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## Organism, Environment, and Literary Representation<sup>1</sup>

For the past decade or so, I have been working to integrate Darwinian thinking with literary study. I have written a book on the topic and a number of articles and reviews. Here, I am first going to describe some of the main features in the theoretical terrain I have crossed and then assess the relations between evolutionary literary theory and ecology.

I am sometimes asked how I came to take up Darwinism. My graduate training, in the 1970s at Berkeley, was in comparative literature. I spent a lot of time in language study and gave particular attention to the history of ideas. I subscribed, uncritically but sincerely, to what Meyer Abrams describes as the traditional humanistic paradigm—the idea that “the site of literature is the human world, and a work of literature is the product of a purposive human author addressing human recipients in an enviroing world” (115). In order to provide a governing frame for my own scholarly and critical work, I adopted no one particular theory. Instead, I depended on what I took to be the common understanding of educated people. The Darwinian theory of evolution, I assumed, was one of the largest and most important elements within that common understanding. In the introduction to my first book, *The Cultural Theory of Matthew Arnold*, which was published in 1982, I made tacit appeal to this Darwinian element. I said that “Arnold bases his system of culture on two assumptions that most of us no longer make. He comes to believe in the existence of objective, universally valid laws, and to believe that these laws have been progressively revealing and developing themselves throughout the history of Western culture” (xiv). Arnold was Darwin’s contemporary, but Arnold never assimilated the cultural and metaphysical implica-

tions of Darwin’s thinking. Unlike Darwin, Arnold envisioned history as an immanent spiritual dynamic leading to a culminating condition of human cultural “perfection.” In his belief in teleological progressivism, Arnold was typical of Victorian cultural theorists.

When I spoke of “assumptions that most of us no longer make,” I was presupposing that “most of us” had assimilated the larger implications of Darwin’s understanding of evolutionary processes. I myself had not yet read much of Darwin, but I understood the basic theory and held it as an axiom that all organisms are the product of an interaction between their innate biological characteristics and their environmental influences. The naturalism of this axiom seemed integral to the Enlightenment belief in reason and nature, and I regarded that Enlightenment belief as the central current in our modern intellectual heritage. Over the next decade, throughout the 1980s, it gradually became apparent to me that in invoking this common heritage, I had been hasty and naive.

In the midcentury period, the traditional humanistic paradigm of which Abrams speaks had accommodated a hodge-podge of ideologies, philosophies, and religious beliefs. Within the culture of literary study, the Enlightenment belief in reason and nature had never achieved clear dominance, and post-Darwinian naturalism had had very little influence. Several of the major literary theorists of the twentieth century were traditional Christians. Others were Romantic mystics. From the thirties into the seventies, the core ideology for academic literary study was the New Criticism, and the core belief of the New Criticism was a mystical sacralization of the literary artifact. This aestheticist credo was compounded from sources that had no affiliation with Darwinian naturalism: from Kantian aesthetics, Coleridgean metaphysics, the Arnoldian transvaluation of religion as poetry and poetry as religion, and the formalist aspects of Paterian aestheticism.

In the late seventies and early eighties, a theoretical and ideological revolution occurred in literary studies. The new poststructuralist paradigm eliminated both the aesthetic idolatry of the New Criticism and the ethos of reason and nature that had subsisted uneasily alongside it. The eighties were a period of swift transition. By 1990, most practicing literary critics had subscribed, however grudgingly, to the new poststructuralist paradigm. There are two essential elements to the poststructuralist paradigm: textualism and indeterminacy. Textualism is the belief that language or culture constructs the world according to its own internal principles, and indeterminacy identifies all meaning as self contradictory. Within the poststructuralist world view, signs determine the shape of reality, and all sign systems necessarily subvert themselves.

Sometime in the late eighties, a friend of mine, lodged happily in the bosom of the new theoretical establishment, remarked in a complacent way, "We are all deconstructionists now." No, I thought, not quite all of us. There is at least one of us who is not. To me, the philosophical rationale for the new paradigm seemed wholly unconvincing. I saw nothing in the propositions of textualism and indeterminacy that even remotely approximated the axiomatic force of the basic biological proposition that organisms are the product of an interaction between their innate characteristics and their environmental influences. But it was not possible simply to ignore the new paradigm and proceed with specialized scholarship. For scholars to register with other scholars that they were initiated members of a professional discipline, it had become obligatory that every formulation couch itself within the codes of textualism and indeterminacy. In order to continue to speak about literature as an act of communication between individual people in an environing world, it had become necessary to formulate an explicit philosophical justification for each of those terms.

