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TABLE OF CONTENTS

ACKNOWLEDGMENTS ................................................................. iii
EISELEY'S TEXTS AND ABBREVIATIONS USED ................................... vi
ABSTRACT .................................................................................. vii

CHAPTERS

I INTRODUCTION AND REVIEW OF THE LITERATURE ....................... 1

Themes .................................................................................... 3
Time ......................................................................................... 4
The Evolution of Life ............................................................... 4
The Emergence of Man ............................................................ 6
Evolving Culture ........................................................................ 8
The Relation of the Individual to Evolutionary Nature and Culture .... 9
The Relation Between Self and Evolution: Autobiography as Theme and Technique .................................................. 11
Literary Influences ..................................................................... 14
Technique .................................................................................. 18
Argument ................................................................................... 22
Notes ......................................................................................... 32

II THE CASE FOR POPULARIZATION ................................................. 34

What Is Popularization? ............................................................. 34
Why Popularization Is Necessary ............................................... 38
   Institutionalization of Science and Estrangement from the Public .......................................................... 39
   Isolation of Specialists from One Another ................................. 47
   The Specialist and the Pull of Tradition ................................. 51
   The Threat of Technology and the Need for Reflection ............ 55
   Answers of a Popularizer: Reflective Union of Science and Art ................................................................. 59
   Notes ....................................................................................... 66

III EISELEY'S METHOD ................................................................. 68

Hybrid Genre .............................................................................. 69
Eiseley's Hybrid Genre and the Paraliterary ................................ 73
The Observer-Participant and the Uses of Autobiography ............ 81
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Structure and Method: The Conclusion to <em>Darwin's Century</em></td>
<td>86</td>
</tr>
<tr>
<td></td>
<td>Metaphor and Method</td>
<td>104</td>
</tr>
<tr>
<td></td>
<td>The Uses of Metaphor</td>
<td>105</td>
</tr>
<tr>
<td></td>
<td>Eiseley's Metaphors</td>
<td>114</td>
</tr>
<tr>
<td></td>
<td>A Postscript to Method: The Continuing Hybrid Genre</td>
<td>125</td>
</tr>
<tr>
<td></td>
<td>Notes</td>
<td>131</td>
</tr>
<tr>
<td>IV</td>
<td>CULTURAL METAPHORS FOR THE PHYSICAL UNIVERSE</td>
<td>133</td>
</tr>
<tr>
<td></td>
<td>Metaphorical Framework: The Journey</td>
<td>133</td>
</tr>
<tr>
<td></td>
<td>Cultural Metaphors Within the Journey</td>
<td>156</td>
</tr>
<tr>
<td></td>
<td>Trickster</td>
<td>158</td>
</tr>
<tr>
<td></td>
<td>Games of Chance</td>
<td>163</td>
</tr>
<tr>
<td></td>
<td>Alchemy and Magic</td>
<td>172</td>
</tr>
<tr>
<td></td>
<td>The Magic Theater</td>
<td>179</td>
</tr>
<tr>
<td></td>
<td>Art as a Cultural Model for Symbiosis</td>
<td>188</td>
</tr>
<tr>
<td></td>
<td>Notes</td>
<td>191</td>
</tr>
<tr>
<td>V</td>
<td>BIOLOGICAL METAPHORS FOR CULTURAL EVOLUTION</td>
<td>193</td>
</tr>
<tr>
<td></td>
<td>Hand</td>
<td>194</td>
</tr>
<tr>
<td></td>
<td>Eye</td>
<td>210</td>
</tr>
<tr>
<td></td>
<td>Eye as Metaphor</td>
<td>215</td>
</tr>
<tr>
<td></td>
<td>Metaphors Dependent on the Eye</td>
<td>226</td>
</tr>
<tr>
<td></td>
<td>Tongue</td>
<td>256</td>
</tr>
<tr>
<td></td>
<td>Notes</td>
<td>275</td>
</tr>
<tr>
<td>VI</td>
<td>A POPULARIZATION OF SCIENCE, A SCIENCE OF POPULARIZATION</td>
<td>277</td>
</tr>
<tr>
<td></td>
<td>Eiseley and Science: What We Have Learned</td>
<td>278</td>
</tr>
<tr>
<td></td>
<td>Eiseley's Texts and the Case for Popularization</td>
<td>288</td>
</tr>
<tr>
<td></td>
<td>How the Vehicle Explains</td>
<td>293</td>
</tr>
<tr>
<td></td>
<td>Rhythms</td>
<td>295</td>
</tr>
<tr>
<td></td>
<td>Codes</td>
<td>296</td>
</tr>
<tr>
<td></td>
<td>Models</td>
<td>301</td>
</tr>
<tr>
<td></td>
<td>Models and the Reexamination of the Dominant</td>
<td>305</td>
</tr>
<tr>
<td></td>
<td>Philosophemes</td>
<td>305</td>
</tr>
<tr>
<td></td>
<td>Science as a Vehicle for Thought</td>
<td>306</td>
</tr>
<tr>
<td></td>
<td>Notes</td>
<td>309</td>
</tr>
<tr>
<td></td>
<td>WORKS CITED</td>
<td>311</td>
</tr>
<tr>
<td></td>
<td>VITA</td>
<td>320</td>
</tr>
</tbody>
</table>
## EISELEY'S TEXTS AND ABBREVIATIONS USED

### Scholarship

<table>
<thead>
<tr>
<th>Title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Darwin's Century (1958)</td>
<td>DC</td>
</tr>
</tbody>
</table>

### Collections of Popular Essays

<table>
<thead>
<tr>
<th>Title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Immense Journey (1957)</td>
<td>IJ</td>
</tr>
<tr>
<td>The Firmament of Time (1960)</td>
<td>FT</td>
</tr>
<tr>
<td>The Unexpected Universe (1969)</td>
<td>UU</td>
</tr>
<tr>
<td>The Invisible Pyramid (1970)</td>
<td>IP</td>
</tr>
<tr>
<td>The Night Country (1971)</td>
<td>NC</td>
</tr>
<tr>
<td>The Man Who Saw Through Time (1973), originally published in 1962 as Francis Bacon and the Modern Dilemma</td>
<td>MWSTT (FBMD)</td>
</tr>
<tr>
<td>The Star Thrower (1978)</td>
<td>ST</td>
</tr>
<tr>
<td>Darwin and the Mysterious Mr. X (1979)</td>
<td>DMX</td>
</tr>
</tbody>
</table>

### Autobiography

<table>
<thead>
<tr>
<th>Title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>All the Strange Hours (1975)</td>
<td>ASH</td>
</tr>
</tbody>
</table>

### Poetry

<table>
<thead>
<tr>
<th>Title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Notes of an Alchemist (1972)</td>
<td>NA</td>
</tr>
<tr>
<td>The Innocent Assassins (1973)</td>
<td>IA</td>
</tr>
<tr>
<td>Another Kind of Autumn (1977)</td>
<td>AKA</td>
</tr>
<tr>
<td>All the Night Wings (1979)</td>
<td>ANW</td>
</tr>
</tbody>
</table>
Abstract of Dissertation Presented to the Graduate School of the University of Florida in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy

POPULARIZATION AND SCIENCE: INFORMING METAPHORS IN LOREN EISELEY

By

Mary Ellen Pitts

December 1985

Chairman: Gregory L. Ulmer
Major Department: English

This study addresses the literary role of the hybrid of science and literature, as exemplified by Loren Eiseley's essays, which provide both a popularization of science and a science of popularization. Eiseley's purposes as a popularizer of scientific information are both scientific and literary. His metaphors are "informing"—carrying information and giving form to the thought. Using simple metaphors, Eiseley reexamines and reshapes evolutionary concepts and displaces certain popular assumptions that have arisen largely out of metaphor, such as the emphasis on warfare. Specifically, Eiseley displaces metaphors and notions of fixity, teleology, hierarchy, extreme reductionism, struggle, decidability, and determinacy. He stresses an understanding based on the cooperative, symbiotic elements of physical and cultural evolution. Eiseley's metaphors join explanation with exploration of other possible understandings and with exploration of how we understand.

vii
Because essay suggests exploring, the heuristic function of the metaphors reinforces the larger heuristic function of the essays. Eiseley's metaphors also function affectively and persuasively to evoke sympathy with and concern for man's relationship to the natural world, to stress cooperation rather than struggle.

