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Chapter 10

A New Agenda

“I began by observing that you cannot find out what a man means by simply studying his spoken or written statements, even though he has spoken or written with perfect command of the language and perfectly truthful intention. In order to find out his meaning you must also know what the question was...to which the thing he has said or written was meant as an answer.”

R. C. Collingwood (1978, 31)

As previously discussed, my writings on immunology characterized the conceptual “infrastructure” of the science, which was organized by three contrasting positions: The first highlighted two competing understandings of immune function—defensive versus ecological. That appraisal showed how the clinical thought collective dominated the environmental context of immunity. The second opposition pitted Metchnikoff’s reductionist critics against his holistic vision, which in modern terms I posed as mechanical versus dynamic models. The latter position led to systems biology and the introduction of probabilistic thinking into biology. The third contrast, the one that organizes the following chapters pertains to Metchnikoff’s introduction of agency in his depiction of phagocyte behavior. The dissenters accused him (unfairly) of vitalism when he applied a descriptive interpretation of a complex phenomenon that could not yet be ascertained by chemical mechanisms. That controversy rested on a fundamental argument about what comprised evidence and with a new confidence in positivist tenets in the life sciences, Metchnikoff’s claims were dismissed as fanciful. That he was ultimately proven correct by later developments highlights both his scientific creativity and the limits of a mindset restricted to the reductionist approach.
It took many years to fully develop these themes, but already, shortly after completing *Metchnikoff and the Origins of Immunology*, I announced my general program. In the first colloquium I organized at the Center for Philosophy and History of Science (“Organism and the Origin of Self”) my interests in complexity and resistance to reductionism were outlined (Tauber 1991b). At that time, I was absorbed by readings in non-linear dynamical systems. As discussed in chapter 6, I sought a broader philosophical framework in which to understand science based upon probabilistic principles, or, in the terms of this narrative, the limits of certainty. This was the impetus for swerving back to a historical study of reductionism that had been framed by a larger philosophy, positivism. At that junction, the second half of my story unfolds to include philosophical topics uncovered by these initial studies.

Deciphering Metchnikoff’s theory served as the fulcrum for addressing this wider set of issues. Putting aside the specifics of his new conception of inflammation, he had prescient insight into the inadequacy of the philosophy of science guiding biology during his period. Clearly, he found himself at odds with the immunochemists of his day, but that controversy reached far deeper than contested views of host defense. Where they saw chemistry as the key to discerning immune functions, Metchnikoff substituted what was then called a “cellular” approach. That was shorthand for a “biological” orientation that embraced a holistic conception of the organism (Silverstein 2009).

The dynamics Metchnikoff intuited caught my attention, for beyond his specific theory of immunity, I discovered a sensibility, that, lacking terminology more precise, I must call romantic. I am referring to his rejection of a mechanized image of nature, where organic life is conceptualized as a conglomerate of interacting elemental parts defined by physics and chemistry. (Note, he was not exercising poetic enchantment or disenchantment of nature, or some existential posturing that has become a caricature of romantic angst.) Metchnikoff substituted Nature-as-Machine with life in constant struggle—fundamentally dynamic, “disharmonious,” and chaotic. Such a depiction is ill-disposed to the mathematical idealization proposed by Descartes and the reductive methods he advocated. The Cartesian model relies on the mechanical linear causality (A → B → C) that is readily schematized and when successful, highly predictable. However, on the romantic view, life processes do not conform to such a schema. Metchnikoff has been vindicated, albeit in terms utterly foreign to fin de siècle biologists. That almost a century would pass before complexity would receive it full due does not gainsay his intuitions. I am not suggesting Metchnikoff was a prophet of New Biology per se, but I do maintain that his science resisted the
reductive monopoly of his period that was eventually supplemented by modern dynamic modeling. In this regard, his romanticism proved fecund.

Romanticism had another appeal for me, namely, its critique of science’s adherence to an austere positivism that precluded a synthesis between science and the personal. That conflict, reiterated in several formats in this narrative, reflected my divided loyalties to different ways of thinking. The romantic critique was not directed to questioning the technical mastery of specific phenomena, but rather the displacement of wonder and the aesthetic for an objectivity that eliminated the subjective, altogether. As explained in the following chapters, I carefully examined this issue, first advocating a synthetic ‘solution’ and then rejecting it.

