

THOMAS HARDY'S
NOVEL UNIVERSE

PAMELA GOSSIN

THOMAS HARDY'S NOVEL UNIVERSE

For Victor, Will, Christian, and Olivia: for love, joy, and light.

For my parents and grandparents: for life, faith, and courage.

Thomas Hardy's Novel Universe

Astronomy, Cosmology, and Gender
in the Post-Darwinian World

PAMELA GOSSIN

The University of Texas-Dallas, USA

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*I learn to prophesy the hid eclipse,
The coming of eccentric orbs;
To mete the dust the sky absorbs,
To weigh the sun, and fix the hour each planet dips.*

*I witness fellow earth-men surge and strive;
Assemblies meet, and throb, and part;
Death's soothing finger, sorrow's smart;
— All the vast various moils that mean a world alive.*

— Hardy's "A Sign-Seeker," stanzas 4 and 5

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The Nineteenth Century Series

General Editors' Preface

The aim of the series is to reflect, develop and extend the great burgeoning of interest in the nineteenth century that has been an inevitable feature of recent years, as that former epoch has come more sharply into focus as a locus for our understanding not only of the past but of the contours of our modernity. It centers primarily upon major authors and subjects within Romantic and Victorian literature. It also includes studies of other British writers and issues, where these are matters of current debate: for example, biography and autobiography, journalism, periodical literature, travel writing, book production, gender, noncanonical writing. We are dedicated principally to publishing original monographs and symposia; our policy is to embrace a broad scope in chronology, approach and range of concern, and both to recognize and cut innovatively across such parameters as those suggested by the designations 'Romantic' and 'Victorian.' We welcome new ideas and theories, while valuing traditional scholarship. It is hoped that the world which predates yet so forcibly predicts and engages our own will emerge in parts, in the wider sweep, and in the lively streams of disputation and change that are so manifest an aspect of its intellectual, artistic and social landscape.

Vincent Newey
Joanne Shattock
University of Leicester

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Notes on Texts and Style

With the general readers' convenience in mind, I have elected to cite editions of Hardy's primary works that have been readily available in the past and are likely to remain so in the future. In the case of *Two on a Tower*, one of the novels that stays in print only irregularly, I have, for the purposes of textual stability (if not accessibility), cited the 1895 edition.

Only those markings that have direct significance for the meaning of the passage cited have been reproduced from Björk's edition of Hardy's *Literary Notebooks*.

Author's Preface

Nay, from the highest point of view, to precisely describe a human being, the focus of a universe, how impossible!

–*The Woodlanders*

When Ernest Brennecke published his book, *Thomas Hardy's Universe* (1924), he hardly intended the title to be taken literally. Indeed, Brennecke's conception of Hardy's "universe" required no understanding of nineteenth-century astronomy, cosmology or astrophysics, nor any appreciation for what Hardy may have thought about them. Instead, Brennecke's volume proffered, as the subtitle clarified, "A Study of a Poet's *Mind*," in which he aimed to examine "the closest intellectual affinity" between the *world views* of Hardy and Schopenhauer.¹ Attending to verbal, topical, and thematic echoes in the texts of the two men, Brennecke made as strong a case as he could for the "influence" of Schopenhauer's philosophy upon the metaphysics of Hardy's poetry and novels. While Hardy knew better than to depreciate the sincere efforts of such a serious reader, he immediately recognized the failings of such an approach and expressed his concerns in a letter to Brennecke, written June 21, 1924. Deflecting his most pointed criticism of Brennecke's study by citing an unnamed third-party reviewer who remarked that "it was a little too much like a treatise on Schopenhauer with notes on Hardy," Hardy continued, with pained politeness:

and though that was a humorous exaggeration, what the critic meant, I suppose, was that Schopenhauer[']s] was too largely dwelt upon to the exclusion of other philosophies apparent in my writings to represent me truly - that, as my pages show harmony of view with Darwin, Huxley, Spencer, Comte, Hume, Mill, and others (all of whom, as a matter of fact, I used to read more than Sch. [sic]) my kinship with them should have been mentioned as well as with him. Personally I have nothing to say on this point, though I share their opinion to some extent.

(Hardy to Brennecke, as in Brennecke, frontispiece)

After praising Brennecke for his astute observation regarding the absence of Bergson's thought in his work, Hardy corrects several other matters of fact and complains (while maintaining that he is not) about the author's "attempt to trace imitation . . . in a purely

¹ Ernest Brennecke, Jr., *Thomas Hardy's Universe: A Study of a Poet's Mind* (1924; New York: Russell and Russell, 1966) 14, emphasis added. Hereafter: Brennecke.

accidental resemblance" and frequent "tendency to find influence in chance likenesses."

That any case study of the influence of a single figure upon Hardy – whether philosophical, literary, historical, scientific, or otherwise – would meet with similar criticism goes without saying. No monolithic approach could "represent . . . truly" the full range of "influences" upon Hardy's life and thought; nor, really, should Hardy have hoped for one to. Having been subjected to more than his fair share of misrepresentation and misunderstanding over the course of his career, he no doubt developed an unusually strong sense of what their opposites might feel like, were he ever to experience them.² The overall tone of Hardy's letter to Brennecke seems to hold in uneasy tension a grateful solicitousness for all that his study intends and a disappointed resignation over its all-too-inevitable falling short.

