POETRY AND CHEMISTRY, 1770-1830: MINGLING EXPLODED SYSTEMS

by

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ABSTRACT

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Poetry and Chemistry, 1770-1830: Mingling Exploded Systems

Dissertation directed by Associate Professor Jill Heydt-Stevenson

Poetry and Chemistry, 1770-1830: Mingling Exploded Systems argues that changes in how scientists understood and practiced chemistry influenced how literary writers defined their field. These changes also contributed to a profound transformation occurring between 1770 and 1830: the separation of the arts and sciences into disciplines. I examine the establishment of chemistry as a branch of physical science, the relationship between poetic criticism and scientific theory, and the growing estrangement during the period among humanistic, aesthetic and scientific pursuits. Authors including Anna Barbauld, Samuel Taylor Coleridge, John Keats, and Humphry Davy responded to the specialization of knowledge ambivalently, embracing the capacity of new methods of order to intensify intellectual scrutiny, but resisting the tendency of disciplines to produce epistemological stability. My project highlights how the period's writers of imaginative literature found chemistry entrancing. For example, I draw attention to Anna Barbauld's eager depictions of Joseph Priestley's laboratory and experiments, and feature Humphry Davy's multifaceted generic and disciplinary fusions in his *Consolations in Travel*. In particular, I explore how the concept of the chemical element changed during the period, and how it changed literature: Antoine Lavoisier, in collaboration with other French chemists and following the work of an international scientific community, rejected the idea of four basic elements that the sciences had received from antiquity. Literary authors variously adopted and adapted his new concept to give order to their pursuits, and its prominence inflected their ideas about aesthetic wholeness and poetic fragmentation.

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> Years have passed away since we first met; & your presence & recollections with regard to you have afforded me continual sources of enjoyment. Some of the better feelings of my nature have been elevated by your converse; & thoughts which you have nursed have been to me an eternal source of consolation. (Humphry Davy, Letter to Coleridge, 25 March 1804)

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Contents

Introduction

Mingling "Exploded Systems"

> And thus for a time I was occupied by exploded systems, mingling, like an unadept, a thousand contradictory theories and floundering desperately in a very slough of multifarious knowledge, guided by an ardent imagination and childish reasoning, till an accident again changed the current of my ideas.
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> **-Victor Frankenstein** (Mary Shelley, Hindle 42)

Victor Frankenstein mistrusted the growing order of Romantic-era intellectual life, and for that reason, the implicit warning about the danger of knowledge in his tragic story remains poignant nearly two centuries later. Our own sciences, and our arts as well, began to develop their contemporary contours during the nineteenth century, beginning their long journey towards relative stability in the modern university. Sciences like chemistry and biology gained new nomenclatures, dedicated professional societies, consistent funding mechanisms, and other conventional disciplinary practices. Victor's ambitions are famously grander than those of his narrative contemporaries, who tout their modern scientific views and denigrate his alchemical enthusiasm. He expresses dissatisfaction with the small practical aims of scientists: "I was required to exchange chimeras of boundless grandeur for realities of little worth" (Mary Shelley, Hindle 48). While Victor seems to have endless, private financial resources for his "grand illusions," in the eighteenth century – and of course in our contemporary world – reality dictates that scientific research must be funded. The Royal Institution, which was established in 1799 and over the course of several decades became the highest-profile public institution committed to

supporting and popularizing scientific research, began from a Malthusian-influenced desire to increase crop yields and better feed the growing English population.[1] Humphry Davy, the most famous English chemist of the era, produced important discoveries in electrochemistry and discovered numerous elements, but his most successful and widely-known published volume of lectures was his *Elements of Agricultural Chemistry* (Golinski, *The Experimental Self* 133-36). Science that manages to secure funding is science that serves practical ends. Victor's status as an outlier, and his eventual transformation in later pop-culture revisions as a mad scientist, arises from his uneasy relationship with collectively established scientific principles and practices.

His continued capacity to enthrall readers, however, arises in part from his struggle to seize the mantle of genius by proceeding to an occult stratum of knowledge that he imagines subtends the ordered world of university professors like M. Krempe and M. Waldman. He aspires to arcane secrets: the capacity to bestow life, "immortality and power" (Mary Shelley, Hindle 48). This is the search for Wordsworth's "something far more deeply interfused" (Wordsworth, "Tintern Abby" 97), though in Victor's case, single-minded, all-consuming, heedless, and dangerous. This undifferentiated form of knowledge is something like Michel Serres's ichnography, "the ensemble of possible profiles, the sum of horizons [–] … what is possible, or knowable, or producible, it is the phenomenological wellspring, the pit. It is the complete chain of metamorphoses of the sea god Proteus, it is Proteus himself" (19). The sciences of the period increasingly delineated distinct bodies of knowledge out of this mass; their success at stabilizing nomenclatures produced scientific efficiency, such that what had to be ignored with regard to a particular type of philosophical scrutiny would be set aside, for the sake of creating a unified and systematic body of knowledge. So, for instance, nineteenth-century

[1] See Berman 1-31.

chemistry, a domain of facts and reaction tables, had no need for the fancy, at least according to the rhetoric of its most prominent practitioners, and remained blind to aesthetic concerns. It eschewed moral speculation at the level of theory, using it only as a rhetorical resource when it came time to justify the science's importance publicly.

Victor seeks to escape the reaction tables of nineteenth-century chemistry – he strives for a degree of disorder increasingly difficult to access as the century progressed. That he is "occupied by exploded systems" suggests not only his willingness to engage supposedly bygone scientific paradigms, like alchemy, but also his only partial orientation towards any system. He takes what he will from one body of knowledge and combines it with others. His "mingling" is performed with the caprice of "an unadept": Victor is no professional. This openness, as he narrates it, was a fleeting infatuation of his youth, from which he turned in favor of mathematics, for a time, but, in fact, it conditions all his scientific ventures. Victor's obsession with "exploded systems" is poignant. He seeks to move beyond ordered science to what sociologist of systems Niklas Luhmann calls greater "complexity."[2] According to Luhmann, systems, like disciplines, establish coherence by designating their constitutive elements and fixing a limited number of relations among those elements. These acts reduce the "complexity" of a system: only a fixed number of reactions and interactions can feasibly occur once a system conditions itself in this way. Meanwhile, the external environment against which that systems defines itself, the sum of all other systems, phenomena, and information not included in that system, evinces absolute complexity. From the standpoint of any given system, "complexity [in the environment] is a measure for indeterminacy or lack of information" (Luhmann 27). The idea, here, is that systems reproduce themselves by repeatedly restricting, and selectively relating, what information they

[2] On complexity, see Luhmann 23-28.

internalize from the surrounding environment. They become, over time, incapable of recognizing the radical plurality of phenomena in the environment, the "very slough of multifarious knowledge," and misrecognize it as an absence of *usable* information (Mary Shelley, Hindle 42). In this way, Krempe and Waldman can find nothing productive in Victor's enthusiasm for Agrippa, Paracelsus, and Albertus Magnus. Victor's rejection of natural philosophy is a rejection of order, and his ultimate discoveries are the fruit born from mingling "a thousand contradictory theories" (Mary Shelley, Hindle 42).

These are the two sides of Romantic-era science: its growing order; its residual chaos. The late eighteenth and early nineteenth centuries were, in fact, conspicuous for their "exploded systems." Traditionally, the period has invited characterization as a moment of epistemic shift. Thomas Kuhn's foundational *The Structure of Scientific Revolutions* identifies this moment, the chemical revolution, as an exemplary instance of paradigm change (1-9, 52-65). What was ending alongside Antoine Lavoisier's overthrowing of the phlogiston theory, according to most commentators, was an episteme in which the sciences remained, for the most part, structurally undifferentiated and, in most respects, unprofessional. Though discrete schools of thought, or types of investigation, had been articulated since at least Francis Bacon's lifetime, exclusive society memberships and arcane nomenclatures did not yet divide practitioners from one another on the basis of disciplinary expertise. William Whewell, an early nineteenth-century scientist, offers a formulation of this pertaining to the history of electricity in his *History of the Inductive Sciences from the Earliest to the Present Time*: he describes the distinction between periods of scientific endeavor in which "a large and popular circle of spectators and amateurs feel themselves nearly on a level, in the value of their trials and speculations, with more profound thinkers," and those in which "the subject is become a science, that is, a study in which all must

be left far behind who do not come to it with disciplined, informed, and logical minds, the cultivators are far more few, and the shout of applause less tumultuous and less loud" (16-17). The salient transition, which Whewell could recognize by his third edition's publication in 1857, is that from an amateur and disorganized pursuit to a disciplined science. The earlier "amateur" version corresponds to eighteenth-century "natural philosophy," whose end Simon Schaffer argues "was accompanied by the appearance of models of discovery which appealed to *discipline* and to *genius*, and which have dominated theories of sciences ever since" ("Scientific Discoveries" 407). What was exploded was the holistic body of the *ancien régime* of natural knowledge, and after the fact, practitioners sought to reorganize knowledge into separate intellectual systems called disciplines.

Yet the vision of scientific history that scholars have inherited from Kuhn doesn't fully capture the degree to which paradigms themselves often mingle "exploded" systems. Mi Gyung Kim, in considering the last two decades of scholarship on Lavoisier's chemical revolution, writes, "If there is a point of consensus among the Lavoisier scholars, it is that the 'revolutionary' nature of the episode needs a careful reevaluation and that any synthesis of current scholarship is likely to yield a multi-faceted and multi-layered account of the episode" (279). Kim rejects traditional understandings of eighteenth-century chemistry that characterize it as hopelessly disorganized and merely waiting for Lavoisier to bestow philosophical order and completeness. By contrast, she demonstrates that Lavoisier's modern chemistry was the product of many intertwining theoretical, artisanal, and academic traditions, all in their own right coherent if unreconciled. What's more, Lavoisier's aim was to forge "a more comprehensive, trans-disciplinary approach to the truth of nature" (Kim 280). His revolution, it seems, was a long time unfolding, the paradigm it ushered in a "mingling" of "contradictory theories" and

"exploded systems." Perhaps, then, what Victor was doing was not quite so out of the ordinary. Indeed, it suits us to remember what Lorraine Daston and Peter Galison have reminded us about the history of science: "in contrast to the static tableaux of paradigms and epistemes, this is a history of dynamic fields, in which newly introduced bodies reconfigure and reshape those already present, and vice versa" (19).

Nor was the period's science the sole nineteenth-century pursuit constituted of an amalgam of exploded systems. The enlightenment "Republic of Letters," which had sustained literary writing in public and maintained a large-scale and vibrant print culture to facilitate public discourse and political progress was imploding as the eighteenth century ended. The "Republic" was a widespread network of authors and publishers conversing about matters of social and political importance via private epistolary correspondence and in print. Within this media ecology, the category of "Literature" contained a wider array of texts, including not merely "imaginative" writing, but legal and social opinion, science writing, and an increasing number of review periodicals. In *The Crisis of Literature in the 1790s* Paul Keen attributes the break-down of this system to the political crisis of the Revolution. Social critics increasingly refused to tolerate the reformist principles of many authors, and a concomitant explosion in cheap print threatened to put radical texts like Paine's *Rights of Man* into the hands of the lower classes. The high-ideal of a free and public exchange of knowledge came to be regarded instead as the threat of a violent and radicalized laboring class. According to Keen, in response to this crisis the Romantic poets generated a new definition of literature based on aesthetic writing, "the literary tradition as a cultural domain free from social contradictions," which "recuperated the universalist assumptions of the public sphere, but only to the extent that it remained securely within the cultural, rather than the political, domain" (Keen 19). Wordsworth's "real language of

men" captured the universal scope of eighteenth-century letters, while also reconstituting it in a less politically threatening form. According to Keen, poets shifted their focus to building an autonomous cultural identity, mobilizing "existing cultural assumptions in order to highlight the importance of the poet rather than in exploring their changing relation to the reform movement as an end in itself" (Keen 18). This context offers deeper insight when considered alongside Stuart Curran's claim that "the hegemony of neoclassical rules, with their simpleminded and impossible clarity, broke down in the eighteenth century and with it a facile means of taxonomy" (8). As the social order established in the republic of letters began to disintegrate, the forms and rules at the heart of that order seemed increasingly trite. Perhaps for this reason William Cowper could begin *The Task* as a mock-heroic epic, only to close it as a contemplative locodescriptive georgic. Poets of genius would have to offer new systems and new rules. This turn is conspicuously similar to the one Simon Schaffer describes the era's natural philosophers undergoing: the new disciplinary model of the sciences in the nineteenth century was centered around the high-profile work of geniuses. In both cases, the new model of intellectual production became categorically defined by its link to exceptional subject-actors. From the cadaverous remnants of the enlightenment public sphere, "exceptional" authors refashioned the poet-as-creature, a figure reanimated by a more specialized form of knowledge.

From the shambles of the republic of letters the early nineteenth century witnessed the slow process of reconstituting the structures that would organize knowledge and make it legible. Jon Klancher describes the reorganization of knowledge into disciplines by a "matrix of arts-and-sciences" institutions (1), public organizations committed to popularizing various intellectual pursuits, most often as separate intellectual fields. This transition was, in no way, instantaneous. It is neither correct to describe this moment as pre-disciplinary, nor as wholly disciplined. Victor,

himself, may offer a useful model as we seek to characterize the Romantic intellectual: "an unadapt" (Mary Shelley, Hindle 42). Increasingly, public institutions, kept afloat by private subscriptions, offered gentlemen scholars a platform to establish the canons of various forms of knowledge. The prevalence, for instance, of widespread public lectures on Shakespeare, and on literary history, taken up by authors like Coleridge and Hazlitt, were a means of establishing a tradition, and a body of knowledge, for literary criticism. That poets sought to instantiate a coherent body of critical ideas to compete among the coalescing arts and sciences ads poignancy to Curran's observation that "the paradox of British Romanticism is that its revolution came about through an intense and largely isolated engagement with its own past" (22). Faced with the exploded system of neoclassical rules, Romantic poets adopted an antiquarian premise, and looked to previous poetic schema for the rudiments necessary to build their own literary system. Continuity with the enlightenment public sphere existed in the repurposing by authors, scientists, and other thinkers of pieces of the old systems – but the material of knowledge, its matter, would be reorganized towards a new purpose, which was to clarify and sustain the boundaries among interrelated systems of knowledge. This imperative towards cohesion is central to Romanticism as a cultural movement, and holds across regimes of science and literature.

Poetry and Chemistry, 1770-1830 argues that in this moment of epistemological reshuffling the discipline of chemistry, Victor Frankenstein's chosen science (or at least the one he most tolerated), offered to practitioners of other types of knowledge a model for how discipline-formation could work. It was the era's most spectacular natural philosophical pursuit, and during the period transitioned from a "systematic art," in the words of Kant (*Metaphysical Foundations* 4), to a science. Kant's demotion of the pursuit was, of course, expressly a response to chemistry's intrinsic commitments to experiment, which prevented it from attaining apodictic

certainty. But his perception of the discipline's disordered and a-rational character likely also arose from its association with practical pursuits: eighteenth-century chemistry evinced competing theories dependent upon the artisanal commitments of its various practitioners, and it was still largely inextricable from the chaotic pursuit of medicine. Its recognition as a science was contingent on the work of French chemist Antoine Lavoisier in the 1770s and 80s. Two of Lavoisier's innovations stand out as instrumental in the reformation of chemistry. On the one hand, he touted his own work as revolutionary, drawing upon the political turmoil of the period to argue for a radical novelty to the system he presented. That he would, himself, end his life a victim of the Terror suggests, perhaps, the implicit danger he faced in adopting such rhetoric. More importantly, and central to his reconstituted chemical system, he refocused chemistry on a newly redefined concept of the element.

This dissertation explores how literary criticism responded to pressures during the period to become more disciplinary, surrounded as it was by sciences, particularly chemistry, that were gaining increasing systematic coherence by delineating their own elements. It was during this period that the element transitioned from a metaphysical concept with no particular intellectual provenance, to one explicitly and intimately connected to the basic structure of disciplinarity. Lavoisier defined the element as "the last point which analysis is capable of reaching" (xxiii). This constituted a radical redefinition of the element from the classical four of antiquity: earth, air, water, and fire. Now, what was elementary, would be whatever substance persisted, however temporarily, as the simplest that the chemist could isolate as a product of his many experiments. As I will discuss below, this change brought into effect an intimate relationship between the fundamental ideas of the chemical system, and the very matter that discipline would study. Elements could only be recognized through the proper chemist's intellectual labor (enabled by

specialized apparatuses). The system of chemistry would allow practitioners to record the reactions between different substances, seeking always to isolate the most individuated species of matter, understand their relations, and calculate their proportions. Ideas and matter, in this moment, were joined within an explicitly disciplined framework, as the parts that made up nature's whole so happened also to be the parts that would constitute the discipline studying those very same phenomena. Chemistry therefore offered a remarkable (if largely unstated) solution to the longstanding philosophical problem of dualism, however much it was bracketed within a particular philosophical discourse. More importantly, it provided an example of an intellectual system with objective bearing.

This model of part-whole relation crept into Romantic poetic discourse, offering poets a beguiling means of organizing their own pursuits, or else pressing them to reject (as Coleridge did) the tidy nature of the chemical system and the quantitative ambitions it inaugurated. Some, it seems, dissatisfied as Victor Frankenstein, sought more complex views of the universe. But, in truth, this elementary logic was quite compelling because it offered to practitioners of pursuits that had not attained "scientific" status a means to transmute the messiness of observed experience into a rational order. The process was straightforward: first, fix the elements of the pursuit. Next, discover their varieties of relation to view. Finally, exclude what phenomena do not accord with the overall system. The principles that Luhmann has attributed to all systems – social, biological, and otherwise – roughly 200 years later, find their inaugural exemplary instance in the chemical revolution. Surprisingly, scholars of literary Romanticism have paid no heed to Lavoisier's novel theorization, despite wide critical acknowledgment of the Romantic-era passion for fragments, part-whole relationships, and claims about cosmic unity. But the period's writers were not blind to this conceptual transformation that afforded them, at once, a

handy way to describe the relationship between parts and wholes in nature, and a rhetorical ground upon which to establish an intellectual field. Many, as I will show below, embraced it, for as Curran intones, "wherever the human mind conceives a system for organizing reality, the artist is bound to appropriate it, sometimes certainly as a principle of belief, almost always as a realm for conceptual play" (4).

It is not so fashionable as once it was to ferret out residual ideologies, but nevertheless we ought to recognize that this schematic persists in our own writing on all manner of humanistic topics. We, too, are taken with elements. Looking to the chaos of the revolutionary era, and speaking to the complex of factors influencing the development of poetic forms, Curran writes, "Language, culture, norms of education, availability of models, religion, climate, commercial centrality or isolation, relative peace or vulnerability to warfare, not to ignore the ever-present practical necessities of any literary marketplace – such are the elements that continually temper the inherited values of literary kinds" (6). What are the repercussions of thinking this way? If we have internalized a rationalizing schematic from nineteenth-century chemistry that constitutes our knowledge as a disciplinarily-bounded system of exclusively related parts, what else have we inherited from this scientific and epistemological moment? What are the elements of literature? Of Romanticism? Is the element an appropriate concept for organizing a system of literary criticism? Would systematic completeness be a desirable characteristic for literary studies? This dissertation will not answer all of these questions, but in wrangling with them and exposing them to view, it will open the door to considering how often, historically, practitioners of the literary arts have resisted the stabilizing tendency of elementary thinking. Indeed, the concept is powerful and beguiling, and literary authors have also adapted it to their own purposes, but

always to accommodate a vision of their productivity capable of intermixture with other types of knowledge.

Making the Modern Element

The concept of the modern chemical element described by Lavoisier is the product of a long conceptual history, a mélange of components from different theories of matter. Over the course of chemistry's development during the seventeenth and eighteenth centuries the theoretical importance of the concept of the element shifted, becoming more or less of a focus at different temporal moments, depending upon which national tradition one considers. Chemistry's modern realization as a systematic science was famously delayed; the first scientific revolution unfolded during the seventeenth century, ushering in Newtonian physics at the century's end, while Lavoisier's chemical system did not appear until the end of the eighteenth. Both developments proceeded from novel seventeenth-century commitments to experiment as the engine of the scientific method and were enabled by advances in instrument technology and the formation of special scientific societies and organizations.[3]

Most seventeenth-century chemical practitioners were alchemists who adopted a belief system and experimental practice heavily indebted to the Aristotelian idea of elements, and committed to the analysis of substances into constituent material principles. Early-modern alchemy presumed the ultimate transformability of all matter, a belief that owed its power to the period's ideas about nature as a vast web in which everything connected with everything else.[4] Aristotle's system included four primary elements (earth, air, fire, and water), and practicing alchemists either accepted these as the constituents of all matter, rejected them in favor of

[3] See Shapin and Schaffer, *Leviathan and the Air Pump* 3-79.
[4] See Foucault 17-77. For another version of the transition from disordered to ordered knowledge see Latour 13-48.

Paracelsus's three chemical principles – sulfur, salt and mercury – or combined the two sets of fundaments into various hybrid sets. In theory, a stable set of elements and principles, differently proportioned depending on the material, made up every substance, part of what was called a "mixt." As David Knight notes, "the relationship of the three principles and the four elements was not very clear; the former might be regarded as composed of the latter, as chemists of the nineteenth century saw their atoms and those of physicists, but we should be careful not to read excessive precision into early writing" (*Ideas in Chemistry* 18-19). Much disputation during the period centered on the degree to which these constituent elements persisted once in the form of a mixt. Did they contribute their characteristics to the compound substance? How could they do so unless they remained, in some measure, present in their theoretically simple form even while combined as parts of a mixt? In seeking to expose these basic elements and principles, alchemists hoped they'd be able to unlock matter's inherent transformability, ultimately enabling, among other transmogrifications, the longed-for capacity to render gold out of any metal.

The identities of the elements or principles making up the absolute constituent set varied considerably over the period, though as Mi Gyung Kim explains, "By the middle of the century…[chemists] had stabilized five 'principles or elements' as the chemical constituents of all mixts" (35). According to Kim this number proved consistent because chemists had mastered distillation to the degree that "a skilled chemist who knew how to regulate the intensity of fire usually was able to extract five groups of substances from a variety of natural bodies (mostly vegetables): spirits, oils, aqueous liquor (phlegms and water), earths, and salts" (35). Far from identifying particular types of matter, then, elements and principles served as theoretical markers categorizing a diverse array of substances based purely on the "morphology of distillation products" (Kim 36). If something had earth-like qualities it was earth; if sulfur-like qualities,

sulfur. Every distillation was expected to produce water, earth, sulfur, salt, and mercury, and so from every distillation these principles would be discovered. According to Kim, "as chemists freely acknowledged, these philosophically defined principles were never isolated in pure form" (35). The elements and principles operated first as ideal categories, and bore an unclear and uneasy relation to the actual products of alchemical experiments. For this reason, these principles would come under attack from the late century's chemical mechanists.

The first modern assault on the classical elements came from mechanist natural philosophers as the seventeenth century dwindled. Chemists like Robert Boyle, and others associated with the Royal Society, preferred the corpuscle as the concept most central to matter theory. Their conviction arose from a reliance upon Cartesian philosophy, which determined that matter was inert and uniform. Its attributes arose from the peculiar fit of pieces that, nevertheless, bore no superadded qualities. Alchemical elements had harbored secondary qualities – they were moist or dry, hot or cold – that contributed to establishing their qualitative differences. By contrast, mechanist atomists "denied all qualitative differences to atoms and granted them only geometrical attributes" (Bensaude-Vincent and Stengers 33). Bernadette Bensaude-Vincent and Isabelle Stengers provide an illustrative example of how this theory purported to interpret chemical phenomena: they describe how French chemist Nicolas Lémery reasoned that the caustic reactions associated with acids happened because acidic substances consisted of pointed corpuscles that pierced other substances. The stronger the acid, the sharper the point. Robert Boyle allowed for the utility of elemental categorization in chemical experiments, but his commitment to uniformity of matter meant that this allowance remained purely practical. As Bensaude-Vincent and Stengers put it, he "cut off the relationship between the 'element,' as a principle of intelligibility, and the element as a body that the chemist could not decompose"

(Bensaude-Vincent and Stengers 37). In other words, elements might usefully denote constituents produced during particular experiments, but they did not in reality align with actual simple substances. Boyle named himself aptly in his *Sceptical Chymist*: his mechanist atomism rendered him a skeptic. Given that the technological limitations of philosophy prevented access to the "arrangements of particles 'without qualities'" that nevertheless gave birth to the qualities of matter (Bensaude-Vincent and Stengers 37), chemists would have to make do with what they could observe, and console themselves on not actually perceiving matter's most basic form.

During the eighteenth century, the emphasis in chemical experimentation shifted from a focus on breaking substances down into their constituent principles to one tabulating the relationships among different substances; chemists focused on identifying which substances would interact together and recorded the intensity of those reactions. In part, this came about because of Sir Isaac Newton's contention in his *Opticks* (1704) that similar sorts of unintelligible forces as those he had diagnosed in the heavens in the *Principia* operated to draw together particles of matter as well. Forces of attractions and repulsion served to coalesce matter and also to foment chemical reactions. This theory contradicted the absolute inertness of the mechanistic system, while also gesturing toward a new mode of chemical research. English chemists sought to prove the existence of chemical forces. Across the channel, French chemists began extensively to focus on a certain kind of reaction: those that took place when alkaline and acidic substances combined to form neutral salts. Experimentalists noted the "convenance" or "disposition to unite" among these substances (qtd. in Kim 113), inferring therefrom a degree of attraction unique to each particular reaction. In embracing this focus, they effectively inaugurated a chemical practice oriented towards "chemical affinity," a term Goethe would monumentalize in the title of his 1809 novel. The first affinity table would be published in 1718, recording the

intensity of various reactions and combinations of salts. The production of such tables increased dramatically after 1750. Increasingly chemists focused less on trying to explain the particular mechanism of chemical reactions (pointy corpuscles or internal forces) and committed instead to mapping the relations among substances. According to Bensaude-Vincent and Stengers, "the chemistry of salts, like the table of relationships or affinities that would henceforth accompany it, marks therefore the inception of a new *systematic practice*" (Bensaude-Vincent and Stengers 55). Rather than seeking to penetrate into the recesses of matter to determine its fundaments, chemists acted as cartographers, reading across the relations among substances.

It is worth pausing here to consider the ramifications of these developments for chemistry, but also for the broader culture of Romanticism. Chemistry's appeal arose from the fact that it accumulated diverse theoretical commitments so that no particular set of practices, apparatuses, or beliefs held total sway over chemical theory at any moment: as a result of its conceptual history, at one and the same time it had the theoretical capacity to individuate matter into types, penetrating into its essential nature, and to relate those types as part of a constantly-changing natural system. Historians of chemistry articulate these shifts as distinct, looking, for instance, at how discrete theoretical preoccupations motivated the use of different methods, or were occasioned and enabled by particular scientific apparatuses. Kim notes, for instance, that the use of distillation in chemistry waned as the mania for principles subsided, to be replaced with a solution method more suitable to the study of affinity.[5] But even if such bodies of theoretical consensus are visible in the history of the science, concepts in chemistry tended to reemerge, combine, and conflict throughout the century. In this way, "exploded systems"

[5] On this early period of Chemistry see Kim 17-159.

constantly mingled, and the discarded concepts of one tradition became the retrofitted obsessions of another.

The Phlogiston theory of combustion, proliferated by Prussian chemist Georg Ernst Stahl (1660-1734), provides one instance of this intermingling. Stahl initiated a broader reaction against mechanism that came to be known as the "vitalist" turn in natural philosophy, but he also extended the influence of the idea of principles into the eighteenth century, despite the seventeenth-century triumph of mechanism. Stahl argued for the existence of constituent principles of water, air, and earth, with earth being further divisible into metallic, vitrifiable, and phlogistic earths. In this schema, each principle commuted some particular quality to a substance: the presence of metallic earth gave malleability, vitrifiable earth the capacity to melt, and phlogistic earth combustibility. Over the eighteenth century's course, after the importance of the other two earth principles had diminished, phlogistic earth would survive as the phlogiston theory of combustion. As an imponderable substance responsible for combustion, phlogiston inhered in any body that could burn or corrode: during the process of combustion that body released its phlogiston into the surrounding air until the atmosphere became saturated, at which point combustion ceased. The air itself, though, was not an active agent in the process. This remained the dominant theory of combustion until Lavoisier's revolution, and indeed, much of his insurgent rhetoric traded upon his claim to be overthrowing the theory of phlogiston and replacing it with the understanding that combustion resulted from a substance's reaction and combination with an air he named "oxygen." It is a curious quirk of the palimpsest character of chemical theory that even as Lavoisier dismissed one imponderable principle, he was himself adapting the concept of principles for a new purpose. The name oxygen means "acid-former," a denomination Lavoisier chose because he believed oxygen to be the principle of acidity. This

was not the same version of principles intended in Stahl's imponderable substances, which chemists generally assumed they would never isolate in their pure form. Rather, Lavoisier's theory recycled the concept of principles by explicitly attaching them to his new, material, and very much ponderable elements.

Lavoisier's work during the 1770s and 80s, culminating in his *Elementary Treatise on Chemistry* in 1789, gave to chemistry a new element, one with a provisionally unified chemical identity that was tied to the very empirical and analytical methods with which chemists pursued their study. In this way, his revolution wedded the practical tools for investigating chemical affinity with a refurbished commitment to discovering and naming simple substances (principles and elements). The difference between Lavoisier's view of elements and the classical elements was that for Lavoisier the catalogue of simple substances was far from complete, and yet significantly more extensive (than the three, four, or five common at the century's beginning). Lavoisier explicitly reimagined the element as a product of chemical analysis, describing it as "the last point which analysis is capable of reaching," which resulted in his affording elementary status to "all the substances into which we are able to reduce bodies by decomposition" (xxiii). On the one hand this meant that chemistry could determine rational categories for matter that also were understood to describe actual simple substances. This would lead in the nineteenth century to vigorous debates about the elementary status of various materials. Part of Lavoisier's intervention in chemistry was an explicit rejection of the classical elements:

> the fondness for reducing all the bodies in nature to three or four elements, proceeds from a prejudice which has descended to us from the Greek Philosophers. The notion of four elements, which, by the variety of their proportions, compose all the known substances in nature, is a mere hypothesis,

> assumed long before the first principles of experimental philosophy or of chemistry had any existence. In those days, without possessing facts, they framed systems; while we, who have collected facts, seem determined to reject even these, when they do not agree with our prejudices. (xxi)

The primary four elements were not, according to Lavoisier, sufficiently empirical. In this he was continuing a process (the dismantling of the classical elements) already begun by Robert Boyle and continued by Joseph Priestley with his work on the plurality of airs. The difference between Boyle's work and Lavoisier's is that Boyle cast doubt upon the classical elements only to throw theoretical emphasis onto mechanistic atomism. Lavoisier had replaced the "mere hypothesis" of the four stable elements, a "system" framed "without possessing facts," with a concept that possessed both empirical and categorical reality. In this sense, he was reversing Boyle, rejoining the element as "a principle of intelligibility" to the element as "a body that the chemist could not decompose" (Bensaude-Vincent and Stengers 33).

More importantly for the direction that chemistry would take during the nineteenth century, Lavoisier's chemical element was a thoroughly disciplinary concept. Insomuch as it was defined as the limit of chemical analysis, elementary status could only be established and defended using chemistry's protocols and apparatuses. The discipline determined the concept. The classical element had been inherited from a bygone and fanciful philosophical system. Its widespread conceptual utility had always depended on its fundamentally metaphoric nature (elements and principles, again, were identified based on a presumption of similarity between the idea and certain characteristic features of the products of distillation). This same nature had afforded classical elements a universal philosophical significance, while also enabling them to maintain literary and cultural relevance through the eighteenth century and beyond. They appear

as structural conceits, for instance, in Erasmus Darwin's *The Botanic Garden* (1791) and Lord Byron's *Manfred* (1817) significantly after Lavoisier's revolution. By contrast, only a chemist could interfere with the catalogue of modern chemical elements. This relationship between the element and chemistry was likewise reversible: the concept determined the discipline. Elements made up not only the focus of chemical experiment, but also the stable compendium of chemical knowledge (to be reported in textbooks and public lectures). Stoichiometry, or the study of chemical compounds and the proportional relations of their elements, came to dominate early nineteenth-century chemistry. Nevertheless, although it was no longer their focus, chemists continued to invoke chemical affinity as a central force in chemistry, even if they could not understand why it worked. The elegance of this reciprocity between element and system, and its capability in modeling the process of discipline-formation, was a byproduct of the chemical revolution with broad cultural applicability. While the republic of letters was collapsing into shambles, chemistry was transforming from a "systematic art" into a science. It offered an organizational and epistemological solution that was broadly applicable. No wonder, then, that it would provide a compelling model for organizing bodies of knowledge, one with resonance even today.

The element's duality as singular and plural rendered it attractive to literary and philosophical romanticism: it was characterized both by its status as an individuated substance with a deep identity and by the simultaneous fact that this conditional unity depended upon a methodological plurality. In order to declare chlorine an element in 1810, Humphry Davy had to undertake experiments combining the substance with numerous others, recording what it would and would not react with. Thus, its individual simplicity was predicated upon the articulation of a network of relations, not only those mapped in the pages of Davy's own lab notebooks, but also

those being carried out by an international network of chemists. One is reminded of Coleridge's definition of beauty as "the many seen as one" (*Lectures 1808-1819 on Literature* 2: 221). For Coleridge, the mind's imaginative synthesis does not absolutely efface the components of nature – the new unity bears their traces. Elements, by this aesthetic, could be nothing less than beautiful. Likely, such sentiment would have been taken as nonsense by the period's chemists. Consider Lavoisier's rejection of the imagination:

> Imagination, on the contrary, which is ever wandering beyond the bounds of truth, joined to self-love and that self-confidence we are so apt to indulge, prompt us to draw conclusions which are not immediately derived from facts; so that we become in some measure interested in deceiving ourselves. (xvi)

If the period's chemists actively sought to build an empirical science quarantined from frivolous concerns of the fancy, they ultimately could not prevent poets and authors from absconding with their concepts, or translating them across the boundaries between bodies of knowledge. Though they understood the material volatility of their object of study, it's not at all clear that they truly appreciated or understood the element's cultural and epistemological adaptability.

Romantic Elements

Of what would Romanticism's literary elements consist? Is it even appropriate to seek to identify such things, or to chart their appropriate networks of connection? The answer to the latter question depends first upon deciding the degree to which poets and authors conceived of what they did as a discipline, autonomous from other sorts of knowledge, and characterized by a specialized nomenclature and set of common practices. Certainly, as I show in Chapter Two, the arts and sciences institutions exerted considerable cultural pressure upon bodies of knowledge to

articulate themselves as coherent and complete. Chemistry's newfound intrigue arose in part from its flashy demonstrations and in part from its novel systematic character – chemists presented their science's disciplinary nature every time they catalogued its known elements from behind the lectern. What's more, chemistry lecturers accumulated considerable prestige: Humphry Davy's lectures were important social events attended by high society. Literary authors responded variously to the pressure to specialize, taking up strategies that reified literature's disciplinary character, or else seeking to upend the arts and sciences matrix by crossing disciplinary lines.

I draw attention to the fact that Romantic-era authors translated the concept of the element into a figure for communicating the connection between unity and plurality, especially as they sought to characterize the poet's capacity to marshal the diverse materials of human experience and the natural world. This tactic constitutes a relatively straightforward translation of the concept for poetical ends. Hazlitt, for instance, uses a chemical metaphor to describe Shakespeare's unique capacity to create lifelike characters: "In Chaucer we perceive a fixed essence of character. In Shakspeare [sic] there is a continual composition and decomposition of its elements, a fermentation of every particle in the whole mass, by its alternative affinity or antipathy to other principles which are brought in contact with it" (51). Character, the fundamental unity in human life so central to Hazlitt's thinking, remains nevertheless constituted of a plurality of feelings, thoughts, and interactions with nature. Poetry's greatest genius breathes life into his characters by looking beyond a commitment to fixed essential qualities to scrutinize the matter of human experience subtending. The chemist of letters, Shakespeare pierces to the fundaments of humanity, and even as he creates unified characters with recognizable personalities, he does so by capturing the restless molecular activity of human life. In the preface

to *Lyrical Ballads,* Wordsworth offers a similar justification for his decision to focus on characters from "low and rustic life," maintaining that "in that situation our elementary feelings exist in a state of greater simplicity and consequently may be more accurately contemplated and more forcibly communicated" (174). Like an astute experimentalist, Wordsworth admits to restricting the parameters of his experiment – focusing on low and rustic life – to better isolate "elementary" feelings, constituents of thought. Here, the concept of the elementary allows Wordsworth to celebrate the unity of a human's experience, while also acknowledging the diverse ideas that constitute human thought. His desire to trace how "we associate ideas in a state of excitement" promises something like a poetic table of emotional affinities ("Preface" 174).

Furthermore, this poetic orientation towards the elements of human experience inspires a method that involves minutely observing the peculiar interactions among human emotions, between pleasure and pain. In an age before psychoanalysis, the poet becomes a chemist of the human mind. Consider, for instance, Coleridge's meticulous cataloging of his feelings and his infirmities during his recuperative sojourn to Malta. According to Wordsworth, valuable poems are produced by authors who "being possessed of more than usual organic sensibility," have also "thought long and deeply" (175). This deep thinking involves a deliberate effort to reflect upon associations in the mind: "our continued influxes of feeling are modified and directed by our thoughts, which are indeed the representatives of all our past feelings; and as by contemplating the relation of these general representatives to each other, we discover what is really important to men" (175). Wordsworth intones that the brunt of the poet's work lies in recollection that considers "the relation of these general representatives to each other." The constituents of the mind, those "elementary feelings" must be charted before the poet gains enough intimacy with the intrinsic character of humanity to write worthwhile poetry. The poet makes of himself a kind

of laboratory for conducting psychological experiments, only intermittently emerging to make report of his discoveries to the public.

Part of the attraction of elemental components was that they provided poets rhetorical access to eternity in a way that was ratified by science. The preoccupation was longstanding, but suddenly the element provided a concept, legitimized through experimental rigor, that gave greater access to the universe's permanent parts. The chemical element was remarkable because even though it was discoverable purely through the technological intervention of human philosophy, namely through chemistry, and even though it was almost always the product of intense rhetorical disputation, it nevertheless stood, finally, as an eternal designation. Elements, once discovered, exited the stream of time and escaped the social and experimental conditions of their own discovery. If scientists had not accurately been able to name them before, they had existed all the same. Poets adopted this seeming paradox. One the one hand, in "A Defense of Poetry," Percy Shelley argues that "ethical science arranges the elements which poetry has created" ("A Defense of Poetry" 517). This claim accords with the "Defense" as a whole by giving priority to poets for creating the moral fundaments that ethicists arrange into philosophical systems. Yet Shelley also seems to attribute to the elements of poetry an eternal pre-history: "all the authors of revolutions in opinion are not only necessarily poets as they are inventors, nor even as their words unveil the permanent analogy of things by images which participate in the life of truth; but as their periods are harmonious and rhythmical and contain in themselves the elements of verse; being the echo of the eternal music" (515). Rather than "inventing" elements, then, poets create in a way that resonates with "the eternal music." The "elements of verse," in this case, preexist the poet. In not reconciling these opposed claims Shelley isn't leaving a logical aporia in the "Defense," so much as he is translating one of

chemistry's central paradoxes into the sphere of poetry. The poet creates what has always existed because he creates it out of himself.

And yet the structural responses of poets and authors to disciplinarity were complex, and often not consistent. In this regard, it is best to see literature during the period as balanced between opposed forces of unification and disaggregation. We may identify strategies during the period that tended towards disciplinarity, but individual actors rarely took up the systematic and hierarchized sociability of chemists (or other scientists) necessary to build a discipline. Certain activities in literary life tended towards disciplinary coherence. For instance, the prevalence of public Shakespeare lectures and lectures on literary history sought to build a unified canon, a literary system, through targeted acts of inclusion and exclusion, establishing, so to speak, the elements of literary history. On the other hand, the idiosyncratic behaviors of particular authors could undermine such coherence. Though Coleridge's lectures on Shakespeare would seem invested in the project of building a literary canon and thus stabilizing literature's object of scrutiny, in fact they were an often chaotic mixture of discourses, characterized by digression, interruption, and inconsistency. Coleridge refused to wander in the enclosed gardens of literary delights, preferring lectures that unfolded like his circuitous walks through the lake district, crossing philosophical, literary, and scientific terrains. We also see these contradictions in the aesthetic writing of John Keats, whose medical training at once informed him of the utility of disciplinary thinking, but also incentivized working to cross the boundaries between types of knowledge.

In some ways, what the element offered was dangerous: it seemed a step on the way to a more rigidly structured arrangement of knowledge. As I discuss in Chapter Two, Coleridge, in particular, resisted the tendency of bodies of knowledge to become specialized and enclosed.

And we can find a similar reticence in Wordsworth's contention in the 1802 preface to *Lyrical Ballads* that the man of science "seeks truth as a remote and unknown benefactor" and that "he cherishes and loves it in his solitude" ("Appendix A: Additions" 423). Wordsworth's man of science is isolated, penetrating to the depths of nature in a way that cuts him off from social ties. Lavoisier's work reestablished chemistry as an autonomous discipline. Indeed, chemists like Davy who followed Lavoisier also divested their practice of fancy, and were at pains to treat the objects of their study with a strident empiricism. Shelley directly opposed this view of the sciences that exiled the imagination: "The cultivation of those sciences which have enlarged the limits of the empire of man over the external world, has for want of the poetical faculty, proportionately circumscribed those of the internal world, and man, having enslaved the elements, remains himself a slave" (530). Shelley's is not an inapt observation. As I said above, the element ushered in the nineteenth century's stoichiometrical craze – much chemical work involved calculating proportions of elements in compounds, thus subjecting chemistry to systematic quantitative analysis, and widening the divide between it, as a science of measurements, and more humanistic preoccupations.

This dissertation engages with the period's literature both as it responds to the increasing order of the sciences, especially chemistry, and as it is itself torn between impulses to conform to the arts and sciences matrix and to supersede that matrix's interior enclosures by traversing them. The possibilities for order and understanding offered by the element made it, on the one hand, an irresistible concept. And it entered poetic discourse (and humanistic discourse at large) as a structural conceit that at the same time afforded the promise of grounding any new field of study with its own proprietary set of fundaments. At the same time, the period's authors seem to have been aware of how the concept would contribute to greater degrees of alienation among the arts

and sciences. The same thing that made the element attractive, made it something of which to be wary. This ambivalence manifested as a resigned commitment to specialized knowledge that nevertheless aspired to greater degrees of interconnection between ways of understanding the world. Disciplines offered in their specialized focus the possibility of knowing one aspect of nature in great depth, but a truly comprehensive view of the cosmos and of human life, the authors realized, would require communication and collaboration among these focused pursuits. As my final chapter makes clear, even Humphry Davy, himself a chemist whose work was structured by chemistry in the disciplinary sense, ultimately embraced a more syncretic view in his last years.

Chapter One sets the stage, investigating chemistry's relationship to poetics within late eighteenth-century dissenting culture at a point before the emergence of either the modern element or recognizable disciplines. I argue that Anna Barbauld publicized Joseph Priestley's wide-ranging inquisitive practice to advocate for a model of knowledge that conjoined chemistry, metaphysics, religion and politics. Priestley's research into gases, or as he called them "airs," invested the natural world with moral significance: he defined different substances by the degree to which they bore "virtue." At the conceptual level his science consistently intertwined with his religious musings – in part because he drew upon the early eighteenth-century idea of chemical principles. As I've noted above, these were unmeasurable substances that natural philosophers imagined must exist to explain phenomena like corrosion and combustion, and by their occult nature they harbored a secret sense of the spiritual amid this increasingly empirical science. Both Barbauld's poetry and pedagogical prose strove to publicize this spiritualized view of matter, often taking Priestley as an explicit interlocutor. I close the chapter by showing how chemistry's conceptual realignment to the element foreclosed this moral-material interweaving.

Chapter Two traces the role of the London lecture scene in enforcing separations between science and the humanities: I expose how such major Institutions as the Royal, London, and Surrey demarcated poetry and science. They established chemistry's priority over the humanities, financially supported chemical research more robustly, and gave scientists longer-term lecture engagements. I argue that these dispensations pressured surrounding disciplines reactively to define their own fields of knowledge by stabilizing their nomenclatures and designating master terms that were akin to "the element." I analyze Coleridge's strategies for organizing and lecturing on literary criticism, and the ways that he ultimately embraced cross-disciplinary borrowing as inherent to literary criticism's self-definition.