My first effort to formulate a theoretical system as an alternative to poststructuralism was descriptive and schematic. I designed a set of concentric circles that were meant to constitute a map of all possible categories of experience. The innermost circle, at the center of the set of concentric circles, was the individual person. The outermost circle was the universe—the whole world to the furthest glimmer of light filtering in from the big bang 15 billion years ago. Between these two points, I located a series of nested categories. These categories were, I said, the major terms through which human beings organize their experience. Starting from the individual, the next category was the sexual dyad, the couple, and I noted that love stories—stories about the romantic and sexual relations between two people, usually a man and a woman—constitute the overwhelming preponderance of all literary plots. Beyond that, the next circle—the next major category through which human beings organize their experience—was the family, that is, a social group consisting of parents and children, of sisters and brothers, and then of other kin. It is within the family that individuals develop and define themselves personally and socially, and few love stories take place without some reference to family relations. Moreover, the family is the basis for the generational ethos, and thus for dramas, epics, and myths in which the sense of connection and consequence extends beyond the lifetime of a single individual. The next category was that of the whole social world—the world of communities, occupations, classes, nations, political organizations, and political ideologies. For most contemporary critics and humanists, this is the last sub-

stantive category. All experience defines itself exclusively in terms of particular social configurations. But in this respect most contemporary theorists part company with most literary authors. Beyond the limits of any particular social order, most authors make some appeal to "human nature," that is, to a set of motives and cognitive dispositions that are specifically human and that appear in all cultures. The category of human nature is itself contained within the still larger category of Nature—the world of living things and their physical environment. For me, this last category, that of the physical environment, was coterminous with the outermost sphere on my map. There is no larger or more inclusive category. For many other people, the outermost sphere would be defined not in terms of the physical universe but in terms of spirit or divinity. This outermost sphere is thus the sphere of metaphysics, the sphere in which one identifies the ultimate stuff or matter of the universe.

Every person has a world view, and all literary representations articulate the world views of their authors. The individual person at the center of this set of categories can be an author of a literary representation, and he or she can also be a character in a literary representation. That is, all authors and all characters are individual persons. Characters are passionate agents, animated by the common human passions and motives, but they are also perspectival agents. They struggle to make sense of the world, to interpret actions in ways that answer to their own needs and values, and to impose their reading of events on other characters. In the degree to which authors themselves wish to influence the behavior of others through their works, they are themselves passionate agents, but their primary role is that of perspectival agents. They enjoy a special privilege of exercising interpretive authority over the stories they themselves tell.

The relations of comparison and contrast among the viewpoints of characters and between the viewpoints of authors and characters is one of the most important dimensions of meaning in literary texts. Characters struggle with one another to tell the story in their own terms, and the author constantly mediates among characters, aligning himself or herself with one or another, and distancing himself or herself from others. Each distinct point of view involves a distinct meaning system, and the total meaning structure derives from the interplay of competing or collusive meaning systems within any given text. It is for this reason that the analysis of irony, as a central stylistic and tonal medium for registering differences in point of view, occupies a position of singular importance in the interpretation of literary meaning.

Every text has a total meaning structure, that is, an at least hypothetically recoverable set of meanings, but even when we have gone

so far as to establish a category as portentous-sounding as that of "the total meaning structure," we have not yet exhausted the problems and potentials in point of view. The viewpoints of readers need not converge precisely with those of characters or authors. The total meaning *situation* of any literary text thus involves more than the total meaning *structure* of the text. The total meaning situation involves the relation between the total meaning structure of the text—with all its interacting points of view—and the point of view of any reader or set of readers. When we interpret the larger meaning situation of a text, we at least tacitly include the response of various readers, and in this respect, interpretation presents the prospect of an endless regress—of new readers reading previous readers reading the text. Lest this formula sound dizzily abstract, consider that in any ordinary introduction to a paperback edition to a classic literary text, we are almost certain to hear an account of the historical reception of that text, and at the end of the introduction, if it is even ordinarily competent, we shall find a "guide to further reading." Each of the books and articles in any such bibliographic list embodies a distinct way of organizing the main categories of human experience.