With evolution, itself symbolic, as the central metaphor and concern, Eiseley uses cultural metaphors for the physical universe. The journey is the central metaphor through which he explores the individual's relationship to the evolutionary world and his means of understanding. Within the metaphor of the journey and its accompanying contingencies, Eiseley employs metaphors from the body of man in treating cultural evolution. Specifically, the physical metaphors are related to hand, eye, and tongue and their associated philosophemes or root metaphors, through which Eiseley reexamines the means by which we know. Eiseley's system of metaphor and metonym is basic to his task as a popularizer, to his defamiliarizing and reshaping evolutionary concepts. The Eiseleyan vehicle works through alternation of familiar and unfamiliar, through appeals to cultural codes, through moving from metaphor to model, and through reexploration of the dominant philosophemes associated with the organs through which knowledge is acquired. Using science and personal experience, Eiseley creates an effective literary hybrid, a model of science as a vehicle for thought.
CHAPTER I
INTRODUCTION AND REVIEW OF THE LITERATURE

By profession a physical anthropologist, university administrator (he was for a time Provost of the University of Pennsylvania, and later Benjamin Franklin Professor of the History of Science), and lecturer, Loren Eiseley was nevertheless a poet by temperament and both essayist and poet by choice. Of his fifteen published volumes, all remain in print: *Darwin's Century* (1958), a work of scholarship whose Conclusion parallels his development as a popular essayist; six collections of popular essays—*The Immense Journey* (1957), *The Firmament of Time* (1960), *The Unexpected Universe* (1969), *The Invisible Pyramid* (1970), *The Night Country* (1971), and *The Star Thrower* (a 1978 collection bringing together several previously unpublished essays and some of Eiseley's most popular published work under the title of his best-known essay, which was originally included in *The Unexpected Universe*); a biography of Francis Bacon, originally published in 1962 as *Francis Bacon and the Modern Dilemma* but later republished as *The Man Who Saw through Time* (1973); a loosely structured series of reminiscences published as an autobiography, *All the Strange Hours: The Excavation of a Life* (1975); three volumes of poetry—*Notes of an Alchemist* (1972), *The Innocent Assassins* (1973), *Another Kind of Autumn* (1977), and *All the Night Wings* (1979); and a posthumous collection of essays, scholarly and popular, on which he had worked to establish the importance of Edward Blyth's contributions
to the development of evolutionary theory, *Darwin and the Mysterious Mr. X* (1979).

Scholars have agreed that demands for "classification" and the difficulty of classifying Eiseley's texts have led to some neglect of the texts. James M. Schwartz finds Eiseley "primarily a scientist," but he emphasizes Eiseley's "aesthetic intentions" and contends that not only does Eiseley argue for the existence of creativity in both science and art, "but the literary quality of his own narrative design and thematic concerns" reveals "just such an imaginative integration" ("The 'Immense Journey' of an Artist" 10-11). Deborah H. Pickering also finds Eiseley difficult to classify and feels that he was more comfortable with other roles than the scientific and scholarly ones that he referred to as "disguises" (10).

Part of the difficulty in classification arises from Eiseley's status as a writer of essays rather than books. Though his essays have been combined and organized thematically to give a strong sense of coherence to each of the collections of popular essays, they were, nevertheless, often combined from multiple sources. Eiseley's strength lies in his essays rather than in the particular combinations produced in these collections. In *The Immense Journey*, still his most popular collection, there are, for example, perhaps six essays—including especially "The Real Secret of Piltdown" and "The Maze"—whose scientific information is now dated. Current readers may find the environmentalist polemics of *The Invisible Pyramid* less to the point than explorations of how to implement the environmentalist ethic today. For these reasons, Leslie Gerber and Margaret McFadden suggest
that Eiseley's editors rather than his books may determine his standing as a literary figure. Properly "winnowed," Eiseley's texts could, they suggest, stand as examples of "a powerful and exact exercise" of Roszak's "rhapsodic intellect" (158). In the present study, the focus is on Eiseley's essays rather than on his books, specifically on the popular essays in the five major collections and *All the Strange Hours*, as well as the seminal Conclusion to *Darwin's Century*.

As a literary figure, Eiseley has been studied in regard to biography (Andrew Angyal, Leslie Gerber and Margaret McFadden, James Schwartz, Deborah Pickering, and E. Fred Carlisle, whose recent book suggests the growth of Eiseley's identity through writing); the role of autobiography as theme and technique (Pickering, Gerber and McFadden, Schwartz ["The 'Immense Journey' of an Artist" and "Scientist as Artist"]); literary influences and relation to other literary naturalists (Deanna K. Haney); and themes (Gerber and McFadden, Angyal, Schwartz, Kassebaum, Haney, and Pickering). Though my concern is with Eiseley's metaphorical method and its relationship to exploration and explanation of themes, at this point a review of the major Eiseleyan themes, literary influences, and autobiographical and thematic techniques will provide an introduction to the *oeuvre* and a preparation for the approach I will follow.

**Themes**

Eiseley's themes have met with general scholarly agreement. The themes may be grouped under five general headings to reflect Eiseley's concern with (1) time, (2) the evolution of life, (3) the emergence of
man, (4) evolving culture, and (5) the relation of the individual to evolutionary nature and culture. ¹

Time

Time is, for Eiseley, immense, flowing, nonreturning, and, paradoxically, both creative and destructive. Of the four perspectives that had to be understood and accepted before Darwin's thesis could be articulated,² two are related to time: the great age of the earth and the succession of geological and animate forms. Both vast reaches of time and the "naturalness" of death had to be accepted, Eiseley contends, before man could accept the extinction of species and the evolution of life (FT, Chap. 2). Form is, for Eiseley, not reality, but "an illusion of the time dimension" ("The Star Thrower," UU 78); only primitives are without the concept of time, possessing sometimes a notion of "dream time."

The Evolution of Life

Eiseley treats life as a product of continuous and non-teleological evolution. Evolution is more than scientific fact for him; it is "a sensibility, a specific way of feeling and seeing," which is best appreciated through an understanding of its own evolution from pre-Darwinian thought to the present (Gerber and McFadden 37). Eiseley has been called "the Proust of evolution, remembering the past of the life of his species" (Gerber and McFadden 40). And evolution is a process—ongoing, unfinished. Schwartz finds that "the concept of dynamic process is central to Eiseley's epistemology," and he treats Eiseley's link of evolution and the human need to explore as representative of a "conjunction between exterior
and interior process," with emphasis on the human need to project oneself into other substances, human or not ("The 'Immense Journey' of an Artist" 13, 21).

In this unfinished process, the "unexpected" becomes an important theme, whether Eiseley deals with unexpected mutations in evolution or with natural occurrences such as cyclones. "To the unexpected nature of the universe man owes his being," Eiseley says. "More than any other living creature he contains, unknowingly, the shapes and forms of an uncreated future to be drawn from his own substance" ("The Unexpected Universe," UU 46-47). For Eiseley, life is continuously dissatisfied with what it is, continuously "reaching" or "probing" beyond itself and seeking to be other than what it is.

Life is also, paradoxically, both creative and destructive; aware of the nineteenth-century images of evolution as warfare or struggle, Eiseley is also concerned with the possibilities for symbiosis. Flowers created our atmosphere ("How Flowers Changed the World," IU); and the cooperation of microscopic parts of the human body, such as the phagocytes that "sacrifice" themselves for the good of the whole, provides a model for symbiosis rather than for struggle.

Evolving life also creates the paradox that its failures become its successes. In "The Inner Galaxy," Eiseley affirms his faith in life's power to endure: "We would win, I thought steadily, if not in human guise then in another. . . . It was the failures who had always won, but by the time they won they had come to be called successes. This is the final paradox, which men call evolution" (UU 193). And it is love for the "failures of the world" that leads the narrator in
"The Star Thrower" to a feeling that he compares to "the renunciation of my scientific heritage" (UU 86), which is not to be taken literally, but as a statement of Eiseley's role as critic as well as explicator of science.

Life's infinite adaptability Eiseley considers both boon and blessing. It makes possible the emergence of man, but it is "the single lethal factor" in civilizations because it has led man away from the security of instinct and into a world of exploration and hunger for experience ("The Lethal Factor," ST 262-63).

Finally, Eiseley finds in nature not only the indeterminate, the unfixed, the unexpected, but also the inexplicable. "[I]n the world," he says, "there is nothing to explain the world. Nothing to explain the necessity of life, nothing to explain the hunger of the elements to become life, nothing to explain why the stolid realm of rock and soil and mineral should diversify itself into beauty, terror, and uncertainty" (ASH 242).

The Emergence of Man

For Eiseley, because man "belongs to the community of descent" (Gerber and McFadden 51) and partakes of the same experiences that have produced all of life, he needs to develop an awareness of the web that links all things together. Man is both infinitely small—displaced from what he once thought was the center of the universe—and enormous—capable of modifying and even of destroying the nature that produced him. He is capable of great destructiveness, so that the sensitive individual may be forced to assume the identity of a fugitive (Schwartz, "The 'Immense Journey' of an Artist" 64-65).
Reflecting the unexpected quality of the universe and having the ability to shape his own future, man bears a responsibility to the natural world that produced him. Yet in Eiseley's texts, one is constantly aware of the human tendency to move farther from the natural world, whether by creating a society whose frequent changes make individual adjustment impossible, by directing his attention "exteriorly upon the machines which now occupy most of his waking hours," by denying "personal responsibility for the way his discoveries are used," or by consuming "the great green forest that once surrounded us Americans and behind which we could seek refuge" ("How Human Is Man?" FT 133-39). Man re-enters nature less like a Greek shepherd than like "an evil and precocious animal who slinks home in the night with a few stolen powers" ("How Human Is Man?" FT 139-40).