Although Brennecke's attempt to chart *Thomas Hardy's Universe* is only rarely cited in current critical discussions, even eighty years later his project can still usefully remind us of the extent to which crises of influence and representation continue to vex Hardy scholars today. No matter how meticulously textual or conscientiously contextual, no matter how widely or deeply biographical, philosophical, social, political, Marxist, feminist or masculinist, new critical, new historical, new new historical or postmodern, no matter how faithfully committed to consideration of form and function, poetics, plot and character, narrative and narrator, no one of us has fulfilled Hardy's heart's desire to have his life, work and thought represented "truly." Of course there is, perhaps, no one who could better empathize with the ineluctable futility of our efforts than Hardy himself, whose every work was a failed experiment in representing "truly" life and the universe within him and around him.

Additionally, Brennecke's conflation of Hardy's inner and outer "universes" highlights another set of concerns of continuing importance to readers of Hardy: the fundamental and unresolvable philosophical problems inherent in describing the relationship of perception to reality, subject to object, individual self to the social realm and the physical world beyond. To whatever extent we might ultimately agree with Hardy's assessment of its overall success and relevance, Brennecke's study directly engaged (and, inadvertently expressed) questions still at the center of all interpretative work: how to relate the meaning(s) to be found upon (or made from) an author's pages to the understanding he or she formulated in his or her mind and, how the reader's "universe" relates to them both. Like Brennecke, who brought his personal reading of Schopenhauer to his reading of Hardy, all of Hardy's readers necessarily make ontological cuts in his already ontologically unique universe and bring eclectically cut universes of their own to the task.

In *Thomas Hardy's Novel Universe*, I mean to take the "universe" literally and personally – in reference both to his understanding of past and contemporary

² For one scholar's view of the critical reception of Hardy's works, see: Edward Neill, *Trial by Ordeal: Thomas Hardy and the Critics* (Columbia, SC: Camden House, 1999).

astronomy and cosmology and in relation to the internal spaces of Hardy's mind and my own. Drawing upon my own eclectic background and training in the history of science, and the history of popular astronomy and cosmology, in particular, I hope to bring a unique contextualization to my reading of Hardy's novels. Interpreting his major and minor fiction against the background of how Hardy and his contemporaries may have conceived of the mid- to late-Victorian cosmos, I hope to convey some sense of how and why Hardy's apprehension of humanity's place in time and space was "novel" in its originality and power as well as uniquely encapsulated in the form and setting of his novels *per se*.

In the three chapters that constitute Part I, I describe the critical, literary and historical frameworks that form and inform my interpretative approach to Hardy's life, mind and work. In the Introduction, Chapter 1, I discuss the historically uneasy scholarly relationship between literary history and criticism and the history of science and explain why I have chosen to mediate between their professional, philosophical, and disciplinary differences by focusing on their shared term, "history," rather than turning toward discourse theory or cultural studies, among other possibilities. Through what I am pragmatically calling a "literary history of science," I attempt to combine elements of both disciplinary outlooks and interpretative methodologies. Bringing methods of analysis and values of historical inquiry from the history of science to literature seems an apt choice for close reading of primary texts which themselves display – as Hardy's texts do – the deep integration of historical, scientific, and literary materials and concerns. A renewed faith in the power of the word to embrace and express our literary, historical, and scientific understanding can offer literary scholars and historians of science alike a sanctuary from cross-disciplinary conflict and contention. In such an open literary and historical interpretative space, we can freely offer our best approximations of Hardy's understanding of cosmology in the configurations that seem to have held the most immediate personal and cultural meanings for him.

In Chapter 2, I survey the history of astronomy's engagement with literature and literary history's engagement with astronomy and cosmology from the ancient world through the Victorian era, situating Hardy's personal synthesis of astronomy and cosmology within both traditions. The vast range and seeming ubiquitousness of literary uses of astronomical phenomena never fails to surprise most readers, once they are made aware of them. Even those whose study of individual works has otherwise been exhaustive are often astounded to discover to what extent they have taken for granted the astronomical imagery and allusions in their favorite poems and novels. Many of these texts, of course, are well-established as strong literary models for Hardy's poetry and fiction. Safely distanced in time from the later (and still on-going) wrangling of interdisciplinary critics and historians over such materials, I suggest that Hardy drew on his inheritance of primary "astronomical literature" for his own purposes, in his own eclectic way, fashioning a uniquely personal philosophy of life that considers the "facts" of the universe boldly, offering significant biological and cosmic implications for his readers as individuals and for their shared surrounding culture.

In the third chapter, I provide a brief history of astronomy and cosmology from their ancient Greek origins through their manifestations within Victorian observational and theoretical astronomy, cosmology and early astrophysics, in preparation for Part II's discussion of how and what Hardy knew of these developments and discoveries and how he applied that knowledge within his own cosmological narratives. Significantly, the most sophisticated astronomical observations and theories produced by a particular culture have not always been in lockstep with that same society's most prevalent world view or most influential cosmological myths and stories. Hardy's broad-ranging familiarity with natural philosophy, drama and literature – classical to contemporary – prepared his mind to detect substantial resonances between ancient Greek world views and the cosmological – philosophical, social and political – significance of the astronomy and astrophysics (as well as geology and natural history) of his own space and time.