The purpose of the map I have described was to provide a set of common, neutral categories that could provide a basis for the comparison of world views. Different people and different cultures give different definitions to the various categories of the map. From my own naturalistic perspective, the figure at the center of the map, the individual person, is an organism, and the whole set of circles surrounding that organism is the environment. (The human environment is both social and natural; it includes other people as well as land, sea, and sky, plants and animals.) For a Christian, in contrast, the circle at the center might well be the individual soul, and the whole set of intervening circles a series of challenges and temptations lying between the soul and God, who occupies the outermost circle. For someone participating in the postmodern paradigm, the inner circles of individual, the sexual couple, and the family, would be defined through textualized Freudian terms such as those available in Lacan; the social world would be defined through textualized Marxist terms such as those available in Althusser, Foucault, and Jameson; and the outermost circle would be defined through the deconstructive linguistic philosophy derived from Derrida.

By constructing a set of conceptually neutral categories for the comparison of world views, I had provided myself with a framework within which to compare the competing paradigms of poststructuralism and the traditional humanistic paradigm, but I had not yet constructed a rationale for the naturalistic content that I myself wished to give to the

categories in this map. This was the point to which I had come, about ten years ago, when I first sat down to read two of Darwin's major works, *The Origin of Species* and *The Descent of Man*. The immediate occasion for reading Darwin was simply to participate in a conference panel as part of my ongoing scholarship in the field of Victorian prose. The effect of reading Darwin was immediate, massive, and decisive. It did not so much transform my world view as rather unfold and illuminate it. Darwin's own vision of evolutionary history has a simple grandeur and power that comprehends the whole natural world, including the human world, over all of geological time. Set beside the scope and comprehensive force of the Darwinian world view, the sophisticated verbal formulas and tortured encodings of poststructuralism appear trivial and irrelevant. Up to this point, my own naturalistic convictions had been stubbornly but passively held intuitions. Now, I began to formulate them as active theoretical propositions about human nature, the adaptive functions of the mind, and the nature of literature as a biological phenomenon.

While formulating these propositions, I was reading intensively in the current research on the biological basis of human behavior, and I was able to locate my own Darwinian efforts within the larger historical trajectory of evolutionary thought. The general outlines of that trajectory are now well known. Darwinism had been an active force in social and even in literary theory until about the end of first decade of the twentieth century. In the following decade, an anti-Darwinian counter-revolution took place in the social sciences. Social theorists such as Émile Durkheim, Franz Boas, Alfred Kroeber, and Robert Lowie propounded the doctrine that culture is an autonomous agency that produces all significant mental and emotional content in human experience. Innate, evolved characteristics exercise no constraining influence. The idea of cultural autonomy became the cornerstone of standard social science, and until the 1970s Darwinism essentially disappeared from professional social theory. In the mid-century period, the animal ethologist Konrad Lorenz and the philosopher Karl Popper made major contributions to "evolutionary epistemology," an adaptationist theory of human cognition, but they did not concern themselves much with specifically human motivational structures and thus did not mount a direct challenge to the theory of cultural autonomy. The first major professional challenge to cultural autonomy appeared in 1975, with the publication of Edward O. Wilson's *Sociobiology: The New Synthesis*. Wilson offered a comprehensive analysis of the social behavior of animals within the explanatory framework of natural selection. His final chapter, extending this analysis to the human animal, provoked a series of violent rebuttals, but it also helped inaugurate a line of research that

has since grown at ever-accelerating rates. Over the past three decades, Darwinism has had a major impact on psychology, philosophy, political science, linguistics, and aesthetics. Within the past decade or so, a scattered group of literary theorists and critics has begun to take account of all this information. At the time I started working on a Darwinian literary theory, I assumed that I was working alone. But there were several other people who had also responded to evolutionary theory and were actively developing ways of applying it to literary study or to the wider field of aesthetics. Like me, most of these people started in isolation and only gradually became aware that they were part of a rapidly expanding common effort.<sup>2</sup>

From my reading in Darwinian studies of human behavior, I abstracted four large principles that I used to organize my understanding of literature: (1) The relation between organism and environment is a matrix concept prior to all social, psychological, and semiotic principles; (2) The human mind is organized through innate psychological structures (motivational and cognitive) that have evolved through an adaptive process of natural selection; (3) Inclusive fitness is the ultimate regulative principle that has governed evolutionary adaptations. (4); Literature is a form of cognitive mapping. All four of these principles work simultaneously to repudiate the textualist indeterminacy of poststructuralism and to affirm the naturalist conviction that literature reflects and articulates the vital motives and interests of human beings as living organisms.