In Eiseley's texts man is, says W. H. Auden, "the Quest Hero, the wanderer, the voyager, the seeker after adventure, knowledge, power, meaning, and righteousness" (18). L. Harvey Kassebaum, however, insists that Eiseley "also sees man as the modern and mindless hero, a 'hero' on a Quest that is focused on a means without knowledge of what end may be found, and, worse, without caring about the consequences of the means" (200). This view suggests a pessimistic and often "grim vision" (Kassebaum 67) of man, which is especially evident in The Invisible Pyramid and its description of men as "world eaters" (Chap. 3). For Kassebaum, this grim vision leads to the "Eiseley Imperative" that "'a life in nature' must remain possible if man, perhaps if life, is to continue on our earth" (248).
Individual man is a potential fossil sedimented with the crudities of former existences, but he also contains the future, both genetically and in his linguistic ability to create the future. The Darwinians, Eiseley suggests, would, sometimes unwittingly, animalize man. Eiseley, though his admiration for Darwin is great, would displace this animalizing tendency and humanize man. Man's ability to displace the perceived reality of one time to the imagined reality of another came only through language and writing, and this is the most important of human abilities. Yet this ability to communicate with another time and place is both a bane and a blessing, as is science, which could not exist without linguistic and writing abilities.

Finally, man is a product of the last ice age, and his relationship to the ice is recurrent in Eiseley's texts. The ice is a source of isolation and desolation. "On the world island we are all castaways," Eiseley says in the first essay in The Immense Journey ("The Slit" 14); the notion, Kassebaum suggests, reverberates throughout the texts (5-6).

**Evolving Culture**

Several themes center on human culture. One of Eiseley's major themes is that man, through the evolved brain capacity that makes possible technology, has escaped the "tangled bank" of struggle for existence. Man has the capacity for empathy, for compassion, for love—not only toward fellow human beings, but toward animate and inanimate nature. Man's specialized brain, which enabled him, as Alfred Russel Wallace emphasized, to escape further specialization, has made possible the growth of culture, which, like nature, evolves.
Culture is linked to time, which is unreturning, continuously changing. Through language, man has created cultures, has devised an inner world. (The Cartesian opposition of inside-outside is recurrent in Eiseley's texts.) Science is a product of culture; it is an institution that has often gotten out of hand, has been worshipped as the panacea for man. For Eiseley, however, a reunification of science and the humanities is more important than scientific "progress," which has created the spinning "whirlpool" of modern man. Eiseley is both critic and advocate of science (Haney 6; Carlisle, "Heretical Science" 57). As a major cultural institution, science, in Eiseley's view, can be made to serve human ends (Gerber and McFadden 53). Angyal sees Eiseley as "more comfortable with Bacon's style of visionary science and his concern for the ends to which the scientific method would be put than with Darwin's methodical sifting through factual evidence" (73).

Writing in the tradition of the literary naturalist, Eiseley is clearly concerned with the uses of science, as well as with science as a cultural phenomenon. Deanna K. Haney not only finds the naturalist an important figure spanning both science and art, whose study can lead to "the essence of civilization" (12), but also notes that for Eiseley there is also a kind of solace in the ongoing evolutionary process (200-201).

Relation of the Individual to Evolutionary Nature and Culture

Eiseley's most powerful themes address the relation of the individual to evolutionary nature and to culture. He writes often of the limits of the empiricism that he embraces. Eiseley's concern with
the relation of the individual to the whole, of the microcosm to the macrocosm, is reflected in Schwartz's view of Eiseley as representative of "one of the essential epistemological problems of Romanticism: how and why man should see the relationship between an ever-evolving self and an ever-evolving nature" ("The 'Immense Journey' of an Artist" 123). Schwartz sees Eiseley's chief concern as the relationship between the evolving self and the evolving universe ("Scientist as Artist" 859). The individual's consciousness may isolate him from the nature which produced him, but it can also enable man to return to nature; the projection of the inner upon the outer, of the dream onto the semblance of reality, is the key to humanity (Schwartz, "Scientist as Artist" 860). The individual's isolation may lead him to become a "fugitive," an identity assumed by Eiseley and treated by scholars, but it also leads to a search for a kind of alchemical means of transcending immediate reality and finding a "reaffirmation of nature's mutability and variety" (Schwartz, "The 'Immense Journey' of an Artist" 36). As Schwartz suggests, "a reunion of man and nature . . . is often dependent upon solitary experience" ("The 'Immense Journey' of an Artist" 32).

The individual's relation to the Darwinian universe is expressed by Gerber and McFadden in a comparison with Kierkegaard's questioning of intellectual schemes: "What Hegelian thought was to Kierkegaard, Darwinian evolution was to Eiseley. Both men ask the question, Where shall I live in this embracing system?" (113). In more specific terms, "What meaning have the words 'mercy' or 'pity' in a Darwinian world?" (Gerber and McFadden xvii). The individual's awareness of
time, of the interrelationship of all life, and of the paradox of failures and successes must be explored in an attempt to answer these questions. The result of such questioning is a hybrid of knowing and not knowing, and a continuing epistemological quest that stretches throughout the texts. From this hybrid of knowing and not knowing a certain wonder emerges, for "science expands rather than reduces the mystery of the world" as the scientist encounters "unexpected angles" (Gerber and McFadden 53, 91). Eiseley writes that for the scientist who is not afraid of feeling, "the common day turns marvellous" ("How Death Became Natural," FT 58).

Yet for all of his knowing and unknowing, for all of his ability to feel wonder, man is not necessarily free or happy or able to love (Gerber and McFadden 53). Angyal emphasizes Eiseley's concern with projecting oneself "into other lives" and finds the recurrent themes of antimaterialism, condemnation of scientism, and transcendence of time in an effort to recover the past (27), as well as a Bacononian sense of man's power to create and shape the natural world (74). The question Where shall I live? will become, for Eiseley, the question How shall I know where I shall live? The answers will come, for Eiseley as for Heidegger, in "dwelling poetically."

The Relation between Self and Evolution: Autobiography as Theme and Technique

Eiseley's use of autobiography, of the self to think through the problems that he poses, is one of the dominant features of his texts. The relation between self and evolution is both theme and technique; as such, it has received considerable attention from scholars. Schwartz studies Eiseley as a literary figure, stressing his emerging
narrative abilities and his autobiographical technique and suggesting that Eiseley, like many important thinkers, "parallels the maturation of creative consciousness, the growth of the artist, to the evolution of the entire universe" ("The 'Immense Journey' of an Artist" 11, 70). Schwartz contends that Eiseley transcends the formal essay or the scientific tract because, in his texts, "space and time, perception and recollection, become important only when projected onto the screen of individual human consciousness"; the result is "sacrificing photographic verisimilitude for a more percipient, conceptual universal validity" ("The 'Immense Journey' of an Artist" 71, 74).

Thus Eiseley insists that man must accept his own duality and must also recognize the need for compassion, for "oxymoronic recognition" in a "wise sorrow" (77).

Carlisle treats Eiseley's "connection between personal impulse and universal intent" as "two poles of a single endeavor" and thus "really inseparable" ("Heretical Science" 365). For Carlisle, Eiseley's "science is a personal quest that recognizes the self as the origin of all knowledge—even scientific knowledge—but that also requires the systematic structure of science for its success—and that relies on investigation and imagination for its insights"; thus Eiseley gives to both biology and anthropology "a new idiom" and "a new dimension" (359). He blends "the universal intent of science" with his "personal quest" (368) to create a second world through art. Carlisle stresses Eiseley's notion of the importance of language as "an instrument of science," an instrument, in Bacon's phrase, "for the uses of life" (372). Thus for Carlisle Eiseley's texts provide a
means by which "both the scientist and the artist discover and remake reality" (373), creating a "more comprehensive version of science," which now includes Bacon's phrase (377).

If Carlisle's approach to Eiseley seems at first more biographical than analytical, he is not alone in stressing the relationship of self and science in Eiseley's writing. Gerber and McFadden return to Eiseley's theme of the fugitive, concluding that his lack of a sense of belonging partly explains "his avidity for literary form" (144) as well as his concern with "identity—its elusiveness and final impossibility in an unexpected universe" (146). They find, with Carlisle, a blending of science and self in Eiseley's quest and questioning, and they perceive in the choice to love the "failures of the world" a negation of the standard assumption of evolutionary struggle through the choice to feel and express pity (86).

Angyal compares Eiseley with Augustine, Rousseau, and Wordsworth in that he is "primarily concerned with the growth of his mind and sensibility," rearranging experiences for effect and changing facts and settings so that memories of childhood are turned into fictions that reveal the part childhood plays in developing the artist's sensibility (93-94). He finds more in common with Thoreau's ability to see metaphors in "natural facts" than with Darwin's love for painstaking assembly of details (111).

Pickering, too, emphasizes Eiseley's use of autobiography in his quest for a human and a scientific identity. Pickering views Eiseley in terms of a series of "selves" through which he explores the role of the individual in relation to science. For her, the "mask" the author
wears may determine what he perceives (15). In the movement from one
life form or landscape or metaphor to another she sees the search for
self, which is an impossible search, for "the object is the search
itself" (21). In writing his own "Obituary of a Bone Hunter" in All
the Strange Hours, she contends, Eiseley "ironically . . . signaled
the beginning of his life as a humanistic writer" (132).

