinstone was a prescient one. The two types of rock are chemically similar and share an igneous origin – a connection British geologists would not formally establish until later in the eighteenth century.[6]

[4] Fleming, 154-155. See also Charlotte Roberts, "Living with the Ancient Romans: Past and Present in Eighteenth-Century Encounters with Herculaneum and Pompeii," *Huntington Library Quarterly,* 78.1 (Spring 2015): 68-72.

[5] Camillo Paderni and Allan Ramsay, "Extracts of Two Letters from Sigr. Camillo Paderni at Rome, to Mr. Allan Ramsay, Painter, in Covent-Garden, concerning Some Antient Statues, Pictures, and Other Curiosities, Found in a Subterraneous Town, Lately Discovered Near Naples. Translated from the Italian by Mr. Ramsay, and Sent by Him to Mr. Ward, F. R. S. Prof. Rhet. Gresh," *Philosophical Transactions of the Royal Society of London* 41 (1739) 484-489. This volume of the *Transactions* also contained the first reference to lava in the Society's history: "An Abstract of a letter from an English Gentleman at Naples to his Friend in London containing an Account of the Eruption of Mount Vesuvius May 18 and the following Days, 1737," Ibid., 252-261. As Roberts remarks, "the locations of Pompeii and Herculaneum were preserved in local knowledge…. The myth of a sudden recovery was in part a convenient fiction promoted by the Bourbon court." Roberts, 62.

[6] Sir James Hall, "Experiments on Lava and Whinstone," *Journal of Natural Philosophy, Chemistry, and the Arts* 4 (April 1, 1800): 56. This was one of Hall's major contributions to geology. *Encyclopedia Brittanica Academic*, s.v. "Sir James Hall, 4th Baronet," accessed May 6, 2017. http://academic.eb.com.ezp-prod1.hul.harvard.edu/levels/collegiate/article/Sir-James-Hall-4th-Baronet/38914

Figure 0.1 An engraving of Herculaneum from a drawing by Hubert Robert, published in Jean Claude Richard de Saint Non, *Voyage pittoresque, ou, Description des royaumes de Naples et de Sicile* (1781-1786).

Like all of his able-bodied compatriots, Adam scaled Mount Vesuvius while in Italy. He was delighted to find the volcano in a low-level state of eruption: "[T]hough I had conceived a very horrible notion of it," he wrote to his mother, "I assure you I was much disappointed to the better, as that great mouth, which is immensely deep and which sends out a pillar of flame and sulphurous smoke of an immense volume, exceeded much my conception." The experience produced a "most Hellish solemnity, whilst the view of nothing but sulphur, burnt rocks and ashes all around augmented the savage prospect."[7] Here Adam's words are typical of the descriptions circulated by his peers; there is a sameness to British touristic language about Vesuvius that speaks to a limited vocabulary as well as to a shared experience.[8] In both their particularity and their generality, Adam's remarks serve to articulate the new connections between natural history, antiquarianism,

[7] Quoted in Fleming, 156.

[8] For typical descriptions of Vesuvius during the Enlightenment, see Lucio Fino, *Vesuvius and the Grand Tour: Vedute and Travel Memoirs from the 17th to the 19th Centuries* (Naples: Grimaldi, 2012), 47-136.

mining technology, and architecture that were engendered by the mid-eighteenth-century iteration of the Grand Tour.

Lisbon

Figure 0.2 "Lisbon before the earthquake of 1755."

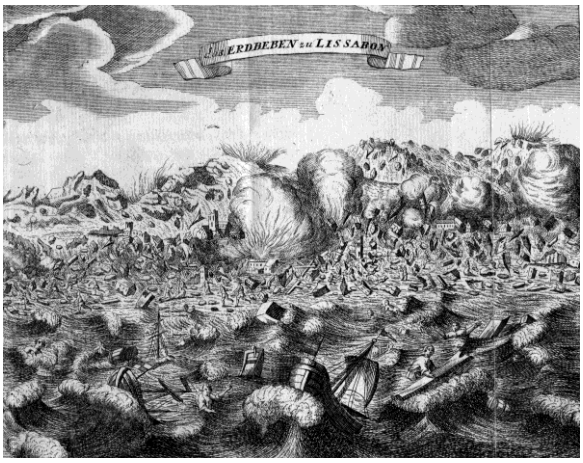

Figure 0.3 "Lisbon during the earthquake of 1755."

From J.H.R., *Kurzverfaste Beschreibung der vortreflichen, mächtigen und reichen Haupt- und Residenz-Stadt Lissabon im Königreiche Portugall, Frankfurt* (1756).

Adam's travels in Italy also coincided with one of the great natural disasters of the Enlightenment: the Lisbon earthquake of November 1, 1755. "The news of the earthquake is very terrible," Adam wrote from Rome that December, and indeed it was. Scientists have retrospectively determined that this seismic event measured approximately 9.0 on the Richter scale, and it was followed by three tsunamis and a fire that burned for five days.[9] The fact that this catastrophic sequence commenced during the celebration of morning Mass on All Saints' Day endowed it with fearsome significance. Ever quick to spot an opportunity, Adam realized soon enough that the earthquake represented a once-in-a-century chance to redesign a European capital from scratch. He began work on a series of grandiose schemes for the riverfront city in the hopes of attracting royal patronage. But Adam had misjudged the prevailing attitude of the Portuguese ruling

[9] David K. Chester, "The 1755 Lisbon Earthquake," *Progress in Physical Geography* 25.3 (2001), 363-383. The east coast of North America was only saved from inundation by a quirk in the epicenter's location and resulting focal mechanism, which directed most of the seismic energy elsewhere. Emile A. Okal, "Tsunamigenic Earthquakes: Past and Present Milestones," *Pure and Applied Geophysics* 168 (2011): 970.

class. The Lisbon earthquake marked a turning point in the way people regarded the relationship between the built environment and the natural world. By and large, what kills people in earthquakes is not the temblor itself but the buildings it brings crashing down on top of them. Voltaire's 1756 *Poème sur le Désastre de Lisbonne* may have been first and foremost a challenge to Leibnizian metaphysics, but it was also a catalogue of architecturally precipitated suffering:

> Deluded philosophers who cry, "All is well,"
> Hasten, contemplate these frightful ruins
> This wreck, these shreds, these wretched ashes of the dead;
> These women and children heaped one on another,
> These scattered members under broken marble;
> One-hundred thousand unfortunates devoured by the earth
> Who, bleeding, lacerated, and still alive
> Buried under their roofs without aid in their anguish,
> End their sad days!"[10]

To this, Jean-Jacques Rousseau replied that God was "content to preserve the genera and the species and to preside over the whole" without intervening in the geological processes of the planet for the benefit of human history.[11] Rousseau scorned what he saw as a rejection of theodicy in the face of a calamity that was actually caused by poor urban planning. "Does this really mean," he inquired sarcastically, "that the order of the natural world should be changed to conform to our caprices, that nature must be subject to our laws, and that in order to prevent her from causing an earthquake in any particular place all we need to do is build a city there?"[12] If Lisbon had not been built so high, so densely, so shoddily, and on such unsuitable ground, he claimed, much of the

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[10] F. M. A. de Voltaire, *Poèmes sur le Désastre de Lisbonne et sur La Loi Naturelle avec des Préfaces, des Notes, etc.*, (Geneva, 1756), trans. in *Selected Works of Voltaire*, ed. Joseph McCabe (London: Watts and Co. 1911).

[11] Jean-Jacques Rousseau, *Oeuvres completes de Jean-Jacques Rousseau*, ed. Marcel Raymond and Bernard Gagnebin (Paris: Gallimard, Bibliothèque de la Pléide, 1969) 4: 1069, quoted and discussed in John T. Scott, "The Theodicy of the *Second Discourse*: The 'Pure State of Nature' and Rousseau's Political Thought," *American Political Science Review* 86.3 (September 1992): 706.

[12] Jean-Jacques Rousseau, "Cartes à Voltaire de M J.-J. Rousseau, le 18 août 1756," in *Oeuvres Complètes de Voltaire*, ed. Louis Moland, vol. 39, *Correspondence* (Paris: Garnier, 1877-85), sec. 7, trans. and quoted in Kenneth Maxwell, "Lisbon: The Earthquake of 1755 and Urban Recovery under the Marquês de Pombal," in ed. Joan Ockman, *Out of Ground Zero: Case Studies in Urban Reinvention* (Munich: Prestel Verlag / New York: Temple Hoyne Buell Center for the Study of American Architecture, Columbia University, 2002), 27.

damage from the earthquake could have been avoided.[13] Both philosophers thus implicated architecture in their discussion of the disaster, as did Immanuel Kant, who expressed the new sensation of instability the earthquake instilled by remarking on the human tendency to "build unconcernedly on vaults whose pillars sometimes sway and threaten to collapse."[14] As would be the case in Adam's native Scotland, Kant used architectural terminology to describe the earth's as yet barely understood structure.

Architecture and the study of the earth have intersected with varying degrees of closeness since the Renaissance.[15] As antiquarianism developed, artifacts and natural curiosities dug from the scoria and soil of Italy were arranged side by side in *Wunderkammern* across Europe. During the Enlightenment, travelers delighted in basaltic formations shaped like columns and steps, and recreated artificial caves and volcanoes in their gardens at home. As G. W. F. Hegel recognized, the raw material of architecture is that of mountains: if all cultural products find their ultimate source in the earth, architecture remains the closest to its origins by virtue of its mass and its direct engagement with gravity.[16] Furthermore, as the most enduring of human arts, architecture retains the position of a preeminent index of time's inexorable passage.

Britain

In the late eighteenth and early nineteenth centuries, the intersection between architecture and the earth sciences became both more definite and more diffuse. Discoveries across the earth

[13] Jean-Jacques Rousseau, "Cartes à Voltaire," quoted and discussed in Edgar S. Brightman, "The Lisbon Earthquake: a study in religious valuation," *The American Journal of Theology* 23.4 (October 1919), 509.

[14] Immanuel Kant, "Von den Ursachen der Erderschütterungen bei Gelegenheit des Unglücks, welches die westlichen Länder von Europa gegen das Ende des vorigen Jahres betroffen hat," (1756), trans. with commentary by O. Reinhardt and D. R. Oldroyd in "Kant's Theory of Earthquakes and Volcanic Action," *Annals of Science* 40 (1983), 253.

[15] See, for example, Lauren Jacobi, "On Stones and History: Florentine Architecture under Cosimo I de' Medici," *Architecture and Geology Colloquium*, St. Catherine's College, Oxford University, January 14, 2017; and Helen Hills, "Beyond Mere Containment: The Neapolitan Treasury Chapel of San Gennaro and the Matter of Materials," *California Italian Studies*, 3.1 (2012), 1-21.

[16] For a concise summary of Hegel's writings on architecture, see John Whiteman, "On Hegel's Definition of Architecture," *Assemblage* 2 (February 1987): 6-17.

sciences contributed to a new and deeply challenging picture of the earth as an entity with a history of its own – one that dwarfed both human history and that of all life. These developments had a profound impact on architecture, which shared the same physical landscape, inorganic spectrum of materials, and representational conventions with the nascent science. Conversely, such overlapping areas of expertise and concern allowed architecture to play a privileged role in both counteracting and assimilating geology's decentering effects. While geological theorists used architectural metaphors to highlight the connections between natural processes and human endeavors, architects engaged with the philosophical and material ramifications geology presented to the Enlightened gaze. In what follows, the focus will be on this exchange in Britain, where the intensive exploitation of mineral wealth simultaneously contributed to the rapid development and popularization of geology and furnished capital for major architectural commissions. Although scholars have examined its influence on literature and art, little attention has been paid to geology's encounters with architecture. Here these engagements are explored in a series of chronologically organized case studies that chart architecture's fundamental shift from a cultural practice predicated on its own historical codes to one forced to reckon with the external and often deeply alien models established by the earth sciences. In the process, a sense of architecture as capable of resisting the inhospitable aspects of the natural world was undermined in favor of a view that treated architecture itself as a natural production.

The first chapter examines Robert Adam's late creative output in the context of the geological and aesthetic ideas circulating during the Scottish Enlightenment. Over the last two decades of his life, Adam created approximately one thousand romantic landscape watercolors. In these paintings, invented castles are set amongst real and imagined geological formations that reflect the theory of the earth then being advanced within Adam's intellectual circle by James Hutton, the father of modern geology. Likewise, Hutton's published account of his theory relies

strongly on architectural terms and analogies, and his cyclical model of perpetually self-effacing and self-aggregating strata corresponds to the combinatorial treatment of classical antiquity that Adam pioneered in British architecture. Adam's design technique reached its apex in the late "castle style" projects he produced at the same time as his watercolors. Influenced by Hutton's geological collaborator, John Clerk of Eldin, who was also Adam's brother-in-law, these designs recast architecture as a form of cultural resistance to its newly troubling landscape context. In fact, both Adam and Hutton relied on a uniquely Scottish formulation of the Sublime as an overpowering apprehension of "the broken up jumble" of time, as David Hume expressed it, to mitigate the inhuman timescale Hutton's geological theory proposed.

In 1824, the *Knight's Quarterly* magazine published an article that lampooned Sir John Soane's idiosyncratic approach to architectural ornament. For the authors, Soane's "Boeotian order" was a disorder that, rather than upholding the purity of architectural language, infected it with absurd references to foreign sciences. "Is he a geologist?" they asked. He "uses an interminable joint, which copies successfully the grand appearances of nature in the stratification of rocks." The second chapter of this dissertation turns from Adam's heroic confrontation with Hutton's cyclical model of earth's history to explore the relationship between John Soane and Joseph Gandy's novel approach to architecture – and particularly architectural ornament – and the catastrophist theory of the celebrated French paleontologist, Georges Cuvier. In the new context of an old earth, the real extent of geological time suddenly eclipsed the importance of Greco-Roman antiquity, and along with it, the cultural authority it had bestowed on architecture. As even the most ancient aspects of human culture were revealed to be chronologically recent compared to the earth's vast duration, architecture seemed poised to become an exercise in proleptic ruination. At the same time, architecture became a privileged model for geology – particularly for Cuvier and his rival, Étienne Geoffroy Saint-Hilaire. This chapter considers the cultural reciprocity between these two

discourses and begins to document the extensive connections between Georgian architects and the founders of the earth sciences in Britain.

In the early decades of the nineteenth century, architects gained early access to the disconcerting ideas and discoveries being produced by the young science of geology partly on account of physical proximity. The Royal Academy and the Geological Society of London were both located in Somerset House, and Soane's museum at 13 Lincoln's Inn Fields is directly across from the Royal College of Surgeons, host institution for Cuvier on his trips to Britain and home to the Hunterian Museum, one of the premier geological collections at the time. By the Victorian period, however, geology commanded wide general interest and had amassed significant cultural currency. Rather than being drawn to outlandish and erudite discoveries, as their Georgian predecessors had been, Victorian architects paid attention to earth science because it furnished both a powerful set of cultural references and a source of relevant expertise. Whereas early geological theorists had looked to architecture for appropriate metaphorical language and representational techniques, architects now sought out newly authoritative geological imagery and ideas. The third chapter of this dissertation examines this about-face through the lens of ecclesiology, a new branch of architectural history and theory that relied on geology and paleontology for its models. It also investigates the ways in which geological discoveries provided the impetus for architecture's fascination with the biological theory of development. Why was it that, just as the inorganic sciences reached the peak of their popular prominence, High Victorian architects like George Edmund Street began to think about architecture in terms of life? This question is addressed with an examination of Street's parish church of All Saints Boyne Hill in Berkshire.

The closing chapter examines John Ruskin's attempt to connect the essential workings of geology to architectural production by revealing a preexisting ethics common to both. Ruskin's scientific theories were based on a conviction that all inorganic form was largely predetermined by

internal chemical configurations. In his understanding, the entire mineral landscape – whether organized into crystals or decomposed into dust – perpetually strove to fulfill the formational blueprint contained in its atomic structure. Ruskin held that every fundamental "truth" of nature contained an emulable moral lesson for society, and his perspective on the formational processes of the natural world profoundly shaped his approach to the built environment. Ultimately, Ruskin believed that worthwhile architectural "crystallizations" could only be achieved by an ethical community that – like the inorganic world – obeyed inborn laws and committed to a continual process of self-improvement. Convinced that creativity could be modeled on geological principles, Ruskin attempted to align the human subject with nature's own laws. This case study focuses on Ruskin's "post-architectural" pedagogical and social experiments, and in particular, on a collection of siliceous minerals he catalogued and gave to the St. David's School for Boys at Reigate in the 1870s. Ruskin's interpretation of how silica-rich minerals formed, and his interpolation of this process to the formation of individual subjects and the island of Britain as a whole, contained a profound challenge to architectural production.

From Adam's castles to Ruskin's rocks, the aim of this dissertation has been to interrogate what became newly possible in architecture once geo-historical thought emerged to challenge the primacy of human activity. Within the ascendant industrial and imperial realm of Georgian and Victorian Britain, preexisting conventions of practice, form, and ornament fell away as architects grappled with wholly new concepts of time and materiality. In so doing, the dissertation charts a fundamental change in how culture and nature were conceptualized in relation to one another. The shadow cast by this paradigm shift lingers today.

Chapter 1. Temporal Sublime: Robert Adam and Geology in the Scottish Enlightenment

Prelude: "Dead Life"

The Scotland of Robert Adam's era witnessed the emergence of a modern temporality. At the scale of daily experience, the burgeoning Industrial Revolution brought with it a persistent chronological regulation of quotidian existence, termed "clock time" by E. P. Thompson.[1] At the scale of national consciousness, the framework of history began to be assembled. Figures like Adam's friend David Hume claimed that this was "the Historical age and this the historical nation" in his *History of England* (1754–61).[2] Yet the particular contours of a sublime temporality, as it began to be apprehended in the second half of the eighteenth century, only come into focus when these two scales of time—the quotidian clock and a historical lineage—are joined by a rising awareness of the earth's timescale through geology. Britain's great era of mineral exploitation had commenced. Locating, extracting and transporting coal, lead, and iron-ore exposed an uncanny underworld beneath Britain's familiar agricultural surfaces. As more mines were opened, caves explored and quarries established, the more the newly synchronized tick-tock of daily existence and the freshly systematized historical past dwindled beside the yawn of time exposed by mattocks and mapped by commerce.

This new and threatening temporal scale comes into sharp relief in the geological theory of James Hutton. A prominent member of the Scottish Enlightenment, Hutton was an agricultural theorist and deistic philosopher who viewed the planet as a productive base for human life. In his schema, the earth was locked in an immense cycle of erosion and lithification, where old land decayed at the same rate as new land formed under the sea. There was no such thing as primary

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[1] E. P. Thomson, "Time, Work-Discipline, and Industrial Capitalism," *Past and Present* 38 (Dec 1967), 56–97.

[2] David Hume, "Letter to William Strahan," 1770, in *The Letters of David Hume*, ed. J. Y. T. Greig, (Oxford: Clarendon Press, 1932), II: 230.

rock, existing since an originary event; there were simply different densities of soil – some recently deposited from existing rocks, others hardening into new stone under the waves. The earth's contemporary configuration was an amalgamation of the recycled detritus of an endless succession of former worlds, and ceding its own material, granule by granule, to a world yet to come.[3]

Hutton famously concluded the published version of his ideas, *Theory of the Earth; or an Investigation of the Laws observable in the Composition, Dissolution, and Restoration of Land upon the Globe* (1788), with the unsettling remark: "we find no vestige of a beginning, – no prospect of an end."[4] As Stephen Jay Gould has observed, this view of geological time is radically ahistorical. Time passes, but the record of its passing is being continually effaced; and while evidence of great duration can be identified, it cannot be interpreted as part of a directional progression.[5] In Hutton's work, the narrative arc that had been so central to the Western view of the world since the rise of Christianity was lost – and with it, any assumption of an intuitive human affinity with the landscapes that ultimately supported life.[6] Time and matter looped in upon themselves. What had happened before was happening again, very slowly, and would happen once more in a future too remote to imagine.

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[3] For a concise review of Hutton's theory and its context within the Scottish Enlightenment see Dennis R. Dean, *James Hutton and the History of Geology*, (Ithaca: Cornell University Press, 1992) 2–30.

[4] James Hutton, *Theory of the Earth, with Proofs and Illustrations*, (London and Edinburgh: Messrs Cadell junior and Messrs Creech, 1795) I: 223.

[5] Stephen Jay Gould, Time's Arrow, Time's Cycle: Myth and Metaphor in the Discovery of Geological Time, (Cambridge: Harvard University Press, 1987), 61–96.

[6] Martin J. S. Rudwick, Bursting the Limits of Time: The Reconstruction of Geohistory in the Age of Revolution, (Chicago: University of Chicago Press, 2005), 168–70.

Figure 1.1 A section through time. John Clerk of Eldin, "Sketch of the Unconformity at Jedburgh, Borders, Scotland" (1787). In this early geological drawing, the quick surface pace of human life, represented by the moving carriage and the horse and rider, is contrasted with the immensity of time it must have taken for horizontal layers of sediment to accumulate, harden, buckle, upend into their current vertical positions, and be covered again in turn by new horizontal strata.

The incommensurability Hutton's theory proposed between lived experience and the vast and indifferent rhythms of the planet exemplifies the Enlightenment's contradictory attitude toward the earth. In his study of geology's impact on British poetry, Noah Heringman puts the situation succinctly: on the one hand, the Industrial Revolution was based on an instrumental view of the mineral landscape as a static reserve of economic resources. On the other, its meticulous investigation of this reserve revealed abundant evidence of large-scale activity and change, forcing Romantic culture to confront the earth "in its otherness; its non-human aspect."[7] For example, Hutton attributed fundamentally life-like qualities of motion, circulation and self-repair to inorganic matter. In his *Theory of the Earth*, he insisted that the world is not simply a machine but

[7] Noah Heringman, *Romantic Rocks, Aesthetic Geology*, (Ithaca: Cornell University Press, 2004), 1.

also an "organized body" with a "reproductive operation, by which a ruined constitution may again be repaired, and duration of stability thus procured."[8] The transfer of organic rhythms to a mineral kingdom so old that it might well have existed forever imbued this previously inert substrate with eerie, even frightening, agency.

Thinkers had begun to probe such ramifications in the philosophical field of aesthetics, shaping a new linguistic facility required for such work along the way. As Denis R. Dean has shown, early eighteenth-century authors struggled to articulate their reactions to the contours of the natural world. For instance, Thomas Gray and Horace Walpole seemed incapable of describing the Alps during their Grand Tour of 1739 in anything but the most generic of terms: mountain scenes were "poetical", "romantic", and "astonishing".[9] Contrast such inarticulacy with the terminological precision achieved by John Playfair, Hutton's biographer, as he recounted the experience of comprehending Hutton's interpretation of the rock formation at Siccar Point, Berwickshire, in 1788:

> We felt ourselves necessarily carried back to the time when the schistus on which we stood was as yet at the bottom of the sea, and when the sandstone before us was only beginning to be deposited, in the shape of sand or mud, from the waters of a superincumbent ocean. An epocha still more remote presented itself, when even the most ancient of these rocks, instead of standing upright in vertical beds, lay in horizontal planes at the bottom of the sea, and was not yet disturbed by that immeasurable force which has burst asunder the solid pavement of the globe. Revolutions still more remote appeared in the distance of this extraordinary perspective. The mind seemed to grow giddy by looking so far into the abyss of time.[10]

Playfair's dramatic depiction represents one end of a sophisticated gradation of sensual responses that had been devised over the intervening half-century: if the landscape is beautiful when

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[8] Hutton, *Theory of the Earth,* I: 16–17.

[9] Thomas Gray, *The works of Thomas Gray in prose and verse*, ed. E. Gosse, (London: Macmillan & Co, 1884), I: 244; II:36. Quoted and discussed in Dennis R. Dean, *Romantic Landscapes: Geology and its Cultural Influence in Britain, 1765–1835*, (Ann Arbor: Scholars' Fascimiles and Reprints, 2007), 55–6.

[10] John Playfair, "Biographical Account of the late James Hutton, M.D.," reprinted in *The Works of John Playfair, Esq.,* (Edinburgh: Archibald Constable & Co, 1822), IV: 80–81.

cultivated for pleasure, and picturesque when worked for profit, then when it reveals what Hutton called "the exquisite mechanism and active powers of things", it is sublime.[11]

Playfair's account of Siccar Point followed a particularly Scottish notion of this effect. Although geological features had been included in the repertoire of sublime objects since this aesthetic category had been formulated – Longinus, the ancient Roman author whose treatise formed the basis for eighteenth-century theories, included the volcano of Mount Etna in his catalogue[12] – Scottish philosophers placed a unique emphasis on temporality. In his *Treatise on Human Nature* (1738), Hume asked, "Why a very great distance encreases our esteem and admiration for an object: Why such a distance in time encreases it more than that in space: And a distance in past time more than that in future."[13] He concluded that, while the imagination perceived space as a smooth continuum, time was envisioned as a "broken up jumble." The greater difficulty in imagining a remote past than a remote place thus produced a more complete sense of disorientation, followed in turn by the attainment of "a more vigorous and sublime disposition."[14] Here the sublime is couched in terms of a contest between a tableau that fires the imagination and a core of reason that derives strength from resisting its onslaught.[15] Similarly, Hutton's text emphasized his theory's appeal to reason while acknowledging his material's threat to imaginative sensibility:

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[11] Hutton, Theory of the Earth, II: 469.

[12] Longinus, *On the Sublime*, Section 34:277. Discussed in Emily Brady, *The Sublime in Modern Philosophy: Aesthetics, Ethics, and Nature*, (Cambridge: Cambridge University Press, 2013), 13.

[13] David Hume, *A Treatise of Human Nature*, (Edinburgh, 1738), II.3.8: 279.

[14] Ibid, 286.

[15] As Hume expressed it, "This aspiring progress of the imagination suits the present disposition of the mind; and the difficulty, instead of extinguishing its vigor and alacrity, has the contrary effect of sustaining and increasing it." David Hume, *Philosophical Works*, ed. Green and Grosse (London, 1874), II:212. Quoted and analyzed in Samuel H. Monk, *The Sublime: A Study of Critical Theories in Eighteenth-Century England*, (Ann Arbor: University of Michigan Press, 1960 [1935]), 65.

> The hideous mountains and precipitous rocks, which are so apt to inspire horror and discontentment in minds which look at sensible objects only for immediate pleasure, afford matter of the most instructive speculation to the philosopher, who studies the wisdom of nature through the medium of things.[16]

The effort inherent in examining the true power and extent of the mineral world was worth the mental edification that would ultimately result.

Yet there is also the sublime menace of time itself, couched as a ruinous counterforce that erases not just mankind's physical productions, but also mankind's mental constructs. The Scottish associationist philosopher Lord Kames, a contemporary of both Hume and Hutton, and also an influential friend and correspondent of Robert Adam's, speculated that the most basic reduction of a sublime encounter could be produced by "a huge mass of rubbish, the ruins perhaps of some extensive building, or a large heap of stones, such as are collected together for keeping in memory a battle or other remarkable event."[17] This ambiguous index of opposite processes is sublime because it reveals the indifference and unmeaning of Hutton's "medium of things." The past reaches up to touch the present in muteness. Ruins perpetually enact forgetfulness; cairns forecast failures of memory to come. The stones will outlive their arrangements, will again become part of the larger effacing upheaval of the earth, will go down to darkness and dust as they have come from these only temporarily, reluctantly, into the landscapes of the living.

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[16] Hutton, Theory of the Earth, II: 90.

[17] Henry Home, Lord Kames, *Elements of Criticism* [1785] (London: Routledge / Thoemmes Press, 1993), I: 212. Lord Kames was one of the central figures of the Scottish Enlightenment. He was the recipient in 1763 of a much-quoted letter from Robert Adam explaining his views on the use of the Classical orders – one of the rare surviving examples of Adam's own writing on architectural theory and practice (it is transcribed in Arthur T. Bolton, *The Architecture of Robert and James Adam (1758-1974)*, (Antique Book Collector's Club reprint [1984] of London: Country Life, 1922), I: 50–4). Kames was also a member of the Edinburgh Council committee that in the 1760s reviewed and advised on James Craig's plans for Edinburgh New Town, as was Robert's brother John Adam. For a discussion of Kames' influence of the Adam brothers see John Fleming, *Robert Adam and his Circle in Edinburgh and Rome* (Cambridge: Harvard University Press, 1962), 307–311.

The historian John Dalrymple, an associate of Hume, Hutton and Kames, and also a friend and patron to Adam, wrote in an influential 1774 treatise on landscape:

> The chief natural defect of a highland situation is that, being generally ill-inhabited, it has too much the appearance of dead life: that appearance, added to the vastness of the objects, creates a kind of despair in the mind, which considers itself as nothing amidst that stupendous and solitary scene it beholds.[18]

Coupled with Hutton's extension of an eerily biological "reproductive operation" to the entire surface of the globe, this sense of "dead life" becomes part of a deeper eighteenth-century intuition of a negative force, hostile to life itself. For Dalrymple, the ever-present threat of the barren Scottish landscape required extensive defensive bulwarks. His solution was architectural. As he put it, "though the little finishings of art on the face of the ground would in such a situation be lost, yet the great efforts of art would please, because that very art is a sign of cultivation." The "great efforts" he specifically had in mind were castles:

> The slenderness of an Ionic of Corinthian pillar, placed at the side of a vast mountain, would create a ridiculous comparison; and therefore in a highland situation, the principle house should be in the form of a castle. The elegance and fineness of execution belonging to the Grecian architecture, would here be totally misplaced. If in that castle, added to the greatness and solid appearance of the main building, there should shoot up in the middle a Gothic tower, pierced and of hardy execution, a sentiment similar to the sentiment of terror, added to that of grandeur, would still more correspond to the natural genius of the place.[19]

In this Dalrymple echoed a roughly contemporaneous remark by Lord Kames that a Gothic ruin "exhibits the triumph of time over strength; a melancholy, but not unpleasant thought: a Grecian ruin suggests rather the triumph of barbarity over taste; a gloomy and discouraging thought."[20] But embedded within Dalrymple's preference for hardiness over slenderness was a sense that

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[18] Sir John Dalrymple, *An Essay on Landscape Gardening* [Originally titled "Essays on Different Natural Situations of Gardens," (1774)], (Greenwich: 1823), 11.

[19] Ibid., 8.

[20] Kames, Elements of Criticism, I: 446–7.

architecture possessed a sublimity of its own – one capable of rising up against the inorganic hostility of an ancient and vitalized landscape. This illuminates one of the underlying attractions of the sublime in the context of the enlightened estrangement between culture and the natural world. From Longinus to Burke, the sublime had permitted a sense of parity, however fraught, between the works of man and the works of nature. However doomed such efforts were ultimately acknowledged to be, there was yet something in the artifice of human achievements – and architecture in particular – that could resist the overpowering force and temporality of nature, even as it gave way before it.

Figure 1.2 Robert Adam, "View across Park to Oxenfoord Castle."

Dalrymple inherited his own castle, the 16th-century Oxenfoord tower house in Midlothian, Scotland, in 1779, and promptly hired Adam to update and expand the property.[21] His choice of architect was hardly a simple matter of patronage by association, however. Adam was friends with Hume and Kames. Hutton and Adam were also closely associated via Adam's brother-in-law, fellow architectural enthusiast, and sketching companion, John Clerk of Eldin, a polymath who produced the illustrations for Hutton's *Theory of the Earth* and was so involved in that project's conceptualization that Playfair felt it was impossible to tell where the work of one man stopped and the other began.[22] These connections tied him to the intellectual circle most responsible for framing a late-eighteenth-century geological awareness of the landscape. Meanwhile, Adam had embarked upon the second great episode of his career, in which castles, sublimity and time emerged as central concerns.

"Majesty, gravity, and force": Adam's castle style

By the time he designed his major castle-style projects in the 1770s and 80s, it seemed to Adam's early biographers that his best years were behind him. Perhaps Adam felt this way himself: an uneasy worry that the grand commissions and lightly worn accolades were fading, together with the originality he prized above all else.[23] Certainly there is an insistent quality to the well-known preface he authored with his brother, James, for publication in the first volume of their *Works in Architecture* (1773):

> We have not trod in the path of others, nor derived aid from their labours. In the works which we have had the honour to execute, we have not only met with the approbation of our employers, but even with the imitation of other artists, to such a degree, as in some

[21] Alistair Rowan, "Oxenfoord Castle, Midlothian," *Country Life* 156 (August 15, 1974): 430-433.

[22] Playfair, "Biographical Account," 115. Clerk of Eldin's illustrations were lost after his death and rediscovered in the Clerk family archives at Penicuik House in 1968. See G. Y. Craig, D. B. McIntyre, and C. D. Waterston, *James Hutton's Theory of the Earth: The Lost Drawings* (Edinburgh: Scottish Academic Press, 1978), 6-9.

[23] See, for example, Arthur T. Bolton's appraisal of this period in Bolton, *The Architecture of Robert and James Adam*, I:197.

> measure to have brought about, in this country a kind of revolution in the whole system of this useful and elegant art.[24]

As the above passage obliquely suggests, Adam had held his own alongside his "more architectonic" rival, William Chambers, only to see his "picturesque" style poached and (in the eyes of prominent connoisseurs) improved by up-and-coming architects like James Wyatt and Henry Holland.[25] Other events augured ill. Clients in England tightened their purse strings and delayed or decided against ambitious building projects as the revolt in the American colonies ramified. Robert and his brothers had only superficially recovered from the financial fiasco that surrounded their speculative London development at the Adelphi, which had sorely damaged their reputations and strained the bonds of what had, in happier times, been characterized as "a wonderfully loving family."[26] The Adam flair for ambitious ventures that had served the family so well earlier in the eighteenth century finally rendered them vulnerable to unscrupulous absconders and specious investments. As the architectural commissions dwindled, James lost interest in the profession, retired to his farm at Shenley, Hertfordshire, and took up agricultural theorizing.[27] Robert found himself with more time on his hands and more care on his shoulders. His health suffered.[28]

Yet through all of this, or perhaps because of it, the chief scion of Georgian architecture remained prolific in what were to be the final decades of his life, producing designs that Alistair Rowan has characterized as "amongst the most original creations of eighteenth-century European

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[24] Robert and James Adam, "Preface," *The Works in Architecture of Robert and James Adam, Esquires,* (London, 1773), hereafter referred to as *The Works*, I: i.

[25] Robert Adam, quoted in A. A. Tait, *Robert Adam: Drawings and Imagination* (Cambridge: Cambridge University Press, 1993), 3; Sanderson, 74. After visiting Carlton House, designed by Henry Holland, Horace Walpole remarked, "How sick one shall be, after this chaste palace, of Mr Adam's gingerbread and snippets of embroidery." Quoted in Margaret H. B. Sanderson, *Robert Adam and Scotland: Portrait of an Architect* (Edinburgh: HMSO, 1992), 74.

[26] Alexander Carlyle, *Autobiography*, 2nd ed. (Edinburgh: Blackwood & Sons, 1860), 361.

[27] In 1789 James Adam published two volumes on agricultural theory, *Practical Essays on Agriculture* (London, 1789). His country residence, Shenley Lodge, near Shenley, Hertfordshire, though much altered, still stands, and is now home to the independent Manor Lodge School. I am grateful to Colin Thom for this information.

[28] For the best account of this fraught period in the Adam family, see Sanderson, 99-107.

architecture."[29] As Adam's London-based practice dried up, he increasingly turned to his native Scotland, picking up residential commissions from friends like Dalrymple, and working on ambitious urban and public building projects in Edinburgh and Glasgow. Though many of the city improvement schemes relied upon Adam's traditional neoclassical vocabulary, the country residences were designed in a completely novel idiom. Together with hundreds of uncommissioned paintings of invented landscapes, these late, so-called "castle-style" works became the main focus of Adam's increasingly solitary design practice until his death in 1792.[30]

The castle-style buildings are notoriously difficult to cognize, both in relation to Adam's delicate approach to neoclassicism (known today simply as the "Adam style") and in the wider context of late eighteenth-century British architecture. Arthur T. Bolton, author of the first authoritative survey of the Adam's works, suggested that these residences belonged to the whimsical "Gothick" exemplified by Horace Walpole's Strawberry Hill and the work of Richard Bentley and Sanderson Miller. He lamented them as "atrocious attempts" and argued that, "without the requisite knowledge of the detail and character of Gothic architecture, Adam was unable to embody his romantic visions in serious architectural form."[31] Yet, as Rowan has noted, the Adam castles intentionally lack the basic characteristics common to both authentic Gothic architecture and eighteenth-century "Gothick" confections, such as pointed arches, traceried windows, pinnacles and flying buttresses.[32] Part of the issue here is the greater fluidity of Enlightenment nomenclature: as Dalrymple's description of "a Gothic tower, pierced and of a hardy execution" makes evident, "Gothic" could be associated with castles as much as cathedrals. Nonetheless, Rowan has posited a

[29] Alistair Rowan, Designs for Castles and Country Villas by Robert and James Adam (New York: Rizzoli, 1985), 17.

[30] Sanderson, 82–3, 102–3, 108–11. After 1773, James had basically retired from the dwindling practice to focus on his agricultural research. Robert Adam, whose design vision had always been dominant, became solely responsible for the firm's creative direction after that date. See Tait, *Robert Adam: Drawings and Imagination*, 12.

[31] Bolton, I: 94.

[32] Rowan, Castles and Country Villas, 17.

more sophisticated interpretation of Adam's castle style as one also inspired by Diocletian's Palace at Split, in present-day Croatia (which Adam had surveyed for publication early in his career), as well as by other vestiges of ancient Rome, including the remains of military fortifications in southern Italy.[33] Certainly Adam's castles share features, not just with Diocletian's palace, but also with Diocletian's baths in Rome – a structure that the Adam brothers also studied and admired.[34] These include the semicircular, tripartite windows that bear the Roman emperor's name, strong horizontal banding, round windows, and relieving arches. But such elements also feature prominently in Palladian and neo-Palladian architecture, and Adam used Palladian windows in several castle façades. Moreover, all of these elements are present in Adam's neoclassical designs.

Figure 1.3 Robert Adam, "A Fortified Castle or Palace, Surrounded by a High Wall, Corner Towers and a Central Gateway (Barnbougle Castle)."

[33] Ibid, 18–19.

[34] *The Works*, I: iv.

Figure 1.4 Robert Adam, Seton Castle, Longniddly, East Lothian, Scotland.

Figure 1.5 Dalquharran Castle, South Ayrshire, Scotland.

The influences unique to his castle style often have a more local source: the pepper pots, crow-stepped roofs, crosslet loops and bartizans that appear in many of Adam's designs are typical of 16th-century Scottish tower houses. As William Kay has suggested, their presence alongside Roman and Palladian features seem to conjure an alternative British past in which the Romans had stayed in these distant and troublesome colonies rather than withdrawing at the end of the fourth

century AD.[35] Likewise, John Dalrymple once remarked that Adam's late eighteenth-century update of his 16th-century castle "really made it much older than it was."[36] By invoking a remote past without remaining tethered to the ornamental indices of any specific period or place, the castles contrive to belong either to no particular history, or to one that never existed – a notional, elemental, and universal period of architecture from which all styles ultimately derived.

The most striking difference between Adam's neoclassical architecture and his castle-style buildings is the comparative blankness of the latter façades. At Seton Castle, for example, ornament is stripped down to shapes and lines – the curves of arches, the stark rectangles, crosses, and circles of windows, the double stripes of string courses, and the black bars of machicolations. The machicolations are in fact the only "fortification" element that span all of Adam's castle designs; even crenellations give way in several productions to this one minimum signifier of the castle typology. For all their defensive vocabulary, the castles also share a drawing-like neatness that serves to emphasize their artifice over their mass. Dalquharran Castle gives the impression of being wrapped by a single, paper-like plane that has been embossed, punched, creased and curved to fit; Adam's monumental design for additions to Barnbougle Castle surrounds the original tower house with a bookmatched Roman scrim that emphasizes the stark symmetry of the ancient keep. With their crisp proportions and stripped planes, the castles lean away from the picturesque, which relied instead on cobbled-together and decayed vernaculars.[37] Rather, they call to mind a quip by Elizabeth Montagu, "queen of the bluestockings" and also Adam's friend and client, who recommended Lord Lyttleton's *History of the Life of King Henry the Second* (1767–71) to Lord Kames

[35] William Kay, "Robert Adam: Some Responses to a Scottish Background," in *Architectural Heritage IV: The Journal of the Architectural Heritage Society of Scotland* (Edinburgh: University of Edinburgh Press, 1993), 23-38.

[36] Quoted in Sanderson, 88.

[37] John Macarthur, *The Picturesque: Architecture, Disgust and other Irregularities* (London; New York: Routledge, 2007), 115-118.

by remarking that it was like "a Gothick building by a Roman architect. The story is Gothick, but expressed with majesty, gravity, and force, without any thing dark, or rude, or perplexed & confused."[38] These were no romanticized depictions of workaday ruination that projected an unchanging and unchallenged present, as picturesque productions from the period often stand accused of being.[39] Rather, prismatic, severe, out of time and out of place, Adam's castles embody a resisting and uniquely architectural alterity: a heightened sense of artificial order that resonates with John Dalrymple's "great efforts of art" and speaks to the formulation of an architectural sublime.

Adam's castle style does not continue to his interiors, which maintain the manicured conventions of eighteenth-century neoclassicism. Typical – even indulgent – layouts for what Adam referred to as "the parade, the conveniences, and social pleasures of life" form an internal continuity of clock-time choreography that repudiates the terrestrial timescale surrounding them.[40] This was something of an emerging trend in British architecture during the second half of the eighteenth century. When the landscape theorist Richard Payne Knight designed his own home at Downton in the early 1770s, he gave it a castellated exterior and a classical interior. Knight wrote that his "gothic towers and battlements without, and Grecian ceilings, columns, and entablatures within," provided both "the advantage of a picturesque object, and of an elegant and convenient dwelling."[41] Unusual for its time, Knight's asymmetrical exterior featured picturesque qualities associated with landscape, while his interior demonstrated the connoisseur's imperturbable taste for classical

[38] "Letter to Lord Kames from Elizabeth Montagu," July 30, 1767, National Archives of Scotland, GD24/1/573.

[39] Macarthur, 58–64. See also Brilliana Harley, "'Functional Picturesque': Richard Payne Knight and Uvedale Price in Herefordshire." *Georgian Group Journal* 24 (2016): 135-58.

[40] Adam, *The Works* I: 76.

[41] Richard Payne Knight, *An Analytical Inquiry into the Principles of Taste*, 3rd. ed. (London: 1806), 223.

antiquity.[42] This contrast between the inside and the outside is one the Adam brothers had long explored. They disparaged oversized compartmented ceilings in interiors by noting that such "bold and massive" elements were exclusively suited to "the strength, magnitude, and height" of a building's exterior. The ancients only used such features in open-air soffits, which "served to diminish and lighten the effect to these compartments," while, by comparison, classical interiors "were all delicacy, gaiety, grace, and beauty."[43] Similarly, the Adam brothers commented with satisfaction that their design for Kedleston Hall, commissioned in 1759, would make it difficult "to imagine a situation more striking without, or more agreeably retired and peaceful within."[44]

Like Knight, the Adams also experimented with exteriors that were more aligned with the landscapes that bounded them than the interiors they contained. Today Kedleston sits within a tranquil park, but a surviving design sketch indicates that Robert had initially proposed an undulating landscape involving extensive reshaping of the terrain.[45] This artificial hillscape would have rendered the formal setting commensurate with the building, which embodied a concept the Adams called "movement" – a push and pull of the façade that generated the effect of landscape without mimicking its appearance:

> *Movement* is meant to express, the rise and fall, the advance and recess, with other diversity of form, in the different parts of a building, so as to add greatly to the picturesque of the composition. For the rising and falling, advancing and receding, with the convexity and concavity, and other forms of the great parts, have the same effect in architecture, that hill and dale, fore-ground and distance, swelling and sinking have in landscape: That is, they serve to produce an agreeable and diversified contour, that groups and contrasts like a picture, and creates a variety of light and shade, which gives great spirit, beauty and effect to the composition.[46]

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[42] David Rodgers, "Knight, Richard Payne," Grove Art Online, Oxford Art Online, Oxford University Press, accessed May 6, 2017, http://www.oxfordartonline.com.ezp-prod1.hul.harvard.edu/subscriber /article/grove/art/T046965.

[43] Adam, *The Works* I: vi, note C.

[44] Ibid., II: 52, explanation of Plate II.

[45] Tait, Robert Adam: Drawings and Imagination, 136.

[46] The Works, 46.

The aim was to create highly articulated and diversified massing that sunlight and shadow would transform into an ever-changing chiaroscuro. In the castle style context, the greater "movement" of the landscape demanded bolder strokes. The entire catalogue of architecture's defensive forms was mustered to protect the pockets of present-day taste and decorum they encircled.

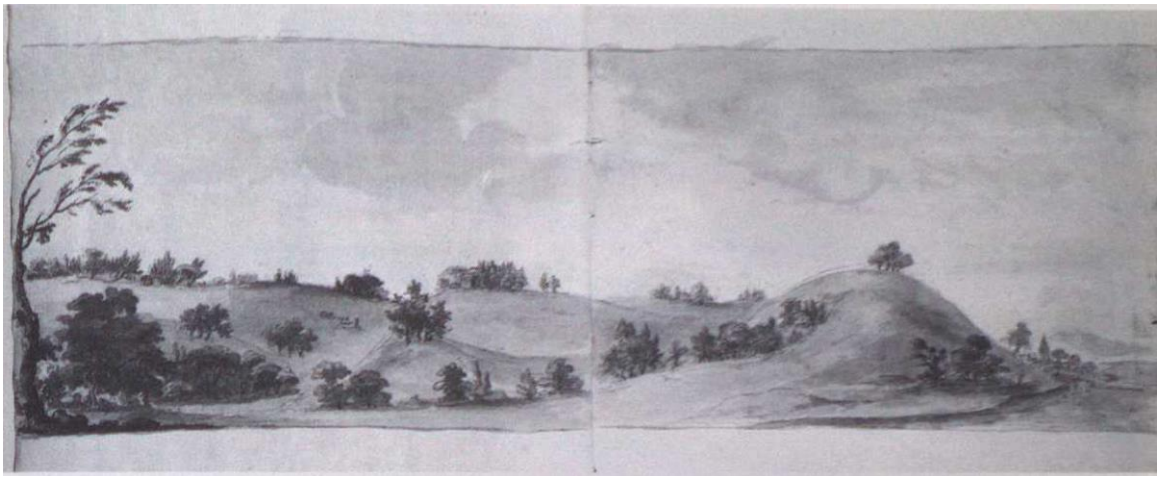

Figure 1.6 Robert Adam, "Rough Sketch of proposed landscape for Kedleston Park, Derbyshire."

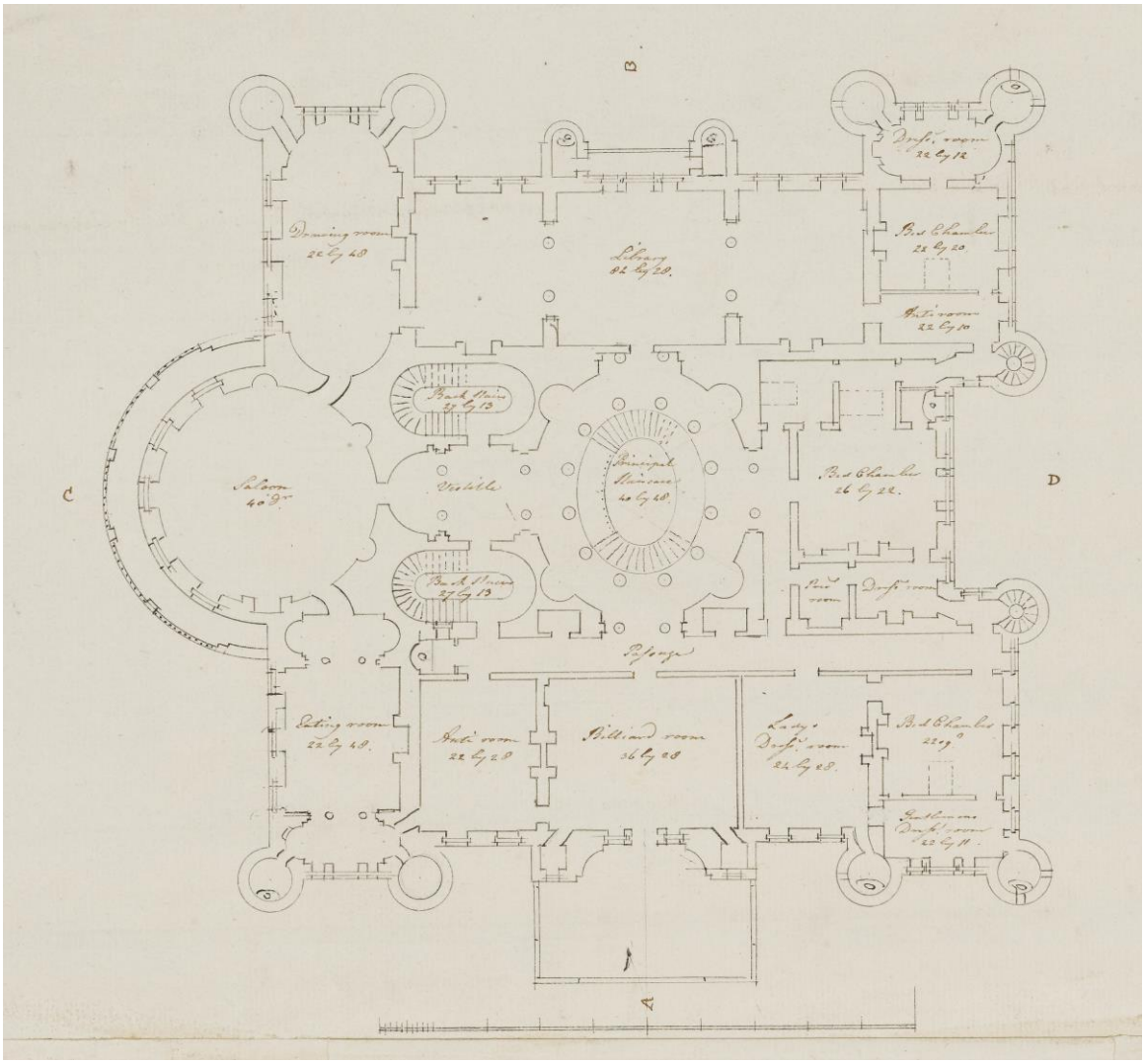

Figure 1.7 Robert Adam, "Findlater Castle Principle Plan."

And yet in Robert Adam's castle-style work, the insulated interior does not remain entirely unaffected by its exterior context. At Culzean Castle, for example, an original medieval fortification was altered and expanded, and Adam's *piece de resistance* is a grand three-storey oval staircase that was cored out of the thick walls of the ancient castle keep. Each level is decorated with a classical order. The principle floor of Culzean is on the *piano nobile*, however, and the design responds to this condition by inverting the typical sequence of the three Greek orders. A large Corinthian order is placed directly above the Doric ground floor, and a more modestly scaled Ionic

order is relegated to the top storey.[47] To the eighteenth-century mind, the traditional vertical distribution of Doric, Ionic and Corinthian reenacted the sequence in which they had appeared on the historical stage. Moreover, the conventional placement respected apparent structural properties, with the solid Doric supporting the more slender Ionic, which in turn propped up the delicate and maidenly Corinthian. At Culzean, then, the keep's genuinely ancient fabric has been modified to accommodate the neoclassical penchant for antiquity, which is unsettled in turn by a disordering of the orders.

Figure 1.8 Robert Adam, Culzean Castle, Ayrshire, grand central staircase.

[47] Eileen Harris has described the interiors and Adam's complicated sequence of renovation and alteration at Culzean Castle in Eileen Harris, *The Genius of Robert Adam: His Interiors*, (New Haven: Published for The Paul Mellon Centre for Studies in British Art by Yale University Press, 2001), 316-333.

Culzean's Corinthian *piano nobile* contributes to the visitor's sensation of floating in a grand space out of sequence, out of history, out of all time except that cushioned diurnal rhythm characteristic of upper-class routine. This effect is heightened when the salon one first enters after ascending the stairs bows out toward the dramatic seaside cliffs the castle overlooks. In plan, a good two thirds of the full circle is pushed out from the main volume; in elevation, its cylindrical form is breached by tall windows and ringed by a terrace and low-slung balustrade, so that the closest encounter between the castle's civilized enclosure and the drop to the Firth of Clyde takes place in a space very much like the crow's nest of a ship.