From the evolutionary perspective, human beings are only a late and special instance of primate evolution; primates are late and special instances of mammalian evolution; and mammals themselves are relatively recent branches on the tree of animal life. The peculiar cognitive, linguistic, and cultural developments of human beings have done nothing to liberate them from the elemental constraints of all animal life—the necessity of nourishment, of water and air, a certain range of temperature, of protection from physical harm, and successful reproduction. The evolution of all specifically human adaptive structures has proceeded within biological conditions that are larger, broader, deeper, and older than any specifically human characteristics. Humans are social mammals, and the consequences of that broader set of conditions are fundamental to their motivational and affective lives. Live birth, the suckling of young, and the organization of individuals within a larger community shape and constrain our deepest needs. Upright posture and a large brain—our two most important specifically human adaptations—have produced innate motivational characteristics that fundamentally constrain sexual identity, human mating, and childhood development. The combination of a large brain

and an upright posture produce a narrow birth canal. Humans are born premature, more helpless for longer than any other animal. Human babies are totally dependent on mothers, and as a result, throughout all of human evolutionary history, successful human reproduction has involved some kind of female dependence on male support. (In this respect, humans differ from the majority of other animals, including mammals and primates, but not from most birds.) The common characteristics of human sexuality—the specificity of male and female identity and the often conflicted interdependence of men and women—flow directly from these biological realities.

The human brain has evolved to subserve all these more elemental needs and characteristics. In opposition, then, to the textualist creed of poststructuralism, I invoke the central principle of evolutionary epistemology, the idea that “all human knowledge derives from a process of interaction between man as a physical entity, an active, perceiving subject, and the realities of an equally physical external world, the object of man’s perception” (Lorenz 1). From this perspective, literature itself is but a special case of the cognitive activity aimed at orienting the organism to its environment—an environment that is in the first place physical. Literature distinguishes itself from other forms of knowledge in subject and method. Its subject is human experience, and its method is to evoke the subjective, felt quality of that experience by integrating conceptual understanding with the senses and the emotions.

While I was writing *Evolution and Literary Theory*, one of the main challenges I saw in front of us, both for evolutionary psychology and for evolutionary literary study, was that of giving more precise and definite content to the second heuristic principle identified above, the idea that the human mind is organized through innate psychological structures (motivational and cognitive) that have evolved through an adaptive process of natural selection. Which structures, organized in what way? I wished to use biologically based and empirically derived information about human nature as a framework for discussing the depiction of human behavior in literary texts, and for discussing the motives and identities of authors. Where to start? We needed detail, specific ideas. The seminal thinkers within evolutionary psychology also recognized the need for detail, and they responded to it with the theory of “cognitive modules” or “domain specific modules.” Merging the ideas of adaptive mental structures with the findings of cognitive psychology, evolutionary psychologists identified cognitive modules as something like “mental organs,” hard-wired bits of neural anatomy that have evolved to solve specific adaptive problems. By identifying such modules, evolutionary psychologists were able to

repudiate an idea that they saw as central to the Standard Social Science Model they wished to overthrow—the idea that the mind is a blank slate or general, all-purpose computer in which all particular cognitive structure is supplied by culture. In what has become the single most influential theoretical essay in evolutionary psychology, John Tooby and Leda Cosmides offered a list of special modules for the following functions: face recognition, spatial relations, rigid object mechanics, tool use, fear, social exchange, emotion perception, kin-oriented motivation, effort allocation and recalibration, child care, social inference, sexual attraction, semantic inference, friendship, grammar acquisition, communication pragmatics, theory of mind, “and so on” (113). This is the sequence they themselves give, and the “and so on” signifies an open-ended series. Steven Pinker offered a similar list containing fifteen items (*The Language* 420). The metaphor that became standard for signifying this conception of the mind was that of the “Swiss army knife,” with each little corkscrew or snipping device standing for yet another specialized mental “organ.”

Random lists of modules meet the need for specificity but do not meet the need for structure at higher levels of organization. To meet that second need, one must construct a bridge between the idea of cognitive domains and the elementary regulative principles of evolution by means of natural selection. In Darwin’s own formulations, there are two elementary regulative principles of natural selection: in order to become part of the evolutionary process, organisms have to survive and reproduce. More precisely, they have to survive long enough to reproduce. According to the distinguished sociobiologist Richard Alexander, these principles serve for biologists as a basic dichotomy for the analysis of life effort in all organisms. “Somatic effort” is the effort an organism expends in acquiring energy, in growing and sustaining itself. “Reproductive effort” is the effort the organism expends on mating and nurturing young: the risks males run and the time and energy they expend in seeking and defending mates, and the expenditure of bodily resources, and often of time, by female parents.