Chapter Three investigates John Keats's medical-scientific training to argue that his concept of "Negative Capability" honored the utility of disciplinary knowledge, while also maintaining pathways for connecting different arts and sciences. I demonstrate Keats's intellectual debts to the syncretic dissenting tradition for organizing knowledge (described in Chapter One). Then I turn to reading Keats's poem "Lamia" as encapsulating the multi-disciplinary dimensions of Negative Capability. In particular, I focus on how the poem's description of the lamia's beauty and erotic power evokes the formative role of disciplinary divisions in knowledge, in this case that of pleasure: the lamia is "of sciential brain / to unperplex bliss from its neighbor pain" (I: 191-2). Keats therefore portrays division in knowledge as selectively positive when it results in an intensification of knowledge and a refinement of practical techniques. He differentiates this "unperplexing" from "cold philosophy's" more negative attempts to "unweave a rainbow" (2: 229-37), denigrating in this latter case intellectual systems that seek to exert an epistemological hegemony over all knowledge.

My final chapter addresses Humphry Davy's visionary but now little-known amalgam of science and mysticism, *Consolations in Travel*, his scientific papers, and his unpublished personal and laboratory notebooks to argue that he invests his text with a vital utopian energy by mixing genres in a disjunctive and unsynthesized fashion. Considered in light of the race of composite extra-terrestrials it prominently features, the *Consolations* evokes an alien future when knowledge will have been reconstituted. I link this generic mixing with the text's comingling of the chemical element and the poetic symbol, signified by a vial of chlorine attached to a rosary that the text's chemist figure wears around his neck. Davy's invocation of the element chlorine as suspended in an antique Greek vial demonstrates his conscious engagement of the concept of the chemical element, and his interest in foregrounding its historical development. Though Davy spent most of his professional life attempting to distance modern chemistry from its alchemical past, here he acknowledges the persistence of classical ideas in the modern chemical system, and invites speculation about the nature of the element as a construct of chemical science. I argue that this reimagining of the element inscribes in that concept the same composite constitution that characterizes the text as a whole. Ultimately, I demonstrate how Davy valorizes the principle of generic and chemical mixing as a prescription for reintegrating knowledge.

Emerging out of a moment of epistemological crisis, the Romantic era was characterized by widespread reorganizations in knowledge. Increasingly, public institutions provided new venues for both funding and popularizing the arts and sciences. The disciplines as we understand them had not yet amassed the cultural capital they would come to enjoy, nor had every intellectual field established yet the nomenclatures and disciplinary protocols necessary to ensure their cultural longevity. Nevertheless, the pressure towards such specialization increased during the period. Part of chemistry's impact, and central to the broad applicability of the element as an

organizational concept, was this revolution in the way knowledge would be organized. The growth of fields would come to depend upon the stabilization of specialized fundaments. And Victor Frankenstein, drawn to chemistry for its explosive spectacle and its alchemical lineage, which still promised access to the arcane secrets of life, stands as the consummate Romantic allegorical figure of science. Entranced by the products of modern science, he yearns towards the future this science makes possible. Yet enamored of the messy fecundity of interwoven "exploded systems," he finds himself repulsed by the order that is also a product of scientific modernity. His response, which I will return to in my coda, is one among many to the transitional Romantic moment, during which authors remained torn between a future that promised spectacular advances arising from exclusive and specialized research and a past in which all things remained fruitfully entwined.

Chapter One

"Born of the Air and Doomed to Flame":

Barbauld, Priestley, and the Revolution in Knowledge

Writing as a citizen of a country and a continent immersed in violence, Anna Barbauld, in *Eighteen Hundred and Eleven,* eulogized an English ingenuity, grandeur, and cosmopolitanism she thought lost to the ravages of greed, industrialization, and war. Her poetic satire's gloominess occasioned a flurry of bitter reviews, none more vitriolic than John Wilson Croker's in the *Quarterly Review*. Croker's review characterizes Barbauld as speaking beyond her remit; he chauvinistically derides her criticism of public and military matters on the presumption that such concerns are alien to her sex. His review prescribes the proper object for Barbauld's literary exertions: as "the fair pedagogue of our former life" she ought to restrict her activities to writing educational prose for children (Croker). Indeed, Croker's gestures to Barbauld's pedagogical texts bookend his review. Her primary sin, it seems, is that she "has wandered from the course in which she was respectable and useful, and miserably mistaken both her powers and her duty, in exchanging the birchen for the satiric rod, and abandoning the superintendence of the 'ovilia' of the nursery, to wage war on the 'reluctantes dracones,' statesmen, and warriors, whose misdoings have aroused her indignant muse." Striking is the way Croker's review couches its invective as a critique of Barbauld's having wandered outside the bounds of her "respectable and useful" expertise. He dismisses her on the grounds that she does not have the right sort of knowledge to be able to speak to the political conditions of the world. Most of his review counts as little more than misogynist screed, but that he seeks to obscure his vitriol by framing it as a kind of disciplinary critique suggests a novel interpretation of this poem: *Eighteen Hundred and*

Eleven mourns the loss of the enlightenment commitment to capacious and diverse forms of knowledge and human culture so much valorized by the dissenting culture in which Barbauld grew up. What Croker takes as a given – ruthless efficiency predicated on the strict restricting of a person's intellectual activity to their narrowly-conceived and culturally-sanctioned expertise – is one of the things that Barbauld's poem prominently laments.

Barbauld's dark vision posits ruin arising from the divisions that humans create among themselves – divisions manifested as widespread strife among political factions, among states, and between ignorance and enlightenment. She envisions starvation as the despot of the moment, the poor so blighted by war and hunger that they "call[] to Famine" (15), courting, as many under the sway of tyranny do, the increase rather than the cessation of their suffering. Bloodshed is the only produce during the Napoleonic wars: "the sword, not sickle, reaps the harvest now" (18). By contrast, at the heart of the poem's more elegiac strains is a yearning for a different England – a golden time of intermixture, synthesis and cooperation. *Eighteen Hundred and Eleven* posits a world in transition: civilizational collapse, in Barbauld's view, inheres in the turn from an ethics of connectedness to one of enclosure and separation. This conviction arose out of the philosophical, social, and religious commitments instilled during her upbringing amid late eighteenth-century dissenting culture, and though her poetic depiction may be intensified by the force of her nostalgia, she was not wrong to diagnose that a fundamental shift in the organization of society, and in its production of knowledge, was occurring as the century turned.

For Barbauld, at its best, England embodied a principle of intermixture. *Eighteen Hundred and Eleven*'s description of London (the bygone London of Barbauld's present, now lost to ruin in the poem's bleak future) captures this commitment. The metropolis maintains myriad unimpeded connections with the world: "The mighty city, which by every road, / In

floods of people poured itself abroad" (159-60). A commerce of bodies persists unhindered, as Londoners traverse the globe, and foreigners immigrate to a new home. The city itself is a cosmopolitan mélange, a point of destination where "the turban'd Moslem, bearded Jew, / And woolly Afric, met the brown Hindu" (165-66). Key to this free movement is a structural aspect of the city that Barbauld highlights: it is "Ungirt by walls, irregularly great, / No jealous drawbridge, and no closing gate" (161-2). In Barbauld's vision, London eschews enclosure; indeed, its growth, undertaken in fits and spurts, has led to the city's irregularity. It is a patchwork of people, materials, and architectural remnants. That it is "irregularly great" only points to the city's lack of systematic planning, to its almost monstrous vitality.[6] It spills over into new territories as a natural outgrowth of England's multifarious creative capacity. Indeed, the figures in Barbauld's proleptic encomium of bygone worthies engage with different sorts of expertise, including poets like Cowper and Thompson, dramatists like Baillie and Shakespeare, scientists like Priestley and Davy, orators like Fox and Clarkson, and philosophers like Locke and Paley.

This commitment to variety, considered both in terms of bodies and ideas, was characteristic of dissent during the period. Indeed, speaking of English dissent as a homogeneous religion or ideology risks a reductive view of eighteenth-century spirituality: as Dan White has emphasized, this period more often evinced a "seemingly endless variety of religious beliefs and communities" (5). White carefully distinguishes the denominationalism of the period from sectarian exclusivity, citing "characteristics of inclusive membership…, breadth and tolerance combined with infrequent expulsion, an unclear self-conception and unstressed doctrinal positions,…and acceptance of the values of secular society and the state" (6). That is, if the

[6] On the origins of this idea of chaotic intellectual fecundity in mid-eighteenth century ideas about vitalism, and on its repercussions for literary forms see Gigante, *Life: Organic Form and Romanticism*.

number of different non-conforming denominations during the period proliferated, these religious groups did not enforce strict ideological or theological boundaries. Dissenters "articulate[d] the virtues of religious division precisely as a means toward political and social unity, or at least harmony" (White 7). This openness persisted in the educational edifices of dissenting culture as well; many dissenting academies were among the first to offer formal instruction in sciences like chemistry, departing from the classical curriculum of England's Universities. Courses at the Manchester new college (a dissenting institution) would include practical mathematics, chemistry, fine arts, and moral philosophy, among other subjects (White 29).[7] These disparate pursuits, made urgent by a dissenting commitment to free inquiry, came together in Barbauld's early pedagogical prose as "the patchwork product of familial literary collaboration" (White 70). White emphasizes the cooperative nature of dissenting cultural production alongside its tendency to elide distinctions between public and domestic activity; dissenting authors like the Aikins made a literary object, to be exchanged in the intellectual commerce of the public sphere, of their family lives. I would add to this, however, that "patchwork" also offers a serviceable metaphor for the principle of juxtaposition at the heart of that community's ideas about the best way to organize knowledge and the world. According to Lucy Aikin, *Evenings at Home*, a pedagogical collaboration between her father John Aikin and his sister Anna Barbauld, could be "regarded as a commentary upon his two favourite ideas – of teaching *things* rather than words; and of early presenting to the mind capacious and diversified views of the great empire of knowledge" (qtd. in Daniels and Elliott 108).

In this chapter I focus on the flowering of this epistemological commitment to the "capacious and diversified views of…knowledge" in Barbauld's early poetry, especially that

[7] The kinds of fusions possible in this schema are exemplified by Barbauld's brother John Aikin, with his multifarious interests and role as a "Literary Physician," see also Ready 70-93.

addressed to, or considering, Joseph Priestley. More than any other figure, for Barbauld, he embodied the voluble intellect of the enlightenment man of science:[8] a figure that she respected, but also with whom she sometimes sought to contend. In *Eighteen Hundred and Eleven* he appears as a wrongly-maligned genius whose reputation posterity will someday restore. Travelers returning to a ruined England from America will "Join with their Franklin, Priestley's injured name, / Whom, then, each continent shall proudly claim" (203-4). Here the memory of Priestley's glory promises to bridge national distinction; even in his absence, he combines an American with an English scientific tradition. His political and religious commitments would have intensified Barbauld's regard for his heterogeneously realized inner virtue. Barbauld claims that Priestley's damaged reputation is a symptom of the same malady of narrow-mindedness and enclosure afflicting nineteenth-century England. In "To Dr. Priestley," she laments that his name has "On evil days…fallen" (12), commenting that Priestley should remain little perturbed by the mob's slander, for "Scenes like these hold little space / In his large mind, whose ample stretch of thought / Grasps future periods" (14-16). Priestley's "large mind" is capacious, encompasses a diversity of pursuits – as I will show below – and does not fit with his present. As Deirdre Coleman suggests, with the flare up of the reactionary social energy of the 1790s, "the Enlightenment sociability represented by Warrington in the 1760s and 1770s suddenly seemed a thing of the past" (85). Indeed, coming on the heels of the Birmingham riots, this poem excoriates the political closing of the English mind, a narrowness that will be exacerbated by the Napoleonic wars on one hand, and, on the other, by the increasing specialization and exclusivity of intellectual pursuits in an industrializing and increasingly technologically-driven society.

[8] On the figure of the enlightenment Man of Science, a figure who took up myriad philosophical pursuits see Shapin, "The Image of the Man of Science" 159-183.

The story of how that intellectual narrowness developed is a complicated one. While eighteenth-century knowledge included myriad pursuits, nothing about those fields rendered them exclusive. This scientific paradigm is properly designated the era of "natural philosophy," and within that capacious intellectual designation myriad objects of scrutiny attracted the attention of men of science, and the institutional and epistemological structure of such pursuits did not enforce specialization or exclusivity. What's more, Priestley's scientific research always also expressed his deepest religious commitments. His theological writing took up controversies, like materialism, that likewise invited scientific and empiricist scrutiny.[9] And as I will demonstrate, his experimental procedures remained, in fact, answerable to the sentimental poetic exhortations of peers like Barbauld. In this chapter I will demonstrate that the way eighteenth-century thinkers like Priestley and Barbauld conceived of the relationship between different types of knowledge led to a fruitful intertwining of diverse pursuits. I will chart this commitment as it arises in Barbauld's early poetry, as she, in fact, seeks to represent the benefits of such a fluid patchwork of ideas, before I turn to Priestley's own scientific practice to demonstrate how he maintained this commitment to an analogously dynamic scientific practice. It may seem strange, or an ill fit, that I began this chapter by scrutinizing Barbauld's poetic satire of England at war. For are not these pursuits, scientific theory and war, tangentially related at best? Is there not a great chasm extending between the moral perspective that sways toward peace and the analytical and theoretical exercise that organizes scientific knowledge? In fact, in this chapter's final turn, I emphasize that for Priestley and Barbauld, moral concerns were inextricable from scientific pursuits because for Priestley and those he influenced, at a fundamental level, matter harbored the capacity for consciousness and conscience in certain organized forms, and always

[9] On Priestley's materialism and its tendency to conflate matter and thought see Yolton 107-126.

bore a residuum of virtue. No Kantian dualist or severe subjectivist moral systematist, Priestley discovered in matter, through the course of his experiments, the stamp of virtue on all parts of the world, indicative of God's benign intent.

But as I will show, the chemical paradigm that subtended Priestley's moral-material and theological-scientific fusions was coming to a close: the new matter theory of Antoine Lavoisier would base chemistry – the most intimate and probing empirical study of matter – on a new conceptualization of the element that expressly banished fancy from the work of science. This was part of a much broader transformation, as the intellectual unity of natural philosophy and the Republic of Letters gave way to the specialized and disciplined arts and sciences paradigm. Lavoisier's system subjected the study of substances to the unforgiving regime of enumeration, and reinforced a distinction between properly scientific – because quantifiable – scientific pursuits, and more esoteric forms of study. Certainly, after Lavoisier's new nomenclature took broader hold, chemists would not be so foolish as to imagine that they could capture virtue in a jar, or wrench goodness from a mineral they'd subjected to the torturing rack of focused electrical current. But to assent to this way of conceiving matter was to encode in the very fundaments of science a caesura between forms of knowledge reliant upon quantitative and qualitative forms of evidence, which has persisted to the present and informs many of our presumptions about the nature and value of different intellectual pursuits. At the same time, it encoded in the world's DNA, so to speak, the appropriateness of division and enclosure in the production of legitimate knowledge.

Epistemology as Conversation: Poetry and the Man of Science

In a suite of early poems focused on her close friendship with the Priestleys, with whom Barbauld became familiar during Joseph Priestley's tenure at Warrington Academy between 1761 and 1767, Barbauld outlines an underlying worldview aligned with the capacious heterogeneity of the natural philosophy practiced by Joseph Priestley. The Priestleys represented different aspects of an ideal human comportment for Barbauld. According to Coleman, Mary Priestley embodied "the harmoniously organized temperament so central to definitions of sociability," while Joseph, whom Barbauld certainly respected, became a contentious figure whose "masculine rigour" Barbauld sought "to soften and temper…by subjecting it to an aesthetic discourse of beauty and sentimental standards of morality" (Coleman 90; 84). I'll draw attention to two implicit points in Coleman's reading of these relationships: first, sociability among these friends could be both cordial and adversarial – dissenting intellectual conversation entailed both agreement and contradiction. Second, faultlines within the Republic of Letters between types of knowledge or intellectual pursuits generated opportunities for critique and controversy precisely because these different pursuits were not institutionalized. In other words, because the comparatively more rigid distance of nineteenth-century disciplines had not alienated them, the natural philosopher and the poet had much to say to each other. As a result, Barbauld's early poetry, when it addresses enlightenment science, does so by positing literature as, at once, contiguous with it among a more holistic muddle of knowledge and differentiable enough to serve as the basis for methodological and ethical critique. In her schema, disciplines coalesce, momentarily individuated from a broader totality, only to return to the wider welter of enlightenment intellectual and social praxis.

Barbauld conceives knowledge as a collection of loosely ordered multiplicities: she represents, particularly in the iconic figure of Priestley, the links between historical, literary,

scientific, and political knowledge. “An Inventory of the Furniture in Dr. Priestley’s Study,” first published in the collected edition of 1825 but likely written during the period of Barbauld’s intimacy with Priestley, represents the ranging nature of his knowledge by the charts festooning his walls and the books lining his shelves. His study displays knowledge of diverse pursuits. That he features “a map of every country known” demonstrates his geographical awareness (1). His “list of folks that kicked a dust / On this poor globe, from Ptol. the First” indicates historical curiosity (3-4), as does “A group of all the British kings, / Fair emblem! on a packthread swings” (7-8). Taken together, these lines engage the histories of diverse social strata even to the point of radicalism. The colloquialism of “folks that kicked a dust” idiomatically performs common parlance even as it aspires to casual comprehensiveness – Priestley’s list includes all “folks.” He doesn’t neglect regal histories of state, but his kings, hung on a packthread, emblematize a commitment to overthrowing the monarchy. Barbauld, in this instance, inflects Priestley’s view of history by depicting it as committed to the “poor globe,” a history, in a sense, of humanity as one more undeservedly lowly multitude amidst this catalog. His deference to “The Fathers, ranged in goodly row” indicates his theological pursuits (9), while his copies of Juvenal and Ovid display his literary engagements.

Barbauld expands the catalog from books and papers to apparatuses to show Priestley’s variety of intellectual activity while also presenting his productions in varying states of completion, valorizing the often partial – and constantly shifting – products of an active mind. His shelves contain “bottles, jar and phial, / By which the rogues he can defy all, – / all filled with lightning keen and genuine” (17-19) – not only does he store implements for specimen collection, but also a Leyden jar – a basic battery intended to accrue static charge – no doubt suggesting Priestley’s researches in *The History of Electricity* (1767). Or these could be the very

jars he used in his study of pneumatic chemistry, submerging them upside down in the water-filled trough to capture distinct airs. In fact, Barbauld's poem nicely captures Priestley's transition from electricity to air: she describes the bottles' usefulness for containing electricity, but ends the poem with the man of science's discovery of a new enthusiasm in air. Far from presenting such inquiry as disinterested, Barbauld represents Priestley's experimental pursuits as political interventions, means of defying rogues. The accoutrements of natural philosophy appear in tandem with "Sermons, or politics, or plays. / Papers and Books, a strange mixed olio, / From shilling touch to pompous folio" (28-30). Jumbled together, Priestley's own literary produce, alongside his chosen reading materials, embody a range of genres and forms of print. From the cheap political broadside to the meticulous and lavishly produce philosophical folio, the man of science voraciously consumes knowledge in many forms. This tendency leads to restless activity, and Priestley's study is a museum of his partial compositions, "Forgotten rimes, and college themes / Worm-eaten plans, and embryo schemes" (37-8). Knowledge in this view appears muddled and prolific, actively engaging the world on many fronts.

In fact, Barbauld's inventory levels ontological hierarchies, dismantling the categorical boundaries between experimental apparatus and text, between thing and thought. For instance, Priestley's study contains "A rare thermometer, by which / He settles, to the nicest pitch, / The just degrees of heat to raise, / Sermons, or politics, or plays" (25-8). These lines collapse the distinction between the technical and medial apparatuses by which a scientific discovery would be first achieved and then disseminated: sermons, politics, and plays do not arise immediately from heated substances, though this passage describes just such a transformation, thereby metaphorically linking experiment and popularization more intimately with their political fall-out. Barbauld likewise invests these processes with political radicalism by emphasizing how the

sciences democratize natural knowledge. Priestley indeed claimed in his *Experiments and Observations on Different Kinds of Air* that "the English hierarchy (if there be anything unsound in its constitution) has equal reason to tremble even at an air pump or an electrical machine" (1: xiv). From Priestley's perspective false hierarchies had everything to fear from scientific apparatuses capable of increasing access to natural knowledge; though he knew he needed to construct the narrative accounts of his experiments meticulously in order adequately to transmit his research to others, he nevertheless viewed science as political to the core.[10] Barbauld's metaphor honors this principle of Priestley's, and the thermometer, applied to a preparation either chemical or culinary in nature, measures the degrees of heat necessary directly to bring forth his literary bromides. Not only is Priestley's knowledge holistic and undifferentiated, each of his various pursuits can be made to serve any and all epistemological purposes at once. Barbauld calls the contents of his study, "A mass of heterogeneous matter," effacing even the basic distinction between matter and ideas: everything that the poem catalogues – Priestley's ideas as much as his possessions – is a part in this mass of matter (39). That Barbauld characterizes the mass as "A chaos dark, nor land nor water," suggests that she perceives the knowledge upon which Priestley draws as undifferentiated even by divine categories (40). Knowledge, in a sense, exists suspended in a state before the ordering processes of a biblical Genesis.

"An Inventory" evinces direct concern with multiple types of genesis and generation: both the production of new books and the discovery of unrecognizable natural phenomena. Barbauld describes Priestley's political salvos emerging through metaphorical parturition:

> New books, like new-born infants, stand.

[10] On the meticulous narratives that Priestley constructed to facilitate the transmission of his scientific methods see Golinski, *Science as Public Culture* 50-90.

Waiting the printer's clothing hand;—
Others, a motley ragged brood,
Their limbs unfashioned all, and rude,
Like Cadmus' half-formed men appear;
One rears a helm, one lifts a spear,
And feet were lopped and fingers torn
Before their fellow limbs were born;
A leg began to kick and sprawl
Before the head was seen at all,
Which quiet as a mushroom lay
Till crumbling hillocks gave it way;
And all, like controversial writing,
Were born with teeth, and sprung up fighting. (42-54)

His unpublished manuscripts, "like new-born infants," have been generated, but await clothing by the printer. Gestated from Priestley's chaotic studies, they've nevertheless assumed a recognizably infant form, though they've yet to be dressed in a socially appealing fashion – as printed books. More thrilling, the birth of new ideas invokes the myth of Cadmus, the founder of Thebes who sewed dragon's teeth into the soil to grow ferocious soldiers. Or perhaps it reminds us of Victor Frankenstein's wistful desire to create life from exploded systems. Barbauld describes Priestley's thoughts (his soldiers) emerging from a disordered intellectual stew, their birth-process itself disorganized. The "motley and ragged" nature of these other books suggests their composition from a patchwork of different types of knowledge, their seams sometimes poorly sewn and showing, their edges torn from an early encounter with the world. They emerge

as half-formed parts, already active, flailing, rhetorically violent, at once incomplete and synecdochically invoking their future martial completeness. Per this description "controversial writing" does not immediately attain a clear generic or disciplinary identity, but rather acts as a loosely sutured collection of parts working to different ideological ends. Barbauld presumes but does not explicitly describe its eventual wholeness.

By contrast, scientific discovery remains only obliquely representable within the poem, a generative process veiled from the lyric voice's total recognition, though arising in some way out of the diverse volume of Priestley's intellectual labor. It must be introduced in a mediated form, and in the interrogative mode: "'But what is this,' I hear you cry, / 'Which saucily provokes my eye?'" (55-6). The lyric voice's apperception of the discovery of some new sort of air explicitly depends upon Priestley's perception (the observational capacity of the man of science), and even his knowledge is incomplete. He queries the phenomenon as to its true identity – not yet understanding what his experiment has generated. Importantly, his expertise in this moment of identification is not disciplinary in the modern sense: the point is not that a poet is fundamentally unable to understand scientific discovery because she is somehow limited by an exclusively non-scientific mindset. In fact, Priestley's first response is to accuse this new form of matter of "sauciness," a metaphorical and personifying gambit more suitable to poetry than specialized scientific inquiry. On the contrary, the lyric voice demonstrates a perspective less widely read than Priestley's – the man of science doesn't have exclusive access to a specialized type of knowledge so much as he has accumulated a greater volume of knowledge. In this sense, the exclusivity of his judgments arises from the prolific diversity of his intellectual attainments. Though the poet can only rest at a vague description of natural phenomena – "A thing unknown, without a name, / Born of the air and doomed to flame" (57-8) – her knowledge, were it

augmented by Priestley's voluminous studies, could likewise rise to the challenge of assessing and assigning a name. Diversity of knowledge is itself reproductive.

Based on partial knowledge, Barbauld's poetry is also a part of, that is, continuous with, the broader plane of knowledge to which Priestley has access. I want to emphasize, here, that Barbauld's poem exemplifies poetry as one among many pursuits inherent in the Republic of Letters. Her chosen genre – the inventory poem – utilizes the same principle of paratactic assemblage that she uses in describing Priestley's pursuits. Her images accumulate, often becoming so densely packed as to overlap, seeming each to spill across the boundaries of the others. For instance, the catalog includes two categories:

> A group of all the British kings,
> Fair emblem! on a packthread swings.
> The Fathers, ranged in goodly row,
> A decent, venerable show
> Writ a great while ago, they tell us,
> And many an inch o'ertop their fellows. (7-12)

These lines provide an image that is literally layered: a row of royal portraits hangs on twine above a row of books written by famous religious leaders. The couplet break and full stop after "swings" seem to support the need to distinguish between the "kings" hanging "on a packthread" and "The Fathers," suggesting a division between state histories of kings and religious histories of church leaders. But the close juxtaposition of kings and Fathers still allows an affinity between the patriarchal authority of the state and that of the throne. Barbauld is careful to grant the religious fathers greater deference as a "decent, venerable show" that "many an inch o'ertop their fellows." But the structure of the lines seems to give the lie to this "o'ertopping," as the

hanging kings come first in sequence and dangle in lines above the "goodly row" of fathers. The Fathers, then, are at once above and below the kings, a paradox of relation that lends credence to the reading that Barbauld hints at conflating all such authority as patriarchal.

At a broader level, the poem likewise begins and ends with such overlayed images, rendering this accretive palimpsestic character a structural principle. Its first line, "A map of every country known" (1), introduces the first item in the poem's catalog, but also establishes a geographic metaphor for the poem in its entirety: on the one hand, knowledge is a map that one can read if one follows Barbauld's cartographic account of Priestley's study – types of knowledge are discrete territories.[11] Yet the catalogue doesn't overtly invoke such a spatial metaphor again until its end, when it undermines that discreteness by portraying the absence of geographical distinction as the wholesale abandonment of order, "A mass of heterogeneous matter, / A chaos dark, nor land nor water" (39-40). Here the metaphor of thought as terrain returns, alluding this time to the absence of distinction in Priestley's epistemological landscape. This recurrence exemplifies the poem's figurally transformative logic: it flows easily from descriptive representation to symbolic substitution. It opens with a literal, illustrative reference to the maps festooning Priestley's walls and closes with a symbolic featureless landscape, knowledge as blank map. For Barbauld, knowledge is a territory, but it is also an apparatus, a book, an army, and a flame.

Yet if poetry constitutes a part of knowledge, continuous with the whole, it may also be rendered instantaneously apart from the other pursuits that make up knowledge. Like Priestley's inflammable air – an object to be individuated, scrutinized, and catalogued – poetry may become

[11] Daniels and Elliott describe how Barbauld and her brother, in their coauthored pedagogical texts, used the study of geography to frame connections among "various symbolic systems," describing "a cosmopolitan countryside, in interchangeable images of the book and of nature, feeding body and mind, of the open page and the open landscape as lettered spaces of learning" (98-9).

distinct, counterposed to other ways of understanding the world. This differentiation must be momentary within an enlightenment epistemology committed to syncretism, but it nevertheless provides enough epistemological stability to a particular school of thought for it to stage critiques of other forms of knowledge. Precisely this sort of positioning informs Barbauld's "The Mouse's Petition" (1773), which draws upon poetry's role in the culture of sensibility and the fantasy of emotional immediacy characteristic of lyric to rebuke the philosopher, whose methodical inquiry has rendered him insensible to animal suffering. Mary Ellen Bellanca argues that, though the mouse's plea may offer a generalized resistance to tyranny – and critics have found in the poem critiques of both gender and class inequality and exploitation[12] – we ought not to read the poem in an exclusively allegorical fashion: the mouse in fact lodges a specific complaint against enlightenment science.[13] According to Bellanca, Barbauld's poem "both celebrates and critiques an Enlightenment science that increased the physical comfort of human beings yet destroyed animals for knowledge about their bodies" (49). Indeed, Barbauld's affection for the Priestleys, her situation at Warrington, and her enthusiasm for enlightenment science prevented her from unequivocally accusing Joseph Priestley of cruelty: upon its first publication the poem included a note explicitly exonerating him, asserting that the author "was certain that cruelty could never be apprehended from the Gentleman to whom this is addressed." As Bellanca notes, such a qualification diminishes the poem's polemical force but makes manifest its status as "a scene of engagement among competing but interdependent discourses struggling to come to terms with the material world and with its meanings for thinking, feeling women and men" (61). As an

[12] Myers argues for the poem's situation within an alternative tradition of feminine enlightenment pedagogy, one focused on details, which binds science and the imagination closely, and which was diminished by male poets and writers during the Romantic period, see 255-88. For a reading of the poem as offering a plea to power from the poor and marginalized, see Ross 91-110.

[13] For an alternative view, one that sees Barbauld's poem being misinterpreted and oversimplified when taken literally as opposing animal experimentation, see Ready, "What then Poor Beastie!" 92-114.

artifact, Barbauld's poem exemplifies the uneasy juncture of a natural philosophical establishment dependent upon animal test subjects, a community of philosophically-minded dissenters invested in science's potential for social improvement, and a cultural proclivity to sentiment that judged practices like vivisection to be uncivilized acts of cruelty. Julia Saunders argues that Barbauld's critique in this instance, alongside the efforts of other women writers of the period who took up scientific subjects, constituted an active role in science itself: "Barbauld's role as ethicist in the laboratory illustrates to Priestley and his scientific fraternity how their private activities figure in a much wider context" (513).

I maintain that this cross-field engagement arises out of enlightenment thinkers' epistemological preoccupations – as I've noted above, they constantly yoked together moral, philosophical, political, and poetical thought – and I build upon Bellanca's claim about "competing but interdependent discourses" to show how "The Mouse's Petition" records the momentary elucidation of proto-disciplinary contours for "poetry" and "science" in this moment of criticism. Critique, in a sense, is a seismic event in the epistemological plane that produces temporary fissures along the fault lines between ways of knowing. Phantasmal boundaries of science and poesy as discrete pursuits become visible in this moment: the poet attains greater facility for sympathy; the scientist sacrifices moral concerns for methodological rigor. We may recognize the tendency to associate certain types of feelings and ideas with these proto-disciplines, though we must keep in mind than any such formation remained ephemeral, prone to fall back into the mix of enlightenment knowledge. In the absence of sustaining disciplinary and institutional features that were to come later over the nineteenth century's course – specialized nomenclatures and apparatuses, unique training facilities and regimes, and overarching cultural

institutions differentially distributing financial resources – individuations within knowledge remained impermanent.

Nevertheless, when these discipline-like formations coalesce, often as staging grounds for epistemological critique, they do so according to consistent and recurring conceits: for instance, Barbauld conceives poetry as defending life in the form of a universally linked mental principle. According to the poem's rodent speaker, "The well taught philosophic mind / To all compassion gives; / Casts round the world an equal eye / And feels for all that lives" (21-4). Considering the petition's commitment to sympathy and the speaker's poetic identity, "well taught" likely connotes being trained in sympathy, with the poet-mouse standing in as pedagogue. The poem posits mind as both diverse and universal, a principle at the heart of all life and therefore grounding the necessity of care among creatures:

> If mind, as ancient sages taught,
> A never dying flame,
> Still shifts thro' matter's varying forms,
> In every form the same. (29-32)

I want to emphasize that the emergence of a poetic voice discrete from science which can intervene in natural philosophy's ethical development by offering a critique from outside that epistemological territory occurs in tandem with the conceptual invocation of universal life. Poetry and natural philosophy may in fact represent entangled parts of the mass of ideas and pursuits that makes up knowledge in the Republic of Letters, but certain anchoring preoccupations, like the unity of mind, can exert a gravitational pull to draw knowledge into a topography of somewhat ephemeral types. Poetry coalesces, in Barbauld's early poetry, around the idea of life as a pervasive and connective energy.

She likewise asserts poetry's vitalizing capacity in "To Mrs. P[riestley], with Some Drawings of Birds and Insects" (1773). Here poetry and painting execute complementary functions, with drawing bestowing form and poetry conferring life to natural representations:

> The Kindred arts two sister Muses guide;
> This charms the eye, that steals upon the ear;
> There sounds are tun'd; and colours blended here:
> This with a silent touch enchants our eyes,
> And bids a gayer brighter world arise:
> That, less allied to sense, with deeper art
> Can pierce the close recesses of the heart;
> By well set syllables, and potent sound,
> Can rouse, can chill the breast, can sooth, can wound;
> To life adds motion, and to beauty soul,
> And breathes a spirit through the finish'd whole. (6-16)

Barbauld differentiates these arts in terms of their sensuous inputs, but soon poetry escapes the surface divisions between the senses, as "with deeper art / [it] can pierce the close recesses of the heart." Rhythm, consonance and assonance become means to excite a reader's emotions; by turns, this energy "to life adds motion, and to beauty soul, / and breathes a spirit through the finished whole." Poetry, in Barbauld's formation, characteristically uses prosodic effects to excite an awareness of life's motion as a potentially universal force. The tendency towards a "finish'd whole" constitutes only an equivocal completeness; on the one hand poetry could be enlivening the singular aesthetic object, but on the other it might open one's perception to "life" as an expansive and macrocosmic principle. There is a recursiveness in poetry's progress

towards a universal life principle – poetry becomes individuated, defined by its conspicuous and unique access to cosmic vitality, only to wind up back at an undifferentiated totality. Barbauld reemphasizes this point in the following line when she concedes of painting and art that "each perfects each, in friendly union join'd" (17).

As in "The Mouse's Petition," politicized critique gives rise to an opportunity for epistemological differentiation – in "To Mrs. P" the abovementioned recognition of poetry's conditional autonomy comes in tandem with a critique of natural philosophy's exploitative gendered labor practices. Barbauld invokes the sister arts, setting the stage for a subtle political critique of scientific fame: these particular sisters undertake a form of labor going unremunerated by society, that of female illustrators and scientific popularizers, to which Barbauld's epistle draws attention. Thora Brylowe discusses the fraught political associations that the "sister arts" concept bore during the period: "the sister arts carried a particular historical weight because they index the emergence of a modern artist whose professional identity was predicated on the success of the modern author" (10-11). Barbauld, in her poem, expresses solidarity with a scientific co-laborer in obscurity, functioning again as "ethicist in the laboratory" (Saunders 513). Her poetry provides grounds from which to criticize scientific practice for effacing female exertions. The poem's depiction of unequal power relations in the natural world suggests its potentially allegorical engagement of human inequality. In a section on birds Barbauld describes some species as gathering around man's "hospitable door" and finding "protection there / From all the lesser tyrants of the air" (28-30). Turning to the eagle, a "royal bird," she offers a rebuke to monarchy: the eagle's "lonely kingdom forms / Amidst the gathering clouds, and sullen storms" (35-6). He "feasts his young with blood," and "with cruel eye premeditates the war, / And marks his destin'd victim from afar" (32, 39-40). Barbauld characterizes the avian ruling

class as bloodthirsty, cruel, and destructive. But her engagement is not simply an abstract indictment of power. Her more salient critique comes in the poem's framing. By drawing attention to poetic description alongside naturalist drawing, Barbauld publicizes a particularly common, if underappreciated, brand of female scientific labor. This sort of illustration falls under the auspices of what Lorraine Daston and Peter Gallison call "the semivisible network of women helpmeets – wives, daughters, sisters – who translated science into a private idiom" (89).[14] Though the poem's opening lines introduce the conceit of the sister arts by positing the naturalist's pencil in a human hand, by the poem's end the lyric voice is asking "who can follow nature's pencil here?" (104). The transition goes largely unremarked, but the pencil's passage constitutes a surreptitious linking of female naturalist illustration with nature's own forms. The poem seems to suggest that women illustrators achieve in their representations a fidelity to nature at least equal to the experimental work of the more prestigious men of science. In fact, such domestic pastimes as drawing, when oriented towards scientific purposes, prove superior for Barbauld to the public sphere of natural philosophy, as the poem's closing suggests:

> Thy friend thus strives to cheat the lonely hour,
> With song, or paint, an insect, or a flower:
> Yet if Amanda praise the flowing line,
> And bend delighted o'er the gay design,
> I envy not, nor emulate the fame
> Or of the painter's, or the poet's name:
> Could I to both with equal claim pretend,
> Yet far, far dearer were the name of FRIEND. (121-8)

[14] For more on the 18th century's increasing relegation of women to scientific helpmeets, a symptom of the professionalization of the sciences, see Schiebinger 245-264.

Here friendship, and in particular a female friendship oriented to appreciating nature, proves more valuable than "fame." Barbauld depicts feminine sociability as partaking of multiple intellectual pursuits – song, painting, entomology, botany, and aesthetics.

This identifying and valorizing of a widely roving but amateur female knowledge implicitly acknowledges a point that Barbauld's "To Dr. Aikin" (1768), written during a similar period before Barbauld achieved fame as a poet, makes explicit. The poetic epistle offers an opportunity to chart an alternative course to intellectual expression and satisfaction, and does so by clarifying science and poetry as separate gendered pursuits. Barbauld bemoans the access to "science and fame" her brother enjoys that she is denied:

> Those hours are now no more which smiling flew
> And the same studies saw us both pursue;
> Our path divides – to thee fair fate assign'd
> The nobler labours of a manly mind:
> While mine, more humble works, and lower cares,
> Less shining toils, and meaner praises shares.
> Yet sure in different moulds they were not cast
> Nor stampt with separate sentiments and taste.
> But hush my heart! Nor strive to soar too high,
> Nor for the tree of knowledge vainly sigh;
> Check the fond love of science and of fame,
> A bright, but ah! a too devouring flame. (48-59)

These lines express Barbauld's frustration at persistent gender inequities inherent in dissenting culture. She describes a time in youth when knowledge is undifferentiated: she and her brother

"the same studies [hours] saw us both pursue," until gender expectation "our path divides," propelling John Aikin to medicine, and relegating young Anna to "more humble works." On the one hand, these lines emphasize the comparative lowliness of the poetic pursuit; at the same time, however, poetry provides the occasion for critiquing the very divisions that dispossess Barbauld of access to the full range of intellectual opportunities the Republic of Letters affords. As Deirdre Coleman argues, Barbauld "challenged private/public distinctions through [her] longing for equal participation in the world of knowledge and learning" (83). The divisions of labor that barred Barbauld from scientific pursuits arose from the fact that dissenting culture still "tolerated [women] as 'naturalized' foreigners" (Coleman 82). Though the above passage's final lines seem to express resignation and quietism, I hope my reading of Barbauld's early poems demonstrates that the spirit of resistance and criticism persists throughout her early poetry, especially where she constructs representations of science.

More to the point, I want to draw attention to a fact that has gone unnoticed, that these lines offer a broader narrative of the fall into epistemic division. If the grounds of knowledge are the same, an inescapable assertion for a largely materialist and empiricist intellectual culture, divisions of knowledge must always come after the fact, reinforcing social inequities. Barbauld's continual recurrence to undifferentiated knowledge (the common pursuits she enjoyed with her brother in youth), even if she consolidates poetry as a space from which to assail the bulwarks of masculine public science, is a calculated and political decision. To call for undifferentiated knowledge is to demand unhierarchical knowledge: equal access for all. In a sense, the idealized figure of Priestley promised by his syncretically-ordered study is not merely an attempt to popularize a certain set of epistemological commitments; it simultaneously represents how science ought to be.

These poems posit poetry as the source of a social and convivial energy, one whose connective character contrasts the persistent mechanism of scientific matters. At the end of his petition the mouse appeals to "hospitality," a universal receptiveness and charitable disposition towards initiating social cohesion. Such a commitment would have arisen from Barbauld's days at Warrington, which, according to Anne Janowitz, nurtured an "ideal of social intercourse conceived of as informal, familiar and amiable, teaching the virtues of 'candid manners' and an 'active mind'" (62). A similar division between a lively sociability nurtured by poetically inflected conversation and scientific mechanism informs Barbauld's "To the Baron de Stonne" (composed 1786, published 1825) which recounts the occasion of a party of friends visiting the Paris Royal Observatory to view the transit of Mercury. The poem focuses on a disparity between different types of time: astronomical cycles recur with indifferent consistency while humans experience time with emotionally-charged uncertainty.[15] As the astronomer knows,

> In twice five winters more and one,
> Hermes again will cross the Sun;
> Again a dusky spot appear,
> Slow-journeying o'er his splendid sphere:
> The stars shall slide into their places,
> Exhibiting the self-same faces,
> And in the like position fix
> As Thursday morning, eighty six. (1-8)

Here the cosmos moves with the reliable precision of an orrery: the stars "slide" into their expected places, their "faces," like clock faces, unchanged after the passage of eleven years. This

[15] On the connection between new theories of time and novel cosmological systems, see Brothers 38-49.

regularity arises from the fact that "wandering planets have their rules, / Well known in astronomic schools" (13-4). Barbauld separates scientific knowledge, the purview of "astronomical schools" from human experience; the heavens are distant and untouchable. By contrast, "life's swift wheels will ne'er turn back, / When once they've measured o'er their track" (15-6). Mercury will once again traverse the Sun's diameter in eleven years, but patterns in human life don't achieve anything like the same degree of regularity. What's more, one of the more profound losses due to this irregularity is the inevitable termination of social connections. The poem opens with the conceit that even though the planet will retrace its movements, "changing mortals hope in vain / Their lost position more to gain; – / Once more between La Borde and me" (9-11). The poem records as an occasion an astronomical event, but the more profound occurrence is the intersection of two temporal modes: the clockwork time that scientists have discovered in celestial bodies and the irreversible time of the human scale.

Faced with this disjunction, the lyric speaker offers sociability and friendly affiliation as a consolation for the fact that human life cannot replicate heavenly regularity, explicitly linking friendship to aesthetic production and consumption. If in "To Mrs. Priestley" Barbauld depicted a momentary disjunction between painting and poetry where poetry served as vivifying agent, here she restructures poetry's vitality, casting it as the only means of discovering pleasure in a lived present conditioned by, but strangely at odds with, the pendulum swings of a mechanist universe. After realizing that her human relationships may not continue with the regularity of planetary motions in ten years' time, the speaker in "To the Baron de Stonne" decides, "Let Fancy then and Friendship stray, / In Pleasure's flowery walks today, / Today improve the social hours, / And build today the Muse's bowers" (55-8). The temporal scale of "today," contingent and particular, well suits "the Muse." This signals that the poem's primary epistemological

distinction is a fleeting one between scientific knowledge, formed in the "astronomic schools" (14), and the arts so conducive to human connection. Barbauld emphasizes the need for diverse modes for engaging the universe: they are autonomous enough to contradict each other, but their separateness exists only so that different sorts of knowledge can be mutually clarifying. This point is borne out by the shared investment of the speaker and her friends in aspects of *belles lettres*: the speaker imagines her "lyre unstrung" with the passage of time (23), positing that another companion will spend his age "Far from the idleness of rime" (36), and "turn his back on thee and Wit" (40). These speakers are so beset by fears that they will lose the trappings of fancy precisely because it has become so important to them as a consolation in the present moment. They also fear losing poetry and affection, hence the poem's exhortation to focus on "fancy" and "friendship" in the present.

However, the division between science and poetry that Barbauld describes is fleeting, and far from absolute. Repeatedly, her poems stage a tending apart among pursuits, as a means to recover a greater degree of unity. As noted above, the duration of fancy and friendship's straying never exceeds "today" (55-8). After that point the friends must, "when life's pageant on will go, / Try not to stop the passing show; / But give to scenes that once were dear, / A sigh, a farewell, and a tear" (59-62). Poetry, here, falls far short of attaining a permanent hold over human sociability and affection. The muse governs an ephemeral and variable timescale, one easily nested between the resounding clicks of the cosmic clockwork. But neither is science absolutely stark or alienating in Barbauld's formulation; in truth, scientific knowledge produces the occasion (the transit of mercury has brought these friends together) for both sociability and the poem itself. What's more, the poem actually offers space as a second ordering principle in contradistinction to time. Though its opposed temporalities stand out, the poem's lyric voice

initially laments a loss of spatial position: “But changing mortals hope in vain / Their lost position more to gain; – / Once more between La Borde and me! – / Ah, wish not what will never be” (9-12). By gesturing to seats filled with socially-attuned speakers drawn by the dinner table’s peculiar gravity for the garrulous, the poem invokes the free play of enlightenment polite conversation. These are all, after all, the types of people who would gather during the high solemnity of a celestial event to discuss literature and politics, exchanging witticisms and pleasantries. Far from an epistemologically divisive gesture, “today” to “improve the social hours” is to invite all discourses to the table – conversation, and more importantly friendship, engage a wide array of topics, and by that token secure equal intellectual access to all. Janowitz reminds us of the capacity of the “friendly” society of Warrington – at least in the utopian form Barbauld here encourages – to facilitate epistemological border-crossings, calling friendship “that informal polite manner which allows for rational discourse to take place, and for it to wander between the study and the garden, assimilating domestic affection and mental exercise, and apparently drawing women and men together within the circle” (Janowitz 67). Important, here, is the “wandering.” Whether it be between the “study and the garden,” or the laboratory and the brewery, thinkers of the period wandered and wondered, refusing to rest their thought in stabilized intellectual terrains.