In Victorian culture, popular astronomy and cosmology took many forms, including popular illustrated texts for gentlemen, ladies and children; periodical and newspaper coverage of astronomical discoveries and theories; cartoons, poetry and novels; public observatories and international expeditions. None of these forms, however, rivaled in imaginative impact the “real-life” stories and tangible discoveries of astronomical heroes and heroines like William, John, and Caroline Herschel. Current ignorance of the pertinent history of nineteenth-century astronomy may largely be to blame for the lack of scholarly recognition of, and critical appreciation for, the extensive presence of astronomical concepts, allusions, symbolic associations and deep cosmic metaphors in Hardy's literature. Without a basic knowledge of the most important astronomical phenomena of the period, Hardy's modern readers have been hampered in their ability to identify and interpret astronomically influenced plot devices and tropes. As a result, the literary and philosophical significance of these elements has, for the most part, remained unexplored and seriously underestimated.

In the first chapter of Part II, Chapter 4, “Reading Hardy's Novel Universe,” I survey some of the extant evidence that suggests how Hardy accessed contemporary popular astronomy and cosmology for himself and how he integrated that knowledge and information into his personal world view and aesthetic framework. In the next three chapters (5, 6 and 7), I give new close readings of both major and minor novels against the background of Hardy's knowledge and use of popular contemporary astronomy and astrophysics. My analysis treats seven works: *A Pair of Blue Eyes*, *Far From the Madding Crowd*, *The Return of the Native*, *Two on a Tower*, *The Woodlanders*, *Tess of the D'Urbervilles*, and *Jude the Obscure*. Paying special attention to narrative structure, scene setting, plot devices, characterization and issues of gender, I analyze the multiple levels of astronomical allusions and tropes that Hardy incorporates into each text. In unexpected and sophisticated ways, reading Hardy's astronomy enriches Darwinian and feminist perspectives, extends formalist evaluations of Hardy's writerly achievement, and provides fresh or alternative interpretations of enigmatic passages and scenes.

Like many of his literary contemporaries with interests in natural history and astronomy (Tennyson, for one), Hardy considered biological (organic) evolution over geological time as a continuation of the inorganic evolution of stellar and galactic objects described by the nebular hypothesis. In the novels I examine, Hardy explores the possibilities and limits of human existence within the terrestrial *and* celestial spheres, countering the worst potential consequences of social Darwinism with an alternative “moral astrophysics.” The primary bearers of the astronomical and cosmological message of Hardy’s fiction are the female characters through whose narrative lives he appears to express a striking and intense appreciation for morality and sympathy in the godless universe, rather than the heartless scientific pessimism so often attributed to him.

In the Conclusion, Chapter 8, I suggest broader social and cultural contexts for how literary tradition and the history of astronomy converge in Hardy’s “personal construct cosmology” through which he offers new myths for the lives of Victorian men and women. By juxtaposing astronomical narratives of failed potential with visions of new possibilities, he creates “novel” universes in which the fates of his female characters are directly linked to their knowledge and skills in observational astronomy. Indeed, the fates of his fictional women, in particular, are often directly connected to their knowledge of the astronomical “truths” of the universe, including awareness that divine presence may be hostile, indifferent, or nonexistent. Playing out their lives within these literary thought-experiments, Hardy’s cosmic heroines fail personally and socially to resolve the “big questions” of the modern cosmos: how to reconcile instinct with intellect, empathy with technology, creativity with entropy. Yet despite their losing encounters with the ignorance, prejudice, and injustice of human individuals and society, Hardy significantly depicts his primary female characters as active agents within their earthly environments, not passive victims beneath the stars. Offering a critique of contemporary concepts of human progress available in then-current evolutionary theory and anthropology and suggesting imaginative recombinations of the feminine and masculine, Hardy’s cosmological narratives effectively model ways in which readers (male and female) may actively participate in the shaping of their own life stories as well as the cultural evolution of their species.

“I treated Art as the supreme reality, and life as a mere mode of fiction.”

Oscar Wilde, *De Profundis*

PART I
CRITICAL METHODOLOGY,
LITERARY AND HISTORICAL
BACKGROUND

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Chapter 1: Introduction

“Convergence of the Twain”

A Personal Perspective on the Interdisciplinary Study of Literature and Science

When two scholarly endeavors are drawn together from different directions into a single interdisciplinary study, the enterprise need not shipwreck. Although Hardy commemorated the sinking of the Titanic by conceiving of “convergence” as the coincidental collision of opposing forces – Nature/Culture, Fire/Ice, Male/Female, Human Vainglory/Immanent Will – there are other thematic associations available for other incidents of convergence. Although by no means a typical path into Hardy scholarship – and plenty accidental in many respects – my experience with the interrelations of literature and the history of science has enabled me to appreciate, and in some ways even to reenact, aspects of Hardy’s quest to understand the natural world and human life within it.