The vast majority of all organisms that come into life do not succeed in the basic evolutionary task of surviving long enough to reproduce. This is the sobering recognition to which the reading of Malthus drew Darwin’s attention in a forcible way. If the largest proportion of the offspring of any species were not doomed to destruction, that species would with astonishing rapidity overrun the planet. (We are now learning in very practical terms about how this principle applies to the human species.) If the message of the necessity of “much destruction” (*Origin of Species* 56) is a negative or sinister aspect of the evolutionary imperative, there is an equally arresting positive aspect: every

single organism alive at the present time, from the lowliest bacterium to the most gifted and talented human being, constitutes the most recent link in a success story that is billions of years old—a story of successful reproduction that stretches back without a single break to the very beginning of life on Earth. Whatever else might be said about our ancestors, each and every one of them succeeded in the only two tasks that, from an evolutionary perspective, count at all.

To what degree are human motives reducible to the elemental regulative principles of evolution itself? This question lies at the heart of the controversy between the two main phases of modern evolutionary thinking in the human sciences. The first phase, dominated by biologists and anthropologists, was that of “sociobiology.” In the late eighties and early nineties, the sociobiologists were gradually supplanted by the newer generation of “evolutionary psychologists.” Sociobiologists focus on “fitness maximization” or the drive for reproductive success as the ultimate regulator of human behavior. Evolutionary psychologists acknowledge reproductive success or “inclusive fitness” as the ultimate regulator of adaptive change, but they also insist that inclusive fitness is mediated by “proximate mechanisms” that can be decoupled from direct reproductive motives. They argue that living things should be conceived not primarily as fitness maximizers but rather as “adaptation executors.” At its extreme, proponents of this view argue that humans have no irreducible desire for progeny. What they desire instead is sex or mating. More broadly conceived efforts at organizing human motivations have made an allowance for parenting as one of the basic human behavioral systems.

In its more comprehensive formulations, Darwinian thinking about evolved human motives now recognizes at least four basic behavioral systems: survival, reproduction, parenting and kinship, and group living. The single most important development in sociobiological theory since Darwin has been the clear recognition that “selection” proceeds primarily not at the level of individual organisms or groups of organisms, but at the level of genes. Humans share roughly half their genes with siblings. A human being who never reproduced but who sacrificed his or her own reproductive opportunities to benefit two or more reproductively successful siblings—say a maiden aunt who gave up the prospect of marriage in order to devote herself to the care of the orphaned children of her siblings—would thus have achieved reproductive success. The logic of selection at the level of the gene has shaped our motivational systems, and as a consequence sociobiologists and evolutionary psychologists now recognize “kin assistance” as one of the elementary human behavioral systems. In order to account for social interaction beyond the kin group, evolutionary social scientists

invoke the principle of "reciprocation" or "reciprocal altruism." This is simply the principle of mutual backscratching. In the thinking of most sociobiologists, the logic of gene selection strictly prohibits the idea of true "altruism," of evolved proclivities to sacrifice one's own reproductive advantages for the advantage of others. But as Darwin himself recognized, social animals can often benefit themselves through cooperative effort with others: "When two tribes of primeval man, living in the same country, came into competition, if the one tribe included (other circumstances being equal) a greater number of courageous, sympathetic, and faithful members, who were always ready to warn each other of danger, to aid and defend each other, this tribe would without doubt succeed best and conquer the other" (*The Descent* 1: 162).<sup>3</sup> Arguing from a Darwinian perspective, the social scientist James Q. Wilson has proposed that the evolved human capacities for social interaction include the instincts for fair play (reciprocity and equity), and the sociobiologist E. O. Wilson also identifies an evolved human proclivity for contractual arrangements (*Consilience* 171). All such orientations necessarily involve the cognitive capacity for monitoring compliance and non-compliance with social contracts—for cheating and for cheater detection. In cheating and the detection of cheating, some Darwinian social thinkers see an evolutionary arms race that is in large measure responsible for the rapid development of human intelligence. (For literary theorists, cheater detection offers a highly suggestive evolutionary basis for the development of irony.) Finally, all complex social organization involves the creation and recognition of distinctions in rank or status, and in this respect human social instincts are continuous with that of other social animals. Our predisposition for forming alliances and conducting elaborate programs for achieving collective dominance is continuous with that of our nearest evolutionary relatives, the chimpanzees.