Epistemology as Cracked Retort: Disorder and Priestley’s Natural Philosophy

Barbauld’s poetry sketches the figure of Priestley as a writer and thinker constantly evading categorization. David L. Wykes and Isabel Rivers confirm this view of his multifarious researches: “For Priestley the pursuit of truth was never restricted to religion. What was true for rational religion was also true for science, politics, and every other area of life. As a consequence

he drew certain practical conclusions form his religious and philosophical beliefs" (12). She would have seen him, beginning during his time at Warrington Academy, take on myriad roles: pedagogue, divine, metaphysician, historian of science and experimentalist. Indeed, her "An Inventory of the Furniture in Dr. Priestley's Study" and "The Mouse's Petition," likely record this last shift most poignantly. These poems respectively record the object, "born of the air," and an important instrument, "a free-born mouse," of Priestley's primary research investment during his time at Leeds and Calne (1767-1780): the new pneumatic chemistry. This was the period during which Priestley transitioned from being a scientific historian to a full-fledged experimentalist, and his object was the chemical study of gases (what he called "airs"). As I've described above, and as this subsection's heading suggests, Barbauld's representation of Priestley seems to elide the difference between the experimenter and the object under the scientist's gaze. Priestley becomes a kind of human intellectual air – perhaps, in a way, he is very like the "thing unknown, without a name / Born of the air and doomed to flame" of the "Inventory" (57-8). In the section that follows, I will demonstrate how distinct Priestley's practice was, at a rhetorical and methodological level, certainly from our own highly-instutitionalized and specialized view of science, but even from the comparatively less rigid chemical system of the early nineteenth century. Barbauld's representations of Priestley, and her conviction that poetry shared an intimate purpose with the sciences, from which it was not epistemologically alienated, responded to and faithfully captured Priestley's actual activities. A real organizational commonplace existed between poetic understandings of science and scientific practice during the eighteenth century: at base, as systems of thought, both interacted in a dynamic relationship because they shared a mutual understanding of their relationship to the

everyday world as adaptable and, in a sense, etherial. Both poetry and chemistry were like gases, capable of filling a variety of vessels or else blending with the wider cultural atmosphere.

Priestley contrived his own practice to achieve an intellectual tendency towards diffusion and escape: he deliberately eschewed systematicity in his works, embracing, instead, in his multivolume *Experiments and Observations on Different Kinds of Air* a disordered method.[16] He justifies the haphazard organization of his *Experiments and Observations* by emphasizing the urgency of delivering to the public his pneumatic discoveries: "all unnecessary delays in the publication of experiments relating to [this science] are peculiarly unjustifiable" (I: vi). His hurry speaks to the cutting-edge character of the new chemistry of the gaseous state, but also to his disregard for the protracted methodizing activities of scientific speculators and system-builders. Priestley opposes himself to such philosophical egotists, who "keep brooding over a new fact, in the discovery of which they might, possibly, have very little real merit, till they think they can astonish the world with a system as complete as it is new, and give mankind a prodigious idea of their judgment and penetration" (I: vi). In rejecting the vain desire to produce complete and novel scientific explanations of the natural world, he simultaneously levies connected accusations of vanity and unchecked fancy upon those who would aspire after such philosophical totality. Such sentiment draws upon an eighteenth-century English prejudice against speculators, perhaps most poignantly captured in Jonathan Swift's *Gulliver's Travels* by the projectors at the academy of Lagado, who sought to extract sunbeams from cucumbers and food from feces (a completely systematic world would seem to be so completely reversible).[17] Priestley opposes to such strivers philosophers in his own mold, "men, who from a natural ardour of mind engage in

[16] Priestley's ambivalence to systems was by no means unique. On the genre of "system" and its discontents see Siskin, *System: the Shaping of Modern Knowledge* 1-78.
[17] See Swift 146-63.

philosophical pursuits, and with an ingenuous simplicity immediately communicate to others whatever occurs to them in their inquiries" (I: vii). The immediate dissemination of scientific knowledge encourages its proliferation, opening it up to replication by others, expanding the scope of research with the increase in active practitioners, and contributing to society's wellbeing. Indeed, Priestley is able to open his second volume with the claim that speeding his discoveries to press has had happy consequences: "instead of the experiments being prosecuted by myself only, or a few others, the subject has now gained almost universal attention among philosophers in every part of Europe" (II: v). According to Priestley, withholding the results of one's research for the sake of accruing fame betrays a "want of a genuine love of science and mankind" (I: vi-vii). Like the Lagadan scholars who pursue their research while the society around them crumbles, these scientific schemers concern themselves more with securing their own reputation for genius than doing good to the world.

His text likewise establishes itself as unsystematic by emphasizing its temporally sequential nature; in effect, chronological experiment-narratives rich in detail come rhetorically to signal a natural, immediate, and wide-ranging intellectual practice. Jan Golinski has drawn attention to how Priestley's "carefully framed descriptive narratives were composed with the explicit aim of making experiments reproducible by relatively unskilled practitioners working with minimal equipment" (77). He argues that Priestley's writings – those on airs, electricity, and optics alike – generate an ethos of scientific accessibility through narrative means: they present discoveries or phenomena in chronological order, preserve the role of accident in scientific discovery, and limit theoretical speculation – what's more, Priestley's early tendency to approach science through large-scale narrative historical accounts linked science with morality as the apex of human progress. In addition to exposing nature's hidden truths, natural philosophers and their

discoveries manifested nodes in an ongoing human progress.[18] I would like to add to Golinski's point about narrative facilitating the transmission of scientific practices – it makes it easier to repeat experiments – by noting that it also tends to promote mixing between species of knowledge. In particular, I emphasize that establishing chronology as the governing force for communicating scientific experiments and their pursuant discoveries deemphasizes the necessity of completeness or permanence in scientific theorization. A systematically-oriented science would, of necessity, need to delineate its boundaries (the limits of the system) and its sustaining elements. Priestley's narratives communicate natural philosophy as ongoing and unbounded. In fact, he envisions the creation of a scientific system as the arresting of scientific work – because natural philosophers are cooperatively committed to the common goal of improving society, they need not scruple over the absolute perfection of their ideas. Priestley's religious convictions may shed light on this commitment to incompletion. If all scientific work occurs in the interest of explaining God's world and work, in itself perfect, science need not strive for explanatory totality – perfection is already providentially assured.[19]

Far from seeking a record of perfect experiments, Priestley deliberately chronicles experimental accidents, errors, and inconsistencies to establish the natural philosopher's fallibility, characterizing scientific work as the incremental contribution by a humble experimenter to a larger cooperative endeavor. Saunders comments on this aspect of Priestley's scientific practice: "his work stresses his openness to conviction of his own error and his willingness for others to correct his work" (515), and she diagnoses an affinity in this open-endedness with Barbauld's engagement of science. Priestley also records the role of accident in experiment, making explicit his "real views" to emphasize the sciences' fundamentally unstable

[18] See Golinski 77-90.
[19] On Priestley's apocalyptic tendencies, see Fitzpatrick 29-37.

nature: preserving the mismatch between hypothesis and actual discovery "encourages other adventurers in experimental philosophy; shewing them that, by pursuing even false lights, real and important truths may be discovered, and that in seeking one thing we often find another" (I: x). Here, he foregrounds the collaborative spirit in his emphasis on encouragement. Furthermore, he argues that mistaken motives can give way to truthful discoveries – rather than figuring the scientist as a prophet whose experiments ratify his prescience (as Humphry Davy later will do, and as I discuss in Chapter Two), he draws attention to the important role of unplanned discovery in science. His second volume reemphasizes this point when he offers that his discovery of "dephlogisticated air" (oxygen) exemplifies the maxim that "more is owing to what we call *chance*, that is, philosophically speaking, to the observation of *events arising from unknown causes*, than to any proper *design*, or pre-conceived *theory* in this business" (II: 29).

In part, the capacity of accident to produce scientific knowledge arises out of the locally situated character of Priestley's investigations and their objects – he posits the world as a kind of laboratory, such that discovery can arise suddenly and in otherwise unscientific spaces. He doesn't sunder his research from the material conditions that give rise to it, and he eschews the abstract and hermetic completeness of systems, which are predicated on isolation and abstraction: the scientist controls the venue and conditions of the experiment so as to facilitate the mental extrapolation of natural phenomena out of the world, their transformation into series of causal links informing a particular theory.[20] By contrast, the phenomena Priestley queries always remain immersed in their non-scientific contexts. For instance, he discloses that the inspiration for his pneumatic research came from living next door to a brewery: "It was in the

[20] This aspect of Priestley's practice puts him slightly at odds with the kinds of controlled experiment conditions that Shapin and Schaffer describe the Royal Society arranging (1-79). Priestley did not eschew the constructed character of experimentation in general; rather, my point is that he conducted his experiments in a manner less rigidly controlled than that undertaken by Boyle and the Royal Society experimenters.

consequence of living for some time in the neighbourhood of a public brewery, that I was induced to make experiments on fixed air, of which there is always a large body, ready formed, upon the surface of the fermenting liquor" (I: 25). He goes on to describe actually conducting experiments in the layer of "fixed air" (CO_2) floating above the vats of beer. The brewery becomes a laboratory for Priestley, in part, because its metabolizing yeast produce the readiest volume of fixed air with which he can experiment. He doesn't merely secure his gas from the brewery, but uses its vats as scientific apparatuses: "a large strong frog was much swelled and seemed to be nearly dead, after being held six minutes over the fermenting liquor" (I: 36). If the spectacle of Priestley dangling a particularly robust frog over a vat of beer until it passes out (it revived upon being removed from the CO_2 layer) strikes the modern reader as unscientific, it is only because we have inherited a view of science intricately tied to the sterile space of the laboratory. Priestley understands his research within the particular operational context of the brewery; he's even cognizant that his experiments on airs might have an adverse effect on the beer itself. He notes that "all the beer, over which [an experiment with ether] was made contracted a peculiar taste; the fixed air impregnated with the ether being, I suppose, again absorbed by the beer" (I: 35). Rather than seeking conceptually to isolate "fixed air" from fermentation, thereby making scientific assessments about "airs" as generalized natural substances the world over, he understands the objects of his scrutiny as always localized. In the same vein, when Priestley talks about the best way to preserve his murine test subjects in the apparatus section of his *Observations and Experiments* he notes, "Mice must be kept in a pretty exact temperature, for either much heat or much cold kills them presently. The place in which I have generally kept them is a shelf over the kitchen fire-place where, as it is usual in Yorkshire, the fire never goes out" (I: 10). The advice about temperature is abstractly procedural, but,

according to Priestley, the fire itself – instrumental to the proper care of this living bit of apparatus – is extremely specific. Offhanded though it may be, this reference to Yorkshire fires signals the degree to which he understands his whole practice to be linked with his environment.

In a related preoccupation, Priestley continually gestures to the practical origins and importance of the scientific objects he investigates – they must be held in the hand before they can be related in the mind. "Fixed Air" (CO_2) is a major object of study in *Observations and Experiments*' first volume, but Priestley first describes the substance in the midst of a terminological review that accounts for the various names it has accumulated over time. He introduces it as a kind of air that "lies at the bottom of pits, extinguishes candles, and kills animals that breathe it, on which account it [has] obtained the name of the *choke damp*" (I: 2). Here he invokes a miner's term for CO_2 as the first instance of the main object of his experimentation being rendered an object of knowledge – effectively extending scientific priority to miners. He then traces subsequent terms for the substance – Van Helmont's "gas" and Joseph Black's "fixed air" (I: 3). This terminological review has two effects: on the one hand, by invoking these changing names Priestley prevents or unsettles any effort at nomenclature stabilization, such as that later undertaken by Lavoisier and the French chemical establishment. The recurrence to terms no longer in use in increasingly specialized philosophical discourses crowds scientific understanding; regularizing a nomenclature involves, in fact, a reduction and regularization of terms. More to the immediate point, the passage presents in brief an account of scientific knowledge that emphasizes its development out of practical activity. Other experiments exemplify this link: when Priestley heats beef or mutton to determine the sorts of airs released in the process he gestures to the proximity of chemistry and cooking (I: 82).[21] Likewise, he speaks

[21] Humphry Davy would later make this link explicit in his *Consolations in Travel*, also offering a litany of other practical applications for chemistry (350).

to the medical applicability of "fixed air" in making seltzer water, speculating about its anti-scorbutic properties (I: 4). This overt link to practical arts accords with Priestley's designation of his activities as "like all other arts in which the hands and fingers are made use of" (I: 7). As a manual art, Priestley's natural philosophy can only be learned in the doing, a fact that he invokes so as to avoid providing overly meticulous explanations of the exact motions necessary to accomplish each experiment – some of these gestures, he maintains, will come instinctually to the experimentalist who undertakes to practice science. His second volume doubles down on this premise, asserting that "readiness and certainty in the use of instruments, which is acquired by experience, cannot be communicated by any verbal instruction, but must be the result of much practice" (II: xxxiv). It's not merely that the adept should be able to pick up the experimenter's proper dexterity by hand; in fact, he cannot learn it any other way. Natural philosophy, in this sense, is an active endeavor – the body's labor as much as the mind's.

In general, Priestley's method effectively undermines the stability of most of the categorical distinctions it takes up, whose concreteness would be requisite to establishing a scientific system: as basic a difference as that between apparatuses and their associated types of scientific labor remains provisional. This is, in part, a practical concern since the tools that Priestley uses are only sometimes specialized, and often serve multiple purposes. He describes, for instance, "*cylindrical jars*" he uses to contain "several kinds of air" (I: 8); these would have been turned upside down and filled with various gases, their mouths submerged in the pneumatic trough or in "*tea-dishes*" filled with water or mercury to contain the particular kind of air. According to Priestley's description, these same jars are "such as I have generally used for electrical batteries" (I: 8). These would have been electrostatical batteries with which Priestley worked while writing his *History and Present State of Electricity* (1767), a fact that Barbauld in

her "Inventory" of Priestley's laboratory was explicitly aware of. Importantly, instruments in Priestley's estimation are not so specialized as to be exclusively suited to particular scientific tasks. This commitment to simplicity and interchangeability informed Priestley's later aversion to Lavoisier's methods, which, according to Golinski, relied upon an expensive and highly specialized set of scales for weighing gases (137-44). The expense of such apparatuses made them comparatively rarer, ensuring the results obtained from them would be less reproducible; for Priestley, who constructed his entire ethos around producing easily repeatable experiment narratives, this kind of centralized scientific inquiry was anathema, though it would increasingly come to characterize nineteenth-century science (think of the use of large and expensive voltaic piles, for which Institutions like the Royal had to take up costly subscriptions). It's not that Priestley did not or would not classify apparatuses into types according to their usefulness in the moment, but rather that he returned always to the object itself, reconfiguring apparatuses relative to the tasks he needed them to achieve. They were committed to a particular use, functionally classified, only as long as they fulfilled that particular purpose and no longer. At base, jars contain things: electricity as readily as air.

An even more fundamental categorical distinction, and one that would seem to be self-evidently concrete, becomes hazy in Priestley's practice: namely that between apparatus, object and experiment. In other words, for him the distinction between the activity of natural philosophy and the things natural philosophers use and study sometimes breaks down. As I noted in the foregoing section, Barbauld's "Inventory" gestures to the tendency of apparatuses to give way to pamphlets, plays, or "pompous folios." Apparatus becomes experiment becomes social practice. That conceit is more than poetical; it is aptly descriptive. Priestley's own *Observations and Experiments* bears out this transformational tendency, for which his use of mice offers the

clearest example. Mice prove an effective tool for measuring the breathability of air and its degree of corruption (its poisonous character). If the enclosed mice die, the air is bad. The mouse goes from being a living creature to being a ubiquitous apparatus, instrumental to the natural philosopher's much more important work on determining air's breathability. Indeed, he pays the most attention to mice in the midst of section II, subheaded "*An account of the* APPARATUS *with which the following experiments were made*" (I: 6). Priestley intended this section to gather together all descriptions of apparatuses in one place for efficiency's sake (an organizational tactic he repeated in subsequent volumes), and included in that grouping he discusses catching and caring for mice. The impulse to group apparatuses in a devoted section should strike us an attempt at systematic order – they can be isolated from experiments in an effort to make scientific writing tidier, easier to illustrate and follow. And many of Priestley's observations on mice here speak of them according to their function as apparatus, how to catch them, how to keep them alive between experiments, and so on. However, he interrupts such descriptions with the following observation:

> I found, to my great surprize, in the course of these experiments, that mice will live intirely without water; for though I have kept them for three or four months, and have offered them water several times, they would never taste it; and yet they continued in perfect health and vigour. Two or three of them will live very peaceably together in the same vessel, though I had one instance of a mouse tearing another almost in pieces, and when there was plenty of provisions for both of them. (I: 10-11)

Here mice become an object of scrutiny as Priestley's surprise at what seems a curious biological anomaly ("mice will live intirely without water"[22]) gives way to an observation on mouse sociology. The point I want to make is that Priestley interrupts the apparatus section to comment on the nature of mice irrespective of their functional purpose. The apparatus, in this instance, becomes an object upon which to conduct an informal experiment – deprive mice of water, they survive nevertheless. He also draws attention to their potential for irrational and inexplicable acts of violence – that is, a way they exceed their functionality in a horrifying way. At one moment mice are tools, at another, entities that merit investigation of their own. That Priestley makes this shift in spite of the organizational-aspirations of this section suggests, in fact, that such gestures to system can really only ever be that, mere gestures. The inquiry of the natural philosopher roves freely across categories of scientific scrutiny, even his own apparatuses are subject to his investigative acumen. In fact, he himself becomes "the instrument in the hands of divine providence, which makes use of human industry to strike out, and diffuse, that knowledge of the system of nature" (II: ix).

These methodological fluidities align with his broader penchant to think according to analogy in a way that undermines the categorical unity of any given abstraction: things are inherently connected in the world's system, so human system-building is a mere tautology. If the creator's perfection guarantees the world's perfection, then the analogies that natural philosophers discover between things might be more than mere products of the experimenter's fancy. Thus, Priestley notes that flame, mice, and humans require common conditions in order to breathe (if flames may be said to breathe):

[22] Priestley presumes mice live entirely without water because he mistakes the nature of water, not necessarily the nature of mice. Mice take most of their requisite hydration from the food they eat, and Priestley recounts his assiduity in feeding them. Having not isolated the water content in foodstuffs, he doesn't infer that therefore they might be entirely hydrated without drinking perceivably liquid water.

> That candles will burn only a certain time, in a given quantity of air is a fact not better known, than it is that animals can live only a certain time in it; but the cause of the death of the animal is not better known than that of the extinction of flame in the same circumstances; and when once any quantity of air has been rendered noxious by animals breathing in it as long as they could, I do not know that any methods have been discovered of rendering it fit for breathing again. It is evident, however, that there must be some provision in nature for this purpose, as well as for that of rendering the air fit for sustaining flame; for without it the whole mass of the atmosphere would, in time, become unfit for the purpose of animal life; and yet there is no reason to think that it is, at present, at all less fit for respiration than it has ever been. (I: 70)

That the earth has a breathable atmosphere evinces the necessity of a restorative agent across time. Certainly, something of providence lurks in the conviction that "there must be some provision in nature for this purpose," that is, the purpose of making the air capable of sustaining life and combustion. The inevitability of a universal process for restoring airs gains its rhetorical force from the analogy between the flame and the animal. The basic fact that air's respirability can be exhausted for the mouse and the candle alike demonstrates an irrefutable link between the abstractions "life" and "combustion." We accept in the present that oxygen sustains both combustion and organic life, but this would not have been a truism for Priestley. Furthermore, despite understanding in our own time that these phenomena commonly rely upon oxygen, we would distribute the abstractions "life" and "combustion" between separate scientific disciplines: biology and chemistry respectively. Priestley had no oxygen; in fact, these speculations arose as part of the research program that would eventually isolate that gas, which he would call

"dephlogisticated air," a term whose significance I will elucidate below. Suffice to say, he had no conceptual apparatus by which to understand the common ground of life and combustion, nor would he have understood these as epistemologically distinct pursuits. I draw attention to these modern disjunctions in the interest of imparting how alien we should understand this ethereal quality, this epistemological monism, to be from our own experience. After Lavosier and following the second scientific revolution, our sciences have, through institutional developments I account for throughout this dissertation, passed from the gaseous to the solid state.

"Doomed to Flame": Volatile and Virtuous Airs

As I've describes above, Priestley's wandering method produced an ostensibly scientific research program that nevertheless fused theology, philosophy, politics, and experimental data, while also leaving these open to the sorts of critiques and social injunctions that arose out of his connection with Barbauld, Warrington, and the intellectual culture of dissent. His hybridized view of the spiritual and moral significance of certain states of matter is especially alien to modern conceptions of science. In fact, his research program, characterized by what we might call an airy sense of categories, exposes how many of our own presumptions about materiality rely upon an assumption of nested and irreducibly stable categories. Antoine Lavoisier's revolution would transform Priestley's dynamic arrangement, substantively stabilizing chemistry by providing it a systematic form grounded on the relation between a comparatively constant set of elements. Furthermore, modern science, aided by post-Kantian philosophy, adequately extricated empirical from moral truth, scientific from humanistic knowledge, material from ideal, even chemical from biological processes. After Lavoisier, each of these epistemological systems could establish its autonomy and its permanence by invoking a proprietary set of fundaments, the

elements which in combination reduce the overwhelming complexity of the system. And elements, as I've noted, are subject to further categorical delineation: the element may do for chemistry what the phoneme does for linguistics, but culturally we assign different qualities to different sets of irreducibly simple units. Niklas Luhmann speaks to the centrality of elements in the constitution of systems: "The theory of self-referential systems maintains that systems can differentiate only by self-reference, which is to say, only insofar as systems refer to themselves (be this to elements of the same system, to operations of the same system, or to the unity of the same system) in constituting their elements and their elemental operations" (9). This latter differentiation, however, inevitably ends up being tautological – the system determines the element as much as the element the system. An element is not a phoneme only because it is chemical rather than linguistic – considered as fundaments these concepts are identical. We must keep in mind that for Priestley, and even for many of the chemists who followed him, the elemental unit was not a scientific base to be assumed, but rather an object to be experimentally scrutinized, something that could only be isolated through chemical analysis. Even this, for Priestley, seems not to have been an urgent concern until Lavoisier's chemical revolution forced him to account for the increasing centrality of elements in chemical theory.[23] I want to emphasize Priestley's chemistry as one preceding modern elements: his vision of natural philosophy, especially during his early career as an experimentalist, eschews these classificatory designations that signal, for us, the basic units of chemistry's epistemological identity. He practices a version of chemistry that precedes the nineteenth-century mania for classifying simple substances, seeking rather to understand these in states of transition across categories, infusing changes in matter with moral significance. Given this epistemological volatility, the fact that Priestley's

[23] For an explanation of chemistry's evolution from the phlogiston to the oxygen theory of combustion, and of Priestley's reticence to accept the latter, see McEvoy 55-71.

science in fact remains open to the concerns of a discourse of sentimentality, such as those that Barbauld's critiques offer, should be unsurprising. Below, I will emphasize how Priestley radically internalized the kinds of moral preoccupations levied by Barbauld, not merely in his life practice or politics, but in the most basic preoccupations of his chemical matter theory. However, as my subheading suggests, his moral-material hybrids were "doomed to flame"; that is, they would eventually be disaggregated into basic amoral elements by the analytical fervor of modern chemistry, which originated out of cutting-edge research into combustion at the end of the eighteenth century.

In fact, while Priestley's work preceded Lavoisier's articulation of the modern element, and therefore did not draw upon it, he also understood his experiments to be refuting the classical notion of elements in favor of a more dynamic view of matter. When he does invoke the idea of the element, he does so to refute its classical form, associating it with a conceptual stasis anathema to his science's transformative focus. His second volume of *Experiments and Observations on Different Kinds of Airs* opens its section on the discovery of dephlogisticated air by undermining the singular air of four-elements fame:

> There are, I believe, very few maxims in philosophy that have laid firmer hold upon the mind, than that air, meaning atmospherical air (free from various foreign matters, which were always supposed to be dissolved, and intermixed with it) is *a simple elementary substance*, indestructible, and unalterable, at least as much so as water is supposed to be. (II: 30-1)

This is the maxim that Priestley claims his studies have disproven. The passage's considerable qualification throws elementary status in doubt from the outset: the parenthetical emphasizes that "atmospherical air" must already be an improbably pure substance. Before one can even begin to

adjudicate the simplicity of common air, one must manage to free it from "various foreign matters." To embrace the classical elements is to accept a pernicious commitment to viewing substances as fundamentally universal and unchanging in their constituents. The problem with how chemists view elements is that they presume them to be "indestructible" and "unalterable." Even had he not gone so far as to determine common air to be composite, Priestley here suggests that those who hold elementary preoccupations might find themselves blind to the changes that substances undergo. However, the volume announces that Priestley's new hypothesis is "that the atmospherical air is alterable, and therefore that it is not an elementary substance, but a *composition* viz. what this composition is, or *what is the thing that we breathe*, and how is it to be made from its constituent principles" (II: 32-3). Tellingly, Priestley's discovery delegitimizes elementary designation itself – he stops short of offering up new elemental constituents of what once was presumed to be simple. The argument doesn't replace one element with new ones, so much as evade the elementary designation entirely. In this sense, we may fruitfully understand Priestley to be between the classical element and the modern.

In lieu of elements Priestley offers "constituent principles," a distinct term that evokes a fundamental concept characterized by its tendency for transformation, less static than the classical element, and less oriented toward determinate simplicity than the modern. It effectively names a fundament imagined from a quality or a natural process, rather than an empirically verifiable simple substance. Priestley inherited this concept from chemistry's alchemical past, most prominently mediated through the work of Georg Ernst Stahl (1660-1734), whose vitalist science I discuss in the Introduction. Stahl resisted the mechanism of the early eighteenth-century in both its corpuscularian and Newtonian forms.[24] He distinguished between physical

[24] On the one hand, mechanists like Robert Boyle sought to reduce chemical properties to the arrangement of uniform corpuscles (or atoms) – explaining selective reactivity (as in the case with certain acids) by various

aggregates and chemical mixts, maintaining that only in the case of mixtion did multiple substances form a new homogenous form of matter – this division denigrated the theory of mechanists, who believed that matter was inert, as predominately physical, the mere calculation of aggregates inadequate to explain the inborn truth of chemical reaction. Mixtion thus entailed something more than the physical jointure of substances, which had to be recombined in a more profound way: "principles" became the inscrutable substrate remixed during a reaction to create new chemical bodies; they were the sub-substances that allowed a novel chemical whole to be more than the sum of its parts. As Trevor Levere cogently summarizes, during the mid-eighteenth century principles were thought to be "material, [though] they could not be isolated. Most importantly for Stahl, they were the causes of particular properties of chemical bodies, and they conferred those properties on the mixt bodies that contained them as constituents" (*Transforming Matter* 35). However, unlike classical elements or Paracelsian principles, Stahl's principles were not universally distributed among all bodies. Rather, since they were, as John McEvoy puts it, "apprehendable only by their effects" (64) their presence or absence in a mixt could be judged by certain of its attributes. One of the most important of Stahl's principles for Priestley was Phlogiston, his principle of combustion, which all bodies capable of burning or corroding contained, and released into the air during the process of combusting. Once a body had given up all its phlogiston, or the air around it had become too saturated to accept any more, that body would cease to burn. Though phlogiston was at various times, in fact, taken to be a substance, such that multiple chemists including Priestley erroneously sought to isolate it, practically we might describe its typical invocation as the substantiating of a process, or the

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microscopic physical characteristics. For instance, acids contained points which pierced the corpuscles of other substances to form violent unions. Newtonians sought to explain reactions by unperceivable attractive forces, or affinities between substances. On chemical mechanism see Levere, *Transforming Matter* 21-27; Bensaude-Vincent and Stengers 33-38; and Kim 36-47.

nouning of a quality: it identified the material of burning, or a body's burnability. Other principles proliferated, undergirding qualities like fusibility, malleability and acidity.

The idea of principles provided Priestley with a basic unit that remained nevertheless fluid, such that a substance's identification proved inescapably elastic and relative. The shifting designations of the gas we call oxygen during this period illustrate my point. Lavoisier's eventual denomination, "oxygen," adapts a presumably unique characteristic of the element, its above-mentioned role in the formation of acids, to denominate its individual nature. This convention continued, with Humphry Davy eventually naming chlorine on the basis of its green hue. In both cases, the name guarantees an isolated material consistency and stability on the part of these most basic types of matter. By contrast, Priestley's denomination, "dephlogisticated air," names a substance and a state: this is the general air with all of its phlogiston removed, and thus better able to support combustion (in other words, better able to absorb the phlogiston given off by a substance during combustion). The air's purity, that which constitutes its identity, is fleeting, and presumes its own obliteration – dephlogisticated air can and will, no doubt, be reloaded with phlogiston. Substances, in this view, remain radically transformable, a fact which draws upon Priestley's monist commitments. Indeed, the preface to his second volume on *Airs* offers universal transformability up as a potential theoretical implication of the facts in the volume:

> The facts […] will furnish abundant matter to those who are disposed to speculate, and especially on the subject of the mutual convertibility, and ultimate identity, of all the acids when combined with substances in the form of air; but I chuse to wait for more facts, before I deduce any general theory. (II: xvii-xviii)

That this prefaces an explanation for the volume's lack of a closing section of theoretical surmises evinces Priestley's general aversion to system-building. Nevertheless, he suggests that the evidence should invite speculation about the fluidity, even the identity, of acids on the basis of their shared principles.

Ultimately, the element is conceptually unappealing to Priestley because he places emphasis more on processes than on stable substances. For this reason, he discovered the cyclical process whereby vegetation recycles carbon dioxide into oxygen (volume I, 1774) before, in fact, he fixed the identifying moniker of "dephlogisticated air" to what we now call oxygen gas (volume II, 1775). His designation of dephlogisticated air, a nominative determination, comes in the second volume of *Experiments and Observations on Different Kinds of Air*. His tendency to skirt issues of material identification occasioned this delay. He characterizes his discovery of the restorative cycle of air as fortuitous: "I have been so happy, as by accident to have hit upon a method of restoring air, which has been injured by the burning of candles, and to have discovered at least one of the restoratives which nature employs for this purpose. It is *vegetation*" (I: 49). The discovery-as-happenstance motif here accords with Priestley's methodological investment in the preservation of accident and error – his scientific process is open and observational. Importantly, he focuses on the "restoration" not the characterization of air. Certain processes like breathing, or the burning of a candle, "injure" the air: they make it less capable of sustaining life. On the assumption that plants and animals both require and respire "common air," or atmospheric air, he enclosed a mint plant in a jar, only to discover that after several months the air "would neither extinguish a candle, nor was it at all inconvenient to a mouse" (I: 50), which it would be if the plant were respiring in the same fashion as animals. Priestley envisions a continuum of air characterized by its goodness, or breathability, speculating that

vegetation removes phlogiston from the air, "restoring" what the process of respiration had "injured" in first releasing the phlogiston. He meticulously arranges experiments that isolate various processes and tests the capacity of first the mint plant, then other forms of vegetation, to mend the atmosphere: "Finding that candles burn very well in air in which plants had grown a long time, and having some reason to think, that there was something attending vegetation, which restored air that had been injured by respiration I thought it was possible that the same process might also restore the air that had been injured by the burning of candles" (I: 51-2). I draw attention to the centrality of processes in his thought. He investigates changes in matter: injury by respiration, injury by burning, restoration by mint plant, and restoration by other vegetation. He further seeks to determine the role life processes play in these matters by enclosing pruned mint leaves in a jar, investigating whether the whole living plant, or merely the plant's matter, ultimately effects the restoration.

Though Priestley recognizes the cyclical nature of vegetation's capacity to restore the breathability of air, he rhetorically avoids extrapolating that observation into a system. He maintains that "plants, instead of affecting the air in the same manner with animal respiration, reverse the effects of breathing, and tend to keep the atmosphere sweet and wholesome" (I: 86). This reversibility, that vegetable life heals what animal life damages, certainly lends a systematic quality to the world, likewise answering the abovementioned need for some means of "rendering [air] fit for breathing again" on a global scale (I: 70). It would be simple enough to theorize these observations into a stable and totalized "air cycle." However, the disjointed and sometimes repetitive sequencing of his experiment narratives works against such an impulse. The data, along with Priestley's restrained speculations about its meaning, does lend credence to the idea of a cycle, but the glut of description buries such a theoretical observation in the voluminous

industry of constant scientific exploration. The rhetorical effect of Priestley's stylistic commitments is to render natural systems as arising from within a much larger observational mass. They are not theoretical systems by which to divide types of knowledge, or to establish the boundaries of philosophical inquiry; they are accidental, almost momentary, by-products, much like the proto-disciplines that Anna Barbauld locates amidst Priestley's and her own intellectual efforts. When Priestley does acknowledge the "systematic" nature of this cycle for the first time in the volume, he does so in manner conspicuously detached from his own scientific work. He quotes from a letter that Benjamin Franklin had sent to him on the phenomena of vegetable restoration: "That the vegetable creation should restore the air which is spoiled by the animal part of it, looks like a rational system, and seems to be of apiece with the rest" (I: 94). Franklin is the interlocutor who imparts systematic completeness upon Priestley's discovery. On the one hand this speaks to Priestley's own humility, his deference to the philosophical community, even as it spares him from indulging the kind of system-making that his preface abjures. This epistolary citation also evokes the distance between empirical practice and systematic theory as analogous to the spatial distance and national difference between Priestley and Franklin. A letter crosses vast expanses, oceans, to reach its source. Just so, a philosopher crosses a wide gulf to arrive at a complete theory.

Without the stabilizing effects of a systematic organization, Priestley tended to conceive of matter as slipping across categorical distinctions. This epistemological disposition arises most pointedly in Priestley's repeated invocation of the "goodness" of airs – that is to say, his linguistic insinuation that gaseous matter bears moral significance. As Simon Schaffer notes, he "immediately interpreted respirability as goodness" ("Measuring Virtue" 287). This tendency appears throughout the volumes, where "good" air supports life and combustion, and vegetation

can make corrupt air (heavily phlogisticated air) more "virtuous." Priestley interprets the facts of his experiments along a continuum:

> I have been so happy, as by accident to have hit upon a method of restoring air, which has been injured by the burning of candles, and to have discovered at least one of the restoratives which nature employs for this purpose. It is *vegetation*. This restoration of vitiated air, I conjecture, is effected by plants imbibing the phlogistic matter with which it is overloaded by the burning of inflammable bodies. (I: 49-50)

Air unfit for respiration is "vitiated" and in need of "restoration" – this terminology bespeaks not a system of related types, but a trajectory or continuity of material states. Air's incapacity to sustain life results from its corruption from an otherwise purer and more salubrious form. The OED lists "corruption" and "spoilage" as alternative terms for vitiation, and divides the definition between uses pertaining to substances and more abstract usages. The earliest example of a vitiated substance comes in 1620, with the abstract sense of the word coming later in 1660; nevertheless, the eighteenth century features instances of "vitiated passions" and "tastes." My point is that Priestley's use partakes of both registers, eliding the distinction between physical and moral corruption on the basis that airs capable of sustaining life would inherently also perpetuate a moral good. His research into vegetable matter's capacity to restore the air makes this connection more explicit:

> These proofs of a partial restoration of air by plants in a state of vegetation, though in a confined and unnatural situation, cannot but render it highly probable, that the injury which is continually done to the atmosphere by the respiration of such a number of animals, and the putrefaction of such masses of both vegetable

> and animal matter, is, in part at least, repaired by the vegetable creation. And, notwithstanding the prodigious mass of air that is corrupted daily by the above-mentioned causes; yet, if we consider the immense profusion of vegetables upon the face of the earth, growing in places suited to their nature, and consequently at full liberty to exert all their powers, both inhaling and exhaling, it can hardly be thought, but that it may be a sufficient counterbalance to it, and that the remedy is adequate to the evil. (I: 93-4)

As regards airs, vegetable life adequately balances the "evil" of human respiration, that is, its corrupting tendency. On the one hand, this recalls longstanding narratives about the corrupting influence of man on nature, which might seem to find Priestley adopting an uncharacteristically pessimistic position on human nature for someone who, as McEvoy asserts, ascribes to a "theistic view of nature as a deterministic system of benevolence" (57). Thus, key to Priestley's vision of benevolence is the inherent interrelation of plants and animals, society and nature, wherein vegetable respiration corrects animal vitiation. Even more important, however, is that Priestley's experiments make clear that man's corrupting character has been since the beginning counterbalanced by the beauty of God's natural system – the massive evil threatened in the global loss of life that animal respiration must otherwise eventually effect can never come to pass. His science doesn't merely schematize the dimensions of an inert material universe, but rather provides humans the opportunity to recognize universal benevolence as divinely promised and to understand the inherent moral dimensions of natural objects. These experiments therefore fulfill what McEvoy calls Priestley's linking of "the perfectibility and happiness of mankind to the intelligibility of the universe" (56). Far from isolating scientific from moral thought, or nature-oriented from human-oriented knowledge, Priestley affirms their necessary conjunction.

Nor was this moral dimension purely a linguistic conceit: immediate practical improvements and far-flung utopian projects promised to manifest the atmosphere's moral scale. Priestley made much of the moral dimensions of his discovery of nitrous air (what we call nitric oxide), a substance which he noted diminished common air, "or *air fit for respiration*; and, as far as I can judge, from a great number of observations, is at least very nearly, if not exactly, in proportion to [that air's] fitness for this purpose" (I: 115). If nitrous air diminished the quantity of air proportionally to that air's salubriousness, it could be use in experiments to test for the "goodness" of air. According to Schaffer, in Priestley's view "a scale of absorption by nitrous air became a scale of *virtue*" ("Measuring Virtue" 287). This moral linkage may have gained material puissance from the fact that, as Priestley maintained, "the goodness of air may be distinguished much more accurately [by this method] than it can be done by putting mice, or any other animals, to breathe in it" (I: 114-5). Priestley's discovery had immediate material moral significance: as a replacement test for the breathability of gases, nitrous air could stem the tide of the murine massacres he had been perpetuating; in this sense, it both tested for the goodness of other airs and itself created a new species of goodness by saving the lives of mice. One cannot help but think Priestley's view of the air's moral excellence – his certainty that "every person of feeling will rejoice with me in the discovery of *nitrous air*" (I: 73) – arose from his poetic exchange with Anna Barbauld, whose collected poems containing "The Mouse's Petition" appeared in 1773 one year before the publication of Priestley's first volume on airs. This way of conceiving of pneumatic chemistry's moral dimensions subsequently expanded in influence, initiating a trans-European vogue for mapping the "goodness" of airs in diverse geographical locations. Simon Schaffer shows how the practice of Eudiometry developed out of Priestley's research. His nitrous air test further influenced pneumatic chemistry, or the chemistry of airs,

which became increasingly concerned with the medical uses for this differentiated spectrum of virtuous gases. Increasingly chemists in England, France and Italy investigated the effects of different kinds of air on human minds, considering that knowledge alongside samples of air collected widely in Europe and tested for goodness, all in an effort to conceive strategies for more effectively mapping ideal climates and managing human populations by manipulating airs. In this schema, as Schaffer argues, "respirability elided into dephlogistication, dephlogistication into health, health into virtue" ("Measuring Virtue" 288). The material character of an air was inseparable from its moral character.

Priestley's matter theory undergirds the sort of epistemological transformations I highlight in my previous section on Barbauld's early poetry and on the nature of knowledge for late-eighteenth-century dissenters; his volatile and virtuous airs served as one material correlative to the ephemeral proto-disciplines that structured eighteenth-century knowledge. For thinkers who believed that the matter making up the world also bore moral and spiritual valences it must have seemed irresponsibly rigid, even myopic, to declare that certain natural objects must only be studied in a particular way, or according to disciplinarily appropriate terms. Airs, or even more pointedly "principles," filled spaces, pervaded the world; they were not, by conceptual definition, delimited by any particular set of intellectual parameters. When Priestley uses the ubiquity of the principle of phlogiston to suggest that all matter must be intrinsically unified, he reaches towards a universal connectedness. Doubtless, the Barbauld-Aikins family gleaned significant chemical knowledge from Priestley and other dissenting intellectuals: Anna Barbauld and John Aikin's co-written primer for children, *Evenings at Home,* is littered with instances of scientific knowledge imparted through naturalistic and everyday observation by a sagacious tutor to inquisitive young children. Like "The Mouse's Petition" and the "Inventory of Dr. Priestley's

Study," it passes easily between scientific and moral truths, arranging a series of short dialogues or narrative vignettes, each with a moral or educational significance, into thirty evenings worth of readings (parents were to read a section's lessons one evening at a time). It was precisely this fluid transmissibility among scientific and more properly literary techniques that undergirds Charles Lamb's famous, and bitter, excoriation of Barbauld's pedagogical efforts, in a letter to Coleridge of 23 October 1802:

> Mrs. Barbauld['s] stuff has banished all the old classics of the nursery … Knowledge insignificant & vapid as Mrs. B's books convey, it seems, must come to a child in the *shape of knowledge*, & his empty noddle must be turned with conceit of his own powers, when he has learnt, that a Horse is an Animal, & Billy is better than a Horse, & such like: instead of that beautiful Interest in wild tales, which made the child a man, while all the time he suspected himself to be no bigger than a child. Science has succeeded to Poetry no less in the little walks of Children than with Men. –: Is there no possibility of averting this sore evil? Think what you would have been now, if instead of being fed with Tales and old wives fables in childhood, you had been crammed with Geography & Natural History.? **Damn them**. I mean the cursed Barbauld Crew, those **Blights & Blasts** of all that is **Human** in man & child. (81-82)

Lamb accuses Barbauld of scientific didacticism because by 1802 he has internalized the dichotomy between the sciences and imaginative literature. What is best suited to occasion a child's moral education, in his view, is the fairy or folk tale. This bias towards fanciful children's literature renders Lamb incapable of valuing the easy transitions between otherwise unrelated topics and types of knowledge in the pedagogical prose of the Barbauld-Aikin circle. But this is,

in a sense, a cultural misrecognition: where Barbauld recognized in the sciences possibilities for future growth, Lamb perceived a disciplinary threat.

Analogous structures to Priestley's airs appear in some of the vignettes in Barbauld's text: matter aligns along developmental trajectories inflected by judgments of value not explicitly scientific. For instance, in the second of two lessons on the subject of "Metals" a tutor converses with two of his charges about the methods for recognizing and classifying different metals. He draws attention to the relationship between iron and steel: "Steel, again, is made by heating small bars of iron with woodashes, charcoal, bone and horn shavings, or other inflammable matters, by which it acquires a finer grain and more compact texture, and becomes harder and more elastic. […] Steel is iron in its more perfect state" (Barbauld and Aikin 4: 131). Steel exists in a teleological relationship to iron – the substance becomes more perfect as it transforms. A theoretical view focused on simple substances would treat the forging of steel as a process of adding or subtracting substances: iron's improvement would be conceived in terms of the distinct types of matter either lost or gained in the production of steel. By contrast, this pre-elemental view posits steel as the "perfection" of iron – at issue is the process of change, not the constituent simple substances. The first dialogue on metals provides a definition of "perfect metals," asserting "gold and silver are both *perfect metals*, that is, indestructible in the fire. Other metals, if kept a considerable time in the fire, change by degrees into a powdery or scaly matter, called a calx" (4: 36). "Perfect" therefore bears announced chemical significance – it denotes a metal that does not form what we would call an oxide when heated. At the same time, steel's status as "iron in its more perfect state" suggests an improving transformation, a development towards a pure or flawless form. These two senses of the word exist in solution, and the latter signification especially recalls the scale of "virtue" that ordered Priestley's airs. In particular, "perfection"

seems to denote something other than chemical purity when the discussants agree that steel is more valuable than gold, and proceed to enumerate its uses (Barbauld and Aikin 4: 133). Here, increased "perfection" designates the metal's ultimate arrival at a state of greatest usefulness to mankind, not its failure to form a calx. What's more, the tutor notes in the earlier dialogue that "Gold almost all the world over is first got by slaves, and it makes slaves of those who possess much of it" (4: 43). Gold's capacity to inspire greed, to enslave humans, in spite its status as the definition of a *chemically* perfect metal, makes it socially destructive, and decreases its value, in the tutor's eyes, relative to steel.