Similar overlooks are present in a number of Adam's other castle designs, including Findlater Castle (Figure 1.8). In each instance, these overlooks precede the eating room, the guests' ultimate destination. (At Culzean the visitor's sequence involves ascending the stairs to the saloon before descending the stairs again to the eating room on the ground floor.) Overwhelmed for a heart-catch of a moment, the visitor witnesses a glimpse of sublimity before turning to the intellectual conviviality of the dining table. The sublime is domesticated.

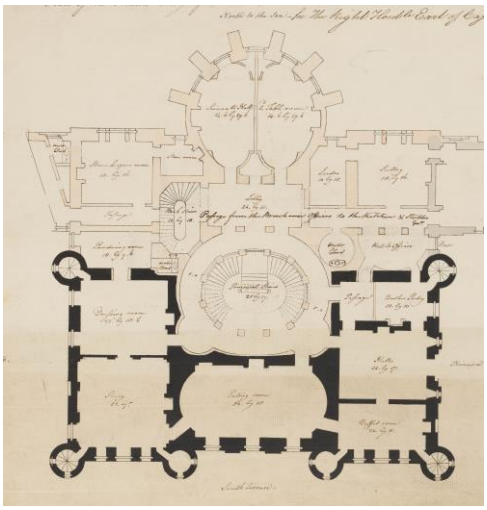

Figure 1.9 Robert Adam, "Culzean Castle Principle Ground Floor Plan." The eating room is at the bottom center of the image.

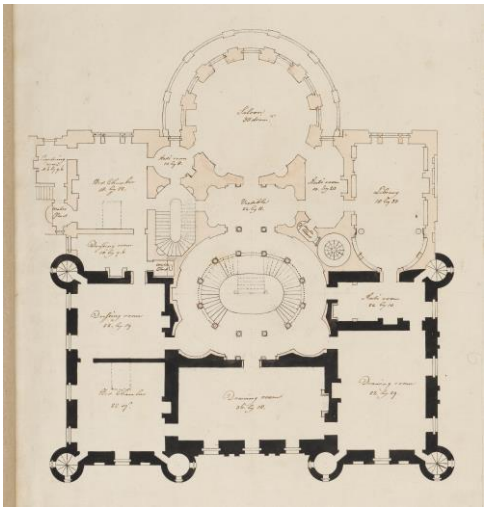

Figure 1.10 Robert Adam, "Culzean Castle Principle Floor Plan." The salon is at the top center of the image.

"The whole operation"

In their ahistorical recirculation of forms and motifs from architecture's past, Adam's castle exteriors are consonant with Hutton's terrestrial cycle, in which the same material is disaggregated and reaggregated into ever-unique configurations. Certainly it seems likely that Robert Adam was familiar with Hutton's ideas. His brother James cited Hutton in his book of agricultural theory, and in the family muniments at Blair Adam, there are watercolor sketches in James's hand of geological sites of interest in southwest England and Wales, including Avon Gorge near Hotwells and the rocky coastline near Tenby Castle.[48] Robert undertook an extensive topographical sketching tour of Ayrshire with John Clerk of Eldin shortly after the latter covered the same territory on a geological expedition with Hutton. Moreover, Adam frequently resided with his brother-in-law at Eldin and later at his Edinburgh home in Princes Street, and dined at the Oyster Club, which Hutton co-founded, on his summer trips to Scotland.[49]

Above and beyond these biographical links, however, Adam's work should not be viewed as a response to Hutton's ideas but rather as consistent with them. As men associated by place and time and personal connections, each helped to develop the intellectual and imaginative context for the other. In the Scottish Enlightenment, architecture and geology shared not only the same physical landscape, but also the same inorganic palette of materials, and methodology borrowed from antiquarianism. These overlapping concerns and areas of expertise are ones Hutton certainly took into account in his *Theory*. Alongside instances of architecture as evidence of the brevity and

[48] James Adam, *Practical Essays on Agriculture* Vol. 1:52. Blairadam Muniments 650 and 650.9. In a 1987 catalogue of the drawings at Blair Adam (unpublished) Alan Tait attributed these sketches to Robert Adam. However, based on a comparison with previous attributions to James Adam in the National Gallery of Scotland (see NGS D 442 and associated documentation), and what registers to my eye as a clear distinction in style, I attribute them to James. The coastal landscape with castle beyond is captioned in pencil "Tenby," in an unknown hand. It is possible that a much more intact Tenby Castle is depicted from the perspective of South Tenby beach, but both the castle in the distance and the coastline also seem remarkably similar to Tantallon Castle, Fife, Scotland, not far from Blairadam.

[49] Sanderson, 1992, 82, 121, 125.

fragility of human endeavors in light of geological time, Hutton repeatedly deployed architectural metaphors to explain the mechanics of the earth as he envisioned them. For example, when trying to give a sense of the discrepancy between the enormous scale and importance of the geological change he described and the minute scale of the observable changes upon which he based his hypothesis, Hutton compared the impact produced by the Egyptian pyramids as completed works to the mundane toil of maneuvering each block into position: "we wonder at the whole operation of the pyramid, but not at any one part."[50]The repetitive processes that produce geological change were equated with the unglamorous labor of building a sublime piece of architecture – a parallel Lord Kames also affected by juxtaposing "the great pyramids of Egypt" and "the Alps towering above the clouds" in his discussion of the sublime.[51] In the same vein, Hutton wrote of his discovery that existing rocks are composites of older rocks: "the thing is evident from inspection, as much as would be the ruins of an ancient city, although there were no record of its history."[52] Hutton evoked the unmistakable signs of urban settlement, as they had been discovered at Herculaneum, Pompeii, and Paestum during his lifetime, to make a case for the similarly distinguishable qualities of conglomerate and metamorphic stone.[53] Throughout his *Theory of the Earth*, pieces of natural evidence are called "monuments;" the planet's strata are "foundations;" and the repair of the eroding world is called "renovation."[54] Encounters between architecture and geology were thus characterized by a paradox: geological time would reduce all architectural efforts to the basic

[50] Hutton, Theory of the Earth, I: 184.

[51] Kames, Elements of Criticism I: 212.

[52] Hutton, Theory of the Earth, I: 469–70.

[53] Hutton owned a copy of Sir William Hamilton's *Campi Phlegraei* (1776), in which Hamilton gave first-hand accounts of volcanic activity at Mount Vesuvius, with colored illustrations, and knew him personally. They agreed that Arthur's Seat was a basaltic extrusion rather than the remnants of a volcano, as we know it to be today. See Dean, *James Hutton and the History of Geology*, 13.

[54] Hutton, *Theory of the Earth,* I: 19–20, 168, 181, 208, 285, 450.

geological components from which they had been shaped, and yet architectural terms and ideas were appropriated to model its effects.[55]

In a general sense, Hutton's cycle of ruination and reagglomeration emerged at the same time as Adam's uniquely combinatory approach to design. An early example of Adam's technique is the anteroom he designed for Syon House in 1761, just five years after he returned from Italy. As Doreen Yarwood has summarized, the composition contains column shafts supposedly dredged from the Tiber River – allegedly real, ancient elements of classical antiquity – that Adam embellished with ionic capitals, an entablature modeled on that of the Greek Erecthion, and necking decoration inspired by those of Roman baths. The coffered ceiling follows William Kent's design for Houghton Hall, and the gilded trophy panels are based on an engraving of the trophy of Octavianus Augustus by Giovanni Battista Piranesi.[56] It is likely that Piranesi himself, who befriended and mentored Adam in Rome, encouraged such an approach.[57] Piranesi saw history as a jumble of fragments available for endless combination and recombination – a perspective that resonated with Adam's own innate eclecticism and dovetailed with Hume's characterization of the past. Certainly the same mix of real and imagined histories is present in Piranesi's archaeological fantasies, some of which seem to evince a stratigraphic sequence of their own (Figure 1.12). And Piranesi's compositions became source material for Adam in turn. In a suite of capriccios made in Rome, for example, Adam repeatedly used elements from Piranesi's engravings to populate his own scenes.[58] Like Hutton's cyclical mechanism, which assembled new mineral formations from

[55] George Poulett Scrope, *The Geology and Extinct Volcanoes of Central France*, 2nd ed. (London: John Murray, 1858), 209.

[56] Doreen Yarwood, *Robert Adam* (London: Dent, 1970), 56-59.

[57] See Erika Naginski's forthcoming *Architectures of Retrospection* for more on this connection.

[58] See the capriccios in Adam's hand in Adam Volumes 56–7 at Sir John Soane's Museum. Thanks to Stephen Astley, former Curator of Drawings at Sir John Soane's Museum, London, for identifying the source of these motifs for me.

old ruins, Adam's collage-like approach crafted entirely unique spaces and views from the existing repertoire of architectural elements and images.

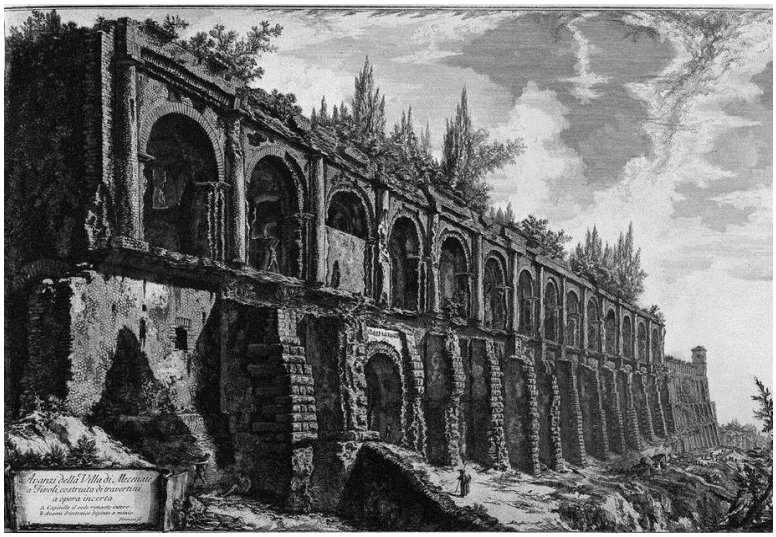

Figure 1.11 Giovanni Battista Piranesi's architectural stratigraphy: "Remains of the Villa of Maecenas at Tivoli."

In addition to this structural correlation, early geological imagery laid claim to formal analogies with architectural components.[59] The famous example is the engraving of Fingal's Cave based on the illustration by John Clevely and published in Thomas Pennant's *Tour through Scotland* (1771), which exaggerated the hexagonal regularity of its basalt pillars to stress their resemblance to architectural columns. Clerk of Eldin's geological drawings for Hutton's *Theory of the Earth* function similarly. In one illustration, rectangular fragments of broken rock in the foreground of an exposed section of granitic veining are pictured like cast-aside building blocks, reminding the viewer of the images of architectural ruins in circulation at the time. In another, the metamorphic intrusions that form the scientific subject of Clerk of Eldin's composition are relegated to the

[59] See, for example, Martin J. S. Rudwick, "The Emergence of a Visual Language for Geological Science 1760-1840," *History of Science* 14.3 (September 1976): 149-195. This article was published before Clerk of Eldin's drawings came to light, and while these would have complicated the picture Rudwick paints, his overall premise still holds. Sam Smiles makes the point that architecture and anatomy were they only two such models available for this kind of knowledge-work in Britain at the time. *Eye Witness: Artists and Visual Documentation in Britain 1770-1830* (Aldershot, Hants: Ashgate, 2000), 23.

background, while an architecture-like sea arch dominates. It is accurate but insufficient to adduce that the emerging science of geology turned to the representational conventions of architecture because it had yet to develop its own visual language. By privileging architectural *forms* in addition to representational techniques in his renderings of natural subjects, Clerk of Eldin imposed a rigorously artificial framework on the treacherous tumult of the earth.

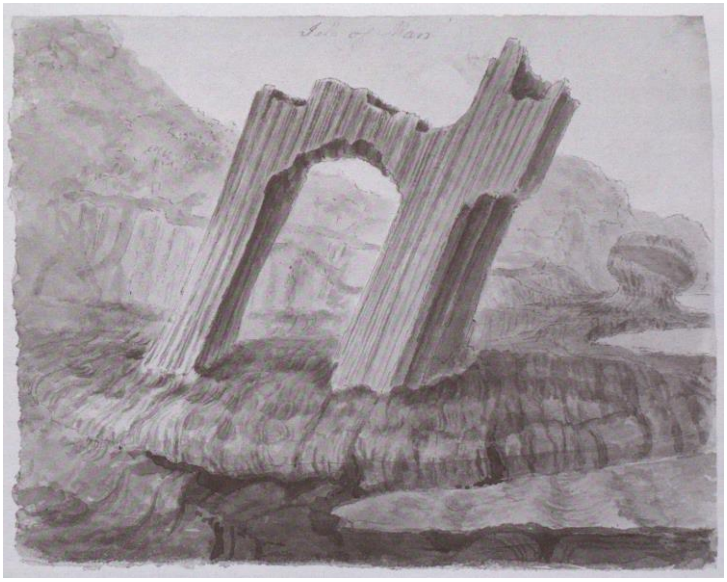

Figure 1.12 John Clerk of Eldin, "Granitic Veins and Sea Arch, Isle of Man." The sea arch that forms the ostensible subject of this painting is of no geological significance. What would have been important to Hutton's theory are the intrusive granitic veins visible on the cliff face in the middle distance.

Figure 1.13 John Clerk of Eldin, "Granitic Veining at Cairnsmore of Fleet." The rectilinear blocks that dominate the foreground of this composition call to mind the classical ruinscapes in circulation at the time.

The inverse of this kind of visual borrowing appears in the cliffside rendering Adam made of his design for Culzean Castle – a project that, according to Clerk of Eldin, allowed the architect to "indulge to the utmost his romantic genius."[60] The castle is situated on a quintessentially sublime site: a sheer drop down to the Firth of Clyde is broken only by the dark mouths of caves associated with legends of fairies and smugglers. In the romantic imagination, Adam's round tower and battlements accentuate the drama of the landscape, particularly if they are viewed in such a way as to diminish their fundamentally symmetrical arrangement. This is what we see in landscape views composed after the project was completed, including James Fittler's etching for *Scotia Depicta* (1801), William Miller's engraving of "Culzean Castle with the Fairy Coves," by D. O. Hill, and Alexander Nasmyth's series of Culzean paintings from the early nineteenth century.[61] Yet in Adam's own drawing a completely different conception emerges. The cliff seems to bulge and compress underneath the castle, which straightens the landscape's contour lines into its own. Rather than depicting an upward-gazing subject's foreshortened visual experience, Adam turned to the architectural convention of an orthographic projection and presented the imaginary vantage of a gaze capable of hovering in mid-air some distance out over the water. The landscape thus rendered is further architecturalized in two ways: it is stripped of its overhanging and upgrowing vegetation and reduced to stonework as stark as that of the castle above, and its irregular projection toward the viewer to the left of the image is made to cast a clean triangular shadow, as though it were a perfectly rectilinear block. In depicting the landscape and the castle alike as if they were cut from the same cloth, Adam gained for architecture what he deprived from the landscape. The drawing

[60] John Clerk of Eldin, "Notes for a Life of Robert Adam," Clerk of Penicuik Muniments, NAS, GD18/4981.

[61] James Fittler and John Claude Nattes, Scotia Depicta: The Antiquities, Castles, Public Buildings, Noblemen and Gentlemen's Seats, Cities, Towns, and Picturesque Scenery of Scotland (London: William Miller, 1801) Plate 19; Robert Chambers, John Wilson, and D. O. Hill, The Land of Burns: A Series of Landscapes and Portraits Illustrative of the Life and Writings of the Scottish Poet (Glasgow: Blackie & Son, 1840) I: Plate of Colzean Castle with the Fairy Coves, np; Alexander Nasmyth, Culzean Castle from the North with Ailsa Craig, c. 1816, National Trust for Scotland, Culzean Castle, Park, and Grounds.

forces an equivalence between the building and the geology that is possible only in the architectural imagination.

In his *Theory of the Earth*, Hutton described erosive forces as "attacks which must, in time, wear away the bulwarks of our soil, and sap the foundations of our dwellings."[62] In Adam's drawings, by contrast, architecture reaches down to fix the irregular stratifications on which it rests.

Figure 1.14 Robert Adam, "Cliffside Elevation of Culzean Castle," 1787.

[62] Hutton, Theory of the Earth, 1: 185.

A "Human Art"

Adam's first biographer, John Clerk of Eldin, privileged Culzean Castle as the commission that allowed the architect to "indulge to the utmost his romantic genius."[63] As Adam's brother-in-law and one of his closest friends, he was in a position to know. He and Adam grew up together, and Robert's father, William, who was the most prominent Scottish architect of his generation, designed a home for Clerk of Eldin's father, the noted antiquary Sir John Clerk of Penicuik. As young men, Adam, who had initially hoped to be a painter, and Clerk of Eldin shared an interest in the landscape and went on sketching trips together with the young Paul Sandby, who subsequently became one of the most preeminent topographical artists of his day.[64] They resumed this pastime when Adam began to spend more time in Scotland after 1770.[65]

In addition to his biography, Clerk of Eldin began writing a theoretical statement entitled "A Short Retrospective of the State of Architecture in Great Britain," which aimed to consolidate Adam's posthumous reputation. Although both documents were left unfinished at the time of Clerk of Eldin's death in 1812, they remain valuable fragments for Adam scholars.[66] The "Retrospective view" in particular has a bearing here. In it, Clerk of Eldin began to establish a lineage for castle architecture that would have presumably culminated with Adam's own works in this vein. By describing different eras of castles as steps in a single sequential development, Clerk of Eldin instilled this marginal architectural idiom with the historicity accorded to classical architecture – a category with which he was willing to make a direct and challenging comparison. He also framed his narrative as a sequence that began with buildings that behaved like landscapes and developed

[63] Quoted in Sanderson, 91.

[64] Sanderson, 32-33; Tait, Robert Adam: drawings and imagination, 13-15.

[65] Sanderson, 116-117.

[66] John Clerk of Eldin, "A Short Retrospective of the State of Architecture in Great Britain," Clerk of Penicuik Muniments, NAS, GD18/4983.

into buildings that began to achieve a separate and properly architectural status – a position that seems to have dovetailed with Adam's own.

The earliest period of fortified architecture Clerk of Eldin treated was that of the fourteenth and fifteenth centuries, when, as he wrote, castles:

> Were really intended for strength and resistance, which was the case with most of them, they seem principally to have been directed by situation and to have adapted their plan to the circumstances of their site without attending to regularity or considering it as leading to beauty. We are indeed far from thinking them blameable for this omission, which might often have interfered with and cramped their ideas of utility and defence, objects much more interesting than regularity, symmetry, and proportion which are qualities more properly attached to the Grecian architecture. From the great and noble remains of these castles in every part of this island, from their lofty towers and pendulous turrets and battlements, we still view them with great admiration as sublimely picturesque and beautiful, the stupendous productions of a warlike age.[67]

Beyond highlighting their intrinsically defensive purpose, Clerk of Eldin was casting this era's fortifications as natural productions. By apportioning equal or even greater merit to their picturesque irregularity and site specificity than he accorded to the "regularity, symmetry and proportion" of classical antiquity, and by describing them with terms like "lofty" and "pendulous," that were used to characterize sublime natural formations, he imbued these early British castles with landscape-like qualities.

[67] Ibid.

Figure 1.15 John Clerk of Eldin, "Etching of Crichton Castle," a ruined fifteenth-century fortress near the head of the river Tyne in Midlothian, Scotland.

Figure 1.16 John Clerk of Eldin, "Etching of Borthwick Castle," a large fifteenth-century fortification south of Edinburgh. These small etchings are from a series of more than one hundred views Clerk of Eldin produced between 1770 and 1779, during the period Adam was also travelling and sketching in Scotland as well as developing his castle style. Clerk of Eldin's productions are early instances copper-plate etching in Britain.[68]

For Adam, these qualities would have placed such fortresses outside architecture as such. In the introduction to their *Works in Architecture*, Robert and James argued that architects had to mine

[68] Geoffrey Bertram, *The Etchings of John Clerk of Eldin* (Taunton: Enterprise Editions, 2012), 41-55.

the accumulated accomplishments of their own tradition rather than directly emulating the contours of the natural world.[69] In the introduction to his publication of Diocletian's Palace Robert also wrote that "the buildings of the ancients are in architecture, what the works of Nature are with respect to the other arts; they serve as models which we should imitate, and as standards by which we ought to judge."[70] Any architect who aimed to match nature without mimicry needed to turn to architecture's internal codes – or what Adam reduced, in a letter to Lord Kames, to "the laws of beauty and grandeur."[71] Although he used them frequently in reference to his own architectural principles and the work of others he admired, Adam never defined either of these terms. Lord Kames, on the other hand, was one of the foremost jurists in Scotland, where cases were decided by carefully parsing first principles rather than evaluating precedents, and he was characteristically clear about what he meant by both words.[72] Beauty was "perfection of order, regularity and proportion," a near word-for-word echo of Clerk of Eldin's description of classical architecture. Lord Kames used "grandeur" as a synonym for sublimity. As he wrote in *Elements of Criticism*, "Great and elevated objects considered with relation to the emotions produced by them, are termed *grand* and *sublime*."[73] Unlike Anglo-Irish theorists like Edmund Burke, the Scottish philosophers did not oppose the sublime and the beautiful.[74] For Lord Kames, for example, the sublime was most productively thought of as an expansion of beauty. An object was not truly sublime, he wrote:

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[69] Robert and James Adam, *The Works in Architecture of Robert and James Adam*, ed. Robert Oresko, (London: Academy Editions, 1975), "Preface II," 50.

[70] Robert Adam, Ruins of the Palace of the Emporer Diocletian at Spalatro in Dalmatia (London: 1764), B.

[71] Robert Adam, "Letter to Lord Kames," March 31, 1763, Abercairny Collection – papers of the Home Drummond Moray family, NAS, GD 24/I, transcribed in Arthur T. Bolton, *The Architecture of Robert and James Adam (1758-1974)*, (Antique Book Collector's Club reprint [1984] of London: Country Life, 1922), I: 54.

[72] Ian Simpson Ross, *Lord Kames and the Scotland of His Day* (Oxford: Oxford University Press, 1972), 262-63.

[73] Lord Kames, *Elements of Criticism*, I: 211.

[74] Samuel Holt Monk, *The Sublime: a Study of Critical Theories in Eighteenth-century England* (Ann Arbor: University of Michigan Press, 1960), 87.

> Unless, together with its size, it be possessed of other qualities that contribute to beauty, such as regularity, proportion, order, or colour: and according to the number of such qualities combined with magnitude.... A large building, agreeable by its regularity and proportion, is grand, and yet a much larger building destitute of regularity, has not the least tincture of grandeur.... Agreeableness is the genus, of which beauty and grandeur are species.[75]

The implication for Adam's "principles of beauty and grandeur" is that architecture that aspired to be sublime could not jettison the qualities that rendered it beautiful. In this context, the late medieval castles with which Clerk of Eldin began his "Retrospective" were incomplete instantiations of architecture *qua* architecture: their irregular landscape-like beauty still had to be transformed into regularity, symmetry, and proportion.

Clerk of Eldin's manuscript describes sixteenth-century "Elizabethan" castles as a step in this direction. These were not products of war but rather the artificial continuation, in peacetime, of an exterior tradition that included "the principle decorations of the old castle," being "still flanked by towers and surmounted by turrets and battlements." In shedding the onerous trappings of true fortification, the castles gained architectural interiors. Clerk of Eldin writes that there was now "some attention paid to the convenience and size of apartments with some regularity of design and windows of such dimensions as to admit abundance of light," and indeed in comparison with the older keeps and tower houses of Britain, the extensive fenestration that characterizes Elizabethan "castles" is a remarkable development. Other changes were also important. Siting had become a matter of aesthetic consideration rather than defensive strategy. Layouts had become symmetrical. As Clerk of Eldin tells us, the net result of such advances was that the Elizabethan structures lost their picturesqueness but retained "grandeur and effect."[76] In these later castles, then, architecture had begun to pull away from the landscape while retaining a sense of the sublime.

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[75] Lord Kames, *Elements of Criticism*, I: 212-13.

[76] Clerk of Eldin, "Retrospective View."

Figure 1.17 An example of an Elizabethan castle: Wollaton Hall, Nottingham, 1580-1588, by Robert Smythson.

Although Clerk of Eldin's manuscript breaks off after the Elizabethans, Robert and James Adam's own writings appear to pick up the thread. The Baroque period in England witnessed the career of John Vanbrugh, an architect the Adam brothers admired. While they admitted that his "passion for what was fancifully magnificent, prevented him from discerning what was truly simple, elegant, and sublime,"[77] they wrote of his projects:

> …the discerning can separate their merits from their defects. In the hands of the ingenious artist, who knows how to polish and refine and bring them into use, we have always regarded his productions, as rough jewels of inestimable value.[78]

If Vanbrugh's buildings were rough jewels, a significant percentage of their worth must have derived from their carat. Vanbrugh had a unique feeling for endurance on a massive scale. He

[77] Adam, "Preface V," *The Works*, Academy Editions reprint, 56.

[78] Adam, *The Works*, v.

wrote, for instance, that the London churches for which he acted as commissioner on behalf of Queen Anne should "be of such Solidity and Strength, that nothing but Time, and scarce that, shou'd destroy them," and that each edifice ought to "stand like a Rock a Thousand [years]."[79] This weighty duration was to become one of the most remarked-upon aspects of his work, following him to the grave in the form of Abel Evans' epigram:

> Under this stone, reader survey
> Dead Sir John Vanbrugh's house of clay:
> Lie heavy on him, Earth, for he
> Laid many a heavy load on thee.[80]

Likewise, when Sir John Clerk of Penicuik, Clerk of Eldin's father, wrote a long didactic poem about architecture called "The Country Seat," his language when describing Vanbrugh's Blenheim Palace tended toward the alpine:

> Stand and behold our Blenheim's massy Pile
> With all its bold and pondrous ornaments
> Mark how triumphant Arches seem to rise
> Above its Summit, tow'ring to the Clouds.[81]

As Neil Levine has noted, Vanbrugh's architecture seemed to present the possibility – exhilarating and monstrous by turns – that architecture could "indeed represent, and with even more vividness than painting or sculpture can, the *objects* of [the natural] world."[82] As Evans' mockery and Clerk of Penicuik's allusion suggest, there is also a very real sense in which the Baroque architect's buildings went beyond representation – in which they seemed to achieve a physical presence equivalent to

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[79] Quoted in S. Lang, "Vanbrugh's Theory and Hawksmoor's Buildings," *Journal of the Society of Architectural Historians* 24.2 (May, 1965): 130.

[80] Abel Evans, *The Dramatic Works of Wycherley, Congreve, Vanbrugh and Farquhar*, ed. L. Hunt (London, 1840), lvi. For heaviness as a dominant quality of Vanbrugh's work, see David Cast, "Seeing Vanbrugh and Hawksmoor," *Journal of the Society of Architectural Historians* 43.4 (December, 1984): 314-315.

[81] Sir John Clerk of Penicuik, "The Country Seat: A Poem," unpublished manuscript dated 1727, Clerk of Penicuik Muniments, NAS, GD18/4404/1: 19.

[82] Neil Levine, "Castle Howard and the Emergence of the Modern Architectural Subject," *Journal of the Society of Architectural Historians* 62.3 (September 2003): 346.

nature's own. For the Adam brothers, who loathed his ornament and dismissed his "preposterous weight," such kinship with the landscape was solely due to Vanbrugh's massing, which produced a complex and changing surface that animated the passing effects of light and shadow and thus functioned as a precursor for their own architecture of "movement."[83]

Figure 1.18 Vanbrugh's own castle at Greenwich (1719), features shallow decorative machicolations and overscaled crenellations at the corner towers. If it was still fairly outside mainstream taste to treat castles as serious architecture in the late eighteenth century, it was doubly idiosyncratic to do so in the seventeenth. Yet Vanbrugh did champion the castle type, designing several projects in this idiom for himself and one for an adventurous client, and arguing unsuccessfully to preserve the ruins of a genuine medieval structure on the grounds of the Duke of Marlborough. Vanbrugh shared Clerk of Eldin's sentiment that castles were architectural-scale indices of the passage of time, and his castles feature round and Diocletian windows and crosslet loops, just as Adam's do. He also seems to have seen his castles as a hybrid between the landscape-like irregularity of ancient keeps and the symmetry and proportion required of modern architecture since the classical era.[84]

Ultimately, the combined textual efforts of the brothers-in-law sketch a progression from defensive structures that were literally of a piece with the landscape to castles that begin to behave according to architectural rubrics. Vanbrugh's is an amphibious architecture that, beneath its

[83] Adam, "Preface I," *The Works*, Academy Editions reprint, 46-47, note A.

[84] Sir John Vanbrugh, "Reasons Offer'd for Preserving Some Part of the Old Manor," June 11, 1709, sent to the Duchess of Marlborough, British Library, Add MS 61353: 62-63, transcribed in Vaughan Hart, *Sir John Vanbrugh: Storyteller in Stone* (New Haven: The Paul Mellon Centre for Studies in British Art / Yale University Press, 2008), Appendix I, 253, and discussed in Hart, 45. For Vanbrugh's attitude toward castles, landscapes, and time, see Hart, 148-157.

mountainous size and irregular ornament — transpositions from nature that remained too literal for the Adam brothers — possesses massing analogous to, but separate from, that of the landscape. With Robert Adam's castle-style works, in turn, the developmental sequence from fortifications built in cooperation with their settings to architecture that achieves some measure of parity when measured against these settings is complete.

That Adam saw architecture in this way is borne out in a reply he sent to Elizabeth Montagu, who had written him describing her recent travels in Scotland, in 1766.[85] Adam had been staying in Westmorland, in the north of England, with his clients Sir James and Lady Mary Lowther, from whose estate he happily remarked that he "could see the mountains of Scotland." Describing the Lowther estate as sublime collection of "Cloud Capt Mountains, Extensive Lawns, Rapid Rivers and Immense Forests," he wrote:

> Sir James seems resolved to Impose on me the Arduous Task of placing a Castle upon this Principality. It is a work worthy of the Chief Artist of Olympian Jove, and not for a narrow genius of this World; I am not at all surprised that you found the Castle of Inveraray so defective, The surrounding mountains would humble a nobler piece of Human Art, The Pyramids of Egypt if situated near a Ben Lomond, or Skiddo [*sic*] would look mean and Despicable, Even the most admired Efforts of the Greeks and Romans would appear altogether insignificant if placed near these unparalelled [*sic*] Works of Nature.[86]

This short statement acts as a preamble of sorts to Adam's castle style, which commenced in earnest about a decade later, and tethers Adam's attitude toward the landscape to those of Kames and Dalrymple, who expressed similar sentiments. As such, it merits careful parsing. Montagu's implied disparagement of Inveraray Castle, Argyll, might be construed as slightly tactless, considering that the building was one for which Adam had personal responsibility. Although designed by Roger Morris, an English architect, Inveraray had been superintended by Robert

[85] For this identification, see Arthur T. Bolton's index of Adam clients in *The Architecture of Robert and James Adam (1758-1974)*, Vol. 2 (Antique Book Collector's Club reprint [1984] of London: Country Life, 1922), 81. For Montagu's biography, see Barbara Schnorrenberg, "Elizebeth Montagu," in ed. H. C. G. Matthew and Brian Harrison, *The Oxford Dictionary of National Biography* (Oxford: Oxford University Press, 2004) 38:720-725.

[86] Robert Adam, "Letter to Mrs. Montagu, October 11th, 1766," reproduced in Bolton, II: 319.

Adam's father, William, between 1746 and 1747. After the elder Adam's death in 1748 and that of Morris in 1749, work on the castle was finished over a period of about forty years by Robert and his older brother, John.[87] Roger Morris and his theorist kinsman, Robert Morris, were important references for all of the Adams.[88] For both of these reasons, Robert Adam's response to his client's assessment is less a wholehearted agreement with any diagnosis of defect than a comment on the limitations of architecture as such. The project's setting, in the shadow of the immense hill of Dun na Cuaiche, demeans the building because it would demean even the most magnificent of human achievements, including the Egyptian Pyramids and the best of classical antiquity. Adam used the two iconic peaks of Ben Lomond, in Scotland, and Skiddaw (to give the latter its more common spelling), near the Lowther estate in England, both instanced as sublime natural formations in the travelers' accounts in vogue at the time throughout Great Britain, to extend the problem of incomensurability to all "Human Art."[89] Rather than comparing Inveraray with the work of other architects or the accomplishments of other times or places, Adam placed it alongside the *force majeure* of humanity's other and found that it and all artificial achievements fell short.

[87] Fleming, *Robert Adam and his Circle*, 63-66, 89. On the completion date of the castle, see the chronology at http://www.inveraray-castle.com/inveraray-castle-history.html, accessed May 12, 2012.

[88] Fleming, Robert Adam and his Circle, 314; Alistair Rowan, Castles and Country Villas, 16-17.

[89] See, for example, Anonymous, *A Tour, in 1787, from London, to the western highlands of Scotland* (London, 1788), 90; Thomas West, *A guide to the Lakes in Cumberland, Westmorland, and Lancashire*, Second Edition (London, 1780) 309; William Hutchinson, *An excursion to the lakes in Westmoreland and Cumberland, August, 1773*, (London, 1774), 145; Stebbing Shaw, *A Tour to the West of England, in 1788* (London, 1789), 146-147; Thomas Richardson, *Guide to Loch Lomond, Loch Long, Loch Fine, and Inveraray, with Maps from Actual Survey…* (Glasgow, 1798), 65-66; William Thomas, *A Tour in England and Scotland, in 1785* (London, 1788), 110; Tobias George Smollett, *The Expedition of Humphry Clinker* (London: 1771), 39; Sir Richard Joseph Sullivan, *Observations made during a tour through parts of England, Scotland, and Wales* (London: 1780), 225; James Cririe, *Address to Loch Lomond, a Poem* (London, 1788).

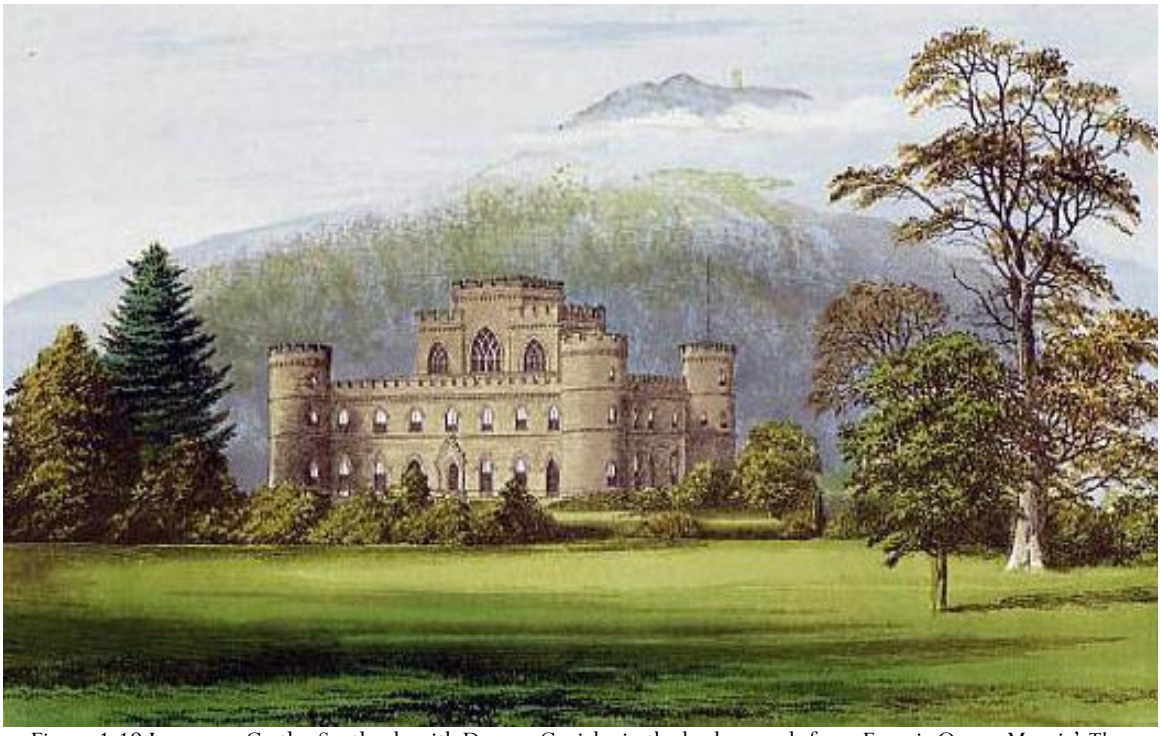

Figure 1.19 Inveraray Castle, Scotland, with Dun na Cuaiche in the background, from Francis Orpen Morris' *The County Seats of the Noblemen and Gentlemen of Great Britain and Ireland*, 1866.

Figure 1.20 Robert Adam, "View of a Design for Lowther Castle the Seat of Sir James Lowther Baronet," 1771. This unexecuted design for Lowther Castle shows Skiddaw in the background at left. The massive dimension shown in this rendering was represented just part of the intended scheme. The left-hand end of the building, designed to mirror the full series of towers and wing on the right, is broken off to fit the paper. Soane Museum.

A "thousand landskips"

Clerk of Eldin's surviving notes for his intended biography of Adam mention the architect's ambition to produce a "thousand landskips" in his later years. The 400-odd finished watercolors and sketches in Adam's hand that are known to survive today testify to the serious energy he devoted to this project.[90] While they have since received little scholarly attention, at the time of Adam's death these paintings were considered as important as his architecture: his obituary in the *Gentleman's Magazine* lauded their "luxuriance of composition" and "effect of light and shadow."[91] By sidestepping the limits of commissioned projects, these works explore architecture's full potential vis-à-vis the newly estranged earth of the Scottish Enlightenment.

Figure 1.21 Paul Sandby, "Romantic Scene." Sandby sometimes also included romanticized views of real landscapes in his compositions. Here this view seems inspired by Holyrood Castle, outside Edinburgh's Old Town, with Arthur's Seat and Salisbury Crags in the distance.

[90] Clerk of Eldin, "Life of Robert Adam." Towards the end of his life Adam also viewed these landscape works as offering some financial security for his family, and during one particularly bad bout of illness in 1786 gave them to his three sisters in London, lest he die. See Sanderson, 103.

[91] Stephen Astley, *Robert Adam's Castles* (London: Sir John Soane's Museum, 2000), 5; See also Robert Adam's obituary in *The Gentleman's Magazine*, 62.1 (March 1792): 282–3.

Figure 1.22 Robert Adam, "Castle on promontory with ravines behind, figures on ramp." The similarities to Sandby's composition here are striking, although Adam has pushed his romantic exaggeration much farther than Sandby. Arthur's Seat and Salisbury Crags are still identifiable in the distance.

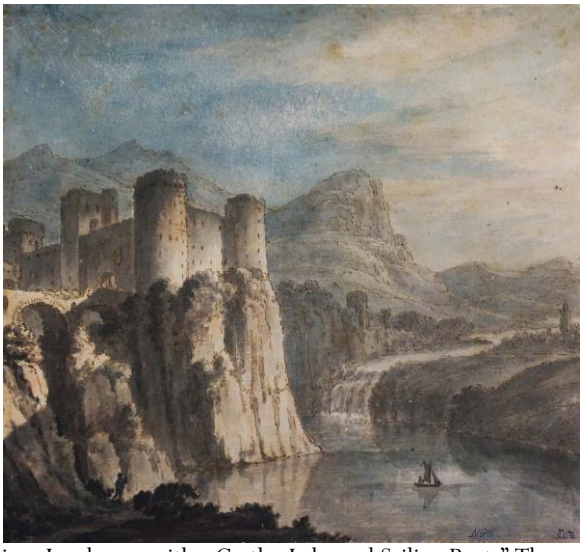

Figure 1.23 Robert Adam, "River Landscape with a Castle, Lake and Sailing Boat." The mountains in the background of this composition appear to be the "Three Sisters" of Glencoe, Scotland.

Figure 1.24 Robert Adam, "Mountain landscape with two castles and smaller towers beside a loch." Here the fictional form of the castle in Figure 1.23 is recycled, while the mountains in the background echo but exaggerate the "Three Sisters" in Adam's other composition.

At first sight, Adam's landscapes could be interpreted merely as inventive examples of the Romantic fantasies just coming into vogue in Britain: with their striking combinations of mountains, rivers, bridges and fortresses, they follow the prescriptions of William Gilpin and echo the fictional compositions of Adam's friend and sketching partner, the topographical artist Paul Sandby.[92] Yet on closer inspection unique traits appear. Fortresses and landforms confront each other or cooperate as if they were equal entities. In some cases, rocky outcrops and castles possess the same apparent heft; in others, somber ridgelines follow the outlines of the architectural compositions they overshadow. In one painting, a rock seems to march toward a hilltop castle like an attacking army.

[92] Adam and Clerk of Eldin were familiar with Gilpin's work and even went so far as to copy his compositions. See, for example, BA151 and BA110 from the Blair Adam Muniments. Both men were also influenced in their art by the work of Paul Sandy, who became a friend of the Adam family through his role as a draughtsman to the Board of Ordnance at Fort George, near Inverness, in the early 1750s, when Robert and James Adam were engaged on construction work there for the family practice. See Fleming, 84–6, 100–1, 259–60; and Tait, *Robert Adam: Drawings and imagination*, 13–15. The Adam–Clerk–Sandby circle is also discussed in A. A. Tait, "Robert Adam and John Clerk of Eldin," *Master Drawings* 16.1 (1978): 53-77 and 109-111.

A pair of paintings by Adam and Clerk of Eldin presents a striking inversion: in Adam's watercolor (Figure 1.25), a mountainous mass, blurred as if in motion, surges by an inert fortress on an equivalently scaled hill. Clerk of Eldin's take on his friend's composition (Figure 1.26), "after R. Adam", takes this scenario to a new extreme, repositioning the castle in front of a rushing landform that rears back as if to engulf the fortress. Taken together with Clerk of Eldin's position as the likely conduit of Hutton's theories and the amount of time these men spent in each other's company during Adam's castle-style period, this startling composition raises the possibility that Clerk of Eldin was a more catalytic figure in Adam's intellectual life than has been previously credited.[93]

Figure 1.25 Robert Adam, "Castle on rocks above lake with figure and cart in foreground."

[93] Richard Emerson has revealed the significant extent to which Clerk of Eldin was involved in architectural experimentation, adding weight to this possibility. See his "Robert Adam and John Clerk of Eldin: From Primitive Hut to Temple of Religion," in *Scottish Country Houses*, ed. Ian Gow and Alistair Rowan, (Edinburgh: Edinburgh University Press, 1995). I am grateful to Ian Gow for first drawing my attention to Richard Emerson's scholarship and to Richard himself for his very helpful remarks and suggestions. Adam and Clerk of Eldin seem to have made a practice both of sketching together and of producing drawings based on each other's compositions or a shared point of reference. See note 64 above; Emerson, 170–1, and Sanderson, 116. In addition to the examples Emerson mentions, the Hunterian Art Gallery at the University of Glasgow owns a "View of Crossaguel Abbey" by Adam after Clerk of Eldin's own etching, "Abbey of Crossraguel" (del. 1762; reprinted in *A series of etchings chiefly of views in Scotland*, Edinburgh: Bannatyne Club, 1855). Clerk of Eldin also accompanied Robert Adam on various site visits and to client meetings during Adam's castle period. See Sanderson, 116.

Figure 1.26 John Clerk of Eldin, "Castle in a Landscape after R Adam." In contrast to Adam's italianate fortress, Clerk of Eldin's castle bears a resemblance to Borthwick Castle, outside Edinburgh. (Compare with Figure 1.16.)

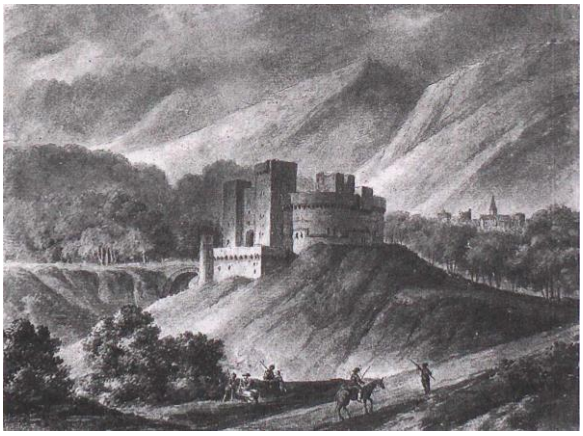

Figure 1.27 Robert Adam, "Castle in a Mountanous Landscape."

Figure 1.28 Robert Adam, "Fortress above a Waterfall," 1782.

Adam had a tendency to include real Scottish landforms in his fictional compositions. A looming ridgeline that overshadows a fortress, mimicking its contours, is a view of the Grampian

Mountains near Cluny Castle (Figure 1.27). The waterfall that drops away from an Italianate tower is recognizable as Cora Lin, a famous feature of the River Clyde (Figure 1.28). The "Three Sisters" peaks of Glencoe appear in several paintings (Figures 1.23-1.24), and the distinctive cone of Ben Lomond dominates the middle distance of a scene with a ruined tower (Figure 1.29). Fictional elements are also reused: castles from one landscape will appear in another, or invented landforms will be recycled. Treated as a series – and the presence of sequential numbering on the versos of many of these compositions suggests that they were intended to be seen as such – the paintings give the impression of a typology that includes both real and projected objects, as well as built and natural forms.

Figure 1.29 Robert Adam, "Fortress overlooking a loch with a boat and several figures." The mountain behind this invented fortress is recognizable as Ben Lomond, a distinctive peak on Loch Lomond in the Scottish Highlands. Ben Lomond was a popular "sublime" tourist destination at the turn of the nineteenth century.

There is, moreover, a laminated quality to many of these works, as though the planes of various two-dimensional tableaux have been stacked together like so many layers of stage scenery. This is deliberate effect, rather than a lack of ability, as can be seen by comparing a surviving rough

sketch from the Blair Adam collection with the complete version at Sir John Soane's Museum. The draft is noticeably seamless compared to the final iteration, which has been adjusted deliberately in order to achieve this kind of effect.[94] In fact, in several of the more highly finished compositions, various perspectival vantages seem to be combined, producing the vertiginous sensation that the landscape before which the viewer is placed is capable of flying apart at any moment.[95]

Figure 1.30 Robert Adam, "Romantic Landscape with Castle," 1782. Like many of Adam's landscapes, this composition appears to combine multiple perspectival vantages into one scene.

[94] The draft composition is in the Blair Adam Muniments, BA 128; the final version is in Sir John Soane's Museum, 68.1.17.

[95] I am grateful to Stephen Astley for first pointing out these perspectival anomalies to me. Other particularly vertiginous examples include 68.1.7 in Sir John Soane's Museum, and D462, D463, D465, and D466 in the National Gallery of Scotland.

Figure 1.31 Robert Adam, "Imaginary Scene with the Pyramid of Cestius."

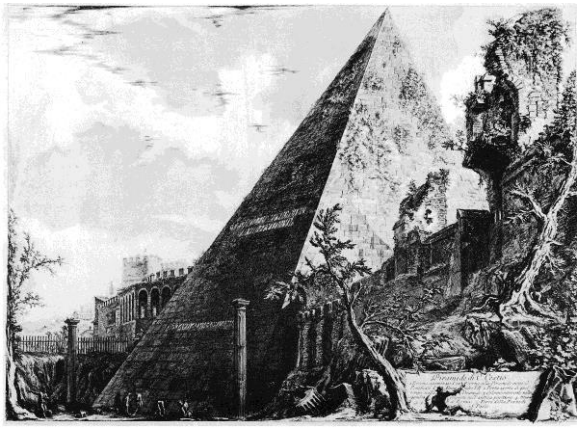

Figure 1.32 Giovanni Battista Piranesi, "Pyramid of Caius Cestius, Rome."

In Adam's other drawing projects, this kind of visual fracture is often the signal that some foreign element has been allowed to invade the composition. For example, in one fictional Rome-inspired scene Adam has placed Piranesi's depiction of the Pyramid of Cestius into a perspective to which it does not adhere, literally allowing a piece of his mentor's world to exist in his own composition under the banner of its own representational logic. That this is an intentional aberration on Adam's part is emphasized by the fact that he has left the precise construction lines for his drawing's two-point perspective visible.

The net result of such maneuvers is to signal that the compositional logic deployed in these watercolors is consistent with Adam's design technique. In other words, Adam was extending his eclectic architectural approach to the landscape as a whole, as if outcrops and rivers, too, were

source material for his designs, and even mountains were as available for imaginative recombination as the cornices and capitals he sampled at Syon House. Moreover, in so blatantly articulating the artificial manner of their composition, these sublime scenes invite the power of reason to eclipse the dazzled gaze.

Figure 1.33 Robert Adam, "Romantic Castle and Bridge over River with Mountains in Background." Salisbury Crags and Arthur's Seat are visible in the background of this composition.

Figure 1.34 John Clerk of Eldin, "Arthur's Seat and Salisbury Crags, Edinburgh," c. 1785.

The most commonly repeated of the geological motifs found in Adam's paintings is Arthur's Seat and Salisbury Crags, a distinctive landform that dominates the skyline of modern Edinburgh and would have been an even stronger presence in the eighteenth century.[96] While we know today that Arthur's Seat is an extinct volcano, Hutton vehemently resisted this interpretation. He proposed a chemical distinction between lava thrown up by volcanoes and basalt – the former being free of zeolites and calcareous spar, the latter containing those crystals and representing a subterranean chamber of molten rock that had never erupted at the surface. Since the rock that made up Arthur's Seat conformed to his definition of basalt, Hutton theorized that this outcrop had been slowly exposed as softer rock around it had eroded away – a scenario that rendered it far older than a volcanic interpretation would have and accorded it the status of silent witness to a former state of the earth.[97] Its insistent presence in the background of Adam's fictional compositions both explicitly references the enormous duration of geological time and draws a direct analogy with the fortresses that populate these scenes: in their separate timescales, both are obdurate and anachronistic remnants of a previous order.

[96] Examples include Blair Adam Muniments, BA 140, BA 254; and National Gallery of Scotland, D459.

[97] Dean, James Hutton and the History of Geology, 15.

Figure 1.35 Robert Adam, "Capriccio of a romantic landscape showing a castle with a distant city set on the banks of a river," 1770.

Hutton's insistence on the great age of exposed basalt paves the way for a geologically informed interpretation of a remarkable Adam watercolor now in the collection of the Royal Institute of British Architects. With their vertical scores and block-like forms, the mountains here are depicted as basaltic plugs – explicit references to the extent of geological time. In the foreground, a blackened fortress seems to have grown from its ancient rocky perch. Drum towers and square-cornered ramparts seamlessly extend the landscape's contours; a heavy arch spans a central sheer plunge. Where two rivers meet, a cataract rushes through the four-arched bridge that connects this grim keep with a white city of spires and domes at the painting's center. Glittering in a long shaft of sunlight, the city is built on a low spur of the surrounding mountains. Beyond, a hulking basaltic outcrop mirrors the size and weight of the fortress. The two twin masses – one

additive, one subtractive – stand like colossal sentinels, guarding the architecture between them from the infinitely slow onrush of the mountains beyond. Their presence will be in vain. Already a rectangular lip of dark landmass opens its mouth over the city; already the mineral landscape takes these pale forms into its jaws like broken teeth. In the context of this bare swirl of natural forces, the formal architectural vocabulary of classical antiquity is depicted as ephemeral, almost mirage-like. The viewer is compelled to call to mind Hutton's remark about Babylon, also built on a low bend of a river: "What is become of that city? nothing remains."[98]

Ultimately, the confrontation to which a painting like this alludes is between more than the earth's inorganic forms and humanity's inorganic edifices. In the Scottish Enlightenment, one of the final props supporting an anthropocentric view of the world slipped – the latest in a series of recognitions that included the discovery of infinity and the Copernican establishment of a heliocentric planetary system. What was at stake was no less than humanity's right to regard itself as the end to which all nature was the means. In this light, paradoxically, Hutton emerges as the more conservative figure. As opposed to Playfair's more scientistic gloss, Hutton's *Theory* is primarily a piece of deistic philosophy that presumes that the self-renovating mechanism of the planet exists to perpetually maintain the earth as an optimal habitat for mankind.[99] By contrast, while Adam's castle-style buildings and landscape paintings seem to register an awareness of the earth's inhuman dimension, they fundamentally propose nothing more than a way to operate in spite of its overtaking flood. Adam's archaeology was always one of fragments rescued willy-nilly from the annihilating crush of time. While both he and Hutton were accustomed to sifting through the incomplete indices of the former states of things, Adam differed from his fellow Edinburgher, and indeed from most of his professional colleagues, in his embrace of the past as a hodgepodge

[98] Hutton, *Theory of the Earth*, II: 211.