**Literary Influences**

Eiseley's relation to earlier writers has been noted. Gerber
and McFadden link him with other familiar essayists, including Heine,
Lamb, Hunt, Hazlitt, Emerson, and Thoreau. They find the roots of
Eiseley's work in Montaigne's classic *essai*, in which the "weighing"
or "assaying" of a thesis is important, with emphasis on the writer's
personal opinion, the writer's self. Thus the essay becomes "a
vehicle for exploration rather than demonstration" (21). With the
essay as a vehicle for exploration, Gerber and McFadden find Eiseley's
movement "backward and forward in time" dependent on "Proustian
epiphanies of mémoire involontaire" (17) in All the Strange Hours.

Eiseley's texts are often linked to natural history writers. In
an essay written for a high school English class, the young Eiseley
proclaimed, "I want to be a nature writer" (ASH 75). Gerber and
McFadden link him both to the tradition of the parson-naturalists
(107) and to contemporary natural history writers (156). Angyal looks
to Eiseley's development as a literary naturalist, noting his quarrel
with reductionism and his kinship with British and American writers of
natural history, including parson-naturalists such as White,
Jefferies, and Hudson, as well as observers such as Emerson and
Thoreau. The work of these prescientific writers, Angyal contends, "is both personal and factual, balancing objectivity with delight" (34), influenced by empiricism but involving personal observations rather than collecting and quantifying data to verify a scientific hypothesis. The "poetic" quality that emerges in Eiseley's essays provides yet another link with these writers of natural history because of what Kassebaum calls his "poetic" techniques of imagery and tropes and "his peculiar emotional intimacy with natural things" (261).

Eiseley's connections with Thoreau, Melville, and Emerson are evident partly because of his frequent references to these writers. Two of the essays in his last collection, The Star Thrower, revolve around Thoreau's texts: "Thoreau's Vision of the Natural World" and "Walden: Thoreau's Unfinished Business." His approach is what Angyal has termed not so much literary scholarship as "appreciation" (88). In these essays Thoreau's texts provide the vehicle for Eiseley's own reflections as well as his interpretations of Thoreau. Thoreau and Darwin provide tutor texts for "The Golden Alphabet" in The Unexpected Universe: Thoreau was the stay-at-home whose mental travels took him into the future; Darwin was the actual traveler whose observations changed the understanding of man and society. Both had insight into the future, both loved odd facts, both were readers, both found satisfaction in nature, and both "forfeited the orthodox hopes that had sustained, through many centuries, the Christian world" (121-22). For Eiseley, in spite of his extensive study of and admiration for Darwin, Thoreau is the one who both "transcends" and "amplifies" the
Darwinian vision (122). Gerber and McFadden emphasize Eiseley's affinity for the rural qualities Thoreau extolls, as well as his sense of estrangement from the mechanistic life of the great city (23).

Schwartz finds Eiseley's "mytho-symbolic world of golden wheels and 'instruments of darkness'" in The Night Country a world comparable to Thoreau's "excursions" or "'incursions'--into nature and self" ("The 'Immense Journey' of an Artist" 92).

Eiseley links Emerson with Darwin in "Man Against the Universe" as "opposed yet converging forces in nineteenth-century thought" (ST 210). His exploration of the affinity between Emerson and Darwin is significant, say Gerber and McFadden, chiefly because Emerson, unburdened as he was by rigorous scientific procedures, was both an observer of nature and one who indulged "his expansive, image-making, synthetic powers" (108). Thus the complementarity between literature and science is extended in Eiseley's link with Emerson, whom he treats as a process philosopher.

Noting that the "intensified empathy," "picturesque revolutionaries and moon-haunted landscapes," and "mysterium" of Romanticism had an unrecognized impact on nineteenth-century science, Eiseley turns to Emerson, who, although he is sometimes perceived as simply a Romantic idealist, is for Eiseley the "honest romantic" who, free of Darwin's rigorous approach to science, saw more clearly than Darwin the lack of permanence in nature, the lack of teleology, and the dominance of process ("Man Against the Universe," ST 211-13). Darwin projected "a certain orthodox benignity" onto the conclusion of the Origin; but Emerson, Eiseley contends, "provided what would have been a less timid notion for the end of the Origin, when he wrote that
nature's "permanence is a perpetual inchoation," further "that no single end may be selected and nature judged thereby," and finally "that if man himself be considered as the end, and it be assumed that the final cause of the world is to make holy or wise or beautiful men, we see that it has not succeeded" ("Man Against the Universe," ST 215-16).

The link with Melville is clear in Eiseley's recurrent use of Ishmael as the wanderer and wonderer who has escaped to tell what he has seen. The most explicit tribute to the insights in Moby-Dick comes in "Science and the Sense of the Holy," in which Eiseley opposes the sensitive, wondering Ishmael to the crazed Ahab—the one representing the sensitive, "wondering man, the acceptor of all races and their gods" (ST 199), and the other representing a "single obsession, the hidden obsession that lies at the root of much Faustian overdrive in science," the desire to know even "if the knowing kills him, if naught lies beyond" (198-99). Carlisle compares Eiseley's texts with Melville's because Melville also presents "another dimension without which the quest cannot succeed"; for Melville, empiricism is not enough, but there must be immediate personal involvement, so that "the seeker . . . must directly experience the living whale in all its beauty and power" ("Heretical Science" 358).

Because of Eiseley's study of Bacon, Francis Bacon and the Modern Dilemma (1962), republished as The Man Who Saw through Time (1973), the link of Eiseley's texts with Bacon's has received some attention. Gerber and McFadden find a similarity of Eiseley's method and Bacon's "dispersed meditaciones" (21). They emphasize that Eiseley, in
upholding Bacon as the originator of a new empirical approach to knowledge, also came to uphold "the shapers of the parson–naturalist tradition"—men for whom observation was joined by empathy and a sense of participation in the immediate experience, but who had often been "dismissed by positivistic scientists as too soft, literary, or undisciplined" (107). In fact, Eiseley suggests that Darwin himself was indebted to Gilbert White (DC 13-14), and he argues later that Romanticism helped to shape and to prepare Darwin's mind for new experiences, for adventure, and for observing unique creatures and possibilities ("Man Against the Universe," ST 214).

**Technique**

Eiseley's techniques have been variously treated, most often with an emphasis on the use of autobiography. Aside from autobiography as a technique as well as a theme, Eiseley's dominant technique is the use of analogues and metaphors. Angyal suggests that Eiseley may have acquired from Bacon "the habit of balancing scientific or scholarly ideas with vivid metaphors, although in this respect he is far more candid than Bacon" (38). In Pickering's treatment of Eiseley's "selves" or "personas," she contends that each of these personas is accompanied by certain images—from rats and spiders and other creatures that suggest the solitude associated with the "contemplative naturalist" (18), to the wanderer, drifter, traveler, sometimes wearing "masks and disguises" as reinforcement of the journey metaphors (20), to images of the seasons to reinforce the journey and to reveal "the ages of man persona" (20). In Eiseley's own references to the task of the writer in All the Strange Hours Pickering finds an
emphasis on visual images, the importance of sight and hearing, and the childhood decisions to read and to be a fugitive (28-35).

The dominant metaphor in Eiseley's texts is the journey. The Immense Journey is for Pickering a revelation of Eiseley's evolution—his journey—as a writer (52-53). Carlisle finds the journey metaphor not just a casual figure, but a means of implying both "quest and discovery" ("Heretical Science" 362). He notes the use of the journey in Darwin's Century when Eiseley refers to scientists as explorers who try "to piece together the charts and maps of unknown seas" just as they try "to piece together the theory of evolution" (362). The metaphor, says Carlisle, is suggestive of the way scientific discoveries are made, in that they are "pieced together from the results of uncertain thrusts into the unknown," and it further suggests the function of new theories as "new maps or charts of experience that enable us to understand the world more clearly" (362). The journey, he contends, suggests "the adventure, risk, and mystery characteristic of scientific search and discovery" (362). And like a journey, science requires "personal passion, commitment, and risk" (363).

But for Carlisle, this metaphor does more than provide structural coherence for The Immense Journey and Darwin's Century. Journeys are made by men, and Eiseley's treatment of science suggests that the journey must be made by men, that scientific "truths" are "still human constructions that are fundamentally personal and provisional," and that the "strange colorings" which scientists give to reality "have come mostly from within" ("Heretical Science" 363). Predating Eiseley's own espousal of evolution as a root metaphor ("The
Illusion," ST 275), Carlisle suggests that Eiseley apparently sees evolutionary theory "not only as a human construction but as a root metaphor" (364).

The journey may also be viewed as a quest. Schwartz writes of Eiseley's use of "literal and figurative pilgrimages through scientific, cultural, and personal history" ("The 'Immense Journey' of an Artist" 86). Man is thus portrayed as "a visionary explorer" (39). And Schwartz stresses Eiseley's maturation as an artist from The Immense Journey through The Invisible Pyramid.

Eiseley's use of the journey is also linked to his allusions to the Odyssey, which Kassebaum finds central to "all Western journeys, both those of the mind and of the body" (61). In "The Slit," the initial essay in The Immense Journey, Kassebaum finds the "prototype essay" for Eiseley's other "journeys" and also "an admirable metaphor for his accumulated work," for in the essay the narrator, situated in a slit in the earth, is able to "look metaphorically upwards through history" and toward the future (102). The essay, then, provides both a perspective and a journey. And Kassebaum further notes that the cyclical journey of Halley's comet is the basis of the structure of The Invisible Pyramid (114).

