GLEN A. LOVE

Science, Anti-Science, and Ecocriticism

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On such a weighty topic, or series of topics, I admit at the start that I am no expert. I am not a professionally trained scientist, or a historian or sociologist or philosopher of science. What I have to say comes from my perspective as an English teacher and scholar, of conventional training and regard for rational argument and the weight of evidence, who has for the last thirty years or so, been concerned with the field's curious disregard for the relationship between the natural world and the study and teaching of literature. Thanks largely to the energy, scholarship, and organizing talents of people like Cheryll Burgess Glotfelty, Scott Slovic, Michael Branch, and many others, the study of literature and the environment and the practice of ecocriticism has begun to assume an active place in the profession. But what that place is to be, particularly in its theoretical and methodological base, is still very much a lively and protean issue. What follows is intended as a contribution to the shaping process.

Ecocriticism's future is, I believe, encoded in the prefix *eco*. The word *ecology*, from which the prefix comes was, of course, coined by Ernst Haeckel in 1866, and meant the science of the relationship between organisms and their environments. Haeckel was, it is worth remembering, a biologist, a scientist and an avid follower of Darwin. Because our field lies in the province of the science of ecology—taking from it not only the popular term *ecocriticism* but also the basic premise of the interrelatedness of a human cultural activity like literature and the natural world which encompasses it—we need to examine where we stand in the current disputes over the authority of science, sometimes

called, perhaps overdramatically, the Science Wars. These disputes have been occasioned by recent attacks upon science, or the uses to which science has been put, primarily by academics from the humanities and the social sciences.

The particular form of anti-science I address here is not that of popular superstition, as recorded recently in Carl Sagan's *The Demon-Haunted World* (1995). The forces of ignorance and warped belief—currently exemplified by widespread fascination with conspiracy theories and paranormal wonders like alien space travellers—have been with us for a long time, though the human need to believe nonsense may have reached new and alarming levels with television's increased programming of uncontested pseudoscience (Yam). More alarming, perhaps, is the realization that many of the new believers in the paranormal are drawn from the better-educated. Whether that new audience includes some of the same anti-science adherents from the academy—the group that I address in what follows—I can't say. But clearly the broad public support for science is threatened by such assaults, whether from highbrows or low, and the scientific community and the rational skeptics are worried. As an ecocritic, so am I.

Anti-science attacks from the academy seem impelled by postmodernist/poststructuralist assumptions of the bankruptcy of a scientifically-grounded Western European civilization. Anti-science positions are often characteristic of Marxist, feminist, or even radical environmentalist theoreticians. These attacks have been largely ignored or unnoticed by scientists in the past. But recently a counter-response from the scientific community has arisen, exemplified most notably in two books, *Higher Superstition: The Academic Left and Science* (1994), by biologist Paul R. Gross and mathematician Norman Levitt, and *The Flight from Science and Reason* (1996), edited by Gross, Levitt, and geographer Martin W. Lewis. A third, and in some ways the most damaging, counterassault came from physicist Alan Sokal, who made front page news across the country in 1996 when he parodied cultural constructionist attacks upon science with an article of scientific nonsense submitted to *Social Text*, a journal of cultural constructionist persuasion, whose editors, Andrew Ross and Bruce Robbins, printed the essay as gospel. Sokal then revealed the hoax in a following issue of *Lingua Franca*.

What do these conflicts have to do with ecocriticism and ecocritics? The issues are large and complex, but I offer what follows as a literary scholar's common sense guide to behavior around the sciences. And in order to keep the curiosity level down to something bearable, let me admit at the outset—if the use of words like *rational, evidence,* and *common sense* has not already tipped you off—that I find myself siding with the scientists more often than my fellow humanists. I think

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that as ecocritics we have much more to gain than to fear from a partnership with the sciences, particularly the life sciences. Having earlier attempted to take my professional colleagues to the woodshed for ignoring the environment, let me now try to repeat the trip for our collective ignoring of—or ignorance of—science. For those weary of jeremiads, bear with me to the end for signs of hope and progress: several recent books by English professors and humanists attempting to correct this doctrinal rejection of science by turning to scientific approaches which seem to offer exciting new areas of possibility for the study of literature and nature, including human nature.