[99] Dean, James Hutton and the History of Geology, 26.

from which any meaning gained would always be a contemporary artifact predicated on present tastes. Architecture is a humanistic endeavor. Robert Adam met the Scottish Enlightenment's new and frightening understanding of the earth by extending his disciplinary logic to the landscape.

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Chapter 2. Floodmarks, Casts, and Fragments: Soane and Gandy's Proleptic Extinctions

Prelude: Before and After

Figure 2.1 Joseph Gandy, *View of the Bank of England as Built*, 1798.

A pair of paintings by Joseph Gandy (1771-1843) presents before and after. In the *View of the Bank of England as Built*, you are placed within an empty, even sepulchral chamber. A clock displaying the time as 10:17 confronts the gaze; the bright sky visible through high Diocletian windows indicates mid-morning. This is the bank's grand Rotunda, designed by Sir John Soane, Gandy's employer and friend. A space that should, at that hour, be bustling with activity is strangely silent, as if to suggest that you are seeing the space in pristine, preoccupancy condition.

The viewing plane is tightly cropped. A luminous oblong beneath the clock repels rather than invites. Every other possible exit is either elided by perspective or walled up: you are thrown back within a claustrophobic interior with no visual guarantee of exit. Two square openings that could be fireplaces are cold and unconvincing; windows directly above seem to negate the possibility of chimneys. There are no hearths, just floor. Yet is it a floor? It could almost be packed earth. There is a monstrous suggestion of a *swell*, as if the ground is rising – a hint, even, of an inky flood to the lower left. You are suddenly gripped with the eerie fancy that what had first seemed to be fireplaces are in fact other, former, exits, half-submerged in a sticky liquid. The painting plays tricks. Surely that blind opening to the lower left is ajar, and yet the joints of its masonry tell you it is solid. The incised decoration surrounding the windows above seems to curl in too quickly, pulling the heavy dome with it to meet the rising floor. Incised lines, which Soane called "sinkings," draw the trapped gaze up to the fickle meteorology of cumulous clouds and to the silent and sole occupants of the Rotunda: a ring of caryatids, their features in shadow, stand in stoic anonymity. From the oculus to the floor, the space is contained by a single curving surface that remains unbroken by projecting cornices or friezes: an overturned teacup without purchase. Meanwhile, the slanting sunlight, the mechanical tick-tock of seconds, minutes, and hours, the changeable climatic conditions – these registers of diurnal temporality seem arrayed in subtle hostility against the duration of the self, the sinkings, the space. In Gandy's rendering, Soane's rotunda is already in confrontation with time.

While it has captured imaginations since it was first exhibited in 1832, *Architectural Ruins: A Vision* is more conventional than its companion. It pays homage to the Piranesian tradition and sits squarely within the late Enlightenment fashion for depicting contemporary works of architecture in a ruined state. But, as is the case with the *Bank of England as Built*, there is more here than immediately meets the eye. The picture frame has been pulled back: what was an oppressive

interior has become a landscape view. The former occupant has now taken up a stance outside the structure, or what is left of it, and is overlooking four unheeding figures: three men quarry for limestone or treasure while a woman tends a cooking pot. Sheltered from the wind by a standing apsidal niche, she has built her open fire directly in front of a built-in fireplace, rendering it doubly redundant. The ground beneath these interlopers is looser and more akin to soil. What had been an impenetrable, glowing rectangle is now a ragged aperture, as if a river in flood had broken through and receded, leaving its course traced in the earth. Trees grow over heaps of rubbish to the left. To the right, the ruins of a vestibule and Soane's Bank Stock Office are partially underwater and cut off from the Rotunda by massive blocks of stone that stop up the framed opening you had assumed was an exit. They seem to occupy a separate time and space – the light here is cooler and the scales seem mismatched. In the central foreground, the meanders and frets that adorned the inner contour of the Rotunda are conspicuous on its fallen blocks; amongst these, a stone face appears frozen in death, its mouth agape. Soane's sinkings are also still sharply incised into the Rotunda's remaining interior. Pressed as they are into the very mass of the architecture, they have survived by presenting nothing but their absence to the erosive power of time. Above, the remaining caryatids have stirred to anxious life. Silhouetted on the skyline, they gaze down with intensity on the small figures below; one appears to wring her fingers. A horizontal datum cuts the composition into the sunlit world above and the earthbound ruin below, as if the level of the landscape beyond corresponded to the spring points of the structure's ruined domes, as if the surface scratched by pickaxes was subterranean, as if the building was now an excavation backed and banked by the earth itself.

Figure 2.2 Joseph Gandy, *Architectural Ruins: A Vision*, 1798.

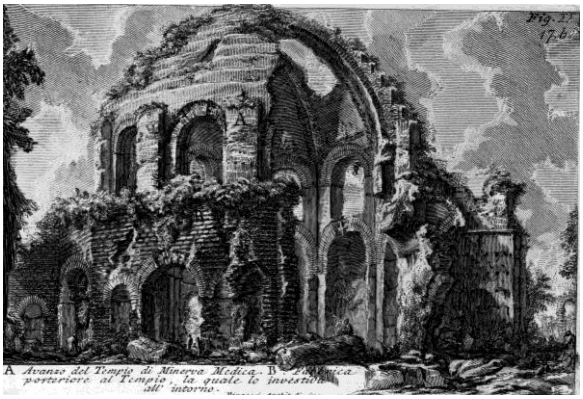

Figure 2.3 Giovanni Battista Piranesi, *View of the Octagonal Temple of Minerva Medica*, 1764.

Figure 2.4 Hubert Robert, *View imaginaire de la grande galerie du Louvre en ruines,* 1796.

Figure 2.5 Charles-Louis Clérisseau, *Architectural Ruins*.

What has happened here, and when did it happen? Although it might be construed to be the real subject of these paintings, time is strangely illusive. The clock in the as-built view has been ripped from the wall of its ruin.[1] The scavenging figures wear the costume of Georgian London. Taken as a pair, the paintings bookend a disaster they cannot describe – a trauma that cannot be located in historical time. The arc of the sun is the only element that ties these paintings together: the morning light that illuminates the complete Rotunda has become afternoon gold in the space's ruined iteration. Preoccupancy to post-institution, work-a-day to spectacular, the recent past pressing quotidian aspects of the present into an ominous future: the paintings represent the duration of British civilization as but a single morning and a single evening in the face of an altogether different scale of time.

[1] Brian Lukacher has described this as "the image allegorizing its own temporal disorder." Brian Lukacher, *Joseph Gandy: An Architectural Visionary in Georgian England* (London: Thames & Hudson, 2006), 165.

Figure 2.6 Joseph Gandy, *A Bird's Eye View of the Bank of England*, 1830.

In *A Bird's Eye View of the Bank of England*, perhaps Soane and Gandy's most famous collaboration, we find the dichotomy between building and undermining collapsed into a single picture plane. The classically trained eye oscillates between two contradictory yet simultaneous readings: that of an excavation, spread out before the archeologist like Pompeii, and that of a construction site, with the brick shown new and neatly pointed, not a weed or a gesticulating tourist in sight. Scale is also at play. To the right foreground, outsized and aperspectival ruins effectively tilt the cut-away complex forward while dwarfing its scale to that of a model. This reading is in turn immediately compromised by the landslip in the lower left-hand corner, where an exposed basement arcade and foundation rest on piles stuck into a patch of earth populated by vaguely fossiliferous shapes and stains.[2] Seemingly caused by a soil fault or an underground stream, the earthfall conjures Gandy's only surviving description of his employer's magnum opus:

[2] Lukacher relates that the Pre-Raphaelite artist George Price Boyce thought *A Bird's-Eye View* was a painting by J. M. W. Turner because of its geologically informed content. *Diaries of George Price Boyce* ed. Virginia Surtees (Norfolk: Real World Publishers, 1980), 6, quoted and discussed in Lukacher, 162.

> The domes, arches, and pottery coned roofs soaring above, and reversed deep beneath[,] arch, subarch floating on piles penetrating a profound subterranean into a swamp.[3]

Soane used inverted arch footings at the Bank, and this is what Gandy's cutaway reveals: openings shaped like zeros, rounded both above and below. It is as if, in Gandy's imagination, this doubling continued in both directions: columns and pilasters above echoed by pilings under; the marked wrapper of the building akin to the marked earth below; the baked cones of the Bank's domes paralleled in the wet mire of the London clay beneath. The imagination wavers between an unstable edifice perched on shelving soil and an unstable ground plane pinned in place by the building. The Bank on its famous "island" site is shown marooned in its own moment in time: beyond the painting's slanting curtain of weather, Georgian London is intact. Brian Lukacher, author of the definitive monograph on Gandy, has tied *The Bird's Eye View of the Bank of England* to Edmund Burke's imagined spectacle of London destroyed by an earthquake.[4] Yet this apocalyptic scenario is patch-tested only on this specific complex, as if it were a kind of time machine.

Figure 2.7 Giovanni Battista Piranesi, *The Baths of Caracalla, Bird's-eye View*, c. 1765.

[3] Joseph Gandy, "Letter to John Soane, thanking him for the *Description*," endorsed "Received 12 August 1836." Sir John Soane's Museum (henceforth SM) Original MS Letters 1. SCA(L).

[4] Lukacher, 162-3.

Figure 2.8 Cork model of Pompeii at the Soane Museum. Helen Dorey has noted that originally a plan of the Bank of England was hung in the Model Room in such a way as to invite comparison with this piece, which has roughly the same shape.[5]

Catastrophes

These paintings were composed in the context of a national preoccupation with natural disasters, ruination, and the fleeting nature of the present moment that had only intensified since Robert Adam first wrote home from his Grand Tour about the Lisbon earthquake and his experience scaling Mount Vesuvius. By the turn of the nineteenth century, earth sciences had been newly grouped under the term "geology," and the Geological Society of London had been established.[6] Appellation and association were joined by what the historian of science Roy Porter has called the "dramatic surge of interest among higher ranks in society" in all things geohistorical – a striking change that he and others have linked to the Grand Tour's heady mix of antiquarian tourism and volcanology.[7] There had been significant advances in paleontology alongside sensational discoveries like William Buckland's find of an "antediluvean" cache of bones in Kirkdale Cave, which was given much prominence in the popular press.[8] William Smith and other surveyors

[5] For this and other information I am deeply grateful to Helen Dorey, Deputy Director and Inspectress at the Soane Museum, for the personal "geological tour" she gave me on July 17, 2014, when I was visiting courtesy of the Sir John Soane's Museum Foundation Travelling Fellowship.

[6] Roy Porter, *The Making of Geology: Earth Science in Britain, 1660-1815*, (Cambridge: Cambridge University Press, 1977), 129, 131, 138-139.

[7] Ibid., 138-142.

[8] Martin J. S. Rudwick, *Bursting the Limits of Time: The Reconstruction of Geohistory in the Age of Revolution* (Chicago: University of Chicago Press, 2005), 628-637.

connected to the mining and canal-building industries had established the broad outlines of Britain's stratigraphic sequence, building up a picture of successive epochs characterized by unique layers of stone and fossils.[9]

In Britain, as in France, such developments were broadly framed by Baron Georges Cuvier's "catastrophist" model of earth's history.[10] Cuvier's pioneering investigations of fossil bones in both their stratigraphic and taxonometric contexts revealed striking and conclusive evidence that different periods of the earth's past had supported unique biological systems of both flora and fauna, and that each populated episode was separated from the others by a series of obliterating natural disasters. Cuvier was also responsible for bringing the new concept of extinction into popular circulation. Unlike James Hutton's eternal cycle, which balanced life atop an enormous boil of inorganic material, Cuvier's paleontology literally sandwiched life into the sedimentary layers of earth's history. In his schema, plant life had preceded animal life, which had in turn preceded mankind; human bones were found only in the topmost layers of the earth's crust. There had been eras of unimaginable strangeness when beasts unlike anything humans had ever witnessed roamed a world devoid of Adamic creation. The history of the world could now be read in definite succession, from the first fossiliferous layers of rock to the detritus of the modern world. Hutton's theory of the earth had threatened to plow familiar landscapes under – an unsettling prospect, but one that anticipated human existence would continue indefinitely in the context of a self-renovating planet. In contrast, with Cuvier it was possible to imagine that humanity and all of its achievements would go down with their substrate, compressed into a thin line in the rock record. There was a

[9] Martin J. S. Rudwick, *Worlds Before Adam: The Reconstruction of Geohistory in the Age of Reform* (Chicago: University of Chicago Press, 2008), 35-37.

[10] Porter, *Making of Geology* 157-169.

general sense that time was progressing all too quickly – that the past, in rushing forward to meet the future, eclipsed the present in the process.[11]

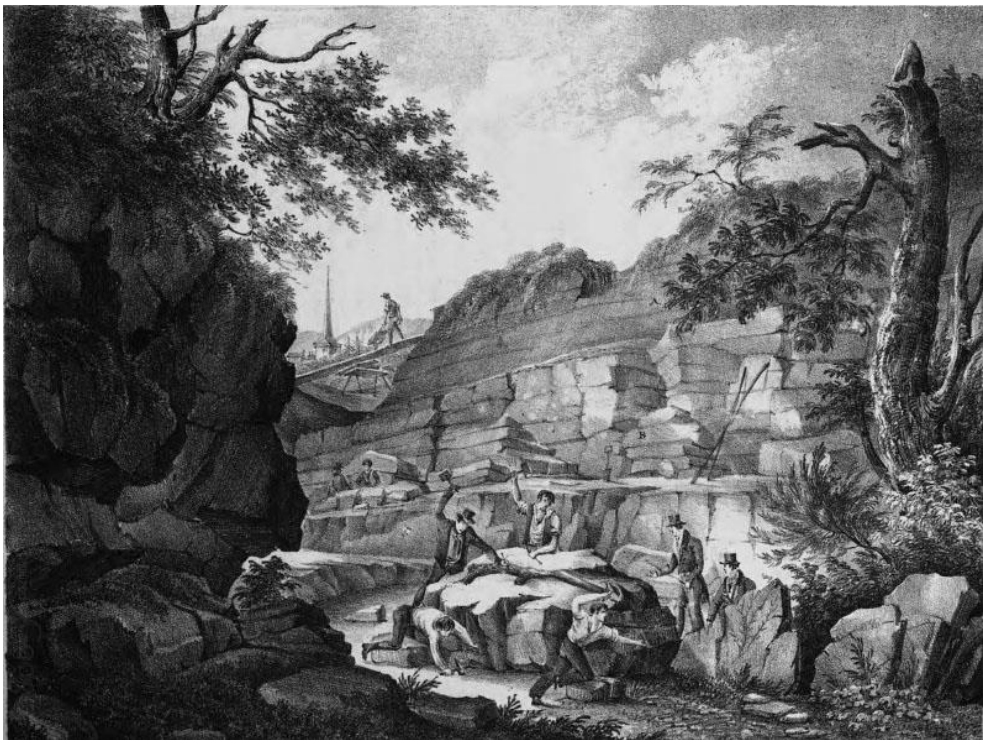

Figure 2.9 *Quarry Scene in the Tilgate Forest*, frontispiece from *Illustrations of the Geology of Sussex* (1827) by Gideon Mantell. Geology and architecture overlap in a fossil-rich architectural quarry.

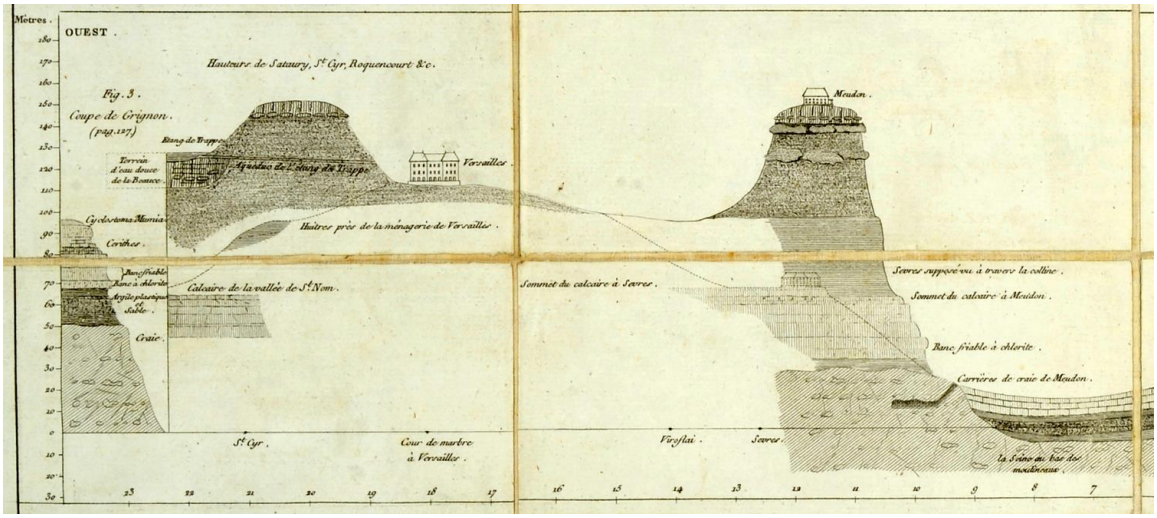

Figure 2.10 A cross section of the terrain in the Versailles–Meudon region southwest of Paris, from George Cuvier and Alexandre Brongniart, *Essai sur la géographie minéralogique des environs de Paris* … (1811). In the physical and chronological extent of the Paris Basin, even Versailles, the epitome of architectural grandeur in *l'age Classique*, is rather absurdly diminished.

[11] Lukacher has identified this tendency in British publications such as Robert Mudie's *Babylon the Great: A Dissection and Demonstration of Men and Things in the British Capital* (London: 1825). Lukacher, 110, 156.

Cuvier's catastrophist model of earth's history registered across elite Georgian artistic culture. Literature was particularly inflected. The newly thinkable possibility of human extinction from a planet that nevertheless endured, as Cuvier's work seemed to suggest, appeared in works such as Jean-Baptiste Cousin de Grainville's novel *Le Dernier Homme* (1805), Lord Byron's play *Cain* (1821), Thomas Campbell's poem "The Last Man" (1823), and Mary Shelley's novel *The Last Man* (1829). As the literary historian Melissa Bailes has shown, Shelley's work is particularly noteworthy in this respect. It depicts a post-human earth that continues to harbor other forms of life rather than following an older narrative of complete apocalypse.[12] The novel's opening also evinces the same chronological flicker that marks Gandy's paintings of the Bank of England. Taking the form of a first-person narrative, the book begins with discovery. In 1818, Shelley writes, she and a fellow Grand Tourist discovered Sibyl's cave – a mythological site from classical antiquity. Shelley and her companion find a prophetic narrative of events that will take place at the end of the twenty-first century written on the ancient Sibyline leaves, and this is the material Shelley ostensibly edits to produce her book. Past slams into future, channeled through the Georgian imagination.

The novel does not simply tangle chronology. It also taps into contemporaneous fixations with extreme weather.[13] In Shelley's narrative such events portend and exacerbate the effects of a plague that emerges from the east, slowly culling the planet's human population. The island nature of Britain not only fails to protect its inhabitants, it concentrates the spread of the contagion. The population is forced to confront the prospect of mass mortality and again time is manipulated. Shelley's narrator, Lionel Verney, recollects that he and his fellow survivors "became ephemera, to

[12] Melissa Bailes, "The Psychologization of Geological Catastrophe in Mary Shelley's The Last Man," *ELH*, 82.2 (Summer 2015): 671-699.

[13] Michael Freeman, *Victorians and the Prehistoric: Tracks to a Lost World*, (New Haven: Yale University Press, 2004), 164-165.

whom the interval between the rising and setting sun was as a long drawn year of common time."[14] The prospect of extinction cast a harsh light on the true fragility of human existence. Verney and his companions imagine that Nature:

> could take our globe, fringed with mountains, girded by the atmosphere, containing the condition of our being, and all that man's mind could invent or his force achieve; she could take the ball in her hand, and cast it into space, where life would be drunk up, and man and all his efforts for ever annihilated.[15]

Eventually, London is abandoned. Shelley depicts the city in the process of becoming an Ozymandian ruin: "The open doors of the empty mansions creaked upon their hinges; rank herbage, and deforming dirt, had swiftly accumulated on the steps of the houses".[16] The siltation of the city had already begun. The icon of London is reduced to its sepulcher: Verney sees that St. Paul's "ponderous mass, blackened stone, and high dome, made it look, not like a temple, but a tomb."[17] The depleted inhabitants of the British Isles decide to emigrate. Significantly, their route reenacts the Grand Tour. Landing in Calais, the last survivors pass through Paris and Versailles before crossing into Switzerland, where they dwell on the sublimity of the Alps. The human race finally dies out amidst the architectural fragments of Greece and Rome. The cradle of Western civilization becomes the grave of humankind.

In Western Europe, fictional climate anomalies in works like Shelley's must be placed against the backdrop of the 1815 eruption of Mount Tambora in the Dutch East Indies. This largest volcanic event in recorded history changed the weather in Western Europe and North America. The huge cloud of volcanic ash and debris that Tambora ejected into the atmosphere partially blocked the sun's rays, creating a condition called "volcanic winter." The result was the so-called

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[14] Mary Shelley, *The Last Man* (Paris, A. and W. Galignani, 1826), II: 159.

[15] Ibid., II: 99.

[16] Ibid., III: 27. See also Percy Bysshe Shelley, "Ozymandius," first published in the *Examiner* (11 January 1818). The poem depicts a great city as a post-apocalyptic ruin.

[17] Shelley, *The Last Man*, III: 27.

"year without a summer" in 1816: a catastrophic event for agriculture that the historian John Post called "the last great subsistence crisis in the Western world."[18] Literary figures like Lord Byron responded to the unusual weather with his poem, "Darkness," which ominously describes "a dream, which was not all a dream" in which the sun is blotted out and all life on earth perishes.[19] Another contemporaneous event which no doubt influenced Shelley's plot was the all-too-real plague of the first and second cholera pandemics (1817-1826; 1829-51), in which the disease spread from the Indian subcontinent to China, Indonesia, Hungary, Russia, and Germany, before finally reaching the great metropolitan centers of Paris and London at the beginning of the 1830s. As is the case in *The Last Man*, the disease's method of transmission was unknown and its choice of victims seemed frighteningly indiscriminate.[20] (Cuvier himself died of cholera in 1832, while the epidemic raged in Paris.)

Shelley's work is an example of the Romantic notion that the artistic genius, and their intimate experience of life, was somehow a conduit for larger truths that would otherwise be difficult to notice or grasp.[21] As Bailes and others have noted, *The Last Man* was not just an expression of general extinction-induced angst. It was also a transparent allegory of personal loss: the deaths of three of Shelley's children, the drowning of her husband, Percy Bysshe Shelley, and the death of her close friend Lord Byron while fighting the Ottomans in Greece.[22] As many of his biographers have explored, Soane's work can be read in a similar vein.[23] His bitter disappointment

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[18] John Post, *The Last Great Subsistence Crisis in the Western World* (Baltimore: The Johns Hopkins University Press, 1977).

[19] Lord Byron, "Darkness" [1816], in *The Prisoners of Chillon: and other poems* (Boston, Munroe & Francis, 1817), 18-20.

[20] See, for example, Pamela K. Gilbert, *Cholera and Nation: Doctoring the Social Body in Victorian England* (Albany: State University of New York Press, 2008).

[21] Adam White, "John Clare and Poetic 'Genius,'" *Authorship* 3.2 (2014): 1-20.

[22] Bailes, 673.

[23] See, for example, Gillian Darley, *John Soane: An Accidental Romantic* (New Haven: Yale University Press, 1999), 238-252.

that his sons failed to follow him into the profession of architecture – Soane had hoped for a dynasty – was compounded by deep grief at the death of his wife, Eliza, in November 1815.[24] His loss seems to have projected outward, into the larger circumstances of the world. Certainly it was around the time of Eliza's death that Soane began to focus on the news in a new way. His newspaper clippings changed from being sporadic and largely concerned with client and professional matters to being daily or near-daily, as he began to take a decisive interest in news items like extreme weather: bad storms, strong winds, and, particularly, floods, including prognostications of future deluges and permanent weather pattern change.[25] And beginning with the smallest snippets from the far-flung corners of India and Greece, he tracked the progress of the cholera meticulously, day by day, as the epidemic spread and neared and the newspapers fattened their coverage.

Soane and Gandy were both involved in producing the catastrophist imagination of early nineteenth-century London. When Gandy exhibited his Miltonic painting *Jupiter Pluvius* in 1819, one journalist wrote, "if London was to become another Herculaneum, it would not be worth while [*sic*] to disclose its ruins, except for St. Paul's."[26] Four years on, another commentator asserted that Soane's Bank of England would provide a second exception: "when London is fallen… this building, with those of Wren and the bridges, will be almost the only ruins left to indicate its

[24] Ibid., 228-236; 267-8.

[25] See, for example, the clipped account of flooding at Plymouth Dock, 6 January 1817, the prognostication "Another Deluge Coming," the speculations that a flood must have instigated early faith traditions, "Origin of Religious Worship," September 1820, the report of an earthquake at Comrie, April 15, 1822, and the account of the 1822 eruption of Mount Vesuvius in Soane's Press Clippings Volume, SM NC/1 "1805, etc.;" Soane's second volume of press cuttings contains articles on strong gales at Dover, December 30, 1821, floods in London and Lincolnshire in January of 1822, and a violent tempest at Marseilles in that same month. Soane Press Clippings, SM NC/3, 1822.

[26] Anonymous review, *The Literary Gazette* (May 29, 1819), 345. Quoted and discussed in Lukacher, 105.

present greatness."[27] But Soane and Gandy did more than capture the late Georgian sense of future anterior. Both engaged directly with geology and its implications for their discipline.

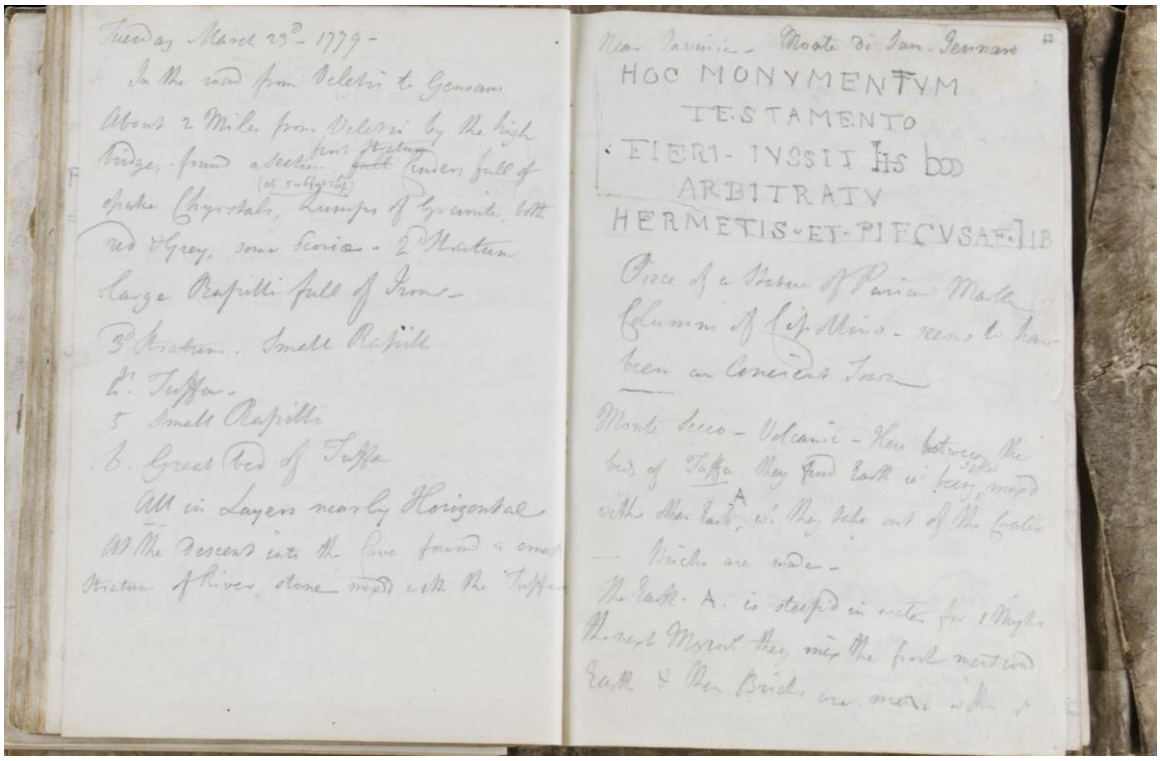

Figure 2.11 Two pages from Soane's "Italian Notebook" (1789) show a notation of a depositional sequence, including the composition of each layer of stone and the strike and dip of the beds on the left-hand page, an epigraphic interruption at the top of the right-hang page, and the continuation of geological notes below. As Pierre de la Ruffinière du Prey has noted, geology became a preoccupation for Soane at Paestum and throughout Calabria.[28]

When Soane went on his Grand Tour from 1778 to 1780, he filled his notebooks with as many geological observations as architectural ones. He examined the bedrock of the Apennine mountains; stopped to examine the stratigraphy of a geological exposure in detail along the road between Veletri and Genzano; and at Paestum, he was as interested in the "petrified" composition of the stone from which they were shaped as he was in the famous ruins themselves. [29] Soane noted the discovery of "genuine Tuffa" and volcanic slag; recorded the Italian name and crystalline

[27] James Elmes, *Lectures on Architecture* (London, 1823) 401-2. Quoted and discussed in Lukacher, 163.

[28] Pierre de la Ruffinière du Prey, "John Soane's Architectural Education 1753-80," unpublished dissertation, Princeton University, 1972, 188, 206.

[29] Sir John Soane, *Notes Italy and Italian Language, etc.* (1780), SM Vol. 162: 162 recto and verso; Soane *Italian Sketches* (1779), SM Vol. 39: 61 verso; *Italian Sketches*, 31 recto.

characteristics of the local breccia; and even determined the precise location along the road from Paestum to Capaccio – "200 yds S. of the Osteria della Scorza" – where the predominant rock changed from limestone to an iron-rich columnar basalt. [30] Soane travelled with Frederick Hervey, the Earl-Bishop of Derry, who was a noted geological enthusiast in the circle of Sir William Hamilton, and likely also met the naturalist Thomas Bowdler. [31] Not only did he complete the obligatory Grand Tour ascent of Mount Vesuvius—twice—but he also scaled Mount Etna and visited the volcanoes at Solfatara and Monte Nuovo. [32] Soane was particularly captivated by the intersections between the history of the earth and that of human civilization. He carefully noted the layers produced by superimposed lava flows and road surfaces to extrapolate their relative depositional ages, and paid attention to the rock upon which and from which buildings were erected. [33]

The Soane scholar Pierre de la Ruffinière du Prey refers to Soane's geological enthusiasms as "a quasi-scientific, yet basically romantic, fascination with vulcanology" that was temporarily prompted by association with the Bishop of Derry. [34] However, Soane's archive indicates that he maintained his interest in geology long after his Grand Tour days had ended and his relationship with Hervey had soured. [35] He clipped news accounts of William Buckland's discovery of "antediluvian" hyenas in Kirkdale Cave and Gideon Mantell's fossil finds in the chalk near Lewes,

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[30] Soane, *Italian Sketches*, 33 verso, 36 verso.

[31] du Prey, "Soane's Architectural Education," 180-81,188, 206.

[32] For Vesuvius and Etna, see du Prey, "Soane's Architectural Education," 214-5. For Monte Nuovo, see Soane, *Italian Sketches and Mema.* (1778-1779), SM Vol. 164: 18-19. For Solfaterra, see Soane, *Italian Sketches*, 51 recto.

[33] See, for example, Soane, *Italian Sketches* 49 recto, 50 verso, and 51 verso. At Catania Solfatara he noted the almost tidal advances and retreats of lava from Mt. Etna: as he noted in his travel notebook, this "Ancient Greek Town at the foot of Mount Etna has been (it is said) destroy'd & rebuilt 17 times, it is now a considerable town." Soane, *Italian Sketches and Mema.*, 15.

[34] du Prey, "Soane's Architectural Education," 206.

[35] For Soane's failed expectations of continued patronage from the Earl-Bishop, see Pierre de la Ruffinière du Prey, *John Soane: The Making of an Architect* (Chicago: The University of Chicago Press, 1982), 118.

saved a pamphlet advertising Mantell's geological museum, and acquired a copy of Cheselden's *Osteographia* in 1805, in which he went to the trouble to painstakingly label a number of the plates by cross-referencing the "Description" loose-leaf sheet that accompanied the volume. [36] He was in contact with Anthony Carlisle, curator of the Hunterian Museum, and collected works on comparative anatomy and earth history, including John Whitehurst's *Theory of the Earth*, Henry Brown's *Geology of Scripture*, and Granville Penn's *Comparative Estimate of the Mineral and Mosaical Geologies*.[37] Soane acquired the sarcophagus of Seti I for his house museum at 13 Lincoln's Inn Fields in 1824. In his guidebook for visitors, *A Description of the House and Museum on the North Side of Lincoln's Inn Fields* (1830), he included an extensive footnote that demonstrated his up-to-date understanding of the precise chemical characteristics of aragonite, the rare stone from which the sarcophagus was carved.[38]

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[36] Soane's Press Clippings, NC/1: "1805, etc.": Notice from *The Herald,* November 7th 1821, of Gideon Mantell's fossil discoveries in the chalk near Lewes; NC/3: 62, account from *The Morning Herald*, March 3, account of organic remains uncovered in the Vale of Kirkdale by William Buckland; clipping of a newspaper's extract of a letter, undated, on advances in geology, including Buckland's discovery and George Bellas Greenough's geological map of England and Wales; report dated March 12, 1822, on Buckland's discovery of an "antediluvian den of hyenas." For Mantell's geological museum, see SM Library reference number 6105; for *Osteographia*, see reference number 1890.

[37] Soane had a copy of Carlisle's *Croonian Lecture on Muscular Motion* (SM Library reference number 1848). Carlisle wrote to Soane after visiting Soane's museum at 13 Lincoln's Inn Fields in 1832, (SM Priv. Corr. XVI.H.93), praising his curatorial approach. See also SM library reference numbers 5566, 570, 734, 501, 4798, and 4781.

[38] Darley, 273-4, recounts the history surrounding Soane's acquisition. The footnote reads: "This sarcophagus is supposed to be the largest specimen known of that beautiful variety of calcareous stone denominated antique or Oriental alabaster.... In the more precise language of modern science, however, the term alabaster is strictly confined to the combination of lime with sulphuric [*sic*] acid (or gypsum, as it is also called), from which plaster of Paris is prepared; whereas the Belzoni sarcophagus is worked out of an astonishingly large mass of the variety of calcareous stone to which the name of aragonite has been given, because its peculiarities were first discovered in specimens found in the province of Arragon. It is a combination of lime with carbonic acid, together with a very small portion of the earth of strontian." John Soane, *Description of the House and Museum on the North Side of Lincoln's Inn Fields...* (London: Levey, Robson, and Franklyn, 1836), 33. Dr. Clarke, who had been asked by Belzoni to determine the precise mineral nature of the sarcophagus' translucent stone, published paper about his identification of the stone as Aragonite in the annals of the Cambridge Philosophical Society in 1821: see Edward David Clarke, "On the chemical examination, characters, and natural history of Arragonite [*sic*].... *Annals of Philosophy* 2 (July-December 1821): 57-62. He wrote a congratulatory letter to Belzoni which concluded, "and to complete the whole who would have imagined that your magnificent soros should turn out to be aragonite. A few years ago we paid a guinea for every specimen of aragonite as big as the end of your thumb. Tenant first found pieces of it among the alabaster of Antiparos and now you bring before the world one integral mass of aragonite nine feet by five inches long and three feet by seven inches wide! If you had found a ruby as large as St Paul's I should not have deemed it a greater curiosity." Quoted in Sir Arthur Brooke Faulkner, *Visit to Germany and the Low Countries...* (London: Richard Bentley, 1833), II: 239. The third (1822) edition of

Soane was particularly drawn to the discoveries and persona of Baron Cuvier, who, as we have seen, was a pivotal figure in earth science. He clipped news items relating to Cuvier and owned an English translation of Cuvier's *The Animal Kingdom*.[39] Sometime between 1832 and 1835, Soane also acquired a bust of the scientist, which he displayed in his basement Ante Room on a table inlaid with "various specimens of Marble and Granite."[40] Soane invited his friend, the author Barbara Hofland, to contribute to the final edition of his *Description* (1836), intended to be the definitive review of his house-museum and its contents. In this edition, Hofland praised "the scientific, the amiable Cuvier" with a variant of the couplet composed for Newton:

> Nature and nature's laws lay hid in night; --
> God said, 'let Cuvier be,' and all was light.[41]

In Soane's basement, the light Cuvier cast illuminated a strange world. Given center-front position on the inlaid table, Cuvier's bust is flanked by nineteenth-century casts of the two sons of Laocoön – the tragic Trojan victims of the gods' wrath from Greek mythology. In Soane's arrangement, their tortured gazes turn toward Cuvier's imperturbable profile, as if to register the implications of the French paleontologist's vision of calamity to come.

Belzoni's *Narrative of the Operations and Recent Discoveries within the Pyramids, Temples, Tombs, and Excavations, in Egypt and Nubia* included a footnote referencing Clarke's discovery: "Dr. Clark [*sic*] the Professor of Mineralogy at Cambridge found the quality of the stone to be aroganitic much rarer than alabaster." (London: John Murray, 1822), 366. Soane, with his positive inclusion of "earth of strontian," would have had to have read, not only Dr. Clarke's opinion on the composition of the sarcophagus, but also Charles Daubeny's follow-up article in the *Annals of Philosophy* on the definitive connection between strontian and aragonite. See that periodical, 2 (July-December 1821): 220-222.

[39] SM Library reference number 4573.

[40] Peter Thornton and Helen Dorey, *A Miscellany of Objects from Sir John Soane's Museum* (London: Laurence King and Sir John Soane's Museum, 1992), 51; John Soane, *Description of the House and Museum on the North Side of Lincoln's Inn Fields…* (London: Levey, Robson, and Franklyn, 1836), 31.

[41] Soane, *Description*, 36. In this Hofland was echoing Cuvier's own assessment of the importance of his work. In his introduction to *Discours sur les revolutions de la surface du globe, et sur les changemens qu'elles ont produits dans le règne animal* (Paris, 1825), he compared his achievements to those of Newton.

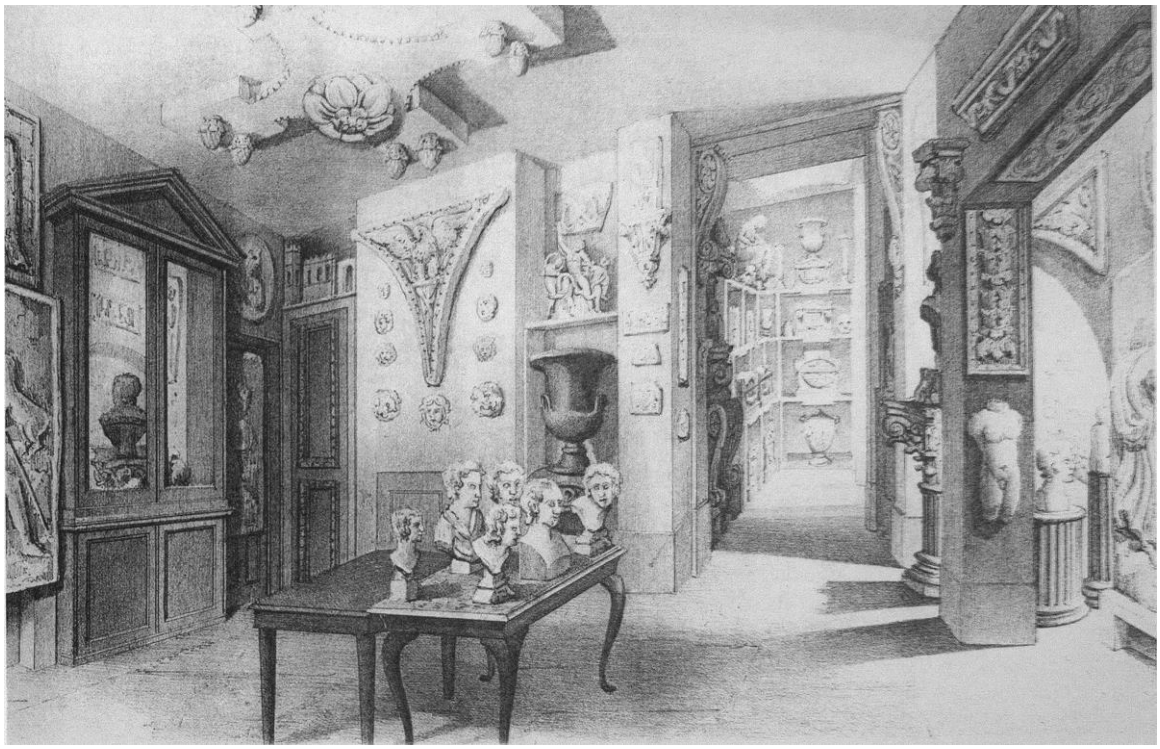

Figure 2.12 "View of the Basement Ante Room," from the 1835 *Description* of Soane's Museum.

"Comparative Architecture"

Figure 2.13 Joseph Gandy, *Architecture: its Natural Model*, c. 1836.

Figure 2.14 This detail of beavers with their dams and lodges beyond reveals Gandy's collage-like approach to his source material for the final composition. The rodents and their architecture-like fabrications are lifted from an illustration published by the French naturalist George-Louis Leclerc, Comte de Buffon (see Figure 2.15 at right), but Gandy's dams have lost the rough materiality of the originals to become strangely like igloos.

Figure 2.15 *La Loutre du Canada & les Castors du Canada*, from George-Louis Leclear, Comte de Buffon, *L'Histoire Naturelle* (1760).

Geology was an interest Soane and Gandy held in common. But what was for Soane an amateur, if persistent interest, stoked by the Grand Tour and his intellectual circle, seemed for Gandy to be more of an all-consuming preoccupation. His *Architecture: Its Natural Model* (1830) collates into a sublime vista architecture-like mineral and organic forms ranging from termite mounds to natural arches. This painting was intended to form part of a monumental and hopelessly comprehensive series on "comparative architecture" – an organizational rubric Lukacher connects to Cuvier's "comparative anatomy."[42] Lukacher and Barry Bergdoll have already discussed the significance of specific geological elements in the composition, including columnar basalts, Fingal's Cave, and what is perhaps a plesiosaurus skeleton in the foreground.[43] To their analysis we could add that the orangutan family depicted to the right of the painting was established code for what Gandy, along with Cuvier and Lord Byron, called "pre-Adamite" – an primitive form of humanity

[42] Lukacher, 173.

[43] Barry Bergdoll, "Of Crystals, Cells and Strata: Natural History and Debates on the Form of a New Architecture in the Nineteenth Century," *Architectural History* 50 (2007): 1-29.

that existed prior to the Flood.[44] Separating these creatures from Noah's ark in the far distance is a dramatic depiction of the water cycle, which carried diluvian significance.[45] Whether the ark is ready for its maiden voyage or has already survived a flood is almost immaterial. What Gandy presents is a collage in time: from pre-humans to Noah and his kin, from extinct species like the plesiosaurus to modern mammals like beavers, with both the record and the promise of catastrophe permeating the composition from cloud to waterfall to stream and back again. As Lukacher has demonstrated, the ark is a leitmotif that runs through Gandy's textual and visual output.[46] It stands both for the once and future origins of architecture and as a kernel of shared cultural knowledge rescued from the uncertain waters of time. As Gandy put it, it was "the first object of the second world and the last of the first."[47] This image also reflects Gandy's contradictory and selective engagement with geological theory. He alternated among older comparisons between natural objects and architectural forms (Final's Cave), contemporary Cuvier-inspired catastrophism (the Deluge), and the looming apprehension of human history but a brief interval of geological time.

While he was working on his Comparative Architecture series of paintings, Gandy produced a manuscript intended to be similarly encyclopedic in scope. Today, three of the seven volumes he either completed or planned survive in manuscript form in the archives of the Royal

[44] Lukacher describes the simian family in the foreground of Gandy's painting as orangutans, in keeping with Gandy's own mention of this species in his catalogue text: "even the ouran-outan of Sierra Leone erects a dwelling to protect his female and young, commodious as the natives". Transcribed in Lukacher, 209, note 37. Certainly, as Lukacher notes, the orangutan was a popular reference point for philosophers and naturalists searching for primitive versions of man; indeed the Scottish linguistic philosopher Lord Monboddo famously failed to find a distinction between these primates and the more "savage" human races. See Alan Barnard, "Orang Outang and the Definition of Man: The Legacy of Lord Monboddo," in *Fieldwork and Footnotes: Studies in the History of European Anthropology*, ed. Han F. Vermeulen and Arturo Alvarez Roldán, (London: Roultedge, 1995), 95-112; and Lukacher, 188-189. Gandy followed Cuvier (and Lord Byron) in exploring the real possibility of "pre-adamites" – a race of humans or humanoid creatures who existed before history and of whom "no vestige remains except in the bowels of the earth". Joseph Michael Gandy, "The Art, Philosophy, and Science of Architecture," unpublished manuscript, Archives of the Royal Institute of British Architects, I:np.

[45] See H. Engelhard, "Kunstgeschichte und Geologie: Der Wasserfall in Gemälden des 17. bis 19. Jahrhunderts," unpublished PhD dissertation, University of Cologne, 1975.

[46] Lukacher, 170-181.

[47] Gandy, "Art, Philosophy, and Science of Architecture," I:332, quoted in Lukacher, 189.

Institute of British Architects. *The Art, Philosophy, and Science of Architecture* obsessively explores the origins of architecture in nature, myth, and primitive prehistory, and seeks to establish a stable symbolic meaning for all architectural ornament. In this document, as in the paintings, geology provides both the backdrop and the model for Gandy's approach to architectural history. In his telling, the history of the earth encompasses the history of human civilization and its artifacts; mineral formations engender various architectural forms; and the emergence and submergence of continental landmasses mirror the rise and fall of societies.

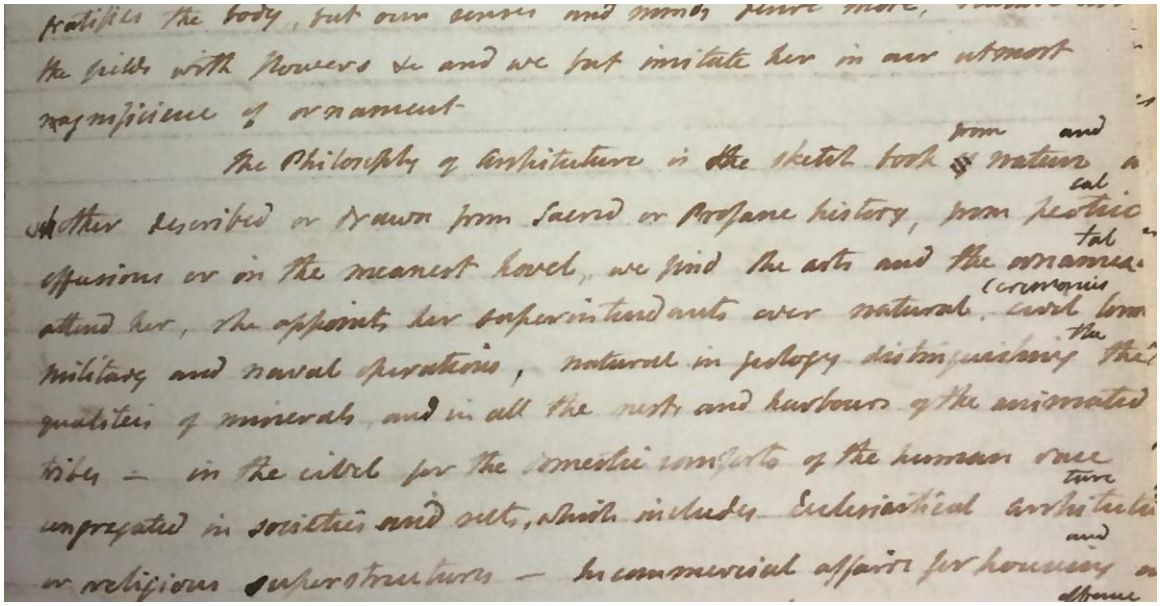

Figure 2.16 As a term, "geology" makes it first appearance on the first page of Gandy's preface to his manuscript opus, *The Art, Philosophy, and Science of Architecture*.

The Art, Philosophy, and Science of Architecture assumes a history of the earth that mixes Cuvier's successive extinction events with James Hutton's more sanguine expectation that humans or at least human-like, intelligent creatures, would participate in life's perpetual renewal. The earth might be subject to violent upheaval, but a regenerative impulse would continue unabated:

> Countries may be submerged by the great agents of fire and water, shifting the solid matters of this earth in its rotatory motion, new continents thrown up and the old

> undermined sink forever. Another parent of mankind like Noah will succeed, thus perpetually reproducing all things. The architecture of all nations points to a prior origin.[48]

As Lukacher has suggested, the "prior origin" Gandy imagined might have been extraterrestrial. Gandy wrote elsewhere that humans might "mingle with a non-descript [not yet described or known] race of beings" from "another planet."[49] Yet there was also the possibility that the earth itself contained a regenerative wellspring: as Gandy wrote in his introduction to his first book, "the origin [of architecture] is in the globe itself, seen in rocks, mountains, alps, woods, forests, animal instincts, and all the artificial defenses men seek."[50] In the same passage, Gandy depicted architecture as part of the periodic development and degeneration of human creativity – a cycle linked to the cosmic order. In *The Art, Philosophy, and Science of Architecture*, the distinction between the natural and the human that was so central to both Hutton's thesis and Adam's resisting vision is obliterated. The globe produces mountains, animal instincts, and human behaviors alike; men are "like nature, swarming herds," and their settlement or scattering is likened to the water cycle's perpetual condensation and evaporation. Gandy wrote of "magnificent cities" coalescing and dispersing like rain clouds, where architecture "oscillates into the obscurity of time" as part of "the perpetual regression or regeneration ordained by Eternity."[51] The history of mankind, whatever that species' eventual duration or mutation, is ultimately that of the rock record itself: a catastrophe unfolding in both directions. In this context, Gandy's predictions of renewal meet a darker realization that what has been and is being lost can never be revived. In the traumatic extent

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[48] Ibid., I:46; quoted in Lukacher, 193.

[49] Ibid. The general idea that intelligent life might have originated or could be sustained outside of earth would have also been familiar to Soane, who purchased a copy of John Wilken's *A Discovery of a New World, or, a discourse tending to prove that 'tis probable there may be another habitable world in the moon* (1684) for his library in 1803. Soane's is the 4th edition, (London: 1864), SM Library reference number 560.

[50] Gandy, "Art, Philosophy, and Science of Architecture," I:1.

[51] Ibid., I:1-2.

of "incomprehensible space and time," humans are "as a taper to the Sun."[52] Mortality hangs over his project like a shroud. "Because animal matter is born, lives, and dies, does it follow that this globe or the universe must do the same?" he asked.[53] Although Gandy's answer to this question would likely have been in the affirmative, the query itself expresses Gandy's occasional confusion about the relationship between human experience and geological change.

These kinds of speculations find their echo – albeit in a more conventional idiom – in Soane's writings. Between 1804 and 1821, Soane embarked on his own extensive research project into the origins of architecture.[54] Produced in ostensible preparation for his lectures to the Royal Academy (1809-1836), his collected notes go far beyond the material he covered in that venue. In them, Soane often seems to trace Gandy's grandiose prognostications and tragic visions with troubled and skeptical words. A note, labeled "crude hint" to indicate it was a draft or roughly recorded idea,[55] underlines several implicit paradoxes in Gandy's approach to architectural history:

> If we are to consider Huts and Caves as the origin of building, and that from such feeble beginnings the art arose, then architecture must be common to all nations and the art itself dates its commencement from the beginning of the world – this enquiry would lead us on to endless and various controversies that might bring down on our devoted heads (as Galileo etc) destruction – it will be more to the advantage of the artist to compare those times and events which have led to its progress and revolutions – he should look to different countries where buildings of the greatest importance have been created, and compare them with each other and examine the different principles and circumstances under which they were raised. (Aside: But if matter existed from eternity, and men likewise in what period was the perfection of architecture to be found!)[56]

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[52] Ibid., I:3.