While Hardy is as interdisciplinary a writer as one could ever hope to meet, and that fact alone may adequately justify taking an interdisciplinary critical approach to his work for some readers, such a choice remains problematic for others. Somehow the linkage of “Hardy and philosophy,” “Hardy and psychology,” and “Hardy and Darwinism” all seem more natural than the unlikely pairing of “Hardy and the history of astronomy and cosmology.” For one, that last combination implies a cooperation between literary studies and the history of science (especially the history of the *physical* sciences) that few practitioners in either domain have encouraged over the years. Indeed, for much of their separate histories, the professional distance between the two disciplines has actively worked against joint interpretative ventures.

Disciplinary History: Literary Studies and History of Science

As professional academic disciplines, literary criticism and History of Science emerged along lines different enough. The two fields developed, by and large, as segregated scholarly communities, with students striking out for careers in one, very early abandoning all hope (or at least, focused interest) in the other. During the first half of the twentieth century, historians of science generally received their initial

training as research scientists and grew into their profession in other buildings, on the opposite side of the campus from classically trained and liberally educated literary scholars. Working from within their science specialties out, the first few generations of historians of science were more often self-taught in history than trained, modeling their research concerns, interpretative approaches and techniques, as well as their writing styles, on the finished products of the previous century's "Great Men of Science" hagiographies and "History of the Empire" tradition rather than shaping them to critical methods, historiographical concerns, and philosophical frameworks offered by theorists. Conversely, during roughly the same time period, literary criticism had already evolved into just that. Biographies of canonical writers and histories of literary forms and techniques were necessarily foundational to a literary critic's work, but such projects did not provide his/her primary driving force, let alone final purpose. Increasingly, literary exegesis and analysis produced case studies of primary texts the central goal of which was to test and demonstrate the strengths and potentials of various literary theories. By the time they entered the working world of academe, newly minted early-twentieth-century literary critics and historians of science were firmly set on divergent tracks of education, professionalization, and socialization. Whether in university classrooms, offices, archives, at conferences, on academic governance committees or editorial boards, they rarely encountered evidence of each other's existence, either in print or in person.

During the 1930s to 1960s, the two endeavors made intermittent contact through the methods and concerns of intellectual history, as evidenced in studies by such scholars as Arthur O. Lovejoy, C. S. Lewis, Francis R. Johnson, and Marjorie Hope Nicolson. Nicolson's "science in literature" studies, in particular, inspired an imitative explosion among literary scholars seeking the alchemical, astronomical, botanical, zoological and/or medico-historical "keys" to "the" interpretation of works of literature with strong scientific content. The exchange of ideas and information from history of science to literary studies via the channel of intellectual history was generally positive, with historians of science expressing polite surprise and some bemusement that their archival studies of primary works of science should be of use to literary critics; although that revelation did not inspire any obvious push to discover to what extent the reverse might also be the case. Once the first rhetorical bombs of the Two Cultures debate fell, however, further chances to negotiate that channel without suspicion of professional or disciplinary disloyalty were temporarily lost.

But not forgotten. Within the past two decades or so, literary studies and the history of science have met up again as a small but potent part of a larger interdisciplinary academic enterprise, Literature and Science Studies. Both Nicolson's "science in literature" and the Two Cultures' "Science vs. Humanities" perspectives influenced the founding in the early 1980s of SLS: the Society for Literature and Science (recently renamed, SLISA: the Society for Literature, Science and the Arts). During its inaugural meeting, the society's officers duly and repeatedly honored Nicolson's contribution to interdisciplinary "literature and science studies" although they simultaneously distanced themselves from her – to their minds – unsophisticated

atheoretical approach to the analysis of primary materials, both literary and scientific. As a professional interdisciplinary organization, SLS made it a central purpose to bridge the "two cultures gap" by inviting research and teaching scientists, physicians, computer scientists, and engineers to participate in its conferences and join its membership. Now, however, after twenty years of professional existence, the society still bears clear marks of the aftermath of the two cultures debacle, with a strong majority of its members working within the arts and humanities, from literary or various cultural studies perspectives. The two cultures dichotomy is present also in the annual conference program, as many plenary speakers and session and panel presenters continue the attempt to define what the "and" in "Literature and Science Studies" can and should mean; whether "a" theory of "Literature and Science" is possible (or desirable); and, if not, what kinds of partial and provisional theories might be most promising and useful.

Yet, as the founding of SLS/SLSA both indicates and encourages, more literary scholars than ever before are aware of and are working with the primary materials once considered the purview of historians of science. Most currently import those materials under the aegis of interdisciplinary Science Studies or Cultural Studies and eschew the more conservative purposes and internalist/externalist confines of the discipline of the History of Science, as traditionally defined. Similarly (and in an appropriately Kuhnian way), while a fair number of younger historians of science use contemporary literary critical theories of discourse, linguistics, and rhetoric as part of their normal research programs, older scholars harbor distrust of such approaches, fearing that they may be but fleeting fads driven by academic politics rather than firm foundations for reliable new paradigms of analysis. Ironically, then, while awareness and exchange of each other's materials and methods seems to be at an all-time high at both individual and institutional levels, the two approaches to understanding human creative activity seem more at odds than ever, with literary studies and the history of science embracing different epistemologies, differing notions about the nature of evidence, the relevance of influence, issues of authority, the stability of language, the limits and potential of representation, and other theoretical and practical crises of scholarship.