Let me begin by admitting that my experience of scholars in the humanities, myself included, is that they (we) are usually deficient in scientific aptitude and interests. C. P. Snow made this point 40 years ago in *The Two Cultures,* saying that intellectuals, particularly literary scholars, are congenitally anti-science. "Natural Luddites" was his phrase, and he urged humanists to wake up and learn something about science (23). Today, though some humanists have learned something about the *uses* of science, the gulf is even wider, but more of that later. Perhaps it is a matter of temperament. Non-scientists simply think differently than scientists. This much is suggested by my own experience of faint bewilderment in science courses in high school and college. Also, for the last 41 years, I have been married to a scientist, an ecologist, no less, and have grown used to being called to account for weak or obscure arguments. As H. L. Mencken said, a man may be a fool and not know it, but not if he is married. Definitely not if he is married to a scientist.

But at the risk of seeming facetious—which, I assure you, I'm not—consider a more authoritative analyst on the subject, no pillar of the scientific establishment but America's current best-loved humorist, Dave Barry. Ponder his advice to young people on choosing a college major:

> After you've been in college for a year or so, you're supposed to choose a major, which is the subject you intend to memorize and forget the most things about. Here is a very important piece of advice: *Be sure to choose a major that does not involve Known Facts and Right Answers.*
>
> This means that you must *not* major in mathematics, physics, biology, or chemistry, because these subjects involve actual facts. If, for example, you major in mathematics, you're going to wander into class one day and the professor will say: "Define the cosine integer of the quadrant of a rhomboid binary axis, and extrapolate your result to five significant vertices." If you don't come up with *exactly* the answer the professor has in mind, you fail. The same is true of chemistry: if you write in your exam book that

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carbon and hydrogen combine to form oak, your professor will flunk you. He wants you to come up with the same answer he and all the other chemists have agreed on. Scientists are extremely snotty about this.

So you should major in subjects like English, philosophy, psychology, and sociology—subjects in which nobody really understands what anybody else is talking about, and which involve virtually no actual facts. I attended classes in all these subjects, so I'll give you a quick overview of each:

ENGLISH: This involves writing papers about long books you have read little snippets of just before class. Here is a tip on how to get good grades on your English papers. *Never say anything about a book that anybody with any common sense would say.* For example, suppose you are studying *Moby-Dick.* Anybody with any common sense would say Moby Dick is a big white whale, since the characters in the book refer to it as a big white whale roughly eleven thousand times. So in *your* paper, *you* say Moby-Dick is actually the Republic of Ireland. Your professor, who is sick to death of reading papers and never liked *Moby-Dick* anyway, will think you are enormously creative. If you can regularly come up with lunatic interpretations of simple stories, you should major in English.

PHILOSOPHY: Basically, this involves sitting in a room and deciding there is no such thing as reality and then going to lunch. You should major in philosophy if you plan to take a lot of drugs.

As delightful as this is, it should also make us wince a bit. It might be seen as *prima facie* evidence of what it is that most of us do, as English teachers, philosophers, humanists and inhumanists, and why, when we were undergraduates, we picked the major that we did. I shamefacedly admit that my eyes glaze over when I am confronted with a math formula. I suspect that most of us chose, as students, to take as few math and science courses as possible, and when forced to, sought the watered-down varieties with titles like "Math for Plants" or "Physics Around the House." But if I am bewildered a little by science, I am bewildered a lot more by the apparent zeal of some of my fellow humanists to scorn and attack it (Livingston 4). My advice to them is to marry a scientist, or at least befriend one. Take one to lunch, or at least make eye contact when walking across campus.