Also worthy of notice is Eiseley's penchant for the journey on which the reader is invited. Angyal finds the "shamanistic perspective" useful in the journey "backward through time and outward from man to his fellow creatures" (18). And Haney notes that Eiseley asks the reader to accompany him "on an inward journey back into the psyche, to where humans and animals merge" (217).
Eiseley's merging of narrative and reflection is another technique that has received some attention. Angyal says that Eiseley's accomplishment "is virtually to invent a new genre--an imaginative synthesis of literature and science--one that enlarged the power and range of the personal essay" (39). Carlisle contends that Eiseley "discovered and developed a new prose idiom for science and for literature" ("Poetic Achievement" 112). Angyal defines what Eiseley called his "concealed essay" as one in which the subject matter "is framed or 'concealed' by the personal approach, which serves as a rhetorical device to engage the reader's attention" (39). Thus Eiseley develops a highly elaborate form, with frequent literary references and allusions, numerous quotations, multiple themes, and an interwoven structure of contemplative concerns. This casual and informal, though sophisticated technique brings narrative and personal experience--essentially fictional and autobiographical tools--to bear on what is otherwise expository material--scientific fact and hypothesis. (Angyal 39)

The form created is what I shall treat in Chapter III as a hybrid genre, a combination of science and literature that draws on the work of writers as disparate as the British parson-naturalists, American romantics such as Emerson and Melville, and twentieth-century thinkers such as Whitehead and Santayana. As an interdisciplinary hybrid, Eiseley's genre engages not only autobiography, philosophical reflection, and popularization of scientific information, but literary intertexts and tutor texts, philosophy, and the politics of rocketry and education.
Argument

Studies of Eiseley's texts, then, have centered on biography, on theme, on the development of personas, on his role as a natural history writer and environmentalist, and on his development of narrative and autobiographical techniques. Scholars have not, however, addressed the framework of metaphors and analogies, the integral relationship of thought and image and purpose, that may be perceived in Eiseley's major collections of essays. My purpose in this study is to examine the question and the necessity of popularization and to examine Eiseley's reasons and methods for popularizing the evolving concepts of evolution. He is a popularizer of scientific information whose purposes are not only scientific, but literary as well (indeed, for Eiseley the two are hardly separable). I shall argue that the key to Eiseley's method of popularization is the use of metaphors and analogues which are what I shall call "informing"—that is, both carrying information and giving form, eidos, to the thought—and which Eiseley himself discusses in terms of Stephen C. Pepper's "root metaphors." In the etymological sense of the Latin informare, "to give material form to" or "to form an idea of," these figures help to shape the information imparted or to give form to an idea, but they also "inform" in the usual exegetical sense. In the rare sense of helping to shape the mind, the term fits the texts, since a major purpose is to (re)shape the reader's mental constructs concerning science, culture, and evolution. These metaphors, involving simple objects and images, do not appear accidentally, nor are they mere ornaments. Instead, as they "inform" the essays they provide the
theoretical models that are often used as a means of approaching complex material in scientific explanations.

My contention is that in what Heidegger calls "here and now and in little things" ("Question" 33) Eiseley discovers a means of explaining the complex materials of evolution to a public that he saw as skeptical, especially toward the notion of continuing evolution (Haney 201). But in the "little things" that function as metaphors and models he also finds a means of exploring the process of knowing, and he attempts to displace certain popular assumptions that have largely arisen out of metaphor, such as the emphasis (partly arising from Darwin's own writing, but largely from writings of his followers) on the aspect of warfare in evolution—an emphasis that resulted in Herbert Spencer's "social Darwinism"—in favor of an understanding that stresses the cooperative, symbiotic elements of physical and cultural evolution.

Thus the metaphors in Eiseley's texts function heuristically to join explanation with exploration of other possible understandings, even with exploration of how we understand at all. If, as Gerber and McPadden contend, the essay in its classical roots is "a vehicle for exploration rather than demonstration" (21), then the heuristic function of the metaphors only reinforces the larger heuristic function of the essays. As models of struggle are replaced by models of cooperation, the possibility of exploring an other understanding is always present. But the metaphors also function affectively and persuasively; as a popularizer Eiseley attempts to evoke the sympathy with and concern for man's relationship to the natural world that will
lead to cooperation rather than struggle, to understanding of the "living screen" rather than dominance of animate and inanimate nature. Eiseley's central concern, then, is the development of man--biologically and culturally--through evolution. For Eiseley, evolution itself is both subject and method, both subject of the quest and source of the question, for "indeed evolution itself has become . . . a figurative symbol" ("The Illusion," ST 275). Thus evolutionary science is both subject and vehicle of understanding. Cultural evolution has brought man into a world of technology, of machines, of "objectivity," of scientism. A frightening result for humankind is the loss of humane concern, of pity, of the capacity for wonder that may accompany the necessary Darwinian understanding. "Like Kierkegaard, Eiseley demanded to know the inner, personal meaning of the great intellectual schemes" (Gerber and McFadden 113). Thus he questions the individual's role in evolving knowledge and evolving culture.

If evolution, then, provides the central concern and the central metaphor of Eiseley's texts, through which he examines human being and becoming, factors the texts must confront are the changes of life through time, and chance or contingency. The metaphors for the physical universe, paradoxically, come from the cultural universe. The journey is basic. It is the central metaphor through which Eiseley approaches the question Where shall I live . . . ? The journey is also the means of exploring the method of understanding. The journey is epistemological, for it is the model for the way we learn--stopping, starting, moving without always knowing our direction,
following a map or a metaphor. The metaphor of journey is the journey of metaphor as well. At issue is the epistemological question How shall I know where I shall live in this embracing system? Within this journey, the physical factor of contingency has been represented in various cultures by symbols for those elements in nature that man cannot understand. Contingency is the "trickster" of primitive man, a dice game, or a shuffling of cards.

Within the metaphor of the journey and its accompanying contingencies, Eiseley employs a no less integral framework of metaphors from the physical universe and the body of man as he treats cultural evolution. The most important physical metaphors are related to hand, eye, and tongue and their associated philosophemes. The eye is the organ for the philosophemes of perception, observation, and participation; the hand is the metaphor of concept because it grasps, holds, gathers together. The hand–eye link is basic to our metaphors of knowing. The tongue, which participates in the voice–ear circuit of knowing, becomes a metonym for language, which is in turn a metonym for culture. (And Umberto Eco notes that metaphor, often assumed to be based on similarity rather than on contiguity, "can be traced back to a subjacent chain of metonymic connections" [68]). The cultural metaphors for the physical and physical metaphors for the cultural are, as we shall see, vital in Eiseley's heuristic of learning and in his program of displacing certain well-known metaphors, especially metaphors of machine and struggle, often associated with popularization of scientific concepts.

Eiseley is clearly aware of the role of metaphor in popularization. He notes "that it is the successful analogy or symbol
which frequently allows the scientist to leap from a generalization in one field of thought to a triumphant achievement in another" ("The Illusion of the Two Cultures," ST 274). For him, scientific analogies are not separate from but identical to the creative act of the literary imagination:

Such images drawn from the world of science are every bit as powerful as great literary symbolism and equally demanding upon the individual imagination of the scientist who would fully grasp the extension of meaning which is involved. It is, in fact, one and the same creative act in both domains. (275)

For Eiseley, such analogies are essential to scientific communication as well as to popularization: "It is only by the hook of analogy, by the root metaphor . . . that science succeeded in extending its domain" ("How the World Became Natural," FT 20)."

"But metaphor is never innocent," says Jacques Derrida. "It orients research and fixes results" (Writing and Difference 17). The "impression" of the image, in Herman Rapaport's terms, may remain even if we forget the image itself. Thus the "impression 'houses' or 'supports' . . . the gaze of the reader"; but the image, "itself framed, can suddenly stage itself as stage and in that way absent itself or disappear from the viewer's consciousness as image, object, or prop" (61,60). Image, metaphor, analogy can disappear from immediate view; yet, remaining unknown to the perceiver or to the creator, it can provide a framework for understanding, can shape results, can be the only means of understanding for even the scientist who cannot see the "waves" or "particles" that he comes to view as complementary theories.
"Even the traditional language of the natural sciences cannot claim to be totally literal," says M. H. Abrams, although "its key terms often are not recognized to be metaphors until, in the course of time, the general adoption of a new analogy yields perspective into the nature of the old" (20). As Howard Gruber suggests, "images generate ideas and ideas clarify images" (133). Or as M. H. Abrams notes, the "facts" of a scientific understanding may be chosen and shaped by the figures which convey the understanding. "For facts are facta, things made as much as things found, and made in part by the analogies through which we look at the world as through a lens" (20).