I want to draw two ideas from this paradox of perfection: first, Barbauld has included a moral judgment in a dialogue otherwise explicitly invested in naming and describing types of metals and their characteristics, and second, and more important, this moral resonance overlays and shares a designating term with that describing a chemical state. Gold is a chemically perfect metal, but steel is more perfect than perfect because it so widely improves human life and bears none of the enthralling appeal of the more precious metal. These intertwined observations reflect the epistemological dynamism of the period before chemistry's elaboration of the modern element. The shifting terrain of knowledge that intermixed the natural and the moral, the material and the spiritual – a terrain resting conceptually on abstract "principles" and airs – would, in tandem with the element's elaboration, soon begin fracturing into the modern disciplines we recognize today.

"Born of the Air": at the Onset of Elements

From our vantage it's worth recognizing that the element itself was, in Barbauld's words, "born of the air." The Pneumatic Chemistry of the late eighteenth century rendered the gaseous

state available to chemical scrutiny, in turn allowing chemists to consider the kinds of continuities that might persist across changes in the states of matter. Once chemists like Joseph Black, William Cavendish and Joseph Priestley had undermined the singular air of classical metaphysics – effectively one of the last remaining antique elements that retained philosophical significance – chemistry could reconsider a whole host of its theretofore unquestioned premises. Lavoisier could relocate, for instance, the fuel of combustion from the solid or liquid substance to the air, and more precisely to oxygen. In fact, as Kim shows, Lavoisier modernized the element in the 1770s and 80s out of an older Stahlian view that retained the elements as "instruments" – that is, primary agents that facilitated the passage from a mechanist aggregate, to a more chemically compound mixt, vitally infused through the medial powers of fire, water (in solution), or air.[25] In this sense, in his earliest chemical research Lavoisier worked from premises he, in fact, shared with Priestley, who was, as I've noted above, also influenced by Stahl's work; however, Kim asserts that Lavoisier's "obsessive pursuit of elements betrays him as an outsider to the contemporary practice of chemistry" (289). The French chemical establishment in the mid-century, like Priestley, found classical element theories intractable to the particularities of their concrete research programs. It was Lavoisier's research into the gaseous state that prompted him to reconsider and eventually reject (at least in part) his classical and Stahlian inheritance on the subject of elements: "he had to make a fundamental transition […] in his understanding of the elements. Air became airs. The instrument air became multiple chemical species. It took years for Lavoisier to work out the consequences of this transition, which forced him to accept the analytic ideal of chemical elements" (Kim 324).

[25] See Kim 279-334. On elements as "instruments," see Bensaude-Vincent and Stengers 57-63.

In fact, what makes Lavoisier's element so distinct from previous iterations, as I've noted, is its explicitly disciplinary character. As "the last point which analysis is capable of reaching" the element quite literally marks a disciplinary endpoint – the elements collectively mark out a coherent boundary. "Analysis," here, signifies a particularly chemical practice, the decomposition of substances. And it presumes specific instruments: the burning glass, finely tuned scales, glassware, eventually the voltaic battery. One cannot speak of this element accidentally; it does not exist freely in nature. This element pertains exclusively to the body of knowledge that scrutinizes it: it is recognizable only within the network of nomenclature, practices and instruments that constitute "chemistry," and it functions as the conceptual unit that gives that discipline clarity and a consistent object. This chemical element is exclusively chemical; and though attending to it from outside that discipline is certainly possible, doing so entails capitulating to the discipline's theoretical structure.

The absolute refocusing on simple substances as revealed through fire, solution, or the force of electricity metaphorically hardens these simple substances, makes them impenetrable to moral, historical or imaginative concerns. Here we reach what I would call the solid state of chemistry. The discipline the elements sustained could not help but be affected by this change, though it would be overstating the case to argue that chemistry became entirely hermetically sealed from other epistemological concerns. As I noted in the introduction, Lavoisier sought to protect his science from the disorder of the imagination, and Priestley's roving inquisitiveness must have looked like a detriment in this view. My point, here, is that the modern element served, by its very conceptual constitution, to press chemistry towards enclosure, foreclosing the possibility of the kinds of radical transformations and improbable conjunctions between epistemological modes possible in Priestley's theory and pervasive in late eighteenth-century

conceptions of knowledge. The element conceived in this way arranged a new form of chemistry more oriented towards epistemological coherence and self-articulation. In turn, such a transition – because it modeled the process by which what had been often conceived as an incomplete or artisanal form of knowledge became first a "systematic art," and then a science – offered a pattern for disciplinary formation to other bodies of knowledge. Increasingly, systemic orders of natural philosophical knowledge articulated their contours by fixing their "elements." Though rationalist and mathematical disciplines had had access to such a systematic ordering concept since Euclid's *Elements of Geometry*, what was different about modern chemistry was precisely its scientific/artisanal fusion.[26] For the first time, these provisional, various, disciplinarily-determined elements were also material – and a partially-practical, newly ordained science had designated them while simultaneously determining itself. Thus the concept offered a means to theorize disciplinary closure applicable well beyond the theoretical territory of chemistry itself, though it threatened likewise to alienate the forms of knowledge it helped to concretize.

We can see this alienation at work in major formulations of Romantic poetics during the early nineteenth century. Indeed, no less central a critical statement than the preface to *Lyrical Ballads* (1802) imagines a growing divide between the respective work of science and poetry. Wordsworth does not entirely decouple poetry from science; we do well to remember that this was a transitional period, and thinkers on both sides of the divide – humanists and scientists alike – still maintained an active attachment to the interconnectedness of the Republic of Letters. In comparing these two sorts of practitioners, Wordsworth opens with a conciliatory gambit: "The knowledge both of the Poet and the Man of Science is pleasure" ("Appendix A: Additions" 423).

[26] Chaouli characterizes this fusion, arguing that eighteenth-century chemists "struggle[d] with a choice not merely ... between two *scientific* paradigms, but also between two paradigms belonging to entirely incompatible orders, one technical (artisanal, artistic), the other scientific" (98).

This is the common pleasure in attaining new knowledge. The difference lies in the use to which that pleasure is put. The knowledge of the man of science "is a personal and individual acquisition, slow to come to us, and by no habitual and direct sympathy connecting us with our fellow-beings. The Man of Science seeks truth as a remote and unknown benefactor; he cherishes and lives it in his solitude" ("Appendix A: Additions" 423). This characterization emphasizes the sciences' alienation from general human pursuits. The man of science, in his philosophical exertions, withdraws from society as he focuses himself increasingly on the "acquisition" of specialized knowledge. By contrast, the poet, whose task involves an immediate relationship with the natural world and other humans,

> is a man speaking to men: a man, it is true, endued with more lively sensibility, more enthusiasm and tenderness, who has a greater knowledge of human nature, and a more comprehensive soul, than are supposed to be common among mankind; a man pleased with his own passions and volitions, and who rejoices more than other men in the spirit of life that is in him; delighting to contemplate similar volitions and passions as manifested in the goings on of the Universe, and habitually impelled to create them where he does not find them. ("Appendix A: Additions" 420)

The poet here is described in terms of his intrinsic connection with the universe: he recognizes the analogous presence of "passions and volitions" both within himself and in the broader universe. In this sense, the highly attuned senses of the poet, according to Wordsworth, investigate the cosmos's basic workings, much as does the specialized scrutiny of the man of science. The major difference is that the scientist's view is mediated by conceptual and technological apparatuses that stand between himself and the world. The poet, by contrast,

observes the motion of the universe, and also reflects upon how what is true in nature's inner workings is also true in himself – thus the poet's work is connective or synthetic, while the man of science's is divisive or analytical. Wordsworth's explicit exemplars of the man of science are "the Chemist and Mathematician" ("Appendix A: Additions" 422). He almost certainly has in mind Humphry Davy and Isaac Newton, English progenitors for their respective scientific fields. In this regard, Wordsworth's critique of the sciences rests on their increasingly disciplinary character: they use proprietary apparatuses, exclusive societies, and specialized nomenclatures to render their pursuits apart from the generality of human experience.

Wordsworth's assertion that the knowledge of the poet "cleaves to us as a necessary part of our existence, our natural and unalienable inheritance" ("Appendix A: Additions" 423) dovetails with his larger characterization of *Lyrical Ballads* as "an experiment…to ascertain, how far, by fitting to metrical arrangement a selection of the real language of men in a state of vivid sensation, that sort of pleasure and that quantity of pleasure may be imparted, which a poet may rationally endeavour to impart" ("Preface" 171). His association of poetry with feelings mirrors Barbauld's commitment to literary pursuits as maintaining affable sociability, as I've descried above, with one key difference: for Wordsworth, that distinction is a hard one, encoded in these separate practices as a matter of method. The poet and scientists perform different sorts of work; they may collaborate, but they are epistemologically isolated from one another. What's more, committed as he is to the "real language of men" Wordsworth would have been fundamentally opposed to the increasingly exclusive nomenclatures of the sciences, a point which Robin Valenza makes in *Literature, Language, and the Rise of the Intellectual Disciplines in Britain, 1680-1820*.[27] Nevertheless, I would argue that his is a disciplinary claim, insomuch as

[27] On Wordsworth's relationship to the specialized nomenclatures of scientific disciplines see Valenza 139-72.

it contends for the exceptional legitimacy of his method of inquiring into nature, ultimately positing poetry as an ur-pursuit among the disciplines: "Poetry is the breath and finer spirit of all knowledge; it is the impassioned expression which is in the countenance of all Science" ("Appendix A: Additions" 423). He characterizes poetic production by its universal language and appeal – defining it explicitly as adisciplinary. Poetry offers a substratum that synthesizes all other scientific pursuits. Implicitly, though, he frames this characterization within a juxtaposition to the sciences, rendering this universality a characteristic unique to poetic production. In this regard, Wordsworth internalizes interdisciplinarity as a fundamental component of literary pursuits. As we will see Coleridge do in Chapter Two, Wordsworth puts interdisciplinary breadth at the heart of his definition of poetic activity.

Poets, in this instance Wordsworth and Coleridge, but as we will see in chapter three Keats as well, accepted the logic of disciplinary division, even as they struggled against it. What's more, they accentuated another legacy of the element's quantifying imperative: they relieved the sciences of any obligation to engage in moral inquiry as a fundamental part of their intellectual pursuits. Wordsworth distributes feeling and human connection to poets, seeming to designate them the arbiters of social interaction and moral responsibility. By contrast, scientists, in the insular and technical nature of their professional pursuits, need not immediately account for the moral content of their research and experimentation. Wordsworth did hold out hope for the possibility of a reconciliation of these diverging pursuits:

> If the labours of men of Science should ever create any material revolution, direct or indirect, in our condition, and in the impressions which we habitually receive, the Poet will sleep then no more than at present, but he will be ready to follow the steps of the man of Science, not only in those general indirect effects, but he will

> be at his side, carrying sensation into the midst of the objects of the Science itself. ("Appendix A: Additions" 423)

Reconciliation of the disciplines will not involve effacing them – the logic of intellectual specialization will persist, as the separate poet "will be ready to follow" the man of science, bringing his particular expertise to bear upon scientific research. The degree to which this cooperation is conditional – men of science may never "create any material revolution…in our condition" – emphasizes the competitive nature of the two pursuits in Wordsworth's mind. Finishing the 1802 preface, one tends to believe Wordsworth doubts the sciences will ever prove as fundamentally necessary as poetry. Priestley, by contrast, and also Anna Barbauld, as we saw in "To the Baron de Stonne," took for granted that "the objects of the Science itself" were already imbricated with "sensation" and more importantly with sensibility and sociability.

Wordsworth's prophetic orientation to a future disciplinary cooperation was not uncommon during the period, as my subsequent chapters will show. Indeed, as I demonstrate in Chapter Four, even Humphry Davy, professionally and predominately a chemist, dreamed of a future beyond disciplines. Returning to Barbauld's *Eighteen Hundred and Eleven*, we can see this poem, published in 1812 significantly later than her poems to the Priestleys and after Lavoisier's revolution, mourning the syncretic intellectual intermixture of the English Republic of Letters, yet accepting the logic of discrete territories of knowledge. Barbauld displaces this awareness of division onto a narrative about the westward passage of artistic, scientific, and commercial genius. As the poem closes, she laments "to other climes the Genius soars" (321). Division between nations in respect to knowledge serves as a proxy for divisions within knowledge; Barbauld's poem insinuates that the territorial logic of division has led to the intellectual and social poverty of the present moment. Though this realization is, for her, a dire

one, it is coupled with a persistent hope that the future will see the obliteration of such boundaries. We must read in this light her desire that Americans will one day "Join with their Franklin, Priestley's injured name, / Whom, then, each continent shall proudly claim" (203-4). This prophesy offers a prescription for healing national differences by bridging epistemological ones. Priestley, the enlightenment polymath who blended literature, science, religion and politics, waits for Barbauld at the other end of history, presiding over a world in which the analytical impulse will have given way to a new unified vision.

Chapter Two

The Romantic-Era Lecture: Dividing and Reuniting the Arts and Sciences[28]

Humphry Davy's 1806 Bakerian lecture showcased the voltaic battery's power to manipulate the universe's most fundamental matter; his demonstrations thrilled London's fashionable elite, who flocked to see the charismatic genius discoverer of potassium and sodium ushering in a new world of chemistry. To Thomas Frognall Dibdin, Davy was "the mighty magician of nature," and his "immense" battery, "so many huge cubical links of wood and metal, forming a vast mysterious chain, and giving the whole a sort of picturesque and marvelous character," evaded understanding but evoked the primal links of creation (Dibdin 226). The public spectacle of the science lecture – with its celebrities, high fashion and clogged thoroughfares – produced the furor of "a noon-day opera house" (226). The energy greeting Davy's lectures stemmed from an unfolding epistemological drama that still affects us, in which public institutions like the Royal Institution consolidated knowledge through newly configured scientific disciplines – the most prominent among them chemistry, characterized by Bensaude-Vincent and Stengers as "the very image of an exemplary science, a model of positivity" (93). Part of this narrative involves, of course, the separation of these new sciences from branches of knowledge we now call humanistic. However, Davy's incredibly popular lecture series provided audiences with a model of something far more novel: a discipline, rising from scattered work in natural philosophy and the ruins of the eighteenth-century republic of letters.

Part of the new chemistry's attraction was its fundamental terms, which, as I've discussed, increasingly structured chemical practice and public awareness of that discipline. The

subsequent discovery of more elemental substances promised to expand and stabilize the system of chemistry, leading the *Edinburgh Review* to call Davy's 1808 lecture, in which he recounted discovering Potassium and Sodium, "the most valuable in the Philosophical Transactions, since the time when Sir Isaac Newton inserted […] the first account of his optical discoveries" ("The Bakerian Lecture" 394). To isolate an element was to fix a volatile piece of the universe and make it visible to genteel viewers; Davy's experiments brought with them the promise of charting a whole world of ordered parts that, through combination, comprised existence. Here, finally, was a science of matter conceptually legible and seemingly simple, and audiences clamored for it because it presented a compelling model for what all fields of knowledge should be: coherent, reducible, and elegantly networked.

The incredible popularity of Davy's lectures alone would have made them a model for other lecturers regardless of discipline, but to literary orators like Coleridge and Hazlitt, chemistry's tidy system presented an especial problem. Chemists commanded a large share of the knowledge economy's financial resources; their model pressed adjacent subjects, including poetry and literary criticism, to articulate their disciplinary character according to similar structural tactics. The focus on elements that Davy had inherited from Lavoisier made nomenclature reform and stabilization central to establishing the field's coherence. During the first half of the nineteenth century the discipline of chemistry overwhelmingly focused on calculating elemental proportions in compound substances.[29] Repeating the names of elements in lectures and articulating common practices in printed reports regularized the objects of chemical scrutiny, allowing for what Daston and Galison call "collective empiricism" (22). Of course, disputes arose, especially surrounding the "elementary" status of certain substances,[30] but for the

[29] See Bensaude-Vincent and Stengers 104-126.
[30] On the chlorine controversy see Golinski, *Science as Public Culture* 218-35. See also Chapter Four.

most part chemists agreed to settle – and only carefully to expand – the list of simple constituents. By contrast, literary-critical lecturers often sought to establish terminological precedents, but neglected to adopt terms as consistently as chemists. For instance, William Hazlitt's lectures on Shakespeare focus on identifying and relating the plays' characters, rendering them the "elements" of Shakespeare, so to speak – but this emphasis is at odds with Coleridge's chaotic mix of linguistic analysis, philosophical aspiration and cultural invective. Literary lecturers' preoccupations remained largely idiosyncratic. English poets and critics as a group never adopted concepts with the pervasive nomenclatural consistency of scientists.

During the early nineteenth century, then, the public lecture trained London audiences to expect that knowledge would be imparted in the form of discrete disciplines, even while its theatricality and improvisational potential allowed exceptional lecturers to push, sometimes traverse, and even flout those fields' boundaries from behind the lectern. Select lecturers across the spectrum of fields drew upon figural language to remake disciplinary boundaries, often undermining the systematizing effects of stabilized nomenclatures: to differing degrees, poets and scientists alike adopted this tactic as the special purview of the genius. In this way, the lecture form divided and reconciled types of knowledge simultaneously. Literary critics and historians of science alike have attested that modern disciplines were not so firmly established during the eighteenth and early-nineteenth centuries as they are now, but the narrative of that transformation remains incomplete.[31] Jon Klancher's *Transfiguring the Arts and Sciences* argues that the Romantic era's newly-formed arts and sciences Institutions managed this

[31] Considering the nineteenth century, Jon Klancher describes the work of the institutional administrator, who arranged knowledge into separate disciplines characteristically divided between "the Arts and Sciences" (51-84). Furthermore, Jenkins identifies a similar process of division in what she calls "the twin pulls toward spread and containment of information" (7). On the period's ambivalence to disciplined science see Jenkins 80-112.

epistemological fissuring. In it he describes the "multidisciplinary" character of the Royal Institution:

> We cannot say that the Royal Institution was […] actually leveling hierarchies of expertise and craft, fine art and practical arts in the London public world […] it was often putting such topics together precisely to widen the conceptual distance between them. (76).

Klancher highlights an important aspect of the period's knowledge economy: the presentation to the public of multiple types of knowledge within the shared space of the London Institutions emphasized the contiguity and permeability of these fields, yet very real administrative, economic, and conceptual factors increasingly structured these divisions, widening the distance between these precursors to our modern disciplines.

In one way, this chapter continues Klancher's project of mapping the growth of nineteenth-century disciplines by focusing closely on several features of the London lecture circuit that vested them with increased psychic, institutional and practical significance. Yet it departs from Klancher's predominately sociohistorical focus to bridge a divide in contemporary thinking about Romantic-era discipline formation, one between scholars who locate the reality of disciplines in the complex of social practices surrounding the London Institutions and those who find it in the development of specialized nomenclatures. On the one hand, Klancher primarily emphasizes the capacity of institutions to vest divisions in knowledge with ontological status, and on the other, Robin Valenza posits disciplines as most immediately a product of linguistic specialization. In what follows I demonstrate that adequately describing the transformations knowledge underwent as it became disciplined entails linking social and material circumstances to rhetorical exercise: concepts, like the element, acted within both institutional and

nomenclatural contexts, they transformed simultaneously along sociohistorical and rhetorical lines. So professional chemists argued for the coherence of their practice by ordering its elements into tidy systems, and the acoustics of the lecture hall amplified their pronouncements. Indeed, the more chemical polemics produced high-profile disputes about the elements, the more the Institutions invested in intensifying the cultural force of chemistry's elemental logic. Even so, regardless of the economic priority that accrued to chemistry in the name of its pursuit of elements, those same simple substances remained partially rhetorical. For that reason, Coleridge could mount his resistance to the epistemological enclosure of disciplines by undertaking a literary-critical deconstruction of the element, and by extension a deconstruction of disciplines.

Following this trajectory, my own chapter begins in the archive to make historical arguments about the material grounds of a systematized chemistry, but ends with language's capacity to undermine such systems. I show that certain (especially financial) aspects of the Institutional structure consolidated fields by amplifying and proliferating the concept of the element as a basic unit of disciplinarity. I focus on lectures by Humphry Davy, William Brande, and Samuel Taylor Coleridge, placing them amidst the milieu of the nineteenth-century lecture circuit. The field of chemistry's priority in the distribution of institutional resources and its prominence in the lecture schedule afforded its concepts – elements – a special significance as uniquely suited to organizing and rationalizing what had been previously conceived as an artisanal rather than a scientific pursuit. As I've noted, the discipline's apparent success made it a model intellectual system. Poets and critics responded with ambivalence: they sought to assert the disciplinary autonomy of literary criticism and historicism, while simultaneously reaching beyond the limits of that field, establishing in humanistic inquiry an inchoate hostility to disciplinary closure. I look particularly closely at Samuel Taylor Coleridge's London lectures as

exemplary: rather than ground literary criticism on a set of elements, he idealized chemical processes, developing a method that allowed him to break systems of knowledge into their constituent principles. Coleridge extrapolated and abstracted out of chemistry something I call "elementality;" this is the abstract connective power at the heart of the element, the idea of an intrinsic link between a system of knowledge and its material and conceptual components. Coleridge embraced the idea and the force of the element, but discarded the structuring capacity of elements, keen as he was to avoid setting disciplinary limits. As a result, in his lectures, whose nature as aesthetic experiments I discuss in my penultimate section, Coleridge analyzed intellectual systems into their constituents, producing lectures that crossed disciplinary boundaries. Taking this tendency in view, our own era's interdisciplinary aspirations don't so much constitute a radically novel practice, as they recapitulate a longstanding theme in literary criticism. When authors or literary critics turn deliberately to other disciplines such as history, philosophy, science studies or sociology they undertake a practice that has been characteristic of literary criticism from its earliest moments of inclusion into the regime of modern disciplinarity.

Lectures Forming Disciplines

Romantic-era lecturers addressed a bevy of intellectual pursuits newly and increasingly characterized by discursive consistency and intellectual specialization. Scholars acknowledge that today's disciplines would have either been absent or unrecognizable during the period between 1770 and 1850, a transformational epoch whose widespread epistemological tumult has earned it the designation, the "second scientific revolution." Luisa Calé and Adriana Craciun have pointed to the "possibilities of disorder" during the preceding eighteenth century, inviting scholars to consider the fruitful intermixtures achievable before the formation of modern

disciplines (1). Golinski describes the century's turn as a time "in which new scientific disciplines such as geology, biology, and physiology were founded and existing ones (especially physics and chemistry) dramatically reconfigured," and he notes that "the boundaries of distinct disciplines became a more entrenched feature of the production of knowledge, embodied in the constitution of university departments and institutes, in specialized scientific societies, and in new journals" (*Making Natural Knowledge* 67). That the disciplines gained coherence and organizational legitimacy during the early decades of nineteenth century is a matter of critical consensus.

This development, however, proved to be neither continuous nor coherent: disciplines coalesced at different times, each the subject of unique social forces and asynchronous developments in nomenclature and agreed-upon practices. As Valenza notes, for instance, the process by which Chemistry became systematic reached a kind of apex in the 1770s and 80s, significantly later than for Physics (which experienced a more rapid shift following the publication of Newton's *Principia*). Indeed, the process of chemical modernization would not be complete until the advent of organic chemistry, a "temporally and geographically" "diffuse" process that emerged "from a gradual accumulation of knowledge across western Europe over the nineteenth century" (Valenza 8).[32] It is not enough, then, to posit a tidy epistemic shift to disciplinarity. Valenza makes clear that the forces that would lead to disciplinarity during the nineteenth century had a long gestation through the eighteenth: divisions in knowledge between "manual and mental labor", "experts and lay persons," and "different fields" had already manifested during the eighteenth century (15). Indeed, she demonstrates that David Hume, Adam Smith, and Adam Ferguson all assented to the necessity of specialized knowledge; the human

[32] On the development of a specialized Newtonian language for Physics, see Valenza 54-91.

mind, they agreed, displayed a constitutional predilection to deeply knowing a narrow slice of the period's intellectual terrain (11-16). This understanding replaced a Baconian view predicated on a more expansive and ranging view of knowledge. Valenza's research demonstrates that the mental habits of enlightenment thinkers had already created the epistemological grounds for disciplines; it remains for scholars now to build from this a comprehensive account of the material and social forces that concretized those predilections into the stable structures of disciplines.

I argue that the lecture series of the Arts and Sciences Institutions, in their basic financial arrangement, played a special role in materially elucidating and enforcing the divisions between disciplines during the early nineteenth century. I am in accord with Klancher's view that the London Institutions managed the epistemological shift to the "Arts and Sciences" paradigm, but I assign greater responsibility to the lecture series themselves for training the public to recognize disciplinary divisions. In what follows I offer pointed scrutiny of the administrative practices involved in arranging the lectures that fixed these epistemological divisions. The Royal's earliest Visitors' Reports (the annual administrative reviews undertaken by a special committee) list its total expenditures on lecturers and professors without recording individual salaries. However, starting in 1811 they record for the first time the stipend paid to each lecturer and professor – identifying these disbursements not by the speaker's name, but by the lecture topic (most often a disciplinary designation). Though the Visitors paid little to no heed at the outset to the Royal's lecture expenses, they came to understand those expenditures in disciplinary terms. The Institution's managers were defining protocols for popularizing scientific and artistic knowledge, and part of that administrative learning curve entailed distinguishing knowledge into types based on cost-effectiveness.

The elite audiences flocking to the London Institutions to consume popular science embraced and proliferated knowledge's new schematic. The series arranged by the major Institutions drew fashionable upper-class audiences, leading Thomas Carlyle to call the Royal Institution, for instance, a "kind of sublime *Mechanic's Institute* for the upper classes" (qtd. in Foote 7). People of diverse ages and professions – not just practicing scientists or specialists – comprised the audiences, which were more or less equally divided along gender lines.[33] Institutional lecture series promised to be exclusive high society events – the proprietors admitted only subscribers to the Institution with their guests; they sold no tickets for individual lectures to the public at large. Exclusivity legitimized the Institutions' production of knowledge. In fact, as Golinski notes, Davy himself would draw on this popular-specialist fusion, appealing "to his public audiences to adjudicate questions that were in dispute between specialist chemists" (*Science as Public Culture* 189). Furthermore, the different Institutions attracted subscribers of different ideological predilections. According to Jon Klancher, the London Institution catered to the interests of the newly wealthy commercial class; the Surrey Institution drew middle-class Quakers and eventually cultivated a reputation for radical dissent among the conservative press; the Russell Institution displayed a cooler temperament, and came to be known as the most historically- and literarily-minded of the four major arts and sciences Institutions.[34] These institutions dispersed knowledge, reorganized into types, to the genteel educated class. They publicized the fruits of the lecturers' research, but also staked boundaries for different species of knowledge.

Increasingly, institutional administrators sought to arrange humanistic lecture series deliberately as supplements to their scientific main events – the less specialized discourse of the

[33] On the diversity of the Royal Institution's audience see Foote 6-12 and Golinski 188-203.
[34] See Klancher 64-72.

arts seemed attuned to drawing the widest possible audiences. Considering the growth of scientific societies with secondary literary investments, nineteenth-century chemist John Dalton described a difference in the capacities of "Science" and "Literature" to draw public attention: he speculated in an 1824 paper read before the Philosophical Society of Manchester that "Probably it was thought that this Town being a commercial & manufacturing one, there would not be a chance of collecting a society of sufficient magnitude to perpetuate itself, without adjoining to *Science* some collate[ral] subject; & *Literature* was very properly judged to be of this description" ("On the associations" 9). Here he acknowledges how spectator enthusiasm, which administrators measured in subscriber rolls, reinforces disciplinary distinctness: different types of knowledge draw audiences of different sizes. He was right. Public Institutions' consistently precarious finances forced administrators to distinguish knowledge into types, attending to which most piqued public curiosity. For example, an administrative report for the Royal Institution, reviewing the year's expenses for 1814, recommended

> that the revival of a Course of Lectures on Music during the present season […] may be advisable; those heretofore delivered having been very favourably received; the revival, consequently may induce the attendance of an additional number of ladies, and may increase the list of those who have so liberally aided the Institution by their Donations. ("Annual Report of the Visitors" 40th bound item[35])

Categorically designated knowledge helped the Royal's administrators draw larger audiences to Albemarle Street. Lectures on the arts attracted spectators yearning to exercise "taste," as distinct from science's sometimes alienating specialized discourse.

[35] Subsequent Visitors' Reports referred to throughout this chapter are bound together in this document.

Institutions also paid more for genius, accompanied as it so often proved to be by deft showmanship, thus internalizing one of the period's predominant cultural preoccupations, the cult of the genius, at the heart of their administrative practice. The Royal Institution maintained several professors – Davy was one from 1802-1812. Paid more than lecturers, professors produced original research in the laboratory and remained contracted for years at a time. While at various times supporting multiple professors in experimental disciplines, the Royal never employed a long-term professor of arts. This fact illuminates the Institution's arrangement of knowledge – at a very basic level it committed to producing only new scientific knowledge on a grand scale; administrators selected other lecturers seasonally, seeking to fill out subscriber rolls. As I pointed out above, humanistic or artistic knowledge often supplemented science. Likewise, Institutional administrators codified basic divisions within science by cost, including valuing genius in financial terms. According to the Annual Reports of the Visitors, the Royal paid Davy £500 per year in 1810, reduced to £400 in 1811. After he stepped down in 1812, the Institution did not immediately appoint a new professor of Chemistry until 1814, when William Brande took the position at £200 per year. The £200 reduction between Davy's and Brande's stipends is symptomatic of the era's preoccupation with genius as a structural component in scientific culture – as a technician, the latter earned less. Simon Schaffer argues that early nineteenth-century science saw disciplines forming based on the dyad between the genius and the practical scientist: in essence, geniuses innovated, elaborating new scientific theories and discoveries, which practical philosophers applied and ratified.[36]

My point is that even within this schema of the prodigy versus the predictable thinker the repetition of concepts inherent in the work of practical philosophers elaborated and stabilized the

[36] On this point see Schaffer, "Genius in Romantic Natural Philosophy" 82-98.

boundaries of any given discipline, though Institutions still remunerated so-called genius more generously. William Brande, who made his name in medical chemistry and pedagogy, and whom Davy characterized as "a 'mercenary' who had 'come from the counter' and 'had no lofty views,'" was broadly known as a practical chemist, not a genius (qtd. in Morus 15). This division likewise inflected the genre of scientific lecture a practitioner would offer: genius's prerogative was the innovative lecture, pushing existing disciplinary boundaries or establishing new ones, while the practical philosopher's was the terminological review, a consolidating genre.

The Element's Centrality in Chemistry's Lecture Genres

Chemistry's model of disciplinary consolidation depended upon Lavoisier's new elements. The period's chemists very carefully sought to distance their newly empirical element from the "fanciful" concept of classical metaphysics, a task as imperative for Davy as it had been for Joseph Priestley. So Davy undertook in his popular Agricultural Lectures – even though they predominantly focused on practical chemistry – a deconstruction of the classical elements: by surveying opinions of classical and historical natural philosophers on their importance, and subsequently citing contemporary chemists who had demonstrated that these one-time presumed simple substances were, in fact, composite, he demonstrated that air and water could not be elements.

Davy meticulously characterized the revised concept of the element at modern chemistry's center: "By methods of analysis dependent upon chemical and electrical instruments discovered in late times, it has been ascertained that all the varieties of material substances may be resolved into a comparatively small number of bodies, which, as they are not capable of being decompounded, are considered in the present state of chemical knowledge as elements" (Davy

Collected Works 7: 181). His attention to the element's unfixed but "small" number of bodies and the narrow scrutiny on "the present state of chemical knowledge" render any elementary designation provisional (he inherited this definition from Lavoisier). Articulating chemistry as a coherent discipline meant grounding the Greeks' fanciful elements in an empirical understanding. Chemists could posit simple bodies only when supported by a variety of phenomenal data, and only with the caveat that the designation remained subject to future analysis. And finally, because the element's provisional unity depended on data and experiments – the host of recorded phenomena resulting from myriad chemical combinations in the laboratory – this concept effectively appended a conceptual singularity to a phenomenal multiplicity. The chemist could only identify an element based on the network of chemical combinations into which it would and would not enter. For this reason, we must understand any given element as a product of both its historical and institutional circumstances and of a complex record of experimentation. In a sense, the concept of the element modeled the process of disciplinary formation: a gathering together, organizing, and synthesizing of a host of practices into a recognizable and unified form.

The element was central to the period's chemistry lectures, which I argue fell into two genres: the "lecture of innovation" and the "elements of chemistry" lecture, with the first introducing and the second rendering concrete chemistry's central concept. The "lecture of innovation" shocked settled chemical theory, and was a genre reserved for the genius chemist undertaking discipline-fashioning. For instance, Davy opened his popular lectures on agricultural chemistry with a mea culpa, acknowledging that "Agricultural chemistry has not yet received a regular and systematic form" (*Collected Works* 7: 177). Davy's comment evokes Kant's distinction between an "art," an empirical and practical knowledge field, and "science," a

systematic body of knowledge. The designation "systematic art" acknowledges chemistry's movement in the 1780s towards order, such that twenty years later Davy could consider chemistry a recognizably scientific discipline. For Davy, however, this sort of systematicity applied only to mineral chemistry; active life's more complex substances required further chemical developments. Thus he characterized "agricultural chemistry," by splitting it off from chemistry as an inchoate sub-discipline:

> It has been pursued by competent experimenters for a short time only: the doctrines have not as yet been collected into any elementary treatise; and on occasion when I am obliged to trust so much to my own arrangements, and to my own limited information, I cannot but feel diffident as to the interest that may be excited and doubtful of the success of the undertaking. I know, however, that your candour will induce you not to expect anything like a finished work upon a science as yet in its infancy; and I am sure you will receive with indulgence the first attempt made in this country to illustrate it, by a series of experimental demonstrations. (*Collected Works* 7: 177-8)

Davy here connects the science's "systematic" potential to an "elementary treatise" surveying its basic concepts, linking elementariness to disciplinary coherence. He characterizes his discourse as reliant upon his own experiments, a representation justified by agricultural chemistry's inchoate disciplinary character. Davy's certainty that his audience's "candour will induce [them] not to expect anything like a finished work," signals that he conceives the lecture as particularly suited to a "science yet in its infancy" because of its open-ended nature. His high-profile status as chemical genius authorizes his engaging an incomplete form and determining an infant discipline through his experimental acuity.

By contrast, the practical chemist undertook the "elements of chemistry" lecture, which reinforced the discipline by restating its primary concept – the element – and providing an overview of the field's ratified discoveries and practices. William Brande's lectures exemplify this type: lecture prospectuses from 1817, 1818-19, 1823-24, and 1825-26 feature identical subdivisions (the following list preserves their order): "Of the Powers and Properties of Matter, and the General Laws of Chemical Changes"; "Of Undecompounded Substances and their Mutual Combinations"; "Vegetable Chemistry"; "Chemistry of the Animal Kingdom"; and "Geology."[37] This structural recurrence demonstrates Brande's commitment to consistent disciplinary contours – new discoveries would no doubt unsettle chemistry at the local level, but its rhetorical architecture persisted unchanged. Manuscript lecture notes recorded by an anonymous attendee at Brande's 1819 series confirm his prospectuses' organization, showing his reliance on the element to organize his information: his first lecture treated "the general properties and elemental divisions of matter" ("Notes on a Course" 13). The series' early lessons focused primarily on forces pertaining to elemental combination, such as heat, electricity, and chemical affinity. Brande stressed in his third lecture, for instance, that "All the operations of Chemistry are founded on the force of attraction, which nature has established between the particles of bodies, & by which force all bodies cohere" ("Notes on a Course" 22). Later presentations directly take up single elements, each lecture identifying one, describing its characteristics and the techniques for isolating it, and then listing the combinations into which chemists have found it to enter. The paratactic organizational consistency that characterized the "Elements of Chemistry" series persisted throughout the period; for instance, John Dalton's

[37] See the following lecture prospectuses: Brande, "Practical Lectures and Demonstrations in Chemistry," *The Journal of Science and the Arts* 2: 466; *The Quarterly Journal of Science, Literature, and the Arts* 6: 182; *The Quarterly Journal of Science, Literature, and the Arts* 16: 191; *The Quarterly Journal of Science, Literature, and the Arts* 20: 203.

lecture notes on "Chemistry" (1827) and "Pharmaceutical Chemistry" (1830-31) begin by attending to the nature of heat and affinity, and include multiple lectures devoted to classifying and characterizing specific chemical elements.[38]

These types functionally and stylistically complemented each other: through terminological repetitions the practical chemist tended the disciplinary flame, so to speak, while the genius's lecture marshalled excitement and bombast to explode new ideas upon the chemical scene (often quite literally, as in Davy's galvanic demonstrations). Brande used descriptive language in his "Elements of Chemistry" talks, narrating experiments closely to facilitate their repetition. Given the genre's pedagogical aim to communicate settled information to audiences seeking access to the field, practical reproducibility was paramount. His lectures avoided figural language. By contrast, because they sought to transmit unfamiliar ideas via familiar analogues, Davy's lectures embraced figural language, seducing audiences to accept his novel theories. In fact, revisions in Davy's lecture notes demonstrate attentiveness to both the chemical content of his lectures and to the best language for communicating ideas in a coherent and entertaining way. For instance, while attempting to express how elemental combination composes the natural world, Davy recorded in a set of manuscript notes for a series most likely delivered in 1811 that "The different arrangements [of elements] when separately examined have <u>no meaning</u> but in their general results, like the parts of a melody in music they exhibit a harmonious and consistent whole. – as sounds of one voice[,] impulses of one eternal intelligence" (Lecture Notes, 1811? 33). An attached half sheet records a revised metaphor:

> The different arrangements may be compared to the characters said to be inscribed upon the leaves scattered abroad by the sybil which separated had no

[38] See John Dalton, Lecture Notes, 1827 and Lecture Notes, 1830?.

> signification but which when connected in their proper order became not merely an intelligible & but likewise a divine language. (33a)

This latter formation draws upon the myth of the Sybil of Cumae, whose prophesies, written on leaves and scattered to the wind, could only be understood if collected and assembled. This reference commutes mythic significance and prophetic capacity to the chemist: the discovery of new types of matter leads him to a future in which nature's "divine language" will become legible, its morphemes recognizable as matter's individuated types. A full understanding of this "divine language's" unity depends on a comprehensive articulation of chemistry's discrete elements, though one that sees them as connected.

In constructing this metaphor Davy enfolds his youthful poetic enthusiasm into his chemistry's rhetorical practice, signaling his genius by his exceptional disciplinary borrowing. The ambivalence between musical harmony and written prophesy evokes the poetry Davy (and Lavoisier) had tried so hard to eject from chemical practice. On the one hand this use of fancy serves an explanatory and emphatic purpose. Davy's metaphor captures how a simple substance can be at once singular and plural and commutes upon that substance a sacral status. At its heart the chemist's work is prophesy. At the same time, by rhetorically exceeding empirical chemistry's proper limits – which would deal almost exclusively in facts – Davy signals his status as a genius. The theoretical chemist, pushing the bounds of the science beyond settled practice, aspires to capture for it a universal domain. In this sense, cross-disciplinary borrowing, coded as exceptional in nature, becomes the privilege of the genius and also a sign of his work. Davy otherwise repeatedly reinforced that chemistry needed, generally, to be narrowly empirical – consider the scrawl in one of his early notebooks: "Think warranted by the facts" (Personal Notebook, MS HD/13/I 42). Yet that warrant, for the genius, often proved loosely conceived.

Linguistic grandiosity rhetorically amplified the possibilities of chemistry. Looking to science's progress Davy exhorted:

> Ages may role on, one theory may succeed to another, for these are mutable and partake of the nature of the being by whom they are invented, but facts are eternal, the progression of truth ever arises from the destruction of Hypotheses which in this point of view as a temporary arrangement might be compared to the fabled nest of the Phoenix[,] its transient habitation, and by its destruction producing a new and more glorious form. (Lecture Notes, 1811? 45-6)

Science with its continual surpassing of its own discoveries resembled the fabled phoenix. The genius's work of proposing new theories authorized the use of fancy in order effectively to communicate ideas as yet beyond the explanatory power of disciplined knowledge, even if chemical practice called for a proscription against it. Such an exception to a rigidly factual epistemology was necessary precisely because the identification of new elements often involved a significant amount of rhetorical work. Davy and his brother, for instance, had to devote all the resources of the Royal Institution, and much rhetorical energy, to defending the elementary status of chlorine. Experiments have never been unequivocal in their meaning; they do not interpret themselves. Each new elementary designation constituted a minor overthrowing of an accepted table of principles, the rebirth of a phoenix system; as such, figural flourish proved indispensable to defending elemental designations in the public sphere.

Coleridge's Lectures: Analyzing and Combining the Arts and Sciences

As I've demonstrated, early nineteenth-century chemistry lectures tended to present a coherent view of the discipline by publicizing its terminological preoccupation with naming and

counting simple bodies. In practice, the pace of discovery constantly undermined finer points of theory – a volatility in line with Davy's phoenix metaphor – though elements remained central to chemistry throughout the period. This dynamic saw Institutions proliferating disciplinary structural consistency, even as some linguistic latitude remained for a chemist who had attained the cultural label of the genius, as Davy had, to guide the science in novel directions. I turn now to Samuel Taylor Coleridge's lectures, which emphasized the disciplinarily destabilizing capacity of genius in a bid to capture for literary criticism a cosmic scope. Coleridge's lectures rejected for literary criticism the kind of stable terminological architecture provided to public chemistry by elements. At the same time, he embraced elementality as a conceptual motif for analyzing and reorganizing knowledge. He advocated for an attentiveness to "method" – the self-aware organizing of discrete experiences and ideas – in order to adapt chemical processes of "analysis" and "synthesis" as categories of thought. His lectures demonstrated how systems of knowledge could be divided into parts, which could then be transported across intellectual boundaries and reassembled in novel configurations. In the section that follows I'll focus first on Coleridge's relationship to chemistry, before explaining how his lectures formed an interdisciplinary method based on processes of reflexivity, analysis, and combination.

Coleridge responded ambivalently to the era's chemistry, drawing upon the explanatory power of its theories (especially where they accorded with his philosophical commitment to unity), but recoiling from its increasingly disciplined self-image. In this sense, he opposed the tactics of commercial Institutions marketing knowledge in comparatively simple ways to increase subscription revenues. Coleridge objected to the mechanistic preoccupations he saw reflected in the profession's commitment to calculating chemical proportions. His notable repudiation of Davy, following their youthful camaraderie, signals the linked sins of mechanism

and institutional participation: "H. Davy is become Sir Humphrey Davy & an *Atomist*!" (qtd. in Lever, *Poetry Realized* 35). In fact, Davy rejected the atomic theory that Dalton put forth in his *New System of Chemical Philosophy* (1808) on the grounds that it was insufficiently empirical – even if Dalton's theory of elemental proportions proved experimentally viable, Davy asserted, his atoms entailed little more than figments of the metaphysical imagination.[39] Coleridge's mischaracterization of Davy as an "atomist" likely reflects his willingness to confound Davy's non-atomic research into elementary substances with his success as part of a scientific establishment increasingly seized with a professional mania for calculating proportions. Coleridge's disdain for establishment science is reflected in his sneering diminishment of Davy's knighthood. The poet labels Davy an atomist not by dint of his theoretical beliefs or experimental discoveries, but because of his professional prominence.

Nevertheless, Coleridge's performed reliance on combination as an organizing principle borrowed from chemical theory, even as he resisted the chemical field's growing tendency towards structured coherence (which he interpreted as rigidity and thoughtlessness). In this sense, he enthusiastically embraced the transformative promise of chemistry, even while he rejected the disciplinary assurances of many public chemists. As Trevor Levere notes, he borrowed facts and theories that he then "reinterpreted dynamically" (*Poetry Realized* 168). Levere shows how, in contrast to the mental passiveness Coleridge discerned in chemical atomism's mechanistic methods, and in rejection of chemistry's attempts to tabulate stable quantities of matter, Coleridge evangelized for a dynamic chemistry focused on forces and transformations. He sought a direct consonance between the active mind and the world.[40]

[39] On Davy's response to Dalton's atomic theory see Knight, *Atoms and Elements* 16-59.
[40] On Coleridge's metaphysical dynamism see Levere, *Poetry Realized* 82-121. On his attempts to reconcile chemical theory with his metaphysics and theology see 159-201.

Against public convention, he strove for more universal grounds. While the natural philosophy of the Institutions organized disciplines around stable practices and nomenclatures, Coleridge attempted to maintain a more connected version of knowledge in the public domain by constructing literary criticism as a practice that deliberately dismantled such structures, recombining new systems of ideas from their constituent epistemological principles.

Coleridge's lectures, then, constitute a novel sort of public experiment on epistemology: he sought to analyze accepted systems of knowledge into their constituents and reassemble them – under the auspices of literary criticism – into new and far-reaching networks of ideas. By asking that we consider these lectures as experiments, I position Coleridge the lecturer within the emergence of what Robert Mitchell calls "a new concept of *artistic* experimentation" inaugurated by the formal inventiveness of *Lyrical Ballads* (17). Mitchell makes the important qualification that "Wordsworth and Coleridge did not simply *apply* an existing scientific concept of experiment to their poetry but rather *experimented* with the concept and practice of experimentation itself" (34). He maintains that positing a straightforward analogy between *Lyrical Ballads*' experimentalism and the period's natural philosophy oversimplifies their correspondence – experimentation differs among epistemological contexts.