We non-scientists seem to have three choices when facing up to this basic lack of aptitude for the sciences: first, ignore them; second, take Snow's advice, pull up our socks and try to learn something about them; third, in the current critical fashion, and as disciples of a profoundly misunderstood Thomas Kuhn, characterize science as no more

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than another cultural/linguistic construction and thus just as subject to relativistic interpretation and cultural control as any other human activity (on Kuhn see Horgan). Assuming that response #1 is unacceptable for its craven confession of inadequacy and #2 for its difficulty, it is not surprising that many in the humanities and social sciences have found option #3 attractive. A typical judgment runs as follows: ". . . science is situated in the culture that enables it, thus science should not be exalted over literature, history, philosophy, or other nonscientific cultural expressions"(McRae 1). This attitude has led to a number of attacks from the unexalted, understandably resentful of science's position of power and prestige in the academy over the last half century.

To be sure, some of these attacks have been valid and necessary. One of the most important correctives from the critics of science may be seen in the rise of ecology itself, not only as an important professional field within the sciences, but more so as a way of thinking which reminds us that everything is connected to everything else, and that science cannot be insulated from either the concerns of society or our rootedness in the natural world. On this point, one must question Gross and Levitt's too easy acceptance of the science and technology-driven engine of economic growth and their tendency to attack what they regard as the excesses of environmentalism rather than taking more seriously than they do the threats to the environment. Paul and Anne Ehrlich's recent book, *Betrayal of Science and Reason* (1996), is an effective response to Gross and Levitt's charges of environmental extremism. Undeniably the context in which science takes place is a matter of the widest public concern, and much useful and productive criticism has been directed at the structure in which science operates and the uses to which it is put.

But on the qualifications of those who attempt to judge the science *itself, Gross and Levitt advance one of their most powerful criticisms:*

> Thus we encounter books that pontificate about the intellectual crisis of contemporary physics, whose authors have never troubled themselves with a simple problem in statics; essays that make knowing references to chaos theory, from writers who could not recognize, much less solve, a first-order linear differential equation; tirades about the semiotic tyranny of DNA and molecular biology, from scholars who have never been inside a real laboratory, or asked how the drug they take lowers their blood pressure. (6)

Gross and Levitt's argument that the detractors of science are usually incompetent to judge the fields that they attempt to criticize is particularly telling, especially when it was followed, as it was, by the Sokal

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hoax, which left the emperors of anti-science standing publicly unclothed in their ignorance.

What is perhaps even more disturbing is Gross and Levitt's charge, repeated by scientists of various political persuasions, that the indictment of science's contextual sins—which are real enough—has been unwarrantedly extended to the scientific method itself, which is the heart and center of science. (See, for example, Alcock, Fox, Gould, Gross and Levitt, Haack, and Sokal.) This method of critical thinking and the gathering and testing of data is almost universally defended by scientists and non-scientists as the best means we have for freeing ourselves from dogma, prejudice, and error. When science is performing its central task, that is, within the strict confines of its method— with its emphasis upon repeatability, weight of evidence, coherent logical progression, falsifiability—it cannot be postmodern or masculinist or feminist or Marxist or whatever.

For example, on the question of whether there is a feminist method of doing science, it is worth noting that even such scientifically knowledgeable proponents of feminism as Sandra Harding, Evelyn Fox Keller, Helen E. Longino, and Stephen Jay Gould assert that there is not (Tuana viii, 17, 37, 45-7; Gould 7). Their collective judgment is that, methodologically, there is no masculinist or feminist science, just good science and bad science. In her biography of Nobel Prize-winning scientist Barbara McClintock, Keller acknowledges that McClintock rejected any such feminist methodology and classification (Keller xvii). Furthermore, it seems clear from McClintock's own accounting that her "feeling for the organism," the title of Keller's biography of her, is less a biologist's version of the feminine mystique than an example of the careful application of the scientific method in which the intimate knowledge of one's subject and close attention to detail might enable a scientist—woman or man—to construct new and correct hypotheses. Doing good science, as McClintock insisted, has nothing to do with one's gender.