When we speak of basic human behavioral systems, we are speaking of human universals, and it is to the level of human universals that evolutionary psychology has directed the largest part of its attention. Identifying common human motivational structures is a necessary step in the whole program of repudiating the idea of cultural autonomy. In a more mature phase—often now only glimpsed in the work of evolutionary social scientists—Darwinian thinking about human behavior must also include at least two further levels of analysis: that of specific cultural configurations and that of individual personal identity.

Specific cultural configurations should be conceived as distinctive organizations of the common or universal human motives. One metaphor that might be helpful for envisioning this level of analysis is that of the kaleidoscope. The common elements are the bits and pieces of

human nature, and the patterns are the way those bits and pieces fall into relation with one another in a given historical situation. The patterns include the forms of social and political organization, religious beliefs and practices, and artistic conventions. A still better metaphor is that of ecology—an economy of natural and biological forces that varies considerably from clime to clime but that operates always under the constraints of adaptive organization and of natural selection.

Individual differences of identity are of vital importance in our personal and social lives and are crucial to the construction of meaning in literary texts. The meaning in any text is informed by the identity of its author, and that identity is itself compounded of the peculiar characteristics of personality or temperament in interaction with the particular circumstances of his or her personal history. In this respect, the formula for what creates individual identity is only a special case of the larger formula that any organism is a product of the interaction of innate characteristics and environmental influences.

For the analysis of personality, some evolutionary psychologists have wisely assimilated the empirical work that is done in personality psychology. The current paradigm in personality psychology recognizes five major factors or dimensions of personality: extraversion/introversion, neuroticism, conscientiousness, agreeableness, and openness or cultural curiosity. Extraversion/introversion speaks directly to the question about the degree to which any given organism orients itself receptively and actively to the environment—in the broadest sense of everything outside the organism—or, conversely, turns in on its own internal workings, absorbed in its internal processes. Neuroticism is a measure of anxiety or fearfulness; its polar antitheses are terms such as confidence and assurance. Conscientiousness is the capacity for making plans and commitments and carrying through on them—for regulating behavior in accordance with long-term objectives. It is a fundamental dimension of moral character. Agreeableness or likableness measures the disposition toward warm and positive social affiliation. Openness or cultural curiosity is a measure of intellectual and aesthetic liveliness or responsiveness—one of the basic measures we take of people when we assess whether they are "dull" or "bright." These five factors have convergent support from multiple sources, and they mesh very neatly with common observation and with the depiction of characters in literature. (In its beginnings a century ago, personality factor research used dictionaries as the source for terms about personality and character.) The consolidation of an empirical consensus about the major factors of personality can provide to literary analysis a common frame of reference for the description both of characters and of authors. By setting such terms in defi-

nite relation to other thematic and tonal elements—to philosophical, religious, and ideological views, to qualities of feeling and to literary conventions and stylistic characteristics—literary critics can make complex interpretive propositions that have a relatively stable point of contact with empirical psychological study.<sup>4</sup>

One further set of terms derived from evolutionary psychology looks particularly promising for literary study—the theory of emotions, and especially of “basic” emotions. Paul Ekman identifies six basic emotions that are recognizable from facial expressions across widely diverse cultures, from modern European sophisticates to preliterate peoples in New Guinea. Emotion combined with point of view is the source of “tone” in literature. Tone is a primary element in the larger emotional structures that, together with subject matter, constitute genre, and genre is a major literary category that operates at a level of generality roughly parallel to that of “species” in biology. Ekman’s six basic emotions are (1) joy, happiness, pleasure; (2) sadness, distress; (3) anger, excitement; (4) disgust; (5) fear; and (6) surprise, interest. Joy and happiness are the governing emotions of festive comedy—all the happy love stories that end in marriage. Sadness is the governing emotion of tragedy and elegy. Together, anger and disgust comprise the main emotional components of satire. Fear has its own special genres of terror and horror (ghost stories, for instance), but it is also an active component in the nearly painful suspense that is important to the reader’s response to most plots. Surprise also is integral to suspense, and it operates almost independently at times, as a generic determinant of the special “twist” we require of mysteries and thrillers. These emotions can combine with one another and with various identity themes to produce more complex emotions such as “pride” and the sense of “honor.” As with the five factors of personality, these terms can be useful for description and analysis both of characters and of authors, and they are also useful for describing audience response. Literary texts depict emotion, but they also stimulate and release it in their readers, and it is the putative quality of emotion in readers that determines the tonal element of genre.<sup>5</sup>