And then a third component of Metchnikoff’s approach impacted my thinking. As mentioned, much of his program originated in a sensibility of wholes, inter-connections, dynamic mechanics, and emergent phenomena. These guiding precepts conflicted with the mechanical model framing my own scientific orientation. Indeed, once I grasped the scope of the phagocyte theory controversy and my own stance within it, the transition I had made from biomedicine to philosophy took on new meanings. Simply, I discovered a startling personal inconsistency. The philosophy undergirding my laboratory research conflicted with Metchnikoff’s more expansive vision of biology. This provoked an awakening of sorts. His modes of thought challenged the

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1 Although interpretation is an inescapable aspect of scientific thinking, that caveat does not mean accepting the subjectivity of early nineteenth century scientists who projected their own emotional reactions onto their observations and conclusions. In other words, a line divides personal modes of thinking and experience that enter any creative enterprise against the subjectivity of Goethe, who interposed emotional valuations to his observations (illegitimate) and attributed aesthetic perception as integral to his scientific interpretations, a position well-accepted in our own era (Tauber 1996b). Goethe made no attempt to separate the faculties of knowing and regarded the search for “Unified Reason” as a problem of aesthetics. In his biological and physical science writings, Goethe combined historical review, aesthetic judgment, and subjective appraisals (Tauber 1993). For example, he posited a “primal leaf” as the basic template from which all plants derived their characteristic form. In some sense, he anticipated Darwin’s basic idea of evolution of species originating from a common ancestor. Goethe, however, had no inkling of evolutionary processes and based his idea solely on aesthetic criteria. The perception of shared characteristics among diverse species was an insight derived not from some scientific judgment, but rather through an analysis driven by aesthetic intuition. He extended this idea to the morphology of animals as well and thereby affirmed the art-science synthesis so dear to his romantic soul. He was, in a word, the paragon of Romantic science (most active period, 1790–1810), and while his methods were rejected in the next generation, Goethe provides an illustrative case study of how objective observation and the subjective may merge, despite failing to offer resolution to the subject-object division. Indeed, science marched on with nary a nod to his discarded aestheticism.
prevailing thought style of the research community with which I affiliated. After all, a positivist ethos pervaded my laboratory, and my success depended on discoveries derived from effectively practicing reductive-based science that assumed simple machine-like models. In other words, my laboratory “mind” did not conform to my affinity with Metchnikoff’s philosophy of biology, which became strikingly apparent when I appreciated that the complexity of the immune system would not be adequately characterized with the prevailing mind set of my research community.

I began to acknowledge that qua scientist, I had become a stranger in a strange land. The irony, of course, was that while I seemingly resided as an alien in the halls of philosophy because of my highly questionable professional standing, in fact, I was quite at home there. I had begun to think well beyond the ordinary parameters of the laboratory investigator. My horizons had widened. My interests had found new pursuits. A new intellectual identity was being forged. I was finally poised to address the underlying issues that had placed me in the laboratory and were now pulling me in other directions.

**The Next Phase**

Key moments in one’s career are often appreciated only in retrospect. One of these occurred with a seemingly ordinary lecture I delivered to medical residents shortly before I formally transitioned from laboratory investigator to philosopher of science. My address attempted to show how understanding the evolutionary history of some key proteins had clinical significance. I designed the title, “Would You Marry a Neanderthal?,” to provoke interest, but my topic had nothing to do with evidence about our ancestors’ crossbreeding with these Sapien cousins. Instead, I placed humanity in the biosphere both historically and as an object of evolutionary process: Neanderthals on one side, the present on the other. The residents politely listened, but, as I learned later, the topic was considered eccentric to their practice-oriented concerns. Humanity’s place in the eons of prehistory was tangential to their interests (Tauber 1991c). That I was making an argument for understanding the history of disease and the insight such a perspective offered made little, if any impact. They sensed (correctly I must add) that I had wandered off the straight and narrow path with which they were comfortable. Recall, I had taken my sabbatical a few years before to acquaint myself with evolutionary biology. I suppose, to be generous, I was attempting to make my extra-curricular meanderings relevant at the bedside. But in fact, my mind was elsewhere and they knew it. Indeed, I had be-
come fully engrossed in finding my way through the fog of romanticism and exploring themes that had followed me into the medical school.

My collegiate introduction to romanticism was heavily influenced by the art historian, Morse Peckham. In *Man’s Rage for Chaos*, he argued that human cognition seeks to order the environment to establish coherence and predictability (Peckham [1965] 1980). Necessarily, this perceptive process is incomplete, and art fulfills the psychological need to fill the gap between conventional patterns and the demands of reality. The Romantics played a decisive role in expanding our understanding of nature and they did so by emphasizing those elements not previously integrated. The “chaotic” is that excluded component art acknowledges and then captures. His scheme of incorporating what is there but previously resisting inclusion into our worldview (both of nature and inner psychological realities) vividly depicts the romantic sense of the creative. Undoubtedly, part of the appeal for me was Peckham’s efforts to include naturalistic aspects in his argument, i.e., art is an adaptive behavior. Art and biology! At the time, his thesis was just what I sought. I suppose temperament again raises his shy head: my measure of science, general wariness of intellectual arrogance, and skepticism of epistemological certainty placed me well outside the positivist camp as I aligned with anti-mechanistic romantic thought.