Very recently, scholars from both fields exhibited their disciplinary differences in very public displays of academic swagger, theoretical drawing-of-lines-in-the-sand, rhetorical jabs, flaming email posts and ripostes during the various skirmishes of the so-called Science/Culture Wars.¹ Fought with pens, PCs, and parody, the conflict

¹ Alan Sokal, "Transgressing the Boundaries: Towards a Transformative Hermeneutics of Quantum Gravity" in *Social Text* 46/47 (Spring/Summer, 1996) 217–52 and "A Physicist Experiments with Cultural Studies" in *Lingua Franca* (May/June, 1996) 62–4. See the first response of Andrew Ross and Bruce Robbins in the following issue, *Lingua Franca* (July/August 1996). For a blow by blow recounting, see: *The Sokal Hoax: The Sham that Shook the Academy*, edited by The Editors of *Lingua Franca* (Lincoln: University of Nebraska Press, 2000). For subsequent discussion, see: Andrew Ross, *Science Wars* (Raleigh-Durham: Duke

wounded and weakened combatants on both sides, giving and taking offense, leaving both positions more disfigured than represented, more defensive than defended. As matters stand, the model of war itself may have done more conscriptive harm than descriptive good. Historically, of course, the binary system of adversarial pros and cons has been inherent throughout the rhetorical tradition, and by incorporation, in academe itself. Now, however, more is at stake than taking honors in debate. In many ivory-towered environments, inter- and cross-disciplinary surface tensions and territorial disputes are directly linked to departmental and programmatic funding levels as well as rates of survival during tenure and promotion reviews. The academic marketplace has become an embattled state, where potential hires are evaluated less on their creativity and fresh perspectives than on their ability to make immediate contributions to the political fire-power of senior faculty needing new defenses for long-held positions. Life-and-death competition between academics has become so commonplace that it seems virtually inevitable, almost natural.

Yet should our territorial imperatives, economic sanctions, political maneuvering, and selfish genes will out? Two wildly divergent branches may spring from the same stem and be nurtured by the same roots, grounded in the same soil. Might the current emphasis on how far apart literature and science studies have grown be obscuring clear sight of underlying shared realities and values? At the center of this stormy culture clash may there not be a place where unity may emerge amidst diversity and multiplex influences flow toward confluence?

A Personal History of Literary Studies and History of Science

I might well have remained among those academics eternally skeptical about the possible existence of a shared interpretative space between literary studies and the History of Science had I not been fortunate enough to experience it personally. In completing the course work for a double Ph.D. in the History of Science and English at the University of Wisconsin-Madison, I had myriad opportunities to observe the values and mores of students and professors of those two endeavors in action and in close juxtaposition. Through that joint educational process and experience, I found consilience between literature and science (to borrow E. O. Wilson's coinage) at the same place that, I believe, Hardy found it – at the level of primary expression of lived history and thought.

Every weekday for more than five years, I carried the lectures, reading, professorial quips, and off-hand remarks of my fellow graduate students from one

University Press, 1996); Paul R. Gross and Norman Levitt, *Higher Superstition: The Academic Left and its Quarrels with Science* (Baltimore: Johns Hopkins University Press, 1997); Alan Sokal and Jean Bricmont, *Fashionable Nonsense: Postmodern Intellectuals' Abuse of Science* (New York: Picador, 1999); and Noretta Koertge, ed., *A House Built on Sand: Exposing Postmodern Myths about Science* (Oxford: Oxford University Press, 2000).

discipline into the next, testing the beliefs and biases of one set of mentors and friends against the real-life evidence found in the texts, classrooms, offices, hearts and minds, of the other. At the time of my graduate studies, the faculty in the two departments were split by a central disagreement concerning the extent to which scholars ought to dedicate their studies to the analysis of texts and discourse (assuming the concomitant "death of the author") or ground their work on some greater faith in the recoverability and "reality" of the past. As I was soon to learn as I read more deeply into the scholarly literature in both areas and began attending and presenting papers at national and international conferences in both fields, this was far from a local dispute. Pressured by sensible arguments from peers and professors in each discipline to reject the "nonsense" of the other, the problem felt overwhelmingly insoluble, one only amenable to choosing-up sides, not synthesis.

The more I interacted personally on a day-to-day basis with literature professors and historians of science, all of whom I liked and respected as people and as scholars, the more the only reasonable choice seemed to be to postpone choosing as long as possible. In the time that indecision bought me, I observed that although both *groups* seemed committed to maintaining a professional, disciplinary posture of mutual exclusion and disregard (if not, occasionally, outright disdain and contempt) *individuals* regularly expressed cross-disciplinary interest and cautious curiosity, frequently stopping me in the hall to clarify points of information for them or to ask me to "translate" something they had read from literary into historiographical jargon, or vice versa. Being caught in the middle of the two disciplines gave me a unique opportunity to develop bilingual communication skills. Although acquiring passing fluency in both at once seemed more than twice as difficult as learning them sequentially, the double immersion experience proved invaluable. For a good long while, it was just plain confusing to hear the concerns and claims of one discipline simultaneously filtered through those of the other; but gradually, what had sounded cacophonous, clarified to counterpoint.