There is only one scientific method, and without it science is indeed nothing but the culture-bound activity that its detractors portray. But science has achieved its "exalted" status because it has, through submitting itself to the rigors of its methodology, been successful in discovering something of how nature works. Like literary realism—also misunderstood and in contemporary disrepute among theory-possessed humanists—science is about the system that works. As Theodore M. Porter reminds us,

> Science is supposed to be about nature. It is supposed to yield knowledge that is impersonal, and in some way objective. And, not to persist too stubbornly with these ironic modalities, it succeeds. Knowledge in the sciences is widely shared, to the point

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> that the same textbooks can be used all over the world. This is often taken as decisive evidence of the moral virtues of natural science, and it is real, even if it is often exaggerated. Scientists pride themselves on appealing to nature rather than opinion, and on using a neutral language of facts and laws, numbers and the logic of quantity. The universality of scientific knowledge is by no means complete, but the most skeptical sociology readily concedes that it is impressive. Is it not to the impersonal, objective methods of quantification and experimentation that we owe the universality of science? (219)

The scientific method is that which leads to figuring out something of the system that works, and if you fly in airplanes or drive in cars or ride a bicycle, or if you wear glasses or contact lenses, or get your children vaccinated, or go to the hospital for serious surgery, or use any of the million and one products of technology, you have already cast your vote on the matter. As biologist Richard Dawkins says, "Show me a cultural relativist at 30,000 feet and I'll show you a hypocrite" (31-32). Scientists may overstate or distort their data but the methodology of their discipline is in place to question and refute and correct those misstatements. Unfortunately, in our own field, overstating the evidence or obfuscating reality often enjoys a free ride, if it matches the prevailing orthodoxy, and may well lead to professional advancement and temporary stardom. (For a lively contrasting of the scientists and the radical humanists, see Harold Fromm's "My Science Wars.") When science is put to ill use, then the social means exist to correct such use. If science has been employed for harmful and destructive purposes, then that needs to be recognized and challenged as bad *policy*, not as an excuse for attacking "science." Let us not throw out the methodological baby with the contextual bathwater. We need the standards of evidence and rational thought to get us beyond attractive theories of unreality. Ecocriticism should be capable of emulating that spirit of rigorous methodology.

Bertrand Russell once defined the essence of the scientific method as "the refusal to regard our own desires, tastes, and interests as affording a key to the understanding of the world" (108). What unfettered cultural constuctionism grants us is the exact opposite—license to regard our own wishes and desires as the legitimate constructors of that world. Following the lead of Bertrand Russell, philosopher Karl Popper, in his book *Objective Knowledge* (1972), accurately describes the scientific method, without actually naming it, when he says

> . . . I am a realist. I admit that an idealism such as Kant's can be defended to the extent that it says *that all our theories are man-*

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> *made*, and that we try to impose them upon the world of nature. But I am a realist in holding that the question whether our man-made theories are true or not depends upon real facts; real facts which are, with very few exceptions, emphatically not man-made. Our man-made *theories* may clash with these real *facts*, and so, in our search for truth, we may have to adjust our theories or to give them up. (328-29)

Alan Sokal's spoof of the social constructionist view espoused in *Social Text* was successful because it told the editors exactly what they wanted to hear: that physics was just another field of cultural criticism. Because his essay corresponded so closely to their wishes and desires, the editors printed the piece without following the least vestige of the scientific method, which would have involved at the minimum allowing a physicist—even of their own political persuasion—to read it. Such a reader could have told them at once that the article was nonsense and that Sokal was pulling their leg. Sokal, incidentally, later identified himself as a political leftist who thus might be considered sympathetic to the ideological leanings of *Social Text*, but one who, he claims, continues to believe that the left has been, and should continue to be, identified *with* the historical role of science in opposing "obscurantism" (*Lingua Franca* 64) . He goes on to say,

> The recent turn of many 'progressive' or 'leftist' academic humanists and social scientists toward one or another form of epistemic relativism betrays this worthy heritage and undermines the already fragile prospects for progressive social critique. Theorizing about 'the social construction of reality' won't help us find an effective treatment for AIDS or devise strategies for preventing global warming. Nor can we combat false ideas in history, sociology, economics, and politics if we reject the notions of truth and falsity.