Does my viewpoint make me an anachronistic remnant of an eclipsed era, or perhaps someone exercising an addled mind? I would rather avoid a label and simply admit that I empathized with Metchnikoff’s dilemma of adhering to a romantic philosophy while working in a scientific community attempting to purge all remnants of that program. He had brilliant insight into the dynamic nature of biological processes, however, he could not prove any of it. Although Metchnikoff received a Nobel Prize, his science was despised by the German reductionists and the 1908 award reflected a tortuous political battle within the Nobel Committee. The issue was first and foremost the evidence supporting a principal role of the phagocyte in the context of immunochemical elucidation of the immune reaction. However, the underlying dispute also concerned the status of Metchnikoff’s general theory of immunity that carried ideas that failed mechanistic explanation.² Fifty years later, the molecular elucidation of his descriptive observations was confirmed. Although I celebrated his foresight, my overriding interests were framed by his vision, by his broad conception of the

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² I reviewed the Nobel archives to piece together the inner debates about conferring the Prize (Taubер 1992; 1994a, 32–43).
organic, not the particulars of phagocyte functions that he first deciphered. Is this an aesthetic orientation? I have been accused of such and I would not shirk this romantic assignment. However, I must note, that my commitments to facts are not in dispute; how to assess data, how to construct a model, how to compose a theory, those are the challenges. And my romanticism, at least as I see it, is based on a multi-layered and inclusive biology that would discern dynamic processes and allows for the uncertainty embedded therein. How and why I further explored the romantic roots of my thoughts are explained below.

Delving into nineteenth-century philosophies of science led me to an examination of competing epistemologies that centered on the knowing agent. And that topic, in turn, prompted a review of philosophy’s treatment of one of romanticism’s key issues, namely, the subjective-objective divide. From my studies of selfhood applied to immune theory, I recognized that the philosophical foundations of the Cartesian ego, the paragon of the mind-world split, had been discredited, so given the tenuous standing of the positivist ego, where did that leave the knowing subject? I would soon learn that the “Question of the Subject” had arisen from several sources, but it seemed the ways in which positivism had subtracted the epistemological agent was key. If science assumed a radical objective posture, where did that leave subjectivity? In short, objectivity had made subjectivity a problem.

Moreover, if biologists were fully committed to reducing complex life processes to chemistry and physics (a key positivist aspiration), and I had recognized the inadequacies of that approach, where did that leave positivist aspirations, more generally? Are the human sciences, writ large, amenable to radical objectification and if not, what then is their epistemological standing? What role does objectification have in ethics? And then more generally, what is the place of positive modalities of thought when applied to the subjective realm, where objectifying rules are imposed on emotion, intuition, and experience? Indeed, does one think subjectively? These were the beguiling questions that lay sequestered beneath the historiography I pursued. Once the immunology project had matured and I had found a tenured home in the Department of Philosophy, I could expand my inquiry to specifically address differing ways of knowing that had so beguiled me in college.

I held a tentative position: the entire question of the subject-object divide, perhaps ironically, reaffirmed the irreducibility of the subjective. The challenge was to understand why this intuition held me close, or put another way, why it was of consequence for me. On that basis, I renewed my examina-
tion with a review of the original romantic response to the conundrum of selfhood—the locus of self-consciousness.

With the completion of *Generation of Diversity* (Podolsky and Taber 1997), the third book of my immunology “trilogy”, I turned to philosophical issues that had been raised by the immunity project but postponed for a decade. I thought that a more thorough investigation of the immunochemist reaction against Metchnikoff’s romantic biology might be interesting, not only as a key precedent in the evolution of twentieth century philosophy of science, but specifically in elucidating the relationship of the “knower” (the scientist) and the “known,” her object of inquiry. I was ready to explore this subjective-objective divide that seemed to underlie my own quest for a better integrated worldview, and thus I turned to the philosophical canon for guidance.

Early modern epistemology sought to discern the nature of human perception and the ability to derive mental “pictures” of the world. Science, with its logic and universal methods offered a powerful model for understanding how those sensory findings are extended into facts and laws, a project Descartes thought would result in the axiomatization of nature. As mentioned, Kant posited that because of reason’s autonomy, the mind became the “lawgiver” to nature, i.e., it provided order on the plenum of experience. Reality was then the product of human perception of nature and imagination in constructing it. And at the same time, the mind patrolled and created its own human social and spiritual universe with a reason designated for that purpose. Kant thus directly confronted the human/nature divide with reason’s own division—“pure” reason applied to nature and “practical” reason to discern the moral universe. He then sought a way to reunify that which had been split, the so-called, “Unity of Reason” problem as discussed in chapter 2.

My collegiate dichotomous partition of ways of knowing relates to these separated faculties of reason. Studying Kant enabled me to see a way out of an irresolvable divide in his formulation of judgment. He posited this central faculty of the human mind as the function that ties together the various cognitive operations into a single unity of rational consciousness. I will not review the structure of this schema and simply note that Kant’s *Critique of Judgement* (1790), with its explication of aesthetics and biology as exemplars of “judgment,” provided me a philosophical scaffold for a deeper understanding of the problem that had pestered me for decades. More, because this *Third Critique* was the “starting point for romantic and post-romantic artistic practice,” I knew it presented a conduit into the romantic reaction to what they considered the
sterile rationality of the Enlightenment (Zoller 1990). Here, I would find the early source of hermeneutics and the various tributaries of the Unity of Reason problem that reached into the twentieth century.