The more I observed practitioners in both fields' work and heard them talk about what they did and why, the more I began to sense that literary studies and history of science were two scholarly communities divided by a common language as much as they were by their philosophical, social and political differences. The commonalities seemed especially apparent at their level of personal engagement and professional praxis with primary materials, whether literary or scientific. There, I heard scholars in both fields speak with equal passion about the past and describe themselves as employing many of the same interpretative processes in their work with authors/scientists and texts, although they did so with heavily different accents, speech patterns, and diction. What I came to understand was, that whatever intricate, internecine interdisciplinary debates over issues and approaches to texts and contexts raged within and between literature and science studies at the metalevel, at the more local, aboriginal level, two subsets of those larger enterprises – Literary History and History of Science – still preserved a fundamental interest in, and respect for, the shared term at which they intersect, namely: history. Listening to how both sides

approached history from different directions, I accumulated a sense of the shape and substance of the two endeavors and began to see that some of the uncertain narrative lines in one could be reinforced by the clearer lines of the other and, together, the interpretation of the past they might collectively produce could prove richer than those they could fashion alone.

At base, both literary history and history of science have as their primary purpose the goal of describing and explaining Δ / t (change over time). On the surface, the content and materials of the two fields may seem as incommensurate as the personalities and training of the professionals who engage in their study, but the primary lines of inquiry they are inspired by are identical: Who did and/or knew what when? How? Why? What did it matter to them? How may it matter to us? Literary history and the history of science share essential values that begin with scholars' deep and abiding interest in and compassion for the individual human life of the past. By association, scholars extend that interest and respect to their subject's quest for knowledge and his/her expression of the process and results of that quest. Literary historians and historians of science alike inquire about the resources and challenges their subjects faced, which inquiry necessarily leads them to wonder about the peoples, places, and events of the past that comprise the historical, social, political and intellectual contexts in which their subjects lived, worked and thought. Although their responses to epistemological dilemmas do widely vary, scholars in both disciplines exhibit an equally serious engagement in discerning the limits and potentials of human knowledge, both in our own minds and times, and in those of the people of the past. Both groups employ similar working models of knowing – a continuum from the unknowable/uncertain/impossible through increasing probabilities to certainty – but each discipline emphasizes the importance of different points along that continuum. In general, literary scholars mind the gaps between the unknowable, possible, probable, and certain; while historians of science commit to closing them by employing a provisional, instrumentalist fine-tuning of the probabilities with ever-firmer appearing data. Though one set of scholars seems to focus on how much *may* be knowable and the other, how much may stay *unknowable*, both groups are aware that their projects approach the knowability of any past or present actor/agent, idea or event only *as a limit* (in the mathematical sense). The resultant core humility informs both.

Whether in literary history or the history of science, we may not know the thoughts, actions, and milieu of another human, living or dead, any more surely than we may know the mind of God. However, in both, we do have (to paraphrase Galileo's argument to the Vatican in defense of natural knowledge as ancillary to revelation) the "book of human nature" to guide us – and we can come to "know" that book both as readers of it, and as contributing authors to it. It is precisely at just this point – where the grateful living meet the remains of past works and days – that I have come to believe that a convergent "literary history of science" may help us bear witness.

A Personal Essay Toward a "Literary History of Science": Primary Texts as Methodological Models

Like many readers brought up within the western intellectual tradition, I first encountered the primary texts of what I call "literary history of science" through Judeo-Christian religious accounts and Greek and Roman classics, especially the Old Testament story of creation and the cosmological myths and early natural history of Hesiod, Homer, Aratus, Lucretius, Ovid et al. As my reading extended through a broad range of medieval to early modern works, and beyond, I met many more writers who crafted texts that combined the natural knowledge of their day with poetic, aesthetic, dramatic, and fictional forms and elements. Dante, Copernicus, Donne, Kepler, Margaret Cavendish, Milton, Aphra Behn, Darwin, the Herschels and Hardy himself (to name a mere few) all offered poetic cosmologies and natural histories or cosmological and natural historical poetry, plays and dramatic fictions that seemed to me to operate continuously, and contiguously, within the same literary genre. Although both literary history and the history of science have long claimed separate disciplinary ownership of these primary materials, to me it just made immediate sense to recognize the existence of "literary history of science" as a natural hybrid in both form and content from the earliest beginnings of written artifacts. By extension, it also seemed pragmatically apt (not to say polite and considerate) for us – as literary scholars and historians – to approach equally literary and scientific artifacts in ways that draw upon the best of their authors' dual worlds, matching our critical and interpretative methods and apparatus to our subjects' multi-disciplinary madness.