Former *ISLE* editor Patrick D. Murphy recently noted the dearth of scientific contributors to the journal and sensibly invited more participation from scientists (v-vi). Their absence may be explained by the fact that the current diehard constructionism of most literary scholars strikes them as absurd. One scientist intervened in the ASLE e-mail network dialogue on "constructing nature" a few years ago with this comment: "The nature discussion is quite delightful. I do think there are people who firmly believe nature is a social construct. These are people who build houses on sandy ocean shores, along fault lines, or on the flood plains of rivers. . . . Nature has a way of correcting such mistakes" (Tiffney). That a scientist is tuning in on the ASLE network is a hopeful sign. More of his science colleagues may be encouraged to participate in *ISLE*'s enterprise if such sane assessments of the need to temper

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constructionist enthusiasms continue to come from e-mail participants like Paul Bryant, George Hart, and others, who remind us that while our conceptions of nature are culturally constructed, and literature encompasses these constructions, nature itself is under no compunction to honor these. "Reality," as novelist Philip K. Dick once defined it, "is that which, when you stop believing in it, doesn't go away" (1).

Those from the humanities and social sciences who have ventured into the sciences with something of an open mind deserve our admiration for their efforts and for the legitimate contributions which some of them have made. I am convinced that, for all its pitfalls, this is the direction which literary studies, particularly ecocriticism, must take in the future. The title of our journal, *ISLE*, begins with the word "Interdisciplinary," and ASLE has from the beginning stressed the need for a cross-pollinating kind of scholarship in ecocriticism. (I assume that "interdisciplinary" in this context means that we in literary studies have something to learn from other disciplines, and not necessarily that other disciplines are sitting in darkness, awaiting colonization by our high theorists of textuality and indeterminacy.) Writing in the Introduction to a recent anthology, *After Poststructuralism: Interdisciplinarity and Literary Theory* (1993), Frederick Crews notes the common yearning he finds in many of the anthology's essays to restore something of the empirical spirit of the scientific method: "This, I think, is the real reason why science looms so large here. The point is not that critics should indiscriminately apply recent scientific discoveries to literary interpretation but that they should cultivate the scientist's alertness against doctored evidence, circular reasoning, and willful indifference to counterexample" (x).

The pitfalls of interdisciplinarity are, of course, summed up neatly in Pope's famous warning couplet, "A little learning is a dang'rous thing; / Drink deep, or taste not the Pierian spring." John P. O'Grady prescribes a healthy skepticism in our interdisciplinary efforts, given the history of ecology as a discipline. William Howarth, in his important article "Some Principles of Ecocriticism" in *The Ecocriticism Reader* (1996), warns us of the need for more ecological literacy than we now possess, and presents a wide, basic background library for prospective ecocritics, reaching across a number of disciplines.

Something of the hazards of narrow dabbling may be seen in the fascination of various humanists with theories of physics involving terms such as *chaos* and *uncertainty*, when the intellectual attraction may be based upon the mistaken—so those knowledgeable in the field assert—notion that such words mean that anything goes, and constructionism is thereby somehow sanctioned by natural law. On the contrary, chaos theory, as one observer notes, could just as well have been

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called antichaos theory, and would thereby have attracted little attention from outsiders (Turner 66). N. Katherine Hayles, in her *Chaos Bound* (1990), sees significant parallels between the physicist's chaos and deconstruction, but she rightly notes that "[f]or deconstructionists, chaos repudiates order; for scientists, chaos makes order possible" (317). Gross and Levitt warn outsiders to the scientific fields of chaos and uncertainty that "there is a deep confusion of categories, and a surprisingly naive sense that the use of the same English word in widely separated contexts assures that there are deep thematic similarities" (104). On Heisenberg's uncertainty principle, Gross and Levitt lament that the mere word has been misappropriated by those like sociological theorist Stanley Aronowitz to suggest a kind of New Age obscurantism, that might have all been avoided "if Heisenberg and company had chosen a less evocative term" (51).