In order to consider how Romantic-era thinkers "experimented with […] experimentation," I build on this point, arguing that we must bear in mind the practical and nomenclatural fissures between disciplines while simultaneously tracing the conceptual transformations that enabled an idea to traverse such divisions. Describing Coleridge's lectures as experiments requires recognizing their distinctness from those of scientists: at a very basic level the period's science lectures reported and restaged discoveries made in secluded laboratory settings, while Coleridge's improvised tangents spontaneously combined disciplines and ideas in

his audience's full view. This tendency relocated the messy work of testing novel combinations to the foreground, exposing it to his auditors. A chemist would have theorized and re-systematized this data, reconciling it to received science before securing assent to its legitimacy through re-presentation. A new, untried experiment's disruptive character, its violent effect on settled theory, would have remained background action for a chemist; by contrast, Coleridge displayed that violence, often eliciting his auditors' disapprobation. So, for instance, in response to Coleridge's volatile performance, Henry Crabb Robinson lamented:

> Unhappily some demon whispered the name of Lancaster in his ear: And we had in one Even[g] – An attack on the poor Quaker – a defence of boarding-school flogging – a parallel between the ages of Eliz: & Cha.[s], a defence of what is untruly called unpoetic language, an account of the different languages of Europe And a vindication of Shakespear against the imputation of grossness!!! (qtd. in Coleridge, *Lectures 1808-1819 on Literature* 339-40).

Crabb Robinson's critique rests in his aversion to the distance between Coleridge's topics. The basic distinction between undertaking untested chemical mixtures in private and performing outlandish conjunctions of ideas in public inflects the discrepancy between chemistry's disciplinary coherence and criticism's terminological sprawl. But insomuch as Coleridge's lectures constituted an attempt openly to model an aesthetic system's formation, they experimented with the idea of experimentation, collapsing the scientific stages of hypothesis formation, data accumulation and presentation.

Coleridge's lectures display three prominent strategies for positing new configurations of knowledge: reflexivity, analysis, and combination. The lectures announce their discontinuous nature recurrently; in apologies and digressions, as well as prospectuses and advertisements,

Coleridge self-consciously frames his discourse as riven, not by breaks in continuity so much as by an abundance of materials that forces him to eschew meticulous transitions. Rather than presenting literary critical discourse as a closed or complete system, these breaks highlight a discipline's potential points of fracture. In Coleridge's presentation, every fastidious stream of logic is subject to the capricious-seeming force of association (if he had expressly disowned associationism as a philosophical principle by this point, it's not at all clear from his produce that he ever escaped it, or even really sought to).[41] Having exposed the fault lines in various systems of knowledge Coleridge also endeavors to perform the act of breaking them up. I borrow the idea of "analysis" from the period's chemistry (chemical analysis divided a compound into its constituent elements) to describe a deconstructive bent in Coleridge's thinking, one especially pronounced in his lecture series. He routinely undertakes to dismantle intellectual systems that he perceives as having become abstracted from their principles. His analysis consists in a breaking-down of dogmas into their constituent ideas, either to expose their unsound constitution or to reconstruct them. Such reconstructing, a repurposing and combining of concepts across disciplinary lines, serves as a final imperative in Coleridge's series. In the remainder of this section I will expand upon each of these tactics in turn as it manifests in the lectures.

Coleridge's self-aware shifts in topic and digressions were at times so drastic as to draw exasperated criticism from his audiences, but they were neither haphazard nor thoughtless; rather, his loose ordering logic allowed him to test the limits of epistemological mixture. If his lectures famously manifested the disorganization of his personal life and compositional practice, their disorder served a deliberate purpose (in line with his broader engagement of fragmentary

[41] I am indebted to Seamus Perry's concept of the Coleridgean "muddle," see 7. This idea describes the sometimes chaotic doubleness characterizing Coleridge's simultaneous commitments to the one and the many, to systematic and discontinuous arrangements.

forms in his poetry and prose). They spurred his auditors imaginatively to bridge the epistemological caesurae between his topics, to reknit errant digressions back into knowledge's broader tapestry. Despite having lectured alongside more ordered speakers like Davy and Brande, and regardless of his prose criticism's avowed methodical intentions, Coleridge rarely spoke systematically. Crabb Robinson described Coleridge's lectures as "immethodical rhapsodies, moral, metaphysical, & literary"; they were not, he continued, "a scientific or instructive course of readings on any one subject a man can wish to fix his attention on" (qtd. in Coleridge, *Lectures 1808-1819 on Literature* 1: 409). For Crabb Robinson, they were neither simply "instructive" nor "scientific," ranging as they did across subjects. This epistemological variety resulted in multifarious performances. Though Coleridge might announce a series on Shakespeare or European Drama, he drifted across these bounds, venturing, for instance, into philosophical territory. Peter Manning has argued that Coleridge's digressions manifest an attempt to capitalize upon failure (238); my point, instead, is that they constitute a formal strategy for rendering porous the boundaries that might otherwise be reified by a structurally and terminologically stable set of lectures. Readers who discover failure in Coleridge generally do so as a result of having overemphasized the content of certain pieces of his print criticism – his avowed orientation towards transcendent unity in *Biographia Literaria* or the *Essay on Method* – at the expense of, for instance, the formal irregularity of all of his works, or his consistent recurrence to performative media. Coleridge lectured for both the Royal and Surrey Institutions and arranged several independent series. His ambivalence about his own lectures arose from the tension between their instructive and entertaining valences. Here I agree with Sarah Zimmerman, who, speaking of the lectures' instability arising from their extemporaneity, remarks, "Coleridge did not, however, wish to peddle 'new facts,' but rather to teach auditors the practice of 'really

thinking'" (63). The inducement to "really thinking" entailed confronting his audiences with a discontinuous and amorphous philosophical and historical mass they were to reassemble for themselves.[42] Coleridge's digressive tendencies frustrated what he perceived as his audience's penchant for facile entertainment; thus, he circumvented the problem of passive audiences, consumers of edutainment, by enforcing attentiveness through a conceptual discontinuity that required hearers to synthesize the topics that his roving intellect took up.

Later in his lecturing career Coleridge practiced what we might call a hard reflexivity – reifying his wandering method by announcing and embracing it. By the time of his 1818 lectures for the London Philosophical Society he had firmly established his digressive reputation. The prospectus for that series, in contrast to the insinuations of the likes of Crabb Robinson, makes a method and a virtue of Coleridge's meanderings:

> The subjects of the Lectures are indeed very *different*, but not (in the strict sense of the term) *diverse*: they are *various*, rather than *miscellaneous*. There is this bond of connexion common to them all, – that the mental pleasure which they are calculated to excite is not dependent on accidents of fashion, place, or age, or the events or the customs of the day; but commensurate with the good sense, taste, and feeling, to the cultivation of which they themselves so largely contribute, as being all in *kind*, though not all in the same *degree*, productions of GENIUS. (qtd. in Coleridge, *Lectures 1808-1819 on Literature* 2: 40).

This passage emphasizes the "difference" inherent in Coleridge's lecture practice as methodical – by refusing the "strict" "diversity" of his lectures' intellectual parts Coleridge denies the

[42] This commitment aligns Coleridge with the German romantic lecture tradition described by Sean Franzel in *Connected by the Ear*, which posited the lecture "as a speaker presenting free and original thought and occasioning the active 'thinking along' by individual audience members" (9).

absolute separation of the disciplines from which he borrows. True knowledge is singular "in *kind*," even if "*various*," not an aggregate or a trivial miscellany. The passage's final clause marks this epistemological variorum as a product of genius. Striking, here, is the association of genius with the capacity to cross intellectual boundaries: much as Davy the genius could reinsert figural language into his innovative lectures, momentarily inviting an exiled fancy back into his strictly empirical science, Coleridge claims an even more audacious interdisciplinary latitude by making all pursuits subject to the imagination. What's more, the "bond of connexion common to them all" is not a particular system of facts; it cannot be said to belong to any one field. Rather, the audience's own attentive listening and thoughtfulness, a process "excited" by the lectures that brings "mental pleasure," must smooth Coleridge's discontinuities.

Coleridge encouraged his audiences to be mentally active; he resisted what he understood to be a basic human aversion to thinking, which mental torpor threatened to result, on the one hand, in an abstract systematicity, and on the other in apathy. He maintains in the lectures that "systems had been produced with the avowed object of instructing men how to think but […] their proper title should have been 'a system to teach men how to think without thinking'" (*Lectures 1808-1819 on Literature* 1: 192). Romantic-era readers, he claims, accept opinion too easily, do not query the ideas of writers by testing them against personal thought and experience. They do not experiment. Nor do they question "the vague use of terms" (*Lectures 1808-1819 on Literature* 1: 193). Coleridge often apologizes for the need to "tune my Instrument in your presence" (*Lectures 1808-1819 on Literature* 1: 27), but this seemingly simple apology deliberately draws attention to the exercise of his "instrument," a wide-ranging and associative mind. So he takes up new words in lectures and cogitates on them publicly, demonstrating intellectual activity as the linking together of diverse concepts, and overtly refusing

terminological lassitude. This basic distrust of words' capacity to evoke stable ideas seems to justify Coleridge's evasion of the nomenclatural practice he lamented in his era's chemistry – a single concept could never ground something as sprawling as knowledge.

Teaching his auditors "how to think" involved training them to experiment with "method," the mental practice of synthesizing experience and ideas. This attentiveness demanded a kind of double-perception: the methodical experimenter of knowledge must analyze what seemed totalized and systematic into component ideas while also keeping in view those parts' capacity to be synthesized anew. Coleridge thus enjoined his auditors to consider the elementality of ideas. This practice would train audiences to dismantle systems of thought that had become unmoored from principles, deconstructing them into their constituent conceits in order to query their soundness. By analyzing intellectual systems into their conceptual and verbal components and then performing experimental admixtures in public, Coleridge highlighted the mind's radical reach and versatility. This tactic installed in his literary criticism a counter-method to the sciences' tendency to elide the most disorganized forms of their own labor, an attempt among often fledgling disciplines to present a coherent self-image. For this reason, the disorganized lecture form plays a role in Coleridge's metaphysics, being particularly important for conceiving the relationship between the arts and sciences. Klancher argues that Coleridge devised the idea of "method" both to fill the vacuum left by the degradation of the eighteenth-century Republic of Letters and to reintegrate the arts and sciences via an active organizational principle (153-181). He notes that Coleridge prominently juxtaposes "method" – "something like pure science that has been transfigured beyond mere experiment into a lasting law of nature and mind" – and "theory," more properly understood as the purview of the experimental and the empirical (168). According to Klancher, for Coleridge "the great role of the 'Fine Arts' was to

mediate these sides of science, idea-based and practice-based, by acting as both ideal and experiential at once" (169). In this spirit, his lectures on literature combined the methodical and the experimental, intermixing their respective synthetic and analytic powers.

Coleridge sought to avoid the stabilizing tendencies of the era's disciplines because he feared that systematicity would ultimately prove arbitrary, and his oratorical excesses served to disrupt such hyper-abstraction towards inert thought and empty conceit. Disciplinarity, with its boundaries and tendency towards terminological short-hands, could contribute to what Coleridge would elsewhere call "the thinking disease" (Coleridge, *Notebooks* 3: 4012). Klancher argues that the fine arts in Coleridge's triad "save 'Method' from itself, from its own instability as an 'Idea' that may otherwise become so unmoored from the world as to make it a fantastic plaything or an object to dominate by sheer force of political will" (172). Coleridge's lectures warn against sundering concepts from their contexts. Notes to the fourth lecture of the 1808 Royal Institution series caution against the "Danger of a false Ideal – *of aiming at more* than what is possible on the whole – *supermoralize & demoralize*" (*Lectures 1808-1819 on Literature* 1: 83). This passage equates the "false ideal" with a tendency to reach for an idealized completeness incommensurate with its own parts' sum: "what is possible on the whole." In other words, unity must not become extreme abstraction. That in the lecture this observation follows a harangue against the neoclassical unities indicates Coleridge's aversion to a completely systematized poetics in which the edicts of taste arise from dogma rather than necessity, where, put another way, nomenclature becomes alienated from the objects it describes. He excoriates partisans of the unities for having forgotten that the convention undergirding their criticisms of Shakespeare had arisen from a historical performance context unique to ancient Greece. The unities, applied in a modern context, exemplify a false ideal, and they "demoralize" by excessively moralizing an

abstraction untethered both from its own components and the environment that engendered it. Coleridge carries this point further in the second lecture of the 1818 series:

> it should never be forgotten, that Rules are <are in all cases> but Means to Ends – that therefore the end, the nature, the Idea of a work must be first known and appreciated, before we can discover, much more apply, the Rules, according to which we are to judge its merits or defects. – To apply the same technical criticism to a Virgil and a Dante, or to a Shakespear [sic] and a Sophocles is scarcely less absurd, than to demand in a Pointer the form & proportion of a Greyhound. (*Lectures 1808-1819 on Literature* 2: 70)

He advocates for a critical practice that takes into account the formal and historical circumstances of a work as lending uniqueness to "the Idea of a work." His lectures entice listeners to descend from the verities offered by abstractions and rules to the circumstances that give rise to transcendent ideas about literature, training them to approach systems both from the perspective of their totality and from that of their components.

Disconnected from a totalizing epistemological network, terms and concepts could be recombined in new ways – Coleridge's lectures draw metaphors from a variety of contexts to combine them, at the same time signaling their home disciplines' porousness by the jointure. For instance, in the seventh lecture of the 1818 series Coleridge borrows a botanical term to describe the characters in Shakespeare's plays: "the Play is a *syngenesia*, each [character] has indeed a life of its own & is an individuum of itself; but yet an organ to the whole – as the Heart & the Brain – &c/. *The* Heart &c of *that* particular Whole. – S. a comparative Anatomist" (*Lectures 1808-1819 on Literature* 2: 151). The inclusion of "Syngenesia" imports a Linnaean botanical class into Coleridge's comparative explication of 17th-century drama. The metaphor conceives

Shakespeare's characters as botanical parts, functionally discrete but unified by the play's action like the connected stamens of a whole flower. However, the metaphor slips, and by a premise of likeness flower parts become animal organs. If Shakespeare begins a botanist, he ends this passage a "comparative Anatomist." This slippage suggests an expanded purview for comparative anatomy that includes vegetable objects of scrutiny: anatomy subsumes botany, becoming the combinatory science of all life. Coleridge's lecture pushes the elision of disciplinary boundaries further. Coming as it does in the midst of a lecture undertaking a comparison of early-modern dramatists, Coleridge's "comparative" activity overlays Shakespeare's comparative composition, as well as the fused scientific metaphors (the comparative anatomy) giving it rhetorical force. Literary, dramatic, and anatomical comparisons become conjoined as subsets in the broader study of life.

Coleridge speaks in disciplinary palimpsests, capturing in the overlap of otherwise discrete types of knowledge glimpses of universality as the radical transformability of knowledge. The introduction to an earlier lecture in the 1818 series features a similar epistemological overdeterminacy: "Poets of the Italian and English School" are like "stately…Plants, each with a…living principle of its own taking up into itself and diversely organizing the nutriment derived from the peculiar soil in which they grew – or rather like various fruit branches engrafted on the same tree" (*Lectures 1808-1819 on Literature* 2: 111). Here the botanical metaphor communicates a literary critical point: writers develop unique styles as a byproduct of their cultural and natural situations. The comparison to "fruit branches engrafted on the same tree" figures the cultural intermixture of the Middle Ages, arguing that the "allegorical, chivalrous, and…amalgamating Genius of the middle ages" combined the "arts and philosophy of the South" with the "deeper sensibility, the wilder imagination," and "the greater

Inwardness of the North" (*Lectures 1808-1819 on Literature* 2: 111). The era's pneumatic chemistry provides Coleridge with a metaphorical means to describe the medium in which this combination occurred: "the vital air of…a common Faith" (*Lectures 1808-1819 on Literature* 2: 111). The "vitality" of chemical reactions makes "airs," with their profound miscibility, an appropriate metaphor for the national mixture and religious synthesis Coleridge seeks in this moment to describe. However, as he turns to the early modern poets the chemical metaphor gives way to an alchemical one: "These Poets, and our own Spenser more than his predecessors, English or Italian, had…indeed…by the alchemy of…Genius modified and transmuted the aliments,…offered by the Soil in which they grew" (*Lectures 1808-1819 on Literature* 2: 111). This invocation of chemistry's archaic ancestor reverses attempts by chemists to distance themselves from their epistemological past, in order specifically to highlight the fact that even scientific disciplines change over time. Just as this lecture's introduction addresses developments in literary history, Coleridge's metaphoric reference to "alchemy" immediately after his allusion to "vital air" extends that changeability to the sciences. Lavoisier and Davy had sought to legitimize chemistry by effecting an historical break and rejecting alchemy's fanciful elements (as I describe above). Coleridge's combinatory tactic rejects such tidy historical breaks. Furthermore, alchemy is rhetorically useful here because it insinuates a more mystical transformation; that is, Coleridge deliberately reintroduces fancy in order to signal the sublimity with which poetic geniuses like Spenser transformed the rudiments of cultural experience (the elements of literature) into literary nourishment. The overlaying of botanical, chemical, and alchemical notions hints at the universal connectedness of nature and culture, in spite of the sometimes narrowly proscribed systematic ambitions of the sciences.

In fact, it is a chemical metaphor that structures the literary historical narrative of the 1818 series as a whole. In his notes to the first lecture Coleridge characterizes literary history as a series of syntheses: "the Greeks as the Ideal Pole, and the Romans as the Real – and I observed that the synthesis or Union of Both was in Christendom" (*Lectures 1808-1819 on Literature* 2: 48). That this synthesis bears a chemical imprint is suggested by the language with which he describes the period of Roman history during which Christianity and Paganism existed in solution, "a state in which Christianity was still held in check, & incapable of shewing itself in its full influences upon Society by Paganism, and Paganism reduced to a Caput Mortuum by Christianity" (*Lectures 1808-1819 on Literature* 2: 48). According to R.A. Foakes's note "Caput Mortuum" or "death's head" was an antique chemical term for the residue that remained after the process of distillation. The metaphor speaks to Coleridge's view that paganism had become a mostly inert cultural force, though one that still held Christianity in check. More significantly, it suggests that Coleridge understood cultural and chemical combination to be analogous. This link becomes explicit, in fact, as he develops his historical narrative. He describes the intermingling of the Romans and the Goths (and their respective literary proclivities): "The Gothic Tribes fought their way down Southward; the Romans upward North – met in collision – which ended in chemical Union" (*Lectures 1808-1819 on Literature* 2: 50). The note's fragmentary character rushes past any designation of this invocation as expressly metaphorical; it is almost as if Coleridge argues that cultural intermixing might be a proper object for chemical scrutiny. At the very least this collapsing of culture into chemistry suggests that Coleridge saw the discipline as offering a fertile conceptual ground for uniting material and ideal historical changes.

As I began this section noting, chemical concepts, extrapolated out of what Coleridge perceived as a stultifying institutional structure, proved apt at connecting matter and ideas. The

method he advocated for and performed during his lectures encouraged disciplinary intermixture – a practice he aspired to instill in his audiences. Once an intellectual system had been broken down into its constituent elements, those parts could be remixed across disciplinary boundaries. Thus, for Coleridge, an advertised syllabus functioned more like a hypothesis, to be changed during the messy work of thinking he actually conducted in front of his audiences, elaborating concepts by showing their relation to each other, testing what might cohere and what could not. This opened his lectures to divergent types of metaphors and discourses. However, this kind of performance also rendered his lectures particularly ill-suited to generating a stable critical poetic nomenclature, and his roving practice rendered disciplinary closure nugatory.

A Cohering Discipline Disintegrating

Literary-critical practice did not behave with chemistry's comparatively consistent focus: practitioners took up diverse conceptual centers. Coleridge's terms were not Hazlitt's, Thomas Campbell's, John Thellwall's, or Thomas Frognall Dibden's. In Coleridge's case, his tendency to dismantle disciplinary coherence in preference for a more cosmic scope of knowledge exacerbated the already unstable character of the discipline. Because of its comparative instability, literary criticism sought restlessly for new concepts, reached out beyond (or altogether ignored) its borders, and replenished its "stock of metaphors" (qtd. in Lever, *Poetry Realized* 28), the phrase Coleridge used to describe his borrowings from Davy's lectures, by drawing from the exciting natural philosophical discoveries with which it found itself surrounded. Poets herein became the voracious consumers and recyclers of other types of knowledge, nurturing a commitment to a ranging accumulation of knowledge. As Valenza puts it, "Poetry thus began to assume its distinctively modern role: it took on many of the functions of

a disciplinary language while still claiming universal intelligibility" (145). Valenza describes an ambivalent relationship among poets to disciplinarity: "Poetry's answer to this pressure was not to become a discipline like physics or philosophy, but to follow a different path, becoming a practice whose specialized role was the creation of common language and universal experience" (142). At the same time, "the explicit rearticulation in prose manifestoes of what constitutes poetic language can be read as a concerted effort to maintain poetry's relationship to the intellectual disciplines" (Valenza 153). Rhetorically and linguistically, then, literature evaded disciplinary coherence, yet its situation within an institutional framework pressured practitioners to consider establishing something like a disciplinary identity. This conceptualization by its nature opposed the coherence implicit in discipline formation, lending to literary criticism an undisciplined view of human knowledge.

Though the lectures served as a particularly poignant cultural form for performing humanistic interdisciplinarity, the principle held a significantly broader sway during the period. Coleridge's own theoretical commitments recall those of the German encyclopedists, who Tilottama Rajan describes as seeking "in idealism a basis for maintaining the connectedness of knowledge in an environment no longer guaranteed by the totality of the book" (336). Not merely content to conceive of knowledge as separate, stable and tabulated pursuits, these thinkers preferred "an encyclopedic thinking: a perception about the disseminative interconnectedness and incompleteness of knowledge" (Rajan 336). Rajan describes a self-deconstructive method for conceiving disciplines, similar to what I've posited in Coleridge's lectures, which arises out of the thinking of Shelling and Hegel, and theorizes a more fluid means of linking types of knowledge. This organizational method involves redefining the idea of system so that it "means something closer to connection than to structure: not a whole that is consistent

throughout, but an organism in which the waywardness of parts has effects through the whole" (Rajan 348).[43] Systematicity, in this view, consists in the combinatory capacity of various knowledge structures, having been deconstructed, to relink to form what Rajan calls new "inter-sciences" (348). This theoretical distinction accords with my discussion of the difference between public chemistry's focus on elements, the fundaments of a structure, and Coleridge's investment in elementality, an adaptation of the concept of the element that reduces it to its connective capacity.

Indeed, Rajan's discussion of the national differences in encyclopedic culture lends force to the division I posit between public chemistry's systematic consolidation, and the interdisciplinary openness of literary criticism. Rajan argues that the *Encyclopedia Britannica*, and by extension the Scottish university tradition, adopted the tabular model for understanding disciplines and for arranging the encyclopedia. In this epistemology types of knowledge remained mostly stable, and the encyclopedist's task was to collect them and describe them in their completeness. This fact is especially poignant when we consider how many British chemists were trained at Scottish universities. Considering this correlation, the difference I describe above between the lectures of Coleridge and those of William Brande recalls that between German and Scottish modes of encyclopedism. My point is that deeply-seated cultural and epistemological differences informed the distinction between the lecture practices of chemists and those of literary critics. Of course, there were greater cultural incentives for scientists receiving institutional research funds to draw borders around their practice, but deeper philosophical influences also informed this epistemological disagreement.

[43] Franzel discusses the repercussions of this epistemological theory on German lecture culture in "Romantic Encyclopedics and the Lecture Form" 347-56.

Literary criticism came to occupy, then, a paradoxical stance: it both claimed disciplinary coherence as an imperative of economic, institutional and epistemological survival, and manifested in practice as disaggregated. As a discipline it became remarkable for its undisciplined behavior. In sum, I find in these dichotomous tendencies the seeds of modern literary studies' investment in interdisciplinarity. Reaching all the way back to the discipline's Institutional origins, a preoccupation with the comprehensive and free attainment of all types of knowledge remained inextricable from a disciplinary commitment that responded to the threat of epistemological obsolescence arising from natural philosophy's rapid accumulation of prestige and cultural resources. Asserting disciplinary coherence, therefore, became and has remained a rhetorical necessity for situating literary criticism as a legitimate part of a broader institutionalized epistemological system. Yet the disaggregating energy of the literary commitment, reified as a characteristic of the discipline, persisted, ready to be adopted, reformulated and reiterated as contemporary criticism's commitment to radical interdisciplinarity as an end in itself.

Chapter Three

Knowledge's "gordian shape": Keats and the Disciplines

Disciplinarity was unkind to John Keats, and the review was its bludgeon (in this, we see him in a similar predicament to Anna Barbauld in Chapter One). The literary field, elite reviewers and other poets, famously responded to the incursions of an "uneducated and flimsy stripling" into their midst by attacking his medical training and education (Lockhart 274). His previous professional commitments, unrefined by medical celebrity and ungilded by a reputation for scientific genius, encouraged critics rhetorically to undermine his poetic legitimacy. Attacking Keats's education, John Gibson Lockhart wrote disparagingly that both Keats and Leigh Hunt "write about Apollo, Pan, Nymphs, Muses, and Mysteries, as might be expected from persons of their education" (275). Nicholas Roe argues that these reviews waged a proxy war in the literary press against the politically threatening models of dissenting education embodied in Keats's Enfield School: "it was Keats's unusual educational background, above all, which served as a focus for [Lockhart's] animosity" (23). Lockhart dismissed Keats to the apothecary's toiling anonymity: "It is a better and a wiser thing to be a starved apothecary than a starved poet; so back to the shop Mr John, back to 'plasters, pills, and ointment boxes', &c." (276). This is a disciplinary dismissal; even if Lockhart subtextually disregards Keats based on the young poet's radical politics, he explicitly claims that Keats's problem is that he lacks the right sort of expertise.[44]

Keats responded by redoubling his commitment to maintaining porous boundaries between medical and poetic practice. Critics have spoken voluminously about how Keats's

[44] On the association between the medical profession, radical politics, and dissenting academies see Roe 160-81.

medical training emerges in his poetry.[45] His characterization of the poet as "A humanist, physician to all men" in *The Fall of Hyperion* fuses his two professional pursuits (I: 190). Indeed, as Roe maintains, Keats's responses to the critical drubbing of *Endymion* indicate that he considered his apothecary training and his poetry as intertwined (168-9). For instance, in an 1819 letter to his brother, Keats wrote, "I have been at different times turning it in my head whether I should go to Edinburgh & study for a physician," going on to suggest that should he fail in that role it would not be because of an incapacity for the work, but because of a distaste for the need to charge fees as a healer (*Letters* 2: 70). Later he would remark in a letter to Charles Brown about the "Lamia" volume, "This shall be my last trial; not succeeding, I shall try what I can do in the Apothecary line" (2: 298). Important to note is Keats's assurance that, having left medicine, he could return to it – poetry would not distract from or undermine his medical attainments; in fact, it likely strengthened them.

Though critics have thoroughly attended to the echoes of Keats's medical training in his published poetry, they've not considered the effect of his era's epistemological organization – with its professions and its growing disciplines – on his poetics. In part, this oversight may arise from the dispersed and unsystematic character of Keats's theoretical produce, appearing as it does among the letters. In this essay, I argue that the concept of negative capability participated doubly in the period's increasingly disciplinary organization of knowledge: it both arose from the plurality of Keats's professional commitments and also served as a conceptual bridge among disciplines. Negative capability was more than merely a poetic conceit for Keats. After situating several of his most poetically-theoretical letters in a multi-disciplinary context, I turn to reading

[45] In addition to source cited throughout this chapter, see Goellnicht on Keats and the medical sciences. On Keats and Romantic brain science see Richardson 114-50, and on the poet's indebtedness to climatological notions of disease see Bewell 161-93.

Keats's "Lamia" as a test case for his vision of negative capability, and I explore how the poem's allegorical dimensions contribute to preserving an experimental space in which Keats brings together diverse species of knowledge. Viewed within the context of the period's proliferating arts and sciences institutions, negative capability and Keatsian allegory both become tools he could use to imagine the reconciliation of different schools of thought.

Negative Capability amid the Arts and Sciences

To fully engage with Keats's concept of negative capability we must consider the intellectual milieu within which it circulated, not in an exclusively literary context, but influenced by the arts and sciences institutions. As my dissertation shows, Romantic-era writers and audiences witnessed a transformation in the organization and dissemination of scientific and philosophical knowledge in society. The eighteenth century had been characterized by epistemological fluidity, but scholars have long recognized the protracted foreclosing of such possibilities, positioning the end of the Republic of Letters at the close of the eighteenth century. Clifford Siskin broadly situates "the simultaneous advent of modern disciplinarity … and modern professionalism" during the late eighteenth and early nineteenth centuries (*The Work of Writing* 2). This shift has been more minutely chronicled by Jon Klancher, who shows the role the London Arts and Sciences institutions played in proliferating an epistemological model predicated on a "matrix" of recognizably distinct arts and sciences (1). This evolved into a model of disciplinary relation based increasingly on competition. According to Catherine Ross, some degree of disciplinary antagonism was inevitable, given that poets and philosophers would have to compete for "affirming audiences" drawn from the same "polymathic public" (24), the lecture-going audience I described in Chapter Two. As a result, "a rivalry ensued that became the

catalyst for both groups to initiate the delineation and emphasis of their differences" (Ross 24). Nevertheless, such enclosures within the cultural field of knowledge were by no means complete. Even as disciplines strategically coalesced around stabilizing nomenclatures or regularized sets of practices, they nevertheless remained interwoven.

While many professions increasingly yearned for disciplinary enclosure during this period, the practice of medicine, the object of young John Keats's study, more than any other field, exposed in practice the quixotic nature of seeking autonomy for a field of knowledge. Medical practitioners marshalled expertise from across the spectrum of scientific research, and formal training at Guy's or any of the other teaching hospitals (mandatory for licensure after the 1815 apothecaries act) exposed one to diverse schools of knowledge. Students attended lectures on chemistry, medical practice, materia medica, medical botany, and anatomy. Indeed, medicine as a profession straddled the division between art and science; it could not boast the mathematical precision of a science like physics, given its reliance upon anatomy and chemistry, which were themselves only partially systematized. Neither was it clear that doctors acted first as scientists or as social agents; as Hermione De Almeida writes, romantic-era doctors perceived medicine as "at once humanitarian philosophy and practical art for knowing life" (34). Brittany Pladek informs us that doctors who failed to cure disease because of medical science's imperfections turned instead to assuaging pain: "instead of a failure, the doctor who could not cure was a humanist, his palliative attendance a shining example of professional sympathy" (405). Pladek describes how pervasive this role as comforter was during the period, which increasingly lauded medical professionals' humanist credentials. Not only, then, did medicine bear the marks of being both a science and an art (that is, an ordered collection of commonplace best practices), it also took up both scientific and humanistic practices and prerogatives.

John Keats responded to this epistemological schematic, which organized knowledge as a matrix of permeable fields. He was cognizant of the continuing elaboration of separate intellectual systems during the period, bodies of knowledge held together by the common practices and conceptual structures of increasingly professionalized thinkers. The plurality of his expertise prepared him to offer, albeit in an unsystematic way and buried among his letters on aesthetics, a prototype for accepting intellectual fields as systems that were nevertheless interconnected. Schools of thought, many like biology and chemistry being newly articulated as distinct for the first time, nevertheless had to attain their coherence by drawing lines of distinction from a world of undifferentiated experience they remained implicated within. In this regard, Keats's awareness of a simultaneous separateness among and connection between disciplines reminds us of Niklas Luhmann's claim, one I discussed in the Introduction, that,

> the theory of self-referential systems maintains that systems can differentiate only by self-reference, which is to say, only insofar as systems refer to themselves…in constituting their elements and their elemental operations. To make this possible, systems must create and employ a description of themselves; they must at least be able to use the difference between system and environment within themselves, for orientation and as a principle for creating information. (9)

Keats's concept of negative capability responds to this problem of systematization, acknowledging the utility of specialized knowledge, but maintaining means to reknit diverging modes of thought.

Keats was conscious of the era's proclivity towards specialization, and insisted that such categories not be lasting or intellectually exclusive. An 1818 letter to John Hamilton Reynolds describes the interaction between his medical and poetic activities: "Were I to study physic or

rather Medicine again, – I feel it would not make the least difference in my Poetry; when the Mind is in its infancy a Bias is in reality a Bias, but when we have acquired more strength, a Bias becomes no Bias. Every department of knowledge we see excellent and calculated towards a great whole" (1: 276-7). Here "departments of knowledge," mental "infancy," and "bias" are linked – Keats describes a proclivity towards specialization that he at least partially stigmatizes. He degrades narrow thinking, naturalizing it as a stage in human development. But he expects that with "strength of mind" comes a more capacious kind of thinking oriented towards "a great whole." In fact, he puts forth a developmental narrative that valorizes the expansion of knowledge: "an extensive knowledge is needful to thinking people – it takes away the heat and fever; and helps, by widening speculation, to ease the Burden of the Mystery" (1: 277).

Of course, the well-known "Mansion of Life" passage from later in this letter reimagines Keats's "departments of knowledge" framework, and the overlap between these two frameworks suggests that while he ultimately seeks to expand knowledge by connecting it to the universal, he is not entirely averse to the era's newly developing matrix of arts and sciences. The architectural metaphor at the center of the passage (quoted in full below) indicates his openness to a compartmental logic:

> I compare human life to a large Mansion of Many Apartments, two of which I can only describe, the doors of the rest being as yet shut upon me – The first we step into we call the infant or thoughtless Chamber, in which we remain as long as we do not think – We remain there a long while, and notwithstanding the doors of the second Chamber remain wide open, showing a bright appearance, we care not to hasten to it; but are at length imperceptibly impelled by the awakening of the thinking principle – within us – we no sooner get into the second Chamber, which

> I shall call the Chamber of Maiden-Thought, than we become intoxicated with the light and atmosphere, we see nothing but pleasant wonder, and think of delaying there for ever in delight: However among the effects this breathing is father of is that tremendous one of sharpening one's vision into the heart and nature of Man – of convincing ones nerves that the World is full of Misery and Heartbreak, Pain, Sickness and oppression – whereby This Chamber of Maiden Thought becomes gradually darken'd and at the same time on all sides of it many doors are set open – but all dark – all leading to dark passages – We see not the ballance of good and evil. We are in a Mist – *We* are now in that state – We feel the 'burden of the Mystery'. (1: 280-91)

As in the passage on the "departments of knowledge," Keats first posits a naïve stage of unthought: in the mansions allegory this is "the infant or thoughtless chamber, in which we remain as long as we do not think," and in the departments framework it is the mind "in its infancy [when] a Bias is in reality a Bias" (1: 277). Next follows, in the mansion allegory, the "Chamber of Maiden-Thought," where poets experience and inhabit "the Burden of the Mystery" (1: 281). This period in thought represents a kind of interminable middle, an endless present that has no clear analog in the departments framework. However, the departments framework does finally promise to ease this burden by "widening speculation" to achieve "an extensive knowledge" beyond "departments" (1: 277). Superimposing these two formulations reveals that the "Chamber of Maiden-Thought" is at once characterized by murk – the indistinctness of Keats's allegorical description – and by an epistemology structured around "departments" or disciplines. Indeed, knowledge in this stage is dim precisely because it is compartmentalized: at any given moment, we dwell within an epistemological territory that limits our understanding of

the world by occluding those of its features not relevant to our current concern. From this intersection, I take Keats to be arguing that dwelling with specialized knowledge, accepting the truth proscribed by a single department, prevents a deeper awareness of the world. One must be prepared to accept the possibility that there exist other chambers, that one department cannot encapsulate the entirety of experience. To widen speculation one must proceed into the mystery, a darkened manse of unexplored chambers.

Cast in this light, Keats's famous commitment to "negative capability" takes on new significance once set amidst the diverse territories of the arts and sciences matrix. I argue that negative capability serves as a conceptual bridge between types of knowledge for Keats, an aid that facilitates "widening speculation" without effacing specialization. It is not a negation of systematic thought, but an openness to the intermedium between thought systems. Keats neither sought to escape nor to abolish departments, only to recognize their fitness to "a great whole" (*Letters* 1: 277). As the capacity "of being in uncertainties, Mysteries, doubts, without any irritable reaching after fact & reason" (1: 193), negative capability seems situated within the darkened "Chamber of Maiden-Thought," which I have characterized as at once obscure and compartmentalized. Keats celebrates, here, a person's capacity to rest within one discursive or epistemological territory, while remaining open to "Mystery," the murkiness that at once encloses that way of knowing and houses other contiguous "departments." Mystery therefore functions as an ether – the medium of knowledges – both acknowledging and working against the idea captured in Luhmann's claim that "there is no fundamental common ground among systems" (35). For Luhmann, this premise arises from the fact that every system establishes its autonomy by closings itself off from its environment; as a result, it can only view that environment as undifferentiated. Keats imagines his departments to function similarly; the

Mystery occludes everything beyond their borders. Importantly for Keats, though, the indistinctness of Mystery does not efface the heterogeneity of knowledge. Forgetting or rejecting Mystery would involve a disavowal of that heterogeneity and an attempt to expand a single system of thought to contain the cosmos. Coleridge's public commitment to metaphysics looks like just such an attempt to construct a master-system, which is why Keats posits him as the antithesis of negative capability; to use Keats's terms, Coleridge appears to want to expand a single "department" until it encompasses all knowledge, rather than to "widen speculation" by embracing the diversity of knowledge. Keats's accusation is largely inaccurate, given Coleridge's own ambivalence to disciplinary system-making as discussed in Chapter Two, though Coleridge's critical ambitions would certainly have looked totalizing in many lights. Significantly, Keats's call to be "content with half knowledge" isn't anti-intellectual: such contentment merely indicates an author's having recognized the limitation of his current intellectual sphere, and embraced it as an opportunity to entertain the possibility, and explore the mystery, of other ways of knowing.

Being content with incomplete knowledge would have been a valuable skill for Keats to cultivate during his medical training. As a patchwork of scientific pursuits, medical practice inevitably failed to articulate itself as a completely autonomous field. Furthermore, human bodies were and remain mysterious objects of scrutiny. Keats's own lecture notes indicate the field's incompleteness. We might consider, for instance, that he took notes on a lecture listing five separate explanatory theories for blood's coagulation without resolving upon one as most probable. My point is that negative capability was not, for Keats, solely a literary quality; it was a characteristic that more broadly went to form "a Man of Achievement" (1: 193) – a name and orientation at least partially connected to that of the "man of science." That it is instrumental

"especially in Literature" does not make it exclusively so. Perhaps, here, we find a medical precursor for poetic negative capability: apothecary training involved holding in suspension multiple types of knowledge, and also entertaining competing scientific theories.

Gordian Capability

Keats's "Lamia" offers a poetic test case for this view of negative capability, inviting as it does allegorical interpretations that posit its investment in multiple scientific discourses. The lamia herself stands in for several distinct sciences; at the same time, she figures the very process by which natural phenomena become ordered into disciplines. Marjorie Levinson said of "Lamia" that it is "the closest thing we have in the Romantic repertoire to a scientific poem," by which she meant that in it Keats undertook the most methodical, and in that sense, scientific, analysis of the processes of his own poetic production (28). Other commentators have extended this line of thought, offering readings that highlight different sciences. For Denise Gigante the lamia represents the unruly energy of eighteenth-century vitalism; she is "a central instance of Romantic monstrosity whom Keats positions explicitly against Newton's mechanically organized rainbow" (210). Dometa Wiegand Brothers reads in the celestial forms adorning the lamia's scales an astronomical vision: she is "a galaxy," or "the universe embodied" (111-12). Stuart Sperry, in an early instance of such reading, argued that the lamia's transformation "resembles nothing so much as the effects of a violent chemical reaction" (302). Life sciences, astronomy, chemistry: critics have found in "Lamia," and in the poem's excoriation of its exacting philosopher Apollonius, traces of a litany of epistemological domains.

These discrete disciplines share critical space in the poem without appearing at odds because, as I maintain, in "Lamia" Keats explores, at a more fundamental level, how discrete

types of knowledge form and negate each other. Levinson has argued that the poem operates by linked tactics of division and abstraction. Her analysis finds in the monetary form the ultimate symbol towards which Keats's poem tends, with the lamia coming to signify an emptied-out and exchangeable commodity. I would posit that these processes – division and abstraction – serve equally well to characterize the forces that increasingly produced seemingly discrete disciplines (and indeed, money as an institutional pursuit often motivated public arts and sciences Institutions to publicize knowledge in a disciplined fashion). Yet disciplinary designations in the arts and sciences generally proved only partially successful at establishing stable categories of knowledge, drawing together as they did a complicated mix of contradictory theories, unsettled nomenclatures, incompatible practices, and unreliable apparatuses. Of course, the real world these disciplines studied was undifferentiated and in fact hostile to such tidy system-making, a truth to which Keats's medical experience would have attested. In what follows, then, I show that Keats's poem embraces the generative potential of "departments" as a means of intensifying the scrutiny of natural phenomena, while nevertheless maintaining the need for a capacious and multivalent view of knowledge.

In her serpentine form, the lamia embodies the natural world's undifferentiated character, uniting, as she does, incommensurable contrarieties. Because of this, her being affronts the natural philosopher's categories. She compiles diverse aspects of the animal kingdom, bridging the divide between predator and prey – she is "striped like a zebra, freckled like a pard" – even crossing different classes: since she is "eyed like a peacock" she contains birdlike attributes along with her mammalian and reptilian ones ("Lamia" I: 49-50). Not merely terrestrial she is "full of silver moons" that compound the night sky with her animal vivacity; yet the night does not exclusively predominate in her pattern, as her "rainbow-sided" nature also sees a daytime

glory splayed in chromatic brilliance across her body. The rainbow itself is a colloquy of natural and human aspects – sunlight, vapor, vision, humanity, belief, covenant, God. Indeed, bearing God's covenant she nevertheless evokes a complicated spiritual nature: she is at once perhaps a pagan "elf," "a demon's mistress, or the demon's self" (I: 55-6). This potential pandemonium bespeaks a complex moral nature – she embodies a spectrum of good and evil. That she is a "gordian shape" suggests the permanence of this condition (I: 47). Over the poem's course, she will be twice untangled, but that she is described as a knot famously impossible to untie suggests the persistence of her undifferentiated shape even after her transformation. In this respect, the serpent lamia signifies an immense and undifferentiated nature. While in this state she can "muse / And dream…Of all she list, strange or magnificent," traversing as a wandering thought the supernatural and natural worlds from Elysium to Corinth (I: 202-19). She coextends fully with the cosmos – a vaster object than human knowledge could hope to comprehend.

Her transformation unfolds as a process of division and arrangement; each portion of her gordian self gets reordered into units of epistemological similarity – that is, units pertaining to various sciences. In a similar fashion, as I will show in Chapter Four, contemporaneous chemist Humphry Davy articulated multiple but connected genres in his *Consolations in Travel.* The lamia's transformation begins as bodily, so an anatomist's attentiveness characterizes its opening lines: "her elfin blood in madness ran / Her mouth foamed…her eyes in torture fixed" (I: 147-50). Next we learn that her eyes "flashed phosphor and sharp sparks, without one cooling tear, / The colours all inflam'd throughout her train" (I: 152-3), which suggests, as Stuart Sperry has noted, the combustive effects of a chemical experiment. Alluding to objects of geological scrutiny the poem describes

A deep volcanian yellow took the place

Of all her milder-mooned body's grace;

And as the lava ravishes the mead,

Spoilt all her silver mail and golden brede. (I: 155-8)

A final turn notes that this metamorphosis "Made gloom of all her frecklings, streaks and bars, / Eclips'd her crescents, and licked up her stars," hinting at an astronomical cataclysm (I: 159-60). Physiology, chemistry, geology, astronomy: the lamia's disordered and diverse aspects, which had been thoroughly intermixed, come to rest over this transformation's course in compartmentalized groups of between two and three lines in length. These lines' enjambment, and the syntactic piling up of images evinces a residual connection among these "departments," but the lamia's aspects have, during this transformation's course, nevertheless been sorted. As I noted above, critics have variously taken up these distinct sciences in readings of "Lamia," but have stopped short of recognizing that Keats depicts here the very process by which individual disciplines form.