All these psychological categories—cognitive domains, the idea of cultural configuration as an economy of human universals, personality factors, and basic emotions—help give specificity to the idea of an evolved human nature. Much of this information is modern, most of it is still developing, and none of it was current before the middle of the nineteenth century. How then can it be relevant to literature of earlier periods or literature that is written from within world views different from the Darwinian? Milton is not a Darwinist, nor Shakespeare, nor Homer, nor Jane Austen. The answer to this question is that writers,

and especially great writers, have an intuitive grasp of human nature and of the elementary realities of human experience. A modern, empirical understanding of human experience can provide us with a common framework for assessing the meaning structure of any given literary text. We can assess how different cultures and ideologies organize the common elements of human nature into their own distinct cultural ecologies, and we can analyze the way in which individual authors make sense of the common human realities. We can examine the way in which literary conventions function within the economy of our needs and impulses, and we can analyze literary techniques as prosthetic extensions of evolved cognitive aptitudes—as when we treat irony as a literary means for articulating our evolved propensity for cheater detection. Empirical study grounded in an evolutionary understanding of human nature provides a framework within which we can both interpret literary texts and also assess other interpretive paradigms such as those of psychoanalysis, Marxism, and Foucauldian discourse theory.

The elemental, universal motives recognized by evolutionary psychologists include the desire for sexual intimacy, the love of one’s own children and kin, and the need for social interaction. To this list, I would add one further motive that, among sociobiologists and evolutionary psychologists, receives only spotty, fragmentary recognition: the need to create cognitive order. Because they do not recognize this need as a need distinct in itself, evolutionary psychologists have for the most part been able to make only clumsy efforts at providing an adaptive explanation for literature (or, more precisely, for its oral antecedents). Geoffrey Miller speaks of artistic activity as a form of sexual display. Steven Pinker and David Buss acknowledge that literature can provide models for behavior, like moves described in a chess book. To account for the pleasure of art, Pinker describes it as an exploitation of response systems evolved for other adaptive purposes. He presents literature as operating in parallel with pornography, rich foods, and recreational drugs. Most Darwinists in the humanities have an intuitive conviction about the inadequacy of this thesis, and at least one distinguished evolutionary biologist has formulated a better hypothesis. In reconstructing the evolution of mind, E. O. Wilson treats general intelligence as a major advantage but also as a major problem—as a source of confusion and disorientation—and he suggests that the arts evolved as a means for counterbalancing this confusion (*Consilience* 225).

The arts make emotionally meaningful connections between elemental motives and specific configurations of culture and of individual experience. Literature presents simulated situations through which we can model our own behaviors, but it does not only provide game plans



for specific situations. It integrates emotional processes with elemental motives in highly particularized circumstances that readers might never encounter. It helps us to regulate our complex psychological organization, and it helps us cultivate our socially adaptive capacity for entering mentally into the experience of other people. Literature produces pleasure, but it is not merely a "pleasure technology" (Pinker, *How* 528). It contributes to personal and social development and to the capacity for responding flexibly to changing circumstances.<sup>6</sup>

From all that I have said so far, it should be apparent that evolutionary thinking and ecological thinking have large areas of overlap. In both conceptual fields, the relation between organism and environment takes a predominating role, and ecologists as well as biologists recognize that the relation between organism and environment is adaptive and has been produced by natural selection. Evolutionists are of necessity ecological theorists—they understand biological relationships as complex, systemic interactions within an ecosystem, and biologically oriented humanists often use ecological metaphors to describe psychological and social interactions. Much of Darwin's own specialized work was devoted to analyzing the coevolution of adaptive mechanisms among interdependent organisms, and he delighted in expatiating on the "ever-increasing circles of complexity" in ecological systems (*Origin* 61).

Ecology is integral to evolutionary thinking, but the concepts that are specific to ecology cannot by themselves provide a basis for a theory of literature. Human feeling, motivation, and thought occur only in individual minds. The individual mind is the locus of experience and meaning, and it is, consequently, on this level that we must seek the organization of meaning in literary texts. Literature is produced by the psyche, not the ecosystem, and the direct causal force that creates complex cognitive structures is not an ecological principle of community, of sustainable growth, or of the stable interchange of energy within a biosphere. The direct causal force that creates complex adaptive structures is natural selection. Organisms interact with their environments, and natural selection always operates within the constraints of a specific ecological context, but ecology is itself neither the locus of meaning nor the ultimate regulative principle within the total set of biological relations. The locus of meaning is the individual psyche, and the ultimate regulative principle is inclusive fitness, the transmission of genes.