If humanists have been inordinately attracted to the most arcane fields of physics, they have for the most part curiously ignored the life sciences, especially evolutionary biology. Here, I think, is where ecocriticism should find its strongest links to the study of the natural world. When one notes that "Evolution and Ecology" is now the standard title for a rapidly-growing sub-area of biology, and when we become aware that Charles Darwin was not only the wellspring of evolutionary thinking, but also that he recognized that ecological principles were inseparably intertwined with evolutionary development, it seems clear that ecocriticism should move toward a better understanding of what one scientist calls "ecolution," the braided record of evolution and ecology (Rhoda Love). Historian Carl Degler's important recent study, *In Search of Human Nature: The Decline and Revival of Darwinism in American Life* (1991), describes how evolutionary biology has returned to command an important place in the social sciences in recent years. Studies of the human genome have released a flood of information about human physiology and behavior, information which not only rewrites our understanding of human nature but also reignites the never-resolved controversies over Darwin's original insights of 140 years ago. Unfortunately, as Frederick Turner notes, "just as chaos theory has been wrongly assumed to confirm randomness, evolution has been wrongly assumed to confirm determinism" (66). It is an outworn conception that can grasp only two possibilities: deterministic order and random freedom. Turner and others emphasize the existence of both deterministic order and free order in describing the creative powers of evolution (68).

Despite the fact that evolution has progressed beyond the state of theory to acceptance by virtually all of the world's reputable scientists, as well as the informed lay community and even enlightened religious

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leaders up to and including the current Pope, John Paul, it still strikes fear and loathing into the hearts of many humanists (Holden 717). The record of intellectuals, particularly literary scholars, in misunderstanding and refusing to seriously consider evolution, especially as having any role in human behavior, is such as to group many of our colleagues with creationists, backwoods school boards, and other defenders of the faith—with "faith" here meaning, as defined by Nietzsche, not wanting to know what is true. Armed with theories which exclude evolutionary thinking, they are free to reject any work which considers such matters, especially those they haven't read. Yet, as philosopher John Searle says of evolution, "Like it or not," it is "the world view we have," It "is not an option. It is not simply up for grabs along with a lot of competing world views" (quoted in Storey xx). Citing philosopher and noted author on science and morality Mary Midgley, who says pointedly that "no excuse remains for anybody in the humanities and social sciences to evade the challenge of Darwin and treat social man as an isolated miracle," literary critic Robert Storey concludes that evasion may be less to blame in these fields than smug ignorance (36).

What seems self-evident is that ecological thinking—insofar as it involves an enlarged sense of what needs to be taken into account in attempting to answer questions about the natural world and our place in it—must include a larger consideration of evolutionary biology and genetics and human behavior. The rapid explosion of knowledge in these areas is one of the central intellectual and social issues of our times. It has caused significant realignment of thinking in the social sciences and an evolutionary paradigm may, as one observer predicts, become the dominant viewpoint there within twenty years, "in spite of all prejudice and entrenched interests, because of the irresistible force of its explanatory power" (Carroll 468). Whether we in literary studies agree with this prediction or not, we need a better scientific understanding of our own and related fields, an ecologically expanded awareness of the social and biological context which encloses the literary act.

That awareness will involve keeping an open mind, a willingness to question the presuppositions of entrenched but scientifically untenable poststructuralist assumptions and to recognize the tendency of some influential participants to put their politics ahead of their science. The word "sociobiology" has virtually disappeared after the wave of heated and often politically-inspired debate that followed its appearance in E.O. Wilson's textbook of that title in 1975, but awareness of the genetic and instinctual influences on human behavior has become central to many fields. The conception of the human infant as blank slate to be inscribed only by culture and language is gone forever. Our genetic and hereditary nature now claims an undeniable and

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important place in our common humanity. But it need not signal a resurgence of the sins of the past. The return of biology, as historian Carl Degler reminds us, "has no place for the reintroduction of discredited practices like racism and sexism and eugenics." Rather, the return of biology "is to place once again the study of human nature within evolution, to ask how human beings fit into that framework which Darwin laid down over a century ago. . . ." (ix).