For the texts that held the most immediate attraction for me – the literary history of astronomy and cosmology – the one interdisciplinary scholar who had attempted a comprehensive analysis of their literary and scientific form, content and contexts in relation to each other, was Marjorie Nicolson. Yet, even as a young scholar, I recognized that her project to navigate the history of science *in* literature, left the reverse current open to exploration. So in my early work, I attempted to extend and retool her approach by bringing literary materials into the historiography of science.² The importation was not too taxing, as within both disciplines many of the same critical methods and techniques had equal currency: close exegesis of primary texts; attention to the language usage of individuals and communities; recognition of past transmission and influence; tracing of scales of context, from the life and mind of the writer or scientist, to those of his/her coterie or circle, professional community, public audience, and his/her social and political milieu. Since the history of science already encompassed studies of popularization, transmission, translation and scientific biography – all of which could fairly be dubbed "literary" history of science, it was not too much more of a stretch to argue that more overtly literary forms – such as poetry and fiction – might serve as raw materials as well. My initial essay into crafting

² Pamela Gossin, *Poetic Resolutions of Scientific Revolutions: Astronomy and the Literary Imaginations of Donne, Swift and Hardy*, diss., University of Wisconsin, 1989.

literary history of science as a critical methodology, then, was essentially an extension of the history of science's traditional project to study popularization and the history of popular science, especially astronomy and cosmology, from the Copernican and Newtonian through Astrophysical Revolutions.

Yet my interdisciplinary interpretative and analytical approach did not really develop as a mere variation on Nicolson's literary scheme. My deepest interest in and curiosity about the interrelations of literature and the history of science arose independently of my education and training in either discipline, emerging more fundamentally from the confluence of my personal experiences, perceptions and observations of how language, history and nature seem to operate and make meaning in my own life and from a direct engagement in the vicarious experiences offered by other authors' primary texts in which they expressed their personal experiences, perceptions and observations of language, life-in-time and life-in-nature. Although vital to my understanding of and participation in professional, disciplinary discourse, my awareness of the analyses and theories of Nicolson and numerous other interdisciplinary critics, historians and philosophers were superadded, and quite of secondary significance, in my efforts to craft my own philosophy of life, literature and history of science.

It is impossible to recapitulate this process as I lived it (as, of course, it is impossible to do so for another, like Hardy); but I believe that whatever limited understanding of the interrelations of the phenomena of literature, history and science that I have been able to form, it was primarily forged by reading and re-reading words like these:

Hers is the head upon which all "the ends of the world are come," and the eyelids are a little weary. It is a beauty wrought out from within upon the flesh, the deposit, little cell by cell, of strange thoughts and fantastic reveries and exquisite passions. . . . All the thoughts and experience of the world have etched and moulded there . . . / She is older than the rocks among which she sits; like the vampire, she has been dead many times, and learned the secrets of the grave; and has been a diver in deep seas, and keeps their fallen day about her; and trafficked for strange webs with Eastern merchants: and, as Leda, was the mother of Helen of Troy, and, as Saint Anne, the mother of Mary; and all this has been to her but as the sound of lyres and flutes . . . The fancy of a perpetual life, sweeping together ten thousand experiences, is an old one; and modern philosophy has conceived the idea of humanity as wrought upon by, and summing up in itself, all modes of thought and life.³

Melding form and content, Pater's words attempt to express the interrelations he perceives between art and reality, the individual and the universal, the present and the past. His interpretation of this single aesthetic artifact is simultaneously (and necessarily, for him) historical and philosophical. His poetical prose, in turn,

³ Walter Pater, "Leonardo Da Vinci," *The Renaissance: Studies in Art and Poetry*, 1893 text, ed. Donald L. Hill (Berkeley: University of California Press, 1980) 98–9.

aestheticizes his view of history and philosophy. The cognitive craftsmanship necessary to such syntheses of form and content intrigues me as a reader and inspires me as a writer. The sort of sensory and syncretic way with words that Pater achieved was a long time in the making, and was, perhaps, incipiently present within the earliest origins of human communication.

Human language may well have developed as a technology of survival. Among its many uses and purposes, language retains a primal connection with the preservation of life. Awe-struck or stricken with the sense of our own mortality, we record that we exist in the handprint of a petroglyph, autobiographies, diaries, and letters. Beyond our "Kilroy was here" statements, we use language in myriad social, economic, and political applications, in a motley array of workaday pleasure and practicality. We also, all of us, encounter life experiences that we recognize as requiring – that seem to call out for – extraordinary speech. Here in Oklahoma, in the aftermath of the Murrah Federal building bombing, we were overwhelmed with poetry. Thousands of poems in every conceivable form, from senders of every description from all over the world, poured into the state. Crises of sympathy demand the muse. In birthing rooms, in the company of a dying friend, in righteous anger or mercy, we feel an urgent impulse to speak or write words, to express thought and feeling in such a way that their meaning impresses itself upon the soul of the listener or reader like the scent of rose petals crushed into the palm of a lover's hand. Poetic forms of language are necessary. We may speak and write to live.

Less immediately intelligible are reasons why the living read the words of the dead. Historically, our motivations have been many: the search for *prisca sapientia*; the need for practical guidance in the structure and administration of social and political systems; curiosity about the experience and activity of human cultures and individuals; need for inspiration and hope, or admonishment and warning; the private desire for explanations of sorrows our parents did not share with us. For me, opening a book written so long ago that the author cannot still be alive, weighing its words, sends a tremble up my forearm, in acknowledgment: he lived, he died; I live, I will die. But (with my apologies to James G. Frazer), it is not the fear of death, nor the fear of the dead, that starts the tremble. No guilty morbidity keeps the book open. The affinity begins with the awe of vitality. I hold an artifact of a life in my hands.