[53] Ibid.

[54] David Watkin, *Sir John Soane: Enlightenment Thought and the Royal Academy Lectures* (Cambridge: Cambridge University Press, 1996), 3.

[55] John Soane and Helen Dorey, *Crude Hints towards an History of My House in Lincoln's Inn Fields* (Oxford: Archaeopress Pub., 2015), 33, note 1.

[56] John Soane, "4: Miscellaneous Extracts, Crude Hints etc, Relating to Architecture," (1819) Sir John Soane's Museum archive, Case 179/1: 131.

In other words, the issue with Gandy's search for universal origins was that it was predicated on a linear conception of time and development that was fundamentally at odds with his theory of regeneration. The two models could not coexist. Either architecture had developed from primitive origins (caves and huts) in a teleological trajectory or it was part of a cycle for which no origin could be located. The prudent response would be to make productive synchronic comparisons across cultures without delving too deeply into questions of ultimate origins. As Cuvier had done, Soane planned to study architectural species within the context of their climatic and behavioral environs: "the circumstances under which they were raised." Yet, as was also the case with the professionally cautious Cuvier, Soane could not resist the occasional burst of private speculation. If there *were* no beginning to the world and to the human race, the whole edifice of historical thought could be brought down by the threat of a Huttonian eternity in which perfection might have been already achieved and obliterated countless times over – in which any apparent progress was simply the upward swing of a pendulum's period. The bottom would be knocked out of any narrative arc comprising what Soane described elsewhere as architecture's "origin – progress – meridian splendour & decline."[57]

Soane continued both to worry about the prospect of an eternal earth and to attempt to dismiss this concern. "Aristotle believed the World to be eternal," he wrote, "and do we not read in Scripture, "the Earth abideth for ever?"[58] He noted apparently poetic or allegorical passages in Holy Writ to remind himself that it was futile to read scripture with the expectation of scientific accuracy: "2 Psalms 24 v. 2: it is written 'He hath founded the earth upon the Seas, and established

[57] John Soane, "Crude Hints towards an History of my House in Lincoln's Inn Fields" [1812], transcribed and ed. Helen Dorey, in *Visions of Ruin: Architectural Fantasies & Designs for Garden Follies* (London: The Soane Gallery, 1999), 70.

[58] Soane, "Miscellaneous Extracts, Crude Hints etc," 1: 35.

it upon the floods' – we must not look for the grounds of philosophy in the words of Scripture."[59] It appears that, by the end of 1818, Soane had reconciled himself to a Cuvier-inspired history of the world as a pattern of catastrophe and rebirth than never precisely repeated the life forms it contained in each populated episode – a prospect that allowed for incremental improvement over a long period of time. This seemed to be applicable to architecture as well. As he wrote on a loose sheet at the back of his notebook for that year:

> Nature acts slowly by a series of insensible changes and repetitions, whereupon results a habit of seeing and judging that a thing is good and suitable: -- nothing is durable that is not formulated in the bosom of time and experience…. The smallest Hut of the savage might offer the constitutive elements of Architecture but the space between it and the Temple of Minerva must have been great indeed.[60]

In other words, architecture and nature both progressed very slowly, in an accumulating series of stuttering and infinitesimal gains. Even if it was revealed to be composed of a wobble of smaller advances and retreats, the narrative arc of history could be salvaged. In this context, Soane was able to indulge his own conviction that his generation was witnessing a decline while still believing that his own theoretical inquiries and curatorial and pedagogical activities were worthwhile. "We are fallen back into the low and defective," he wrote, "everything seems to threaten us with an entire decay."[61] If architecture, like life as a whole, had to sink low before it could recover, he could still conceptualize his own work as a time capsule or a seed capable of jump-starting a renewal in the future.

Likewise, the ultimate task Gandy set himself in both his Comparative Architecture paintings and the *Art, Philosophy, and Science of Architecture* was, as he dramatically stated in his

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[59] Ibid., 6. This was a position Soane supported with a reference to John Wilkins' *The Discovery of a New World… in the Moon*. See note 48 above.

[60] Soane, "Miscellaneous Extracts, Crude Hints etc," loose leaves in back of volume numbered 229-231.

[61] SM Archives 1/180. David Watkins notes that this is likely to have been written in about 1806. Watkins, 118, note 88.

preface to the latter, "to imitate the works of God and create a new world".[62] For Gandy, as for Soane, architecture was at a lamentably low ebb.[63] There is a shared sense in the written output of both architects that this artificial catastrophe could be addressed on architectural terms: that it was possible to invent and induce a disciplinary regeneration from within. Gandy described his own work as planting a "seed." If the times proved utterly infertile, the seed would keep. Gandy was confessedly uncertain about the way a more fecund future might unfold. "Whether this will be the operation of one mind, or the many, after a long research and secret study," he wrote, "is in the soil or seeds of time." Meanwhile, Gandy defined his task. "To create a new world," he wrote, "it is necessary to comprehend the pansophy [accumulated wisdom] of the one we live in."[64]

Casts

Yet of what value was this pansophy if its meaning was already undermined? As David Watkin has shown, Soane harbored a persistent fear that the entire ornamental system was in a precarious state – that if it was logically pursued most standard classical features would prove inappropriate or unintelligible.[65] Soane battled with Lord Kames' doubt in Kames' *Elements of Criticism* (1762) about whether ornament could be justified, either as once-meaningful symbol or as a valuable vestige of an older technical solution. Kames was particularly suspicious of the Corinthian order: how did a vine grow at the top of a column without climbing its shaft? If the origins of the orders were in the stylization of utility, as was commonly believed to be the case, how did a leafy basket come to occupy a position that required it to support the load of a roof? As Soane wrote, "this idea once admitted in its full extent, there were an end of all ornament nearly."[66]

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[62] Gandy, "Art, Philosophy, and Science of Architecture," I:1.

[63] Lukacher, 168.

[64] Gandy, "Art, Philosophy, and Science of Architecture," I:1., quoted in Lukacher, 171.

[65] Watkin, 280.

[66] Ibid., 234.

Somehow the modern world seemed to have outgrown the myths and meanings that had nurtured classical ornament for so long. Worse, it seemed incapable of producing new meanings in the form of novel decorative motifs.[67] Soane made his position clear in a Royal Academy lecture:

> The decorative system, amongst the ancients, was held to be of such importance that their architects were forbidden to use any ornaments, for the introduction of which they could not account. Accordingly nothing was introduced into their buildings which did not relate immediately to the mysteries and rites of their religion, to their political institutions, or to the imitation of nature, as exhibited in the vegetable, and fossil world, in foliage, fruit and flowers.[68]

If the meaning attached to the "mysteries and rites" of forgotten religions had been lost or impoverished over time, the modern architect was faced with two alternatives. On the one hand, he could limit himself to natural objects that seemed capable of carrying enough significance in and of themselves. This is what Soane's mentor, George Dance the younger, had done when he invented his ammonite order for John Boydell's Shakespeare Gallery on Pall Mall (1788-9).[69] Commonly found in England, the ammonite fossil was similar in appearance to the Ionic scroll and linked to the worship of Jupiter Ammon, a Greek god often depicted wearing rams' horns.[70] It was thus a neat conjunction between an architectural ornament that had been abstracted from some unknown and unknowable source, the authority of classical myth, and the history of the earth. Placing an ammonite in a column capital amounted to enacting a fictionalized process of abstraction in reverse: the Ionic volute was given a natural "source" from whence it had not actually descended. As something that sprang from the soil of England, an ammonite was also an appropriate

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[67] Ibid., 309-310.

[68] John Soane, "Royal Academy Lecture II," quoted in Watkin, 264.

[69] For John Boydell's project to create a "Shakespeare Gallery," in which the bard would be celebrated with a dazzling display of paintings and artworks commissioned by the best British artists, see Robin Hamlyn, "The Shakespeare Galleries of John Boydell and James Woodmason," in *Shakespeare in Art*, ed. Jane Martineau et al., (London: Merrell, 2003), 97-101.

[70] Michael Kerney, "Ammonites in Architecture," *Country Life* (January 27, 1983): 214-218; Michael Hall, "Fossils and the End of Time," *Country Life* (January 8, 2004): 52.

representation of the "native" genius of Shakespeare over and above any symbol imported from afar.[71] Soane approved of Dance's invention and had an illustration of it made for his lectures on architecture. He also collected ammonites – nine in total – and displayed them at 13 Lincoln's Inn Fields together with other natural historical objects, including elephant teeth, curiously curled sticks, and corals, that might suggest other, equally fictitious but no less fruitful, natural models for architectural ornament.[72]

Figure 2.17 *Entablature, capital & base for the Ammonite order used by George Dance the Younger at Boydell's Shakespeare Gallery*, a Royal Academy Lecture Drawing commissioned by John Soane.

[71] I am grateful to Michael Hall for suggesting the connection between Shakespeare as a "native" genius and the ammonite as "native" ornament in answer to the question posed by Frances Sands in "Architectural responses to Shakespeare in the Georgian period," in *The Cloud-Capped Towers': Shakespeare in Soane's Architectural Imagination* (London: Sir John Soane's Museum, 2016), 14. Hall's connection was credited in Sir John Soane's Museum, *"The Cloud-Capped Towers:" Shakespeare in Soane's Architectural Imagination*, 31 April – 8 October 2016, caption 5.2.

[72] There are two ammonites along the roofline of the exterior monuments' court. The other ammonites in Soane's collection are SM MC2, MC3, S115, L124, M1158, M1159, and S33. Soane's elephant tooth is SM A51. SM S40 is a fossilized Neptune's cup sponge; SM S127 and SM M769 are fossilized corals. SM L96 and 104 are twisted wood pieces from an ash tree that resemble volutes, as do SM M614 and M584, from an elm tree. Other specimens include an Australian bird's nest, made of mud (SM X158) and the skull and horns of a cow (SM M9). Helen Dorey, Geological Tour of the Soane Museum, July 17, 2014.

The other alternative was to eliminate ornament from architecture altogether, and this, too, was an avenue Soane explored. The results were not always appreciated. As Henry Greswolde Lewis of Malvern Hall complained to John Constable in a letter in 1819, "that *Modern Goth*, Mr Soane, spoilt a handsome house by shaving clean every ornament, architraves, coins, keystones, string courses, and balustrade."[73] Soane's "Description and Estimate of Repairs, Alterations, and Additions" (1784) for Malvern Hall shows that this was not an unanticipated move on the part of his architect, however much Lewis later disavowed the results. The first words in that document are "to take down."[74]

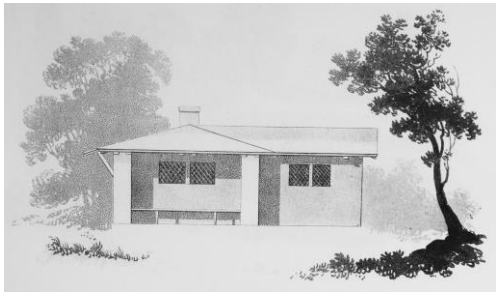

Figure 2.18 "Cottage for Labourer."

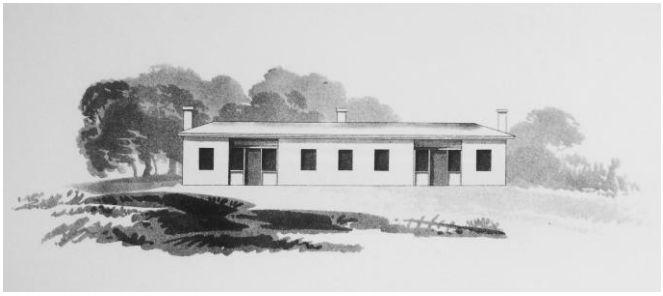

Figure 2.19 "A Double Cottage for Labourers."

Figure 2.20 "Five Cottages."

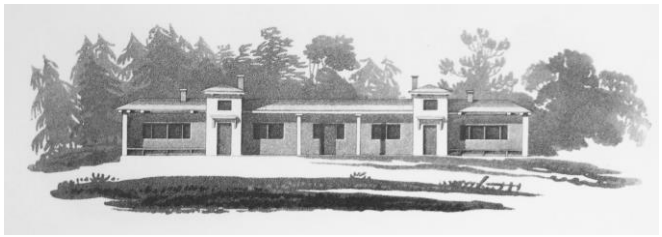

Figure 2.21 "Three Cottages."

[73] Henry Greswolde Lewis, "Letter of 18 April 1819 to John Constable," *John Constable's Correspondence IV*, edited by R. B. Beckett, *Suffolk Records Society* X (1966). Quoted in Darley, 132.

[74] John Soane, "Description and Estimate of Repairs, Alterations, and Additions for H. G. Lewis, May 1784," SM Vol. 41/19 recto.

Figure 2.22 "Four Cottages for Labourers."

Figure 2.23 "Four Cottages."

Figures 2.18-2.23 are all from Joseph Gandy, *The Rural Architect* (1806).

This formal reductivism was investigated more fully by Gandy when he published a series of startlingly unornamented housing prototypes in his *Designs for Cottages* (1805) and *The Rural Architect* (1806).[75] These designs effectively translated the most traditional of building typologies into a series of ahistorical objects. Gandy justified the "simple mass of form" these designs evince by remarking that "ornaments … are of little use externally: it is in the inside chiefly that ornaments should be objects of attention, where they are not liable to be destroyed by the weather."[76] In the context of Gandy's wider oeuvre, the weather he had in mind must have included much more than the occasional storm.

For Soane's part, as Watkins has shown, he was struck by and apparently in agreement with the Abbé Jean-Louis de Cordemoy's hostile characterization of the Baroque tendency to produce a "moulded wall mass of pilasters and engaged columns" rather than free-standing columns and entablatures. Cordemoy denigrated this approach as "architecture in bas-relief."[77] Yet, unlike an earlier generation of French architects like Jacques-Germain Soufflot, who famously used

[75] Joseph Gandy, *Designs for cottages, cottage farms, and other rural buildings: including entrance gates and lodges* (London: John Harding, 1805); *The Rural Architect: consisting of various designs for country buildings, accompanied with ground plans, estimates and descriptions* (London: John Harding, 1805).

[76] Gandy, *Designs for Cottages*, viii.

[77] Quoted and discussed in Watkin, 141-2.

monumental freestanding columns at St. Genevieve in Paris,[78] Soane responded to this criticism with a different strategy. Concerned that even disengaged classical elements might be obsolete, he *suppressed* the objectionable pilasters and engaged columns rather than freeing them. With his "sinkings," Soane even recessed the lines that indicated where these elements would have been, as if to imply a trajectory from ancient utility to classical symbol to Baroque contour, and finally, modern absence.[79]

In new constructions, Soane resorted to an extremely limited repertoire of forms and tropes initially borne out of programmatic and spatial necessity – and thus, presumably, justifiable on these grounds. John Summerson describes the narrow range of Soane's architectural invention in almost compulsive terms: one solution reproduced again and again in varying scales and degrees of elaboration. In Summerson's reading, Soane's Stock Office for the Bank of England (1792) – a project on which he most likely collaborated with Dance – remained the basic model for his entire output. A complex and unprecedented spatial solution to an awkward problem, this interior features the shallow floating dome and central lantern that would be iterated throughout Soane's career.[80] At the Dulwich Mausoleum and the tomb Soane designed for Eliza, Soane's signature combination passes, as Summerson puts it, "from positive to negative":

> …You will notice that the inner surface of the dome becomes an outer surface; in fact, that the examples are modeled on a hypothetical "cast" of the interior of the Stock Office dome, the lantern becoming (in the case of the Soane tomb) a solid cylindrical projection on the summit. These miniature "negatives" of the theme are reduced even further in the case of the gate-piers at Pitzhanger [Soane's country residence] and here they have become

[78] On the analytical underpinnings of Soufflot and his French contemporaries' use of freestanding columns, see Antoine Picon, "The Freestanding Column in Eighteenth-Century Religious Architecture" in Lorraine Daston, ed., *Things That Talk: Object Lessons From Art and Science* (New York: Zone Books, 2004), 67–99.

[79] As Watkin remarks, "the whole basis of Soane's personal architectural language, in which the orders were replaced by a system of incised lines, could be seen as an historical development in the process by which the orders were themselves a representation of their timber origins." Watkin, 183.

[80] John Summerson, *Sir John Soane: 1753-1837* (London: Art and Technics, 1952), 30-34.

something very like the lids of those antique cinerary urns which Soane was just then (1802) beginning to collect.[81]

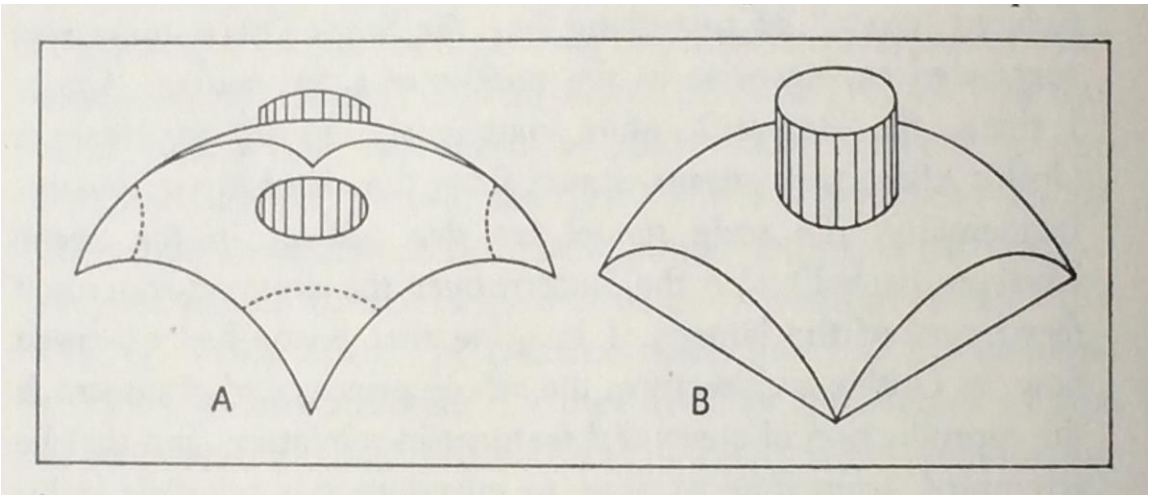

Figure 2.24 Summerson's diagram of how the lantern-dome motif in Soane's oeuvre passes from positive to negative, 1952.

Soane's sinkings and Summerson's observation bring us to the most unsettling attribute of Soanian architecture: the sense that Soane was not simply evacuating or "shaving" newly meaningless ornament from his designs, but that he was attempting to block out three-dimensional pockets of space for as-yet-unimagined alternatives.

Once intuited, this sense that one is looking, not at a piece of architecture itself, but at its *cast*, infects Soane's entire oeuvre. A cast is meant to be an index of the presence of a thing – a guarantee of its existence – and yet is only legible once the original is removed. It thus paradoxically stands in for precisely what it is not, filling the space in the lost object's stead. To return to Soane's sinkings at the Bank of England, these linear reductions are a less literal cast-type, intended "to preserve some faint glimmerings of architectural effect,"[82] in Soane's phrase, and to

[81] Ibid., 31-32.

[82] John Soane, "Lecture X," in *Sir John Soane: The Royal Academy Lectures*, ed. David Watkin (Cambridge: Cambridge University Press, 2000), 236.

record in reverse what had been lost.[83] As Soane remarked, it was futile to "blindly and servilely copy" the ancients, but it might be still possible to "catch the spirit of them" and "trace the springs whence we derive satisfaction from them."[84] Soane's architectural elements thus suggest an architecture that is both more primal than and posterior to the classical: both its origin and its ghost.[85]

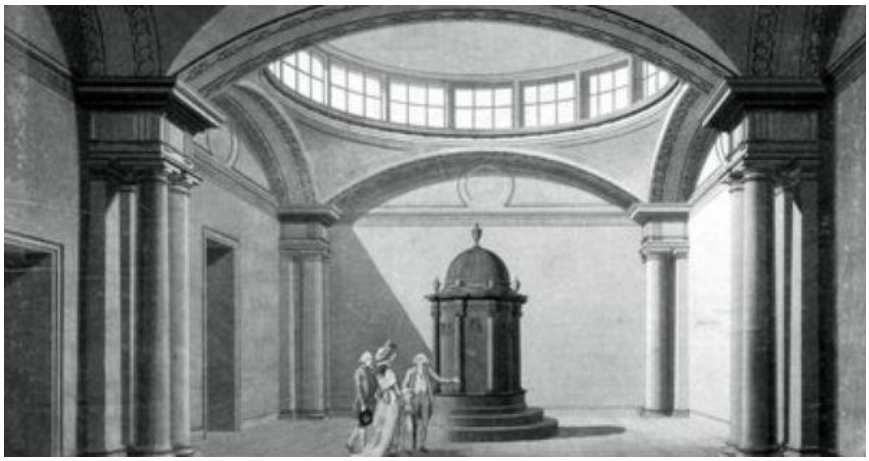

Figure 2.25 The Bank of England's Reduced Annuities Office, by Soane's predecessor, Sir Robert Taylor, 1788. The Doric order Taylor used here is completed by the appropriate full entablature of architrave, frieze and cornice.

Figure 2.26 The Bank of England Stock Office, by Soane; all of Taylor's detail is missing in Soane's inverted iteration, 1791-1801.

[83] Summerson describes these elements collectively as "a substitute, a token order consisting of vertical strips in relief, in the places where columns of pilasters might be expected to occur." Summerson, 27.

[84] John Soane, *Memoirs of the Professional Life of an Architect, between the Years 1768 and 1833*, (London: privately printed, 1834), quoted in the *Literary Gazette* (January 25, 1834): i.

[85] Summerson remarks, "these pilaster-strips… are symptoms of a 'primitivism' to which Soane subscribed and which will have been connected, in his mind, with the neo-classical thesis that the bed-rock of architecture is, not the canon of the orders, but the primitive hut in which they orders and their parts have their prototypes." Summerson, 27.

This same casting impetus makes itself felt, albeit in slightly different and less pure ways, in Gandy's own small architectural output. It is visible, for example, when comparing the front (Charing Cross) and rear (Spring Gardens) elevations of Gandy's now-demolished Phoenix Fire and Life Insurance Company building in London. The Charing Cross façade consists of a fairly conventional screen of classical orders set in front of a typical three-story Georgian façade, although, as Lukatcher notes, there is something odd about the high, blank plinth under the ground-floor Doric columns and the wide, equally blank entablature above the first floor's Ionic columns.[86] It is as if the same suggestion of a fold or a doubling that Gandy seemed to register in his comments on Soane's Bank of England – pilasters above, "and reversed deep beneath," pilings below – is intimated here as well; as if the elevation were hinged at the height of the projecting cornice that divides these two levels. The plinth at the base of the building is over six feet high and pushes the building's ornamental treatment above eye level, as if to imply a higher ground plane. Above, the Ionic columns at the first floor are exactly the same height as the Doric columns below, and the entablature they support is the same thickness as the one upon which they rest, and upon which the company name is emblazoned. It is as if the façade is really a stack of two possible facades – one labeled with the building's existing tenants, one as-yet unmarked – at two possible ground planes. The Phoenix Insurance company is given a six-foot buffer, but the building suggests that in the end this will not be enough. At the rear, Lukacher remarks that the Spring Gardens façade betrays Soane's influence.[87] It is certainly a much simpler and shallower arrangement that seems, when the two facades are placed side by side, like an *impression* of the front. Applied mouldings around the attic windows in the Charing Cross elevation become incised on the Spring Gardens side; the three-dimensional orders on the front have been compressed to rectilinear pilasters at the

[86] Lukacher, 61-62.

[87] Lukacher, 62.

rear; the wide plinth and entablature that trouble the Charing Cross composition have been pushed back behind the plane of these flattened elements on the other side, and the entire decorative ensemble has been collapsed to a depth of inches rather than feet.

Figure 2.27 Joseph Gandy, Phoenix Fire and Life Insurance Company building, London, Charing Cross Façade.

Figure 2.28 Joseph Gandy, Phoenix Fire and Life Insurance Company building, London, Spring Gardens Façade.

In another approach to the same theme, Gandy's Doric House at Bath, designed for Thomas Barker (1803-18), places what would, in Greek architecture, have been the two-story colonnade demarcating the central aisle of a temple's inner chamber in the position of the peristyle wrapper around a temple's exterior. This arrangement is pushed up against a solid wall, as if the

cella had been turned inside out and flattened.[88] The effect is of a collapse in distance but also in time: the baseless Doric championed by Enlightenment archeology is subjected to a Renaissance architecture of the wall.

Figure 2.29 Joseph Gandy, Doric House, Bath

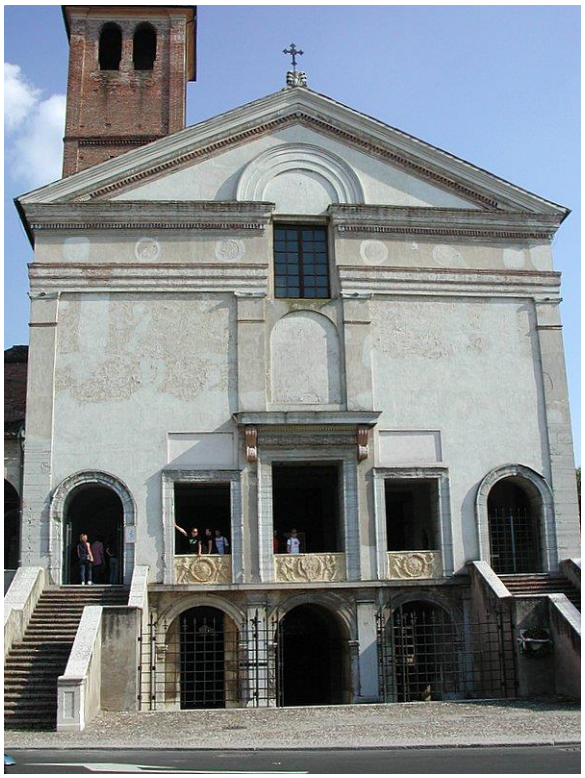

Figure 2.30 Leon Battista Alberti, San Sebastiano, Mantua, 1460.

[88] Lukacher has eloquently remarked that this design "explores the visual and tectonic tension between planarity and relief." Lukacher, 63.

Figure 2.31 Detail from John Buckler, *Northwest View of Storrs*, 1814.

Floodmarks

The solid wall behind Gandy's Doric colonnade at Bath is not entirely featureless. A third of the way down, the wall is sharply recessed at a forty-five degree angle, like an undercut stream bank. It is as if the surface has been pressed back or scraped away by a torrent or a tool much more powerful than its own material. This kind of horizontal register appears in another of Gandy's built designs, Storrs Hall on the banks of Windermere, Cumbria. Gandy's extension of the original house takes the form of twin wings that squeeze the original volume between their taller, block-like masses. Classical ornament is largely elided: Empty rectangular frames punctuate the otherwise blank stretches of wall between the window bays and replace corner coigns or pilasters. Vacant frames form the trim around the windows and indicate the space where an entablature would have been. The cornice midway up the wall has been reduced to three rectilinear projections; the

parapet is an outlined, undecorated wall. In ostentatious contrast to this Spartan linearity, oversized scroll brackets to either side of each outer window, two thirds of the way up the ground floor façade, support a sill or shelf above the windows. Lined up neatly on these sills, like ornaments on a mantelpiece, is a row of oversized, cup-like lotus ornaments.[89] For Gandy, the lotus symbolized the followers of Noah;[90] likewise, Soane noted that it betokened perpetual regeneration. Its presence here, half-way up a country house on a lake, thus evokes an imagined flood in miniature: a future high-water mark traced all around a structure that has pulled up its ornaments to safety like specimens salvaged from the rising waters. Gandy added a porch to the original central building at Storrs that features the same line of overscaled lotuses in place of a parapet. It is supported by a Doric screen with flutes stopped two thirds of the way to the top, at exactly the same level as the bases of the scrolled brackets. The effect is as if any ornament below this point either will be obliterated or has already been erased.

Gandy produced three other designs for the Storrs estate: an unbuilt boathouse, a remodeled jetty with a small pavilion, and an unbuilt "druidical Temple." For the boathouse, Gandy designed a Doric structure modeled on the Temple of Poseidon at Paestum with a miniaturized colonnade of five by six columns, raised on a plinth about six feet above the level of the lake. In his design, the slip is created by breaking away this plinth and removing what would have been the central front column, as if the structure had been compromised by violent waters. A similar logic is at work in Gandy's reworking of the jetty and pavilion. He was probably responsible for adding crenellations to the breakwater, and he decorated the pavilion with a classical parapet, giving the resulting assemblage the appearance of being the top of a much larger edifice that had been

[89] I am indebted to Lukacher for identifying these ornaments. Lukacher, 67.

[90] Gandy I: 7.

drowned in the lake.[91] In the same vein, Gandy's proposed "druidical temple" for an island on Windermere would have featured three massive trilithons. As a Freemason (so was Soane), Gandy would have understood such structures to refer to an astrological, universal religion founded in the aftermath of the flood.[92] "Druidical" trilithons on an island emerging from a lake would thus signify architectural regeneration after an obliterating deluge. Each project that Gandy imagined or carried out at Storrs either indexed a past flood or anticipated a future inundation.

Figure 2.32 Joseph Gandy, Sketch of a proposed "Druidical monument" at Storrs, detail from 1806 "Storrs" sketchbook.

[91] Although my interpretation of this pavilion differs from Lukacher's summary of the structure as a "modest undemonstrative building," I am relying on his archival research and documentation to determine the scope of Gandy's intervention. See Lukacher, 64-67.

[92] William Stuckeley, *Stonehenge: A Temple Restor'd to the British Druids* (London: W. Innnys and R. Maney, 1740). Extensive notes on Stuckeley's druidical research together with his book on Stonehenge and copies of all of his other works are in the Soane Museum. See Watkins, 267, 326.

Figure 2.33 Thomas Harwood, *View of Storrs, Windermere Lake*, in W. H. Pyne, *Lancashire Illustrated*, 1831. The jetty as Gandy designed it is in the middle distance of this composition.

Figure 2.34 Joseph Gandy, *A Boathouse for Sir J. Legard, Bart., on the Lakes Windermere*, 1804.

In Soane's work, too, there is a tendency to present a reduced, effaced façade at lower levels – to line ornaments up along the skyline. This was in fact considered such a distinctive characteristic of Soanian design that it was ridiculed in the contemporary press. In their screed, "On the Sixth, or Boeotian Order of Architecture," published in 1824 in *The Knight's Quarterly*, the two pseudonomous authors purport to praise Soane's invention of a particularly barbarous new order of architecture. They go on to describe the cornice level of the Bank of England as if it were an excavated ground plane, sarcastically remarking in wonder on "the long lines of altars, acroteria, and vases, which are arranged, like the Street of the Tombs at Pompeii, on the summit of the Bank."[93]

Figure 2.35 George Bailey, "View of the Eastern Extremity of the North Front of the Bank of England."

[93] "Oliver Medley and Reginald Holyoake" (pseudonyms), "On the Sixth, or Boeotian Order of Architecture," *Knight's Quarterly* (1824), 458. The Boeotian Order authors were not Soane's only contemporaneous critics to pick up on a sense that his architecture seemed to forecast its own siltation. Humphrey Repton accused Soane of "reversing or turning things topsy turvy – for instance the rustic storey such as we see at the bottom of buildings he placed a the top over the Corinthian entablature!" Humphrey Repton, *Memoir*, British Library Add MS 62, 112, ff. 204-5, Quoted in Darley, 176. Philip Norris' "Modern Goth: A Satire in Verse on Sir John Soane" similarly mocked his "scrolls fix'd below, and pedestals above." (London: privately printed, 1796).

Soane's Dulwich Mausoleum presents an even more striking example of this treatment, with symbolic sarcophagi and vases situated above an indented high water mark that Soane called a "retracted frieze." Significantly, the authors of the "Boeotian Order" interpreted this kind of notch as a stratigraphic indication:

> Is he a geologist? He dismisses the petty markings of the mason, and uses an interminable joint, which copies successfully the grand appearances of nature in the stratification of rocks.[94]

Here the horizontal datum so many of Soane and Gandy's designs have in common is explicitly connected to the superimposed layers of the earth itself. However mocking its intent, the Knight's Quarterly lampoon is a valuable window on which aspects of Soane and Gandy's design approach seemed most original (or strange) to their contemporaries. In this light it is worth noting that geology is only one of several sciences this piece's authors accuse Soane of paying too much heed: botany, conchology – their charge that Soane tended to "fill his pediments with the products of the sea or of the sand, from the cockle to the conch" seems a well-aimed blow in light of his fondness for ammonites – and astronomy are also invoked. "'All sciences a true Boeotian knows,'" Soane's fictional double is quoted as crowing. "(At least enough for *his* purpose)," the authors add. It is as if Soane's engagement with natural history and the questions it raised rendered his architecture too open to outside contamination: "There is no acquirement within the range of human knowledge which a learned Professor may not apply to the ornamental purposes of his Art."[95]

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[94] Boeotian Order, 458.

[95] Ibid., 458-9. The "Ode on Dulwich College" these authors appended to their larger critique mocks that design's "*stepless* door, the *scored* wall/ Pillars *sans* base or capital,/ And curious antiques;/ The chimney groups that fright the sweep,/ And *acroteria* fifty deep,/ And all my mighty freaks." Here again the emphasis is on the overload of ornament at the top of the building and its absence lower down. Ibid., 461-2.

Figure 2.36 Soane office, Preliminary design for the Dulwich Mausoleum.

Soane unsuccessfully sued the publisher of this piece and never established its true authorship.[96] Yet for all that he resented the criticism, Soane may have very well been in sympathy with the geological analogy this piece contained. After all, in his description of the mock classical ruins he installed at his country house, Pitzhanger Manor, Soane deployed a fictional third-person narrator to wonder if the ruins were created to "confuse the geologist and the antiquary." A sketch of these ruins in Soane's hand suggests a way to interpret this remark. While the broken column shafts on their bases to the left of the image appear to be resting on the "current" ground plane, the column capitals atop partial shafts on the right seem to sit on a deeper, and therefore earlier, level, revealing only their top halves to the visitor's gaze. That Soane intended the columns to register as buried wholes rather than fragments resting on the existing ground is indicated by the penciled indication of a lower horizontal datum below, down to which the outlined shafts continue. The

[96] See Darley's account of this unflattering episode in Darley, 278-279.

image of antique architecture buried in the accumulated detritus of time would, of course, have been familiar to any Grand Tourist who had witnessed the dramatically built and silted up ground plane of modern Rome in relation to its ancient monuments.[97] What is curious about Soane's drawing is that the column bottoms to the left match up with the column tops to the right, so much so that at first glance it appears that they originally formed complete wholes. When this reading is undermined by Soane's penciled marks, the image's apparent chronology is destabilized.

Figure 2.37 Sir John Soane, *Perspective of the ruins at Pitzhanger*.

Has the ground level risen so suddenly that there has been no stylistic development in the interim? Why are the submerged columns more complete than their apparently modern counterparts? Both the geological gaze and the antiquarian interpretation are confused indeed, and the ruin is endowed with powers of chronological manipulation. Soane played with the apparent location of the ground

[97] Archeological evidence reveals that Rome's ground plane is on average 5-10 meters, and in some areas, as much as 20 meters above its ancient level. See Gregory S. Aldrete's discussion of Rome's rising ground in *Floods of the Tiber in Ancient Rome,* (Baltimore: The Johns Hopkins University Press, 2007), 40-42.

plane at his house museum in London as well. The walls of his Dome Area were originally painted a dark chocolate brown, as if to suggest this windowless shaft were an excavation open to the sky. Shafts of colored light play across the objects on the walls, which are, for the most part, a uniform pale stone color – the difference between real stone and plaster casts is repressed – as the sun moves above and clouds and other atmospheric conditions change.[98] A nineteenth-century visitor remarked of this space that "the principal part has the appearance of a mine with many veins, in which instead of metallic ores, you find works of art … which heightens the feeling of the subterranean and the mysterious."[99] If, in Soane's Pitzhanger sketch, the ground plane is rendered into a temporary stratum in a depositional sequence that is still continuing, at 13 Lincoln's Inn Fields it is the building that seems to be sunk into the earth. The cumulative effect of this kind of architectural strategy is that the encounter between building and subject is one of displacement in vertical space as well as in time. Both the ground plane on which one stands and the present in which one exists seem destabilized. Shared across the output of these two architects, this architectural language of floodmarks and negatives evokes an unsettling and vertiginous sense of time accelerating in both directions, as if a new catastrophe impended just as an antiquarian investigation of a lost past got belatedly underway.

[98] Helen Dorey, Geological Tour of the Soane Museum, July 17, 2014.

[99] Waagen, G. F., *Works of Art and Artists in England* (London: John Murray, 1838), 2:180, quoted in Lukacher, 137.

Figure 2.38 Joseph Gandy, *View of Part of the Museum at 13 Lincoln's Inn Fields* [Section through Dome Area and Basement], 1811.

Fragments

Although the design direction Soane and Gandy developed in response to earth's newly plumbed history was unique, they were certainly not the only architects to pay attention to this emerging field. Soane's pupils, Decimus Burton and George Basevi, became early members of the newly formed Geological Society in London, as did Sydney Smirke, RA, and Edward Smirke, younger brothers to Soane's most famous pupil, Sir Robert Smirke, and John Claudius Loudon.[100] (Although there are no records that Soane ever attended a meeting of the Society, Gandy did so in

[100] Geological Society of London OMI/3: 59; OMI/4a: 57, 180, 189, 370.

1826.)[101] Decimus Burton in particular seems to have become very involved. He helped catalogue and arrange the society's specimens and designed both their small initial suite (1828) and their expanded chambers (1834) at Somerset House – services for which he refused payment "having received much gratification in being connected with [The Geological Society] as a body; and in the acquaintances I have made amongst its Members."[102] Soane must have consulted on the society's chambers at some point himself; sketches in Soane's hand of Burton's initial space layout are among Soane's papers.[103] The overlap between architects in Soane's circle and the early members of the Geological Society was partly due to proximity. Originally the Society met at the Freemason's Tavern, also frequented by Soane and Gandy, and just down the street from Soane's atelier at 13 Lincoln's Inn Fields. Once the scientists were granted space in Somerset House, they would have been in the same building as the Royal Society. No doubt architects were additionally drawn to geology for the same technical reasons that attracted engineers like Thomas Telford, who joined in 1825.[104]

Beyond these links, however, and at a more general level, geologists themselves continued to be invested in links between these two disciplines. In addition to the kind of terminological and representational borrowings we first traced in the work of James Hutton and John Clerk of Eldin, nineteenth-century geology poached actual experts from the field of architecture. As Martin J. S. Rudwick and Noah Herringman have noted, Thomas Webster, the first secretary and curator of the Geological Society, was trained as an architect and practiced in London, where he designed the

[101] Geological Society of London OMI/3: 106-108.

[102] *Minutes of the Geological Society of London* I: 275.

[103] Thanks to Caroline Lam, Archivist of the Geological Society, for facilitating access to Burton's complete plans and helping identify what is represented in Soane's sketch.

[104] *Minutes of the Geological Society of London* I: 21.

Royal Institution's innovative lecture theatre in Albemarle Street.[105] Webster began his career as a geologist when he was commissioned to depict the chalk formations of the Isle of Wight by Sir Henry Englefield, who rightly guessed Webster's architectural training would facilitate accurate interpretation of that island's structure.[106] Sir James Hall, another Scottish geologist who had accompanied James Hutton to Siccar Point in his youth, went on to produce a significant, if controversial *Essay on the origin, history, and principles of Gothic architecture* at the end of the eighteenth century – a work that Soane acquired.[107] Nor were the British alone in their exploration of such connections. As Paula Lee has shown, Cuvier and his rival, Etienne Geoffroy Saint-Hillaire, conducted their famous debate on mollusks in architectural metaphors which also came in handy for personal attacks: when Geoffroy accursed Cuvier of being a "mere mason" in contrast with his own, properly architectural, thought, Cuvier snapped back that Geoffroy's work was "an edifice built upon the sand." Here it is important to emphasize the absolutely privileged role architecture continued to play in both dissimulating geological concepts and assimilating the decentering effects of geological discoveries at the turn of the nineteenth century.

Cuvier specifically associated his particular approach to comparative anatomy with antiquarianism. As he wrote in his introduction to his *Recherches sur les ossemens fossiles de quadruped* (1812):

> As an antiquary of a new order, I have been obliged to learn the art of deciphering and restoring these remains, of discovering and bringing together, in their primitive arrangement, the scattered and mutilated fragments of which they are composed, of reproducing, in all their original proportions and characters, the animals to which these fragments formerly belonged, and then of comparing them with those animals which still

[105] Noah Herringman, "Picturesque ruin and geological antiquity: Thomas Webster and Sir Henry Englefield on the Isle of Wight," (London: Geological Society Special Publications, 2009) 317:299-318.

[106] Rudwick, *Bursting the Limits of Time*, 514-515.

[107] The paper was read before the Royal Society of Edinburgh on April 6, 1797 before it was published in book form in 1813. Sir James Hall, *Essay on the Origin, History, and Principles of Gothic Architecture* (London: John Murray, 1813), SM Library reference number 2418.

> live on the surface of the earth.... That review has afforded me ... a great body of rules and affinities ... and the whole animal kingdom has been subjected to new laws in consequence.[108]

These remarks are strikingly similar to Soane's description of his pedagogical aim to study "the precious fragments of antiquity...to discover the principles that directed the great artists of antiquity."[109] In both cases the intent was the same: to create an overarching order that would simultaneously structure the "scattered and mutilated fragments" of the past and generate "new laws" for the future. Such an order was the answer, in fact, to Soane and Gandy's central conundrum: how to inaugurate a robust architectural profession from only the extinct remnants of its history; how to create a foundation for the discipline at the very moment when its traditional status and supports were eroding away.

In 1812 Soane became an antiquary of a new order himself, when he created a fictional narrative that the architectural historian Helen Dorey identifies as "one of the strangest and most perplexing documents in the history of English architecture."[110] Entitled *Crude Hints towards an history of my house in Lincoln's Inn Fields*, the document was written while Soane's residence and atelier was being extensively remodeled. In it, Soane imagines the construction site as a "partly buried" ruin, and himself as "an antiquary" charged with deciphering it. One of the more unsettling aspects of this text is a temporal feint that is by now somewhat familiar: Soane writes as though the ruin he is tasked with deciphering belongs to an antiquity so remote that its origin and use have been completely lost, and his own words are peppered with antiquarian anachronisms, medieval

[108] The first part of this work was translated into English and published separately as *Essay on the Theory of the Earth* in 1813, together with a preface by the Scottish geologist Robert Jameson. The excerpt quoted in English here is from this translation. Georges Cuvier, *Essay on the Theory of the Earth*, 3rd ed., (Edinburgh: William Blackwood, 1817), 1-2.

[109] Soane, "Royal Academy Lecture I," Watkin, 499.

[110] Dorey, *Crude Hints*, 1.

superstitions, and early English spellings that cast uncertainty on the date of the document itself.[111] And yet the structure this text describes is not the 1812 project, lobbed into a future in which it has fallen into decay, but a much larger expansion that Soane designed but never implemented. The document thus purports to excavate the past of an imaginary future that is uprooted from its historical moment. In Soane's fictional interpretation, his collected works of art, architectural fragments, fossils, and natural curiosities – objects culled from the entire span of earth's history, from the Paleolithic to Soane's own time – become clues of the architecture's temporal disorder. Soane's antiquarian makes it clear that the ruin is impossible to date:

> We are so completely in the dark on the subject of this structure, that to ascertain with any hope of precision either the periods in which it was founded – its extent, or on what occasions or for what purposes it was originally destined will be found to be no moderate task & such as will require no small portion of penetration and reflexion.[112]

The task of history, as the document goes on to claim, is an impossible attempt at recovery in the face of "few data" and "scanty materials."[113] In the event, Soane's antiquary concludes that the ruin is itself a fragment: because the structure seems to contain no staircase, it must have once been part of a much larger complex.[114] Just as the building's temporal origin is uncertain, so too is its real physical extent.

As Dorey has noted, Soane's draft history of his house darkens as it progresses. His antiquarian narrator tests a number of hypotheses about the founder of the ruins he is investigating before settling on a figure that represents Soane's tragic conception of himself:

> Alas poor man he flatterd himself that a race of Artists would have been raised up whose efforts from the advantages they set out in life with – advantages the lot of the chosen few only – would have raised Architecture to its meridian splendour – Oh man, man, how short is thy foresight – in less than half a Century – in a few years – before the founder was

[111] Ibid., 2.

[112] Soane, *Crude Hints*, 19.

[113] Ibid.

[114] Ibid., 21-22.

> scarcely mouldered into [reduced to native] dust, no trace remains of the Artists who were to leave inhabited the place from one generation to another – & the building itself only presents a miserable picture of horrible delapidation [*sic*] – Oh could the dead but for a moment leave their quiet mansions – could they but even look out of their Graves and see how posterity treated them and their Works what Hell could equal their Torments.[115]

Considering that when he wrote these words, both of Soane's sons and his wife were still alive, Soane seems to have been projecting the bleakest possible future for his dynastic enterprise. It came true.

Soane remained committed to his larger project of rescuing what he could of architecture's ancient splendor for future generations. Deprived of direct architectural heirs, he could still hope to influence the course of architecture through his lectures, his pupils, and his house-museum itself, which he opened to the public in 18xx. The Napoleonic wars had interrupted British access to the antiquities of the Grand Tour, and Soane offered his own collection as a pedagogical substitute. 13 Lincoln's Inn Fields was also meant to function as a makeshift foundation for Soane's own design approach. As Hofland put it in the *Description*:

> The most original thinker, and even the wildest wanderer in poetic conception, must have some foundation on which to raise the superstructure that may prove the temple of his fame. Where shall he find one so broad, so safe, as that supplied by the aggregate wealth of the mighty minds that have preceded him, -- they who found in the towering rock and the arborescent tree theories of utility and grandeur; and in "leaf, fruit, and flower" examples of ornament for taste to combine and art to perpetuate in designs so perfect as to offer examples to all after-ages?[116]

The terms "so broad, so safe" betray Soane's sense that his position as arbiter of the discipline was uncertain. Here Hofland's language calls attention to a fundamental contradiction: her reference to "leaf, fruit, and flower" – organic sources of architectural ornament that are subject to rapid decay –clashes with Soane's own fixation with developing an ornamental language that would be

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[115] Ibid., 30-31.

[116] John Soane and Barbara Hofland, *Description of the House and Museum on the North Side of Lincoln's Inn Fields…* (London: Levey, Robson, and Franklyn, 1836), 14.

impervious to change. In the context of Soane's London residence, safety resonates on two levels at once: the implication is not only that Soane's investigation of architecture's origins amounts to a foundation that cannot be undermined, but also that his museum is a protected space or locked cabinet for his work's perpetual safekeeping. And the collection of fragments and exemplars this repository housed was intended to be generative, offering materials sufficient in quality and quantity "for taste to combine and art to perpetuate" throughout "all after-ages." It was as if, late in life, Soane was able to reimagine his hoard of extinct architectural ornament as so much raw material for productive ferment to come.

Obsolescence

In her comparison of the Soane and Hunterian Museums, which face each other across Lincoln's Inn Fields, the art historian Ellen Adams has noted that Soane's earliest organizational idea for his museum carried "the ordered look of an academic institution," and featured a more straightforward comparative approach with like items grouped together.[117] As is still evident today, Soane ultimately opted for a much more picturesque arrangement. An order is apparent, but it is a far cry from the tabulated approach on display at the Hunterian. Rather, Soane's is a make-do order of remnants, in which different yet like objects are arranged in an approximate symmetry that invites and even demands prolonged visual engagement. The gaze darts from one juxtaposed or opposed object to another while the mind conjures a sequence of possible meanings. The museum becomes a fixed assemblage ever capable of quickening the imagination. It is as if Soane feared that a more rigidly taxonomic arrangement would pin a weakened discipline to its board like a butterfly under glass. There was an interpretive liveliness that could be produced by conversations between things. Amongst his papers, Soane kept a pamphlet by the writer and poet Peter Coxe (printed

[117] Ellen Adams, "Shaping, collecting and displaying medicine and architecture: A comparison of the Hunterian and Soane Museums," *Journal of the History of Collections* 25.1 (2013): 70. See also S. Millenson, Sir *John Soane's Museum* (Ann Arbor, 1987), 45.

under the pen name of "Fabricia Nunnez") entitled *Architectural Hints* (1806), which elaborated on just this kind of possibility. Coxe compared "the superadded glow of an animated intelligence on the human countenance" to the effect produced by tastefully arranged decorative objects. Such displays would, he wrote:

> impart cheerfulness and splendour even to the most magnificent mansion which would be cold and inanimate without them. 'Walls hung round with thoughts in pictures that live and breathe,' and other works of art, present instruction and entertainment to the observer, and arrest attention, when the very name of the artist who raised the building is lost sight of.[118]

In a similar vein, Hofland wrote that Soane's museum was an exercise in forestalling the effects of time with art. She referenced the picturesque author Ebenezer Rhodes, who described his pleasure at obtaining a sketch of a decaying building in *Peak Scenery, or the Derbyshire Tourist*: "Happy Art! that can disappoint time of its prey, prolong the remembrance of forms that now exist, and transmit them through successive generations."[119] It is as if the livening "movement" Robert and James Adam sought to produce on their exteriors had to be moved indoors, where, as Gandy remarked, it was less "liable to be destroyed by the weather."[120]

Soane permanently instantiated his interior arrangements in 1833, via an extraordinary act of Parliament that Summerson has described as "the only possible way of salvaging this hoarded cargo from the shipwrecked dream."[121] Summerson was referring to Soane's thwarted ambitions for his sons, but the imagery also seems appropriate in the context of his larger concern with temporality. In the ocean of geological time, the museum and its ever-animated contents became

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[118] SM Library reference number 1848.

[119] Soane and Hofland, 5. Ebenezer Rhodes, *Peak Scenery, or, The Derbyshire Tourist* (London: Longman, Hurst, Rees, Orme, Brown, and Green, 1824), 270.

[120] Gandy, *Designs for Cottages*, viii.

[121] Summerson, 44.

like an ark, secured against the depredations of time and unworthy heirs, and carrying within its berth the seeds of an eventual regeneration.

Shelley's *The Last Man* includes a peripheral character named Merrival, a natural historian and philosopher whose literary function is to model the general human disinclination to live in the present moment. Merrival, preoccupied by his vast opus on "the Pericyclical Motions of the Earth's Axis," which, when complete, will forecast the "state of mankind six thousand years hence," neglects to pay attention either to his own family or to the growing menace of the epidemic that is bringing the human race to its knees.[122] He is jolted out of his intellectual preoccupation with the far-distant future when his wife and his entire family perish from the disease. This personal tragedy is doubled by Merrival's abrupt realization that his entire project has been based on false premises. Pericyclical motions of the earth's axis could not matter to mankind if the human race was well on its way to extinction, and indeed, they could never have mattered, else Merrival's research would have predicted humanity's present predicament. In Shelley's words, "the old man felt the system of universal nature which he had so long studied and adored, slide from under him."[123] In their very different ways, both Soane and Gandy seem to have experienced a similar tragic disconnect from their own moment in time – an inability to register the increments of actual lived existence in the face of the longer durées of architectural history and the history of the earth. For all of his professional success, personal wealth, and fame (he was knighted in 1831), Soane died an embittered and thwarted man, saddened to the end by his family's fate. He may not have been killed by exposure upon his wife's grave, as Shelley has Merrival end, but in a very real sense he never recovered from his grief at Eliza's death, the death of his younger son, and the disgraceful behavior of his firstborn. As Lukacher has described, Gandy's life was also deeply unhappy. He had

[122] Shelley, *The Last Man,* 206.