Throughout most of our evolutionary history, an alert attentiveness to the natural world would have been crucial to our survival, and the latent emotional responsiveness that attends this adaptive function has not disappeared with the advent of controlled climates and

supermarket foods. Responsiveness to the sense of place is an elemental component of the evolved human psyche. In this respect, ecocriticism and Darwinian literary study are reciprocal and interdependent. Darwinian humanists must take account of the organism's relation to the environment, and ecological humanists must take account of the evolved psychology that derives from our deep evolutionary past. Leading biologists and ecologists have both already shown us the way. E. O. Wilson identifies "biophilia" as "the innately emotional affiliation of human beings to other living organisms" ("Biophilia" 31), and Aldo Leopold, declaring that when he is in the wilderness he feels himself "back in the Pleistocene," describes outdoor recreations as "essentially primitive" and "atavistic" (148, 181).

Evolutionary change proceeds very slowly. Its units of measure are tens and hundreds of thousands of years. In the past ten thousand years, since the introduction of agriculture, the human species has abandoned the hunter-gatherer form of life that dominated its evolutionary past. The rate of change in culture has vastly exceeded the rate of evolutionary change. Evolutionary psychologists have often speculated about a possible "mismatch" between the conditions of modern life and a psychological organization shaped in the Pleistocene. We evolved to meet the demands of a world in which we lived in small, closely affiliated groups, in much closer and more immediate contact with the natural world than we now usually experience. Much of our ancestors' energy was devoted to the direct pursuit of food, shelter, and safety. At the present time, in the industrialized nations, the immediate problems of hunger, the elements, and physical danger are less pressing, but we are all rapidly becoming conscious of great potential danger from a catastrophically degraded natural environment. In this respect, the effects of mismatch have come full circle. Modern industry and technology detached us from our close and immediate dependence on the natural world, but did not detach us emotionally. In all the phases of modern urban life, literary writers have in their images and metaphors brought us intimately into imaginative connection with the earth and sky, the weather, the sun and moon and stars. Now, industry, technology, and the growth of the human population have created new dangers, and our sense of affiliation with the natural world has become shadowed by alarm and dismay.

Each generation reinterprets the literary tradition in the terms of its own concerns, and in our own generation, we rightly give a new and urgent attention to the role of the environment. But the current and necessary preoccupations with problems of environmental degradation should not obscure the general theoretical significance of the environment in the biology of literary representation. No organism



can be understood except in its interactive relations with its total environment. An organism is never an isolated thing. By definition and in brute reality the world that an organism inhabits is part of that organism. The organism carries that world embedded and molded into every inmost fold of its physiology, its anatomy, and its psyche. Ecology can be linked to literary theory only through the intervening medium of human nature, but human nature can itself be understood only in its adaptive relationship to its environment. Writers, and especially great writers, vividly apprehend the fundamental conditions of experience, and they make these conditions part of their total imaginative structures. The felt quality of experience within a natural world is one of those fundamental conditions of experience. It should thus also be one of the fundamental categories of literary analysis.

## NOTES

1. The following remarks are adapted from a talk given at the annual meeting of the Association for the Study of Literature and Environment, Flagstaff, Arizona, June 2001.
2. For overviews of the history of Darwinism in the human sciences, see Brown, Degler, Fox (*The Search*), and Tooby and Cosmides. For examples of Darwinian aesthetics and Darwinian literary study, see Barrow, Boyd, Carroll, Cooke, Dissanayake, Easterlin, Fox ("Sexual"), Gottschall, Jobling, Love, Miller, Nesse, Storey, Sugiyama, Thiessen and Umezawa, Vermeule, and Whissel.
3. On the development of the theory of selection at the level of the gene, see Alexander, Dawkins, Hamilton, and Trivers. On the basic behavioral systems, see Buss and McGuire and Troisi.
4. On personality factors, see Buss, Digman, McCrae, and MacDonald.
5. On the theory of basic emotions, see Ekman, and Lewis and Haviland.
6. On the adaptive functions of art and literature, see Boyd, Carroll ("Steven"), Dissanayake, and Storey.

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