**ROMANTICISM’S CALL**

Romanticism held me firmly in its grip. From my collegiate studies of myth to my understanding of postmodernity, the romantic ethos has pervaded my thinking. By the late 1990s, having come to a plateau in my immunology scholarship, I stepped back to assess its broader implications, not only about science writ-large, but more particularly about the knowing subject—the ostensible objective observer. The next step seemed to follow seamlessly. Eventually, I developed a philosophy of science in dialogue with the incipient romanticism that had formed so much of my intellectual sensibilities. From that direction, I tackled the science-humanities divide and, more particularly, developed interpretations of late nineteenth century biology relevant to our own times.

While aware of my intellectual proclivities in this regard, I did not consciously assemble my ideas until I stumbled upon Isaiah Berlin’s exposition that so clearly captured the major themes of the Romantic movement (Berlin 1999). Aside from articulating my own intuitions and integrating fragmented knowledge, Berlin confirmed the legitimacy of my interest in clarifying the conflicted and tensioned characteristics of Romanticism in contrast to the Enlightenment. I would have profited from listening to his lectures delivered in Washington’s National Gallery of Art and broadcast over the radio in June–July 1965. Alas, I was travelling cross-country and missed the insights of his historical vision until much later.

Assigning dates for intellectual movements is only approximate and inevitably varies with country, chronological overlap, and disciplinary interests. In terms of my own scholarship and internal sorting (note, not necessarily those of experts), I date the Early Modern period between Descartes’s *Discourse on Method* (1637) and John Locke’s *An Essay on Human Understanding* (1689). Politically, it begins with the Thirty Years War (1618–1648) and ends with England’s Glorious Revolution (1688–1689). The “radical” Enlightenment is co-extensive with secularization and political liberalism (Israel 2001). The political and ethical writings of the Scottish and American Enlightenments exemplify these ideals. Philosophically, the Enlightenment commences with Spinoza’s *Theologico-Political Treatise* (1670) and extends to Kant’s *Critique of Judgement* (1790). Romanticism ripples through Germany to England
to America from Rousseau’s *Emile* (1762) to Thoreau’s *Walden* (1854) that marks its zenith.

My own interests centered on Kant’s “Copernican Revolution.” One of the ironies of this chapter of intellectual history is that Kant, despite his abhorrence for Romanticism, contributed to its genesis by triggering a reaction to his own philosophy (Berlin 1999, 80–87). I followed the Kantian aftermath in German Idealism (Hegel and Fichte) and then tracked the inevitable reactions (principally, Schopenhauer, Kierkegaard and Nietzsche). Nietzsche brought me to the twentieth century, where I closed my philosophical circle begun in adolescence with a close examination of the contrasting schools of thought initiated by Heidegger and Wittgenstein (discussed in chapter 13). My late education follows this rough segmentation, and I sketch it here only to offer an overview of the broad territory I traversed, some of which will be detailed, but most of which will pass quickly beyond our hastened gaze. In any case, to the extent that my scholarship has a primary source, I would assign that wellspring to the Romantics, in particular, how they characterized the epistemological agent.

Who is the knowing subject? I understood that the foundations of the Cartesian ego, instantiating the mind-world split, had been discredited in the twentieth century. So, given the tenuous standing of the observing ego, where did that leave the subject-object divide? The elimination of the subject, the “subjectless-subject,” became an ideal of objectivity (Fox Keller 1994). Ironically, that conception coincided with the same subjectless-subject who appeared as the logical result of the romantic aspiration to eliminate the separation of the Cartesian ego looking at nature to a stance in which she is integrated within nature. In other words, romanticism reached the same idealized endpoint of positivism’s elimination of the subject. It was as if two armies, moving in the same circle, one clockwise and the other counterclockwise, met at their zenith.

The subject, romantically scrutinized, centered on the status of various kinds of knowledge, and more specifically, the legitimacy of subjective experience in the face of science’s authority. If the human sciences, writ large, were subject to radical objectification, where did that leave ethics, aesthetics, and the spiritual that could not be reduced to scientific scrutiny? Self-conscious thinking becomes a different species when applied to the subjective realm, where objectifying rules are poorly imposed on emotion, intuition, and experience. What happens when objects of thought are one’s own feelings, emotions, and desires? Does language even capture such mental states? What are the modes of contem-

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3 I found Frederick C. Beiser’s works (1987; 2002; 2003) particularly useful.
planation that address the ineffable? And when existential questions loom, *Where Do We Come From? What Are We? Where Are We Going?* the reason of science soon collides with the impenetrable and thus becomes inapplicable.