[123] Ibid., 220-1.

always been in a precarious financial position, in and out of debtor's prison and dependent on Soane for paid employment, gifts, and loans. Gandy was also subject to mental instability. With Soane's death in 1837, Gandy suffered the loss of both a patron and a friend. It was a privation he could ill afford. Unable to complete his encyclopedic investigation into architecture's origins, plagued by poverty and increasingly erratic in his behavior, Gandy was committed to Plympton House, a private asylum for the insane, by his family sometime between 1839 and 1841. He died there of dysentery in 1843.[124] To all intents and purposes, Soane and Gandy's project died with him. Although there had been many pupils, there were no disciples; there was a stagnant air of obsolescence about their work even during their lifetimes. There was nowhere to go but to some other place, and perhaps some other time, entirely.

[124] Lukacher, 200.

Chapter 3. Stratigraphic Life: G. E. Street and Charles Lyell

Prelude: Lithodomus Lithophagus

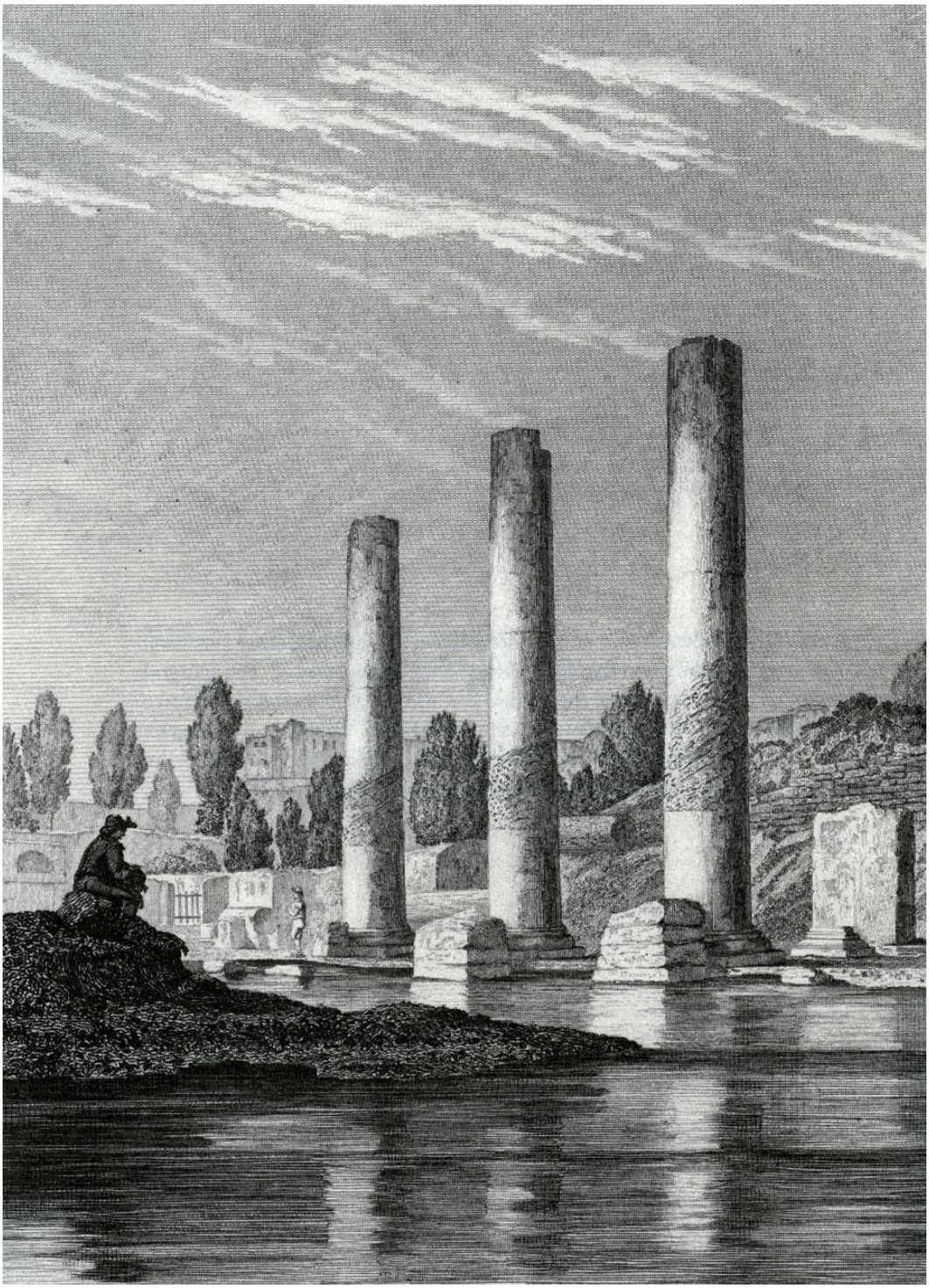

Figure 3.1 Frontispiece of Charles Lyell's *Principles of Geology* (1830) "carefully reduced from that given by the Canonico Andrea de Jorio in his *Ricerche sul Tempio di Serapide, in Pozzuoli*" (1820).

Three broken columns are reflected in water. Darkened and crumbling, their tops suggest the friable softness of wooden pilings, yet their joints – horizontal breaks picked out by erosion – suggest stacked stone. Wisps of cloud float from the tips of the two nearest columns, as if they were freshly extinguished tapers. The remnants of walls that kneel in water in front of the columns look strangely pillowed and soft, like folded blankets. The water moves with the tight sideways shimmer and lap of a tide in flow. A ruin by the sea, then, and a view facing inland. A porous stripe peels across the columns in a downward swipe, right to left. An engraver's trick pulls its grain through to meet the lines of the landscape beyond: a tatty conglomerate of architecture, verdure, and topography. A chafed tick at the lower left of the rightmost column becomes a dark mark in the ragged breccia beyond; the nearly horizontal line of a far hill becomes the upmost boundary of the middle column's stripe. The diagonal scores at the top of the leftmost column carry through to the cypress behind it. On close inspection the background seems to push through the columns like gravel pressed into paper.

This is the engraving Sir Charles Lyell used as a frontispiece for his three-volume *Principles of Geology* (1830-33). The image depicts a Roman structure then believed to be a temple dedicated to Jupiter Serapis at Pozzuoli, on the Bay of Baia near Naples. It was closely adapted from an illustration made by John Izard Middleton for Andrea de Jorio's antiquarian publication on the ruin – the most complete account since its full excavation in 1750.[1] Known today to be the remnants of a Macellum, or market, the so-called Temple of Serapis formed a site where architecture, antiquarianism, and geology precisely overlapped. As an architectural relic of classical antiquity, it

[1] The original engraving is located in de Jorio's *Ricerche sul Tempio di Serapide, in Puzzuoli* (Naples, 1820). The historian of science Luca Ciancio has produced an elegant and thorough study of the depictions of this monument throughout its history in the contexts of scientific, archeological, and artistic discourse. Luc Ciancio, *Le colonne del Tempo: Il "Tempio di Serapide" a Pozzuoli nella storia della geological, dell' archeologia e dell' arte (1750-1900)*, (Firenze: Edizioni Firenze, 2009). Although Ciancio discusses the Middleton original in comparison to the Lyell engraving, produced in London by T. Bradley, he does not mention the shape of the mollusk-pocked band in the Bradley engraving versus others based on Middleton's original, such as that produced in Paris by Langlois and Leclereq. Ciancio, 122-155.

had been visited by both Adam brothers on their respective Grand Tours. A sketch by Robert's tutor, Charles-Louis Clérisseau, survives in the collection of Adam material that John Soane purchased for his museum in 1818.[2] Soane sketched the ruins himself in 1779 and had a reconstruction of the temple drawn up for his third Royal Academy lecture on architecture in January of 1810,[3] and it is possible that Joseph Gandy also visited the ruins on a tour of Naples and its vicinity in 1796.[4] Even prior to its full excavation, two of the temple's standing columns had long been partially uncovered, attracting antiquarian interest for centuries.[5] The columns themselves also represented a geological puzzle. The lowest quarter of each shaft was smooth while the second quarter was pocked with bore holes left by *lithodomus lithophagus* a species of marine mollusk whose name, "stone-eater," describes their favorite diet. The upper half of each shaft was weathered but not pocked, suggesting that this portion of the columns had remained above the level of the ocean and exposed to the elements for a significant period of the structure's history. The temple had stayed mostly above sea level since the beginning of the eighteenth century, but the columns' stripe of sponge-like texture indicated that they had been submerged in the bivalve's saltwater habitat for long periods of time. Early theorists such as Anton Lazzaro Moro (1687-1764) typically treated these columns as evidence that the level of the sea had risen and fallen at some

[2] The excavations at Pozzuoli commenced in the spring of 1750 and ended in the summer of 1753. Ciancio, 13. The veduta by Charles-Louis Clérisseau is in SM vol. 57/35. See Alan A. Tait, *Robert Adam, the Creative Mind: from the sketch to the finished drawing* (London: Sir John Soane's Museum, 1996), 2, cat. no. 5.

[3] Soane recorded his trip in his travel notebook and sketched the column capitals and other details in his sketchbook. See SM vol. 164/16 recto and SM vol. 39/9 verso – 10 verso. The Royal Academy lecture illustration is SM 19/9/1; Soane's number for it within lecture III was 25. See David Watkin, *Sir John Soane: Enlightenment Thought and the Royal Academy Lectures* (Cambridge: Cambridge University Press, 1996), 675. For the chronology of Soane's lectures see the Appendix prepared by Susan Palmer in Watkin, ibid., 731.

[4] Brian Lukacher, *Joseph Gandy: An Architectural Visionary in Georgian England* (London: Thames & Hudson), 27, and Gillian Darley, *John Soane: An Accidental Romantic* (New Haven: Yale University Press, 1999), 145.

[5] Maria Conforti, "Review of Ciancio, *Le colonne del Tempo* and Toscano, *Gli Archivi del mondo*," *Nuncius* 27 (2012): 224.

point in the earth's history.[6] By the nineteenth century, however, British geologists like Lyell and Charles Babbage rejected the notion that sea levels had changed dramatically over such a short period because the larger lengths of Atlantic coastline did not substantiate such claims. Instead, they interpreted the ruin as an index of locally rising and falling land due to nearby volcanic activity. When Lyell visited Serapis for the first time in 1829 – an earlier visit on his Grand Tour with his father (1818-1820), had been impossible because of the political situation in Naples[7] – his firsthand observations of the temple corroborated his preconceived theory of its history: a gradual, subterranean swell and collapse of the ground on which the temple had been erected, gentle enough to leave several columns erect and centered over their bases, was the only interpretation that fit the evidence. The smooth lowest quarter of the columns had been protected from bivalves and weather alike by a thick deposit of ash from nearby Mount Solfatara, the volcano with which the changes in land level were closely linked. When the ground beneath them had sunk to its lowest point, the columns had been attacked by mollusks up to the highest relative level of the sea. Meanwhile, their tops had remained above the surface of the water, spared from boring but continually subject to the ruinating effects of weather.[8]

[6] Ciancio, 36-39, 111-112. John Playfair also authored an interpretation of the ruins at Pozzuoli based on James Hutton's theory. John Playfair, *Illustrations of the Huttonian Theory of the Earth,* (Edinburgh, William Creech, 1802), 450-455.

[7] Charles Lyell, *Life, Letters and Journals*, ed. Katherine M. Lyell (London: John Murray, 1881) I:114.

[8] Charles Lyell, *Principles of Geology, being an attempt to explain the former changes of the earth's surface, by reference to causes now in operation,* second edition (London: John Murray, 1832) I: 517-530.

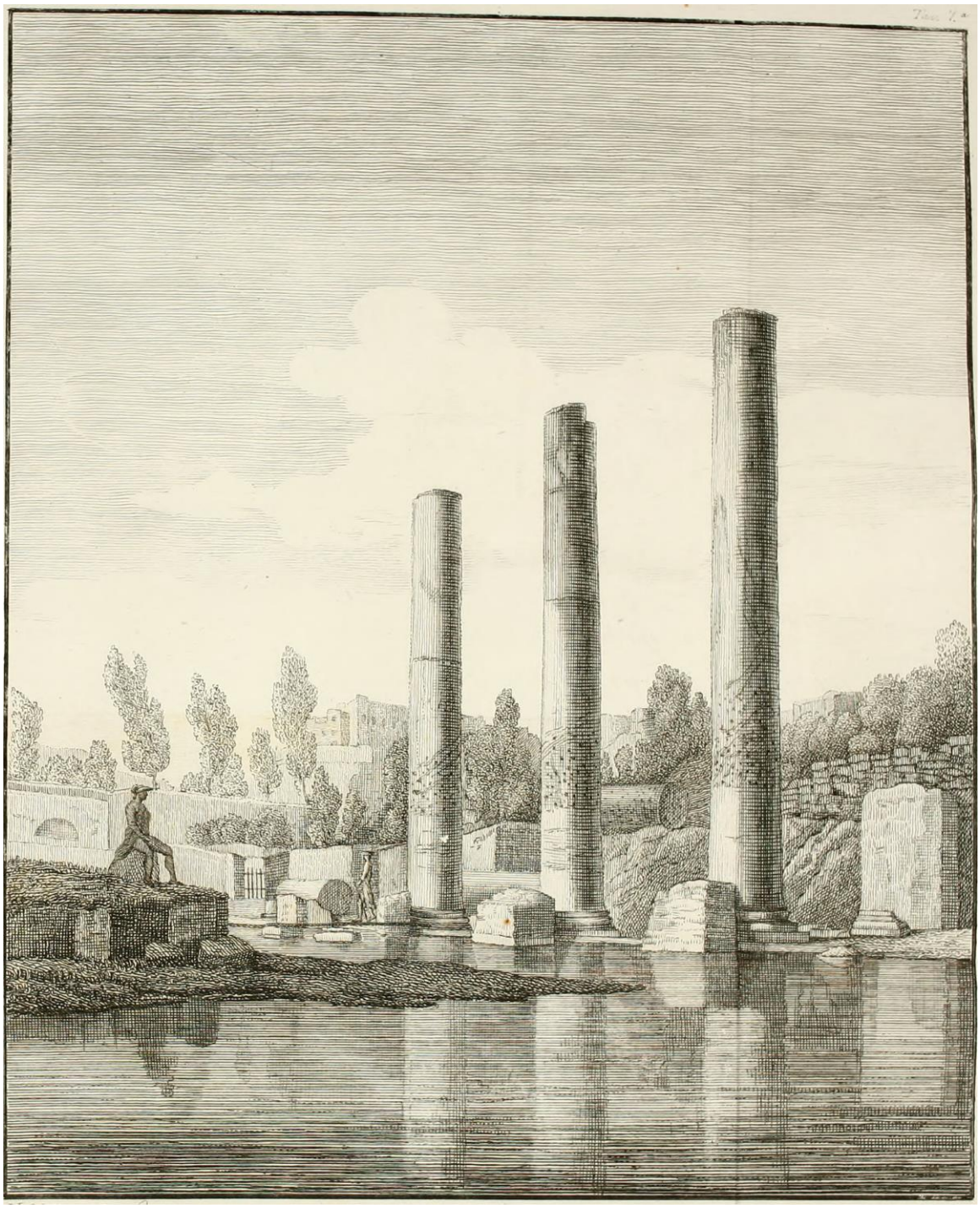

Figure 3.2 John Izard Middleton, *Stato del Tempio di Serapide in Pozzuoli ne 1810*.

In the first volume of *Principles*, Lyell discussed the ruins at Pozzuoli in strikingly ambivalent, even internally contradictory terms. He began by extolling the temple's significance, writing: "this celebrated monument of antiquity affords in itself alone unequivocal evidence that the

relative level of land and sea has changed twice at Pozzuoli since the Christian era."[9] The building was presented as a sufficient and truthful witness "in itself alone" to the rise and fall of the ground on which it stood. However, Lyell immediately followed this declaration with the claim that the landscape surrounding the temple provided all the proof that was needed: "the evidence of this change would have been complete even if the temple had to this day remained undiscovered."[10] Thus in Lyell's account the temple becomes a redundant token: a neat illustration of a point that has already been made by its context. Lyell's frontispiece, with its interpenetration between landscape and ruin, prioritizes this interpretation over scientific accuracy: the wedge shape given to the stripe of bore holes might be necessary to knit the columns into the scene beyond, but it is also an invention. In actuality, there is no angle to the top of this band, as indeed there could not be: the bivalve activity was limited by the level of the water, and the mark it left was subsequently horizontal. This reality is more correctly depicted in Middleton's original, where a bar of sparsely drawn dots largely follows the perspectival level. In Middleton's image, this bar is partly obscured by a competing set of diagonal striations that have nothing to do with the marks left by the mollusks. In the iteration produced for Lyell, these striations are taken for the top boundary of the mollusk-pocked band – an obvious error of transcription that contradicts both Lyell's observations and his interpretation. What the frontispiece engraving emphasizes instead is a new equivalence between architecture and the terrain – as if the Temple of Serapis could and ought to leach into the far more robust materiality of its context. The fact that the marks left by stone-devouring bivalves become the visual registration of this equivalence hints, too, at the nascent prominence of organic activity relative to the mineral world.

[9] Ibid., 517.

[10] Ibid., 518.

Like several prominent geologists of his day, Lyell was interested in architecture. If Soane's grand tour notebooks were filled with as many geological observations as architectural ones, Lyell's early journals show that he was as likely to investigate buildings as he was to examine strata. In Edinburgh in the summer of 1817, Lyell remarked that Robert Adam's recently completed Bridewell Prison was "built with great spirit," and disparaged the ornaments used to weigh down the crown arches of St. Giles Cathedral. On his Grand Tour a year later, Lyell was taken with the "beautiful" villas of Palladio in Vicenza and devoted significant space in his letters and journal to Venetian architecture.[11] Lyell also continued the Huttonian tradition of using architectural terms like "foundations," "walls," and "monuments" in his geological writings.[12] Yet, as his choice of image and claims about the Temple of Serapis begin to indicate, Lyell's engagement with architecture was no longer motivated by a need for legitimacy. Though he and others of his generation continued to exploit architectural vocabulary, they were not nearly as dependent on architectural methodology and expertise as that of his predecessors. Rather, Lyell and his Victorian colleagues treated buildings and their ruins as artifacts from a brief and recent chapter in the history of the earth. In his *Principles,* for example, Lyell described the "céramique" stratum on the Peloponnesian peninsula in Greece:

> Pottery, tiles, and bricks, intermixed with various works of art, enters so largely into the alluvium and vegetable soil upon the plains of Greece, and into hard and crystalline breccias which have been formed at the foot of declivities, that it constitutes a real stratum

[11] Lyell, *Life, Letters and Journals* I: 47, 102-6. A second trip to Italy, made with his father in 1820, when Lyell was suffering from poor health, seems to have been largely devoted to art, architecture, and a picturesque appreciation of the landscape. Lyell, *Life, Letters, and Journals* I:112.

[12] Such imagery appears in every geological work Lyell produced. To take the third volume of his *Principles* as an example of the whole, Lyell alludes to "foundations" on pages 105, 107, and 125, "walls" on pages 69, 85-89, 91, 95, 122-123, and 357, and geological "monuments" on pages 3, 7, 22, 34, 46, 52, 58, 62, 118, 134, 155, 203, 227, 274, 328, 352, 364, and 383. In addition, there are extended analogies with architecture on pages 119 and 344. Charles Lyell, *Principles of Geology, being an attempt to explain the former changes of the earth's surface, by reference to causes now in operation*, (London: John Murray, 1833).

> which might, in the absence of zoological characters, serve to mark our epoch in a most indestructible manner.[13]

Here artifice is folded back into the geological "real" as a cementation of angular fragments: an instance of the inevitable recycling of all human culture into the inorganic matrix from whence it arose. Lyell's experience of the céramique led him to imagine a future stratum composed of fragments rather than an in-situ burial of intact buildings, as suggested by the architecture of Soane and Gandy. Yet Lyell too endowed architectural remnants with existence in near-perpetuity, as either originals or casts:

> We may anticipate with confidence that many edifices and implements of human worksmanship, and the skeletons of men, and casts of the human form, will continue to exist when a great part of the present mountains, continents, and seas have disappeared.[14]

In the same way that pebbles from previous iterations of the earth's surface had survived in new conglomerates, Lyell foresaw "no limit to the perpetuation of some of the memorials of man."[15] He approvingly quoted the early eighteenth-century philosopher George Berkeley, who speculated that weapons and "pillars, vases, and statues … of granite or porphyry or jasper" would outlast humanity itself.[16] Lyell's thinking was partly a reasoned recognition of the stubborn toughness of geological material, whether shaped into cultural artifacts or not, but he was also tapping into the particularly Scottish concept of time as a rotatory force that we first traced in the work of Robert Adam and the words of James Hutton. History's *disjecta membra* were destined to be tilled into ever-new conglomerates.

Between Hutton and Lyell, however, there was an essential difference. Whereas Hutton envisioned a self-repairing geology designed to ensure the indefinite survival of the human race,

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[13] Charles Lyell, *Principles of Geology, being an attempt to explain the former changes of the earth's surface, by reference to causes now in operation*, second edition (London: John Murray, 1833), II: 240.

[14] Lyell, *Principles*, fourth edition (London: John Murray, 1835), III: 279.

[15] Ibid., 279-280.

[16] Ibid., 278-279.

Lyell folded humanity into the system. What had been two analogous yet separate orders of things had been tumbled together into a single mechanism. Gone was the sense of an opposition between culture and nature: between the castle of Culzean and its cliffs, between Adam's fortified composites and the landscapes they confronted. Early in his life, touring the north of Scotland in 1817, it was still possible for Lyell to echo Lord Kames: "One of the inducements to go directly from Staffa to Iona," he noted in his journal, "might be to contemplate the triumph of the architecture of nature over that of art."[17] By the late 1820s, as he labored over the *Principles*, architecture had lost its resisting significance. The contrast was no longer between two types of architecture: the natural and the manmade. Instead, it was between two scales of production – that of the earth, and that of humankind – and the first was capable of engulfing the second.

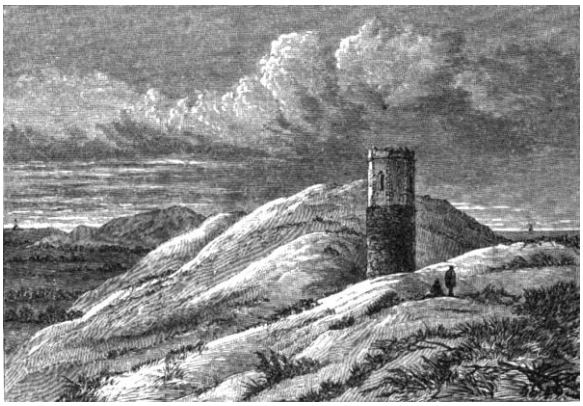

Figure 3.3 "Tower of the buried Church of Eccles, Norfolk, A.D. 1839: The inland slope of the hills of blown sand in show in this view, with the lighthouse of Hasborough, N.W. of the tower, in the distance." Charles Lyell, *Principles of Geology*, 10th ed.

[17] Lyell, *Life, Letters and Journals*, I:51.

Figure 3.4 "Eccles Tower as it appeared after the storm of November 1862, from a drawing by Rev. S. W. King, taken from nearly the same position as fig. 43." Charles Lyell, *Principles of Geology,* 10th ed.

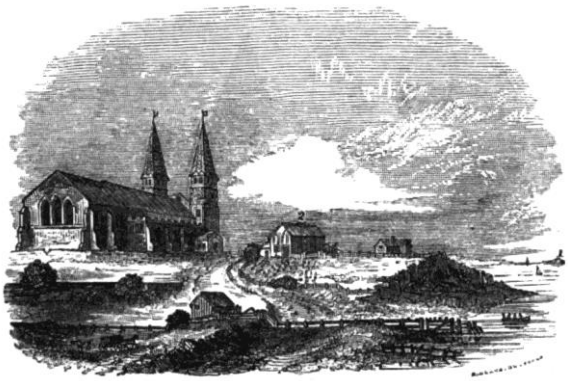

Figure 3.5 "View of Reculver Church, taken in the year 1781." Charles Lyell, *Principles of Geology*, 10th ed.

Figure 3.6 "Reculver Church, in 1834." Charles Lyell, *Principles of Geology*, 10th ed.

Lyell's positioning of architecture within the long durée of the earth's formational processes was typical of Victorian geology as a whole. Buildings were treated as ruled markers, measuring both the horizontal progress of erosion and the vertical degree of relative elevation, and they provided ideal fixed reference points in the landscape. Because of their importance, great age, and durable construction, churches and castles were particularly useful indices of erosion. Lyell, synthesizing a number of geological and historical sources, recounted the loss of the Priory of Crail, originally on the Isle of May off the coast of Fife, to the sea in 1803; discussed the precarious state of Tynemouth Castle, on the east coast of England; listed the churches threatened by crumbling coastlines in Yorkshire; and remarked on the ruined tower of Eccles church, half-buried in the sand

dunes along the Norfolk coast and the sole monument of a series of towns lost to the encroaching North Sea.[18] The iconic presence of Christopher Wren's St. Paul's Cathedral – the monument always considered worthy of being salvaged – was pressed into fresh service. Henry De la Beche, founder of the Geological Survey then underway across England, illustrated the shallowness of the Irish Sea by asking his readers to imagine St Paul's sunk to its deepest depths: "the top of the building would rise to about the surface of the water."[19] Geologists like William Conybeare and William Phillips treated churches as pre-assembled repositories of local stone, rich with fossils and valuable indicators of relative susceptibility to weathering over time.[20] Professor D. T. Ansted of King's College London, author of a popular textbook on geology, compared limestone properties by examining how ornament produced from different varieties had fared. The Bolsover Moor stone used in the Southwell Church in Nottinghamshire was praised because the church's "mouldings and carved enrichments are as sharp as when first executed," while that of Bramham Moore could not be trusted: St. Mary's Church at Beverley was in a "very crumbling state, even to the total obliteration of many of the mouldings and enrichments."[21] A sense that buildings – and especially sacred buildings – could now be *seen through* as well as *looked at* comes across in even the most aesthetically inclined authors. In 1836, a young John Ruskin treated the pristine sharpness of Basle Cathedral's "numerous and delicate ornaments," carved in the early 11th century out of a soft red

[18] Lyell, *Principles of Geology* tenth edition (London: John Murray, 1867), I:508-514.

[19] Henry De la Beche, "On the Formation of the Rock of South Wales and South Western England" in the *Memoirs of the Geological Survey of England and Wales* Vol. I (1846): 265.

[20] See W. D. Conybeare and William Phillips, *Outline of the Geology of England and Wales* (London: 1822) I.IV.II:26; II.I.69; and II.II.123 for examples of churches considered as repositories of local stone; I.VI.II:33 as an example of a church used to mark erosion; and I.V.II:47; II.II.VI:151-152; and II.III.219 as examples of churches used to indicate geologically significant locations.

[21] David Thomas Ansted, *Geology: Introductory, Descriptive, and Practical* (London: J. Van Voorst, 1844) II: 466, 469.

sandstone, as an opportunity to theorize why certain types of rock seemed to harden on exposure to air. He did so at length without once remarking on the building's formal character.[22]

Victorian geologists continued to make comparisons between their own science and architecture. Yet there began to be a binary between professional language, which treated architectural terms as a kind of convenient descriptive shorthand, and works intended for wide popular readership, which labored to equate God's architecture with that of His subjects. George Poulett Scrope, a contemporary of Lyell's who rose to prominence with his radical reinterpretation of the volcanic landscape of Auvergne, France, excelled in making the first kind of comparison. In his landmark *Memoir on the Geology of Central France* (1827), Poulett Scrope described "a sort of lower story of very perfect and well-matched columns" of basalt which produced "an almost architectural symmetry;" called a similar formation of columnar basalt a "façade" with "architectural regularity;" and noted that an exposure of horizontally stacked porphyritic trachyte (a prismatic volcanic rock) "exactly imitates the ruins of Cyclopean walls."[23] On the other hand, Hugh Miller's popular *Testimony of the Rocks, or Geology in its Bearing on the Two Theologies, Natural and Revealed* (1857) contained comparisons between geological forms, produced by the workings of divine natural law; Gothic architecture, produced by Godly societies of yore; and calico patterns, produced by inspired contemporaneous artisans.[24] Another prominent example of this latter approach is *Geology and Mineralogy considered with reference to Natural Theology* (1836) by William

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[22] John Ruskin, "To what properties in nature is it owing that the stones in buildings, formed originally of the frailest materials, gradually become indurated by exposure to the atmosphere and by age, and stand the wear and tear of time and weather every bit as well, in some instance much better, than the hardest and most compact limestones and granite?" Originally published in *Loudon's Magazine of Natural History* vol. 9.65 (September 1836): 488-490; reprinted in *The Works of John Ruskin*, ed. E. T. Cook and Alexander Wedderburn (London: George Allen, 1906), I: 197-200.

[23] George Poulett Scrope, *Memoir on the Geology of Central France; including the volcanic formations of Auvergne, the Velay, and the Vivarais* (London: Longman, Rees, Orme, Brown and Green, 1827), 133-4, 149, 106.

[24] Examples include Hugh Miller's popular *The Testimony of the Rocks, or Geology in its Bearing on the Two Theologies, Natural and Revealed*, in which he compared geological forms to Gothic architecture and calico patterns. (Edinburgh: Thomas Constable and Company, 1857), 59, 224, 232, 238-42.

Buckland, the Oxford geologist whose discoveries in Kirkdale Cave had been followed by Soane. This was Buckland's contribution to the Bridgewater Treatise project – a series of eight publications commissioned to demonstrate the evidence of God in nature to a wider audience, and it contains a number of somewhat strained references to architecture. *Geology and Mineralogy considered with reference to Natural Theology* compares the structure of ammonites, chambered nautili and lily encrinites to Gothic columns, groining, and tracery, and claims that these creatures were "adapted, with architectural advantage, to produce a combination of Ornament with Utility."[25] Here Buckland could presume to speak with some authority, since he was a founding member and vice-president of the Oxford Society for promoting the Study of Gothic Architecture (renamed the Oxford Architectural Society [OAS] in 1848) and the minutes indicate that he was at least occasionally an engaged participant.[26] The geologist Adam Sedgwick, Buckland's Cantabridgian counterpart, was also deeply interested in architecture and a member of the OAS's sister body, the Cambridge Camden Society (CCS).[27] And yet it is striking that when he encountered Buckland's claims of consilience between the forms of geology and those of architecture, he felt no need to uphold them

[25] William Buckland, *Geology and Mineralogy considered with reference to Natural Theology* (London: William Pickering, 1836), I: 341-2, 344, 348, 422, and II: Plate 50: *Body of Encrinites Moniliformis Dissected*.

[26] Buckland is listed as a Vice President in the Officers of this society through 1847. *The Rules and Proceedings of the Oxford Society for Promoting the Study of Gothic Architecture* (Oxford, Oxford Society for Promoting the Study of Gothic Architecture, 1839): np; *Rules and Proceedings* 1840: np; *Rules and Proceedings* 1841: 6; *Rules and Proceedings* 1843: 6; *Rules and Proceedings* 1844:6; *Rules and Proceedings* 1845: 8; *Rules and Proceedings* 1846: 8; *Rules and Proceedings* 1847: 13. For examples of his involvement in the meetings, see the minutes from November 13, 1840, *Rules and Proceedings* 1840:47; the minutes from June 9, 1841, November 3, 1841, and December 1, 1841, *Rules and Proceedings* 1841: 17, 3, 5; the minutes from May 25, 1842, *Rules and Proceedings* 1842: 9; and the minutes from the 6th Annual Meeting of the Society, June 3, 1845, *Rules and Proceedings* 1845: 84.

[27] Sedgwick took "a genuine interest in archeology and architecture." As his editor and biographer John Clark wrote, "no visits give him so much pleasure as those which he paid to English cathedrals." *The Life and Letters of the Reverend Adam Sedgwick*, ed. John Willis Clark and Thomas McKenny Hughes, (Cambridge: Cambridge University Press, 1890), 1: 2. Indeed the letters and journals Clark and Hughes published feature many instances of this hobby. For example, see ibid., I: 128, 133, 218, 228-229, 457, 516, and 518. This volume also includes a picturesque description of Edinburgh and its environs along the lines of Lyell's youthful musings. As Sedgwick turned from a discussion of the area's architecture and natural scenery to social matters, he remarked, "I will say no more of dead things, but I will speak of the living." The remark is noteworthy in that it couples architecture and geology together under the rubric of "dead things". Ibid., I: 264. See also Ibid., II: 132, 402, and 444.

to a fellow scientist. As he put it in a letter to Conybeare in December of 1836, "some of the illustrations (e. g. from Gothic architecture) are false."[28]

Meanwhile, architects were now doing more than engaging with geology for their own purposes and on their own terms, as was the case with the professional encounters between Soane's pupils and the early members of the Geological Society in London. Geology became an authoritative reference, a useful science, and an appropriate metaphor for architecture in much the same way that architecture had functioned for a prior generation of scientific thinkers. An example of this shift is the way stone for the new Houses of Parliament was selected after the medieval Palace of Westminster was destroyed by fire in 1834. As the historian of science Edward Gillin has shown, what would, in a previous generation, have been an architectural decision alone was handed over to a committee composed of Charles Barry, the architect, De la Beche and William Smith, distinguished geologists, and Charles Smith, a "master mason." Tasked with identifying the stone best capable of chemically withstanding the "blackening and decomposing effects of a London atmosphere,"[29] the group visited medieval structures to determine which quarries produced the most impervious building stone over time. As Gillin emphasizes, the committee's published report on their findings from various buildings and quarries across Britain became the definitive reference on building stone until 1870.[30] (In the event this new, scientific approach to materials research did not yield the desired effect. Before the new Houses of Parliament were even completed, it became apparent that the Anston limestone the committee had selected for this important project was

[28] Letter from Adam Sedgwick to W. D. Conybeare, December 5, 1836, *Life and Letters* 1: 469.

[29] The National Archives, Kew, Records of the Board of Works 11/17/5/10, 'Letter from C. Barry to Her Majesty's Commissioners of Woods & Forests &c,' (5 Jul., 1838), quoted and discussed in Edward J. Gillin, "Stones of Science: Charles Harriot Smith and the Importance of Geology in Architecture, 1834–64," *Architectural History* 59 (2016): 281–310. Gillin's book on the *Houses of Parliament and the sciences, The Victorian Palace of Science: scientific knowledge and the building of the Houses of Parliament*, is forthcoming from Cambridge University Press in 2018. The stone selection for this project will be covered more fully in chapter 3 of that work.

[30] Gillin cites G. K. Lott, 'The Development of the Victorian Stone Industry', *The English Stone Forum Conference*, (York, 15-17 Apr., 2005), 46. Gillin, 291.

deteriorating – not necessarily because of its inherent chemical characteristics, but because inferior blocks of a reasonably durable stone had been selected from the quarry without adequate oversight.)[31]

A cross-section of architectural attitudes toward geology can be gleaned from the editorial choices of *The Builder* in 1845. In that year, the periodical provided an extensive description of the Museum of Practical Geology, a new institution that foregrounded the connections between architecture and the earth sciences and captured the public imagination. It also reported on the progress of the stone selection for the Houses of Parliament, reflected on the increasingly apparent economic utility of geology, and recommended Dr. Ansted's geological textbook to architectural readers. In the same year, *The Builder* published a lecture on the geological characteristics of marble, treated the Temple of Serapis as an object of equal architectural and geological interest, and speculated that it might prove difficult to differentiate primitive man-made structures from natural formations like columnar basalts. *The Builder* also eulogized Thomas Webster in an obituary that acknowledged both his architectural and geological careers.[32] By the mid-1850s, geological articles appeared regularly in the architectural press without introductory explanations of why such scientific news would be of interest to architectural audiences. The connection had already been sufficiently made by institutions like the Museum of Practical Geology and through the efforts of experts like Charles Smith, who, as Gillin has shown, went on from his role in selecting the stone

[31] Gillin, 302-303. See also Timothy Hyde, "'London Particular:' the City, its Atmosphere and the Visibility of its Objects" *The Journal of Architecture* vol. 21:8 (2016): 1274-98.

[32] "The Museum of Economic Geology," *The Builder: An Illustrated Weekly Magazine for the Architect, Engineer, Archeologist, Constructor, and Artist* Vol 3 (1845): 87; "The Museum of Economic Geology," Ibid: 267 (on its new and expanded premises, designed by James Pennethorne in consultation with Henry De la Beche); "First Judgements on New Discoveries," Ibid: 106; "The Geologist's Textbook," by Professor Ansted [Review], Ibid: 129; "A Chapter on Marble," Ibid: 39; "Ruins of Ancient Town in the Caroline Islands," Ibid: 624; "Obituary: Mr. Thomas Webster," Ibid: 23. The dates for each article were not given in this early volume.

for the Houses of Parliament to become a recognized authority on the intersections between architecture and geology.[33]

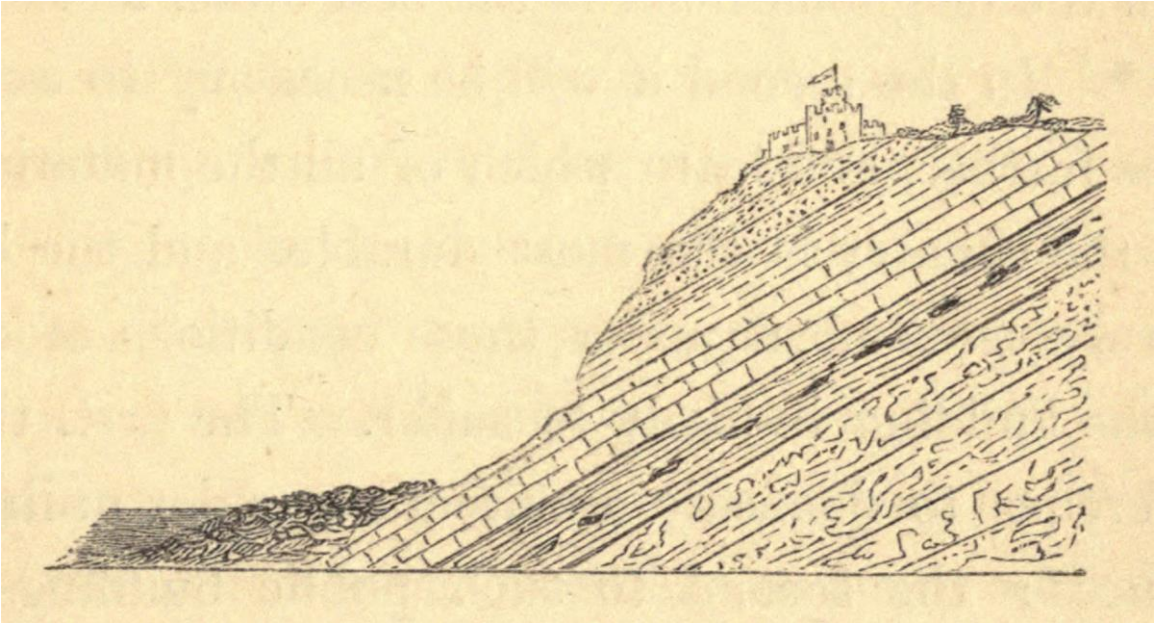

Figure 3.7 This illustration from D. T. Ansted's *Geology: Introductory, Descriptive, and Practical* (1844) is meant to demonstrate the practical relevance of geological dip to architecture. The castle is in danger of sliding into the valley below, along with its substrate. The image calls to mind Robert Adam's Culzean Castle.

Perhaps because of institutions like the Museum of Practical Geology and prominent projects like the Houses of Parliament, architecture and geology were linked in the popular imagination as well. "What would people think," Charles Dickens asked the readers of *Household Words*, "if a new chain of mountains were to rise up, one night, the whole length of Regent Street, London? or an unheard-of crater were to swallow up the greater part of Hertfordshire?" He continued:

> Oh no! Geological changes in the nineteenth century are out of the question. They would cause great inconvenience. Our settlements are secured on the family estate, and that, of course, ought to be a sufficient security. No one expects his park, timber, or mansion to be either lifted halfway up to the moon, into an air-pump atmosphere, above breathing-point,

[33] The Builder, for example, provided a detailed report of Smith's lecture on the geological characteristics of suitable building stone at the Architectural Museum on Monday, May 26, 1856. "On the Varieties of Stone Used for Architectural Carving," June 7, 1856, *The Builder* vol. 14 (1856): 306-8.

> like a range of the Himalayas; nor to be dropped into a great deep hole, as if we deserved to belong to the Dead Sea.[34]

The same kind of uplift and depression that Lyell had identified as the agent responsible for the stripe across the columns at Pozzuoli is exaggerated here to a rise equivalent to the earth's highest mountains and a fall as low as its lowest valley. This cartoonish undulation is placed into the absurdly incommensurate context of economic stability and social conventions. In Dickens' flight of fancy, the urban surface became the plane of "well-behaved composure" onto which imaginary geologies, with their unruly timescales, threatened to erupt. The body of Dickens' essay addresses the terrifying pace of erosion along Britain's northeast coast (as measured by progressively undermined buildings): a geological change that was indeed unfolding in the nineteenth century, and within the observational span of a single generation.[35] The ironic way Dickens foregrounded this topic points to a significant development in Victorian geological thought. As opposed to their Georgian predecessors and the majority of their continental colleagues, Victorian geologists were conceptualizing continual geological activity like erosion in a new way. Geological changes that had previously been thought of as *historical* were now inserted into the modern world in deeply uncomfortable ways. Gone were the comforting plateaus of quietude between catastrophes, as too the sense of cleanly divided geohistorical epochs. As Martin Rudwick has discussed, what made Poulett Scrope's interpretation of the Auvergne so original was that he refused to divide it into a periodized landscape of antediluvian basalts gouged by the waters of a great historical flood. Rather, he understood it as a territory shaped by many successive eruption events in the context of steady alluvial erosion. Lyell, who promoted a "uniformitarian" interpretation of earth processes based on

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[34] Charles Dickens, "What is to become of us?" *Household Words* V (1852): 352. Michael Freeman quotes a small portion of this essay in his authoritative *Victorians and the Prehistoric: Tracks to a Lost World* (New Haven: Yale University Press, 2004), 120.

[35] Dickens, 352-356.

a similar belief in gradual, ongoing change (a position he had inherited from Hutton), found Poulett Scrope's work a valuable reference for his own.[36] The picture that emerged (to the discomfort of commentators like Dickens) was of geology as an intrusive presence capable of disorganizing, and indeed undermining, the architecturalized thickness of ordinary routines in real time.

In the context of this larger geological awareness, it is striking that the sense of proleptic ruin marking Soane and Gandy's works was more fully explored by geologists and writers than it was detailed into Victorian architecture itself. It was too unsettling for the discipline to consider its material artifacts in the context of geological time and geological forces. What emerged, instead, was a sense of alignment with biology, in which architecture, like the fossilized remnants of extinct species or the contemporary plethora of flora and fauna, would no longer be understood in confrontation with the mineral mechanics of the globe but rather in the context of it. The discipline was to be linked with organic development and diversification rather than the inorganic material from which it was hewn and shaped. The Victorian scientific gaze had turned the lithic piles of medieval churches into repositories of other significances. Yet, paradoxically, it was through their history, and most importantly, through their registration of change over time, that such buildings were to matter for the same reason that fossils and indicator species mattered: as registers of a persistent vital impulse in the midst of the "dead life" of the world. Precisely at the moment when geology conquered the British popular imagination, saturating the press, art, literature, and architectural discourse itself, Victorian architects began to talk of life.

Dissona et contraria

The top halves of G. E. Street's chancel walls at All Saints Boyne Hill are striped. Bands of ocher, verdigris, and garnet glazed tile are lined with glazed black tile and unglazed brick, and

[36] Martin J. S. Rudwick, "Poulett Scrope on the Volcanoes of Auvergne: Lyellian Time and Political Economy," *The British Journal for the History of Science*, Vol. 7.3 (Nov., 1974): 205- 242.

sandwiched between thick bands of alabaster. Starting from the bottommost set of stripes, the shiny yellow is bounded by dull brick, then shiny black, yet the green and red stripes are treated the other way around, with black tile surrounds between them and the brick. Alabaster, translucent and dully lustrous, gives and takes the light in equal measure; it functions here as a neutral. Brighter than the rest of the palette, yellow and green are double-lined in brick and black, but only a thin stripe of tile separates the red from the stone. What the gaze first registers as an organized, if unequal, pattern unfolds strangely. An impost band runs from the spring points of the north chancel windows, bisects the pillars to each side of the east window, and becomes a sill band on the other side. The pattern pretends to absorb this interruption, but it does not. The verdigris stripe is displaced upwards. Its lining thickens: black, brick, then black again. Now the red is flanked on both sides. The yellow is triple-lined when its turn comes, like the green. Then five stripes of black and brick to either side of one green, five and then four to one red, five again on each side of the yellow, before all strong color and the alabaster disappear. This is a non-linear pattern: a sequence of differentiated similarities. It is a sequence, not only of color, but also of light reflectivities and absorptions. The luminescence from the stained glass windows animates the space with glimmering threads. Even if the pattern repeated exactly, these flashes and glints of borrowed color would render it endlessly changeable.

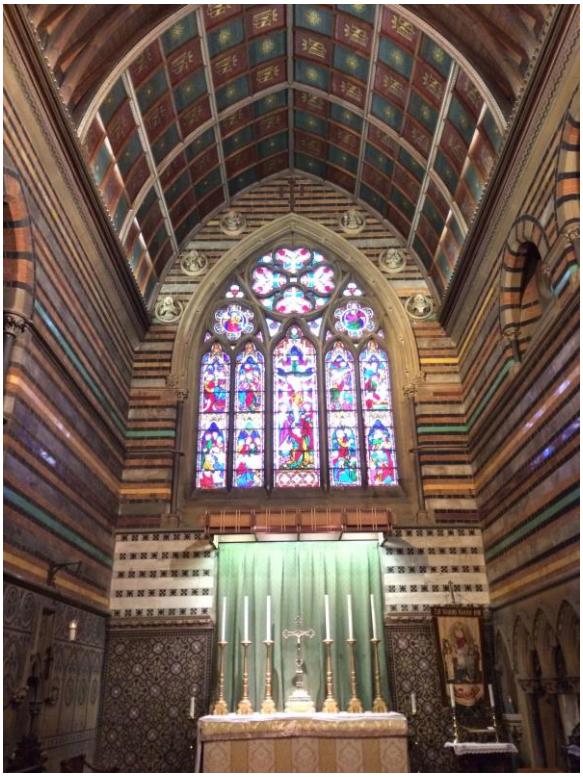

Figure 3.8 G. E. Street, chancel of All Saints Boyne Hill, Maidenhead, Berkshire, facing east.

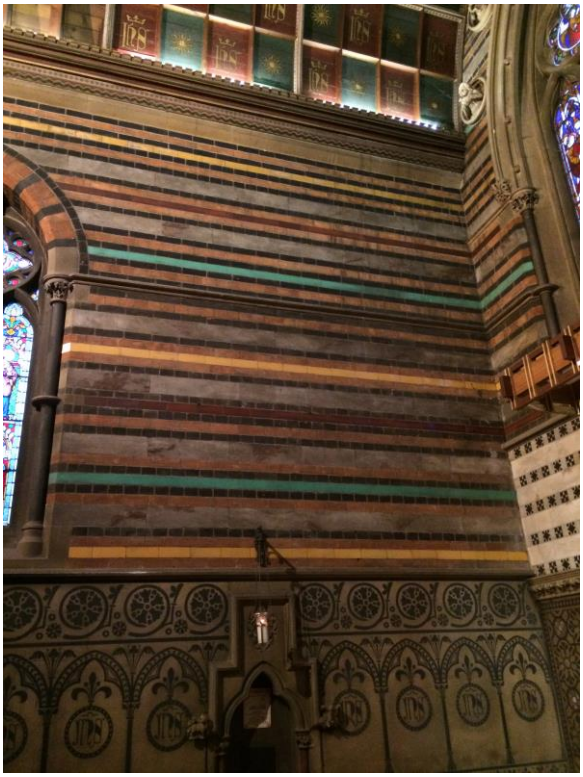

Figure 3.9 North wall detail of chancel stripe pattern.

Against this vibrating background, the discrete liturgical elements that populate the chancel spring to individuated life and begin to conform to their own distinct architectural idioms. Decked in gray stone, the picina and credence shelf, sedilia, and vestry door form a unified composition. The aumbry, its own tiny sanctuary, is echoed and extended by a band of stenciling that registers its shape on the adjacent wall. There are upper and lower registers of clashing inlay to each side of the high altar, and, in Street's original configuration, there was also a reredos (now partly dismantled) behind the altar with its own pattern of hemispherical marbles set in an alabaster diaper.[37] At the corners of the chancel, all of these various patterns and bands fail to resolve. Rather, they seem to simply slip past each other and continue on, as if they were vectors with little relationship beyond their temporary intersection.

Figure 3.10 G. E. Street, south wall of the chancel of All Saints Boyne Hill, stone group of pisina and credence shelf (left), sedilia (center), and vestry door (only partially visible, at right).

[37] The reredos Street originally installed was partially dismantled in the 1940s – perhaps because it was seen as too "high church" by the vicar at the time – and is currently concealed behind a modern dossal. Anonymous, *The Parish Church of All Saints Boyne Hill, Maidenhead*, (Cheltenham, Tower Publications: 1989), [8]. I am grateful to Ken Smith, Berkshire historian and the undisputed expert on All Saints Boyne Hill, for showing me what is left of the original reredos and explaining its demolition in January 2017.

Figure 3.11 North wall of the chancel of All Saints Boyne Hill, featuring an aumbry (right) with similar stenciled patterns on each side.

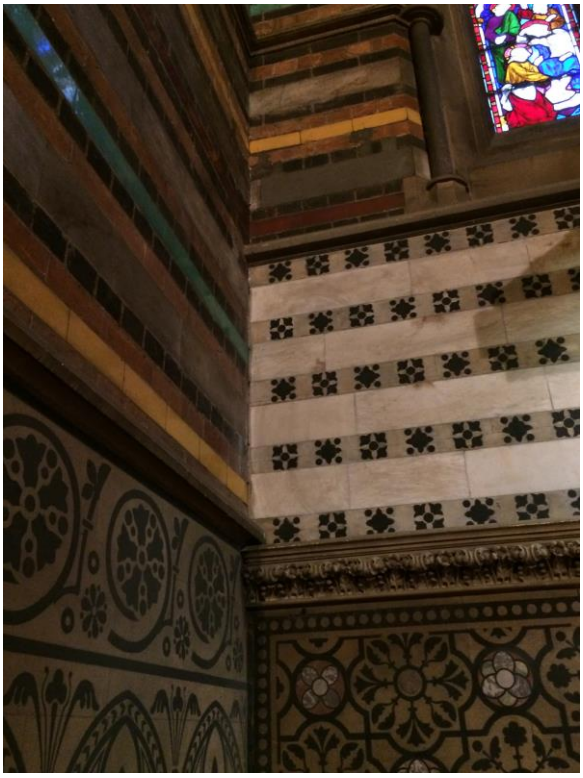

Figure 3.12 Corner detail of the chancel at All Saints Boyne Hill.

Figure 3.13 All Saints Boyne Hill interior, looking from the nave toward the chancel.

Figure 3.14 Rounded and clustered columns.

Figure 3.15 Rounded and clustered columns.

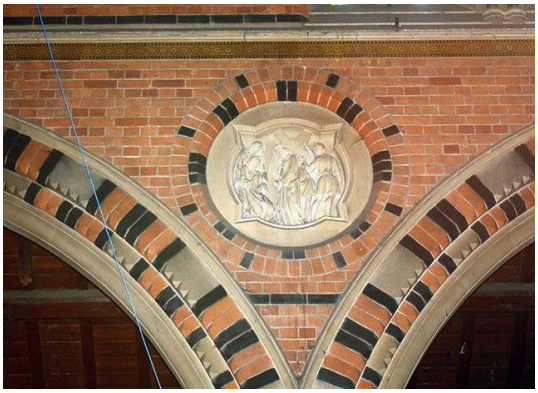

Figure 3.16 Nave roundels and arcade.