The fruitful possibilities of division come to characterize the lamia in her human form, as focused specialization enables new kinds of learned intensity. As a maid she is, though

Not one hour old, yet of sciential brain

To unperplex bliss from its neighbor pain;

Define their pettish limits, and estrange

Their points of contact, and swift counterchange. (I: 191-4)

Her brain's "sciential" nature invokes the systematic quality of her specialized training in "the lore / Of love." Her focus is singular. For her, love is a science, as seemingly autonomous as the popular chemistry of the Royal Institution.[46] Her method involves division: unperplexing,

[46] On the specialization of popular chemistry and its relationship to the period's literary lectures see Chapter Two.

defining limits, estranging points of contact. The lamia can induce pure pleasure and dispel pain. She has enclosed an area of expertise, dividing it from "the specious chaos" of undifferentiated human experience (I: 195). That singularity of focus allows her to develop an intensity of pleasure, divorced from pain, otherwise unattainable. The lyric voice describes her in superlative terms: she is at once "A virgin purest lipp'd" and knowledgeable about love "to the red heart's core" (I: 189-90). These descriptors suggest that her schooling in love runs the gamut from chaste to erotic pleasures, and indeed, Lycius's total enthrallment, achieved without direct supernatural enchantment – she wins him "with no more awe than what her beauty gave" (I: 338) – affirms her command of her subject. At the same time, her beguiling character in this new form suggests the seductive pull of specialization.

Intensity, in this instance, is the fruit of compartmentalized thinking. The lamia's "sciential brain" makes her a better lover, gives her greater command of her erotic discipline, and allows her to focus on her goal, pleasure, extricating and isolating it from pain. In this sense, division is not unequivocally pernicious; in fact, it trains the departmental practitioner to attend to minute details, to cultivate effective protocols, to be precise. Medical man that he was, Keats could hardly dismiss the improvements that scientific thinking had conferred upon medicine. For an important appraisal of intensity, it is worth returning to the letter to Keats's brothers of December 1817, in which he defines negative capability. Early in that letter Keats asserts that "the excellence of every Art is its intensity, capable of making all disagreeables evaporate, from their being in close relationship with Beauty & Truth" (*Letters* 1: 192). Intensity narrows focus, makes "all disagreeables evaporate," in contradistinction to the "widening speculation" that eases "the Burden of the Mystery" (*Letters* 1: 277). Furthermore, through intensity, that is, the piercing focus that follows from scientific thinking, one approaches more closely to "Beauty & Truth".

This approach is as diverse as the arts and sciences matrix itself. Keats remains committed to honoring the capacity of individual departments, through increased intensity, to produce great good. That this paean to intense focus appears in the same letter with the concept of negative capability suggests that Keats saw these two impulses as co-implicated. He perceived that half-knowledge and intense knowledge balanced each other within the focused activity of a specialized attentiveness.

Division becomes anathema, for Keats, only when it grows single-minded or destructive. We may be tempted to read the famous passage recounting the effects of the "touch of cold philosophy" as an absolute warning against the divisive characteristics of all scientific or philosophical scrutiny ("Lamia" II: 230). In other words, we might be tempted to consider this an anti-scientific poem. But the lamia's own fruitful "unperplexing" instead argues for the possibility of a worthwhile form of division. This verb, while implying a disentangling of complicated strands, clarifies rather than marring. It separates to enable greater degrees of productive focus upon the disentangled parts. By contrast, "cold philosophy" "unweaves" the rainbow, an act of aesthetic unmaking that cannot be undone. Apollonius's character signals, in many respects, the selfishness and singularity of his particularly destructive version of philosophy. As he enters the temple he laughs, "as though some knotty problem, that had daft / his patient thought, had now begun to thaw, / and solve and melt: – 'twas just as he foresaw" (II: 160-2). Here the image of the lamia as problematic knot returns; she is an object of his philosophy's penchant for "unweaving." Even more significant, however, is what the line suggests about Apollonius's intellectual method: he does not seek to discover new truths through experimentation, but rather to confirm what he already knows. This Corinthian sage seeks only to expand his own philosophy, not truly to increase the breadth of his knowledge by embracing

epistemological diversity. Apollonius is an epistemological tyrant, a dogmatic refuser of negative capability.

Ultimately, the most egregious ill recounted in the passage on cold philosophy is its tendency to expand a single species of knowledge into a totality. More execrable than its unweaving of the rainbow is philosophy's attempt to "Conquer all mysteries by rule and line" (II: 235). Seeking to conquer "mystery" is tantamount to aspiring to eclipse all forms of knowledge outside one's own narrowly proscribed department of thought. Apollonius, it seems, "would let go by a fine isolated verisimilitude caught from the Penetralium of mystery," rather than allow his pupil to escape the narrow constraints of his intellectual influence. In this sense, "Lamia" is a poem that advocates a particular version of negative capability: one that embraces the usefulness of intense focus, but which maintains the need for openness to other ways of understanding the world.

Departments of Allegory

As a fable about the formation of distinct types of knowledge, and one that poetically overlays diverse departments while addressing a Romantic-era readership newly re-trained to disciplinary thinking by the public arts and sciences institutions, Keats's "Lamia" also reinvents allegory for the world of disciplines. There is, of course, a tradition of reading Keats in terms of allegory. A letter of 1819 to George and Georgiana Keats invites this attention in the assertion that "a man's life of any worth is a continual allegory" (*Letters*, 2: 67). Drawing upon this quotation, Levinson's seminal *Keats's Life of Allegory* offers a poignant use of the trope to explain his relationship to his economic circumstances. According to Levinson, his poetic produce served as "a parodic reproduction of the social restrictions that marked Keats as

wanting: unequipped, ineffectual, and deeply fraudulent" (6). Her conceit makes of his poetry an allegory of his life, particularly highlighting his poverty and exclusion from literary history and community. I would contend that Keats's use of allegory, however, demands a more overdetermined sense of the trope: he is not pushing for a view of human life that discovers its meaning in some single extrinsic and totalizing system of meaning; rather, he refers to the plurality of interpretive lenses that people bring to bear upon life, and the diverse types of knowledge that go to forming a human "of any worth." In reconditioning allegory to suit it to multiple types of thought, as he does in "Lamia," Keats adapts the trope to the arts and sciences matrix. His statement points to allegory's capacity to mediate among varieties of human experience.

As I've shown above, Keats was cognizant of the epistemic shift his society was undergoing, and he also understood the imagination to be a means of accommodating this social change. "Lamia" itself evinces a concern with epistemic shifts. The poem's opening lines set the scene by referring to a sequence of mythological paradigms (a conceit it shares with the Hyperion poems):

> Upon a time, before the faery broods
> Drove Nymph and Satyr from the prosperous woods,
> Before King Oberon's bright diadem,
> Sceptre, and mantle, clasp'd with dewy gem,
> Frighted away the Dryads and the Fauns
> From rushes green, and brakes, and cowslip'd lawns,
> The ever-smitten Hermes empty left
> His golden throne. (I: 1-8)

Jeffrey Cox describes how these lines "call attention to the outmoded beliefs and fictions of 'old Romance,'" in the interest of discovering "a new eroticized romance, with *eros* not as a power of dubious enchantment but as a means of connecting with the physical world" (57-8). Cox describes "Lamia" as an effort at generic novelty, an attempt, through romance, to envision an affirming new mode of erotic engagement that reconciles humans to their world. This task, he argues, is necessarily complicated by the tendencies of romance as a genre to lead down dead ends, and towards socially harmful and oppressive versions of erotic attachment (matrimony, in the case of "Lamia"). He builds this reading into his argument that a broader trajectory organizes the three romances – "Lamia," "Isabella," and "The Eve of St. Agnes" – in Keats's 1820 volume. This passage from Greek to Italian to British models "plots a cultural movement from the classical past through the Christian middle ages to the present" (Cox 56-7). Convinced of the centrality of this historical development for Keats's thinking, I suggest that his description of passing mythopoetic systems, in light of my above reading of negative capability, also signifies the passage of epistemic systems. The lamia's mastery of the nomenclature of love restrains her in a single discipline, propelling her from an episteme of undifferentiated knowledge, to one characterized by a plurality of arts and sciences.

The poem's allegorical character leaves it open to multiple interlocked interpretive schema, such that Lycius's cold possessiveness carries overlapping significations. His amatory tyranny signifies Cox's view of marriage as foreclosing erotic joy. It also signifies Levinson's triumph of the money form as assigning all value to the lamia. At its most abstract, such possessiveness evokes a type of epistemological enclosure. The ultimate institutionalization of Lycius's love for the lamia evinces Luhmann's discussion of the formation of a hard boundary between a system (in this case that of love, an art for which the lamia was trained in "Cupid's

college," I: 197) and its outside environment. The notion to marry strikes Lycius suddenly when the sound of trumpets from the surrounding city pierces their palace's mystical boundary: "a thrill / Of trumpets – Lycius started – the sound fled, / But left a thought, a buzzing in his head" (II: 27). Keats never names that thought explicitly, leaving open the question of Lycius's motive, but "for the first time, since first he harbor'd in / That purple-lined palace of sweet sin, / His spirit pass'd beyond its golden bourn / into the noisy world almost forsworn" (II: 30-3). The terms of the pair's attachment have become completely systematized, such that Lycius experiences the outside world as undifferentiated. A "golden bourn" surrounds their boudoir, and the outside world is "noisy," a cacophony of indistinguishable sounds. Immediately he characterizes his need to draw the lamia to himself, to control the elements of their erotic system, considering "how to entangle, trammel up and snare / Your soul in mine, and labyrinth you there / Like the hid scent in the unbudded rose?" (II: 52-4). He re-envisions the lamia as a totem for reestablishing his preeminence in the wider world – the language of love that the lamia had brought to their attachment has mutated as the bounds of that attachment calcify. Nothing better signals the lamia's transformation than the lyric voice's subsequent intrusion: "Ha, the serpent! certes, she / was none" (II: 80-1). Captured within the context of her expertise, restrained as a marker of her own attachment to Lycius, the lamia is no longer a serpent. She is now, in a manner of speaking, *only* a scientist of love, alienated from the sprawling cosmos she once contained. The lyric voice's interjection marks her out as effectively separated from the ultimate complexity of nature. The entirety of the world now surrounds the lovers, whose attachment has come to signify the only meaningful dimension of themselves. Their chemistry has hardened into a discipline.

Just as it offers a new form of romance, therefore, "Lamia" also suggests a new theory of allegory, one consonant with a growing world of departments. Theresa Kelley has argued that the empiricist philosophy of the eighteenth century gave rise to a crisis for allegorical representation: "if Neoclassicism is not exclusively the age of empiricist epistemologies, it is an era in which a preference for observable phenomena works against allegory" (3). According to Kelley, the traditional view holds that the period's rhetorical rejection of allegory hinged on its perceived inferiority to realistic modes of representation, but in fact, "allegory survive[d] after the Renaissance, against pressures that ought to have done it in, by making border raids on the very categories that [had] been presented as its contraries: realism, mimesis, empiricism, and history" (2). These "border raids" suggest a shifting ground for allegory – as a conceit it came to serve a mediating function. In an intellectual milieu increasingly organizing knowledge into types, allegory provided a way of accounting for their separateness, contiguity, and overlap, hence "Lamia's" multiply-signifying title character.

Allegory invites critical attention for its tendency to foreground the process of signification in its representations, which has historically lead commentators to speculate on its epistemological function. Paul de Man describes allegory as "dryly rational and dogmatic in its reference to a meaning that it does not itself constitute" (189). According to de Man, this transparent signification rendered allegory anathema to Romantic thought, which preferred the mystifications associated with the symbol. Gordon Teskey moves beyond de Man's focus on the linguistic function of allegory, positing for the trope a deeper metaphysical significance: "the very word *allegory* evokes a schism in consciousness – between life and a mystery, between the real and the ideal, between a literal tale and its moral – which is repaired, or at least concealed, by imagining a hierarchy on which we ascend towards truth" (2). At the heart of the

"psychological work" allegory does is a persistent splitting, what Teskey calls "instrumental meaning": in allegory, the drive to meaning is a wedge that cleaves the undifferentiated natural world, manifesting a division between vehicle and tenor analogous to that between subject and object (5). Teskey's innovation is to see allegory, not as a simple species of representation in which meaning is secondary to or follows from an opaque narrative, but to reconceive it as a literary practice in which meaning is the "creative exertion of force" that produces the difference between the word as written and an occluded "other" significance (5).

Keats's allegorical practice in "Lamia" is new insomuch as it accommodates this aspect of allegory to the growth of the intellectual disciplines. Though Kelley didn't have this particular context in mind, she acknowledges the significance of this project when she says that "the work of reinventing allegory is not alien but intrinsic to modernity" (13). I am arguing that in "Lamia" modern disciplines exert their influence upon allegory, and that allegory reciprocally provides a means of imagining the contiguous relation of discrete (and seemingly autonomous) modes of thought. Much like with the formation of disciplines, allegory articulates difference and hierarchy out of an undifferentiated and unmanageable other. Teskey argues that in allegory "the object on which the force [of meaning] is exerted belongs to a realm that is intolerably 'other'" – nature, in other words – and that relative to this meaning that other appears as "a chaos" (6). By the early nineteenth-century, any attempt to create order out of the chaos of the natural world would have had to pass through the epistemological medium of the arts and sciences.

In other words, allegory is a system, like intellectual disciplines, that manifests its coherence and operational legibility through a process of exclusion and internal arrangement; the crisis for allegory at the turn of the nineteenth century arose, in part, from a reorganization of that system's "environment," to use Luhmann's terms, that likewise necessitated a

reconsideration of the elements of allegory. Per Teskey, the basic force of allegory, its "violence," is its demarcation of a boundary between order and chaos that did not exist before: "In every case…the object on which the force is exerted belongs to a realm that is intolerably 'other' before it is raised to the position of the transcendental 'other.' This archaic, negative other marks the point at which instrumental meaning exerts force on what is to that meaning a chaos" (6). The encyclopedic obsessiveness of the enlightenment would have refracted the early-modern sense that a singular ordering agency, a universal arranging force or "violence," existed to clarify every natural phenomenon. The growth of specialization during the eighteenth and nineteenth centuries increasingly posited multiple lenses for interpreting the world. Each of these intellectual or experimental systems would have posited a unique chaos or environment lurking outside the well-trammeled collection of elements it had curated, thereby proliferating, in Teskey's terms, "transcendental 'others.'" In this sense, though the chaos of any system is unified in its undifferentiated character, in an increasingly disciplinary world it also bears the ghost-images of other species of chaos.

"Lamia" self-consciously adapts allegory to account for this new plurality of disciplines; rather than pointing only to an all-consuming unity of meaning, one tenor, it figures traces of alternative meanings, one tenor among many. Hence, the lamia stands in at once for several distinct intellectual systems, even as she is characterized by her intense focus upon only one. Teskey argues that "the critical discussion of allegory as a distinct genre, rather than as a rhetorical figure, began in the enlightenment" (98). This transition constituted a recognition of the systematic character of allegory, as well as its situation within a broader literary or literary-critical system. Keats locates multiple disciplines in his allegory, exploiting the genre's capacity, by signifying multiply, to connect different types of knowledge. Set amid the arts and sciences

matrix, allegory can offer multiple conflicting tenors, each engaged singly and, in a sense, irrespective of the others, but not exclusively so. This singular (yet plural) orientation arises from a characteristic of systems more generally, namely, that they may only relate individually to each other because of any system's overwhelming fixation upon its environment as undifferentiated:

> No system can decompose another analytically to arrive at final elements (substances) in which knowledge could find an ultimate foothold and secure correspondence with its object. Instead, every observation must employ a difference schema whereby the unity of difference is constituted in the observing system and not in the observed one. (Luhmann 35)

By functioning as an "observing system" potentially oriented towards multiple other regimes of meaning, allegory acts as an intermediary among systems of knowledge. As a genre, it includes two characteristics that suit it to this task: (1) it presumes a systemic relationship among its elements, and (2) it is at the same time presumed to bear no stabilized meaning in itself (the vehicle) because it points outward. Because of this, critics and readers approach an allegory with the expectation that they will choose and arrange its dominant elements to wrest its meaning towards one or another particular system of ideas. Keats's innovation in "Lamia" is to make allegory's capacity to gesture to multiple species of knowledge explicit by letting the lamia stand multiply for several distinct arts and sciences.

Keats the apothecary and anatomist would have had an acute sense of the inevitable interaction of systems, and the complications arising among them. Alan Richardson has argued for the embodied character of Keats's poetry, its tendency to link the mind's activity with the body's, focusing on "the rush of blood to the skin in blushing or sexual arousal, the welling up of tears, even the operation of sweat glands" (235). Richardson argues that, for Keats, poetry did

not arise exclusively from a disembodied subjectivity, but was distributed across the sensorium, a comprehensive combination of bodily systems: "Volition…is anything but the prerogative of a conscious, disembodied subject. It arises from a complex system of mental intentions and physiological operations, physical sensations and unconscious as well as conscious fears and desires" (236). Yet Keats's study made him intimately aware that medical practice depended on being able to recognize and isolate those systems to increase knowledge and more effectively treat illness. His lecture notes display a schematic engagement of anatomy; they focus on dividing systems and further subdividing organs from each other. Surely, he could not have failed to understand that it was in their mutual interdependence that these systems ultimately sustained life, but the compartmentalizing view, the departmental perspective on the body, would have remain deeply important.

The diversity of human knowledge can be at once maintained as separate and reintegrated in the literary space of allegory. Furthermore, I'm arguing for an intimate relationship between allegory and negative capability, which serves as the bridge concept for "widening speculation." It is our own critical negative capability that allows us to see the lamia as an archetype of biology *or* chemistry *or* astronomy *or* geology, while also conceding that she is exclusively none of those things (and all of them at once). Keats wrote that "A Man's life of any worth is a continual allegory – and very few eyes can see the Mystery of his life" (*Letters*, 2: 67). "Mystery", we must recall, lurks at the fringes of departments. The "continual" nature of Keats's allegory points to the constant tension between resting in half-knowledge and preparing to plunge through a doorway, down a murky corridor, and towards some new way of understanding the world. Meaning in human life constantly shifts as we traverse the diverse territories of knowledge and experience, ceding ground here and making inroads there into the mystery. In this regard, Keats

anticipates Teskey's claim that "allegory elicits continual interpretation as its primary aesthetic effect" (4). But Keats's allegory is one modeled on medicine: it must accommodate competing artistic and scientific schema; it must correlate separately conceived interacting biological systems. Knowledge, no longer constructed on the syncretic principles of Francis Bacon or even on the more tenuous unity of the enlightenment Republic of Letters, but now fracturing and fragmentary, interrupted allegory's metaphysical work. In "Lamia," Keats offers up a modern allegory, one that signifies with a single serpentine figure at once the union of all knowledge and multiple autonomous disciplines. Allegory provides the means of holding these departments, in their completeness, in solution; negative capability builds the passages amongst them.

The contradictory interpretations jostling for space in the allegory become apparent when we attend to the moments in "Lamia" when the narrative vehicle contradicts itself. If allegory in a world of disciplines must contain, or at least account for, a plurality of epistemological systems, inevitably it will prove incapable of fluidly relating its elements in every circumstance. Late in the poem there appears a sequence of lines that looks something like a moral, and is often interpreted as such:

> Do not all charms fly
> At the mere touch of cold philosophy?
> There was an awful rainbow once in heaven:
> We know her woof, her texture; she is given
> In the dull catalogue of common things.
> Philosophy will clip an Angel's wings,
> Conquer all mysteries by rule and line,
> Empty the haunted air, and gnomed mine –

Unweave a rainbow, as it erewhile made

The tender-person'd Lamia melt into a shade. (II: 229-38)

This passage seems to offer itself up as a key to interpreting the strange conflict that immediately follows it, the moment between the lamia and Apollonius when he fixes his gaze on her and pronounces her a serpent. Their contiguity seems to invite an allegorical reading in which the lamia stands in for the "awful rainbow," a mythologized nature, and Apollonius for a callous and destructive "Philosophy." That Apollonius arrives at the wedding fixated on untying "some knotty problem" which his "patient thought, had now begun to thaw, / And solve and melt" (II: 160-2) suggests his kinship with the "Philosopher" unweaving the rainbow. And the lamia's "rainbow-sided" nature when she is a serpent seems to confirm her allegorical affinity with the rainbow (I: 54). Read in this way the poem seems to offer a generalized opposition between science and the imagination and looks considerably anti-enlightenment.

Except the lamia is not so certainly the rainbow, and Apollonius is not so certainly the Philosopher. By the time of their fateful encounter she is not the rainbow-sided serpent that opened the narrative; she is the "maid," "in the lore / Of love deep learned to the red heart's core" (I: 189-90). More to point, in her first transformation, the lamia's rainbow has already been unwoven:

The colours all inflam'd throughout her train,

She writh'd about, convuls'd with scarlet pain:

A deep volcanian yellow took the place

Of all her milder-mooned body's grace;

And, as the lava ravishes the mead,

Spilt all her silver mail, and golden brede;

Made gloom of all her frecklings, streaks and bars,
Eclips'd her crescents, and lick'd up her stars:
So that, in moments few she was undrest
Of all her sapphires, greens, and amethyst,
And rubious argent: of all these bereft,
Nothing but pain and ugliness were left. (I: 153-64)

Whatever epistemological modes this transformation organizes into being – physiological, chemical, geological, astronomical – it also explicitly describes the separation of the serpent's constituent colors and their subsequent extinguishing. By this reading then, the maiden lamia cannot be allegorically linked to the rainbow, as she is already unwoven. Similarly, Apollonius proves to be an uncertain fit for the "philosopher." It is true that immediately after the rainbow passage he is designated "the bald-head philosopher" right when he begins to fix his piercing gaze upon the lamia (II: 245). But as the ramifications of his ruthless scrutiny become apparent his pupil laments his "impious proud-heard sophistries, / Unlawful magic, and enticing lies" (II: 285-6). From that moment on the lyric voice refers to Apollonius exclusively as a "sophist" (II: 291 & 299). His malicious and unyielding scrutiny seems also to transform him from a lover of knowledge to a single-minded and possessive opportunist, an ideologue. As I noted above, his sin seems in fact to be his commitment to expanding his own system of knowledge to encompass all others.

In this moment of unclear referentiality, I would argue, a sense of a broader historical and epistemological development from primitive natural-theological myth to secular scientism enters the poem. If the lamia and the rainbow are not linked in volume two, we are left to ask what that rainbow *does* signify. Given the poem's abovementioned engagement of a succession of myth

systems, I'd offer that we should consider that the rainbow still bears markers here of its role as post-flood covenant. The lyric characterizes it both as a singular and a common occurrence: "There was an awful rainbow once in heaven: / We know her woof, her texture; she is given / In the dull catalogue of common things" (II: 231-33). This link between the special and the common evokes Genesis 9:13-16, in that the Biblical first rainbow, marker of God's promise never again to inundate the world, is characterized both by its exceptional nature and its eventual routinization. God sets "my bow in the cloud," an inaugurating and singular instance, and foretells that "it shall come to pass, when I bring a cloud over the earth, that the bow shall be seen in the cloud" (KJB Genesis 9: 13-14); these verses couple the exceptional with the common. In fact, this moment in "Lamia" hearkens to a pre-modern worldview that presumes the universal legibility of a nature imbued with divine significance. A rainbow is "awful" because of what it once signified, and the residual power of that covenant inheres in its "common" recurrence. The repercussion of this interpretation is that instead of thinking of this verse paragraph as proleptically presaging the conflict between the lamia and Apollonius specifically, it suddenly plunges us back into mythic history. We move not ahead in the poem, but backwards to a time before its beginning. The juxtaposition invokes a much longer trajectory of intellectual and epistemological development whereby philosophy, not empirical or enlightenment science specifically, pried the meaning of nature apart from its phenomenal expression.

Between the lamia and the "awful" rainbow rest multiple specialized, or perhaps in a more Keatsian idiom "intensified," types of knowledge. Philosophy, myth, and religion become discrete but related systems in their own right. "Philosophy" "unweave[s] a rainbow, As it erewhile made / The tender-person'd Lamia melt into a shade" (II: 234-8). As I've noted, proximity tempts us to imagine an allegorical link between this "Philosophy" and Apollonius.

But as I've also shown, he is relegated to the role of sophist for his dealings with the lamia. Furthermore, his gaze does not melt the lamia; she simply vanishes in poem's final scene. This would seem a quibbling distinction had she not, in fact, already melted during her first transformation:

> In moments few, she was undrest
> Of all her sapphires, greens, and amethyst,
> And rubious argent: of all these bereft,
> Nothing but pain and ugliness were left.
> Still shone her crown; that vanish'd, also she
> *Melted and disappear'd* as suddenly. (I: 161-6, emphasis added)

As this is the only instance in the poem which describes the lamia as melting, it stands to reason that this transformative moment is the one most appropriately linked to the "awful rainbow" passage. Given that this moment also describes the slow stripping away of all the serpentine lamia's scintillating hues, characterizing her by her absence of color, here she becomes even more "a shade" than in the poem's closing. What's more, if the rainbow passage constitutes a casting back to biblical time, then even the temporal indicator "erewhile" remains an appropriate reference to this moment (the biblical rainbow, at least within the Genesis myth, pre-exists "Lamia's" classical context). Who, then, is the philosopher in this instance? Who makes the lamia "melt into a shade"? In this reading it is Hermes who plays the role of philosopher, transforming the lamia into a more schooled and disciplined lover. While the reading of Apollonius as philosopher throws emphasis on the antagonism between the divinized nature of myth and what Keats would call the "departmentalizing" impulse, Hermes as philosopher suggests that myth-systems themselves can give rise to specialized knowledge.

Neither of these readings is perfect or wholly convincing. That the rainbow passage describes the lamia as "tender-person'd" seems to suggest we are not dealing with her serpent form at all. My point, in fact, is that Keats exploits the plurality and volatility of allegory to shuffle both interpretations into his poem. The practical effect of this superimposition is that he includes at once a narrative about the natural progression towards specialization that is ubiquitous across forms of knowledge (not just in the sciences, but in the arts, in religion, and so on), and grafts onto it a cautionary injunction against intensification exceeding its usefulness by discarding care to become single-minded and epistemologically totalitarian.

That these different allegorical readings are so richly irreconcilable in the poem suggests Keats's ambivalence on the subject, which, I would argue, is a thoroughly modern one, and one we share today, pursuing as we do, sometimes half-heartedly and sometimes doggedly, a seemingly fabulous interdisciplinarity. In the same sequence of letters that features his statement on allegory Keats acknowledges a much messier vision of human life. This comes during a moment of disillusionment at the reviews of *Endymion*, when Keats was thinking once again of returning to medicine. "Every body is in his own mess," he tells his brother (*Letters* 2: 70). His disappointment whispers that lives are messes of circumstances; bodies are messes of vessels and tissues. The medical practitioner and the poet in Keats could not rest easy with such a bitter embrace of disorganization. Negative capability and allegory were means of arranging messes, intensifying scrutiny, building knowledge while maintaining the connections between types of investigation. It is in this sense, in a world increasingly characterized by intellectual plurality, that Keats offers a simultaneously disciplined and interdisciplinary vision: one that recognizes the valuable focus that specialization brings, but that looks always in between schools of thought for the connections that renew and enrich human understanding.

Chapter Four

Humphry Davy's Intergalactic Travel: Catching Sight of Another Genre[47]

When Humphry Davy's *Consolations in Travel* was first printed posthumously in 1830 it evoked mixed responses reflecting its disjointed nature: Davy was pious; he approached heresy. He lived in the "fantastic"; he was "purely scientific." Yet whether he was a "dying Plato," an "orthodox Christian or [a] skeptical free-thinker," critics agreed on the text's "desultory and disordered manner."[48] It offered scientists compelling passages on geology and the life sciences, but ultimately escaped into metaphysics. The popular press considered it dry and technical. Most of all, it evaded classification by its participation in multiple discourses (religious, scientific, and visionary). This confusion has likewise spurred modern critics to flee the text's strangeness and read it almost exclusively through a biographical lens, considering Davy's status as a "superstar" scientific performer or as a scientist peering through a poetic microscope.[49] These responses—both the modern and those contemporary with Davy—demonstrate the common perception of the *Consolations* as fractured. While such a view seems inevitable, my interest lies instead in

[47] Portions of this chapter first appeared in the journal *Studies in Romanticism*; see Hessel, "Humphry Davy's Intergalactic Travel."

[48] The *Monthly Review* praised Davy, but denigrated the text's "fantastic design," charging Davy "with an unlawful tendency to very grave technical disquisitions, touching geological formations and chemical changes, when he proposed to be amusing .... [W]e should have sought him to forget the laboratory for a season, to cease to be purely scientific" (13: 391). In contrast, Cuvier noted, "that once escaped from the laboratory, [Davy] had resumed the tranquil reveries and sublime thoughts ... of his youth: it was in some measure the work of a dying Plato" (qtd. in Davy, *The Collected Works* 9: vii). Taking another position, *The Gentleman's Magazine* extolled the *Consolations* for embracing revealed religion (23: 228-31), while the *Medico-Chirurgical Review* questioned the text's piety: "whether the lamented philosopher will be hailed by the orthodox Christian or the skeptical free-thinker, as supporting one or the other of their respective doctrines, we shall not attempt to determine; but we suspect that he is rather too Pythagorean for the divine, and too spiritual for the materialist" (12: 401). *The Edinburgh Journal of Science* complemented the *Consolation*'s geological passages, but didn't extract from its cosmic jaunt because it was "so completely the work of imagination" (3: 178).

[49] Romanticism scholars tend to consider Davy as influencing the lives of canonical Romantic figures like Coleridge, Wordsworth and Southey – see, as instance, Levere, *Poetry Realized* – or as a scientist whose scientific pursuits are intrinsically Romantic-poetic ones – see Lawrence, "The power and the glory" 130-43.

exploring the reasons for and productivity of its fissile nature, which renders it at once an experimental text offering current scholars a laboratory in which to reconsider how we organize knowledge both historically and in the present, and an alienating artifact tempting us to retreat in befuddlement. Generically, the text displays markers of four genres, the philosophical dialogue, the travel narrative, the scientific treatise, and the medieval consolation, without synthesizing or completely integrating them. For instance, apropos to travel narrative it describes the countryside surrounding the ruins of Paestum: its "green hills," "marble cliffs," and "vineyards." (Davy, *Collected Works* 9: 279). Yet it becomes scientific in offering a technical explanation of respiration: "By the action of air on the blood it is fitted for the purposes of life, and from the moment that animation is marked by sensation or volition this function is performed" (9: 335-6). I will argue that this unruly generic excess and its varying and often opposed epistemological stances constitute a new kind of organizational strategy, one which I call, in light of the interstellar journey that opens the text, a utopian genre.

In particular, Davy's text incites utopian thinking through the interplay between generic construction and deconstruction. By this I mean that the text allows for several discrete but incomplete strategies of categorization, which encourage the reader to imagine, from the shambles of *all* the ways the *Consolations* might be classified, an unknown genre of the future, cognizable only to an advanced, perhaps even alien, form of humanity. Importantly, this deferred genre has more value as a catalyzing goal motivating reflective reading than as a stable classification system with recognizable contours. Thus, rather than merely striving to arrest the text in the present, to delimit its generic characteristics, I argue that the *Consolations* tempts us to take up a practice of utopian reading, one in which we perpetually pursue textual unity via repeated generic interpenetrations, while keeping in mind its inevitable displacement into the

future, reminding ourselves that we must change the way we read before we can read the text for itself. Ideally, this awareness of the distance between the present disjunctive text and the future cohering genre would refocus our thoughts on conceiving experiments (generic and ideological permutations and combinations) that might accomplish such a development. For Davy, this textual method serves a concomitant social imperative, rounding out the political dimension of his utopian investments – he addresses, attempting to countermand, the direction science was taking during the early nineteenth century: rapid professionalization and the increasing tendency to divide the arts and sciences into disciplines, the results of which we recognize in today's compartmentalized university. His fractured text engages that scientific-social context, so that through generic admixture he critiques this disciplinary divide, seeking instead to inspire interdisciplinary cross-pollination in scientific institutions. In other words, the *Consolations* presents itself as an invitation to a textual utopia whose combinatory energy might also occasion a post- or interdisciplinary epistemological shift in his scientific scene – this point should beguile modern readers to question whether our own desires for the "interdisciplinary" draw upon similar utopian hopes. In this sense, utopia for Davy is neither fantasy nor wish-fulfillment, but an intellectual practice capable of marshaling social energy towards real-world ends.

In addition to the generic cues to intermixture that the *Consolations* features, it also prominently takes up the foundational concepts of the period's chemical and poetic disciplines, the element and the symbol respectively, in order to undermine their epistemological exclusivity. As I will show below, Davy's tandem engagement of these concepts seeks to demonstrate how the nominally distinct disciplines of chemistry and poetry in fact share similar philosophical or metaphysical aims, and to point towards opportunities for discursively reintegrating them. In other words, the *Consolations'* generic nature impels its readers to consider visionary

possibilities for disciplinary syncretism, and its embedded representation of the element and symbol as linked undertakes a rhetorical reconstitution of these two concepts which likewise figures their epistemological compatibility. This chapter undertakes first to elucidate Davy's generic utopianism relative to the disciplinary scientific context of the early nineteenth-century before turning to consider his engagement of the concepts of the element and symbol.

Constellated Genres or Genres in Solution

Davy responded to the increasing disciplinarity of the nineteenth century by investing the *Consolations*, as I've noted, with an abundance of fragmentary genres, each of which offers interpretive strategies, but none of which stabilizes the text. The *Consolations* incorporates multiple genres—philosophical dialogue, travel narrative, scientific treatise, medieval consolation—and loosely divides them into six segments bound together by narrative interludes: in the first three, the narrator, Philalethes, and his friends Ambrosio and Onuphrio travel through Italy, meeting along the way an itinerant chemist identified as "the Unknown"; and in sections comprising the last three dialogues they continue through Austria. This frame gathers discussions of scientific, religious and social concerns, linked in varying degrees to the landscapes within which they unfold. David Duff writes in *Romanticism and the Uses of Genre* that "the transformations of *form* which are a hallmark of Romantic literature are often linked to changes of *function*" (Duff 6). Linking form to function reflects Frederic Jameson's contention in *The Political Unconscious* that "Genres are essentially literary *institutions,* or social contracts between a writer and a specific public, whose function is to specify the proper use of a particular cultural artifact" (106). I argue that the generic agglomeration in the *Consolations* might be understood as an example of what Duff – borrowing from Romantic chemical discourse – calls

"rough-mixing," involving "juxtaposition rather than synthesis" (165). The mixed generic matter in such texts never fully disappears into solution. I build on Duff's point in identifying the *Consolations*' discrepant character (a text he does not address) as ultimately evoking an unknown future genre and its concordant utopian episteme. Throughout the rest of this section I will explore how each genre contributes to this utopian vision, first by showing how these forms' concatenation productively undermines the ability of any one of them to dominate the text, and second by demonstrating how Davy exploits each genre's instability to the same purpose. In doing so, I will argue that generic mixing provides a textual analogue to the seemingly inevitable disciplinary borders developing amidst scientific and humanistic pursuits during the period.

As the most prominent organizing genre, the philosophic dialogue here provides only disputatious energy without the dialectical control of, for instance, Socratic dialogues. Instead, characters articulate divergent positions on religion, science, and the progress of mankind, amending their opinions in response to their fellow interlocutors' claims, though no one attains mastery over the discussion. Bypassed theses consistently reemerge into debate after having been seemingly resolved or contradicted. For example, in an episode to which I will turn below, Philalethes, having traveled into space, recounts in the first dialogue a vision that the second dialogue subsequently refutes, but whose relevance he even later insistently reasserts. Furthermore, argument for its own sake sometimes steers a dialogue's development, insomuch as disputants attack positions they otherwise adhere to, seeking to provoke an intriguing defense. In one instance, Philalethes and Eubathes (travelling companions through Austria) goad the Unknown into defending Chemistry even though both purport to value the science. In philosophical dialogues more generally, but especially here, discussion as argument self-propels, striving for continuation rather than resolution. In the *Consolations*, the genre neither settles the

text's disputes nor its conceptual impasses, but eschews resolution for rhetorical interaction, thereby emphasizing disciplinary exchange.

The second generic construction, travel narrative, uses geography and sites of interest as an epistemological map, but this analogy's logic meanders as much as the dialogue's. These spatialized epistemologies evoke the developing disciplinary borders between the sciences and humanities during the Romantic era, for each section unfolds in a different location, and though many sub-disputes arise, a particular epistemological concern focuses each part, from the progress of mankind and Philalethes's vision, to a religious dispute, to discourses on geology, life sciences, chemistry, and time, respectively. As above, under this generic cartography the text remains aimless: the travelers favor no location over another, nor permanently return home. Conceivably they wander eternally, nomads crossing diverse philosophical terrains.

However, travel narrative affords the *Consolations*, in the picturesque panoramic description, a technique whose combination of provisional unity and restless conjunctive energy models Davy's utopian generic practice. The second dialogue situates the disputants at Vesuvius's summit, where Philalethes expresses his uncertainty "whether there is more of sublimity or of beauty" in the vista (9: 249). The volcano, as "the great laboratory of nature," inspires sublime emotions with its creative fires and ruined crater. He contrasts these sights to the surroundings:

> There we see the rich field covered with flax, or maize, or millet, and intersected by rows of trees which support the green and graceful festoons of the vine; ... olive-trees cover the lower hills; islands, purple in the beams of the setting sun, are scattered over the sea in the west, and the sky is tinted with red softening into the brightest and purest azure; the distant mountains still retain a part of the snows

> of winter, but they are rapidly melting, ... And man appears emulous of nature, for the city below is full of activity; ... busy multitudes crowd the strand, and at the same time may be seen a number of the arts belonging to civilized society in operation. (9: 250)

This vantage presents a unity of motions, hues, and objects, and collates natural and artificial beauties together with a metropolitan bustle. The larger aesthetic categories informing this view, the sublime and the beautiful, associate in an indeterminable juxtaposition, achieving an aesthetic middle-ground in the picturesque, which according to Jill Heydt-Stevenson, entered, during the period, "into the famous Burkean dichotomy of the sublime and the beautiful as a destabilizing and mediating term, taking the energy from the sublime and the languor from the beautiful and intermixing them" (269). William Gilpin's explanation of the picturesque, that its "composition consists in uniting in one whole a variety of parts; and these parts can only be obtained from rough objects" (19), emphasizes active interpretation: note that composition "consists in uniting," a phrase which signifies unification as ongoing, and unity as provisional. Insomuch as it "mediates," the picturesque eye constantly reestablishes its unifying capacity despite the resurgent partness of the parts in view, which retain their "rough" edges. Heydt-Stevenson and Gary Harrison suggest the utopian potential of this aesthetic volatility: "In putting people in motion, the picturesque – allied with tourism – galvanizes the process of viewing and interpretation, leading to dystopian and utopian configurations" (5). In particular, they refer to the picturesque's capacity to shift attention from structure to energy, from the landscape to the act of interpreting it, thus allowing observers to imagine solutions to social problems arising from a recognition that travelers interact with environments ceaselessly. This reflexive awareness is similar to that I've described emerging from Davy's text.

A third model for Davy's *Consolations* is the *consolatio* tradition, and Davy's text exploits that genre's focus on grief to invest its utopian energy with emotional immediacy. According to classicist Joel Relihan the consolation genre, "a moral exhortation, an address to one who is bereaved, an argument that death is not to be feared," generally includes a view of the afterlife, with its punishments and rewards for sinners and the blessed (xi). In this generic formulation, the reassuring substance of Davy's comparatively secularized *Consolations* would be its progressive version of history as driven by science, and its view of the afterlife would be Philalethes's vision in the coliseum, which posits that after death human intelligences undergo a cosmic development, transforming into increasingly intelligent alien life-forms. Via this cosmic pantheism's promise of intellectual immortality the dialogues can be said to proffer aid to a reader or to Davy himself, with his late-life afflictions.[50]

In drawing upon the consolation tradition and specifically Boethius's text, Davy invokes an ancestor who, by depicting classical Philosophy's split into schools, prefigures his concern over developing disciplinarity during the nineteenth century. Boethius's *Consolation of Philosophy* opens with the figure of Lady Philosophy dressed in tatters, as philosophers of various schools have torn shreds from her clothing, an allegory for philosophical thought's fragmentation. She recounts how the various schools "tore scraps from [her robe] and went away, each of them believing that I had gone off with them in my entirety": not only does each school attain only a partial philosophical understanding, but each mistakes its part for the whole, suggesting a myopic vision (Boethius 7). No surprise that this text would offer Davy a useful precursor given the comparable situation of "natural philosophy" at the eighteenth century's close. Functionally, then, the *consolatio* tradition allows Davy, in light of this familiarity, to

[50] See Fullmer 349.

consider history's continuity, since the genre, deriving from a historically distant episteme, marks the inescapable presentness of the past. Coupled with the genre's focus on consoling grief, which situates salvation and resolution in an attainable future, this continuity legitimizes imaginatively striving towards utopia.

Yet Davy, as with the other generic lenses, employs the *consolatio* only partially as an organizational structure, and avoids replicating his precursor's ordered character. Boethius's *Consolation* keeps in view a particular end, offering each stage of consolation as a separate book. When Lady Philosophy describes the truths she will unveil to the prisoner, she specifies that every epiphany he experiences will give way to the next, each more difficult to understand: she begins by hearing his complaint (book 1) and offering him a simple explanation of fortune (book 2), which will in turn acclimate him to "more bitter tasting" ideas to come – that is, more idiosyncratic explanations of happiness, virtue and providence (49). Furthermore, though Boethius's *Consolation* models, to some extent, the formal variety upon which Davy's text draws – it intersperses passages of prose with verse – it subjugates that variety to its argument's ends. For example, Lady Philosophy explains a particularly taxing point about providence to the prisoner, asserting, "and yet, if it is the delights of music and song that you find delightful, you must put off this physical pleasure for a time while I weave together arguments that are tightly bound to each other in sequence" (113). Here, the argument's sequential order eclipses the need for the song's delights, and subsequent verse interruptions are suspended for an unprecedented volume of text. By contrast, Davy's *Consolations* rarely produces such an overarching order, never sacrifices generic shifting for argumentative clarity, and doesn't imitate the regularity of Boethius's metrical intrusions. Less as a directed response to grief offered up by a divine guide, Davy's consolation unfolds along the byways trod by footweary wanderers.

Empyreal Utopias or the Action of Combination

If none of these individual genres coheres Davy's *Consolations*, their combining effects condition the possibility for imagining another generic mode: the utopian. The text's initial gesture towards utopia occurs in the first dialogue when Philalethes, who has been skulking around the Coliseum bemoaning cultural decline, converses with a spirit from outer space called "the genius," who presents an opposed progressive historical vision. Humans, says the genius, have progressed since their inception by the strength of their mental and scientific accomplishments. Driving this advancement is the principle of combination – understood explicitly in terms of mixed races, classes, genders and substances; implicitly it formally valorizes mixed genres.[51] Soon the genius moves from the historical to the cosmic significance of combination. He and Philalethes ascend from Earth into the solar system, and their escape from terrestrial atmosphere draws the necessary boundary for what I designate a utopian space.

This ascent from earth, a type of separation, according to Jameson, constitutive of any generic utopia, allows for the formation of a circumscribed imaginary space within which to conceive alternative social possibilities. Jameson's *Archaeologies of the Future*, which focuses predominantly on twentieth-century science fiction and does not mention the *Consolations*, posits utopia as simultaneously separated from history and bound up with the social context that produces it. In his formulation, an author diagnoses a predominant social ill and then offers up an imaginative remedy for that singular concern, which is enacted in the literary utopia. Conceptually, this prescription may serve as the political impetus for the amelioration of the actual social ill which first inspired the utopia.

[51] This embrace of cultural mixture as a counter-narrative to degradation stretches back to the seventeenth century's scientific revolution, see Schmidgen 1-100.

I depart from Jameson in my claim that Davy's text not only represents utopia, but also manifests it through formal characteristics that disclose manifold generic natures coupled with outlandish content, all of which suggest a utopian context extending beyond its textual limits, or more precisely, a utopian genre. Removed from the familiar world, Philalethes lacks a frame of reference within which to order his understanding, and can only perceive the new phenomena in terms of vague and incommensurable similarities to familiar ones on Earth. When he and the Genius land on Saturn they encounter the Saturnians:

> I saw moving on the surface below me immense masses, the forms of which I find it impossible to describe; they had systems for locomotion similar to those of the morse or sea-horse, but I saw with great surprise that they moved from place to place by six extremely thin membranes, which they used as wings. Their colours were varied and beautiful, but principally azure and rose colour; I saw numerous convolutions of tubes, more analogous to the trunk of the elephant than to anything else I can imagine, occupying what I supposed to be the upper parts of the body, and my feeling of astonishment almost became one of disgust, from the peculiar character of the organs of these singular beings. (Davy, *Collected Works* 9: 241-2)

Philalethes cannot comprehend the Saturnians as whole, but only as composed of unreconciled parts: they move like seahorses, and have wing-like membranes and tubes like elephants' trunks. Like the varying generic models themselves, their bodies stage conjunctions between differences, in this case, colors, sizes and species (fish and bird and land mammal). His transition from "astonishment" to "disgust" evinces the degree to which Philalethes cannot tolerate these

aliens' discontinuity. Initially, he abhors them because they undermine his sense of ontological solidity, a reaction the *Consolations'* first critics repeated.