Because I began with the irreducibility of the subjective, I sought to understand why this intuition held such standing even in my self-identification as a scientist. Given the adoption of a scientific way of thinking as the standard of knowledge, the Romantics had asked, how does the rest of “me” relate to the objective world? In other words, where does subjectivity reside in the reality science describes? How does the picture of reality depicted by science include subjective judgment? And I would also ask, most generally, on what basis does the objective-subjective integration occur, if at all?

I returned to the origins of this query in my *Thoreau and the Moral Agency of Knowing* (Tauber 2001). Here at last, I directly addressed my unresolved collegiate conundrum and studied how scientific inquiry might be included in a humane pursuit of meaning; more specifically, how imagination mediates the personal/objective interface. That opened the door to a host of issues seemingly far removed from philosophy of biology, topics pertaining to the self-consciousness of the knowing agent and the nature of her reason.

Thus, in ways I would never have predicted, the question of the self that had dominated my studies of immunology launched a cascade of topics loosely arranged around the knowing subject: epistemology considered from the Romantic perspective, a conception of agency that revised the Cartesian model, the search for Reason’s unification that reached to the very sources of the modernist-postmodernist divide, an affirmation of subjectivity drawn from philosophical sources. I had not anticipated that the extended study of immune theory would lead me to these larger philosophical undertakings. But looking back, I can see that my historiography was driven by twin concerns: a self-evident epistemological exercise, and in a more latent form, an exploration in moral philosophy.

By “moral,” I refer to how values structure and orient what one sees and understands, whether engaged in scientific or historical discourses. Not only is knowledge itself valued, that is, employed for ends, but knowledge is constituted by an ordering, a prioritization of interest, that confers a particular character on observations, facts, and theory. If we admit that scientific investigations are constituted, at least in part, by a value-driven perspective and implicit

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value-inspired goals, then we must acknowledge such elements in any assessment. This blurring of the fact/value distinction became the dominant theme of my more general writings on science in culture, where I discussed the incipient extracurricular factors that may easily influence the interpretation of scientific data used for social ends (Tauber 2009a, chapter 5). That inquiry begins with the scientist herself and the blurring of the subject-object division. With this interest kindled, my study of romanticism, in which Thoreau served as an exemplary model, began to take form. As discussed in the next chapter, I saw both the strengths and weaknesses of an epistemology that consciously sought to draw the objective and personal elements of “seeing” together. And once I recognized that long-lost path stretching before me, I set off to see where it would take me.

The Romantic Resistance

In our post-positivist age, the romantic complaint remains unanswered. The “spectator gap” beyond its explicit epistemological significance also stands for a metaphysical dissociation of humans and nature. This, and what the romantics had identified as “disenchantment,” became the catch-all lament for Western complaints of alienation. Improved health, agriculture, and industry notwithstanding, this romantic cry represented the other side of the coin of discontent with modernity’s mass society and its trappings associated with science and its technological off-spring. The pastoral ideal personified by Thoreau captures those sentiments that gained momentum during the twentieth century. The same grievance about a rising scientism placing a wedge separating humans from nature, resurfaced in the philosophies of Heidegger and Husserl, the environmentalism emerging from American Transcendentalism (Tauber 2003b), various anti-science critics (Roszak 1972; Holton 1995b), nature religions (Albanese 2002; Dunlap 2004), neo-pantheism, 5 Zen Buddhism, 6 among others. Each protested that science’s ether had pervaded (to the exclusion of competing ways of knowing) all aspects of human life to profoundly determine how we think and what we think of the world, of other persons, and of our-

5 To appreciate contemporary Spinozism as the culmination of Western philosophy see Kronman 2016. A very different tack that regards science capable of revealing nature's divinity see Kaufmann 2008.

6 Of the massive literature devoted to surveys placing classic Asian texts in a Western philosophical translation see Harvey 1990; Wright 1998; Kupperman 1999.
selves. I short, science was indicted for putatively redefining even those aspects of experience that might, at first glance, seem to escape its positivist vapors.

Each of these romantic protests begin with the Cartesian *res cogitans/res extensa* division, where the scientist becomes a witness of nature, not part of it. To peer at nature dispassionately is to maintain that metaphysical divide, which according to the dissenters is the origin of a traumatic cascade: objectivity instantiates isolation; alienation soon follows, and in the end, existential crisis results. Accordingly, any delimited picture of nature presented through the objective stare must be translated into human significance. Where does the divine fit into a disenchanted cosmos? What is meaningful in an objectified nature and how is it derived? What might counter such disenchantment? Without a revamping of metaphysics, the spiritual, emotional, and aesthetic dimensions of experience were left to find their own course. How to personalize objective knowledge then became the key challenge.7

The Romantics understood science’s centrality, but they challenged the allures and costs of its standing. Moreover, they insisted that the reality science provides is truncated, incomplete and ironic, inasmuch as the objective picture is hardly the reality we know intimately.8 Although recognizing the power of the “view from nowhere” (universally neutral and objective) they championed the sanctity of the individual’s vantage that emphasized the aesthetic, spiritual, and imaginative components of experience. Or more simply, the subjective. And because the romantic temperament resisted the subordination of the personal at the expense of the objective, a Great Divide loomed. The issue was not

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7 As Walt Whitman mused:

When I heard the learn’d astronomer,
When the proofs, the Figures, were ranged in
Columns before me,
When I was shown the charts and diagrams, to add,
Divide, and measure them.
When I sitting heard the astronomer where he
Lectured with much applause in the lecture room.
How soon unaccountable I became tired and sick.
Till rising and gliding out I wander’d off by myself,
In the mystical moist night-air, and from time to time,
Look’d up in perfect silence at the stars.
(Whitman [1865] 1973a, When I Heard the Learn’d Astronomer, 271).