Such study will reveal several important new books with suggestive evolutionary connections to ecocriticism. All of them, not surprisingly, are anticipated to some degree by Joseph Meeker's *The Comedy of Survival: Studies in Literary Ecology*, first published in 1974, and recently reissued in a new third edition from the University of Arizona Press. This remarkable and groundbreaking book—largely ignored at first publication by the literary establishment, now must be seen as far ahead of its time in applying evolutionary thinking to literary criticism, in this case to the reading of various literary genres. The new books, in the Meeker orbit but curiously unaware of it for the most part, include Alexander Argyros' *A Blessed Rage for Order*, published in 1992, Frederick Turner's *The Culture of Hope* (1995), Joseph Carroll's *Evolution and Literary Theory* (1995), and Robert Storey's *Mimesis and the Human Animal: On the Biogenetic Foundation of Literary Representation* (1996).

Turner's wide-ranging work is perhaps closest in spirit to Meeker's, in the sense that both emphasize that if evolution carries the potential for determinism, it also offers the potential for greater human freedom and creativity. Turner shares with Argyros an attraction to chaos (antichaos) theory and evolution as a basis for redirecting contemporary literary theory. Turner's approach calls for a reuniting of art with science as part of a larger rapprochement of art with all aspects of public and private life. Carroll's imposing work is more strictly ecological in its assertion that the relationship between the organism and its environment, whether in the sciences or the humanities, has a hierarchical priority over all other concepts. Unlike Turner and Argyros, Carroll rejects any compromise with most of the literary theory of the last twenty years, which he sees as "essentially a wrong turn, a dead end, a misconceived enterprise, a repository of delusions and wasted efforts" (468). Storey's book, the most recent and the only one to recognize Meeker's work, affirms Carroll's basic thesis that Darwinian evolutionary biology offers the most defensible basis for literary theory. Storey also shares Carroll's polemical spirit. In an assertively "Pugnacious Preface," Storey admits that

> What follows is not intended for readers who must be cajoled into the idea of the legitimacy and general integrity of the scientific

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> pursuit of knowledge; such readers, in the late twentieth century, strike me as intellectually unreachable. Nor is it for those for whom political rectitude forgives all squalor of logic and evidence. It is for what Virginia Woolf called the common reader, with common, if unanalyzed, intuitions, who is dispassionately curious not only about the phenomenon of literature but also about what lies on the other side of today's garrison wall. (xxi)

Interested readers will find in the bibliographies of these works a number of relevant nonliterary studies with intriguing opportunities for scientific-literary explorations. Some that I have found particularly useful include Aldous Huxley's groundbreaking and still relevant *Literature and Science* (1963); Harvard biologist E. O. Wilson's *Biophilia* (1984), *Consilience* (1988), and Kellert and Wilson's *The Biophilia Hypothesis* (1993); Richard J. Alexander's *The Biology of Moral Systems* (1988); Daniel C. Dennett's *Darwin's Dangerous Idea: Evolution and the Meaning of Life* (1995); Nancy Easterlin and Barbara Riebling's *After Poststructuralism: Interdisciplinarity and Literary Theory* (1993); Peter Morton's *The Vital Science: Biology and the Literary Imagination, 1860-1900* (1984); Robert J. Richards' *Darwin and the Emergence of Evolutionary Theories of Mind and Behavior* (1987); Mary Midgley's *Beast and Man: The Roots of Human Nature* (1978); and Paul Shepard's *The Others: How Animals Made Us Human* (1996). A recent anthology of interdisciplinary approaches, *Steinbeck and the Environment* (1997), edited by Susan F. Beegel, Susan Shillinglaw, and Wesley N. Tiffney, Jr. (the same scientist Tiffney of the ASLE e-mail exchange), reveals the rich possibilities of work drawing concurrently upon the sciences and the humanities.