The role of scientific metaphor as a controlling force in human culture is thus inescapable. David Edge posits the centrality of ambiguous technological metaphors in contemporary thinking. Technological devices, he says, have become part of our everyday existence, "forming the literal basis of metaphors which give implicit, tacit structures to our thought and feeling" (136). Edge notes that the successful metaphor, "by radically restructuring our perception of the situation, ... creates new questions, and, in so doing, largely determines the nature of the answers" (136, italics in original). Successful metaphors are usually ambiguous, and the result is a certain ambivalence in the public mind that leaves the public open to manipulation (137-139). Another possibility he suggests is that metaphor may "alter feelings and attitudes towards oneself and others, and the natural world," with Descartes' image of the body as machine a classic example (140). Further, and most significantly, Edge suggests that the metaphor is likely to be accompanied by
"attitudes appropriate to its literal referent" (141), so that in the popular mind the vehicle replaces the tenor. Society, then, responds with attitudes toward the vehicle instead of attitudes toward the tenor of the metaphor. In a kind of unwitting Derridean reversal, the vehicle becomes the tenor; assuredly the vehicle shapes the response to the tenor. Such response clearly occurred to the metaphor of the universe as clock, with resulting shifts in attitudes toward nature from cooperation to exploitation—man as master of the machine (Edge 141)—and in the social application of the Darwinian metaphor of struggle in the tangled bank epitomized by Herbert Spencer's notion of struggle in the economic marketplace—survival of the "fittest" by any "useful" means. Thus metaphor itself becomes a means of "establishing and reinforcing moral and social control" (142).

That Eiseley is aware of the social and moral implications of scientific metaphors is clear when he writes of the role of evolution as a symbol, the result of the creative act:

Indeed evolution itself has become such a figurative symbol, as has also the hypothesis of the expanding universe. The laboratory worker may think of these concepts in a totally empirical fashion as subject to proof or disproof by the experimental method. Like Freud's doctrine of the subconscious, however, such ideas frequently escape from the professional scientist into the public domain. There they may undergo further individual transformation and embellishment. Whether the scholar approves or not, such hypotheses are now as free to evolve in the mind of the individual as are the creations of art...

As figurative insights into the nature of things, such embracing conceptions may become grotesquely distorted or glow with added philosophical wisdom... ("The Illusion," ST 277)

Because the figurative insight is itself subject to evolution, "we will do well," Eiseley says early in his writing career, "to take a
long second look at the history of [evolution] and at its moral implications" (DC 326).

The problem of metaphorical transfer is one that James Bunn also addresses, contending that the transfer of a discovery from one field to another often leads to distortion. In fact, the successes of Newtonian mechanics, of Darwinian evolution, of information theory, might be gauged by their widespread misapplication in remote disciplines. The complete substitution of the model for a different problem produced cross-categorical sports such as the interiorization of Newtonian space inside the head of Lockean psychology, the transformation of natural selection into an economic principle justifying Herbert Spencer's dog-eat-dog theories, and the chess-playing computer that would subjugate man. (25)

Other transfers, such as Harvey's comparison of hydraulics to the circulation of blood, have been more successful; but the distortions have occurred, Bunn suggests, when "revolutionary models were understood to be special cases of wider phenomena which the original designers had not imagined" (26). Such understandings of metaphors and models, then, are not necessarily detrimental. According to Bunn the danger arises chiefly when the model is perceived as a panacea (25).

If in Eiseley's view evolution itself has undergone a process of transformation, one purpose of the contemporary natural history writer is to use science as the vehicle for other understandings. The struggle suggested by Darwin and his followers has escaped from the domain of the scientist, and the metaphor of the tangled bank has brought both "enrichment and confusion." If science moves by what Eiseley calls "the hook of analogy" and the analogy is often altered as it moves into the public mind, then the results may be powerful.
"The machine analogy," says Eiseley, "... bulks large in the interpretation of eighteenth-century thought and descends into our own day" ("How the World Became Natural," FT 20). An analogy may even be false, yet so potent is its effect upon a whole generation of scientific thinking that it may lie buried in the lowest stratum of accepted thought, or color unconsciously the thinking of entire generations. While proceeding with what is called "empirical research" and "experiment," the scientist will almost inevitably fit such experiments into an existing comprehensive framework, an integrative formula, until such time as that principle gives way to another. (Eiseley, "How the World Became Natural" 20)

In the words of the early medical scientist William Harvey, "Doctrine once sown strikes deep its root," and "wont and custom become a second nature" (120). Having studied thoroughly the scientists whom he later called the "dancers in the ring" (ASH Chap. 18)—the thinkers of Bacon's time and their responses to empiricism, the forerunners of Darwin and their difficulty in seeing outside their own "framework" of analogies, and the Darwinians and their tendency to emphasize one aspect of evolution, the struggle, to the detriment of the larger view—Eiseley is, both in his explicit statements and in his textual methods, clearly aware of the scientific, social, and cultural importance of metaphor. For him, then, one of the primary tasks of the literary naturalist is to help modify the old metaphors and provide new ones.

My contention, then, is that Eiseley's texts attempt to shift from metaphors of fixity and decidability long dominant in Western thinking, for as we have seen Eiseley is aware that the machine metaphors continued to have an impact long after their time, and to
return to simple, natural, physical metaphors for cultural changes, and to cultural metaphors for physical changes. I see in Eiseley's texts an attempt to displace conventional metaphors of struggle, reductionism, teleology, hierarchy, fixity, decidability, and determinacy in favor of metaphors which become models of an other way of viewing nature and culture.

Thus metaphors of struggle are replaced by those of symbiosis; metaphors of reductionism, by those of the inexplicable or of "magic"; metaphors of teleology, by those of the unexpected or unplanned; metaphors of hierarchy (both the power hierarchy, whether in nature or in human affairs, and the hierarchy of fields of knowledge), by those of coexistence or of symbiosis (especially, in cultural affairs, the symbiosis of "science" and "art"); metaphors of fixity, by those of continuous change; metaphors of decidability, by those of undecidability; metaphors of determinacy, by those of indeterminacy. Thus the struggle in the tangled bank is replaced by the metonymic statement, which becomes metaphorical, that flowers changed the world (by providing oxygen, plants made animate life possible, and by providing seed for sustenance, flowers made possible the chain of food leading to man). Human phagocytes "sacrifice" themselves for the organism. Circular or recurring time gives way to unreturning, continuously altering time. The planned, ordered, machine-like universe gives way to the "hazard" of a dice game; even the mingling of genetic traits that sexual attraction brings is the shuffling of a deck of cards. The reductionism of Ernst Haeckel, who proclaimed in the nineteenth century, before modern cell biology, that all mystery is annulled by knowledge of the components of the cell, is displaced
by the inexplicability of alchemy (ironically, Hermes, inventor of alchemy, twice rescues Ulysses, Eiseley's prototypical wanderer, on his journeys) or the sphex wasp's uncanny awareness of its prey's most vulnerable spot. Eiseley's metaphors and metonyms, images and journeys lead to understanding how we came to where we are, to human sympathy for one another, to concern for the natural world that produced us. Eiseley's question Where shall I live in this embracing system? is expanded to How shall I know where I shall live in this embracing system? The answers are not answers, but explorations—on the most obvious level discursive, but begun more importantly through the displacement of metaphors that have reinforced notions of fixity, teleology, hierarchy, reductionism, struggle, decidability, and determinacy.

Notes

1. Gerber and McFadden note six recurrent "Eiseleyan motifs":

   1. Time is immense, linear, and creative.
   2. Humanity belongs to the community of descent.
   3. The human brain creates a second world.
   4. For the evolutionist, the common day has turned marvelous.
   5. Guided by Bacon's ideas, science can serve human ends.
   6. Scientific knowledge bestows neither freedom nor the capacity for love. (50-54)

2. Eiseley articulated four perspectives that had to be understood and accepted before Darwin's thesis could be stated: (1) the great age of the earth, (2) the succession of geological and animate forms, (3) the great quantity of individual variation and the significance of minute changes in creating species, and (4) the decline of the eighteenth-century notion of the world as a great, balanced machine (see DC Chaps. I-VIII; these perspectives are more succinctly stated in FT 70-71). All require a dynamic rather than a static conception of nature (DC 6) and an awareness of a universe "being made continuously" (DC 9), as well as "a combination of Judeo-Greek ideas, amalgamated within the medieval church itself" to bring
about "the recovery of the lost history of life, and the demonstration of its total interrelatedness" (DC 6).

3. Schwartz pinpoints Eiseley's motif of "a modern-day 'fugitive' on a recollective journey through the darkness of interior and exterior reality" ("The 'Immense Journey' of an Artist" 63), a motif Eiseley treats also in All the Strange Hours, as he identifies with an escaped fugitive who perished in a snowstorm when Eiseley was five years old ("The Time Traders" 248-257). Schwartz also treats the motif of the fugitive in The Night Country as man becomes the attacker who makes war on nature, while the sensitive observer becomes the "fugitive" searching for harmony with nature outside the activities of his fellows who would "conquer" the natural environment ("The 'Immense Journey' of an Artist" 64-65). Pickering treats The Immense Journey, The Night Country, and All the Strange Hours in terms of Eiseley's "selves" or "personas," each of which is accompanied by certain images, with the personae of wanderer, drifter, traveler, and fugitive sometimes wearing "masks and disguises" and reinforcing the journey metaphors (20, 118). The fugitive, she notes, is fleeing; he is the dominant persona, becoming dominant only after examining the other "possible selves" (119).