8 Heidegger dubbed scientific reality, a “world picture” (1977a; 1977b), which captured the image of a circumscribe depiction of limited scope. This disavowal focused his attack on Cartesian metaphysics and prompted him to offer his own. The fate of that effort awaits my later commentary (chapter 13).
knowledge, but rather the authenticity of subjectivity in the processing of experience. Analysis is one way of knowing, “subjectivity” encompasses much else.

In celebrating the subjective, the Romantics decried positivism not only as a philosophy of science, but more generally as a philosophy of knowing. For them, radical objectivity fails because the view from nowhere subordinates, if not eliminates, the human dimension from consideration. Science may offer facts and theories, but the second step of investing such knowledge with personal meaning remains an unattended matter unless deliberately addressed. In their philosophy, poetry, and art they celebrated the fluidity (and sanctity) of personal experience. Here, individualism was born, and a new self-awareness birthed. The lines connecting Blake to Baudelaire, Schopenhauer to Nietzsche, and Turner to Gauguin led to the bevy of figures that had profoundly influenced my own thinking about modernity and the postmodernism that grew from the romantic mulch.9

No less an authority than Isaiah Berlin opined that Romanticism was “the greatest single shift in the consciousness of the West,” by which he meant that it transformed the lives and the thought of the Western world more profoundly than any of the later shifts which have occurred in the course of the nineteenth and twentieth centuries (Berlin 1999, 2). The Romantic era was a pivotal moment in Western history because this “great break in European consciousness” (ibid., 8) moved “away from the notion that there are universal truths, universal canons of art, that all human activities were meant to terminate in getting things right, and the criteria of getting things right were public, were demonstrable” (ibid., 14). The individual became paramount and the “world picture” science presented was categorically rejected.

Romantics adopted a new “universal,” one dominated by the private, by the emotional, by the independent self, bequeathing the relativism that currently dominates our own postmodernity. In this post-Enlightenment period, the universe is plastic, there is no abiding structure of things or thought or morality. Objectivity has different meanings in different domains, no abiding method is universally applicable. The world and the modes by which it may be understood and governed become more pliable, require more tolerance, allow for plurality, and must be understood as amenable to acts of will and free choice. The Romantic world then might well encompass divergent and even contradictory characteristics: harmony and turbulence, unity and multiplicity.

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9 The relation of postmodernism to romanticism is a complex topic that has been most explored in the literary context (e.g., Altieri 1979; Larrissy 1999).
ity, integration and fragmentation. Then one might well ask, what is the normative? Which values govern? And then, how does one find bearings without foundational values? As I have reexamined the trajectory of my own scholarship, these fundamental uncertainties emerged as the underlying currents guided my inquiries. In this sense, the Romantics set my agenda, not as they originally posed their own challenges, but as similar anxieties reappeared in the context of our own time.

**An Appraisal**

The origins of the Romantic Revolt began as a secular attack on religion in the late seventeenth century that soon enrolled science as an alternative way of obtaining truth. Facts and theories based on them would replace the revelations that formed the basis of divine directives. Science had established standards of knowledge derived from objective accounts and the truth of interpretations (and by extension, inner experience) thus became suspect. While religion was the target, a major revision of personal identity occurred in parallel. The repercussions were seismic. The newly found authority of the individual translated into the public display of a new way of thinking about agency. And that extended to the status of the individual’s cloistered thought. The private realm was subject solely to one’s own judgment. That proved complicated: on the one hand, the sanctity of private thought reflected a new-found freedom, but on the other hand, the subjective resided in a province where truth claims answered to different criteria of veracity. After all, given the prejudice and bias afflicting human opinion versus the dramatic results of dispassionate scientific methods, how could subjective ways of knowing compete with the objective enterprise?