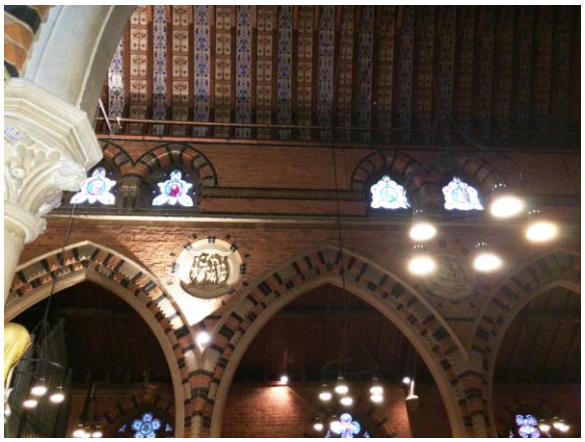

Figure 3.17 Misaligned clerestory windows and nave arcade from the interior.

Figure 3.18 Misaligned clerestory windows and nave arcade from the exterior.

This same, almost unheeding, differentiation between clashing constructional or functional elements emerges as the central organizing feature of Street's church. The dwarf screen, pulpit and font are carved out of a pink Bath stone that is distinct from the materials used elsewhere in the church, as though these sacred elements had been dropped into All Saints Boyne Hill from another, more heavenly, structure. The columns of the nave alternate in section – a rare decision in the 1850s, when this church was designed. Clustered and rounded in turn, they support a polychromatic, roughly dogtoothed arcade with two orders that never match up. The two bands of decoration surrounding the roundels above each column are likewise always one tick off. There is also a startling disconnect between the rhythm of the nave arcade, which aligns with the aisle windows beyond, and that of the clerestory windows above. The two punctuated horizontal bands are out of sync, as though they were spliced together without first matching their ends. This maneuver is unprecedented.[38] Even William Butterfield, a colleague of Street's with a decided propensity for letting things "collide grotesquely," to use John Summerson's phrase, lined his

[38] There is something of a precedent for alternating columns in large-scale medieval cathedral projects like Canterbury Cathedral, which was a multi-generational construction project in which different phases followed different stylistic preferences, and alternating piers often feature in Romanesque churches. But in 1854, when Street designed All Saints Boyne Hill, alternating columns were a bold stroke. Butterfield, the most iconoclastic architect of Street's generation, didn't attempt this design maneuver until 1876, in St. Mark Dundela, Belfast, Ireland. See Paul Thompson, *William Butterfield* (Cambridge: The MIT Press, 1971), 165, 432.

windows up with his arcades.[39] To do otherwise, as All Saints Boyne Hill demonstrates, breaks the legibility of a Gothic building's vertical lines of force, and implies the presence of competing horizontal bands of structure. And although this design decision is anomalous, it is not a mistake: Street went on to make the same move again in a slightly later commission, the Church of Saints Philip and James (1860) in North Oxford.

Figure 3.19 G. E. Street, Church of Saints Philip and James, North Oxford, 1860.

At All Saints Boyne Hill, the headlight tracery at the top of each aisle window is different. The shape of each pair of offset clerestory windows is unique – an approach that is also maintained at Saints Philip and James. On the exterior of the church, the stripes on the main building do not align with those on the tower, and each stage of the tower has its own distinct stripe pattern. Each adjacent building that makes up Street's quadrangle of vicarage, school, infant school, and clergy housing at Boyne Hill has its own decorative logic. On the exterior of the main church building,

[39] There is little precedent for this in the Middle Ages. The architectural historian Peter Draper labels West Walton, a church in Norfolk in which "the clerestory bears no discernable relation to the arcade below," an "exceptional case." Peter Draper, *The Formation of the English Gothic: Architecture and Identity* (New Haven: Yale University Press for the Paul Mellon Centre for Studies in British Art, 2006), 191.

half of the stripes on the aisle blocks do not turn the corner to meet the stripes of the chancel's volume.

To put Boyne Hill's persistent discordance into context, it is useful to compare Street's design to Butterfield's church at Baldersby St. James, North Yorkshire (1855-57), which was also a new parish designed at the same time.[40] In Butterfield's church, all the piers are the same, the stripes in the chancel are integrated into the rest of the decoration in placement, proportion and coloration; the stone of the dwarf screen and pulpit matches the lighter stone used throughout, the orders of the arcade arches are aligned, the clerestory windows are neatly centered at the apex of each arch below, and all the window shapes, including the tracery in their headlights, are the same.

Figure 3.20 William Butterfield, interior view of the parish church at Baldersby St. James, North Yorkshire. In Butterfield's design, the sill band that runs along each side of the nave terminates into the chancel arch – a typical design solution for the time. At Boyne Hill, such a resolution is actively avoided. See Figure 3.13.

[40] On Baldersby St James, see Thompson, *William Butterfield*, 430.

And yet an architectural unity is present at All Saints Boyne Hill, albeit of a tense, sometimes barely ascertainable kind. Where surfaces and colors conflict, as they do in the chancel, liturgical functions bind them together. Where forms and functions are juxtaposed, as they are in the nave, material and color coincide. Likewise, the exterior differences that mark each programmatic component of the All Saints compound are still unified by a material and decorative palette, and although gable projections and window heights vary, the buildings are configured on the site in a tight, continuous arrangement. In all cases, the viewer has an impression of a variety of elements that are just barely held together by a minimum registration, whether of material, color, physical adjacency, or ritual. The nature of the link changes relative to each area and scale of the design.

All Saints Boyne Hill was a privately funded commission intended to introduce what was, at the time, a sparsely populated area of Berkshire to a brand of high-church theology known as Tractarianism.[41] This was a radical attempt to reanimate the Anglican liturgy by reintroducing aspects of ritual that had been lost or suppressed when the Church of England was established after the Reformation. Conceived in the ecclesiastical hothouse of Oxford University, Tractarianism was sometimes identified as the Oxford Movement. Its most prominent thinkers, including John Henry Newman, John Keble, and Edward Pusey, began publishing an influential series of "tracts" advocating their position in 1833, and although Oxford remained an important center, Tractarianism quickly spread beyond its academic confines. Because of the Tractarian focus on rites and procedures that required spatial accommodation, architecture was an important consideration from the first. Several prominent church architects, Street and Butterfield among them, espoused

[41] Bridgeen Fox, "The Church of All Saints Boyne Hill, Maidenhead: 'The Tractarian Cathedral of an Upper-class Suburb,'" in ed. John Elliott and John Pritchard, *George Edmund Street: A Victorian Architect in Berkshire* (Reading: Centre for Continuing Education, The University of Reading, 1998), 47.

Tractarian theology and indeed worshipped in Tractarian churches.[42] As was the case with Butterfield's All Saints Margaret Street church in London (1850-9), All Saints Boyne Hill was a kind of demonstration project, intended to model the proper architectural receptacle for the full liturgy the Oxford Movement advocated.[43] As such, it energetically embodied a favorite concept shared by Tractarian theology and architectural theory alike: development.

As the architectural historian Michael Hall has discussed, "development" was a powerful concept in the Victorian period that had simultaneous purchase in both scientific and religious circles.[44] From the scientific perspective, development was a biological concept naturalists, paleontologists, and geologists used to make sense of the fossil record their research revealed. In nineteenth-century discourse it specifically referred to the controversial transmutational theory of Jean-Baptiste Lamarck (1744 –1829), a French naturalist who posited that development was the fundamental quality of animate life.[45] Lamarck dismissed the new chemistry of Lavoisier, preferring instead the older model of alchemical fluids and polarities. For Lamarck, all matter was in a low-level state of agitation because of certain inherent self-differentiating and complexifying forces. In inorganic material, these forces produced crystallization – a process that, as the next chapter will discuss, also became a powerful model for architecture. In animate life, these forces, stimulated by what Lamarck called "exciting causes" like galvanic action, produced "invisible, subtle, expansive fluids," capable of "etching canals between delicate tissues." These pathways split former wholes

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[42] For example, Street worshipped in Butterfield's All Saints Margaret Street when he was resident in London, and even became a deacon there. Arthur Edmund Street, *Memoir of George Edmund Street, R. A., 1824-1881* (London: John Murray, 1888), 47-48.

[43] Thompson, *William Butterfield*, 4; Fox, 47-48.

[44] Michael Hall, "'Our Own': Thomas Hope, A. J. B. Beresford Hope and the Creation of the High Victorian Style," *The Victorian Society: Studies in Victorian Architecture and Design* 1 (2008): 63.

[45] See Charles Lyell, *Principles of Geology* II: 2-17; Buckland, *Geology and Mineralogy* I: 585; and Sedgwick, "Appendix IX: Additional Remarks on 'the Vestiges of Creation'…" in *A Discourse on the Studies of the University of Cambridge,* fifth edition, (London: John W. Parker, 1850), 248. In each case these Victorian geologists specifically associate "development" with the theory of Jean-Baptiste Lamarck.

into separate entities and carried agitating fluids further into an organ's interior, contributing to still more internal differentiation. Lamarck posited that this fractal, ever-intensifying diversification was only halted or constrained by environmental limits, and then only temporarily, since the "irritation" or "nervousness" that characterized life responded to such limits by developing differently, until either the external limit changed or was overcome.[46]

Figure 3.21 Godmersham Church font.

Figure 3.22 Braishfield Church font.

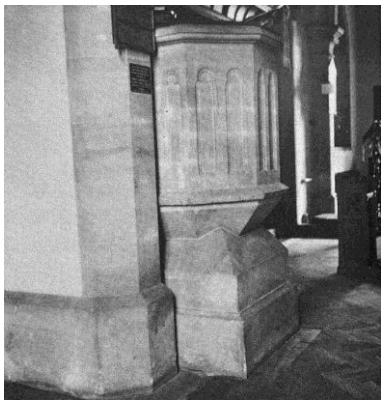

Figure 3.23 Coalpit Heath Church pulpit.

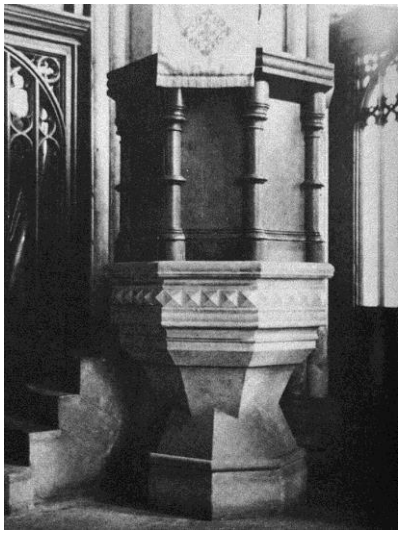

Figure 3.24 Amesbury Abbey pulpit.

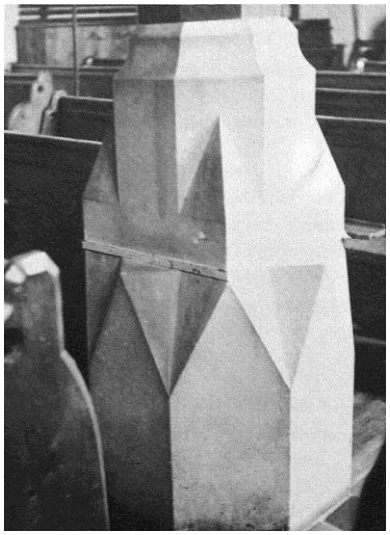

Figure 3.25 Mapledurham church pier base.

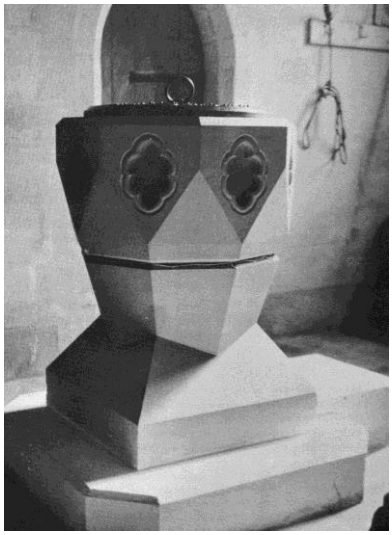

Figure 3.26 Netherhampton church font.

Figures 3.21 – 3.26 The crystalline forms of these fonts, pulpits and piers by William Butterfield reveal the Victorian fascination with the faceted and prismatic forms of the mineral world.

[46] *Britannica Academic*, s.v. "Jean-Baptiste Lamarck," accessed March 31, 2017, http://academic.eb.com.ezp-prod1.hul.harvard.edu/levels/collegiate/article/Jean-Baptiste-Lamarck/46919; Jean-Baptiste Lamarck, *Zoological Philosophy: an exposition with regard to the natural history of animals* [originally published in French as *Philosophie zoologique*, 1809] trans. Hugh Elliot (London: Macmillan & Co., 1914), x, 200-218.

This was what the rock record revealed: a gradual transition from very simple, very primitive animals to ever-more-complicated assemblages. In the context of Lamarckian thought, the word "assemblage" is particularly appropriate because Lamarck believed that all but the simplest life forms were more accurately seen as hybrids and compounds: plants were actually "compound plants;" animals were really "compound animals."[47] And life, that magical nervous movement of fluid through these compounds, sprang from their very aggregate nature.[48] It was stimulated by the conflict created by what Lamarck described as "the tendency of the constituent elements of compounds to free themselves from their state of combination" – the individual impetus to keep differentiating, to develop separately and autonomously, according to internal principles.[49] Furthermore, the moment this process stopped, or slacked, or stilled – the moment, paradoxically, that harmony or equilibrium between these conflicting factions was achieved – was the moment that death began.[50]

It might initially seem strange to associate Lamarckian development, which was seen as radical, even outré, in British scientific circles, with a high-church theological movement like Tractarianism. Yet whether or not the founders of the Oxford Movement explicitly modeled their notion of development on Lamarck's ideas, as some scholars have argued, they certainly used similar concepts for their own ends.[51] In his *Essay on the Development of Christian Doctrine* (1845), Newman described the development of living doctrine as a process in which its "most diversified

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[47] Jean-Baptiste Lamarck, *Zoological Philosophy*, 199-200.

[48] Ibid., 201.

[49] Ibid., *Zoological Philosophy*, 254.

[50] Ibid., 249.

[51] The link is between Tractarian "development" and Lamarck's theory by the same name has been explicitly made in Ralph Keen, *The Christian Tradition*, (Upper Saddle River, N.J., Prentice Hall, 2004), 306. Although very similar models of vitality achieved through conflict were at work in both Tractarian theology and Lamarckian biology, it remains unproven that one group borrowed consciously from the other.

aspects" were opposed in a "warfare of ideas, striving for mastery."[52] For Newman, a particular aspect of theology was most vibrant when it seemed a bit discordant and unresolved relative to the doctrinal whole that made up the Christian faith.[53] In his words, it was in "in the collision and conflict of opinions" that God's revelation "was to succeed in purifying, assimilating, transmuting, and taking into itself the many-coloured beliefs, forms of worship, codes of duty, schools of thought, through which it was ever moving."[54] In 1843, Pusey gave a sermon entitled "The Holy Eucharist a Comfort to the Penitent," which was judged "*dissona et contraria*" to the doctrine of the Church of England and resulted in his suspension from preaching for two years – an extraordinary disciplinary measure that sharply increased sales of Tractarian literature.[55] Although the controversy centered around Pusey's assertion of material transubstantiation – the idea that the Eucharist really transformed into Christ's flesh and blood – the sermon is also striking for its emphasis on the Eucharist as a life-augmenting "effluence" that Pusey imagined "circulating through the whole Body, into which He shall have 'knit things in heaven and things on earth.'" In his sermon, Pusey wrote that both communion and baptism "engraffed" the "disharmonized" individuals of the church into a single spiritual unity:

> The Life which He is, spreads around, first giving Its own vitality to that sinless Flesh which He united indissolubly with Himself and in It encircling and vivifying our whole nature, and then, through the bread which is His flesh, finding an entrance to us individually, penetrating us, soul and body, and spirit, and irradiating and transforming into His own light and life.[56]

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[52] John Henry Newman, *An Essay on the Development of Christian Doctrine*, (London: James Toovey, 1845), 39.

[53] Ibid., 37-40. Newman's discussion of "the process of development in ideas" in this section of his text follows the biological model of development particularly closely.

[54] Ibid., 356-357.

[55] "Pusey, Edward Bouverie (1800–1882)," Peter G. Cobb in *Oxford Dictionary of National Biography*, eee ed. H. C. G. Matthew and Brian Harrison (Oxford: OUP, 2004); online ed., ed. David Cannadine, October 2009, http://www.oxforddnb.com.ezp-prod1.hul.harvard.edu/view/article/22910 (accessed March 31, 2017).

[56] Edward Pusey, "The Holy Eucharist a Comfort to the Penitent," (1834) accessed on Project Canterbury, March 31, 2017, http://anglicanhistory.org/pusey/pusey4.html.

The same vision of individuals pulled into a larger unity by a circulating vital fluid that characterizes Lamarck's biology is present here.

The Cambridge geologist Adam Sedgwick, a contemporary observer whose own expertise spanned theology, architecture, and science alike, traced a connection between these two discourses. Sedgwick despised the Oxford Movement's perceived Romish tendencies as "pregnant with evil."[57] While the OAS had been linked to Tractarian figures and ideas from the start (both Newman and Pusey were members), Sedgwick was dismayed to discover that the CCS, in which he was a member, had been infiltrated. This precipitated a crisis within that organization that culminated in 1845, when Sedgwick and many other prominent figures withdrew.[58] Coincidentally, in that same year he also took on the role of public adversary to Lamarckian development, which had just burst into the English-speaking mainstream in the form of a sensational anonymous book entitled *Vestiges of the Natural History of Creation* (1844).[59] The similarity between Tractarian and Lamarckian ideas struck the architecturally literate Sedgwick forcibly. In a long preface to the fifth edition of his *Discourse on the Studies of the University of Cambridge* (1850), Sedgwick tied the two intellectual movements together, attacking Lamarckian thought and the authors of *Tracts for the Times* alike and asking "whether some strange doctrines of development may not have been tainting the speculations of certain members of our Church."[60] Whether or not Tractarians deliberately borrowed from Lamarck's biological theory, Sedgwick made the connection for them.

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[57] Quoted in James F. White, *The Cambridge Movement: The Ecclesiologists and the Gothic Revival* (Eugene, Wipf & Stock, 1962), 153.

[58] Ibid., 150-153.

[59] For a detailed history and close analysis of Sedgwick's role in defending mainstream science from the Lamarckian claims in *Vestiges*, see James A. Secord, *Victorian Sensation: The Extraordinary Publication, Reception, and Secret Authorship of* Vestiges of the Natural History of Creation*,* (Chicago: The University of Chicago Press, 2000), 231-47.

[60] Adam Sedgwick, "Preface to the Fifth Edition," *A Discourse on the Studies of the University of Cambridge*, (London: John Parker, 1850), ccclxxiii.

Lusis naturae

Development initially made its way into architecture in a very obvious manner. One of Lamarck's basic principles was that organisms have the ability to build up exterior manifestations of interior habits. If an animal is constantly using a particular muscle, it becomes more pronounced; if an organ that had been used for one task is now required for several, it becomes more complex. Lamarck believed that such acquired characteristics could be handed down to offspring, and thus a series of infinitesimal adjustments could become a completely new trait. The implication was that if a biologist wanted to trace, not just the comparative differences between species or between individual specimens of a species, as Cuvier had done, but the actual direction or tendency of its development or devolution over time, it would be necessary to assemble a history of gradual changes in form. Likewise, in his *Essay on the Development of Christian Doctrine*, Newman used the "considerable alteration of proportion and relation" evident in biological development as an analogy for the constructive changes he was attempting to trace in the teachings of the Church: "if beasts of prey were once in paradise," he wrote,

> and fed upon grass, they must have presented bodily phenomena very different from the structure of muscles, claws, teeth, and viscera which now fit them for a carnivorous existence.[61]

The logical inference was that developments in form necessarily followed changes in function. In the case of church doctrine, Newman argued, both external pressures and internal advances could produce more sophisticated additions to existing knowledge, and the true causes for such shifts could be retrospectively identified by studying changes in the church's teachings over time.

It is helpful to keep this context in mind when considering James Parker's paper on "architecture and geology," read to the OAS on November 16, 1859. Parker referred to Buckland's

[61] Newman, *An Essay,* 58.

Bridgewater Treatise as he sketched a comparison between the First, Second, and Third Pointed periods of Gothic architecture, and the Primary, Secondary, and Tertiary geological epochs, and Buckland himself was likely in the audience. However, Parker's overall point was not that architectural styles were like strata but that they were like the fossils that these strata revealed. Just as the ammonites Buckland described and illustrated were exquisitely adapted to physical constraints and functional requirements, so too "true Gothic style" designs were adapted to materials, and ornament emerged from use.[62] His paper, reported at length in the *Builder*, concluded with the appeal:

> In the stone of the quarry, marked by the impressions of living things, if we read faithfully and carefully, we can trace the history of the earth; so too in the stone of the building, marked by the chisel, if we will but care to open the book rightly, we can read the history of our country. English architecture does not present a series of men's fancies, any more than the strata of the earth presents, as was thought some years back, a series of 'Lusis naturae.'[63]

Before the advent of modern paleontology, fossils had often been dismissed as curiously figured stones or *lusis naturae*, jokes of nature. Here, then, the analogy is between fossiliferous stone "marked by the impressions of living things" and ornamented buildings "marked by the chisel," both registering a developmental progress that could be read backwards in time. And, carefully studied and correctly interpreted, both types of ossified productions would reveal adaptations born out of biologically necessary growth and change.

Parker referred specifically to Gothic architecture, as opposed to the classical antiquity of Greece and Rome, because it was considered the indigenous building type of the British Isles: something that had naturally emerged to suit the needs and manners of the population. As such, he believed it had developed over time in precisely the same way that organisms in pre-Darwinian

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[62] Report of a paper by James Parker on Architecture and Geology, given to the Oxford Architectural Society on November 16, 1859, *The Builder* 17 (November 26, 1859): 781.

[63] Ibid.

evolutionary thought were supposed to have adapted in response to environmental change. This position was broadly characteristic of the great movement for the study of medieval church architecture which swept through England during the nineteenth century. Ecclesiology, as the new field came to be called, was championed by both the OAS and the CCS. The CCS was a particularly active group, publishing a number of influential tracts in addition to *The Ecclesiologist*, a highly regarded architectural periodical. Both the OAS and the CCS referred to Gothic churches as "specimens:" the same word geologists used for fossils, and as we have seen, both retained prominent geologists as members.[64] The aspiration to "something of the completeness of an exact science," as one contributor to the *Ecclesiologist* termed it, was explicitly acknowledged. In the inaugural issue of that periodical, J. S. Howson set the tone when he insisted "that Ecclesiology, like Astronomy and Geology, is an Inductive Science," that dealt with "particulars" rather than "generalizations."[65]

The term "inductive science" is significant because it points to the influence of one of the great scientific philosophers of the early Victorian era, William Whewell. An amateur architectural historian as well as a geologist, Whewell wrote at length about the similarities between the two areas of inquiry in his greatest work, *The Philosophy of Inductive Sciences, Founded Upon Their History* (1840). He grouped the study of architecture with geology under a single subcategory of induction he termed "palaetiological sciences:" or sciences concerned with tracing progressive development

[64] For the OAS's use of "specimen," see, for example, the *Proceedings of the Oxford Society for Promoting the Study of Gothic Architecture* (1839-41) [There is no consistent pagination for this volume, but the term is often used in the minutes throughout.]. For the CCS's use of the same term, see, for example, the *Transactions of the Cambridge Camden Society* (1839-1841): 4, 7, 8, 12, 22, etc.. For the use of this same term by geologists of the period, see, for example, William Conybeare and William Phillips, *Outlines of the Geology of England and Wales, with an Introductory Compendium of the General Principles of That Science, and Comparative Views of the Structure of Foreign Countries …* (London: W. Phillips, 1822) I: 9, 10, 12, 25, 28, etc.

[65] *Ecclesiologist* I: 60. Quoted and discussed in White, 49.

backward in time, from a given object's "maturest and most complete condition to their earliest form."[66] In any case, he wrote:

> The researches into the origin of natural objects, as in those relating to works of art, pass by slight gradations into each other.... Cuvier's assertion that the geologist is an antiquary of a new order, is perfectly correct, for both are palaetiologists.[67]

What Cuvier had initially intended as a legitimating link to the superior cultural status of architecture could now be repurposed by architectural historians as a legitimating link to the superior cultural status of science. In the 100th issue of the *Ecclesiologist*, published in 1854, its editors claimed: "Church architecture is no longer tentative.... It is admitted to be a subject not so much of taste as of facts. It has rules, principles, laws."[68] How different this is to Soane and Gandy's approach, in which architecture's vitality in the face of geological realities could be stimulated and protected by good taste and cultural acumen. Here, in contrast, taste is eschewed for facts.

STYLE.	DATE.	REIGNING SOVEREIGN.	EXAMPLES IN OR NEAR CAMBRIDGE.
Saxon	600—1066		Tower of S. Benedict's, and perhaps Chancel Arch of S. Giles, Cambridge.
Norman	1066—1154	William I. ..... 1066 William II. ..... 1087 Henry I. ..... 1100 Stephen..... 1135	Nave of S. Sepulchre's, Cambridge: Nave of Ickleton: Doors and Chancel-arches of Milton, Hauxton, and Duxford S. John's: Coton Font.
Transition or Semi-Norman	1154—1189	Henry II..... 1154	Jesus College Chapel: Soham: Bourn: West Tower of Ely Cathedral: Oakington Font.
Early English..	1189—1272	Richard I..... 1189 John ..... 1199 Henry III..... 1216	Chancels of Cherry Hinton and Foxton: Barnwell S. Andrew's: Transepts of Histon: Witcham and Foxton Fonts.
Decorated	1272—1377	Edward I..... 1272 Edward II. ..... 1307 Edward III..... 1327	Chancel of Grantchester: The Chapter House, Ely: Little S. Mary's, Cambridge: Bottisham: Lady Chapel at Fordham: Carlton Font.
Early Perpendicular	1377—1485	Richard II. ..... 1377 Henry IV..... 1399 Henry V. ..... 1412 Henry VI..... 1422 Edward IV. .....1460 Edward V. ..... 1483 Richard III..... 1483	Transepts of Trinity church, Cambridge: South Chapel, Little Shelford: Landwade: March: Font of S. Edward's, Cambridge.
Late Perpendicular.....	1485—1546	Henry VII. ..... 1485 Henry VIII..... 1509	King's College Chapel: Nave of Great S. Mary's: S. Neots: Trumpington Font.
Debased.....	1546—1640	Edward VI..... 1546 Mary ..... 1553 Elizabeth ..... 1558 James I..... 1602 Charles the Martyr 1625	All Saints: S. Clement's: S. Peter's College Chapel: S. John's College Library: the Law Schools: Font of Great S. Mary's.

Figure 3.27 The Ecclesiologists modeled their field research on the British Geological Survey then underway, with its standard form and county-by-county approach. This table is from *A Few Hints on the Practical Study of Ecclesiastical Architecture and Antiquities* (1843).

[66] Whewell, *The Philosophy of the Inductive Sciences, Founded upon their History*, second edition, (London: John W. Parker, 1847), I: 638.

[67] Ibid., 639.

[68] Letter from the editors, *The Ecclesiologist* 15 (1854): 3.

As the architectural historian Carla Yanni has discussed, this about-face was specifically identified by contemporary commentators. An anonymous author in *The Home and Foreign Review* spelled the situation out:

> Writers like Petit, Street and Fergusson have approached the subject of architecture in the same spirit that Cuvier and Owen approach the animal frame. To their eyes, the great original works of architecture spring up like a natural production of the soil, – they scarcely look upon them as works of manual labor or calculation … As in nature, they look for the typical form, not in one example but in many.[69]

Here the clergyman and architectural scholar John Louis Petit (1801-1868), the Scottish architectural historian James Fergusson (1808-1886), and the architect G. E. Street, all of whom instigated comparative investigations of Gothic architecture across historical periods and geographical locations, were explicitly linked to the comparative anatomy of Cuvier and his British exponent, the paleontologist Richard Owen.[70] As the author's conflation of "animal frames" and "natural productions of the soil" indicates, in this period the history of life remained tethered to the context of inorganic science. It was only in the 1880s, with the triumph of the biological paradigm in British science, that evolutionary theory was extracted from the stratigraphy of the earth.[71]

The connection between architectural theory and paleontology was apt. Even the narrow ecclesiological research program advanced by the early members of the CCS, which was limited to British buildings, aimed to document every local variant of each element of medieval church architecture, abstract these into a single basic form, and induct this form's fundamental liturgical or constructional use. With such an unshakeable commitment to a biological model that predicated form on function, ecclesiologists were intent on determining the utilitarian necessity behind every

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[69] D. N., "The Development of Architecture," *The Home and Foreign Review*, 1859, 77-89, 80, quoted in Carla Yanni, "Development and Display: Progressive evolution in British Victorian architecture and architectural theory," in ed. Bernard Lightman and Bennett Zon, *Evolution and Victorian Culture* (Cambridge: Cambridge University Press, 2014), 231.

[70] Ibid., 227-243.

[71] Sandra Herbert, *Charles Darwin, Geologist* (Ithaca: Cornell University Press, 2005), xv, 259-60.

minute feature and nuance of form. This could sometimes result in a ludicrous attention to detail, as when the CCS produced a copious amount of research, and a neologism, dedicated to the so-called "Lychnoscope," a small, low window on the north or south wall of a chancel otherwise known as a monk's squint. As James F. White has noted in his history of the CCS, even today this feature's onetime use remains uncertain, but the ecclesiologists were determined to get to the bottom of this "*vexata quaestio*." Theories as to its practical use ranged from keeping watch on candles left burning on the high altar, to allowing quarantined lepers to worship, or to perhaps facilitating confession. On the allegorical side, one anonymous author suggested that "lychnoscopes are nothing else than the symbolical representation of the Wound in the SAVIOUR's Side."[72]

The CCS's pedantic emphasis on particulars carried over to its approach to contemporary design. However, this was where the geological analogy broke down: although Whewell's conflation of architectural history and the history of the earth seemed convincing, there was no scientific correlate for attempting to instigate or shape forces discerned in retrospect. Instead, the members of the CCS began to imagine a church building program that would use reintroduced physical traits as a means to rekindling spiritual fervor and ritual. As John Mason Neale, one of the most prominent members of the CCS, wrote in an early letter:

> We know that Catholick ethics gave rise to Catholick architecture; may we not hope that, by a kind of reversed process, association with Catholick architecture will give rise to Catholick ethics?[73]

(Here Neale's term "Catholick" was a reference to the true, universal body of Christ that Anglicans imagined the Church of England to be, rather than any attempt to make an ultramontane connection.) Neale was proposing that it might work to resupply the form and hope the function

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[72] James F. White, *The Cambridge Movement*, 63-64.

[73] John Mason Neale, "On Private Devotion in Churches," (London: 1844), accessed in digital format on the Project Canterbury website (http://anglicanhistory.org/neale/private.html) March 30, 2017.

followed. If this amalgamative approach to revivifying the church had a biological precedent, it was in the science-fiction labors of Dr. Frankenstein.

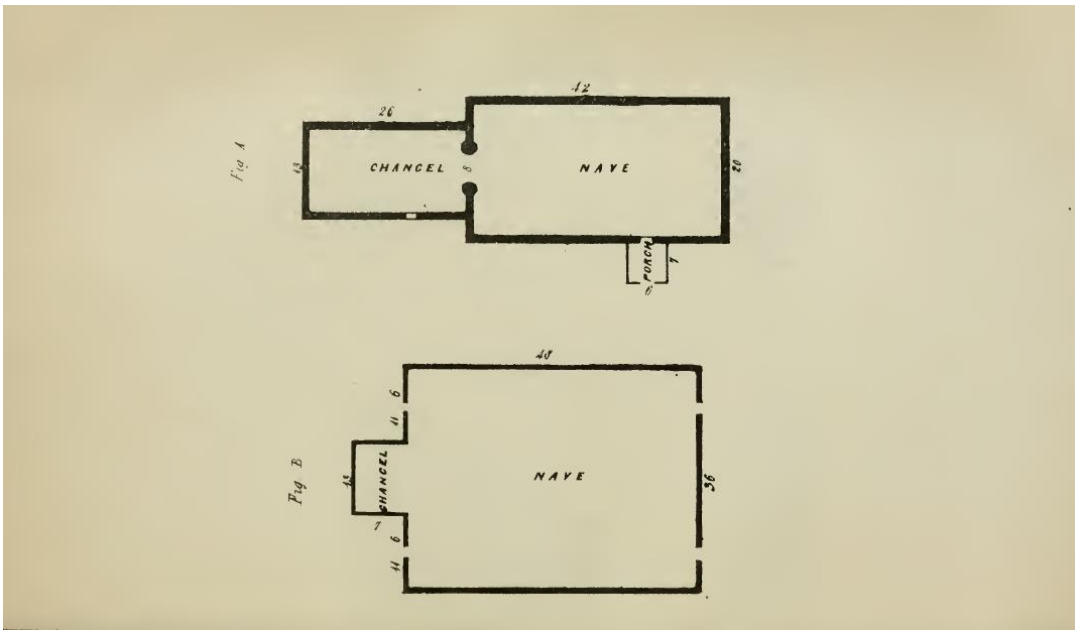

Figure 3.28 This figure, published in a pamphlet produced by the Cambridge Camden Society, entitled *A Few Words to Church Builders* (1841), is meant to demonstrate the most basic reduction of the approved Tractarian church: at least a chancel and a nave are needed, and these need to be differentiated from each other. The chancel must be deep to accommodate and perhaps even to foster the high church form of the liturgy.

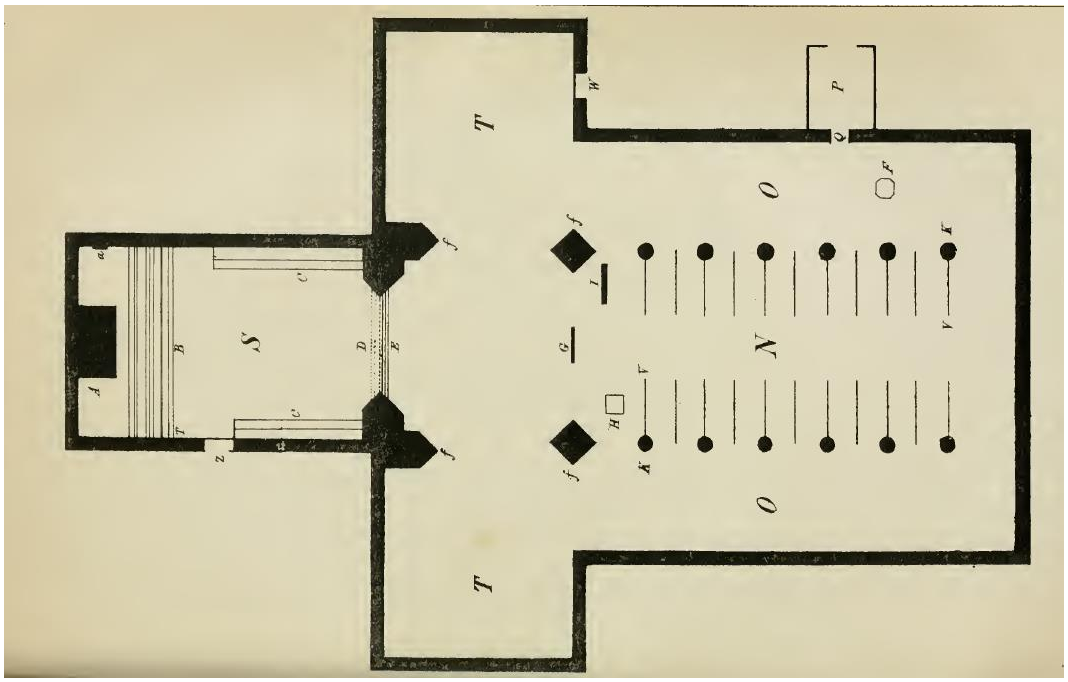

Figure 3.29 More components could be added to this basic model – in fact, the more the better – so long as each element was its proper and distinct identity. From *A Few Words to Church Builders* (1841).

At the OAS, in contrast, the historian Edward Augustus Freeman criticized "the chilling lifelessness of mere antiquarian research" coupled with what he saw as the CCS's penchant for "polemical Theology."[74] However, in the wake of the crisis of 1845, the CCS moved to London, changed its name to the Ecclesiological Society, and broadened its views. Freeman became friends with A. J. Beresford-Hope, who took over the proprietorship of the *Ecclesiologist* and became a prominent figure in the relocated organization. Beresford-Hope agreed with Freeman that "Christian architecture must be developed to suit present exigencies, that though old Churches should be our types they should not in every thing be our exact models."[75] Eventually Beresford-Hope was able to bring the aims of the Ecclesiological Society into alignment with this view. This outlook was shaped in part by the OAS's interest in tracing broader historical changes across a variety of places and times. While the members of the CCS debated lychnoscopes, Freeman was attempting to trace "transmutations" like the slow development of the Roman triumphal arch into the Gothic chancel arch.[76] Street, who was friends with Freeman, participated in this project with extensive research trips to Italy, Spain, and France. As a practicing architect, he was interested in the architectural equivalent of biological cross-breeding – "engrafting" the best and most promising characteristics from different regions into new architectural hybrids with the best chance for future vitality.[77] The ultimate goal was to trace a lineage in both directions: to understand where

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[74] Sixth Annual Meeting, at Wyatt's Room, High Street, June 3rd, at 2 o'clock, P.M.," *Proceedings of the OSPS-GA,* (Easter and Act terms, 1845): 73-4, quoted and discussed in David Brownlee, "The First High Victorians: British Architectural Theory in the 1840s," *Architectura: Journal of the History of Architecture* 15 (1985): 36.

[75] Letter from A J Beresfort Hope to Freeman, 5 March 1846, Freeman Papers in the John Rylands University Library, Manchester, quoted and discussed in Brownlee, 44.

[76] Edward Augustus Freeman, *Historical and Architectural Sketches, chiefly Italian* (London: Macmillan & Co., 1876), 211-214. For Freeman's use of the term "transmutation" to describe architectural changes or developments in form, see, for example, Edward Augustus Freeman and William Basil Jones, *The History and Antiquities of Saint David's*, (London: J. H. & J. Parker, J. Russel Smith, and J. Petheram, 1856): 52; Edward Augustus Freeman, *Remarks on the Architecture of Llandaff Cathedral, with an essay towards a history of the fabric* (London: W. Pickering, 1850), 43, 94; and Ibid., *A History of Architecture*, (London: Joseph Masters, 1849), 151, 228, and 415.

[77] George Edmund Street, "The Study of Foreign Gothic Architecture and its Influence on English Art," in ed. Orby Shipley, *The Church and the World: Essays on Questions of the Day* (London: Longman's, 1866), 411.

particular form-function pairs had come from, as well as where there might be opportunities for further development.

Street seems to have also self-consciously followed geological programs of inquiry. In 1860, after three weeks spent investigating the Alps, the architect visited the Auvergne region in France – the same landscape that had been so central to the rise of uniformitarianism in British geology. In his memoir of the trip, Street accurately described the landforms he saw as "a series of truncated conical hills, evidently ancient volcanoes," suggesting he was aware of the relatively recent scientific consensus which had emerged in the wake of Poulett Scrope's 1827 publication.[78] Street proceeded to treat the Romanesque and early Gothic architecture of the region to an interpretive lens very similar to that applied by Poulett Scrope to the landscape. Poulett Scrope articulated his gradualist theory in *Volcanoes of Central France* as a rebuttal to an earlier publication on the Auvergne by Charles Daubeny, which periodized the landscape according to a binary of "ancient" versus "modern." Instead, Poulett Scrope presented evidence that the landscape was continually changing as lava flows and erosive forces worked in tandem. There was no sharp separation between two different landscapes: one antediluvian and the other after the Flood.[79] Likewise, Street's "Churches of Le Puy en Velay and Auvergne" attacked the earlier chronology of Aimond-Gilbert Mallay, whose *Essai sur les Èglises Romanes et Romano-Byzantines du département du Puy-de-Dôme* (1838) bisected the region's architecture into a period "before the lava was discovered" as a building material, when churches were constructed largely of scoriae, and a period "after the

[78] George Edmund Street, "Some Churches of Le Puy in Velay and Auvergne," in *George Edmund Street: Unpublished Notes and Reprinted Papers* (Hispanic Society of America, 1916), 203.

[79] Martin J. S. Rudwick, "Poulett Scrope on the Volcanoes of Auvergne: Lyellian Time and Political Economy," *The British Journal for the History of Science*, Vol. 7, No. 3 (Nov., 1974): 212-220.

lava was discovered" and put to architectural use.[80] Street was at pains to point out that Mallay had committed a fallacy of induction:

> He considers that lava was not used until the eleventh century, but he must also prove (which he as not done) that stone was never used in Auvergne after the lava had once been admitted.[81]

This was the same argument from overlooked alternatives that Poulett Scrope had critiqued in Daubeny. Instead, Street proposed that the architecture of this region exemplified slow yet continuous development over time. Writing of the chapels flanking the cathedral at Le Puy, for instance, Street presented evidence "that there was seldom any long pause in the works, and the development in their architectural features is therefore very gradual."[82] As was the case with Poulett Scrope's reevaluation of the Auvergne region's geology, the slow change over time these relatively obscure churches expressed meant that Street could claim a larger significance for them:

> These buildings, therefore, have great value, not only as illustrating a chapter of the history of our art, but because the chapter which they do illustrate is just one of the most interesting I can conceive; being that which explains how and by what steps Gothic architecture, of which, as our national style, we are so justly proud, was developed from the noble architecture of the old Romans and Greeks, an architecture to which we owe, among other things, this great debt of gratitude, that it naturally led up to, and rendered possible, a Westminster, a Chartres, an Amiens, and all the other glories of our Christian architecture.[83]

The churches of the Auvergne were valuable precisely because they were evidence of the messy process of hybridization and adaptation by which one living style transformed into another.

The way Tractarian architectural theorists defined what it meant for a style to "live" connects back to the larger equation of life with conflict that we have traced in the theology of

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[80] Aimond-Gilbert Mallay, *Essai sur les Èglises Romanes et Romano-Byzantines du département du Puy-de-Dôme* (Moulins, 1838.)

[81] George Edmund Street, "Some Churches of Le Puy en Velay and Auvergne" (1861, rev. 1889) in George Edmund Street and Georgiana Goddard King, *George Edmund Street: Unpublished Notes and Reprinted Papers* (New York: Hispanic Society of America, 1916), 241.

[82] Ibid., 219, 221.

[83] Ibid., 244.

Newman and the scientific theory of Lamarck. Here a paper entitled "Uniformity considered as a principle in Gothic Architecture," read by the Rev. William Basil T. Jones at the OAS in 1845, provides an overview of the position.[84] Jones reasoned that "the law of Gothic Beauty" was "Unity seen in a plurality and variety of particulars" – a principle he connected to both "the mysterious unity of animal and vegetable life…so apparent and so striking, that a certain school of naturalists have assumed it as the leading idea in their investigations," and the "Spiritual…Unity of the Principle and the marvelous diversity of its manifestations."[85] One can imagine that such conjunctions between Lamarckian biology and Tractarian theology constituted precisely the "strange doctrines of 'development'" Sedgwick censured.

For Jones, the irregularity and conflict apparent in Gothic church architecture was both a record of the developmental struggles that characterized church history and a symbol of "the general idea of life."[86] In medieval buildings, disharmonious elements were:

> the evidence of a struggle, – a clashing of antagonist energies; – the law striving to bring into subjection to itself the individual powers, — the individual powers in part resisting, and in part submitting to the general law.[87]

Likewise, for contemporary architecture to cultivate a life of its own, "the parts of a building ought to stand out in bold relief, and while they are subordinate to the whole, at the same time preserve a certain degree of individuality."[88] The ultimate model was nature herself:

> We conceive of her laws as working in matter as in a resisting medium; – the life, both of animals and vegetables, has its disturbing forces…. Each species seems struggling on to gain a higher place in the scale of creation: there is nothing fixed, nothing at rest; all is

[84] David Brownlee briefly discusses this work in "The First High Victorians," 34.

[85] William Basil T. Jones, "On Uniformity, considered as a Principle in Gothic Architecture," *The Rules and Proceedings of the Oxford Society for Promoting the Study of Gothic Architecture*, Minutes: May 14, 1845, 46-7.

[86] Ibid., 50-51.

[87] Ibid., 47.

[88] Ibid., 48.

> motion, and strife, and progress: death labours to give birth to life; matter is ever striving to become mind.[89]

Street seems to have taken this approach to heart at All Saints Boyne Hill, even following a few of Jones's more specific ideas. In the context of particularly discordant designs, "in which the particulars are diversified to such an extent that the general form can be traced only with difficulty," Jones recommended the introduction "some compensating principle" that would register a deeper unity. He suggested two possible arrangements that might achieve this end: alternating elements and pairs.[90] Both techniques are in evidence at All Saints, where the piers alternate in section and roundels and clerestory windows, among other elements, are paired. In a similar vein, Freeman described the productive contrast produced when "any number of decorative arcades may be placed over one another, but they have no connection with each other; they are so many horizontal bands."[91] If Street heeded his friend's observation, it might explain why his clerestory fenestration at All Saints and Saints Philip and James is out of alignment with the nave arcades below. Certainly it seems clear that the ultimate aim of architectural efforts like Boyne Hill – with its barely unified clash between differentiated programmatic, ecclesiastical and constructional components – is the generation of architectural life.

Street was a prolific theoretical writer in his own right, and his words express a concern with life on more than one level. While he identified with the Tractarian effort to reverse engineer a vibrant liturgy through architecture, he was also concerned with the liveliness of architecture as such – an interest he expressed in biological terms like "nervous," "vital," and "germ."[92] In seminal

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[89] Ibid., 49-50.

[90] Ibid., 47.

[91] Freeman, *History of Architecture*, 344.

[92] For Street's extensive use of the term, "nervous," see, for example, Street, *Unpublished Notes*, 77, 210, 219, 264, 267, 317. For his use of the term "vital," see, for example, ibid., 22-23. For his use of the term "germ," see for example, ibid., 176 and 318.

papers like "The True Principles of Architecture and the Possibility of Developement [*sic*]" (1852) Street was in a sense picking up where Soane and Gandy had left off:

> For three hundred years men have tied themselves down by absurd and arbitrary rules, to their obedience to which are owing most of the contemptible caprices evidenced in their works. And they have had no life and no semblance of life in their work.[93]

Yet while the general diagnosis of "absurd and arbitrary rules" that resulted in moribund design practices was one his Georgian predecessors would have wholeheartedly agreed with, both Street's specific indictment and his proposed solution were radically different from theirs. For Street, architecture had its own built-in developmental impetus in construction technology, quite aside from functional adaptations required by changing rituals and variations in use. He believed that the reason architecture had languished for three centuries was because architects had failed to take advantage of the revolutionary potential of the pointed arch, which he saw as the greatest and possibly the last true architectural innovation.[94] Yet simply because arcuated construction was a development from trabeated construction did not mean that no merit could be gleaned from Greek architecture. Freeman and Jones both quoted Coleridge's remark that "without strife there is no victory" when discussing the potential for productive contrast between horizontal and vertical systems.[95] Perhaps taking a cue from them, Street hazarded that the best architecture would combine "the verticality of Pointed with the repose of Classic architecture."[96] The desire to register both vectors at once may be the reason he resorted to mismatched nave and clerestory bands at Boyne Hill and Saints Philip and James. He was concerned with achieving maximum contrast between light and shade in interiors – an effect he certainly attained at Boyne Hill, not only in the

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[93] George Edmund Street, "The True Principles of Architecture and the Possibility of Developement [*sic*]: A paper read before the Oxford Architectural Society, on 18 February 1852," *Ecclesiologist* 10 (August 1852): 248.

[94] Ibid., 249-50.

[95] Freeman, *History of Architecture*, 306. Jones, "Uniformity… Gothic Architecture," 50.

[96] Street, "True Principles," 253.

variety and placement of his windows, but also, as we have seen, in the play of reflections in the chancel.[97] Street also expressed the preference that "decoration by colour in arches should be kept as much as possible in distinct rims," and that arches themselves:

> …should be carefully defined and kept away and distinct in colour from the wall, their office being quite distinct from its office, and therefore not to be confounded with it in decoration.

As we have seen, this was his approach at Boyne Hill. Street's emphasis here on maintaining maximum differentiation between parts is indicative of his approach to decoration overall. In 1855, while All Saints Boyne Hill was under construction, Street delivered a lecture "On Colour as Applied to Architecture" to the Worcester Diocesan Architectural Society. He argued that differently colored building materials were "vehicles given us for increasing the expression, defining the outlines, and separating, when necessary, the various parts and features of our buildings."[98] Architectural finishes – and particularly the effects achieved by the constructional polychromy that Street advocated – were to have the "office of distinguishing parts and forms of buildings."[99] To make his point, Street asked his listeners to imagine a reredos "whose outlines of stone are filled in with variegated marbles or alabaster," just like the one he had designed for Boyne Hill. He also advised architects to "separate all colours by lines either of metal or black," a principle he had picked up from Owen Jones, and also put to use in the project then under construction.[100]

Although Street admired John Ruskin and was likely inspired in his own appreciation of mountain scenery by Ruskin's writing, the kind of life he seemed concerned to produce in projects

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[97] Ibid., 256-7.

[98] George Edmund Street, "On Colour as applied to Architecture: a Paper read at the Annual Meeting of the Worcester Diocesan Architectural Society, Sept. 26, 1855," *Reports and Papers read at the Meetings of the Architectural Societies of the Archdeaconry of Northampton, the County of York, the Dioceses of Lincoln and Worcester; and the Architectural &Archeological Society of the County of Bedford during the year MDCCCLIV* 3 (1854-5): 354.

[99] Ibid., 355.

[100] Ibid., 365, 349. Neil Jackson has discussed this connection in "Clarity or Camouflage? The Development of Constructional Polychromy in the 1850s and Early 1860s," *Architectural History*, vol. 47 (2004): 201–226.

like All Saints Boyne Hill is markedly different from that advocated by Ruskin in *The Stones of Venice* and other early works. Street's is not the animation wrought by the hand of the individual craftsman, constrained by benevolent, divine, and never-changing ethics. Street's agency is not really human agency at all. Rather, it is a kind of architectural agency – a kind of architectural animation – where the conflict and the struggle that denominate vitality are given over to the architectural elements themselves. It is these that are quickened – that glimmer and flash and change with every shift of light and every visual discovery. This is a powerful way to express the concept that architecture can attain a life of its own, and Boyne Hill pursues it to a degree that Street's more mature works do not.[101] One supposes he heeded Freeman's self-admonition:

> We talk of development and expand until we almost fancy a style of architecture to be something really existing, endued with vital powers, like a tree which grows and throws out branches without the intervention of human aid.[102]

Ultimately, for Freeman as for Street, architectural development was not spontaneous. It had to be designed. And it was at this level that both the geological model that worked so well when analyzing architecture's history, and the paleontology that seemed so fruitful in the context of modern efforts to produce architectural development, ultimately fell short.

Ad librum

Architectural historians have a tradition of connecting the High Victorian predilection for horizontal banding with the High Victorian fascination with stratigraphy.[103] As this chapter

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[101] Although it is not carried out to the degree evident at Boyne Hill, the general principle of differentiation does register across Street's entire oeuvre. For example, Street's largest project, The Royal Courts of Justice in London (completed after Street's death and opened in 1882), is composed of hundreds of highly individualized programmatic elements grouped together. See Thompson, 237-243.

[102] Freeman, *History of Architecture*, 309.

[103] Michael Hall, "What do Victorian Churches Mean? Symbolism and Sacramentalism in Anglican Church Architecture, 1850-1870," *Journal of the Society of Architectural Historians* 59.1 (March 2000), 78-95. Hall's argument has been taken up by Neil Jackson, "Clarity or Camouflage? The Development of Constructional Polychromy in the 1850s and Early 1860s," *Architectural History* 47 (2002): 201-226; and Carla Yanni, "Progressive Evolution," 231-232.

corroborates, there is a great deal of circumstantial evidence to support this view. Not only did architectural periodicals and individual theorists popularize geological discoveries and ideas, but, as Hall has noted, Ruskin defended the use of horizontal stripes in buildings by connecting them to stratigraphy in the *Stones of Venice*.[104] Certainly it is easy to see something stratigraphic in the chancel stripes at All Saints Boyne Hill. Not only do they resemble the geological sections coming into popular circulation at the time, as Hall has noted, but their coloration is strikingly similar to the Geological Survey's emerging palette.[105]

[104] John Ruskin, "The Wall Veil and Shaft," *The Stones of Venice* (1851), *Collected Works* IX:347.

[105] Hall, 83.