Davy's aliens therefore constitute a representational quandary: Philalethes cannot comprehend them in themselves, but neither is his perception complete if he remains satisfied with the tenuous identification their parts' likeness to terrestrial fauna provides. Jameson identifies such a mélange as characteristic of the alien body, which he argues induces macroscopic Utopian imagining. The alien body, he maintains, manifests a representational problem – "the new sensory phenomena will not be reified at the level of innovation: rather they lead us back to other representational questions ...[,] for a new quality already begins to demand a new kind of perception, and that new perception in turn demands a new organ of perception, and thus ultimately a new kind of body" (Jameson, *Archaeologies* 241-2). Incapacitated by our need to imagine novelty based on ideas "derived from sensory knowledge," we cannot apprehend the truly alien in terms of its irreducible difference. Jameson claims that, faced with this impasse, the writer of science fiction engages the "representationally productive question," which is "not whether we as readers are able to imagine the new color, but whether we can imagine the new sense organ and the new body that correspond to it" (*Archaeologies* 120). In other words, to perceive a wholly alien color requires an inaccessibly alien eye. The genius acknowledges such an impasse to Philalethes: "you want analogies and all the elements of knowledge to comprehend the scene before you. You are in the same state in which a fly would be whose microscopic eye was changed for one similar to that of man; and you are wholly unable to associate what you now see with your former knowledge" (Davy, *Collected Works* 9: 242). For Jameson, however, it won't suffice to comprehend the alien eye only in relation to the alien body; one must posit a context, the world in which that body exercises its faculties. In order to project itself into a

utopian otherworld the reading subject must do more than interpret the alien, and, in fact, must posit an entire alien cosmology and subsequently attempt to refit its perception to that context. Our perception, with Philalethes's, is "bounded by Uranus, and the laws of this planet form the ultimatum of [our] mathematical results," but according to the genius, the Saturnians "catch a sight of planets belonging to another system, and even reason on the phenomena presented by another sun" (Davy, *Collected Works* 9: 243). The illegibility of the alien – similar to the text's multiple illegible genres – initiates an imaginative expansion of increasingly macrocosmic scale. Though such an effort nevertheless constitutes interpretation, it is a holistic and a restless one; the reader must reflexively consider the self along with the alien other and the context resituating both, in the hopes of arriving at a more complete understanding of their mutually constitutive relation. Nevertheless, universal vastness ensures that such imaginative reaching, picturesque travel displaced to space, must ceaselessly chase creation's edges.

The alien, then, offers a fraught representation by which to understand human concerns. This has precedent during the period. Kant's *Anthropology from a pragmatic point of view* (1798), for instance, acknowledges the need to speculate about reasoning extra-terrestrials to understand terrestrial humans: "The highest species concept may be that of a *terrestrial* rational being, however we will not be able to name its character because we have no knowledge of *non-terrestrial* rational beings that would enable us to indicate their characteristic property and so to characterize this terrestrial being among rational beings in general" (416). In his "Kant's Aliens, the *Anthropology* and Its Others," David Clark posits an ambivalence between the *Anthropology*'s empirical aims and Kant's broader need to instantiate a reason-based moral system for critiquing humanity. The reasonable alien offers Kant a taxonomic human relation "by which to throw ... specifically human features into sharp relief" (Clark 205). By eighteenth-

century empiricism's ordering logic, understanding humans as reasonable beings requires organizing them alongside their taxonomic relatives, namely other reasoning beings: "'man' is what he is by virtue of another who always and already tarries alongside him in the universe" (Clark 206). Such beings' absence plagues the *Anthropology*, and Kant recurs to it, remarking,

> It is noteworthy that we can think of no other suitable form for a *rational* being than that of a human being. Every other form would represent, at most, a symbol of a certain quality of the human being – as the serpent, for example, is an image of evil cunning – but not the rational being himself. Therefore we populate all other planets in our imagination with nothing but human forms, although it is probable that they may be formed very differently given the diversity of soil that supports and nourishes them, and the different elements of which they are composed. (282)

Kant both acknowledges the taxonomic interdependence of man and alien and refers to the representational impasse to which I have alluded. Faced with scant empirical information about extra-terrestrials, and unwilling to people the universe with part-beings, "symbol[s] of ... certain qualit[ies] of the human being," Kant justifies the imaginative hegemony of the human form as reason's physiology. Yet, he acknowledges the inadequacy of anthropocentric myopia given the geological, climatological and nutritional circumstances that allow aliens to thrive and condition their fundamental distinctness. Since, for Kant, humans have no terrestrial equal, he invokes the reasoning extra-terrestrial as, according to Clark, a "cipher," a being whose projected existence provides man's reasoning capacity with empirical certainty, but whose unknowability – a kind of embodied sublimity – may be exploited to mount critiques of humanity, via the imagining of its specific nature. He therefore postulates the alien as straddling the divide between a transcendent

system of moral reasoning and an empirical exploration of humanity's species-circumstances. Insomuch as Kant sees humans consistently replicating themselves in their understanding of the alien's difference he proscribes the empirical aptitude of their imaginative power.

If Kant the philosopher identifies the problem of alien representation but characteristically resists its resolution, Davy the scientist-mystic posits a provisional solution in the imagination's restless striving after futurity. Taking Jameson's and Kant's formulations together, I suggest that the *Consolations* illustrates that indeed the alien links the material with the transcendent and social praxis with utopian imagining, and that we can conceive of that alien if we continuously revise our systematic representations of it. In other words, the alien must be real, both because it offers humans a necessary relative and because its conception depends on sense impressions; nevertheless, our inadequate understanding of the alien's reality entices us to consider it imaginatively as an act – constantly reenacted – that is informed by our consideration of a changing world into which this alien might fit. And while Kant specifies that non-humanoid extra-terrestrials only symbolize proscribed human qualities – partiality as limitation, in other words – Davy begins from terrestrial parts to imagine the possibility of truly alien forms of reason in a new cosmos.

The *Consolations* invokes a holistic view of futurity, wherein the Saturnian sensorium fits its environment. The Genius explains that the massive colorful columns rising from Saturn's surface, like the planet's inhabitants, are intermixtures:

> Those columnar masses, which seem to you as if arising out of a mass of ice below, are results of art, and processes are going on in them connected with the formation and perfection of their food. The brilliant coloured fluids are the results of such operations as on the earth would be performed in your laboratories, or

> more properly in your refined culinary apparatus, for they are connected with their system of nourishment. (Davy, *Collected Works* 9: 244)

Here Davy joins the laboratory and the kitchen. Likewise he links artistic with scientific production alongside nutrition, suggesting that the genius uses such terms in the absence of a single descriptor that could communicate these columns' nature to Philalethes. The emphasis on substance and sustenance recalls the features that grounded the difference of Kant's extra-terrestrials – those material facts potentially undermining humanity's penchant for asserting its form as reason's precondition – though Davy goes beyond Kant in actually positing a non-human, reasoning alien body. Furthermore, not only do Saturnians have "modes of perception" incomprehensible to humans, their more familiar senses, vision and touch, exceed Philalethes's own. The genius goes on to show him a comet's inhabitants, explaining that the diverse entities they view are, in fact, related as a series of intellectual strata. Earthbound beings can, if they improve their intellectual faculties and seek virtue in their own environment, graduate to higher planes of existence, becoming Saturnians or Cometarians in turn.

Insomuch as Philalethes' utopian vision arises out of and responds to Davy's own historical moment, it seeks imaginatively to remedy the increasing fragmentation of his scientific scene. Jameson typifies utopian spaces as "foreign [bodies] within the social: in them, the differentiation process has momentarily been arrested, so that they remain ... momentarily beyond the reach of the social and testify to its political powerlessness, at the same time that they offer a space in which new wish images of the social can be elaborated and experimented on" (Jameson, *Archaeologies* 16). The Saturnians' integrated kitchen-laboratory-studios thus offer a critique of the eighteenth- and nineteenth-century divisions emerging between art and philosophy and within philosophy itself. Much as Kant had turned to the alien as a cipher for criticizing

society, Davy turns to his extra-terrestrials to query the stability of scientific institutions: to consider whether disciplines adequately organize knowledge or if a more syncretic epistemology could be pursued. Unlike Kant, however, Davy offers this composite alien as imaginatively generative. The Saturnians' ability to intellectually engage multiple planetary systems provides a model for rousing Romantic-era thinkers to strive after extra-terrestrial reason, lighted, as it were, by another sun, and thus draw together knowledge disciplines that would otherwise settle into exclusive institutional orbits.

Crossed Orbits and Reactions to Utopia

Yet this utopian vision of integrated knowledge does not comprise the entire *Consolations*, as subsequent dialogues rethink the utopian space above delineated. In the second dialogue Ambrosio challenges Philalethes's vision, persuading him to acknowledge it as a dream and a "fiction" (Davy, *Collected Works* 9: 253). Further, the later dialogues challenge the utopian detachment of the alien body by refamiliarizing it in a strange but explicable amphibian called the proteus. By way of these strategies the text undercuts its represented utopia. These challenges, coupled with the work's discontinuous form, exacerbate its alien character. Without attaining synthesis, it lets contradictory conceptions of progress, futurity, and the alien share the firmament, staging a sidereal dance.

The first staged opposition disputes the origin of human advancement. In Philalethes's vision, the genius narrates human progress from savagery to civilization as propelled by a not explicitly Christian energy; the genius never attributes human improvement to a God-granted spark of reason, instead positing a theory of associated ideas. This absence of divine initiation inspires the second dialogue's major controversy, in which Ambrosio argues against Philalethes

that God instilled reason in humanity, enabling humans' present developmental state. In Ambrosio's view, God drives human progress, which becomes a general providence. Philalethes first resists, but by the dialogue's end embraces this view. Even the skeptic Onuphrio, without wholly aligning himself with Ambrosio, embraces revealed religion. When the Unknown enters in dialogue three, he likewise supports Ambrosio's providentially-minded modification to Philalethes's secular-humanist vision. These modifications bring the latter's vision in line with Christian cosmology.

However, we see the pattern of disruption and resistance to unification repeated when, in spite of this seeming accord, Philalethes relapses to his original vision, expressing its attractiveness and attempting to draw consensus back towards the pantheistic cosmos. He hazards in the sixth dialogue that "It is, perhaps, rather a poetical than a philosophical idea, yet I cannot help forming the opinion, that genii or seraphic intelligences may inhabit these systems, and may be the ministers of the eternal mind, in producing changes in them similar to those which have taken place on earth" (*Collected Works* 9: 382). Philalethes here reinvokes cosmic pantheism, revising Ambrosio's revision of his own vision, thereby preventing a stabilized view of the motive force of human intellect. The text refuses to decide from among secular scientism, Christian theism, and modified pantheism: Philalethes' distribution of ideas between the "poetical" and the "philosophical," insofar as these epistemologies offer discrete systems, further overdetermines this refusal.

The Unknown then simplifies and naturalizes the alien body, providing an example of the institutional attitude Davy's text critiques. This occurs in the fourth dialogue when the Unknown describes to Philalethes and a new auditor, Eubathes, the physiology of the proteus, a subterranean amphibian now called the olm. The Unknown describes the proteus's composite

nature: “At first view, you might suppose this animal to be a lizard, but it has the motions of a fish. Its head, and the lower part of its body and its tail, bear a strong resemblance to those of the eel; but it has no fins; and its curious branchial organs are not like the gills of fishes” (*Collected Works* 9: 325). He explains that it is blind, lacks pigmentation, has breathing organs suited to aquatic and open air habitats, and seems to have underdeveloped physiological structures (hands, feet, and eyes). In hazarding that the creature might be the larval stage of “some large unknown animal inhabiting these limestone caverns,” Eubathes attempts to familiarize an unknown life form (a common response to the alien) through analogy: the proteus must be to some other creature as the tadpole to the frog (*Collected Works* 9: 327). Here, Eubathes positions himself relative to the proteus as Philalethes had stood to the Saturnians, that is, he seeks familiar sensory analogues to explain the unfamiliar. The Unknown, however, rejects this possibility, describing the proteus as “surely a perfect animal of a peculiar species,” insisting on its wholeness by arguing for its “perfection,” and staking its strange but complete being on the claim, “it adds one instance more to the number already known of the wonderful manner in which life is produced and perpetuated in every part of our globe” (*Collected Works* 9:327). The Unknown briefly preserves the proteus’s alien nature, only immediately to reconstitute that otherness as a familiar but as-yet-undiscovered terrestrial species; in his formation this terrestrial alien exemplifies the variety and adaptability characteristic of life-on-earth. The Unknown doesn’t appreciate the strangeness of the irreducibly other, but refuses it outright, on the grounds of science’s capacity to order all life.

Effectively, the Unknown refamiliarizes the alien by folding the unknown into a known and knowable system without formulating, in Jameson’s words, “a new kind of perception” (Jameson, *Archaeologies* 120). If the text as a whole aims towards this in concatenating

chemistry, geology, theology, and narrative, among other discourses, and harbors the ambition to perceive the proteus and the Saturnians for themselves, the Unknown here attempts to short-cut such a project by establishing science's hegemony. This making real of the alien, akin to Kant's use in the *Anthropology*, though more anthropocentric in not harboring any doubts about human reason's predominance, countermands the utopian distance of the text's Saturnians by rendering "the alien" intimate with the human: it needs only human scientific advancement, a particularly human form of reason, to become knowable. The Unknown implies that one need not visit Saturn to discover strange new creatures: human comprehension joined with a fundamental sensual aptitude can understand *this* alien, and so *every* alien. Elsewhere however, as I've noted above, Davy's text would seem to ask: if one has only seen the alien with old eyes what has one really seen?

Clear, here, is the impasse of the alien in Davy's text: the first dialogue defers its verifiability beyond a spatial barrier that Davy traverses imaginatively, but this latter dialogue defers it beyond time, awaiting only sustained human scrutiny – namely scientific analysis. An unpublished entry from Davy's 1801 personal notebook sheds light on the relevance of the proteus's "perfection" and demonstrates the implicit connection, for Davy, between humans and their alien others, a connection distinct from that the Unknown posits because it foregrounds the need for human perception to develop with the aliens it scrutinizes. He writes, "the human mind has not even yet attained its adult state; it has been gradually gaining new powers & faculties but it is as yet incapable of [] so as to produce the greatest possible effect; its parts are not firmly united together & they seldom act in perfect unity; many of its exertions are wholly thrown away. In short it [] awkwardness as well as the strength & activity of youth" (Personal Notebook, MS HD/13/C 51-2). Here the human, like the *Consolations'* narrative structure, exists in a

developmental stage characterized by "strength & activity," but also by disconnectedness. As the human race grows, so too will knowledge improve, cohering and coalescing humanity's various and disconnected "parts." For Davy, alongside the provisionality of the alien comes what Clark calls the "provisionality ... of the *anthropos*" (206), wherein humanity and its other are understood as developmentally intertwined. On this premise, the Unknown's hasty obliteration of the alien must be premature – it presumes the capacity to adequately comprehend the terrestrial alien without reforming the organs of perception, without reaching a nebulously deferred "adult state." By contrast, Philalethes' vision suggests that human sophistication surpasses itself ceaselessly; humans understand aliens only as they reconfigure themselves continually for the task. Granted, Davy wrote the above entry long before the *Consolations*, but as Cuvier and more recently David Knight have noted, the mysticism of the *Consolations* likely gestated in Davy's youth.[52] It turns out, then, that it is not only the proteus that exists in a larval stage, but man himself – not aliens who are fragmentary, but humans, whose "parts are not firmly united together." This is the only certainty the text offers. Otherwise it stages contradictions, confronting readers on the one hand with Philalethes's vision, in which the alien occasions a radical reformation of the human, and on the other with the Unknown's engagement of the proteus, a terrestrial alien explainable by science as is. As with the text's intellectual and historiographical commitments, the issue of the alien is not reducible to a particular stance, but vacillates among seemingly irreconcilable positions.

Combining Earths, or Working the Element

[52] On Davy's childhood see Knight, *Humphry Davy, Science and Power* 168-83.

By manipulating and linking the concepts of the chemical element and the poetic symbol Davy effects, in the *Consolations,* a disciplinary combination crucial to his utopian vision. Two distinct but linked objects hang around the Unknown's neck – a vial of chlorine attached to a rosary – which signify respectively the element and the symbol. In this and the next section of this chapter I will demonstrate how these objects, or rather their signified concepts, serve by their linkage to expose the tenuous scaffolding supporting disciplinary distinctions between the scientific and the poetic on the one hand, and between material and ideal on the other. Separated, they may be conceived as autonomous, which the Unknown, by several statements about chlorine that I will elucidate below, demonstrates of the element. Yet insomuch as these concepts ground their respective disciplines, chemistry and poetry, their proximity exposes structural similarities: each articulates for its respective discipline the crux between material plurality and conceptual unity. Practitioners of each concept's pertinent discipline tend to emphasize its nature as either primarily material (in the element's case) or ideal (in the symbol's). And yet, chemists experimenting with the element also inevitably engage speculation and imaginary work, in much the same way that poets considering the symbol must attend, through empirical observations of nature, to the material world as generating symbolic meaning.

The Unknown expresses skepticism at the effectiveness of each object as an object – he finds it incredible that chlorine should purge the air of diseases or that the rosary might create a connection to the divine. His calling into question of these objects' customary practical effects undermines their institutionally-associated, "intrinsic" meanings. Once such disciplinarily-guaranteed conceptual autonomy has been dispensed with, it is possible to consider these as ideas, the element and the symbol, that are products of rhetorical dispute, and therefore subject to arguments arising from outside typical disciplinary quarters. As these concepts lose their

expected meaning their constructed nature becomes clear – they are products of debates over the elementary status of a substances or of disputes over the legitimacy of religious icons. The element and the symbol may thus be rendered conversable between discourses and disciplines as common products of rhetoric. In the element's case this means divesting the concept of its status as straightforwardly the smallest material unit empirical chemistry can ascertain and querying the very nature of "simple substances," thereby complicating the discipline's materialist core and rejecting the rhetorical and theoretical simplicity of Davy's youthful injunction to "Think warranted by the facts" (Personal Notebook, MS HD/13/I 42). Ultimately, the *Consolations*, in gesturing towards the inherent compatibility of the element and symbol, transforms them, reiterating that combination itself has utopian potential to connect disciplines, and advocating that even the most distinct parts, if they cannot forcibly be made whole, might still be fruitfully subjected to the experiment of intermixture.

The *Consolations* evinces an ambivalent representation of the element: on the one hand, descriptive passages hint at its complexity, but on the other, the Unknown's dialogue – neglecting to recall the contentious experimental and rhetorical operations that historically established the elemental nature of his exemplary substance, chlorine – presents a deceptively simple view of the concept. The newly classified halogen, whose elementary status Davy had established (a fact not mentioned in the *Consolations*), appears only briefly in a description of the Unknown when, in the third dialogue, he first crosses paths with Philalethes and his fellow travelers: "his dress was very peculiar, almost like that of an ecclesiastic, but coarse and light; and there was a large soiled white hat on the ground beside him, on which was fastened a pilgrim's cockle shell, and there was suspended round his neck a long antique blue enamelled phial, like those found in the Greek tombs, and it was attached to a rosary of coarse beads"

(*Collected Works* 9: 280-1). The chlorine rests in a Greek-like vial, its substantiality occluded by the character of the vessel that contains it, and the rosary that suspends it around the Unknown's neck. In first viewing it, neither we nor Philalethes's friends can perceive the element in isolation; we only know it by its container and that which "suspends" it (or, to twist the phrase about, that which holds it in suspension). This descriptive passage thus underscores chlorine's connection to the symbolic rosary and also gestures to the fact that any element is at first only perceivable as it is contained in a more complex substance or structure. When the Unknown reveals the contents of the vial, however, he does so in a way that emphasizes its elemental singularity and potential utility:

> it is a mixture which slowly produces the substance *called by chemists chlorine, which is well known to be generally destructive to contagious matters*; and a friend of mine who has lived for many years in Italy, and who has made a number of experiments with it, by exposing himself to the danger of fever in the worst seasons and in the worst places, believes that it is a secure preventative. I am not convinced of this; *but it can do no harm*; and in waiting for more evidence of its utility, I employ it without putting the least confidence in its power; nor do I expose myself to the same danger, as my friend has done, for the sake of an experiment. (*Collected Works* 9: 281, emphasis added)

At issue here is the question of whether chlorine can function as an aerating antiseptic, not its substantial nature. The Unknown repeatedly characterizes the substance as simple: its name is a matter of settled chemical consensus, implying nominal simplicity; its destructive effect upon "contagious matter" is "well known," implying functional simplicity; and it "can do no harm," implying practical simplicity and easeful utility. By invoking this simplicity in tandem with the

consensus of chemists Davy marks this perspective as a disciplinarily bound one. The Unknown, here, limits his doubt to the legitimacy of chlorine's particular application, which orientation characterizes him in the mold of the applied chemist; deeper theoretical questions of substantial natures fall outside his purview.

By housing the chlorine in an antique Greek vial, the text suggests that this expectation of simplicity descends from the classical schema of the four elements that retained philosophical currency through the scientific revolution, and which I've discussed in my other chapters. He draws attention, here, to the skirmish chemists had been staging with their classical precursors. As I've noted, Davy followed Lavoisier's cue in denigrating the classical elements, noting in his *Elements of Chemical Philosophy* (1812) that "to generalize upon the great forms or powers of nature, as elements, requires only very superficial observation; and hence the theories seem to have originated, which have been attributed to Anaximander, and others of the early Greek philosophers, concerning air, earth, water, and fire" (*Collected Works* 4: 4). Here Davy describes the act of generalizing primary elements as excessively speculative, a byproduct of the Greeks' penchant for reasoning "more upon an imaginary system of nature, than upon the visible and tangible universe" (*Collected Works* 4: 5). Thus when Davy characterizes early elemental theories as "little more than a collection of vague speculations, rather poetical than philosophical," the characterization is pejorative; the poetical here is significantly diminished relative to "genuine science," of which the Greeks lacked even "traces" (*Collected Works* 4: 3).[53] The containment of chlorine within the antique Greek vial suggests that this outmoded epistemology still clothes the empirical element in a fanciful simplicity that informs the

[53] In the midst of his most intense research work, during his middle career while researching at the Royal Institution, Davy seems to have been more committed to establishing and maintaining a hierarchy which placed chemistry above poetry and more broadly above the literary in terms of cultural importance and real-world relevance, at least in his public lectures and scientific papers. This hierarchical impulse relaxed in his later life.

Unknown's perspective, chemically trained and intellectually sophisticated as he nevertheless is. The individuated element – the simple substance abstracted from the work of experiment and alienated from its series of chemical relations – is, at least in part, an imposition upon modern science by classical philosophy.

In his simplification of chlorine, one which elides not only the history of the element, but the experimental work that had gone into shaping scientific understandings of it, the Unknown effaces a terminological dispute in which Davy had participated. Davy himself nods to its historical complexity in an 1810 paper, the first to announce his focused and sustained attention to the substance.[54] It was first prepared in its isolated form by Swedish chemist Carl Wilhelm Scheele in 1774, who called it "dephlogisticated muriatic acid air," believing that it constituted muriatic (what we call hydrochloric) acid divested of phlogiston.[55] Scheele's commitment to the phlogiston hypothesis put him at odds with the modern elemental system eventually posited by Lavoisier; as such, though he first isolated it he cannot properly be said to have discovered its elemental nature. Implicit in this historical strophe is an epistemological complexity which, as per typical, the Unknown glosses over: he doesn't attend to chlorine's status as crux between

[54] Davy's researches into chlorine constituted part of a larger program of experimentation in electrochemistry, whereby he used the voltaic pile to analyze common compounds, especially fixed alkalies, into their component elements. The same methods had led to discoveries of the elemental forms of potassium and sodium by decomposing potash and soda (KOH and NaOH) in 1807. As such, Davy's 1808 and 1809 Bakerian lectures bear upon the processes used to establish the elemental nature of chlorine, a task first announced in a paper of 12 July 1810, "Researches on the oxymuriatic Acid; it's Nature and Combinations," which effort found its fruition four months later in his Bakerian lecture of 15 November 1810. All citations from Davy's papers on chlorine in this chapter come from a reprint published by the Alembic Club, *Elementary Nature of Chlorine*.

[55] According to Thomas Hankins, the principle difference between the Phlogiston theory and later theories of combustion is that "the principle of combustion is in the fuel rather than in the air" (94). In this view, combustion occurred when a substance already containing phlogiston expelled that substance into the surrounding air. If phlogiston already saturated the air, that atmosphere would be unable to support combustion. When Joseph Priestley first isolated oxygen, owing to its tendency to support combustion he called it "dephlogisticated air" on the premise that the air, lacking phlogiston, could accept greater volumes of that substance and therefore occasion more combustion. Lavoisier's rejection of the phlogiston theory, according to Hankins, involved resituating the principle of combustion from the fuel to the air, so that combustion occurred by a chemical combination between a substance and a combustible air. To account for the light and heat accompanying combustion Lavoisier posited "caloric," the matter of heat, which he suggested flowed from hot to cold materials, and, as a form of matter, was necessarily conserved in nature.

chemical systems. Subsequent to Scheele's isolation, French chemist Claude Louis Berthollet worked in 1785 to integrate Scheele's air into Lavoisier's new system, positing it as a combination of muriatic acid and oxygen, and dubbing it "oxymuriatic acid." In this view, rather than being an elemental substance, oxymuriatic acid was more complex than the already compound muriatic acid.[56] In 1809 Joseph Louis Gay-Lussac and Louis Jacques Thénard tentatively proposed the view that oxymuriatic acid might, in fact, be a simple substance, but postulated only in the hypothetical – it was a reasonable inference, they claimed, from the experimental evidence, but nowise definitive, and they subsequently abandoned the claim.[57] Davy's work in 1810 sought to provide a comprehensive proof of the elementary nature of the substance and to put to rest notions of its compound status. He announced the name "chlorine," owing to the green hue of the gas, in the November 1810 Bakerian lecture, attempting to wrench the substance away from its previous moniker, oxymuriatic acid, which had emphasized its compound character. In this sense, even though the Unknown doesn't refer to chlorine as an "element" but rather as a "substance," the invocation of "chlorine" itself settles the question: the idea of chlorine came into existence only in reference to a conceptually simple substance.

Lost in this historical effacement is Davy's own novel, if unsystematic, contribution to chemical theories of the element: namely, that by delegitimizing, via his research into chlorine,

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[56] The conceptual slippages between the phlogiston hypothesis and Lavoisier's system, produced primarily when terms, like phlogiston, with no clear stabilizing material referent needed translating into the new system, allowed Davy to claim Sheele as a forbearer in argument, exploiting his primacy against the so-called French school of Berthollet. He claimed in the paper of 12 July 1810 that "the illustrious discoverer of the oxymuriatic acid considered it as muriatic acid freed from hydrogen, and the common muriatic acid as a compound of hydrogen and oxymuratic acid" (*Elementary Nature* 21). Here, Davy recodes phlogiston as Hydrogen in the interest of saying that Scheele implicitly recognized the simple nature of chlorine and its component place within muriatic acid, even if he undertook his researches using an outmoded nomenclature, "obscured by terms derived from a vague and unfounded general theory" (*Elementary Nature* 28). In such a continuity, the French chemists' insistence on the composite nature of oxymuriatic acid can be characterized as a divergence to be corrected. Knight writes repeatedly about Davy's flirtation with a recovery of the phlogiston theory during his electrochemical researches, see *Humphry Davy: Science & Power* 68 and 83-6.

[57] For a brief but clear explication of the history of Chlorine prior to Davy's experiments see Knight, *Humphry Davy: Science & Power* 81-3. On Davy's professional rivalry with Gay-Lussac, see Crosland 95-120.

Lavoisier's theory of acidity (which posited oxygen as the acidifying principle), Davy gave way to an element both radically unstable and inescapably bound up with every other elementary substance. In other words, Davy's work on chlorine produced an element that more thoroughly linked the conceptually singular with material plurality. As I noted in this dissertation's introduction, Antoine Lavoisier had identified oxygen as the principle component commuting acidity upon any complex substance, drawing upon the commonplace that any given composite substance's characteristics must be inherited in total from one or another of its substantial components. Lavoisier plausibly inferred that oxygen was the acidifying principle, given that the acids with which the era's chemists were familiar all contained oxygen.[58] Hence, the presumption of the presence of oxygen in "oxymuriatic acid": if chlorine and its related muriatic acid were in fact acidic, given the terms of the French system, they would necessarily contain oxygen. Davy countered, however, in his July 1810 paper on oxymuriatic acid, that "few substances, perhaps, have less claim to be considered as acid, than oxymuriatic acid. As yet we have no right to say that it has been decompounded; and as its tendency of combination is with pure inflammable matters, it may possibly belong to the same class of bodies as oxygen" (*Elementary Nature* 33). The fact that Davy had been unable to decompose purified oxymuriatic acid by heating charcoal in a retort containing the gas – a typical procedure for attracting oxygen out of combination with other substances, as charcoal and oxygen demonstrated a particularly strong affinity – led him to believe that oxymuriatic acid had, in fact, no oxygen to attract. In the same paper Davy reiterated that oxymuriatic acid combined with hydrogen in equal measure produced muriatic (hydrochloric) acid. Essentially, Davy posited that a well-known and widely used acid lacked oxygen, supposedly the sole acidifying principle under the French system. He

[58] Granted, water contains oxygen and was not considered acidic, but such exceptions, rather than invalidating the theory, invited speculative justifications in what was still very much an evolving and unstable epistemology.

further suggested that chlorine may "in fact be a *peculiar* acidifying and dissolving principle, forming compounds with combustible bodies analogous to acids containing oxygene, or oxides, in their properties and powers of combination" (*Elementary Nature* 33).[59] Through Davy's work, then, chlorine, as an element, could be seen to profoundly unsettle the received system's understanding of acidity. It put forward a second acidifying principle, which, as John Hedley Brooke has made clear, led eventually, for Davy, to undermining the notion that substantial qualities necessarily followed directly and exclusively from elemental principles.

What does this mean for Davy's chemical theory, and by extension for his metaphysical and aesthetic perspective? Principle pluralism first delegitimized the very idea of a direct and simple inheritance of chemical qualities, and eventually cleared the way for the view that the act of combination itself commuted to a given complex substance characteristics contained in none of its parts in and of themselves.[60] Considered against the generative agency Davy attributes to generic combination throughout the *Consolations*, which I recount above, it seems appropriate to consider this a continuity between Davy's electrochemical work and his later prophetic-literary writings: in both generic and chemical instances, combination itself, and not just the principles coded in the combined parts, is vital for Davy and produces effects. Davy's unsystematic tendencies may have prevented him from offering a complete theory of acidity in replacement of Lavoisier's, yet his discoveries surrounding chlorine were far more earthshaking than the Unknown lets on in the *Consolations*. Though his discoveries remained unsystematized, they

[59] John Murray's first salvo on Davy's claim for elementary oxymuriatic acid, published in Nicholson's journal in February 1811, opened by asserting the revolutionary character of Davy's conceptual revision.

[60] In his refutation Murray made explicit the link between a second acidifying principle and the loss of a simple view of the way that substances might impart substantial qualities. He claimed that the common explanation of oxymuriatic acid as oxygen combined with muriatic acid was attractive for its "unity and simplicity," maintaining likewise that Davy's hypothesis would prove too complicated an explanation: "There is some improbability in the hypothesis of two acidifying principles distinct from each other, but exerting similar chemical agencies. The explanations which this involves of the combinations of these principles with inflammables and metals, and of the relation of water to them, are extremely complicated" (Murray 139).

nevertheless generated the conditions for rejecting Lavoisier's system, thereby opening up the element, for a brief time, into a less bounded field of relations. The Unknown, by contrast, stabilizes Chlorine by focusing on an applied chemical perspective, invoking properties of the substance that had been recognized since Scheele's discovery in 1774, while ignoring its contested elemental status – the intellectual controversy surrounding the substance most pressing for more than three decades.

Likewise, the Unknown's anecdotal narrative hints at the element's tendency to be reconstituted through rhetorical disputation at all levels of scientific praxis. Unmoored from a stabilized and singular chemical identity, the characteristics of any particular element had necessarily to be argumentatively established. The Unknown describes

> a friend of mine who has lived for many years in Italy, and *who has made a number of experiments with it*, by exposing himself to the danger of fever in the worst seasons and in the worst places, believes that it is a secure preventative. *I am not convinced of this*; but it can do no harm; and in waiting for more evidence of its utility, I employ it without putting the least confidence in its power. (Davy, *Collected Works* 9: 281, emphasis added)

Of note is the role of persuasion in establishing elementary characteristics: the friend's argument for his invention's antiseptic utility cites data, "a number of experiments," yet the Unknown remains unconvinced. Empirical work, presented persuasively, does not, as this admission emphasizes, beget truths simply or produce scientific assent without controversy. This inter-relation of nomenclature, scientific practice, and rhetoric recalls the situation described in Chapter Two, in which the element's status as the crux of these concerns left open the possibility

that Coleridge could resist the elementary logic of the period's lecture culture, ultimately adapting the concept of the element to his own ends.

Indeed, Davy's own experience with Chlorine – the strong resistance to his hypotheses as late as 1818 and the rhetorical and performative maneuvers he and his brother, John Davy, had to undertake to command attention and confirmation – demonstrates the simple truth that far from facts explaining themselves, the chemist had to make facts speak his truths. Golinski provides an instructive account of how Davy and his brother were able to turn "'the lever of experiment' by placing its fulcrum on the base of the relationship with his audience that he had so successfully constructed" (*Science as Public Culture* 219). In particular Golinski focuses on how, in the face of resistance from Scottish chemist John Murray, the Davys drew upon numerous institutional advantages to control the interpretive terms applied to otherwise common data sets.[61] The dispute as carried out in print journals didn't of necessity lead to a clear resolution; as Golinski emphasizes, Murray and the Davys could respond perpetually, countering in print each other's chemical interpretations, undermining the legitimacy of experiments on the basis of presumed methodical sloppiness or apparatus failure, but by self-consciously making use of the Royal Institution's public forum, bringing in high-profile witnesses to corroborate experiments in the Institution's laboratory theater, and drawing upon Davy's already established charisma and public persona, Davy and his brother were able to influence public opinion towards their interpretation of the data. Ultimately, as Golinski notes, scientific opinion coalesced around chlorine's elementary nature by roughly 1818, due to the discovery of other halogens – iodine and fluorine – whose chemical similarity to chlorine seemed to bear up its simple nature. Owing

[61] Murray's argument is striking for the degree to which it reiterates that Davy's argument is not outright inaccurate or unfactual. Rather, it lacks definitive necessity – again and again Murray offers the traditional explanation of "oxymuriatic acid" against Davy's "chlorine" as simultaneous possible interpretations, settling for the former because of its familiarity and presumed simplicity (it doesn't demand a reconceptualization of the nature of acidity).

to Gay-Lussac and Thenard's discovery of iodine in 1814, the French chemists likewise threw their support behind the elementary theory of chlorine (Golinski, *Science as Public Culture* 232). The point stands: the delay between Davy's initial discovery and what Golinki describes as its eventual broad acceptance arose from the need rhetorically to establish the element after doing so experimentally. Nevertheless, and in spite of increasing consensus, pockets of resistance, or at least theoretical uncertainty and hedging, persisted even until Davy's death. For instance, the notes to John Dalton's 1827 series of lectures on Chemistry given in Manchester introduce under the subheading "Simple or Elementary Bodies" a focus on "Chlorine or Oxymuriatic Acid" (Lecture Notes 14). Even if by 1827 Dalton assented to the elementary nature of the substance chlorine, he still hedged on the nomenclature.

Chemists worked to establish elementary identity, that is, singular substantial simplicity as inherited from the Greek system, through such rhetorical work and in contrast to the inherently multitudinous status of every empirical element as a composite of experiments, reactants, reactions, and phenomena. This is what I mean when I draw attention to the radically multiple and rhetorical nature of Davy's element; its singularity is only tenable if provisional – to be replaced by a future more perfect singularity dependent upon further experimentation. In this regard, it mirrors the utopian generic multiplicity of the *Consolations* – it is both one and many, whole and partial, and its completeness contains within it the conditions both of is disaggregation and recomposition as more perfectly complete in the future. While the *Consolations* defers its post-disciplinary utopia across a temporal caesura, however, the historical concept of the element achieved provisional stability as it crossed generic boundaries: namely from laboratory notebook to public lecture and published paper. In other words, discrete genres of scientific textual production came to represent different aspects of the chemical element – notebooks, on the one

hand, captured its material dimensions, recording complicated series of experiments and measurements, while lectures and public papers contained the inevitable rhetorical wrangling that would give way to its unified form.

I turn, now, to consider directly chlorine's textual history, in order to elucidate how its complex conceptual nature manifests in the chemical archive; I will return to the *Consolations* at this section's close to make clear the work this concept did for Davy's eventual utopian speculation. The lab notebooks record the element in its raw, experimental, and multifarious form. In the months before Davy's November 1810 lecture he combined oxymuriatic acid gas with a host of substances: ammonia, tin, zinc, potash, hydrogen, and charcoal, among others. Furthermore, he recorded volumes of precipitates, the colors of flames and fumes produced in reaction, their smells, and even their tastes. In his effort to arrive at the nature of chlorine, Davy accumulated observations about reactions, determining what would combine with oxymuriatic acid and what would not. The simplicity he would eventually announce in his lecture was only conceivable, and verifiable, as the product of a host of relations, an ever-expanding array of substances, some simple and some not. From this glut of data, he chose particular combinations to highlight in his lectures, crafting an experiment narrative to produce conceptual singularity (an element) out of plurality (a host of experimental phenomena). He forcefully asserted and defended the singularity and identity of chlorine in public lectures, in particular, arguing for the inaptness of designating a substance "oxymuriatic acid" which contained no oxygen and was not, as he claimed, composite.

While high-profile lectures and public papers crafted data and interpreted phenomena to particular argumentative ends, especially seeking to establish definitive discovery narratives, laboratory notebooks served as the textual grounds for such rhetorical exercises by offering up

and standing for an objective recording of phenomena. Practically, for Davy, the lab notebook recorded quantities and empirical close observations, eschewing interpretation, even refusing to mark scientific epiphanies. For this reason, such notebooks symbolized the "objective," promising an unmediated textual archive of natural phenomena: the split between notebook and published paper was that between data and interpretation. The Royal Institution's lab notebook's first use of "chlorine" comes in an entry dated November 24th, 1810:

> 2 grs of Silver were intensely converted into hornsilver. - The absorption of chlorine gas was 9/10 of a cubic inch. - There was no sublimate whatever. - Where the hornsilver was in contact with the glass it acquired a light reddish yellow - the glass was stained this colour - the retort was of white glass. The stop-cock had been used in several expts with chlorine gas, so that little or none could have been absorbed by the brass. (Davy, Laboratory notebook 403)

I stress this inaugural usage's unannounced character. The entry provides no fanfare, no rhetorical set-up. Nor does the notebook record a clear epiphany when Davy either recognizes the substance's simple nature, or stumbles upon the perfect new designation; its pages contain only a series of experiment descriptions recording measurements of mass and heat, and observations of sensed phenomena. The method Davy undertakes involves combining as many substances as possible with the one under scrutiny, and subjecting any precipitates to the same battery of tests and combinations. Also of note, the nomenclatural shift is surreptitiously retroactive; though this is the first recorded experiment with the new element "chlorine," "the stop-cock had been used in several expts with chlorine gas." This shift doesn't inaugurate a new understanding, but rather rewrites every prior instance of Davy's investigations into oxymuriatic acid. Even though the shift to "chlorine" represents a fundamental reconceptualization in the

chemical system, the language of this entry and its passive voice construction completely elide the scientist's role in making this discovery and positing this terminological change – "oxymuriatic acid" was always already "chlorine." Here we see a carefully restrained experimentalist rhetoric: the language of the notebook downplays the activity and identity of the experimenter and refrains from making theoretical or conceptual conclusions, thereby alienating broader epistemological interventions from the experimental data that justifies them, while also distributing distinct methodological tasks between different genres of scientific textual production. Interpretive efforts are the purview of the published paper and public lecture – spaces in which accumulated observations are transmuted with rhetorical flourish into contentious scientific claims.

However, the lines of influence among lab notebook, scientific publication and scientific public run multi-directionally; the rhetorical disputes that arise out of publication occasion perceptible changes in the "objective" space of the notebook, demonstrating the entwining of the element's supposed material and rhetorical dimensions, a point which I demonstrate below by a close-reading of the nomenclatural shifts in Davy's lab notebook. Over the next several months' worth of entries it vacillates on the designation of the new element between "chlorine" and "oxymuriatic acid," during which time scientific journals remediated Davy's lecture and other chemists responded to, accepted, or rejected his claims. Given that, as I've noted above, Davy and his lab assistants rhetorically constructed the notebooks to be a space in which to record unornamented "objective" observation, deliberately free from theorizing or the announcement of general rules, this terminological slippage represents a contingency in the very objectivity the notebooks purport to record. In other words, this discrepancy constitutes a trace in the "real" element of the rhetorical disputes it inspires.

Date	***Word***	***Hand***	***Possible Precipitating Event***
Pre- Nov. 24th	Oxymuriatic Acid	variable	
Nov 24 –Dec 14th	Chlorine	Edmund Davy	Bakerian lecture: proposes designation "chlorine"
Dec. 14th	Oxymuriatic Acid	Davy	
Feb. 6th, 1811	Oxymuriatic acid	Edmund Davy	Murray's dispute with Davy over nomenclature, pub. In Nicholson's *Journal of Natural Philosophy, Chemistry, and the Arts* (Feb. 1811)
Between March 13th and June 29th and after	Chlorine	Davy, then both	

As we look at the chart, we see the notebook vacillating between the terms "oxymuriatic acid" and "chlorine." From November 24th (immediately following the Bakerian lecture) until December 14th's entry, the notebook refers to "chlorine" in a series of experiment descriptions (Davy, Laboratory notebook 429). The hand is neat and carefully legible, the experiment narratives minutely detailed. Likely, this hand belongs to Humphry Davy's cousin and assistant Edmund. After December 14th, the entries once again utilize the term "Oxymuriatic Acid." Simultaneous with this recurrence to the older term the hand changes, shifting to a hurried and fragmentary scrawl, most certainly Humphry Davy's own, in which measurements and brief outlines of observations are jotted in incomplete form. Given the contemporaneity of the terminological shift with the change in hand, I suggest that this inconsistency demonstrates a difference of terminological commitment among the men working in Davy's lab, rather than an agreed-upon shift in nomenclature. In other words, Edmund Davy more quickly took up his cousin's proposed naming, while Davy himself awaited broader chemical consensus. On the one hand, this demonstrates the inevitable plurality of a collaborative lab space and allows

ambivalence or surmise to enter the laboratory, inflecting the work of fact-making. Yet if we look at the entry for February 6th, 1811, we see that Edmund Davy recurs to "oxymuriatic acid" (Laboratory notebook 507), suggesting either a lag in communication between Davy and his lab assistant, or a response to the increasing controversy surrounding the designation. Humphry Davy first adopts "chlorine" in an experiment description recorded sometime between March 13th and June 29th (Laboratory notebook 545). The reversal is striking, with Edmund Davy recurring to "oxymuriatic acid" and Humphry adopting "chlorine" at nearly the same moment. The precipitating event for this double shift may have been John Murray's first disputation of Davy's designation in Nicholson's *Journal of Natural Philosophy, Chemistry, and the Arts* in February of 1811. Likely, these discrepant terminological shifts, following so soon on the heels of Murray's refutation, might constitute the reactions of different levels of scientific authority, with lab assistant Edmund Davy retreating to retrench on the issue of naming, and Davy – more established and motivated by professional pride – doubling down on his terminological neologism.

Even as different genres of scientific textual production – the lab notebook vs. the published article – reinforced the split between experimental or observational practice on the one hand and controversial theory on the other, a reverse recognition was unavoidable: that said division must inevitably break down. The element's individuation required its disentangling from the muddle of phenomena that, in fact, grounded it. The abovementioned break-down, in effect, resulted from the paradoxical situation that on a theoretical level any element, in order to be unified by a principle of self-identity, needed to be sundered from the other substances populating its experimental record, while on a practical level any such absolute sundering would alienate the conceptual element from the material data justifying its individual nature. Put

simply, at no stage could the public work of theorizing be completely disentangled from experimental practice, nor was practice as resistant to theoretical incursion as chemists might aspire to make it. I'm not suggesting that Davy expressly articulated and avowed this break-down as a part of the chemical discipline's mode of operation during the height of his experimentalist career any further than to acknowledge the element's provisionality; to do so would have undermined the claims he was trying to make in a scientific discourse heavily dependent upon an empiricist experimental methodology that assumed the self-evident truth value of facts.

I do maintain, however, that the *Consolations*, written late in his life and drawing together his professional chemical work with his mystical, moral, and philosophical aspirations, seeks to demonstrate and then exploit the element's tendency uneasily to straddle the division between chemical theory and practice. By juxtaposing element and symbol, placing around the Unknown's neck the vial of chlorine attached to the rosary, the text undermines the element's "definitive" disciplinarily established facticity, inviting us to reconsider the Unknown's explication of the element's self-evidently empirical stability. I've followed this cue by drawing upon the history of that concept as it relates to the element chlorine (itself invoked in the *Consolations*) to show that the Unknown's talisman signifies a modified element freed from strident empiricism, an element poetically hybridized by its proximity to the symbol.