Posing such a dichotomy, as Kuhn and others have argued, not only distorts the “ways of science,” but also omits the personal experience of doing science. The science/art dichotomy obscures the creative, personal components of the scientific endeavor. In other words, while the stark division commands the most attention, clearly personal, especially aesthetic factors are at play in science. I recognized this component and early in my transition to the Department of Philosophy I organized a colloquium on the aesthetics of science (1992), which was later published (Tauber 1996b). This was the same bridge offered by Max Weber in his famous essay, “Science as a Vocation” (1946). He maintained that science’s intellectual achievement offers personal satisfaction and provides the thrill of inspiration, imagination, and ideas. Accordingly, a scientist is not solely
a calculator or uninterested observer but engages in a vital, creative activity. To situate science in terms of its humane function rather than solely through its epistemological aspirations or technological applications, Weber referred to “the inward calling for science.” By addressing the broader meaning of the enterprise for its practitioners, he suggested that the defined scope of scientific disciplines seemed restrictive to this wider agenda. However, he recognized that scientific imagination drew upon the same creative sources of intuition that inspires art and thus his attempt to place value squarely in the personal experience. Weber’s insight complements those who regarded positivist science as forfeiting claims to becoming a universal philosophy. Perhaps Weber had a romantic streak, for he drew from the same stream of thought that envisioned the common root of art and science in a unified Reason.

I readily acknowledged Weber’s insight, but any remnant of the romantic program had been indicted and essentially purged by the late nineteenth century. However, I wondered if something might be salvaged. My hesitancy in discarding the romantic trial altogether rested upon a hunch that their mistakes are not so easily dismissed. Five philosophical issues commanded my attention:

1) By common consent, one of the cardinal sins the romantics committed was to allow subjectivity to infiltrate their scientific views. Take for example, Samuel Taylor Coleridge: he posed individuality as an undisguised metaphysical concept, wherein all life strives to perpetuate its own kind in its own particularity (Coleridge [1818] 2010). This proto-Nietzschean Will to Power (also articulated by Schopenhauer) clearly expressed the romantic sanctity of individuality as a cardinal characteristic of life itself and the innate vitality animating it. This metaphysical construction has a startling persistence within contemporary biology. Little extrapolation was required to see the modern parallels with the basic idea of individual autonomy that dominated romantic thought. As I would discover in my studies of immunology’s theory, notions of individuality organized our own contemporary understanding of immune phenomena. The extrapolation to wider ideas about identity (the immune system’s “responsibility” for establishing and protecting the individual) revealed a similar commitment to a metaphysics of identity conceived in its atomistic, autonomous guise. This construction drew from a particular conception of agency, and it was chosen over other ways of thinking about the subject.

2) In addition to the presence of “extra-curricular” elements in scientific thinking, a pressing epistemological matter raised by the romantics remains highly relevant today. I had uncritically accepted an undergraduate under-
standing of the scientific method closely akin to the way positivists had characterized the scientist—a detached observer of the world, objective lens in hand. She reports the findings, the facts as it were, and then steps back to interpret them. Little did I appreciate the unsteady status of a “fact,” nor the interpretive process that molds facts into models and theories. My naive philosophy of science would eventually be corrected, but throughout my career as trainee and then as an independent researcher, I accepted this over-simplification. When I analyzed the fact/value distinction, I concluded that such a dichotomy fails positivist aspirations. Instead of a stark, unadorned objectivity, facts are interpreted and employed through the choice of values that themselves are subject to cultural change. Moreover, standards as to what constitutes objectivity and neutrality have evolved within different disciplinary traditions. The romantics accepted the convergence of non-objective elements in the investigative process, a position that holds a secure place in current philosophy of science.

3) Another persistent idea is the romantic tenet of holism (nature conceived as integrated and whole) that we now appreciate is a required principle in characterizing dynamic biological systems (see chapter 6). Systems biology, a top-down approach, complements molecular reductionism: parts must be assembled by organizational principles derived from functions conceived within the entire construct of the organism. Even though most of contemporary biology still adheres to older mechanical models, other expansive strategies are developing in this respect. To exhibit a molecule’s function, many layers of analysis, interpretation, and finally, definition, are played in a medley of variables. Accordingly, a biology committed to methods that ignore the essential dynamic character of organic processes must, by necessity, lose the perspective required to characterize a complex system. Even Bernard, the Father of Physiology, understood that any physiological element “must always refer ... to the whole and [thus] draw our final conclusion only in relation to its effects on the whole” (Bernard 1957, 188–89).

4) And yet another consideration, derived from the characteristics, enlisted me in what I call, a “neo-romanticism.” Unlike the faith of the Enlightenment in discovering the governing principles of order and the rationality that would expose nature’s workings as a vast mechanism, the romantic sensibility

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10 As discussed, in the immunity scenario, the individualistic self-defense schema draws from a set of values underlying insular understandings of agency; an ecological orientation shifts those same facts into a paradigm where immunity becomes a mediating faculty, where protection is balanced against assimilative measures. See Grignolio et al. 2014; Tauber 2017b.
regarded opaqueness as constitutive to nature or what I have identified here as irreducible uncertainty. This ethos counters the positivism that is predicated on the clarity of “certain” knowledge. In a sense, this is but a sensibility, one that postures the entire investigative endeavor.