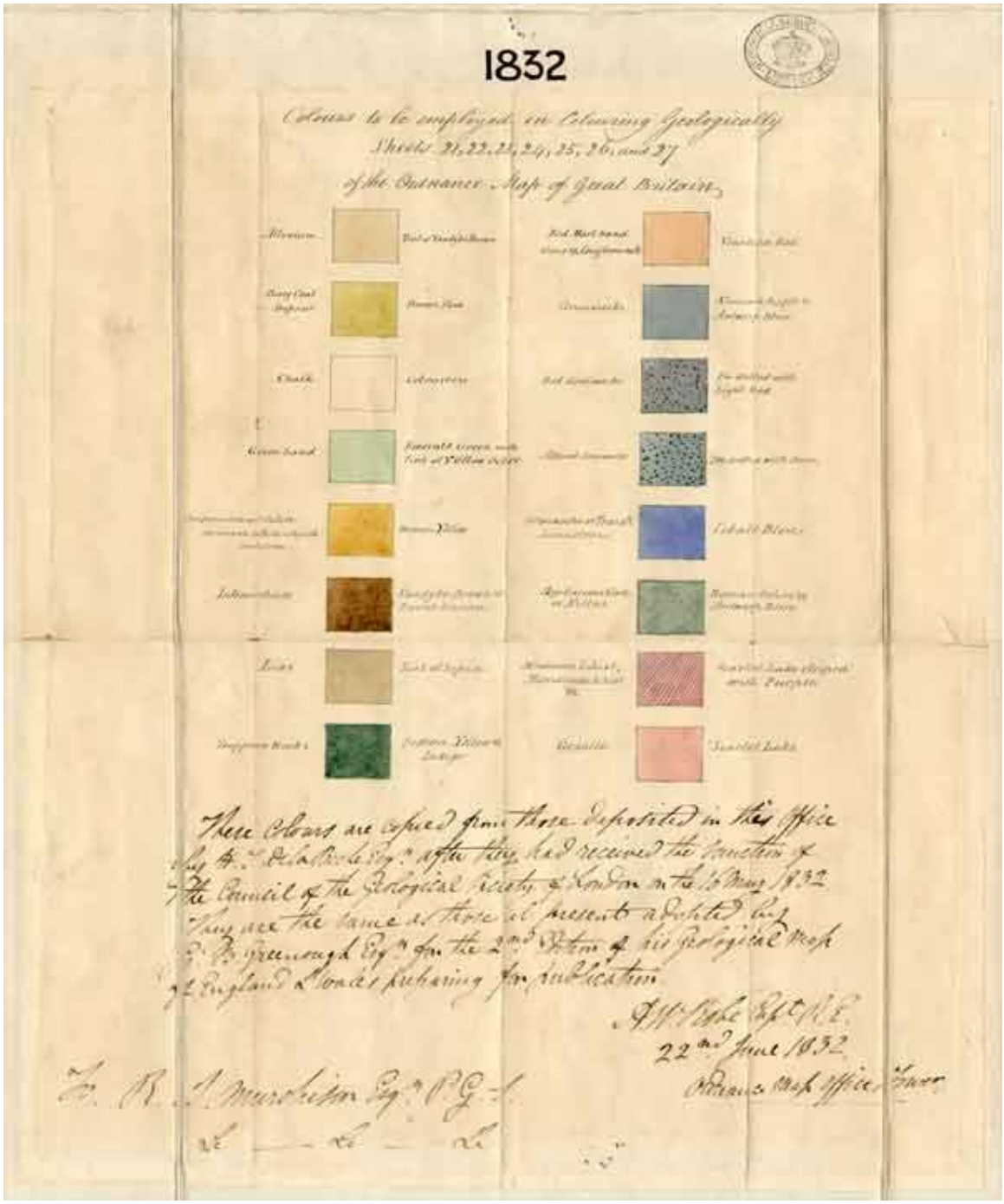

Figure 3.30 Robert Murchison, Standard Map Colors for the Geological Survey (1832).

Yet it is also productive to apply a slightly different interpretive lens to the Boyne Hill chancel. The nave of an Anglican church represents the "church militant" – the body of the church as it is in life, struggling against the forces of darkness. The chancel arch is the threshold between

this life and the next: it represents death. The chancel itself is the chamber of the "church triumphant:" the heavenly space of the saints in glory and the world yet to come. If these stripes do register stratigraphically, then, they might reference the precious stratigraphy of the Heavenly Jerusalem, a city depicted in Revelations 21, which Tractarian theologians understood to be the divinely constructed residence of the saints. As the biblical passage describes, its foundations were to be built of bands of precious stones:

> And the foundations of the wall of the city were garnished with all manner of precious stones. The first foundation was jasper; the second, sapphire; the third, a chalcedony; the fourth, an emerald; The fifth, sardonyx; the sixth, sardius; the seventh, chrysolyte; the eighth, beryl; the ninth, a topaz; the tenth, a chrysoprasus; the eleventh, a jacinth; the twelfth, an amethyst.[106]

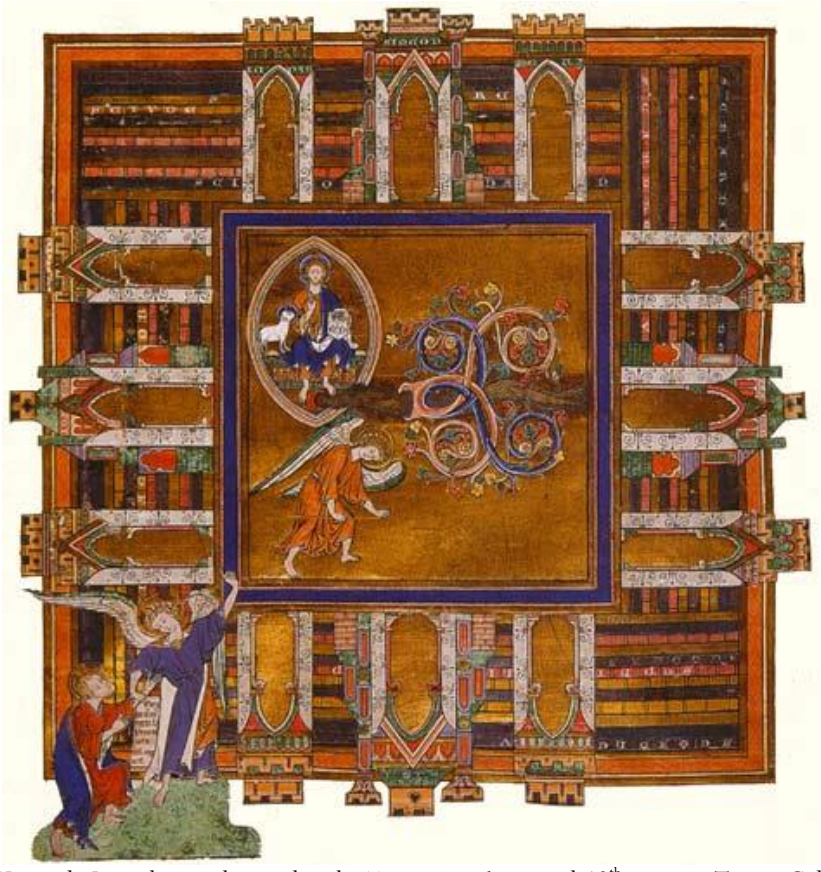

Figure 3.31 The Heavenly Jerusalem as depicted in the *Trinity Apocalypse*, mid-13th century, Trinity College, Cambridge University.

[106] Revelations 21:19-20, King James Version. I am grateful to Michael Hall for making this connection.

In Tractarian theology – as in Catholic theology, which it closely resembles on this point – the church in its present iteration (encompassing the congregation together with the physical building) was not the true, universal Church. Rather the existing church at any period in history was connected to the universal Church by "representing it in type, and witnessing it, and leading towards it," to use Newman's words.[107] Because the chancel represents the saintly church in its full glory, it is also a witness and approximation of what this heavenly city will be like. Thus the chancel becomes a privileged point of connection between historical time and time *ad librum* – time according to the Book – the transcendent, nonlinear time of eternity.

This is where the differentiated sequence of Boyne Hill's chancel stripes becomes important. The glinting tiles, the concatenation of color at the eye level of the congregants, the attenuation of the pattern as the wondering gaze ascends: it is as if an intersection is being effected between the troublesome materiality shared by architecture and the earth, the vast and indifferent accumulation of human history and geological time, and a constant liveliness borrowed from the spiritual realm. A mutually unheeding collision is taking place between this world and its future, on the one hand, and the promised eternity of the Heavenly Jerusalem on the other. Layers of earthly material are transformed into a play of color and light that passes gradually into pure rhythm: a guarantee of something hoped for but as yet only dimly glimpsed. The stratigraphy of the New Jerusalem, in all of its permanence and precision, gives way in the chancel at All Saints to mere sequence – a partially sketched pattern for which the colors are not yet known. Here, in other words, is the architectural-theological riposte to the immense timescale and lasting materiality registered in Lyell's frontispiece: if architectural meaning attenuates in the context of geology, then

[107] John Henry Newman, "The Communion of Saints," (May, 1837) in *P.S.* 4: 174-5. Dolan, Gerald M. "THE GIFT OF THE SPIRIT ACCORDING TO JOHN HENRY NEWMAN (1828-1839)." *Franciscan Studies* 30 (1970): 77-130.

geology itself thins in the context of the divine. If Adam identified architecture's frailty in comparison with the landscape's "dead life," and Soane and Gandy registered the possibility of its extinction, then Street's All Saints Boyne Hill confronts the earth's immense and uncertain duration with the Anglican doxology's promise of a "world without end."

Chapter 4. Chemical Architecture: John Ruskin's Inorganic Ethics

Prelude: the Doge's Palace

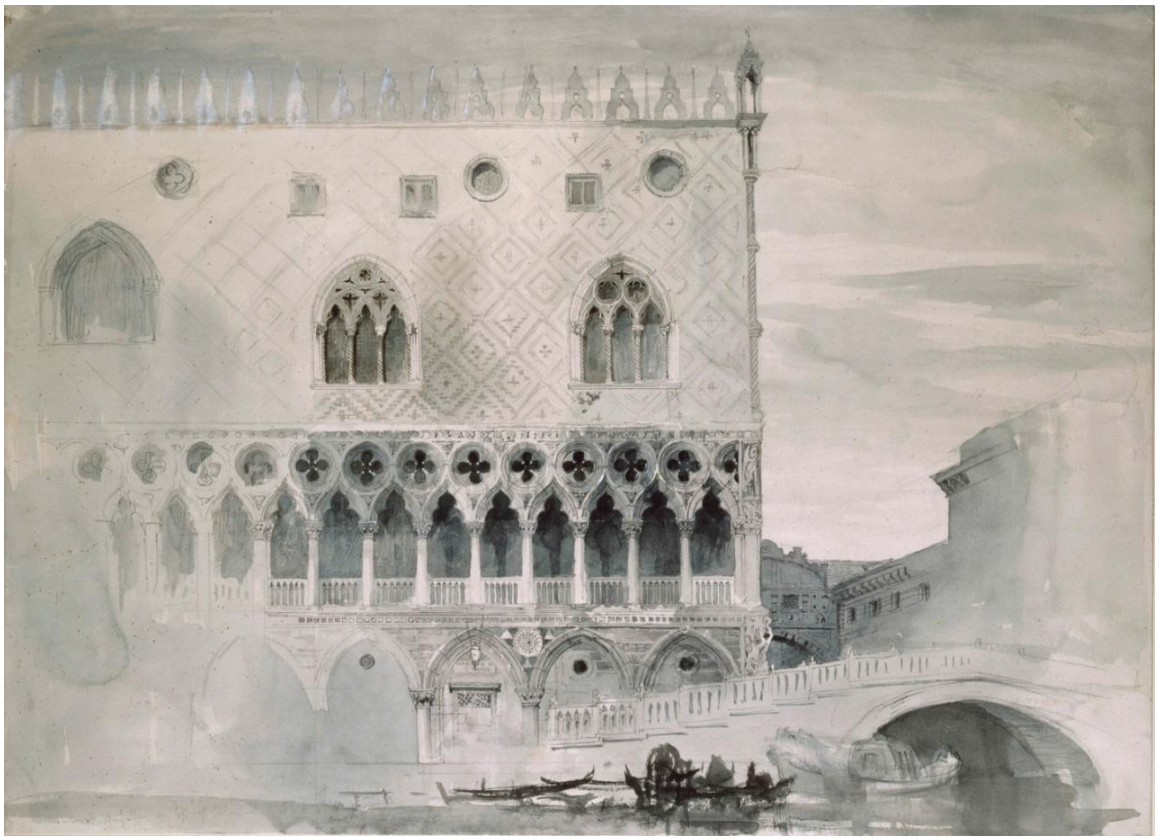

Figure 4.1 John Ruskin, *The Exterior of the Ducal Palace, Venice,* 1852. This view shows the right-most portion of the sea-façade and the Ponte della Paglia.

Buried in a note within an addendum to the published version of his lecture entitled, "A Political Economy of Art" (1857), John Ruskin made a small but sharp criticism of G. E. Street's interpretation of the Doge's Palace in Venice. When it came to Venetian architecture and indeed continental architecture more generally, Street was easily the most knowledgeable practicing architect of his day. His *Brick and Marble in the Middle Ages: Notes on a Tour in the North of Italy* (1855) was an eminently readable yet scholarly account of that region that had done much to enhance

Street's professional reputation.[1] Ruskin reserved more praise for Street's work than he did for any other architect of his day, and Street seems to have valued Ruskin's ideas in turn; Street's Italian journey in 1853, from which *Brick and Marble* emerged, was inspired by Ruskin's *Seven Lamps of Architecture* (1849) and the first two volumes of his *Stones of Venice* (1851-52). Street was descriptive where Ruskin was poetic, and discursive where Ruskin was polemical. Yet their respective publications broadly agreed on the historical narrative that the built fabric of Venice represented: an apogee followed by a slow decline of society and culture.

Ruskin published first. In his observation, the Palace's lagoon façade and part of the façade that turned the corner to face the *piazzetta* evinced the superior craftsmanship typical of the high point of the Venetian Gothic period, in the early fourteenth century. On the *piazzetta* side, the construction seemed to have been interrupted and resumed at a later date. In Ruskin's interpretation, this disruption occurred to the left of the ninth column of the lower arcade, counted from the lagoon side. From this line onward, the quality and originality of its column capitals decreased, the size of its masonry blocks increased, and the shafts of its arcade slightly thickened. Ruskin believed that this change was an indication that the left half of the *piazzetta* façade had been built in the 15th century, that is, after what he believed to be the "decline of Venice" had commenced:

> Now, the architect who built [the second half of the piazzetta façade] in 1424 (remember my date for the decline of Venice, 1418), was obliged to follow the principal forms of the older palace. But he had not the wit to invent new capitals in the same style; he therefore clumsily copied the old ones.[2]

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[1] Arthur Edmund Scott, G. E. Scott's son, gives an account of how *Brick and Marble in the Middle Ages* was received both at the time of its publication and when his father's career was reviewed towards its close. *Memoir of George Edmund Street, R. A., 1824-1881* (London: John Murray, 1888), 21, 227.

[2] John Ruskin, *The Stones of Venice* vol. 1 [1851], in *The Works of John Ruskin*, ed. E. T. Cook and Alexander Wedderburn (London: George Allen, 1906) 9: 52-54. All of Ruskin's published works have been collected into edited editions, of which this 39-volume "Library Edition," hereafter referred to as *Works*, is considered the standard. I will subsequently give the name and date of the original publication, together with its volume and page in the *Works*. Several of Ruskin's original books were themselves collections of earlier essays and lectures given over the course of many years, most

Ruskin saw this inability to invent as a symptom of the broader demise of the Venetian political and social economy in the fifteenth century. For him, the vertical division between what he judged were earlier and more lively forms, and the later, clumsier and more derivative craft, was the inevitable product of a socioeconomic condition that had badly broken down.

Publishing only a few years later, Street understood the building differently. He too believed that the building was evidence of an architectural decline, and he too believed that this decline mirrored a larger decline in society as a whole. But he understood the building's existing facade to have been built in horizontal layers, and therefore read its expression of degeneration, not from right to left on the *piazzetta* façade, but from bottom to top on the lagoon façade. To Street, the arcades that wrapped the first two stories of the Doge's Palace seemed to be a unified achievement that he described as "the very best and truest specimen of Gothic architecture south of the Alps."[3] In his estimation, these had surely been built earlier than the Palace's third level, which was nearly as tall as the first two combined, almost unbroken by windows, and covered in a diaper pattern composed of small, pink and white marble blocks that appeared "only too much like bricks." Street believed the palace had originally been only two stories high, in keeping with other notable Venetian *palazzi*, and that the third stage had been a later addition meant to accommodate larger meeting spaces for an expanded Council Chamber. The effect was not pleasing. "There is something quite chilling," wrote Street, "in the great waste of plain unbroken wall coming above the extreme richness of the arcades which support it."[4]

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notably Ruskin's three "textbooks:" *Deucalion*, *Love's Meinie*, and *Proserpina*. When the texts referenced were originally stand-alone pieces, I will cite them as separate works with their original date of publication or completion.

[3] George Edmund Street, *Brick and Marble in the Middle Ages: Notes of Tours in the North of Italy,* second edition, (London: John Murray, 1874), 200.

[4] Ibid.

Ruskin accused Street of belonging to a cadre of "architects who pass three or four days in a gondola going up and down the Grand Canal," and yet "think that their first impressions are just as likely to be true as my patiently wrought conclusions." He continued:

> Mr. Street, for instance, glances hastily at the façade of the Ducal Palace—so hastily that he does not even see what its pattern is, and misses the alternation of red and black in the centres of its squares—and yet he instantly ventures an opinion on the chronology of its capitals, which is one of the most complicated and difficult subjects in the whole range of Gothic archaeology.[5]

Although he had left himself vulnerable to Ruskin's epithets by characterizing his examination of the Ducal Palace as "somewhat hasty,"[6] Street stuck to his position in the second edition of *Brick and Marble* (1874). He repeated his claim from the original 1855 publication verbatim:

> I feel sure that the impression which I have had from my first acquaintance with drawings of it is substantially correct, viz. that the line at which alterations and additions have been made is to be looked for rather in a horizontal than in a vertical direction.[7]

As it turned out, Street was wrong. Subsequent scholarship has largely upheld Ruskin's interpretation. The facades that unify the Doge's Palace into a single composition today are part of a renovation and expansion project that began in the 1340s, on the lagoon side of the building. This building program was partially motivated by the need to add a third story to the existing structure that could accommodate an expanded Council. The arcades that Street believed were earlier than the massive council chamber above were actually built at the same time, in order to support that volume's projection from the smaller original building beneath. As Ruskin had maintained, the arcade did wrap around the lagoon end of the *piazzetta*, again in order to prop up the Council Chamber above. The rest of the *piazzetta* façade was indeed part of a later renovation project focused on the Palace of Justice, which occupies that wing of the Doge's Palace. Although

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[5] Ruskin, "The Political Economy of Art" [1857], Note 6.141: "Economy of Literature," *Works* XVI: 127 n.

[6] George Edmund Street, *Brick and Marble in the Middle Ages: Notes of a Tour in the North of Italy,* first edition, (London: John Murray, 1855), 145.

[7] Street, *Brick and Marble,* second edition, 200.

contemporary historians place the vertical break at the seventh column from the lagoon rather than at the ninth, Ruskin's interpretation of this complicated structure was therefore largely correct.[8] Street's error was to read the building according to the way he thought as a designer: as a stratigraphic sequence of horizontal layers laid down one on top of the other, like stacked plans. Ruskin, on the other hand, was able to imagine the possibility of a vertical discontinuity in which change was registered, not in layers, but in degrees of sharpness and purity. In both cases, a different type of geological lens was being applied to architectural form. As this chapter will discuss, while they agreed that the building's façade indexed a decline in Venetian civilization, Street saw superimposition where Ruskin saw crystallization.

The nature of the Gothic

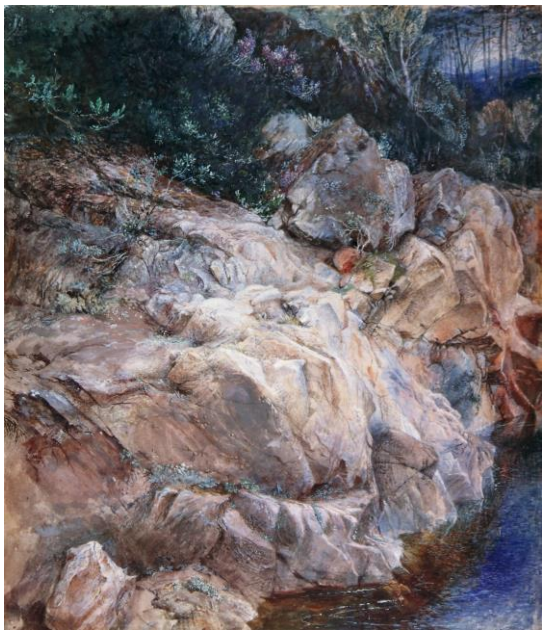

Figure 4.2 John Ruskin, *In the Pass of Killiecrankie*, 1857.

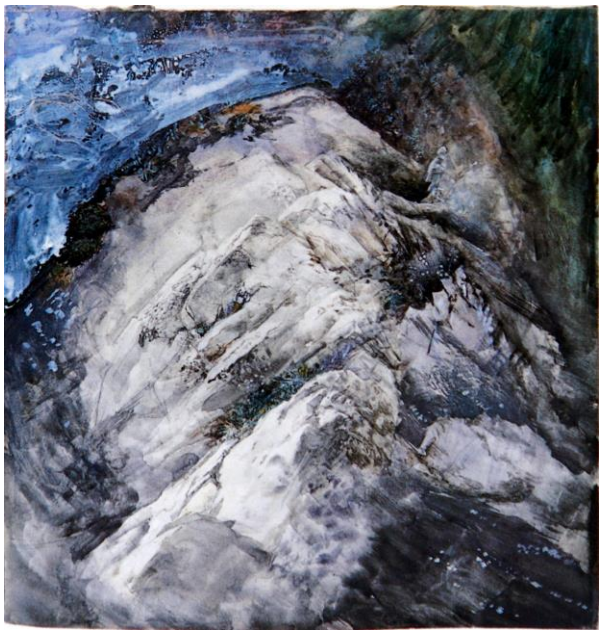

Figure 4.3 John Ruskin, *Rocks and Vegetation, Chamonix*, 1845.

[8] I am very grateful to Christine Smith, Robert C. and Marian K. Weinberg Professor of Architectural History at Harvard University, for so patiently and thoroughly explaining to me the current scholarly interpretation of this complicated structure.

Street and Ruskin had very different relationships with contemporary science. Street's understanding of geology would have been of a piece with his membership in an educated class and firmly grounded in the learned societies of Oxford and Cambridge. It is certain that he was also directly influenced by Ruskin, particularly the widely popular Ruskin of the first half of the 19th century. On a trip to Spain in 1861, for example, Street produced several sketches of Montserrat, the jagged mountain range just outside of Barcelona, that evince a Ruskinian attention to the accurate depiction of mountain structure. As we have seen, his reading of the churches that dot the Auvergne region of France seems to self-consciously reenact George Poulett Scrope's geological interpretation of the same region. The overall impression is of someone alert to the creative and interpretive analogies between this science and his own discipline, but not actively engaged in challenging its claims.

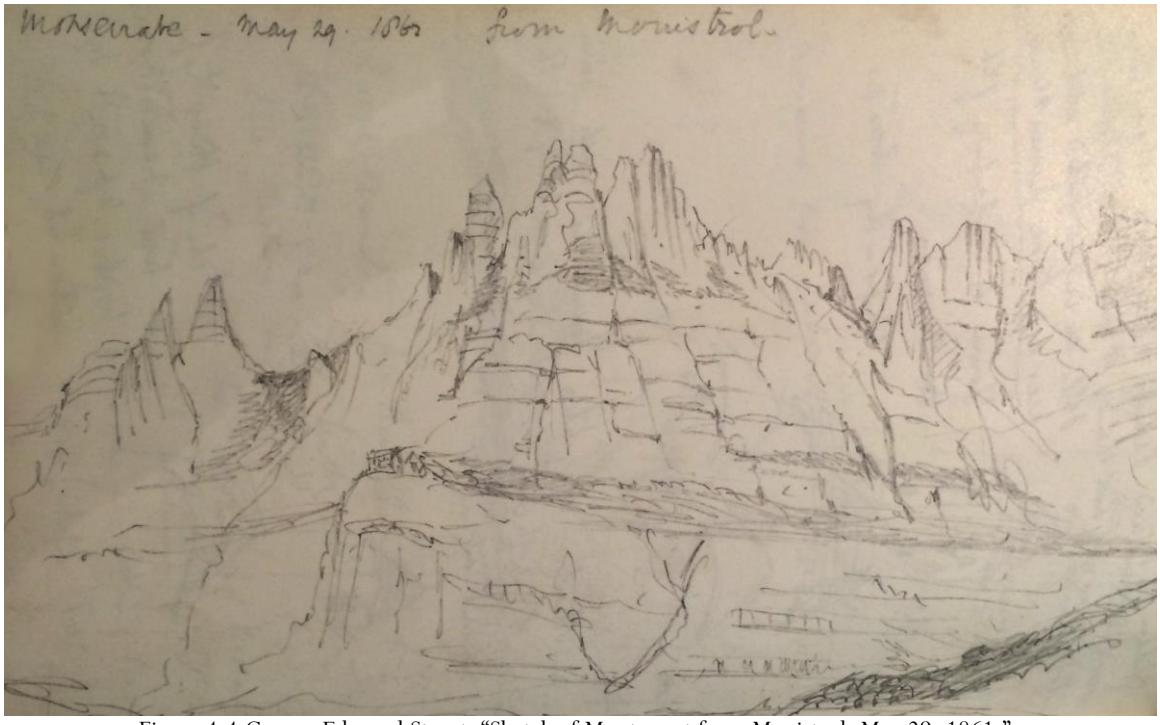

Figure 4.4 George Edmund Street, "Sketch of Montserrat from Monistrol, May 29, 1861."

Ruskin's position was very different. As an amateur geologist of considerable skill, he was involved in the inorganic sciences as a participant, and his approach to geology and mineralogy was consequently both more in-depth and more idiosyncratic. Ruskin was adamant that rocks were his first and most abiding love, noting with some regret in his autobiography that he would "have written *The Stones of Chamouni*, instead of *The Stones of Venice*" if he hadn't happened to see the Tintoretto-lined interior of the Scuola di San Rocco in 1845.[9] His interest in the composition and processes of the earth emerged in boyhood. At twelve, Ruskin began developing a mineralogical dictionary with a special code of "crystallographic signs." At fifteen, Ruskin received a copy of H. B. de Saussure's *Voyages dans les Alpes* (1779) as a gift from his father. That same year, Ruskin published his first geological article in John Loudon's *Magazine of Natural History*, in which he speculated on how the modern forms of the Alps might reveal the structuring processes that had produced them.[10] At Oxford, he studied under William Buckland and became familiar with the work of Buckland's former student, Charles Lyell. Saussure, Buckland, and Lyell would provide the basic intellectual framework for Ruskin's own geological investigations for the rest of his life.[11] After carefully recording his observations of a French granite mine in his diary in 1840, the 21-year-old concluded triumphantly, "I never will work hard again at classics for all the honours on earth."[12] Ruskin diverted his attention to art and architecture between the mid-1840s and the early 1850s, before returning to geology. The fourth volume of his *Modern Painters* (1856) contains as much

[9] Ruskin, *Praeterita: Outlines of Scenes and Thoughts Perhaps Worthy of Memory in my Past Life* [1885-89], *Works* XXXV: 371-372.

[10] Ruskin, *Praeterita*, *Works* XXXV: 120; *Deucalion: Collected Studies of the Lapse of Waves, and Life of Stones* [1875-1883], XXVI: 97; "Facts and Considerations on the Strata of Mont Blanc, and on Some Instances of Twisted Strata Observable in Switzerland," [1834], Works I: 194-96; *Modern Painters IV* [1856], Works VI: 214n.

[11] Wolfgang Kemp, *The Desire of My Eyes: The Life and Work of John Ruskin*, trans. from the German by Jan Van Heurck (New York: Farrar Straus and Giroux, 1990), 61-62.

[12] Ruskin, "October 7, 1840," *The Diaries of John Ruskin*, ed. Joan Evans and John H. Whitehouse, (Oxford: Clarendon Press, 1956-59), I: 83.

geological observation as it does art criticism. It was closely followed by a notice on the geology of Chamouni, which was read before the Royal Society of Edinburgh on his behalf by the glaciologist James Forbes (1858). Ruskin continued to publish geological and mineralogical papers regularly until the end of his working life circa 1890, producing scientific papers in the 1860s, 70s, and 80s that covered topics from mountains to minerals. In Ruskin, then, we have a unique figure who desired to actively participate in shaping aesthetic and scientific discourse alike, and who did not hesitate to connect the two realms whenever possible.

The primary link between architecture – or any practice that carried aesthetic value – and natural form, was that both rewarded careful visual inspection by offering up the secrets of their creation. As the literary historian Patricia Ball has remarked, for Ruskin, true observation meant "reading deeply into the object, recognizing the comprehensiveness of its self-expression, as it demonstrates its energies, displays the formal laws of its being, and sums up its past and its potential simply by the impact of its visual presence."[13] In other words, the only correct way to consider an object was as an index of its formation. "Form … may be considered as a function or exponent either of Growth or of Force, inherent or impressed," Ruskin explained. "All forms are thus either indicative of lines of energy, or pressure, or motion, variously impressed or resisted, and are therefore exquisitely abstract and precise." Truly factual seeing – "impartially, intensely, and fearlessly," as he wrote of his favorite painter, J. M. W. Turner – was never just seeing *what*, but always seeing *how*: mastering "the perfect cognizance of the form, functions, and system of every organic or definitely structured existence."[14] This is ultimately what Ruskin admired most about Turner: he did not merely master the look of things but "learned their organization." Ruskin

[13] Patricia M. Ball, *The Science of Aspects: The Changing Role of Fact in the Work of Coleridge, Ruskin and Hopkins*, (London: Athlone Press, 1971), 69.

[14] Ruskin, *Modern Painters I* [1843], *Works* III: 146; *Diaries of John Ruskin*, II: 370-71; *Modern Painters V* [1860], *Works* VII: 68; "Preface to the Second Edition," *Modern Painters I* [1844], *Works* III: 35.

sought fidelity to the processes "which bear upon the growth or movement of the thing" above any recognizable reproduction of effect. "Your common sketcher or bad painter…breaks his mountain side into ragged fragments, wholly unconscious of the lines of force with which the real rocks have risen, or of the lines of couch in which they repose," he wrote. "It is the main delight of the great draughtsman, to trace these laws of government."[15]

Figure 4.5 J. M. W. Turner, *The Pass of St Gotthard, near Faido*, 1842-43.

[15] Ruskin, *Modern Painters I*, *Works* III: 252; *Modern Painters IV*, *Works* VI: 232; John Ruskin, *The Elements of Drawing* [1857], *Works* XV: 116.

Figure 4.6 John Ruskin, *Rocks in Unrest* (study of the foreground of Turner's painting, above), c. 1845-1855.

Ruskin followed the Protestant exegetical tradition of typology, in which nature's forms and the processes by which they come into being are seen as "types:" embodiments of eternal truths and models of correct human behavior.[16] It is because of this typological link between literal attributes and moral lessons that Ruskin's various objects of concern are disparate only on the surface; they connect in ever-tighter and more factual ways the deeper down one goes. Apparent leaps in magnitude and duration are often more productively viewed as shifts in the observer's distance from or angle on a single, unified system. Indeed, Ruskin found such shifts necessary to correctly observe the analogies he discerned between silicates and spires, between the crystalline logic of mountains and the inborn morality of their inhabitants, and between the shaping of landscape by nature and the shaping of landscape by art.

Ruskin's inclination to ascribe exterior contours to internal processes contributed to a bias in favor of chemical forces over physical forms. His interpretation of the world differed sharply from that of Lamarck, for whom development over time was the result of struggle and adaptation.

[16] The most helpful discussion of Ruskin's typological thought remains Patricia Ball, *The Science of Aspects*. See also Robert Hewison, *John Ruskin: The Argument of the Eye* (London: Thames and Hudson, 1976), 26–27.

Ruskin, by contrast, was invested in a kind of hyper-uniformitarianism inherited from Lyell, in which change was secondary to a dynamic equilibrium characterized by the same processes occurring over and over again over extended periods of time. Such mechanisms might produce unique objects, but the primary value of such configurations was as demonstrations of ongoing and unchanging rules of formation.

As a consequence of the essential continuity linking all forms and states of matter, Ruskin predicated the production of worthwhile art upon a larger harmony between organic life and its inorganic substrate. He therefore demanded that human life and work be "congenial" with their ecological setting.[17] Along the sliding scale from the simplest chemical compounds to the full unfolding of spiritual life, architecture occupied a critical juncture. In the context of an ethical society, a correct alignment between human creativity and geological particulars could produce spectacular urban achievements. As David Wayne Thomas has described, this is precisely the way Ruskin approached Venice. First, he described the underlying geomorphology of the Venetian archipelago: the shallow seas, the narrow bandwidth of the tides and their regularity (which enabled sewage to be naturally scoured from the city's canals), and the gradual but immense deposition of fine sediment by the Po and other rivers. All of these natural vectors combined in what Ruskin called:

> a preparation, and *the only preparation possible*, for the founding of a city which was to be set like a golden clasp on the girdle of the earth, to write her history on the white scrolls of the sea-surges, and to word it in their thunder, and to gather and give forth, in world-wide pulsation, the glory of the West and of the East, from the burning heart of her Fortitude and Splendour![18]

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[17] Ruskin, *Works* I: 132. I am indebted to Richard Stein's related discussion of this passage in "Milk, Mud and Mountain Cottages," *PMLA* 100.3 (May, 1985), 328-341.

[18] Emphasis in the original. Ruskin, *Works* X: 15. I am indebted to David Wayne Thomas' discussion of this passage in his *Cultivating Victorians: Liberal Culture and the Aesthetic* (Philadelphia: University of Pennsylvania Press, 2004), 52-53.

Venice was the product of exceptional inorganic circumstances coupled with what Ruskin called the "coralline-like energy" of its inhabitants, which not only aligned with this substrate, but was also actively modeled on its principles.[19] As Ruskin prefaced his chapter on "The Nature of the Gothic:"

> We have, then, the Gothic character submitted to our analysis, just as the rough mineral is submitted to that of the chemist, entangled with many other foreign substances, itself perhaps in no place pure, or ever to be obtained or seen in purity for more than an instant; but nevertheless a thing of definite and separate nature, however inextricable or confused in appearance. Now observe: the chemist defines his mineral by two separate kinds of character; one external, its crystalline form, hardness, lustre, etc.; the other internal, the proportions and nature of its constituent atoms. Exactly in the same manner, we shall find that Gothic architecture has external forms and internal elements. Its elements are certain mental tendencies of the builders, legibly expressed in it; as fancifulness, love of variety, love of richness, and such others. Its external forms are pointed arches, vaulted roofs, etc. And unless both the elements and the forms are there, we have no right to call the style Gothic. It is not enough that it has the Form, if it have not also the power and life. It is not enough that it has the Power, if it have not the form.[20]

Here the typological connection between minerals and buildings – and between chemists and critics – is elaborated through a vivid analogy. The Gothic-mineral "submitted to analysis" exists in combination with other "foreign" things that the critic-chemist learns to ignore. Once isolated, the Gothic-mineral presents an outward, physical manifestation and an internal, ethico-chemical condition of possibility. The external appearances here are construed as being such an inevitable a product of the internal logic that neither can exist without the other. It is as if Gothic architecture, the society from which it was generated, the very planetary contours upon which it rests, and the inorganic materials from which it is composed all possess the same self-organizing capacity: a kind of formational logic that aggregates disparate efforts over time into an organized and active whole.[21]

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[19] Ruskin, *Works* III: 102-3.

[20] Ruskin, *Works* XI: 182

[21] Thomas, 67-69. See also Ruskin, *Works* X: 212 and 334-35, where Ruskin describes the Ducal Palace of Venice in terms of self-organizing accretion.

Ruskin treated the built environment and its physical contexts, in Venice and elsewhere, as indissoluble composites that he saw as analogous to the orders of classical architecture. He emphasized their pedagogical utility, noting:

> By each order of landscape, and its orders, I repeat, are infinite in number, corresponding not only to the several species of rock, but to the particular circumstances of the rock's deposition or after treatment, and to the incalculable varieties of climate, aspect, and human interference; by each order of landscape, I say, particular lessons are intended to be taught.[22]

Here the typological interpretation of nature as an educational example is extended to the artificial-natural hybrids of the tended environment. In Ruskin's system, then, the human activity of building was sandwiched between strata of stone. It occupied the organic layer that Ruskin called the "earth veil," stretched over the bedrock of the world, and shaped and assembled its shelters within this matrix. The ultimate aim was to build in harmony with this context – to achieve "lovely cities, crystallized, not coagulated, into form; limited in size, and not casting out the scum and scurf of them into an encircling eruption of shame."[23] Architecture was thus positioned as the calcified shell or deposit of both the society from which it emerged and the relationship between that society and its mineral environment. As such, it could be analyzed just like any other inorganic product.

This perspective helps contextualize Ruskin's architectural criticism. Ruskin stipulated that architects respect the basic chemical properties of the materials they selected. With a rate of decay measured in units of geological time rather than those of human history, stone was the ultimate building material. Yet the very nobility of its mineral order demanded a certain measure of humility. Ruskin produced detailed and polished descriptions of the beautiful forms, textures, and colors that emerged from natural weathering to argue "that in multitudes of instances, instead of gaining greater fineness of finish by our work, we are only destroying the fine finish of nature, and

[22] Ruskin, *Works* III: 39.

[23] Ruskin, *Works* XX: 113.

substituting coarseness and imperfection."[24] Moreover, just as architecture was to form itself like the inorganic elements of the natural world (as indeed it was ultimately an outgrowth of them), it was also to be allowed to disaggregate slowly, at the rate of material or societal decomposition itself.[25] In new construction, there only were two types of architectural ornament that Ruskin approved: those directly sourced from flora and fauna, and those that replicated products of the mineral realm. The same laws that shaped worthy architectural assemblages like Venice also propelled:

> The particle of lime a thousand fathoms deep in rock … mining its way steadily through the mountain's heart. It is doing more than mining, it is purifying itself. All is advance from disorder to system, from infection to purity; and we can trace the transformation from grey flakey dust, which the rain washes into black pollution, to a rock whose substance is of crystal, starred with the beryl and sapphire.[26]

Thus the Greek fret was to be discarded because the only chemical substance it resembled was a crystal of bismuth, which never occurred in nature and had to be artificially generated in a laboratory. "On this ground, then," wrote Ruskin, "I allege that ornament to be ugly; or, in the literal sense of the word, monstrous; different from anything which it is the nature of man to admire."[27] By the same token, an ornament found throughout Lombard ecclesiastical architecture was admired because:

> its main outline is one not only of natural crystallisation, but among the very first and commonest of crystalline forms, being the primal condition of the occurrence of the oxides of iron, copper, and tin, of the sulphurets of iron and lead, of fluor spar, etc.[28]

Column bases at Abbeville and Pisa were similarly praised because they took the form of engaged crystals.[29]

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[24] Ruskin, *Works* IV:153-155.

[25] Ruskin, *The Seven Lamps of Architecture* [1849], *Works* VIII: 221-247.

[26] Ruskin, "On the Forms of the Stratified Alps of Savoy" [1863], *Works* XXVI: 13.

[27] Ruskin, *Works* VIII: 143

[28] Ruskin, *Works* VIII: 145-6.

Figure 4.7 A "crystalline" column base at Abbeville Cathedral.

Ruskin's mineralogically informed engagement with architecture culminated in his involvement with the design and construction of the Oxford University Museum of Natural History (1855-60). Sir Henry Acland (1815-1900), a prominent Oxford-based anatomist and the person most responsible for the formation of this new institution, had been a friend of Ruskin's since their undergraduate days at Christ Church.[30] Acland saw the need to redress an imbalance in the University's pedagogical priorities, which were heavily weighted towards theology, philosophy, and philology. There was little room in the curriculum to accommodate the research programs of scientists like William Buckland, whose official position at the University was an uneasy one, and there was no centralized space in which to display the kind of knowledge he produced. Ruskin was enthusiastic about the proposed new museum from the beginning, and Acland invited him to take an active role in its development.

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[29] Ruskin, *Works* VIII: 95-6.

[30] Ruskin's account of their early friendship is found in his autobiography, *Praeteria*, *Works* XXXV: 188-212.

The museum held out the unprecedented prospect of simultaneously embodying "the nature of the Gothic" as Ruskin had formulated it and erecting "the book of Nature" in architectural form. Ruskin was not interested in Tractarianism or what he dismissed as the falsely alluring "glitter" of Tractarinan architecture,[31] yet there is a certain parallel between his aims and those of the ecclesiologists. Just as John Mason Neale hoped that a new kind of church architecture could inspire a return to faith "by a kind of reversed process," Ruskin aspired to reverse-engineer a larger social shift toward the ethics he identified in medieval Venice by installing an exemplary piece of neo-Gothic architecture. The museum would be exemplary in both the form of its architecture and its didactic display of natural artifacts. Significantly, it would also incarnate the generative power of nature, particularly through the sculpted ornament that was directly inspired by flora and fauna in all of their glorious irregularity. However, because Ruskin thought of architecture primarily as a process rather than as a product, he was less invested in the kind of architectural agency Street attempted to generate at All Saints Boyne Hill and more focused, instead, on the human agency involved in the architectural production. At the Oxford Museum, he took particular interest in the "free hand" given to the O'Shea brothers, two Irish sculptors tasked with producing the extensive ornamentation called for by the architects, Thomas Deane and Benjamin Woodward – partners who were particularly sympathetic to Ruskinian thought. The design process was thus a self-conscious attempt to emulate the ideas Ruskin had set out in *The Stones of Venice*, with Ruskin himself involved at many points along the way.

[31] Ruskin, *Stones of Venice I*, *Works* IX: 437.

Figure 4.8 Exterior view of the Oxford Museum of Natural History.

The issue was that the process thus initiated did not produce the product Ruskin intended. Money was in short supply, and unlike Ruskin's mythical sculptors from the Gothic past, the O'Shea brothers were not economically supported by a cohesive society that believed in and valued their work. Much of the planned decorative program for the building's exterior was never carried out. Moreover, as Carla Yanni has pointed out, the end result of Deane and Woodward's design was a building that mimicked the appearance of Venetian architecture – including misaligned horizontal bands of fenestration akin to those at Street's All Saints Boyne Hill – without adhering to its constructional principles.[32] On a purely aesthetic register, too, there was something unpleasing about the building's effect. For a museum closely bound up with geological ideas and filled with geological displays, it had a strangely unresolved connection to its ground plane. To accommodate

[32] Carla Yanni, *Nature's Museums: Victorian Science and the Architecture of Display* (New York: Princeton Architectural Press, 2005 [1999]), 80.

the display program within, the bottom row of windows began over eight feet above the ground – a vertical shift that was emphasized, in the final design, by a continuous sill band wrapped around the façade. The result was a building that, as a contemporary critic remarked:

> looks for all the world as if the two uppermost stories of a three-storied building had been cut off, and then laid upon the ground; or as if the whole fabric had sunk up to the waist in soil.[33]

Deane and Woodward had unintentionally continued John Soane and Joseph Gandy's deliberate exploration of a shifting ground plane.

Ruskin was both underwhelmed by the building's eventual appearance – he had never been more than equivocal about Deane and Woodward's design, and this had been severely altered by the time of its execution – and disappointed with the disciplinary limits of architecture as such. Above all else, the Oxford Museum proved to Ruskin that, contrary to the possibility suggested in *The Stones of Venice*, architecture could not alter the social conditions of its emergence. It could not instigate ethical priorities like apportioning sufficient funds to finish the building as it ought to have been, nor could the opportunity to work without detailed directions inspire even talented workmen like the O'Shea brothers to produce truly first-class ornament. "When I said that the workman should be left free to design his work as he went on," Ruskin remarked in retrospect, "I never meant that you could secure a great national monument of art by letting loose the first lively Irishman you could get hold of to do what he liked in it." Rather, truly beautiful ornament had to be "carved by workmen left free to their work, but only by those who had inherited the blood and observed the traditions of the noblest artrace [*sic*] of mankind through the two thousand years of uninterrupted and hereditary toil."[34] In his final estimation, the Oxford Museum project had "failed

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[33] Reporter for *Building News* 5 (January 21, 1859): 59, quoted in Yanni, *Nature's Museums* 78.

[34] John Ruskin, "Notes for the Lectures called 'Readings in Modern Painters,'" Lecture VI, delivered November 17, 1887, *Works* XXII: 525.

signally."[35] Ruskin had come to the reluctant conclusion that one could not – as he had initially hoped – resurrect extinct virtues by emulating extinct artistic processes. In order to achieve the effects he so admired in Venice, society itself would have to change profoundly. As we have seen, for Ruskin this involved not just the interactions between people but also the interactions between people and their environments. Thus, for the second half of his life, Ruskin both returned to his beloved "stones of Chamouni" and began to focus in earnest on how he might reshape the relationship between the British population and its landscapes.

Silica

Ruskin's typology extended to the way he organized his mineral specimens. The first rocks one would encounter are the most common: rolled flint pebbles broken or cut to reveal dimly translucent interiors beneath a sand-coloured crust; dark siliceous jellies split along curved, shell-shaped lines of fracture; rust-coloured whorls float across the polished surface of a cloudy purple lagoon; a light grey flint is run through with a black cross-shaped fossil, tapering to a tightly lobed quatrefoil at the other end. Next come banded flints and chalcedonies: a pale silicate like scratched ice over a deep pond prefaces a profusion of delicately layered red, tan, white and grey, each thin line ruching and rippling in a minute amplification of the film below it. The rough rinds of chalcedonies are sliced through to reveal glassy nodules and bubbles of purple and iridescent blue. There are miniature landscapes sugared with crystals: a bubbling carnelian the color of oxblood and the opacity of cast glass; a series of quartzes flecked and interwoven with gold; chalcedonies stained with fernlike traceries of iron. Next are 20 jaspers: saturated clouds and strings of colour set in mauve-grey stone; an oval slice of creamy white and yellow abuts a pink and white agate like an egg next to streaky bacon. Then 20 quartzes, from crystalline veins to detached crystals, clear, opaque

[35] Cook and Wedderburn, "Introduction," *Works* XVI: iii.

and smoky, progressing from the simplest pyramids to perfect tapering prisms. The last rocks are the rarest: roseate, milky and bright blue-green opals, green jaspers and deep purple amethysts.

This is the mineral collection "especially founded on the forms of flint" that Ruskin donated to the St David's boys' preparatory school at Reigate, Surrey in 1883.[36] It originally contained 133 specimens, including 33 flint fossils that appear to have been something of an afterthought, and was accompanied by a detailed catalogue. Ruskin's lifelong fascination with the mineral world is well documented. His collection at Brantwood, from which this and other pedagogical donations were largely derived, contained around 3,000 specimens picked up on long walks at home or abroad, scouted during Ruskin's numerous Alpine tours, or sourced from an extensive network of commercial dealers.[37] Ruskin's motive at St. David's Reigate was to make "mineralogy, no less than botany, a subject of elementary education."[38] The St David's collection was part of a larger effort on Ruskin's part to incorporate the study of minerals into primary education throughout Britain – a goal he enlarged upon in an introduction to his unfinished textbook, *Institutes of Mineralogy*, where he ascribed particular value to common minerals that were familiar, easy to find or affordable to purchase, durable, washable and able to be examined by children "without danger to themselves, the furniture, or the carpets."[39] In addition to the St David's donation, Ruskin gave significant collections to St George's Museum at Sheffield, the Kirkcudbright Museum in Scotland, the Coniston Institute and Harrow. He also spent a good deal of his time between 1882 and 1884 arranging and rearranging the siliceous holdings of the British Museum, after their relocation to South Kensington. Eventually given charge of a single case in which to illustrate "the more common forms of native silica," Ruskin supplemented the museum's specimens with his own and wrote an

[36] Ruskin, *Works* XXX: 75.

[37] Cook and Wedderburn, "Introduction," *Works* XXVI: xlviii.

[38] Ruskin, *Works* XXX: 74.

[39] Quoted in Cook and Wedderburn, "Introduction," *Works* XXVI: lxi.

accompanying catalogue. Smaller collections went to Miss Bell's School for Girls at Winnington, Cheshire, the Whitelands Training College at Chelsea, the Cork High School for Girls, and Somerville and Balliol Colleges, Oxford.[40] The St David's collection was one of only three donations for which Ruskin wrote a catalogue, and as Ruskin's editors remarked, that document stands out among such efforts for being "carefully written and most instructive." Unlike many of Ruskin's mineral collections, which have either been dispersed over time or so altered that any original written material cannot be correlated with individual specimens, the St David's collection has changed hands only twice since the school closed in 1903. While some of the more valuable items have gone missing – most noticeably the majority of the (eminently pocketable) examples involving native gold – the rest of the collection is largely intact, and in some cases Ruskin's original labels still exist. With the St David's collection, then, it is uniquely possible to compare Ruskin's words with the original specimen to which they refer. Table 4.I presents John Ruskin's St. David's Reigate Mineral Collection, in sequence, with John Ruskin's original catalogue entries.

Table 4.I John Ruskin's St. David's Reigate Mineral Collection

St. David's Collection Mineral Example	John Ruskin's Original Catalog Entry
	No. 9 Agatescent chalcedony (i.e., chalcedony throwing itself into bands), showing both the straight-levelled and concentric forms. An altogether exquisite example. Cut into four pieces, and polished, under my own direction.

[40] The circumstances and contents of each donation as well as the work for the British Museum are closely detailed in Cook and Wedderburn's "Introduction" to *Works* XXVI, where most of Ruskin's mineralogical and geological texts were collected. See xlviii-lx of that volume.

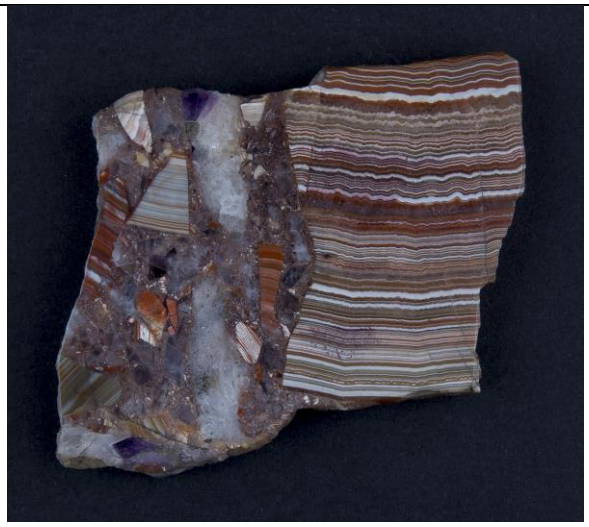
Table 4.I John Ruskin's St. David's Reigate Mineral Collection (Continued)	
St. David's Collection Mineral Example	John Ruskin's Original Catalog Entry
	No. 12 Jasperine agate, in perfect brecciation. A small slice off the best piece I have in my own collection.
	No. 13 Fawn-coloured flint, becoming chalcedonic on the inner surface. The outer surface, to me, inscrutable; the smaller and porous parts showing every state of incipient chalcedony.
	No. 15 Still finer flint, with finer chalcedony. The latter, however, broken on the surface, showing delicate varieties of conchoidal fracture. Look with lens at those on the smallest piece above my old ticket, where the new number 15 should be put for indication. These fractures are, however, partly, where so finely rippled, indicative of the interior structure of the stone. See especially the sharp apex to the left hand of the ticket. The structure of the opaque part is mostly inorganic, founded on effaced shells. See near the red arrow. Two pieces, A and B, cut and polished under my own direction.