A Spirit from another Planet, or the Matter of Poetry

On the one hand, the model of the chemical element to which the Unknown commits eschews its complicated empiricist context by eliding theoretical disputes and focusing on issues of practical or applied chemistry; on the other hand, it embraces its classical inheritances

alongside a number of "romantic" expressions of the element's nature. In the fifth dialogue the Unknown describes "man in his highest state of cultivation," "making the winds carry him on every part of the immense ocean; and compelling the elements of air, water, and even fire as it were to labour for him" (Davy, *Collected Works* 9: 352). Amongst a breathless litany of other scientific and technological accomplishments ornately described – including animal domestication, explosives, irrigation, poetry and print technology – the Unknown here reverts to the classical four elements to capture the apex of human cultivation. Strikingly, the text's ordained chemist (the others will later quiz him about chemistry in order to test his expertise) draws upon the very "imaginary system" from which both Davy and Lavoisier sought to distance themselves at the turn of the century. Eubathes's response that "Really you are in the poetical, not the chemical chair" (*Collected Works* 9: 352), makes explicit the unscientific nature of this perspective. When later describing the potential danger of chemical work the Unknown intones that "the business of the laboratory is often a service of danger, and the elements, like the refractory spirits of romance, though the obedient slave of the magician, yet sometimes escape the influence of his talisman, and endanger his person" (*Collected Works* 9: 365-6). No doubt Davy had plenty of anecdotes of chemical danger with which to furnish the Unknown, especially considering his time at the Pneumatic Institute breathing unknown and often poisonous gases, but he chooses here instead to emphasize cross-generic metaphoric borrowing, invoking the magician, a kind of anti-scientist, to stand in for the chemist. As with the Greek inheritance, this instance may have in view a prior state of chemistry: namely seventeenth century alchemy's preoccupation with occult substances and its often nebulous orientation to natural magic.[62] Even though the Unknown often takes a position contrary to the poetic, conspiring to debunk, for

[62] On early-modern resonances between natural and practical magic and the artisanal and practical ambitions of the likes of Paracelsus and Francis Bacon, see Dear 47-63.

instance, Philalethes's original vision, he nevertheless has recourse to the poetic to describe scientific knowledge.

The Unknown demonstrates by his discourse and demeanor that the chemist ought to cultivate a multi-disciplinary orientation to knowledge – that he should not eschew the imaginative, the poetic, or the human in pursuit of an empiricist practice oriented towards objectivity. He at once commands chemistry and several other schools of thought. In this sense, his poetizing of the element constitutes an epistemological hybridizing of the concept, rather than merely a mistake. No doubt from the point of view of a specialist chemist his disengagement from the material might seem rash dilettantism, but a poetically inflected element might, in fact, be more attuned to engaging with questions that a narrowly disciplined or practical chemistry simply wouldn't consider. Tellingly, the Unknown draws upon these outmoded and poetic versions of the element most when trying to relate chemistry to the wider social world via its indispensable usefulness to civilization. Much like Davy the lecturer, he welcomes fancy into the orbit of science on the condition that it assist in popularization or paradigm formation.[63] In fact, the Unknown lists diverse types of knowledge without which "a man may be a good practical chemist, […] but he never can become a great chemical philosopher" (*Collected Works* 9: 363): requisites include basic mathematics, natural philosophy and general physics, mechanics, Latin, Greek, French (and if possible German and Italian). In addition, the Unknown claims the chemical philosopher must attain "in natural history and in literature, what belongs to a liberal education, such as that of our universities" (*Collected Works* 9: 364). The chemical philosopher, that is, to Davy, the chemist possessed of genius who stands in contrast to the working "practical chemist," must be conversant in many types of knowledge. Perhaps even more illustrative of the

[63] See Chapter Two.

Unknown's breadth of epistemological endeavor is his moniker: some manuscript drafts of the *Consolations* denote him "Philo-Chemicus," lover of chemistry, but the published versions calls him "the Unknown." During the revision process he goes from being nominally associated with a particular scientific discipline, chemistry, to being completely disciplinarily unaffiliated – even more radically, he is "unknown," as if he represents a concoction of knowledge-types beyond human perception and understanding. In this sense, the sublimity underlying his only identification – that of "the Unknown" – coupled with his expertise's diffuse nature, mirrors the *Consolation's* own unknowable genre.

In this regard, the Unknown personifies the conflation of knowledges – just as the charm around his neck joins element and symbol, so does his discourse partake of the diverse disciplines for which those concepts are so significant. He effectively removes the discipline-specific constraints of each of these central concepts, acknowledging their rhetorical contexts and making them conversable. Above I've explained the empiricist context of the element, those historical and experimental conditions which enabled Davy's unique formulation in the *Consolations*, and the ultimate decoupling of the concept from its exclusive contextualization within Romantic-era chemical practice. I will now turn to the symbol as it appears in both Davy's thought more broadly and in the *Consolations* specifically. In particular, I will focus on how its proximity to the element underscores its unexpected materiality, which aspect had allowed the concept to do the work of uniting object and subject, matter and spirit, for Coleridge and the German Romantic thinkers who preceded him. In this instance, however, Davy's juxtaposition emphasizes the inherent redundancy between the two concepts which, nevertheless, were typically alienated from each other during the period by their disciplinary contexts.

What I am arguing for, then, is to look to Davy the chemist for a deliberate aesthetic consideration of the symbol as a concept, even if his engagement is neither protracted nor direct. By this I mean that Davy takes up the concept as coherent, and uses it as an analogue to effect a reconciliation of the poetic and the scientific. It is precisely the symbol's necessarily material extension that makes it useful for Davy. Considered in this way, we can see that the symbol and the element function similarly. Admittedly, Davy's aesthetic engagements never attain the level of completion of Coleridge's or Hazlitt's, nor does he publish them. His early notebooks contain only fragments of aesthetic criticism, incomplete efforts to undergird the poetic career he never fully undertook. Such metaphysical-poetic investigations largely disappear from the journals as he fills them more completely with natural philosophical observations; even so, his own poetry persists as a prominent feature in his personal journals as statements of poetics grow more infrequent.

Davy mentions the symbol directly but infrequently; however, a poetic fragment from his 1812-15 commonplace book offers a conceptualization of the symbol resonant with that active in Romantic aesthetic discourse. According to Coleridge in *The Statesman's Manual* (1816), the symbol is

> characterized by a translucence of the Special in the Individual or of the General in the Especial or of the Universal in the General. Above all by the translucence of the Eternal through and in the Temporal. It always partakes of the Reality which it renders intelligible; and while it enunciates the whole, abides itself as a living part in that Unity, of which it is the representative. (Coleridge, *Lay Sermons* 30)

Davy's relationship with Coleridge during the years leading up to the publication of *The Statesman's Manual* suggests at least the possibility for direct aesthetic influence. Coleridge's major critical treatises famously articulate the aesthetic ideas with which he had been experimenting in his notebooks and lecture series for years, so that Davy's fragment, composed 1812-15, would have been written during a period when Coleridge was most actively considering the symbol. Davy's poetic fragment, a short piece of natural description, strikingly draws upon Coleridge's linking of the symbol with eternity – I've preserved Davy's revisions below in order to highlight the ideas with which Davy struggled most, and to read the specific relevance of the changes he made: [64]

> When the Cataract rushes amidst woods,
>
> Over rocks ~~of its own creation~~ which its [] murmuring waters
>
> Amidst the music of the floods have formed.
>
> [left margin: "lovely shines"] How sweet it is to view the waves
>
> ~~Rising as if it's in~~
>
> The ceaseless motion, tinted by the sky.
>
> To hear its murmuring increasing
>
> -Aye such a scene ~~of time~~ as this becomes the [river]
>
> Of time, & [] the great symbol of eternity.
>
> -That sky remains, its humble light shall change,
>
> But every vernal year shall ~~[] bring~~ radiance bring
>
> And the same western light. (Davy, commonplace book 9)

[64] In order to articulate, as clearly as possible, the character of Davy's revisions I've taken several typographical steps. Any legible excisions I've here marked by a strike-through. Replacements (usually written above excisions in Davy's manuscript) I've written in superscript.

Here Davy invokes the "cataract" and the "floods" as "the great symbol of eternity." The "same western light" shines on the waters every year, even as that sameness preserves the capacity for minute and "humble" changes of gradient or color. The need to assert permanence, while also preserving variety and difference, represents an attempt to reconcile the possibility for a long-term unified and abstract character to light that nevertheless accords with measurable, actual changes in the empirical immediacy of that light. The canceled words "of its own creation" emphasize also the material nature of this symbol: it acts in and upon the world that it also describes; in Coleridge's words, it is "a living part in that unity" (Coleridge, *Lay Sermons* 30). The river not only stands transcendentally for eternity, but also ceaselessly transforms the stones that rest in its path. In the lines, "Over rocks which its murmuring waters / amidst the music of the floods have formed," Davy recoils from simple descriptive statements, instead engaging greater metaphoric abstraction by attributing musicality to the flowing stream. No doubt erosion remains the predominant active force in this symbol, but the new lines draw attention to the water's "murmurs" and "music," an aestheticizing of otherwise natural processes. Thus, Davy revises his image to render it transcendent, rather than simply empirically descriptive. This series of revisions, therefore, demonstrates Davy's striving towards a particularly Romantic conception in his invocation of the "symbol." As the above juxtaposition with *The Statesman's Manual* makes clear, Davy's aims are consonant with Coleridgean aesthetics in that they effect a linking of eternal and temporal, universal and general, ideal and material.

The symbol emerges in the *Consolations* as a conceptual bridge between different views of history that the text initially posits as antithetically opposed: on the one hand a providential historiography focused on spirit, and on the other a geological history concerned with matter. The preponderance of the second dialogue hinges on Philalethes's antagonist-friend Ambrosio

refuting Philalethes's cosmic vision because it eschews divine influence and providence. Ambrosio's is a history primarily concerned with spirit. By contrast, the Unknown offers up in the third dialogue a historiography conditioned by geological theories of "deep time" still considered radical during the Romantic era because they undermined prevailing geological systems by positing a planet much older than Biblical interpretation would allow. Noah Herringman has argued for geology's special aesthetic value as a marker for brute objectivity or materiality: Romantic rocks "manifest materiality as something that is actually recalcitrant" (Herringman 13). Keeping this in view, we can see that the *Consolations* stages a dispute via these two historiographical models: between the spiritual or ideal and the material or real. Fundamentally, the dispute Davy dramatizes can be reduced to one between rival schemas for structuring the planet's human history. He establishes the view from providence as one that imagines planetary and human history as driven by catastrophic events and characterized by discrete and successive world-orders, a discontinuous history, whereas the geological worldview is uniformitarian in nature: it posits a gradual change in the shape of the planet over vast periods of time through uniform and still-active processes like erosion.[65] The text reconciles these discrete historical paradigms by way of a particular symbol, the Jewish Temple at Jerusalem, communicated in a mysterious dream-vision experienced by the Unknown, and which reconciles religious prophesy and scientific understanding. In fact, that the symbol emerges so implicated with prophesy suggests that, like the element, it is bound up for Davy with a utopian disposition towards futurity.

[65] Arguing against the idea that only catastrophic events could explain changes in terrestrial features James Hutton wrote, "we are not to suppose, that there is any violent exertion of power, such as is required in order to produce a great event in little time; in nature, we find no deficiency in respect of time, nor any limitation with regard to power" (Hutton 182). He primarily intended to communicate that geological change could and did happen gradually over greater and slower spans of time than philosophers had conceived.

The *Consolations* unites these discrete historiographical models, and by extension matter and spirit, in a symbolic dream the Unknown describes in the third dialogue as undergirding his Anglican faith. The impulse to recount this dream comes in response to hearing Philalethes's vision and Ambrosio's revisions to it. The Unknown approves of these critiques, likewise advocating the importance of revelation to reason: "After I had formed the idea that revelation was to man in the place of an instinct, my faith constantly became stronger; and it was exalted by many circumstances I had occasion to witness in a journey that I made through Egypt and a part of Asia Minor, and by no one more than by a very remarkable dream which occurred to me in Palestine" (Davy, *Collected Works* 9: 305). In his dream, he says, he nodded off on a rocky outcropping overlooking the sea and woke (within the dream) to find himself accosted by a "sacred madman" (*Collected Works* 9: 306), who turns out to be Alypius of Antioch, the architect the Roman emperor Julian commissioned to rebuild the temple of Jerusalem in order to "belie the prophesies" and bring about Christianity's downfall (*Collected Works* 9: 307). As a "sacred madman" Alypius represents a symbolic archetype. Emperor Julian was famously a neoplatonist and pagan, and Gibbon (whom the Unknown had been reading before falling asleep) interprets Julian's attempt to rebuild the Jewish temple as an example of his vitriol towards Christianity and his hope of delegitimizing Jesus's prophesy of Matthew 24:2 regarding God's complete destruction of the temple. At stake, then, in both Gibbon's and Davy's readings, is the authenticity of Christian Revelation itself, that is, its capacity to be symbolically true, to connect the language of scripture to lived experience and reality.[66] However, a divine catastrophe ultimately prevents Alypius's and Julian's success. In the Unknown's dream, Alypius recounts to him the "tremendous storm" that destroyed his assistants and the "lightning from heaven" that

[66] Coleridge's *The Stateman's Manual* is scant on exemplary symbols, but if anything, it offers up biblical language as quintessentially symbolic.

blasted him (*Collected Works* 9: 307). In this narrative, catastrophic upheaval answers the threat to Revelation, creating a closed system of prophesy and counter-prophesy. In retribution for Alypius's attempts to undermine Jesus's prophesy, the Divine decrees that the architect must wander the world suffering until every part of the temple is destroyed. Alypius, therefore, becomes a symbol of divine retribution and of God's power, insomuch as his heretical aims failed and his suffering must persist until prophetic conditions of God's designation are met. Only the prophetic, in this formulation, can foreclose the prophetic – spiritual power remains subject only to itself.

The *Consolations*, however, modifies this spiritual cycle by rendering prophesy explicitly subject to natural processes as understood via natural philosophy: the Unknown accidentally frees the "sacred madman" from his curse in a very material way – by throwing a rock, and ultimately initiating a process of erosion. Alypius having communicated the nature of his curse to the Unknown and explained that he has wandered for "fifteen tedious centuries" (*Collected Works* 9: 307), subsequently reveals that the Unknown has unknowingly satisfied the terms of the curse: "I now stand in the dust of the pagan temple. You have just thrown the last fragment of it over the rock" (*Collected Works* 9: 307). Thus, although the curse begins with the catastrophic violence of a freak storm and earthquake, its ending remains unnarrated, for the Unknown never describes having thrown the rock that breaks the curse. The very material nature of that action annexes this prophetic cycle to natural philosophy. The particular character of the Unknown's rock-throwing figures a Huttonian premise, namely the action of erosion as it sweeps geological matter into the sea. The temple, symbolically charged in that its completion would have falsified scripture, ceases to be, its power dispelled by geological cycles that press its matter into strata, recycling it via the planet's natural rhythms. Significantly, the unnarrated nature of

the Unknown's action suggests an invisible process, or one which escapes perception, much like the barely perceivable processes of gradualist geological change. That Alypius, upon being cleared of the curse, "rush[es] towards the sea, [throws] himself from the rock and disappear[s]," thereby passing like the tower's remnants into the ocean, reaffirms this plutonic resonance (*Collected Works* 9: 307). Natural cyclical processes sweep all matter, including even the man whose life catastrophe conditions, towards the globe's central furnace to be recast.

In the final stage of Davy's process—spirit's erosion into matter and subsequent return—providence's materialization reaffirms faith. The Unknown's dream seems to vacillate between reality and fantasy. Its vibrancy leads him to wonder, upon being woken by his traveling companions, if he had actually met Alypius, and he recalls asking them whether they had seen the man throw himself into the sea, to which they reply they had not. He explains, "when I looked on the sea, there was the same light, and I seemed to see the very spot in the wave where the old man had sunk" (*Collected Works* 9: 307). In this sense, the dream hovers between a spiritual vision and a verifiable factual sequence; upon waking, the Unknown can neither affirm its reality nor its dream status. Furthermore, he confides that "the image of the subject of it was so peculiar, that it long affected my imagination, and whenever I recurred to it, strengthened my faith" (*Collected Works* 9: 308). Though the content of the dream materializes the spiritual, its form serves a spiritual end, the strengthening of faith. In a sense, this is the thrusting back up to the surface of reconstituted matter as recycled spirit. The Unknown's emphasis that his faith strengthened "whenever I recurred to it," emphasizes the perpetual nature of this cycle. Davy's formulation reconciles spirit to matter, catastrophic providence to gradualist erosion, and religion to geology, through a process of cyclical becoming.

I would suggest, then, that the *Consolations* engages the symbol in a way that runs alongside Davy's clear preoccupation with the element. In point of fact, it is the restless nature of the symbol's vacillation between what Coleridge calls "enunciating" and "abiding," between representation and participation, which allows Davy to conceive of a reconciliation of matter and spirit. In reference to the Unknown's dream, the sedimentary remainder of the forbidden temple constitutes the empirical substratum of a much larger symbol, namely the temple itself and the curse its reconstruction occasions. Because the spiritual dimension of the symbolic temple is tethered to its material base, the curse itself cannot outlive the moment of its volcanic reformation – to change the form of the stone is to change the form of its spiritual meaning, but not, importantly, to terminate its eternal character. In fact, the curse lives on as a trace enlivening the Unknown's faith: "the image of the subject of it was so peculiar, that it long affected my imagination, and whenever I recurred to it, strengthened my faith" (*Collected Works* 9: 308). Thus, the termination of the curse becomes a further strophe in the symbolic development of the temple-as-symbol. Before an anathema for Alypius, the temple becomes a proscription for the Unknown (against hubris or impiety) and likewise a marker of the material character of divine edict and the promise of humanity's capacity to act upon the divine by an understanding of natural processes, namely, in this instance, erosion. Even in its absence, the temple persists as a warning and a truth; just as its matter has been recycled as a layer of sediment to be thrust upwards again at some point in the future by a volcanic action, so does the curse reconstitute as the bedrock of faith. In this way, symbolic unity enfolds within itself a neverending sequence of permutations and reinterpretations, reconciling particularity with eternity repeatedly in perpetuity – here again, emerges the endless process of recombination that characterizes Davy's generic and chemical experimentations.

Most important, however, for effecting the *Consolation*'s disciplinary reconciliation between chemistry and poetry, is the explicitly hybridized rosary attached to the phial which the Unknown wears. In talking about this overt symbol of piety, the Unknown reaffirms its doubled character: it both represents divine love, and "partake[s] of reality" by serving as a "living part in that unity" (Coleridge, *Lay Sermons* 30), what I have called its transcendent and empirical dimensions. Ambrosio first draws attention to the Unknown's rosary, assuming that the chemist shares his Catholic faith. In this instance, Ambrosio indicates the typical and inescapable symbolic freight of the religious ornament. The Unknown, however, responds that he is not Catholic, imparting "I was educated in the ritual of the church of England; I belong to the church of Christ; the rosary which you see suspended round my neck, is a memorial of sympathy and respect for an illustrious man" (Davy, *Collected Works* 9: 310), Pope Pius VII; imprisoned at Fontainebleau. The Unknown, therefore, acknowledges this symbol's traditional religious context, but alludes to another means of considering its poignancy, namely, a kind of relational appreciation. He wears this rosary as a marker of human affection because it was passed to him by "an illustrious man" – here, by its empirical circulation, rather than by representation, the symbol gains an emotional meaning distinct from its spiritual one.

The Unknown's admission that he does not practice the faith typically associated with a rosary marks the beginning of a de-emphasis of its sacramental value – much as the element is decoupled from its exclusive chemical context so as to be amenable to other epistemological modes, this particular symbol becomes disciplinarily conversable. The Unknown does not believe in its Catholic underpinnings – though he shares a related faith – wearing it for a different purpose than Ambrosio presumes. He describes having acquired the rosary during a trip to the Holy Land: "I had just returned from the Holy Land, and had in my possession two or

three of the rosaries which are sold to pilgrims at Jerusalem as having been suspended in the holy sepulcher" (*Collected Works* 9: 310). The Unknown here articulates his disinterested relation to the supposed relics. The rosaries "are sold to pilgrims at Jerusalem as having been suspended in the holy sepulcher," a construction which suggests a degree of disbelief. The Unknown espouses no certain faith that the rosaries actually hung in the sepulcher, but can only report this belief as the pretense under which they were sold to him. Likewise, his indistinct recollection of the number of rosaries he purchased, "two or three," suggests a noncommittal engagement. At least initially, these rosaries are souvenirs, not relics, a fact which emphasizes, as with the text's engagement of travel narrative, the capacity for travel to signify epistemological mobility. Travelling back from his excursion the Unknown had met the imprisoned Pope Pius VII at Fontainebleau, to whom he offered up one of the rosaries, intending it as a gift. Mistaking the nature of his offer, the pope kissed the rosary and returned it to him, now with a pontiff's blessing. The Unknown describes his gratitude: "the blessing he had bestowed upon it and the touch of his lips made it a precious relic to me, and I restored it to my neck, round which it has ever since been suspended" (*Collected Works* 9: 310). That the pope's kiss invests the rosary with "preciousness" seems to suggest the Unknown's embrace of the pontiff's spiritual preeminence. A later description of the rosary, however, clarifies the nature of his newfound spiritual attachment:

> I preserve it with a kind of hallowed feeling as the memorial of a man, whose sanctity, firmness, meekness and benevolence are an honour to his church and to human nature; and it has not only been useful to me, by its influence upon my own mind, but it has enabled me to give pleasure to others, and has I believe been sometimes beneficial in insuring my personal safety. (*Collected Works* 9: 311-12)

Here, the symbolic act of blessing charges the rosary by general respect and humanitarian affection, rather than by any vested ecclesiastical authority. The blessing is a worldly more than a divine one, but carries a comparable weight, at least for the Unknown. What's more, he also treasures the rosary for its ability to act in the world; it has "been useful" as a physical mnemonic for his own faith – in human love and goodness – as a relic with which he can please those around him (those who do believe in the pope's blessing), and as a kind of passport in his future travels. The Unknown explains that the respect the rosary inspires has afforded him safe passage among hostile populations. This special power, of course, owes its efficacy not to the filial respect characterizing the Unknown's conception, but to the recognized power of a pope's blessing among Catholic believers. Thus, the rosary accumulates symbolic significance (much in the way of the tower above) by virtue of its connection to and circulation in the real world. Once again, Davy's text posits the symbol not as a stable signifying image, but, a la Coleridge, as an object active both spiritually and physically, and whose meaning transforms relative to its circulation and proliferation. Furthermore, he exploits this worldly dimension of the symbol to emphasize its capacity to traverse disciplinary boundaries.

Importantly, neither the element nor the symbol is entirely divested of its customary disciplinary relevance – as these concepts migrate across epistemological borders, the Unknown asserts, neither species of knowledge must be subjugated to the other. The accumulation of meaning, therefore, is not a crass conceptual nihilism nor a metaphoric substitution, but a legitimate and earnest jointure. For instance, Eubathes tells of a "very ingenious geological philosopher now living" who, in order to placate some peasants near Etna who "were often troublesome to him" while he attempted to gather samples, told the peasants that he labored to gather one of every type of rock formation as a means to expiate a youth spent sinning (*Collected*

Works 9: 312). The peasants, taking him for a "holy man" or "saint" leave him to his penance, and even offer their assistance. The Unknown responds indignantly to this story: "I do not approve of pious frauds even for philosophical purposes: my rosary excited in others, the same kind of feeling which it excited in my own bosom, and which I hold to be perfectly justifiable, and of which I shall never be ashamed" (*Collected Works* 9: 312). Here, the rejection of "pious frauds" constitutes a tacit claim that, even though the Unknown doesn't revere the rosary as a Catholic, his carrying of it does not constitute dissembling or opportunism, and he does not denigrate or repudiate its Catholic significance. The species of reverence he holds for the pontiff-blessed icon, secular as it may be, is in fact nonetheless a proper piety. In this sense, the symbol is overdetermined. Untethered from an exclusive signification, it becomes dynamic, accruing meanings which it then grafts one upon the other. Worldly respect becomes intimately linked with reverence for ecclesiastical hierarchy – even as the sole authority of institutional Catholicism over the rosary weakens.

Ultimately, the vial linked to the rosary foregrounds the capacity of both the element and the symbol, as concepts, to facilitate disciplinary and conceptual shift. Chlorine, a chemical element, supposed properly to be empirical and a basic type of matter, yet encased in a classical and fanciful system, here signifies the impossibility of extricating science completely from its assignations with metaphysics and even poetry. The rosary, a symbol of devotion to the divine, at the same time bears out by its nature the very quotidian, mechanical, spiritless repetition that in fact manifests its transcendental purpose: one repeatedly tells the beads, rendering them, on one level, little more than an incarnated catechism. Repetition itself produces exaltation and belief, a philosophical premise acknowledged by Hume, but as the Unknown demonstrates, those feelings can be directed away from the customary church to other social or epistemological spaces

(fraternal respect, humanitarian care, etc.). Davy represents these concepts, then, both as they maintain the boundaries of certain customary knowledge disciplines, and as they slough off those exclusive epistemological trappings and serve to facilitate combination and intellectual cross-pollination. For as they cross boundaries in knowledge, they carry with them their accumulated freight of ideas. In this sense, the very concepts that serve to establish the disciplined scene against which Davy writes in the *Consolations*, when misused, may contribute to his utopian aims.

Reading from the Future: Beyond the Chemist's Vision

In sum, the text effects disciplinary jointure both at the level of form and content: its generic multiplicity highlights the need for a visionary commitment to a deferred textual and epistemological holism, while its representation of the principle chemical and poetic concepts exemplifies one mode of disciplinary integration. The text's multiple genres render its form analogous to its own representation of the Saturnians. Davy's critics have always noted the *Consolations*' uncanniness. Faced with this strangeness, they have turned to partial familiarities in the text, attempting to refamiliarize it. Indeed, the genres I've identified above each offer meaning to the work. The philosophic dialogue deals in the relation of ideas. The travel narrative, concerned with real places, invests Davy's text with material immediacy, and prefigures utopia in the picturesque. And the consolation invokes both the power of affect in its focus on grief, and figures history's malleable, even collapsible, character. Overlaying these structures juxtaposes matter, spirit, and history in a palimpsest of genres. And by reconstituting the joined elemental symbol that hangs around the Unknown's neck the *Consolations* offers a new epistemological principle concept for the as yet unknown future form of unified knowledge.

Davy seems to promise that though we cannot know what simplest unit will undergird a truly syncretic philosophy, it will likely arise from a reconciliation of the familiar, if disintegrated, parts of our own cosmos, both as we know it and as it exists.

I have argued that Davy invites the reader, perceiver of his textual alien, to recognize the incommensurate nature of the text's parts in the present and, with Philalethes, to acknowledge his perception's limitations, pivoting his intellectual efforts towards imagining a future, and a society, in which the text's divergent genres and philosophical commitments will not be synthesized, but rather recognized for their uniquely whole form. Linking utopia to a shift in perception has precedent during the period: consider Shelley's *Queen Mab* and *Prometheus Unbound,* which offer poignant comparisons given that both texts carefully craft utopia via cosmic or temporal distance and reflect Shelley's interest in the period's science. Likewise, Davy's utopia prefigures future developments, for instance, the interdisciplinary textual experiments John Tresch describes being undertaken in Paris during the mid-nineteenth century. Though humans in their state of "youth" may read themselves into the *Consolations,* even though its parts are "not firmly united together ... seldom act[ing] in perfect unity; [and with] many of its exertions ... wholly thrown away" (Davy, Personal notebook, MS HD/13/C 51-2), they must strive through persistent combination for a state of adulthood capable of viewing the *Consolations* for itself. Davy's aliens, and Philalethes's reading of them, therefore, provide an object-lesson for understanding the *Consolation*'s genres, and the sciences at large. Just as the Saturnian utopia appeals to Philalethes from beyond the vacuum of space, so does Davy's utopian text call back to his readers, who view it through a shattered lens. Only by embracing the inadequacy of any one generic structure or isolated conceptual apparatus can they imagine a world wherein the text might not seem so alien. The reader must, in Davy's own words, project

himself into his “adult state,” imagining the context within which the radically unfamiliar will become known for itself, and not for its partial likenesses. In the end, the disunity of Davy’s text, rather than being merely symptomatic of disorganization or the distraction of illness, in fact produces the conditions for imagining a more profound interconnection between the apparent fragments, a series of links visible only from the future.

Coda

The Danger after Disciplines

What would it mean to reason, with the prophetic Davy, "on the phenomena presented by another sun" (Davy, *Collected Works* 9: 243)? Davy's Saturnians organize their existence in a strikingly different fashion than early nineteenth-century chemists, who were at work building the institutions and structures that would, in fact, cement the separations between types of knowledge. On Saturn, the kitchen is the laboratory; in England, these spaces are distinct. The history of Davy's own Royal Institution offers an exemplary case of the division. Count Rumford's initial plan for the Institution included the construction of workshops intended to facilitate training the lower classes in the manual and mechanical skillsets necessary to disseminate the sciences as practical attainments – workers would learn to build and operate cutting-edge technology like James Watt's new steam engine. The goal was to form a charitable institution that would ease the financial burden on the landed aristocracy for maintaining social welfare by training the lower classes in the mechanical arts. But after Rumford left the project it evolved under the influence of Thomas Bernard, becoming more pointed towards the genteel classes.[67] There would be no kitchens. There would be no mechanics' workshops. During the early decades of the nineteenth century the institution grew into the spectacular center of the discrete arts and sciences in England, and its model radiated throughout London. It's legacy for the organization of knowledge as a compartmentalized and specialized attainment spread wider still.

[67] See Klancher 54-72.

To aspire with the ailing sage, Davy, to a perspective beyond the chemist's vision involves desiring to move beyond disciplines. A post-disciplinary world offers a utopian endpoint, the desire for which is an engine in the real world for driving collaboration, interdisciplinary communication, rhetorical deliberateness, and epistemological ingenuity. That Davy situates his post-disciplinary world on another planet indicates that he recognized the desire itself as utopian, an ideal if unrealizable pursuit that nevertheless promoted the genesis of new avenues for cultural and intellectual exchange. Davy spent most of his life as a practicing chemist and devoted countless hours to publicizing the special significance of his pursuit; it would be preposterous to claim that he wanted absolutely to do away with specialized knowledge. He recognized, as did Keats, that the specialization of knowledge produces an intensification of scrutiny that yields advances in technology and natural understanding, as well as real social benefits. What we can recognize in Davy's *Consolations* and in Keats's poetry is a commitment to interleaving the arts and sciences more effectively, one that manifests during the period as a desire to move beyond specialized knowledge. This desired endpoint involved a nostalgia for the more integrated organizational tactics of the Republic of Letters conjoined with the recognition that dividing knowledge had produced undeniable advancements. With Anna Barbauld, many commentators looked to the far end of history only to find Joseph Priestley waving back at them. Yet relating the arts and sciences more closely remained an achievable goal during the period. As I've shown with regard to the period's lecture culture, rhetorical common ground brought specialized thinkers into shared institutional spaces, and in such an environment discipline-specific concepts, like the chemical element, could be adapted to unexpected purposes. Though Wordsworth's formulation is likely more competitive than collaborative, it offers a less utopian option for reforming the arts and sciences: the poet must do

more than "be ready to follow the steps of the Man of science," for that formulation produces an unequal relation between the two cultures just beginning to become institutionalized through an unequal distribution of cultural resources during the period ("Appendix A: Additions" 423). More valuable, in fact, is the spirit of collaboration implied in Wordsworth's claim that in the future the poet "will be at [the scientist's] side, carrying sensation into the midst of the objects of the Science itself" ("Appendix A: Additions" 423).

In closing, I'll turn, once again, to Victor Frankenstein, the most famous Romantic scientist, who offers an exemplary case of Romanticism's tortured relationship to disciplinarity. Mary Shelley's revisions to *Frankenstein* shifted its focus to blur the fine lines of discipline, at least among the sciences: rather than being explicitly invested in chemistry, Victor becomes over time a more broadly-conceived scientist. In 1818, ruminating on his misguided dalliance with alchemy, Victor claims that

> If…my father had taken the pains to explain to me, that the principles of Agrippa had been entirely exploded, and that a modern system of science had been introduced…I should certainly have thrown Agrippa aside, and, with my imagination warmed as it was, should probably have applied myself to the more rational theory of chemistry which has resulted from modern discoveries. (Mary Shelley, Hunter 21)

Had his father properly dissuaded Victor from his alchemical pursuits, he would, apparently, have turned his curiosity about nature in a more profitable direction, and towards the day's most popular science. Shelley's 1831 revision removes the reference to chemistry, citing Victor's promise to "have thrown Agrippa aside and have contented my imagination, warmed as it was, by returning with greater ardour to my former studies" (Mary Shelley, Hindle 41). What's more,

in the 1818 version, after Victor has described the supernatural goals that motivated his more arcane studies, he describes the more properly scientific demonstrations that, enticing as they were, failed completely to sway his attention away from Paracelsus:

> Distillation, and the wonderful effects of steam, processes of which my favourite authors were utterly ignorant, excited my astonishment; but my utmost wonder was engaged by some experiments on an airpump, which I saw employed by a gentleman whom we were in the habit of visiting. (Hunter 22)

This concrete list of specific techniques and apparatuses broadly indicates the experimental practices of British science, but more pointedly, in invocations of "distillation" and "steam," it gestures more narrowly to chemistry. The 1831 edition replaces this discipline-specific catalogue with this dissertation's epigraph, in which Victor admits

> And thus for a time I was occupied by exploded systems, mingling, like an unadept, a thousand contradictory theories, and floundering desperately in a very slough of multifarious knowledge, guided by an ardent imagination and childish reasoning, till an accident again changed the current of my ideas. (Hindle 42)

This amended version emphasizes the undisciplined character of Victor's pursuits, and very nearly completely reverses the sense of the passage. The 1818 version emphasizes specific sciences, in particular chemistry, as alternatives to Victor's esoteric researches. By contrast, the 1831 version describes Victor relishing the obliteration of scientific systems. His youthful pleasure is to "mingle…a thousand contradictory theories." Between 1818 and 1831, Shelley found cause to diminish her novel's investment in a particularized scientific discipline. Rather, she began to see Victor as torn between the ordering tendency of "science" writ large and the disordered dynamism of an alchemical past.

In the 1831 version, Victor flies from a generalized vision of science as systematic pursuit committed to incrementally revealing information about the natural world. This shift bespeaks the continued prominence of the sciences as ordering systems in Romantic-era culture, as well as their cultural success. Victor even names a scientific forbearer in this later version:

> In spite of the intense labour and wonderful discoveries of modern philosophers, I always came from my studies discontented and unsatisfied. Sir Isaac Newton is said to have avowed that he felt like a child picking up shells beside the great and unexplored ocean of truth. Those of his successors in each branch of natural philosophy with whom I was acquainted, appeared even to my boy's apprehensions, as tyros engaged in the same pursuits. (Hindle 41)

Here, science is clearly divided into branches that share a common ancestor in Isaac Newton. This 1831 *Frankenstein* internalizes a historical narrative of science that posits Newton as the common patriarch of the systematic sciences, meanwhile banishing alchemical and artisanal practices to a fanciful intellectual hinterland. Of course, Victor consistently expresses his dissatisfaction with Newton's ancestors. He longs for the interconnected world of early-modern alchemy, with its overtones of natural magic and its spiritual ambitions. For this reason, it is particularly strange to think of the novel as a cautionary tale about the perils of science: science is exactly what the Victor of the revised novel finds so tedious and uninspiring.

In part, both versions of *Frankenstein* lay the blame for the tragic conclusion on Victor's tendency to become alienated from both the natural world and human sociability, indeed an admonishment against maniacal singularity of purpose that looks like a rejection of scientific systematicity. Both in 1818 and in 1831, the novel identically narrates the months preceding the creation of the creature. Victor becomes an exaggerated version of Wordsworth's man of

science, seeking "truth as a remote and unknown benefactor," but instead of "cherish[ing] and lov[ing] it in his solitude" ("Appendix A: Additions" 423), he disregards all pleasure and affection, noting in retrospect that he "seemed to have lost all soul or sensation but for this one pursuit" (Mary Shelley, Hunter 32; Hindle 55). His studies occupy his whole attention, such that even nature escapes his notice: "Winter, spring, and summer passed away during my labours; but I did not watch the blossom or the expanding leaves—sights which before always yielded me supreme delight—so deeply was I engrossed in my occupation" (Hunter 33; Hindle 57). The single-minded pursuit of truth and the demands of his "occupation" alienate Victor from the pleasure he once took in natural processes. Furthermore, as he throws himself into his work, he becomes incommunicative with his friends and family, and only desires "to procrastinate all that relate[s] to [his] feelings of affection until the great object, which swallowed up every habit of [his] nature, should be completed" (Hunter 33; Hindle 56). His mental and physical health deteriorate as he grows "nervous to a most painful degree" (Hunter 33; Hindle 57), until he shuns "his fellow creatures as if [he] had been guilty of a crime" (Hindle 57).

Victor cannot recognize his creation's humanity, or even nurture any degree of fellow-feeling, because by the time he brings it to life he has become completely estranged from nature, community, and health, an enthusiast of his specialized pursuit. The moment of animation takes place in the near darkness of a "half-extinguished light"; a void presses close around the experimentalist and his creature, blotting out what had remained of the world (Hunter 34; Hindle 58). Victor describes his reaction to bestowing life upon his creation: "the beauty of the dream vanished, and breathless horror and disgust filled my heart" (Hunter 34; Hindle 58). Of course, the outcome of his single-mindedness is an inability to adequately recognize humanity in others. Both versions levy this critique of single-minded pursuits – that they cause us to grow neglectful

of the loves that bind us to the world, and to each other. Immersed in the individual search for scientific truth, Victor has lost the tune of that song that Wordsworth's poet sings, "in which all human beings join" ("Appendix A: Additions" 423). There ought to have been little of menace in the monster's first benign actions towards Victor: "His jaws opened, and he muttered some inarticulate sounds, while a grin wrinkled his cheeks" (Hunter 35; Hindle 59). A grin may signify variously: according to the OED, it can serve "as an indication of pain or anger," or it may denote "unrestrained or vulgar merriment, clownish embarrassment, stupid wonder, or exultation." Three of the four terms in this second definition bespeak a pleasure that overflows the bounds of decorum, but Victor had little hope of recognizing the monster's grin as unrestrained merriment; by the moment of animation he is numb to such things, and can perceive only menace, pain, and anger. Having interacted for a year only in a clinical fashion with disordered body parts, lifeless human meat, how could he identify just how common and caring the creature's gesture is as it reaches out to embrace its parent?

It would be a mistake to assume that this singularity of purpose is expressly a scientific one, or that Victor's strange experiments constitute an unequivocal critique of the scientific method. He most often voices disappointment with the more disciplined protocols of mainstream scientists; their ambitions are always too small, their accomplishments narrow and uninspiring. What's more, Shelley's revisions for the 1831 version, as I've noted above, serve to collapse specific scientific disciplines mentioned in the earlier version into a more undifferentiated mass. In 1818, Victor's disregard of the university's chemistry training, his flight from the lessons of his professors, might have been interpreted as a turning from one discipline to another – from chemistry to the life sciences of such a figure as William Lawrence – or towards a newly invented dark chemistry, a horrifying but ostensibly scientific discipline. By 1831, Victor turns

not from a science, but from science writ large. He single-mindedly pursues alchemy, by then culturally conceived as an anti-science, because he is dissatisfied with the disciplinary fastidiousness of the scientific establishment. By effacing disciplinary distinctions in the 1831 version, Shelley presents proper science as a unified front, with the narrative effect that Victor seems to have veered off the path of science by the time he pursues his dire purpose. He has not gone awry by pursuing science too deeply; in fact, his mistake is a reactionary rejection of its methodical nature and narrow, because terrestrial, ambitions. In a roundabout way, then, *Frankenstein* comes to offer a surreptitious defense of systematic science for its capacity to restrain humanity from indulging its Faustian desires. If Victor had remained under the tutelage of his professors, he would have refrained from pursuing such arcane experiments.

Mary Shelley's revisions also signify a broader turn in how the era's authors and humanists engaged with the sciences as plural and distinct: her novel offers us a cautionary injunction, poignant even today. Be wary, it seems to say, of rejecting systematic knowledge too cavalierly. *Frankenstein* in 1818 presents individual scientific disciplines like chemistry giving way to monstrous results. By 1831 it is the rejection of the systematic itself, Victor's penchant for "mingling" "exploded systems," that is to be feared. As I noted above and in chapter four, by 1830, with the publication of the *Consolations*, Humphry Davy had grown fatigued with the divisions in knowledge he saw characterizing his intellectual moment, so he envisioned a utopia beyond disciplines, a world in which all knowledge would be already mingled. *Frankenstein* in 1831 offers a counterpoint to this hope, a nightmarish vision of what happens if, in a heady act of intellectual enthusiasm, we abandon too quickly the benefits of separate orders. In these two texts we may discover the poles of a Romantic ambivalence to disciplines. In Coleridge and Keats, as I've discussed in the above chapters, trepidation about disciplined knowledge doesn't

progress to an absolute rejection of it. If Coleridge rejected the absolute tendency of the element to stabilize types of knowledge, he nevertheless embraced its capacity to serve as a metaphor for dynamic connections.

The discipline of literature has been seeking its "elements" ever since. For the New Critics these were symbols, structure, and texture; for the structuralists, archetypal figures and long-held cultural myths; for post-structuralists, texts, contexts, and aporia. We have strained beneath the metaphorical volatility of the concept of the element, a concept displaced and not at home in our pursuit. The very fact that we redefine our elements with such regularity, flashing through paradigms in the course of decades, suggests that this concept, adapted from chemistry for its connotations of eternity and objective stability, has a limited usefulness. That fixing our "elements" provides momentarily lucid structure to our pursuit is unquestionable – in that regard, this tactic that we, along with many other disciplines, have inherited from chemistry proves effective. But its momentary success may prevent our asking another question: does an organizational tactic oriented towards closure, whose operative procedure is exclusion, best serve the ends of literary criticism, or even the humanities at large?

In our own time, the inchoate divisions of the nineteenth century have become fully realized. At a moment nearly contemporaneous with the later publication of *Frankenstein* William Whewell in 1833 coined the term "scientist," giving a unified identity to the sort of systematic practitioner that so repulsed Shelley's tragic protagonist. C. P. Snow's diagnosis of "two cultures" in the mid-twentieth century demarcated a long developing estrangement between the work of these scientists and that of artists or humanists. These days, we thrill to the ubiquitous rhetoric of our humanities in crisis. As overwhelming as our institutions may often seem, Romanticism cautions us to think more deeply about the systems of order at our disposal.

The great strength of the humanities, and of literature, as Wordsworth, Coleridge, Keats, Mary Shelley and others remind us, is its capacity to bridge divides, and we cannot join together what we quixotically refuse to acknowledge – that is, the matrix itself, the system of arts and sciences that has become so central to our epistemology, and which we cannot simply wish away. Balanced between Davy's utopia and Shelley's "exploded systems" we must embrace Keats's negative capability, accepting our capacity to reconcile human pursuits that seem increasingly prone to becoming alienated.

Romanticism initiated, as I've shown, an orientation towards creating links across the inchoate disciplinary boundaries of the nineteenth century. For these authors, an intellectual inclusivity lay at the heart of a literary method. In the centuries since, we've turned consistently to other disciplines, borrowing the elements of other systems: anthropology, philosophy, history, the litany of scientific and social-scientific disciplines that have infiltrated literary study since the so-called end of theory. Chemistry, as I've shown, discovered its elements, thereby making a structure for itself; at the same time, it gave to literary critics the imperative to find their own elements, that is, if they wanted their pursuit welcomed among the properly intellectual disciplines. The Romantics recognized just how ill-suited this model might prove to their ends if adopted without modification. If our serial disciplinary borrowing in the years since demonstrates anything, it is that since its inception literature has resisted being disciplined in quite the same way as chemistry. Our purpose, in fact, is not to settle our nomenclature, name our elements, fortify our literary domain in preparation for some siege. In this way, elements may not be for us. The successive borrowings that mark the history of literary criticism, the consistent epistemological wandering of poets and writers, indicate that our function in the arts and sciences matrix remains connective, not expulsive. Certainly, we must learn from Victor

Frankenstein and not abandon entirely the structures we've inherited, but we might also take a cue from Coleridge, and consider whether there aren't ways to revise our sense of *our* elements so they may be more conducive to the actual work of literary studies. In other words, rather than another disciplinary retrenchment that re-centers our work on a new (or old, or renewed) literary periodic table, we should question whether the basic concepts inherent in our methods of disciplinary organization might need, themselves, some re-tuning.

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