Reading is potent communion; a mutually willed violation, an offering and a taking. Opening a book, there is a tacit recognition that the writer's words – willed into existence and an order – are being reconstrued into my own understanding. Tracing out lines of another's thought and experience, I wonder at the immediate sense the words make for me and the simultaneous estrangement I feel from the meaning they made for their maker. I felt the same way when I stepped into my grandmother's farmhouse for the first time after her death. Joining the distressed busyness of the other grieving women in the kitchen, I picked up an old wooden spoon. I was startled by its perfect fit, my fingers and palm matched the subtle woman-made curves of its handle: she was here. Stirring in haste? With what joy? Despite what

heartache? *Lacrimae rerum*. I had to set it down. It felt right in my hand, but I had no right. Her tool, her life; not mine.

Many of the people I love have been dead hundreds of years. Sensing an author's life within a text, I know that I could not look into his or her eyes without weeping. She had immortal longings in her. These are the pearls that were his eyes. Such lives are as real and tangibly tender as they are remote and forever vanished. How do we ever presume to enter the existence of another? How can we bear to blunder into understanding of another? To have another blunder in toward us? What else is there to do? We work, make love, make life, live to tell about it, hope someone else will care. Writing and reading are both acts of empathy.

Reader and writer are bound by the mutual need for companionship across time. Situated as we are within this cosmos, our physics and physiology constrain our experience of each other. Time separates with a tantalizing pang. Transfixed in a transient present, you and I slide frictionless between the vanishing points of the past and future. Looking through the one-way mirror of a text, we can faintly see the author looking upon the surface in which she sees her own image reflected in infinite regression toward invisible readers whom she could not predict and cannot prevent. Her predicament evokes pity and terror.

In the desperate straits of time, so much to think and feel, writing and reading are urgent matters. Some writers staked their lives on the durability of their verbal artifacts – letters in a bottle tossed upon the sea. Yet one's quest for immortality is contradicted by another's concession of futility: Shakespeare's poetic monuments are eroded by Catullus's breath upon the wind. When they do endure, and for as long as they survive, verbal artifacts preserve life. Every reading revives the writer's creation of the text. Through readers, writers have their lives incorporated and multiplied; through writers, readers experience manifold lives. Like Pater's *La Gioconda* (the *Mona Lisa*), our lives perpetuate, and are perpetuated by, all we read and write. We sweep together ten thousand experiences and live and die many times.

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My personal conception of the potential of a literary history of science, then, has been directly shaped by a sense of the power of words to preserve and convey human thought, emotion and experience across the vagaries of space, time and chance. From a personal desire to know, from a personal need to feel less alone, I developed a personal faith in literature, history and science: as academic disciplines and professional fields, to be sure; but more so as ways of knowing and as modes of expression – three particular and versatile means of representing knowledge about life, the universe, and everything. I truly believe that in every human communication, the most casual verbal exchange, the very next text I read, I will receive some insight into the meaning of life. I continue to hope that by reading primary texts in literature, history and science, I might compile a hitchhiker's guide to the "big questions" of the universe: What is out there? What is in here (my heart and mind)? And, who, by the

way, are you? What can we mean to each other? Is there really no exit? Literature, history, and science present themselves to me as different manifestations of common human quests, three cognate languages in which the purposes and results of those quests are communicated and expressed.

Recalling the various influences of texts of the past, I hear a fugue of different voices that sounds something like this:

"History never repeats itself. Historians repeat each other."

*

"I must create my own system, or be enslaved by another man's."

*

"The history of every country begins in the heart of a man or a woman."

*

"Her full nature . . . spent itself in channels which had no great name on the earth. But the effect of her being on those around her was incalculably diffusive: for the growing good of the world is partly dependent on unhistoric acts; and that things are not so ill with you and me as they might have been, is half owing to the number who lived faithfully a hidden life, and rest in unvisited tombs."

*

"The nominal subject [of this book] is North American cotton tenantry as examined in the daily living of three representative white tenant families.

Actually, the effort is to recognize the stature of a portion of unimagined existence, and to contrive techniques proper to its recording, communication, analysis, and defense. More essentially, this is an independent inquiry into certain normal predicaments of human divinity."

*

"The world is made, it is powered by science, and for any man to abdicate an interest in science is to walk with open eyes into slavery."

*

"I am become death."

*

". . . Thus the interest of their sidereal observation led them on, till the knowledge that scarce any other human vision was traveling within a hundred million miles of their own gave them such a sense of the isolation of that faculty as almost to be a sense of isolation in respect of their whole personality, causing a shudder at its absoluteness . . . Having got closer to immensity than their fellow-creatures, they saw at once its beauty and its frightfulness. They more and more felt the contrast between their own tiny magnitudes and those among which they had recklessly plunged, till they were oppressed with the presence of a vastness they could not cope with even as an idea, and which hung about them like a nightmare."

Exactly. How to cope with the nightmare, and the ideas? What to do with all the voices in my head that keep me up half the night? Beauty. Truth. History. Mortality. Oh, my. These literary, historical and scientific voices all seem to me to make sense, seem to me to be telling the truth, some of the truth, some truths, about life, the universe, and everything. For all I know, literature, history, and science may well be