Table 4.I John Ruskin's St. David's Reigate Mineral Collection (Continued)	
St. David's Collection Mineral Example	John Ruskin's Original Catalog Entry
	No. 16 Common mossy flint of the south coast, passing into pure chalcedony, in one part showing black arborescences of oxide of iron (rare). No one has yet given any account of the nature of the mossy matrix, which is extremely common, but extremely curious. (Compare Nos. 22, 33, and C. 1 to 12, page 500, with notes at page 499.) Where the chalcedony is white, it begins to throw itself into sausage-like forms, which might be mistaken for stalactites, but are nothing of the sort. Their decomposition at the edge into coats (see the shortest polished side) is extremely notable. This piece was originally twice as large, and broken; the other half is in my own collection.
	No. 17 Flint-chalcedony, making the best it can of itself. It cannot be seen in finer condition, showing the jasperine, spongy interior, edged with extremely minute sparkling quartz. Examine carefully with lens. I do not know how far these red parts are organic. It is very rare to find chalcedony of the two sides of the wall, as here; and still more rare to find it, as on the blue side, with superimposed pseudo-stalactites (to my great regret, broken short off). Reference number in my old collection, 1591. Cut and polished under my own direction.
	No 26 Level Icelandic chalcedony, traversed by pseudo-stalactites, each with its proper rod of nucleus. Two pieces, A and B, cut and polished under my own direction, and extremely instructive, if one could only understand a single word of what they say. Look at them against the light, and take care to keep the two pieces together.

Table 4.I John Ruskin's St. David's Reigate Mineral Collection (Continued)	
St. David's Collection Mineral Example	John Ruskin's Original Catalog Entry
	No. 32 Native gold, in the same kind of quartz, but itself more massive, and partially crystalline. I believe this Australian; but it represents the kind of gold, all over the world, which forms the nuggets in alluvial deposit. That is to say, the flawed and more or less brittle quartz gets knocked away by attrition, while the gold, in grains and masses of various sizes, falls to the bottom of the stream. This specimen has itself been a little rolled and battered on the outside, but shows the fibrous crystalline character of the gold, beautifully, in its cavities. It was cut when I bought it, and in the section obtained shows the exact lines of contact between the gold and quartz, in the interior of the stone, where the metal is compact; while it effervesces in the cavities into moss.
	No. C.13 Fine chalcedonic agate, with arborescences and spots, of oxide of iron, running between its zones, the spots being entirely independent of the arborescence. An extremely rare example (for the sake of getting which, and one or two others, I bought a whole collection). I should like the reference to it in my old collection, 1292, preserved in this catalogue.
	No. 41 Portion of an imperfectly brecciated flint, coloured by red oxide of iron. I bought the whole piece out of a heap of flints, in a dealer's back-shop, catching sight of its red edge,—for sixpence; cut it, and have kept the biggest piece, which I would not part with for five pounds. (I have now, however, given it to the British Museum, No. 28 of the illustrative Siliceous series.1) It is the finest example of pure red jasperine colour I have ever seen in silica. The white portions might be called white jasper, if they were a little less brittle, and the grey parts might be called grey chalcedony, if they were a little more clear. But on the whole, it is better to call it a high-caste flint, traversed by fibres of red jasper.

Table 4.I John Ruskin's St. David's Reigate Mineral Collection (Continued)	
St. David's Collection Mineral Example	John Ruskin's Original Catalog Entry
	No. 42 Blue agate, surrounded by a coat of scarlet jasper. It will be seen that the globular A. concretions of the agate are independent of this and exterior coat; while yet the and jasper and is itself partly agatescent, and both are bent about by a brown B. concretion at the edge of the stone. The specimen is full of all kinds of puzzling interest.
	No. 45 Three portions of a deeply interesting agate, formed as a ball in A., the hollow of a volcanic rock, and traversed, from its centre to B., the rock, by opposite tubular veins. The quartz crystals, in which and the exterior band terminates, are coated with orange jasper. C. Their own sparkling cleavages seem like a diamond sand on the smaller surface of the middle slice. The whole thing is a trifid lump of wonder, and I wouldn't give it away, if it didn't always split my head into three slices to look at it. It is only half of the original stone after all, but I never had the other half, and found I had quite enough of it when I cut this into three.

Table 4.I John Ruskin's St. David's Reigate Mineral Collection (Continued)	
St. David's Collection Mineral Example	John Ruskin's Original Catalog Entry
	No. 46 Acicular agate passing into jasper. What I mean by acicular agate, you will see by looking at it with a lens, but I don't in the least know how it came to be like that. I was always afraid of breaking the specimen, but think; that a thin slice might be taken off the flat surface, which though broken, would be very marvellous under the microscope.
	No. 49 Brecciated jasper, in variously interrupted bands apparently floating in grey chalcedony. An example of extreme interest connected with the shell-like jaspers on the one side, and with brecciated agates on the other.
	No. 51 Submitted for examination to the greatest authority on muscose matter, Mr. Bowerbank;1 who sent me word back that it was a charming specimen; and that the embedded forms were all real mosses. I am myself, nevertheless, still under the somewhat contrary impression, that Mr. Bowerbank's mosses must be all real minerals! At all events, the specimen is a superb, though a small one, and two or three film-slices might be cut for the microscope from its roughest end, without the least injury; and the question finally settled at St. David's.

Table 4.I John Ruskin's St. David's Reigate Mineral Collection (Continued)	
St. David's Collection Mineral Example	John Ruskin's Original Catalog Entry
	No. 52 Yellow and red jasper, thrown into bands by the force of the containing agate, which, however, is so far bothered by the stolidity of the jasper that it can't form its own orbs and angles properly; but wriggles and loops itself about, partly in the style of the jasperine vermicelli. Small; but extremely valuable and interesting.
	No. 56 Red and yellow jasper variously coiled and squeezed, with veins of imperfect quartz,—a rare kind, which the traveller who gave it me told me he had ridden three days in a savage country to get. As I don't care about savage countries, nor whether a jasper, which one must ride three days to get a bit of (and can't make anything of when one has got it), is to be found in New Guinea or Old Guinea (this is, I believe, from New), I have no reluctance in parting with this specimen: but I believe it could not be easily matched.

Table 4.I John Ruskin's St. David's Reigate Mineral Collection (Continued)	
St. David's Collection Mineral Example	John Ruskin's Original Catalog Entry
	No. 57 We return to the regions of propriety and common sense, in a slice of pebble of the ordinary kind, known as Egyptian jasper. These pebbles are, I believe, found loose in the sand, and I do not find the mineralogists give us any account of where they come from; perhaps, however, the first question ought to be, where the *sand* they are found in comes from, since we get too easily into the habit of thinking that two-thirds of Arabia and Africa were originally manufactured of sand. The pebble itself is very characteristic in its substance, — jasper properly so called, without any admixture of chalcedony. Though so thin, it is perfectly opaque, and though apparently containing a considerable proportion of clay or lime, takes a quite lustrous polish. Its bands appear to be the result of the same process which takes place in banded flints.
	No. 58 Our three last examples of the jasperine group sum its peculiarities, and exhibit them in the finest materials. This specimen, jasperine agate, with central quartz, is beautifully parallel and fine in the agatescent bands, which, please notice in passing, are also remarkable for the bastion-like points of their angles, to which the term "fortification," as descriptive of agate,1 is properly limited. These angles are, in this example, only the re-entering ones of large arches, but we shall see them in others, formed by straight crystalline planes. The flammeate, jasperine, red and grey stains,—the latter especially, where they cross the white band, on the broadest polished side,—are of precision and beauty certainly in their kind, not to be surpassed, and in my own collection unrivalled.
	No. 59 Slice of a jasperine agate of the finest quality, showing agatescent formation, inside as well as outside its quartz. The external bands, variously arbitrary, and unmanaged, or unmanageable, but chiefly notable, because, on the interior of the narrow and consistent band of red jasper, which falls away at one end like the loose thread of a skein, there will be found a series of little circular domes, built into the quartz; white on the surfaces, and cut through into pretty violet sections, which perfectly illustrate the white spots in the two small agates cut into heart-shape, Nos. 5 and 7, of the "Cross" series, p. 500.

Table 4.I John Ruskin's St. David's Reigate Mineral Collection (Continued)	
St. David's Collection Mineral Example	John Ruskin's Original Catalog Entry
	No. 68 Compact quartz, vexed quite out of its moral character by sulphuret of iron, with, I think, a little zinc (the black glittering part at the bottom), and nasty carbonate of iron all over. This specimen is described in the Ethics of the Dust,2 as illustrative of the temper of minerals that don't get on together. We will now take up a series of examples showing how quartz gets on with minerals whose company it likes.
	No. 71 Quartz with Tourmaline. I observed, some time since, that quartz never allowed other minerals to get into the centre of it as a nucleus for its crystals, and, as a rule, kept all extraneous minerals, even those it was very fond of, either at its surface, or just under the surface, as in the last specimen: but with its closest personal friends it relaxes so far as to allow them to crystallize all through it,1 and do whatever they like, and take whatever room they want, going on with its own crystals meanwhile, in perfect tranquillity, while the friends amuse or accommodate themselves by shooting through it in all directions. This piece is a fragment of a large crystal, traversed, I believe, by black Tourmaline. We won't stop just now to ask what Tourmaline is, especially as I am not sure that this is Tourmaline. Polished on one side, fractured on the other, and on the longest edge; but extremely pretty. I cannot make out the granular black nests on the rough edge.

Table 4.I John Ruskin's St. David's Reigate Mineral Collection (Continued)	
St. David's Collection Mineral Example	John Ruskin's Original Catalog Entry
	No. 76 Quartz in perfect crystallization, with a friend whom it respects, but nevertheless keeps outside,—topaz. This mineral is found continually embedded in quartz, at the surface, in this manner, but I have never seen a single instance of its getting inside it!
	No. 79 Perfect quartz crystal, showing its mode of growth, by the accident of a pause when it had got half way, during which the surface of the then existent crystal was covered with mossy chlorite; all the planes in this specimen are genuine, none polished, and the example is extremely rare and good. It is most singular that no mineralogist of any country on earth has ever brought up a school of miners, to take care of a good crystal when they had got it! This example has originally been as perfect as anything could be, and has been only spoiled, as single crystals always are, by the miner's throwing it into his bag with other stones, and banging them about at his leisure.

Table 4.I John Ruskin's St. David's Reigate Mineral Collection (Continued)	
St. David's Collection Mineral Example	John Ruskin's Original Catalog Entry
	No. 82 Detached crystal of dark amethyst, very fine, though the amethystine layer is not above a quarter of an inch deep, over brown quartz. Had it been all amethyst, no jeweler would ever have let it come into a mineralogical collection.
	No. 87 Brazilian opal, of the kind called hydrophane, which absorbs water on being dipped into it, and only then shows its perfect colour; it can't be too often dipped into water, but neither it nor any kind of precious opal should be exposed to strong heat of fire or sunshine.
	No. 88 Precious opal, Hungarian, the best kind, diffused through the stone, not forming veins in it. The opals used in jewellery are pieces cut, as large as possible, out of this kind of rock and afterwards rounded and polished. I never heard of a rolled opal being found in any stream, or a round pebble of it found in any rock.

In Ruskin's view, banded and brecciated silicates, a group of rocks that includes the agates, jaspers and chalcedonies at the heart of the St David's collection, were valuable examples of a self-organizing principle at work in the mineral world. Precisely because they were not bound up in messy narratives of biological development and change over time, crystals were particularly useful, both as objects of study and as pedagogical examples wherein eternal truths could be modeled and taught. In Ruskin's view, mineral formation expressed a self-organizing drive that both animated every particle of creation and formed the basis of ethical human interaction with the natural world. Small, inorganic objects such as crystals and hand specimens of minerals were valuable because they demonstrated this drive in a stable and portable format. "A stone, when it is examined, will be found a mountain in miniature," Ruskin observed in 1856, and added:

> The fineness of Nature's work is so great, that into a single block…she can compress as many changes of form and structure, on a small scale, as she needs for her mountains on a large one.[41]

The same principles of crystallization and decay applied to both a pebble and a mountain, and geological change occurred so slowly that mineral exemplars were enduring. Because the fractal intricacy of the natural world permitted one to observe the same formational processes and internal structuring principles in small examples as one could discern in the world at large, it became feasible to substitute a scientific investigation of essences for an artistic pursuit of aspects. If mountains required being seen or being painted in clear air and pure light in order to reveal "the depth of wisdom and love which are manifested in the ordinances of the hills,"[42] their constituent minerals lent themselves to perusal in more controlled environments. Such seemingly infinite scalability without loss of fidelity allowed Ruskin to persist in his belief that the natural world, even

[41] Ruskin, *Modern Painters IV*, *Works* VI: 368.

[42] Ibid., 117; see also Raymond E. Fitch, *The Poison Sky: Myth and Apocalypse in Ruskin* (Athens: Ohio University Press, 1982) 283-87.

in its smallest modules, could counter the bad science that "studies men only in the skeleton and nature in ashes"[43] by projecting universal truths into human experience. Accordingly, Ruskin had spent much of the mid-1880's organizing, augmenting and cataloguing his already sizable mineralogical collection, which, despite the many smaller assemblages he donated to various educational institutions, still contained approximately 3,000 specimens, many of which were quite rare.[44]

Silicates were a subcategory of minerals to which Ruskin paid increasing attention in the later half of his life. He specifically praised "the great diagonal – or spiral? – force of silica" as bearing "every semblance of a link between molecular and organic structure."[45] Close observation of the striations and blobs of unique color and composition which characterize such stones revealed to Ruskin's eye that these had pulled apart from each other via an internally motivated mechanism he called "tranquil division." This was a chemical process rather than a physical one, in which the individual components of each stone assumed compositional agency. Ruskin's catalogue entries are often oblique, and those for the St. David's collection are no exception. This is because he was perpetually reaching beyond the object to capture whatever minute aspects of its appearance supported a crystalline interpretation of its formation. Ruskin's major contention about silica was that both the rods, bands, and dendrites that distinguish refined silicates like agates and jaspers and the contortions that characterize the siliceous gneisses of the Alps were entirely due to crystallization – an internal force – rather than to successive deposition or large-scale compression, which are external forces.[46] Thus Ruskin's verbs in the St David's catalogue tend to treat his

[43] Ruskin, quoted in *Pall Mall Gazette,* 19 November 1883, quoted in *Works* XXXIII: 398 n. 3.

[44] E. T. Cook and Alexander Wedderburn, "Introduction," in *Works* XXVI: xlviii.

[45] Ruskin, Banded and Brecciated Concretions, *Works* XXVI: 81.

[46] Ruskin's clearest statement of this position is in his "Postscript" to "On the Distinctions of Form in Silica (1884)," *Works* XXVI: 386.

silicates as entities with agency: flint "develops" and "purifies" itself; chalcedony "throws itself into bands;" in the case of number 43, where "*chalcedony is the active and formative element*," jasper "submits." A vein of quartz demonstrates "energetic crystalline power" while a calcite crystal stuck to it has "got hold of a crystal of iron, and swallowed it up, all to itself."[47] Here the St. David's catalogue provides a glimpse into Ruskin's pedagogical approach. His was a Socratic method involving presenting evidence and asking questions while avoiding direct promotion of his own position – a technique that, given the stakes Ruskin believed were involved, indicates supreme confidence in the universality of observational induction. Ruskin's views ran counter to standard mineralogy, which, then as today, interpreted banded silicates as a sequence of individual deposits laid down in solution, in the same way that stalactites form in a cave, while their brecciated counterparts were seen also as banded silicates that had broken into pieces and were then glued back together by subsequent coats of liquefied stone.

Ruskin accused those who held to this explanation of failing to observe or account for contradictory details in the rocks themselves. For instance, the nodules that others treated as tiny stalactites seemed in the case of silicates to form independent of gravity, often pointing in several different directions within a single stone. In the St David's catalogue, Ruskin accordingly chose to call them "pseudo-stalactites," tetchily remarking in the case of his entry for number 21 (now lost) that half of these formations dropped one way and half the other:

> Modern geology would, of course, not scruple to explain this phenomenon by the theory that the world had been turned upside down in the interval. I prefer, myself, to direct attention simply to the circumstance, and to the farther interesting fact, that one stalactite in the middle dropped *sideways*.[48]

[47] Ruskin, "Catalogue of the Siliceous Minerals Given to and Arranged for St. David's School, Reigate" [1883], *Works* XXVI: 491, no. 1; 492, no. 9; 502, no. 43 (emphasis in the original); 507, no. 62-63.

[48] Ibid., no. 21, 493.

Here Ruskin's theorizing ran ahead of his reason, since, as in the case of stalactites forming downward and stalagmites forming upward, gravity alone could account for his first observation: depending on the rate and internal variation of crystallization, his sideways instance might have been the result of rolling the forming stone rather than upending its parent orb. Yet Ruskin also amassed more persuasive evidence in support of tranquil division. In particular, he noted in the St David's catalogue that in banded silicates "the basic films never exceed a certain thickness, nor the basic rods a certain diameter." This, as he explained in a series of papers aimed at the geological profession between 1867 and 1870, seemed at variance with the idea that such coats and rods formed like baby strata, one at a time and in superimposition. Rather, Ruskin believed that examples like those in the St David's collection proved a chemical process was a work: bands and rods were all a uniform thickness because their formation was simultaneous, which meant they were collectively constrained to the same degree, and width, of separation.

This is the basic argument Ruskin's mineral collections were meant to demonstrate in the most persuasive manner possible. In the St David's collection, the rocks have been arranged to showcase silica's full range of formative potential, from the least organized flint flecked with fossilized organic material to the purest quartz arrayed in complete crystalline order. There is also an attention to color – which surges and ebbs through the collection as if to pull a complex tapestry of molecular kinships through to the surface – as well as attention to form: cut and polished rocks are balanced by rougher specimens, and the large examples are offset by small ones. The somewhat idiosyncratic inclusion of metals in the middle of the sequence and the segregation of gem-quality stones at its end seem calculated to periodically reinvigorate the observer's flagging attention. A visual and material argument is being made, in other words, with subtler means than science alone.

In Ruskin's view, even the large-scale strata visible on cliff faces and in railway cuts were not always to be interpreted as successive layers of sediment that had lithified over time. Rather, he

speculated that they were just as often the result of a process in which the constituent minerals of an originally undifferentiated and gelatinous chunk of rock slowly repelled and attracted, crystallized and formed, until they self-sorted and hardened into clean stripes.[49] At every turn, Ruskin found evidence to support a thesis that the world was generally sorting itself out according to a preexisting chemical code that motivated change from within. Matter was not an inert substance shaped by forces over which it had no control. Rather, it acted in accordance with logics of concretion and dissolution that were present in its smallest particles and simplest configurations.

Ethics of the dust

Ruskin scaled this principle up to an essential ethic for human society. His ideal socio-political structure was one of strictly delineated hierarchies and absolute obedience — a naturalized take, in other words, on the traditional British class system that, by the mid-19th century, was threatened by wide-scale urbanization and industrialization. Ruskin was a relentless critic of the existing state of things, which he believed to have been fatally corrupted by exploitative short-term profit taking on the part of wealthy landowners, coupled with a counterproductive pursuit of freedom on the part of the masses. On the second count, Ruskin insisted that nature offered no examples with which to justify such striving. He began his section on "The Lamp of Obedience," in *The Seven Lamps of Architecture* (1849), by denying "that treacherous phantom which men call Liberty:"

> There is no such thing in the universe. There can never be. The stars have it not; the earth has it not; the sea has it not; and we men have the mockery and semblance of it only for our heaviest punishment.[50]

This is where the pedagogical counterexample of minerals was particularly valuable. In *The Ethics of the Dust, or Ten Lessons to Little Housewives on the Elements of Crystallization* (1866), Ruskin instructed

[49] Ruskin, "On Banded and Brecciated Concretions" [1861–1870], *Works* XXVI: 44.

[50] Ruskin, *Works* VIII: 287.

his eleven female pupils, ages nine through twenty, to persist in their own "unconquerable purity of vital power, and strength of crystal spirit" and develop according to plan, as it were.[51] The girls were to follow the example of mineral atoms, which always "get into order as soon as may be:"[52]

> For in the fulfillment, to the best of their power, of their adopted form under given circumstances there are conditions entirely resembling those of human virtue: and indeed expressible under no term so proper as that of the Virtue, or Courage of crystals.[53]

Ruskin's "crystal virtues" endowed minerals with a "limited, though stern code of morals" focused on purity and form.[54] His "crystal quarrels" included an example he subsequently donated to the St. David's school (no. 68) in which quartz and iron had combined to produce misshapen and imperfect results.[55] Aside from what strikes us today as Ruskin's chauvinism—for his time, his view of female education was considered quite liberal[56]—perhaps the most repellent aspect of Ruskinian ethics to modern minds is that it demanded total submission to an unchanging and unquestionable pattern.

Twenty years after he penned "The Lamp of Obedience," Ruskin was still contrasting the "restraint of voiceful rock" with the "dumb" and hapless freedom of sand.[57] In his mind, humans deviated from their pre-established orbits only temporarily, and with miserable consequences. He wanted to make this reality a tenant of his educational program. "Let the facts be clear…but all debate declined," he wrote in the *Deucalion*. Students were "to know as many [facts] as they can

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[51] Ruskin, *The Ethics of the Dust: Ten Lectures to Little Housewives on the Elements of Crystallization* [1866], *Works* XVIII: 263.

[52] Ibid., 221.

[53] Ibid., 259.

[54] Ibid., 261.

[55] Ruskin, *Works* XXVI: 508, no. 68; *Works* XVIII: 283.

[56] Jeffry L. Spear, *Dreams of an English Eden: Ruskin and his Tradition in Social Criticism* (New York: Columbia University Press, 1984), 167–177.

[57] Ruskin, *Works* XIX: 409. This passage is discussed in the context of Ruskin's larger philosophy on freedom and constraint in Daniel Williams, "Atmospheres of Liberty: Ruskin in the Clouds," *ELH* 82.1 (Spring 2015): 141-182.

thoroughly know, - not more; and absolutely forbid all debate whatsoever."[58] Ruskin established an association devoted to instituting "the wholesome laws of laborious (especially agricultural) life and economy" called the Guild of St. George in the 1870s, through which he attempted to germinate social change in England by modeling it on a small scale.[59] Throughout this experiment, his emphatic demands for total obedience increased. All members of the Guild would be required to obey "the dictation of necessary law" with a submission which was to be "absolute, and without question; faithful to the uttermost, - that is to say, trusting to the uttermost."[60] Thus, the St. David's donation was ultimately part of Ruskin's larger campaign for an obedient nation whose ethics *resembled* the formational patterns of rocks because they were derived from the same divine source, and *responded* to this most basic foundation with creative empathy. Distributing carefully annotated mineral collections to the youth of the nation was an efficient way to disperse granules of natural truth that both embodied right behaviors and inspired emulation.

If the "tranquil division" that Ruskin discerned in silicates typified the way the inorganic world built itself up, then the relationship between glaciers and mountains typified the way the inorganic world broke itself down. In general terms, Ruskin's intervention in an ugly debate between James Forbes, who argued that glaciers were "viscous" and "plastic" flows, and John Tyndall, who theorized that brittle ice inched forward via regelation and disputed the originality of Forbes' work, is well known, and his support for Forbes's roughly correct position has been adequately described elsewhere.[61] But Ruskin's support of the more accurate theory of glacial

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[58] Ruskin, *Works* XXVI:106, 166.

[59] Ruskin, *Works* XXX: 5.

[60] Ruskin, *Works* 28:649; see also Francis O'Gorman, "Ruskin's Science of the 1870's: Science, Education, and the Nation," in ed. Dinah Burch, *Ruskin and the Dawn of the Modern* (Oxford: Oxford University Press, 1999), 48.

[61] See, for example, Bruce Hevly, "The Heroic Science of Glacier Motion," *Osiris 11: Science in the Field* (1996): 66-86; and J. S. Rowlinson, "The Theory of Glaciers," *Notes and Records of the Royal Society of London* 26.2 (Dec., 1971): 189-204. Today we know that glaciers move partially as plastic flows -- modern science distinguishes between "viscous" and "plastic," which Forbes used interchangeably -- and partially by slipping along their channels on the thin layer of

mechanics has tended to overshadow his radical view of the relationship between ice and rock. Ruskin took the viscous analogy much farther than Forbes would have been willing to go, likening glaciers to ice cream and honey – soft, "sponging" flows that picked up bits of rock as they slowly oozed down preexisting valleys and rocky beds. Crucially, he did not attribute any power to sculpt or whittle stone to these immense rivers of ice, and theorized that they were instead *filling up* their valleys with mountain detritus that came, not from their own action, but from an internal predisposition of the rocks around them. His full position is summarized in the following passage from his collection of geological writings, *Deucalion: Collected Studies of the Lapse of Waves, and Life of Stones* (1875-1883):

> All mountain forms are suffering a deliquescent and corroding change, — not a sculpturesque or anatomizing change. All character is being gradually effaced; all crooked places made straight, — all rough places, plain; and among these various agencies, not of *e*rosion, but *cor*rosion, none are so distinct as that of the glacier, in filling up, not cutting deeper, the channel it fills; and in rounding and smoothing, but never sculpturing, the rocks over which it passes.[62]

The key terms here are "deliquescence" and "corrosion." Deliquescence is the chemical state in which a substance is inclined to absorb moisture from the atmosphere until it dissolves. An example is common table salt: crystals whose atoms are more attracted to those of water than to themselves. Likewise, corrosion is the process in which the atoms of various metals combine with oxygen to produce more stable compounds. Ruskin's favorite example of this was rust. In contrast to these two *chemical* processes, erosion is a *physical* change in which rock retains its atomic form whilst being abraded by water and wind. In other words, Ruskin imagined that moisture and air are not beating against stone but rather being inhaled by it, in a process sanctioned by the most minute organizations of matter itself.

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meltwater squeezed between the ice on top and the rock on bottom. While the regelation that Tyndall described undoubtedly occurs in glaciers, it is not now considered to be a major factor in their movement. Rowlinson, 200.

[62] Emphasis in the original. Ruskin, *Works* XXVI: 123.

Figure 4.9 John Brett, *Glacier of Rosenlaui*, 1856.

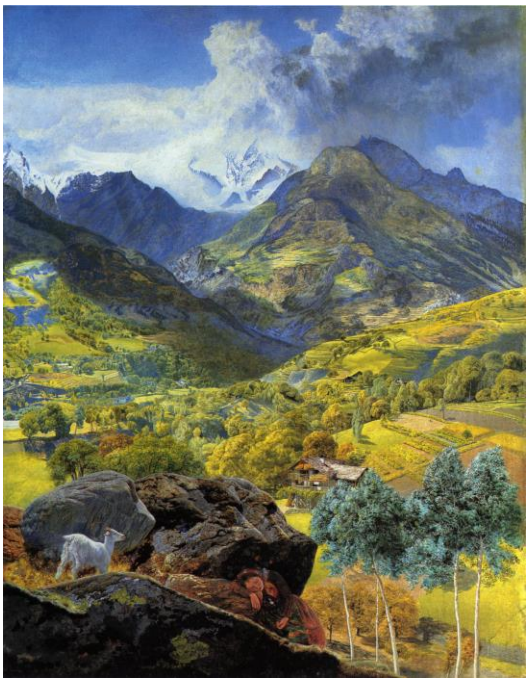

Figure 4.10 John Brett, *Val d'Aosta*, 1858.

There is a counterintuitive kind of symmetry to Ruskin's system. In his understanding, inorganic matter both formed itself into complex compounds like crystals and mountains by chemically separating its components, and took itself apart through an atomic process of admixture. In other words, things went together by coming apart, and came apart by coming together. In the case of glaciers, this meant that valleys were filling themselves up rather than being gouged out. In Ruskin's interpretation, the sharp, v-shaped crevices that had originally formed between crystalline peaks were gradually becoming shallower u-shaped valleys blanketed with deliquescent and corroded matter: that is, with soil. This theory permitted Ruskin to accomplish a typically typological fold, bringing a basic natural process into direct alignment with a material benefit for humankind. As barren mountain crystals mixed with water and air, they produced arable agricultural land.[63] This process is illustrated in two paintings by John Brett. As Christopher Newall has discussed, Brett painted *The Glacier of Rosenlaui* (1856) in an almost fervid emulation of

[63] *Deucalion*, *Works* XXVI: 146.

Ruskinian artistic principles, although he was as yet unaware of Ruskin's specific geological theories. The work depicts a naked mineral landscape whose complex undulations so mirror those of the glacier that it is entirely unclear which is the more yielding substance: rock or ice. *Val d' Aosta* (1858) was literally painted under the exacting tutelage of the master himself, with Ruskin hectoring his convert at every stroke of the brush, and offers a panoramic sequel to the earlier composition.[64] Here the valley is wide and u-shaped, fertile and inhabited. This is the noble end of all of those ferrous and non-ferrous particles: the creation of a landscape that will yield to husbandry and benefit all the living creatures of the earth.

The work of iron

Here a troubling wrinkle, both in typological thought in general and in Ruskinian thought in particular, begins to come into view. The issue with such systems is that they work in both directions: if inorganic matter truly possesses some sort of life, then life as such necessarily takes on certain inorganic qualities. The implications of this position perhaps come into sharpest focus in Ruskin's thinking on iron. In an 1858 lecture on "The Work of Iron," Ruskin described unrefined iron's tendency to oxidize as a desire to breathe, and thus to live. As rust, iron exemplified the same virtuous bond embodied by that between dissolving stone and water. Just as deliquescing mountains produced fertile soil, Ruskin argued that iron was also more beneficial to humans as rust than in its pure form. Iron oxide supplied nutrients to the soil, color to both the landscape and the proper building materials of brick, stone, and wood, and was generally so interfused with human life that it tinted the blood. Rust, Ruskin declared, allows us to blush. On the other hand, refined iron, including iron wrought or cast into architectural components, was suspended in an unnatural

[64] Christopher Newall, "'Val d'Aosta': John Brett and John Ruskin in the Alps, 1858," *The Burlington Magazine* 149.1248 (March 2007): 165-172.

and ultimately treacherous state that Ruskin called "anarchy."[65] He wrote in 1880 that "no builder has true command over the changes in the crystalline structure of iron, or over its modes of decay," and went on to reference "the definition of iron by the Delphic oracle: 'calamity upon calamity.'"[66] "Nay," Ruskin concluded in 1858, "in a certain sense, and almost a literal one, we may say that iron rusted is Living; but when pure or polished, Dead."[67]

Thus, embedded in Ruskin's critique of the industrial revolution's material of choice was a highly anomalous model of life and death. The breath that sent oxygen foliating through iron tamed that metal's energy within a stable compound, while the so-called deadness of its refined form was marked by an unquiet tendency to spring into unexpected chemical action. The replicable equilibrium Ruskin ascribed to optimal mineral life was a quality he actively sought to inculcate in the human population. Just as miniscule, perfectly same atomic actions of separation and cohesion could bring mountains into being, so what Ruskin called the "coralline-like activity" of a society built around a set of self-perpetuating daily habits could produce architectural masterpieces like those of Venice.[68] Within this reiterating system, Ruskin argued that "an enormous mass of intellectual power" that would otherwise go wasted could be captured in durable works of art and building – an achievement that Ruskin likened to "foam fixed into chalcedony" rather than "foam on wine."[69]

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[65] Ruskin, "The Work of Iron, in Nature, Art, and Policy" [1858], *Works* XVI: 375–411.

[66] *Seven Lamps, Works* VIII: 68–70, n. As Cook and Wedderburn note, Ruskin is referring to Herodotus i:68, which literally translates from the Greek as "trouble laid upon trouble by the thought that iron had been discovered for the evil of mankind." Ruskin goes on to reference sudden structural failures in iron infrastructure and damage inflicted to ships as evidence of refined iron's unruly nature. Modern scholarship connects Herodotus' remark with the fact that iron in the ancient world was a synecdoche for war. See, for example, James Romm's note in a recent translation of Herodotus: *Histories*, trans. Pamela Mensch, ed. James Romm (Indianapolis: Hackett Publishing, 2014), 29, n. 82.

[67] Ruskin, *Works* XVI: 376–7.

[68] Ruskin, *Works* VIII: 103.

[69] Ibid., 139.

Yet for Ruskin the most important "work" of the iron-oxygen compound was its typification of "the action of body and soul together:"

> All art worthy the name is the energy—neither of the human body alone, nor of the human soul alone, but of both united, one guiding the other: good craftsmanship and work of the fingers joined with good emotion and work of the heart.[70]

Humans could not produce truly great works, or even choose the best materials to use, without an imbrication between the physical and the spiritual as strong as the bonds that knit together individual atoms of metal and air. In fact, the two types of connections differed from each other only by degree: it was as useless to call spiritual nature "supernatural," Ruskin wrote, "as it would be to call organic matter supermineral; as the organic matter is only another state and order of mineral matter, so what we vulgarly call supernatural is only another state and order of the natural."[71] As he put it:

> Who is to say that the radiation and accretions of a crystal are not life, but that the same arrangements in a leaf or tree are life? – that the clouds which float in their balanced changeableness are not as much guided and defined as the clouds of chalcedony, or the lenses of the human eye which perceives them?[72]

Thus when Ruskin gave *Deucalion* the subtitle, *Collected Studies of the Lapse of Waves, and Life of Stones*, he intended the phrase to be taken quite literally.[73]

Chemical life

Toward the end of his career, Ruskin believed that the social order was so profoundly out of joint that it foreclosed the very possibility of architecture. Contra Street, he did not ultimately

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[70] Ruskin, *Works* XVI: 385.

[71] Ruskin, *Works* XXII: 526.

[72] Ruskin, *Works* XXVI: 212.

[73] "Deucalion" is a figure from Greek mythology who roughly corresponds to that of Noah in the Mosaic tradition. In the classical myth, Deucalion is instructed by the oracle to repopulate the earth by scattering "the bones of their mother" – the stones of the earth. For Ruskin, this resonated with two biblical passages: "God is able of these stones to raise up children . . . "[Matthew 3:19]; and "If these [followers of Christ] should hold their peace, the very stones would immediately cry out"[Luke 19:40]. See Cook and Wedderburn, "Introduction," *Works* XXVI: xlvi–xlvii.

think that any "new" architecture was possible or even desirable. Real architecture was the fruit of a collective project that developed slowly, much like the geological processes of nature, and it could never be instantly 'invented.' Even as early as 1849 he had been suspicious of contemporary neo-Gothic efforts, writing in *The Seven Lamps of Architecture* that "the stirring which has taken place in our architectural aims and interests within these few years, is thought by many to be full of promise: I trust it is, but it has a sickly look to me."[74] By the 1880's, he had concluded that, for cities:

> in which the object of men is not life, but labour ; and in which all chief magnitude of edifice is to enclose machinery; cities in which the streets are not the avenues for the passing and procession of a happy people, but the drains for the discharge of a tormented mob, in which the only object in reaching any spot is to be transferred to another; in which existence becomes mere transition, and every creature is only one atom in a drift of human dust, and current of interchanging particles, circulating here by tunnels underground, and there by tubes in the air; for a city, or cities, such as this no architecture is possible—nay, no desire of it is possible to their inhabitants.[75]

Instead, Ruskin's Guild of St. George was an intensive project to repair the critical cultural juncture between the organic and the inorganic worlds as a whole. Men were to give up cutting gemstones and turn to faceting the very islands of Britain.[76] The Guild was to be concerned with averting floods, draining fens, and checking sea-erosion; i.e., the entropic processes of an earth abandoned by the creatures for whom it was created were to be countered by agricultural efforts, ethical manufacturing and commerce, and education aimed at reforming the next generation.[77] If the basic alignment between biological activities and their geological foundations could be restored, Ruskin theorized, the conditions for a renewed efflorescence of architecture would reoccur.

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[74] Ruskin, *Works* VIII:194.

[75] Ruskin, *Works* XIX: 24.

[76] Ruskin, *Works* XVIII: 219; *Unto This Last* [1860], *Works* XVII: 87; *Works* VIII: 265.

[77] See Cook and Wedderburn, "Introduction," *Works* XXX: xxii; Ruskin's "nothing but indisputable facts" quoted in O'Gorman, 46.

This desire to replicate the former arrangements of things signals perhaps the most consequential recursion in Ruskin's thought. As his explanation of glacier-mountain interaction illustrates, Ruskin knew and accepted that forms disintegrated and existing chemical bonds weakened over time. However, his attribution of absolute fixity to the ethics of the world meant that he was forced to imagine an endless cycle of the same ideal forms for all natural and human productions. The clay dust shed by mountains and deposited by glaciers, tilled by farmers and carried to cities on the wind, would eventually crystallize into its ideal organization once more:

> Left in perfect rest… it becomes not only white, but clear; not only clear, but hard; nor only clear and hard, but so set that it can deal with light in a wonderful way, and gather out of it the loveliest blue rays only, refusing the rest. We call it then a sapphire.[78]

Likewise, the ideal configuration achieved, at least in part, by Gothic architecture and society in the twelfth and thirteenth centuries could be literally revivified. By isolating and removing formational principles from their historical contexts, Ruskin was seeking to establish perfectly static ideals of well-being and well-building. What had been achieved by quartz or salt crystals in the past could be repeated again and again, given a favorable environment, and the same held true for architecture.

Historically, Ruskin's project coincides with that of Charles Darwin, whose 1859 publication, *On The Origin of Species,* famously demonstrated that there is no organic life without conflict and adaptation. In stark opposition to this position, Ruskin's embrace of inorganic fixity reveals itself to be a conservative impulse that attempts to negate precisely the ways in which humans are *other* than their natural contexts. This includes architecture in the largest sense: the intellectual, cultural, and physical edifices we erect to temporarily exclude or contravene the physical laws to which our bodies are ultimately subject. Biological struggle is absent in Ruskin's inorganic ethics. Predicating human behavior on the self-organizational properties of minerals is

[78] Ruskin, *Works* VIII: 207-8.

ultimately an attempt to strip a critical animal faculty from the human subject: the ability to develop and change via precisely the kind of disruptive fluctuation that Ruskin rejected in refined iron at almost precisely the same moment that Darwin underscored its importance in organic life. As Michael Hall has demonstrated, Ruskin opposed Victorian notions of development, and distrusted the idea of progress from a lower point of origin to a higher state. Dissolution was the real threat to Ruskin's world. If any lasting change occurred, it was likely to be in the opposite direction. Thus his tongue-in-cheek question of Darwin in 1868: "When is he going to write—ask him—the 'Retrogression' of Species—or the Origin of Nothing?"[79]

In this context, the St. David's Reigate collection represents a central paradox in Ruskinian thought. Although he was willing to grant silicates and students alike a dynamic formative experience, he attempted to impose the seeming stasis of stones on mature society, as though the ideal rate of change in the human realm was as slow as that of the inorganic world. The difficulty resides in Ruskin's typological insistence on treating irreducibly different, if intimately connected, systems as if they were the same. Because the biological realm depends on the relative immobility of its mineral substrate, for it to advance and alter at the pace of mountains would amount to its paralysis.

For Ruskin, what appears on the surface to be an aesthetic critique shaped by geological insights is ultimately tethered to a vision of human activity modeled on chemical order. Furthermore, behind the rhetoric that urged humans and their institutions to learn from inorganic processes of formation was a conviction that cultures ought to be literally shaped by their inorganic substrates: that humans and their achievements ought to be the final and most intricate outworkings of a natural system that began with the simplest atomic configurations. As Richard Stein's

[79] Ruskin, "Letter to Charles Eliot Norton" [1868], *Works* XXXVI: 552.

examination of Ruskin's "Poetry of Architecture" articles (1837-8) demonstrates, this was a consistent position, detectable in Ruskin's earliest writings.[80] Ruskin wrote in 1838 that the evidence of human life was a fundamental part of a landscape's beauty as long as it was "life congenial with its character." On the other hand, he continued:

> that life is not congenial which thrusts presumptuously forward, amidst the calmness of the universe, the confusion of its own petty interests and grovelling imaginations, and stands up with the insolence of a moment, amid the majesty of all time, to build baby fortifications upon the bones of the world, or to sweep the copse from the corrie, and the shadow from the shore, that fools may risk, and gamblers gather, the spoil of a thousand summers.[81]

A particularly telling phrase in this pronouncement is Ruskin's juxtaposition of "the insolence of a moment" and "the majesty of all time." That is, he characterized the yawning gap between human ambition and the crystalline order of the earth as unethical. Although Ruskin was certainly sensitive to the true extent of deep time, he insisted on yoking the puniness of human temporality to the unimaginable duration of "the bones of the world." Yet our volatile experience of sentient existence is so deeply at odds with the inertia we attribute to the mineral world that Ruskin's attempt to model one on the other seems akin to pursuing death in life.[82]

Ruskin's dismissal of humanity's "baby fortifications" harkens back to Robert Adam's late exploration of castle-style buildings and invented landscapes in the context created by Hutton's *Theory of the Earth*. Yet where Adam recognized the humbling incommensurability between architecture and what he described as "unparalelled [*sic*] Works of Nature" while still attempting to design in spite of it, Ruskin demanded that human activity be brought into alignment with that of nature. Ruskin scorned the Georgian attempt to rival spectacular mountain scenery with "sublime"

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[80] Stein, 328-341.

[81] Ruskin, "The Poetry of Architecture; or the Architecture of the Nations of Europe Considered in its Association with Natural Scenery and National Character" (1837-38), *Works* 1: 132.

[82] Stein, 331-335.

castellated forms whilst industry simultaneously exploited the mineral wealth of the countryside and polluted its atmosphere. This criticism is doubly apt for Adam because it applies to both to his architectural ambitions and his family's coal-derived wealth. Adam's vision of architecture as something that simultaneously registered geological time's deleterious effects yet playfully engaged with the malleability of human history is countered by Ruskin's larger censure of the human "insolence" that imprudently separated itself from nature rather than conforming to its dictates. The question this conflict begs is whether nature is to be expanded to accommodate the imaginative and inventive aspects of human culture, or whether unruly human attributes must somehow be reduced to the automatic processes of the earth. What is ultimately at stake is our definition of nature.

Conclusion

The word "amateur," with its dual connotations of enthusiasm and avocation, was always an accurate description of Ruskin's geological position, but its meaning changed considerably over the course of his lifetime. During the first half of the nineteenth century, it was still possible to work within the tradition of the savant: a wide-ranging thinker whose research could productively span what would strike us today as wildly varying fields, scales, and techniques. For a time, Ruskin operated successfully in this mode. His work was still considered valid, if marginal, up until about 1870, when he published the last in a series of seven papers collectively entitled "On Banded and Brecciated Concretions" in the respected *Geological Magazine*.[1] As the nineteenth century neared its close, however, the professionalization of the sciences, for which the *Geological Magazine* was itself a harbinger, became increasingly hegemonic. Ruskin lacked up-to-date scientific connections and the personality that would have allowed him to cultivate them. He bullied and infantilized the minor geological figures with whom he was acquainted.[2]

Moreover, Ruskin's insistence on the legitimacy of his "interwoven temper" – his fundamentally interdisciplinary approach – clashed with the modern scientific value of specialization. "Amateur" was no longer a term for legitimate empirical study carried out by the man of leisure, but rather a faint slur against unsystematic, untrained tinkering. Ruskin saw his own geological enthusiasms decline in the perception of others from a polyglot inquiry into the nature of things to the trivial status of a hobby. He certainly resented his marginal status in the discourse, peevishly remarking in 1878 that he had been "waiting in vain" for a younger student to

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[1] John Ruskin, "On Banded and Brecciated Concretions" (1867-1870), *Works* XXVI: 37-88.

[2] For the best account of Ruskin's fraught relationship with professional men of science, see Mark Frost, "'Circles of Vitality': Ruskin, Science, and Dynamic Materiality," *Victorian Literature and Culture* 39 (2011), 367–383.

take up the work he had begun.[3] In addition, aside from fairly unoriginal youthful enquiries, all of Ruskin's contributions to geological thought came after the publication of Darwin's *On the Origin of Species*. Darwin, who was trained as a geologist, would have been the last to disavow this field's continued importance. In retrospect, however, it is possible to see how his work helped to mark the moment when geology gave way to biology in both the public imagination and scientific investigation. In other words, when Ruskin published his thoughts on alpine striations and siliceous form, he was writing to a jaded and shrinking audience.[4]

Yet, in the two centuries that have followed, Ruskinian thought has remained an influential strand in architectural and environmental thinking.[5] Today, Ruskin's critique of industrial capitalism is enjoying a resurgence in the context of an increasing cultural awareness that human-produced climate change and exploitative labor practices are two equally unsustainable and odious aspects of the same socio-economic phenomenon.[6] Ruskin's mineralogy has also attracted interest as part of architecture's recent fascination with the inorganic world – a trend the architectural theorist Etienne Turpin has described as "the geologic turn."[7] In both cases, Ruskinian ideas align with the set of contemporary anxieties articulated in the popular imagination by the term "anthropocene," a proposed interpretation of stratigraphy that underscores the impact of human activity on the earth. (One imagines that Charles Lyell, who anticipated that human civilization would leave a legible indication in the rock record in the 1820s, would approve of this term.)

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[3] Ruskin, *Works* XXVI: 274.

[4] Caroline Trowbridge, "'Hammer in Hand': the Geology of John Ruskin," unpublished PhD dissertation, University of Oxford (2003), 17-30. For Darwin's geological training, see Sandra Herbert, *Charles Darwin, Geologist*, (Ithaca: Cornell University Press, 2005). For Ruskin's "unsculpturing" forces, see *Works* XXVI: 117.

[5] An example of a recent publication inspired by Ruskin in architectural theory is Lars Spuybroek, *Sympathy of Things: Ruskin and the Ecology of Design*, (Rotterdam, V_2 Publishing, 2011).

[6] An example of the continued scholarly interest in this aspect of Ruskinian thinking is Vicky Albritton, *Green Victorians: the Simple Life in John Ruskin's Lake District* (Chicago: University of Chicago Press, 2016).

[7] Etienne Turpin, "The geologic turn: architecture's new alliance," Design Research Symposium on the Anthropocene, University of Michigan, United States, January 10, 2012; February 10-11 2012.

Moreover, in the context of the *longue durée* that stretches from Robert Adam's encounter with Herculaneum to G. E. Street's attempt to engender architectural life, Ruskin's insistent conflation of societal ethics with its environmental substrate can be read as an insight – albeit an unsettling one – into a fundamentally architectural problem.

As this dissertation has emphasized, architecture is fundamentally concerned with shaping inorganic matter to suit the ideas and habits of living beings. As such, it occupies a liminal zone between a temporal and physical scale that far outstrips lived reality and those fleeting desires that most reinforce our subject-centered experience. In other words, architecture provides a point of connection between things that humans can and cannot control. In this way, the discipline of architecture can also become a means by which individuals grant creative vitality to objects while ultimately retaining the option of when and whether to grant them agency. Ruskin's extension of this "dead life" from crystals to buildings and thence to human beings themselves simply renders this troubling architectural function explicit.

The "geologic turn" which began in the wake of the Lisbon earthquake of 1755 and trailed off during the second half of the nineteenth century was in some sense a very convenient epistemological development. Precisely because it was concerned with large objects and even larger processes, this turn provided a guise for treating societal change as if it too were inevitable in the course of nature. If, in Adam's youth, the exploitative practices of capitalism were far away, hidden on slave plantations in Virginia and the Barbados, in the mendacious bribery of the East India Company's clerks, and in early transportation schemes to the Antipodes, the ensuing decades saw such violence move closer to home. The turn of the century was characterized by the enclosure of common lands throughout Britain, the clearance of the Scottish Highlands, the brutal suppression of the Irish rebellion of 1798, the rise of industrialized production, and the concomitant relocation of

labor from the countryside to urban slums organized around the portability of steam.[8] These events haunt the case studies presented in the preceding chapters. The geological perspective that informed the major and expensive architectural commissions discussed here played a part in endowing political, social, and economic decisions—all of which could have gone otherwise—with a sheen of inevitability. Caught up in the same blinkered narrative of teleological necessity that colors the writings of Karl Marx and Friedrich Engels, such architectural projects assisted in shifting agency from the contingent actions of individuals to the ineluctable processes of history.

It is one of the great ironies of this period that Ruskin, who was deeply alive to the way daily choices shape societies and their territories over time, was unable to connect the inorganic models he favored to the foreclosure of those imaginative possibilities he was most concerned to preserve. In spite of his eloquence, and by his own valuation, Ruskin utterly failed in his attempt to align society with natural law. "I went mad because nothing came of my work," he wrote bitterly in March of 1880.[9] A decade later, during the last ten years of his life he succumbed to full dementia.[10]

G. E. Street's relatively happy and untroubled biography provides a contrast to Ruskin's, and indeed to those of Soane, Gandy, and Adam before him, yet his contribution to architectural theory and design can also be read as a move away from human agency and toward the agency of things. Christian theology treats humanity as the apogee of a divine creation of which it is nevertheless a part. In the context of a perceived need to reinvigorate an apathetic church, Street's efforts to instigate a kind of architectural life at All Saints Boyne Hill are of piece with a biblical strategy in which inanimate and durable objects can act as instruments of God. Upon his triumphant

[8] A compelling case for this trajectory is presented in Andreas Malm, *Fossil Capital: The Rise of Steam-Power and the Roots of Global Warming* (London: Verso, 2016).

[9] Ruskin, *Works* XXIX:386

[10] Jeffrey L. Spear, *Dreams of an English Eden: Ruskin and His Tradition in Social Criticism*, (New York: Columbia University Press, 1984), 13.

entry to Jerusalem, shortly before his crucifixion, Christ informed those who disparaged the loud cheers of his disciples that if his people fell silent "the stones would immediately cry out."[11] This was a reference to the Old Testament extension of voicefulness to architecture when the occasion called for it: "for the stone shall cry out of the wall, and the beam out of the timber shall answer it."[12]

Soane's project to kindle a perpetual animation for architecture from the picturesque treatment of its fragments belongs to the same vein. His and Gandy's exploration of architecture's future anterior was both a registration of their discipline's fragility in the face of geological time and an attempt to forestall its effects – not with direct inventiveness, but via a series of ornamental strategies they deployed as surrogates for a kind of human creativity that seemed impossible. Both architects placed significant value on professional codes of practice – procedures they helped to standardize – and the quality workmanship that would result from proper oversight and correct detailing.[13] Implicit in this shared concern was the shift from architecture as a noun to architecture as a verb. In other words, with Soane and Gandy it becomes possible to reimagine architecture, not as a set of historiated objects, but as a set of standardized, even automatic actions made possible by institutions rather than individuals.

Even Adam's castles can be couched in terms of how a designed object might resist the overwhelming and inevitable forces of nature. In both his castle-style buildings and his castellated landscape paintings, the architecture does the work: dinner guests no more than glimpse the sublime vista on their way to the table; stiffly drawn figures in the watercolors – Adam was never

[11] Luke 19:40, King James Version

[12] Habakkuk 2:11, King James Version.

[13] I am grateful to Daniel Abramson for his assistance with thinking through the ramifications of Soane and Gandy's concern for durability, both material and professional. For Soane's concern with professionalism, see Susan Bennett, "The Rise of the Professional Architect," *RSA Journal* 147.5490 (1999): 132-33. Soane's concern with construction quality and building methods is reflected in the fact that he devoted an entire Royal Academy lecture (Lecture XII) to this subject. It was also remarked upon by contemporaries like John Britton in his *Brief Memoir of Sir John Soane* (London: Fisher's National Portrait Gallery, 1834), 12.

particularly adept at rendering the human form – look on passively as fortresses confront outcrops. The sublime idiom intended to instill a sense of fraught parity with majestic landscapes on the part of Adam's elite patrons drops off in co-located projects meant for humbler folk. The same Lake District scenery that inspired the Adam brothers to attempt "a Castle…worthy…of Olympian Jove" for Sir James Lowther had no discernable effect on Adam's utilitarian group of twelve workers' houses for an unfinished model village on the estate.[14] The fiction of landscape-induced artistic necessity did not apply to the tenant laborers who worked Lowther's mines.

Figure 5.1 Robert Adam, twelve houses for workers on the Lowther Estate, Cumbria, 1766-73.

The Georgian architects treated in the first two chapters of this dissertation still belonged to a period in which it was possible to define life in cultural rather than biological terms. Even when the paradigm shifted from geology to biology towards the end of the nineteenth century, and thus an organic model reasserted itself over and above the inorganic, the epistemological framework remained scientific. In both Street's architecture and Ruskin's criticism, the balance between culture and science had shifted. Deep time belittled architectural pretensions of durability,

[14] Adam's 1766 designs for Lowther Village were only partly realized. See Adam Volume 33, 67-69, in Sir John Soane's Museum, London.

and the subsequent perspective produced by the life sciences undid the connections between architecture and life – whether organic or chemical – that Street and Ruskin attempted to foster. Compared to the earth, architecture was ephemeral. Compared to biological life, it was dead.

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