5) The final (and most intimate) array of issues inherited from the romantics that held my attention concerned the existential. Obviously, knowledge stretches over a spectrum of objectivity. Some kinds of knowledge are produced at the far end of the objective pole, and such knowledge demands (appropriately) minimal “contamination” with the subjective. But this is not the extant issue, for that battle has been long fought and decided. The point I would pursue is something else entirely: what is personal knowledge, and does it comport in the scientific endeavor? Obviously, to translate an objective picture of the world into terms that has human existential significance requires diverse values and assessments and these too have their legitimacy and just applications. The issue is not to entirely purge the subjective, but to recognize its rightful place in the tribunal of judgment, where knowledge is ultimately valued and deployed for human use and understanding. Stranded knowledge is both useless and irrelevant divorced from the reality of the personal domain. In short, knowledge is inexorably valued along the entire objective-subjective continuum.

Those who would discard romanticism’s yearnings maintained that “meaning” was never listed on science’s menu, at least not as a main course. Whatever meaning is derived from scientific findings must be taken á la carte, probably only as dessert. Accordingly, meaning comes from outside of science, and such interpretation arises as a matter of choice, a question of belief and personal need. Given that meaning resides beyond science, it seems that the romantic quest remains for those so inclined. Simply, let those who seek a better synthesis carry on as best they can, for the aspiration to find meaning is not easily dismissed. This need, a relic of an ancient metaphysics, resides deeply within Western psychology, and science is hardly immune from being co-opted for this larger purpose. Indeed, if scientific knowledge has become a paragon of truth and a source of wonder at nature’s order and function, how could those findings remain immune from being placed within a larger context?

Henri Atlan suggests that this metaphysical posture results from a profound desire for science to provide a comprehensive explanation of nature. He refers to this as a mystical aspiration:

The need for an explanation of reality is, fundamentally, antiscientific. The satisfactory explanation is a bonus, the esthetic pinnacle that accompanies
and sometimes completes ... the result truly sought; technical performance ... For the practitioners of contemporary science ... the need for explanation is merely a relic of metaphysical, indeed religious, wonder. (Atlan 1993, 193)\(^{11}\)

Following this theme, Gaston Bachelard, rather than lamenting the contamination of such a metaphysical remnant, celebrates its role (Bachelard [1934] 1984). He saw in the pursuit of meaning the motive force of research, one that would animate scientific query in a twofold fashion: nature not only has a rationality that invites discovery (and thus enables humans to place themselves within nature from which objectivity separates them), but more intimately, that knowledge, translated into wonder, provides the emotional recognition to marvel, and thus regain, a lost enchantment. To find personal meaning represents the process by which objectivity and subjectivity (both acknowledged and justified) are brought into proximity, to overlap, and even to integrate. To speak of nature, we draw from both objective accounts as well as the relational aspects derived from the pervasive metaphysical picture science presents. The pursuit of the real, in the end, is a quest for meaning. In this latter task, we endeavor to place humans within the cosmos defined by a reality derived from scientific findings.

To shun the existential does not mean we escape its call. Theology may not beckon, but metaphysical wonder remains, and even more deeply, the task of understanding the existential placement of humans in the world cannot be ignored. In the reality composed by science, we may have exchanged one set of beliefs with another, but that does not signify the absence of a metaphysics that helps define our existential understanding. Rather than deny the metaphysics of this scientific age, perhaps we should delve more deeply to understand them? While we might resist alluding to metaphysics in this “post-metaphysical” era, we cannot escape the question of reality and our place in it. And defining that reality extends far beyond the purview of science and its various conjugates.

If philosophy cannot address the challenge, other venues will continue to offer their means of expression—art, religion, literature, music, political discourse, and so forth.\(^{12}\) While each can proceed on its own, historically, philos-

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\(^{11}\) Atlan’s work has unfortunately been neglected in Anglo-American studies (see Tauber 1996c; 2011; 2012a). For a more explicit connection between wonder as a core element of science and religion, see Gilbert 2019.

\(^{12}\) I recognize that the “so-forth” should not be dismissed cavalierly, because the romantic view that puts a holistic, enchanted vision of science squarely into the political framework has served dangerous ideologies in the past. Clearly, Nazism had deep romantic roots and critics
ophy has been instrumental in defining the central themes. I cannot fathom philosophers abdicating that role. If my excursion into philosophy has a single theme, it is to recall that ancient mission. And in doing so, I came to realize that a line, in fact a well demarcated division separates science—a form of knowledge—from the various forms of personal meaning that might derive from such knowledge. In other words, once meaning enters the calculus of knowing, I found myself on a slippery slope much like Alice in Wonderland falling into another realm, where the logic of the regular is replaced by something else. Examining that issue required some major historical and philosophical excavating.

have pointedly charged those who would imbue science with value as flirting with the distortion of science and its surreptitious use for ideological ends (Mosse 1964; Harrington 1996). "The enchanted version of science, looking for 'value in a world of facts' opens up the possibility that any ethical system can be validated by holistic [enchanted] reason ... 'The whole is greater than the sum of its parts' provides the extra something that can be shaped to fit any moral purpose [such as Nazism]" (Kendler 1999, 831; see also Köhler 1959).