4. In establishing these four functions, I acknowledge the influence of Edward Manier, who establishes five broad rhetorical categories for understanding Darwin's scientific uses of metaphor: "(1) critical-persuasive, (2) heuristic, (3) semantic, (4) explanatory and (5) affective" (182).

5. The other physical metaphors Eiseley uses to represent cultural evolution derive from the physical world but are not included here because they are simply recurrent metaphors that do not function, as do the metaphors that derive from the philosophemes, in Eiseley's heuristic of the learning process. The spiral, whose most basic form is the double helix of the DNA molecule, occurs also in the vortices of tornados, whirlpools. It is basic to the code of life, but it is also a model for the unexpected. The spiral in Eiseley's texts is a physical counter-model to the traditional image of the circle of completion, teleology. The spiral is a paradoxical model—at once the code that controls and the uncontrollable, unexpected force that introduces chance or disorder into the orderly. The circle functions as a metaphor of enclosure or restriction. It is most effective in Eiseley's chapter on the tendency of science to become enclosed in its own systems, "The Dancers in the Ring" (ASH Chap. 18), in which he compares scientists caught in the enclosure of their own system to dancers in the circle of fungi that arises overnight (an interesting play on the transitoriness of scientific and philosophical systems from the perspective of the earth's age), the circle known as a "fairy ring" in Bacon's age.

The web, too, is a metaphor from the physical world. Eiseley's usual web is the glistening, fragile web of a spider caught by the sun's light. But the web is also a "nerve net," and it is the screen that links all living beings.
CHAPTER II
THE CASE FOR POPULARIZATION

Although his concerns become increasingly "literary" in the later essays, Eiseley's work is basically that of a popularizer. The significance of the popularizer's role is evident in the comments on popularization made early in *Darwin's Century*:

Eiseley also comments that, in writing for a larger audience, "no man expounds upon great ideas to a single audience. . . . Man is not one public; he is many and the messages he receives are likely to become garbled in transmission" ("Man Against the Universe," ST 208-209). This garbling, however, is a necessary process in the evolution of the "message." Eiseley's texts are concerned with a "scientific synthesis" which can never be "really fixed in the public mind until that public has been prepared to receive it through anticipatory glimpses" ("Man Against the Universe," ST 209). These "anticipatory glimpses" are Eiseley's subject as he presents science, in combination with his own humanistic insights, on a popular level.

**What Is Popularization?**

The term *popularization* refers to making popular or making intelligible and interesting to the layman information which has
formerly been limited to the specialist. Popularization is
vulgarization, "making vulgar," making information accessible to the
mass of people rather than to a scientific, cultural, or educational
elite. The negative connotations of vulgarization in English suggest
an elitist view that specialized information, whether literary or
scientific, belongs in the realm of the specialist. If, however,
writing is the province of the "literary" specialist, then
popularization is a part of the domain. To borrow from Michel Serres
(writing on Michelet's book of natural history The Sea), "There are
texts, and that is all" ("Michelet: The Soup" 38).

The popularizer's texts are not technical or scientific
treatises. The strictly scientific paper requires factual, detailed
sifting of evidence, often organized into four sections: Materials
and Methods, Results, Conclusions, and Discussion. Only in the last
two sections should commentary or interpretation appear, and then only
on the basis of evidence. Scientific writing for the professional
audience is direct, nonreflective, usually not figurative, except when
an analogy or a metaphor seems essential for clarification (more
likely in a textbook or a conference presentation than in a paper
published for an audience of specialists). The emphasis is on method,
since replication of the experiment is the key to verification of the
results, and some emphasis is given to the contribution to the body of
scientific knowledge. "Human interest" is of little or no concern in
modern scientific writing.

In contrast, popularization usually emphasizes the "human
element"--the scientist who, in James Watson's words, "winged into the
Eagle to tell everyone within hearing distance that we had found the
secret of life" (148) or the anthropologist, in Eiseley's "The Relic Men," who carefully removes a "petrified woman," actually no more than a concretion that had become an old bachelor's fetish, before dumping it in a canyon to avoid the museum director's wrath at the expense of bringing in a worthless piece of stone (NC Chap. 8).

The popularizer emphasizes what he or she thinks an informed public needs to know: the informed public neither needs nor wants to know the materials and methods by which one may conduct an experiment in replicating DNA, but wants to understand the architectonics of the DNA molecule; the informed public neither needs nor wants to know how to reconstruct the skeleton of a prehistoric animal, but may be interested in perceiving the relationship of the prairie dog to man in the evolutionary scheme. Thus the popularizer focuses on implications and ramifications rather than on materials and methods or on how to replicate the experiment.

One other distinction between scientific writing and popular scientific writing is the far wider use of tropes and figures in popularizing. Though the scientist may use metaphor and the metaphor may come to dominate popular notions and applications of his theory, as discussed in Chapter I, his basic emphasis is factual, not metaphoric. It is in popularizing that the metaphor becomes dominant—that the double helix becomes more than the means of understanding a molecule, that the tangled bank becomes the means of understanding evolution as struggle, that an individual cell becomes a model for the biosphere (Thomas, Lives Chap. 1). In Eiseley's texts, the metaphors of popularization are explored, tried, "worried" into a system of
subversive metaphors that remove—one might say "derail"—the popular metaphors of mechanism, struggle, determinacy, fixity, teleology, reductionism, decidability, hierarchy.

Eiseley popularizes the basic concepts of evolution, but he emphasizes the implications of evolution and of what George Gaylord Simpson calls the "new" evolution—cultural evolution—for the human future. Popularization of pre- and post-Darwinian evolution involves more than explaining what Eiseley calls the "community of descent." To comprehend the principles of evolution requires one level of understanding. Here Eiseley emphasizes the four vital factors of vast and linear time, gradual geological change, the "naturalness" of extinction, and the creative role of gradual change in organic and inorganic objects (specifically delineated in DC I-VIII and FT 70-71). But to imagine, to visualize, the implications of the theory for human life today in terms of process and change requires additional understanding. Psychological, ethical, and moral implications are inextricably interwoven in any complex understanding. To use the theory, in Bacon's words, "for the uses of life" in a combination of science and art requires far more than naive understanding of the process.

The early evolutionists stressed the "struggle" of life. The infamous result of this stress was Herbert Spencer's "social Darwinism," a notion that since the fit will survive, then any method one uses, in society or in business, is simply a means of ensuring "survival." The resulting disregard of individual rights and humane values, especially among late-nineteenth-century American businessmen, is well known.¹ (Mis)readings of Darwinian thinking have thus led to
disregard of the individual's feelings, rights, and relationships both to other human beings and to animate and inanimate life. For Eiseley, an understanding of the ramifications of evolution is essential for the modern informed public. Understanding of man's relation to time, to the world, to nature, to the ecosystem, and to other men can come only through understanding the evolutionary net, the living screen, that has produced us. The answer to the question Where shall I live ...? depends, in Eiseley's view, on an understanding of the evolutionary screen, an understanding in terms other than the popular "transformations" of Darwin's metaphor of the tangled bank. Eiseley is, then, a popularizer whose role is both dissemination of evolutionary science and application of that science to develop public understanding of interrelationship rather than struggle. His approach is explanatory, heuristic, affective, and persuasive. His purposes as a popularizer are the key to his method, his displacement of traditional evolutionary metaphors by organic and cultural metaphors of the "living screen."

Why Popularization Is Necessary

A number of problems—both institutions and attitudes toward them—make popularization of specialized information, whether from the natural sciences, the social sciences, or the humanities, an increasingly important genre of writing. The recurrent term scientism and terms coined in opposition to it delineate a group of attitudes that underscore the need for popularization of information from both the sciences and the humanities. Involving a "fundamental assumption of a separate, quantifiable, objective world" (Jones 17), scientism,
as it filters into the general public, generates attitudes of awe and expectations of truth from science that are both factually misleading and subject to use for manipulative purposes by members of the power hierarchy. F. R. Leavis, as part of his longstanding debate with C. P. Snow over his notion of "two cultures," opposes the term scientism to literarism (Aldous Huxley's coinage). But the opposition of terms helps to emphasize aspects of the problem of "scientism" that I should like to address, including the institutionalization of science, the estrangement of science from the public, the isolation of specialists from one another, the role of tradition in perpetuating even (especially) scientific thought, and the effects or dangers of technology.

Institutionalization of Science and Estrangement from the Public

Science in this century, Martin Heidegger maintains, "attains to the respect due a science only when it has become capable of being institutionalized"; institutions become essential "because science, intrinsically as research, has the character of ongoing activity" ("The Age of the World Picture" 124). Eiseley contrasts institutionalized science with science "as a dream and an ideal of the individual," suggesting that "powerful and changing forces are at work upon science, the institution," which "is a construct of men and is subject, like other social structures, to human pressures and inescapable distortions" ("The Illusion," ST 272). Historically, Eiseley contends, western science has grown out of monotheism--Whitehead's notion of the medieval assumption of the rationality of God, an ironic "combination of Judeo-Greek ideas, amalgamated within
the medieval church itself" (DC 6)—and out of man's separation from awareness of other animal life. Thus science looks upon the natural world "as might a curious stranger" and then turns to man himself with a look of estrangement, "the same gaze that had driven the animal forever into the forest" (IP 144). Science is a cultural expression which can create tools but has "not succeeded in controlling their ambivalent nature" (Eiseley, UU 81). As an institution "of human devising and manufacture" (UU 46), science retains a "man-centered way of looking at the world" (DC 136). An amalgam of many times and many ways of looking at the world, science is thus a cultural institution, itself still evolving.