I have also found helpful philosopher Maxine Sheets-Johnstone's *The Roots of Thinking* (1990) and *The Roots of Power* (1994), both of which present a challenging evolutionary corrective, through their analysis of the human body as the primal model of thinking, to the current political emphasis on cultural difference. In what might be an admirable summary of many the arguments being made in support of the biological-literary connections being described here, she writes in *The Roots of Power*,

> This inordinate bewitchment by culture results in a reductionism that is as pernicious and costly as its biological corollary. Cultural reductionism keeps us from taking evolution seriously. It in fact quickens the passing of natural history. It precludes our recognizing that, our individual and great historico-cultural diversities notwithstanding, we humans are basically the same. Though we speak in different tongues, speaking tongues are part of our evolution-

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> ary heritage; though we explain the world in different ways, explaining the world is part of our evolutionary heritage; though we dance, sing, tell stories, and paint differently, such creations are part of our evolutionary heritage. . . . When we ignore these ties that bind us in a common humanity and that articulate a very human repertoire of "I can's," we put ourselves out of reach of our own history, insulating ourselves from corporeal matters of fact and the archetypal forms within them. We proportionately distance ourselves from our own human nature; we proportionately distance ourselves from the task of thinking through, and ultimately understanding, the roots of power. (328-29)

Sheets-Johnstone's work has literally vital possibilities for connections to the interdisciplinarity which is the future of ecocriticism.

Unfortunately, literature may be the last of the humanistic disciplines to take evolution seriously, for reasons which Joseph Carroll details at the end of his *Evolution and Literary Theory* (468-69). Thus, I feel a certain trepidation, as a recent retiree and safely *hors de combat*, encouraging the van of younger scholars, like Abdul, the Bulbul Ameer of the old song, by shouting "Hullaloo" from the rear. It's a political minefield out there. I recall playing Darwin's bulldog in an article I had written on William Dean Howells' utopian novels, which I read at a conference on American realism a few years ago. My invoking of Darwin, evolution, and biologists in place of the usual anointed literary theorists marked me as ideologically suspect, and I recall spending more time alone that week than I had intended.

Still, evolutionary biology is where the action is, and the opportunities for pioneering a new and scientifically valid theoretical basis for ecocriticism and for literary study as a whole may be more attractive than the fear that some of your colleagues will inch their chairs away from yours in faculty meetings. Remember Galileo. Remember Darwin himself. Philosopher Susan Haack reminds us of something we tend to forget when she writes, "As courage is the soldier's virtue par excellence, one might say, oversimplifying a little, so intellectual integrity itself is the academic's. (The oversimplification is that intellectual integrity itself requires a kind of courage, the hardihood needed to give up long-standing convictions in the face of contrary evidence, or to resist fashionable shibboleths.)" (59-60).

But whether or not evolutionary biology becomes the theoretical bridge between the two cultures, those of us who practice ecocriticism have increasing opportunities for exciting new scholarship by deepening our interaction with the natural sciences. The stage is set for such a production, even if few actors from the humanities are waiting in the wings. Some of us may find little opportunity for the use of scientific

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discoveries in the sort of criticism that we do, but for those whose work bears significant relationships to contemporary science and for all of us concerned with the redefining of human nature, these are interesting times. And we might all, as Frederick Crews says, emulate the scientific regard for unbiased evidence and logical reasoning, whatever our critical approach. Indeed, we are actually *doing* science, Carl Sagan reminds us, when we regard our own work critically, and subject our ideas to the test of the outside world (39).

Looking ahead, biologist Jane Lubchenco, president of the 144,000 member American Association for the Advancement of Science, has called the environment the defining issue of the 21st century, underlying the economy, health, the threat of war: "It's not economy versus the environment. . . . It's short-term versus long-term" ("OSU biologist"). ASLE members may rightly respond that the study and teaching of literature is an underlying and long-term environmental issue as well. Environmental studies, particularly ecology, began in the life sciences and broadened to include the humanities. Yet most of us have yet to become scientifically literate, and the two cultures are as largely incommunicado as Snow described them forty years ago:

> The clashing point of two subjects, two disciplines, two cultures—of two galaxies, so far as that goes—ought to produce creative chances. In the history of mental activity that has been where some of the breakthroughs came. The chances are there now. But they are there, as it were, in a vacuum, because those in the two cultures can't talk to each other. (17)

Given the urgency of our environmental concerns and the opportunities for emerging synthesis, it is time to outgrow the Dave Barry stereotypes. It is time to start talking to each other.

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