One result of institutionalized science is the belief that "science" is the domain of "truth." Especially strong in the public mind, though not infrequently revealed by some scientists, this assumption is the source of increasing estrangement of the scientific institution from the general public. The assumption that everything can be quantified and objectified is part of what Geoffrey Vickers calls "a mistaken identification of science with rationality" (162). Thus if "everything real must be fully describable," our culture rejects a non-quantifiable phenomenon such as intuition "as a strange incursion from a foreign field called 'aesthetics'" (Vickers 145).

Institutionalized science accepted as the domain of truth easily becomes authoritarian as well as narrow. The narrowness, Eiseley contends, has been produced by "high technical specialization, the deliberate blunting of wonder, and the equally deliberate suppression of a phase of our humanity in the name of an authoritarian
institution, science." ("The Illusion," ST 271). To Eiseley, such an attitude represents a kind of "puritanism"—a rigidity and an inflexibility characteristic of the old puritan "authoritarian desire to shackle the human imagination," though it arises from "a total dedication to science" ("The Illusion," ST 269).

Further, an isolated and authoritarian scientific institution takes on mythological overtones. Increasingly, Eiseley says, science becomes the twentieth century's "substitute for magic" ("The Time Effacers," IP 105), and scientists themselves form a kind of priestly elite. People look to science as the replacement for "primitive magic as the solution for all human problems" and as the source of human happiness (Eiseley, "The Spore Bearers," IP 90). As Michel Serres contends, myth is not excluded from science, but "the science in question is diffused along paths belonging to myth. It is grasped as myth, it becomes myth" (Feux et signaux de brume 18, qtd. in Harari and Bell xix).

One result is a "public unenlightened by the achievements of science," which, says Jacques Barzun, only "gapes at its wonders, incapable of critical judgment" (335). The popular mind sees science as "truth" when it should be asking "What is science?" (Barzun 335). Both scientists and the general public are guilty of what Roger S. Jones calls "scientific idolatry," characterized by an "implicit assumption that an external physical world exists as an objective reality independent of the human mind and that the business of science is the discussion and description, not the creation, of that world" (206-207). Thus science, which is "a value-construct, created by the human mind" (Jones 42), assumes the role of idol.
Even in 1862, Henry Adams wrote, "Man has mounted science and is now run away with. I firmly believe that before many centuries more, science will be the master of man" (Henry to Charles F. Adams, Jr., qtd. in Marx 350). Eiseley notes that modern science as "a professional body" intent upon "regulations" and governed by a narrow "professionalism" is marked by the assumption "that the accretions of fact are cumulative and lead to progress, whereas the insights of art are, at best, singular and lead nowhere, or when introduced into the realm of science, produce obscurity and confusion" ("The Illusion," ST 272). Unquestioning faith in institutionalized science, in Eiseley's view, leads to loss of vision, of humanity, of wonder. And "when one has destroyed human wonder and compassion, one has killed man, even if the man in question continues to go about his laboratory tasks" ("Science and the Sense of the Holy," ST 298).

But another effect of institutionalized science is the creation of a caste system of cognoscenti and laymen. A scientific elite emerges--the kind of elite that F. R. Leavis opposed when he attacked Lord Snow for advocating schools designed to supply large numbers of "trained technicians" (208). Appearing in the public mind as possessors of "truth" who move unfailingly toward further accumulations of "truth," this scientific elite becomes a powerful political force. As Jürgen Habermas argues, the increasing dominance of science, through research and technology, can lead to the scientific institution's assuming "the role of an ideology" through which "the masses will accept their own depoliticization" (Toward a Rational Society 104). If the model of science replaces communication
and action based on communication, then the depoliticized masses, separated from knowledge and understanding, turn increasingly toward the scientific institution.

There emerges, then, "under the slick domination of technology and science as ideology," a "reorganization of social institutions" in the name of progress (Habermas, Rational Society 118). The motives for a technology that can accomplish almost anything are open to questioning, and science shapes even society itself as technology projects "what a society and its ruling interests intend to do with men and things" (Habermas, Rational Society 82). Often if the decision-makers are able to increase productivity and to manipulate nature to provide comforts that assuage anxiety, the people are unaware of repression (Habermas, Rational Society 83). Thus the combination of "idolatry" toward science and science functioning as ideology without mediation through the populace is likely to lead to repression in which the populace cooperates. In a free society, decision-making must involve an informed populace.

And science has other political roles. In Darwin's Century Eiseley notes the use of the pre-scientific scala naturae and of early scientific notions of "missing links" to suggest racial hierarchy (255-85). Without the humorous examples that Stephen Jay Gould employs in The Mismeasure of Man, Eiseley nevertheless places in perspective the use of science for racist and sexist purposes. He cites a Swiss scholar who not only attempted to relate the foot of the Negro to the form of a hand, but also turned to woman's role in the "hierarchy": "We may be sure that wherever we perceive an approach to the animal type, the female is nearer to it than the male..." (Carl Vogt,
Lectures on Man [London, 1864], qtd. in DC 265). Eiseley sees in Darwin's farewell to his South American Indian shipmates "the pathos of great literature" and suggests that only after he became dominated by the idea of natural selection did Darwin begin to search for evidence of the closeness of savages to "missing links." Recalling Darwin's description, Eiseley says that "Jemmy Button's wistful, forgotten face is an eternal reproach to those who persist in projecting upon the bodies of living men the shadow of an unknown vanished ape" (265).

Specialized, institutionalized science is also tied to other institutions. Military secrecy requires that research findings with practical applications remain secret, and the processes of research are subject to such "bureaucratic encapsulation" that what was once a free and expected contact between the scientist and the public is no longer possible (Habermas, Rational Society 76). The client of research has ceased to be an interested public and has become merely an agency concerned with technological application of research findings. Memoranda and research reports replace what Habermas and Heidegger and Eiseley call "scientific reflection"; and mediation through public opinion, which could lead to confrontation of technical capability with human understanding, is replaced by communication between political authorities and scientific consultants, both tied to the political institution (Habermas, Rational Society 72-76). Thus instead of abolishing war and cruelty and corruption, science has enabled them to thrive and has, in Eiseley's words, allowed problems to "escape out of scientific hands" ("The Unexpected Universe," UU 46)
to the advantage of the military-industrial complex and to the
detriment of the "uses of life" that Bacon projected for science.

The public, then, willingly participates in its own
depoliticization, accepts the scientific institution as "right," and
remains isolated from the scientific elite. "Man, the tool user,"
says Eiseley, "grows convinced that he is himself only useful as a
tool, that fertility except in the use of the scientific imagination
is wasteful and without purpose..." ("The Illusion," ST 269). Thus
the isolation of the scientist and of the institution from the public
is a matter of great concern, for as communication is lost man
increasingly accepts his role as a "tool." A scientific elite such as
Leavis decries is separated from the public by lack of communication.
The focus of science on quantification—on "reckoning-up" as
"methodology" (Heidegger, "Science and Reflection" 170)—and
announcements concerning the "hard" subjects by writers such as Lord
Snow lead to further isolation and lack of communication.

Furthermore, a populace isolated from and manipulated by a
scientific-industrial-military institution may willingly cooperate in
destruction of the environment. New technological capabilities "erupt
without preparaton into existing forms of life-activity and conduct"
(Habermas, Rational Society 60). That these new technologies have far-
reaching effects on the physical environment has been treated from
Hawthorne and Thoreau to the present; Leo Marx documents how the
machine, particularly through the railroad metaphor, is asserted in
literature as manipulative, even destructive, technology. In
addition, domination of nature and domination of man have become so
linked that we attempt to control nature, refusing to "seek out a
fraternal rather than an exploited nature," but expecting, says Habermas, "to adapt the environment to our needs culturally rather than adapting ourselves to external nature" (Rational Society 88, 115).

Yet if specialization, as Heidegger maintains, "is not the consequence but the foundation of the progress of all research" ("World Picture" 123), neither a "deterioration" nor "an unavoidable evil," but a necessary result of the presencing of science ("Science and Reflection" 170), human culture must learn to live with specialization. Clearly communication seems the most likely means of living with specialization and remaining part of a free society; such communication will require popularization of specialized information.

In voicing his concern with specialization, Eiseley recalls that some of the most important scientific discoveries were made by those who today might be called "amateurs," while today "the content of much of science and philosophy is confined to learned circles and only rarely reaches a wider audience" ("Man Against the Universe," ST 208). The public, he notes, turns to the specialist for answers. "As our probes into nature become more sophisticated, the greater becomes our reliance upon the specialist, while he, in turn, appeals to a minute audience of his peers" ("Man Against the Universe," ST 208). Eiseley decries the narrowness of writing intended solely for a scientific elite, just as Jacques Derrida decries what happens to writing in the humanities when "a writing made to manifest, serve, and preserve knowledge—for custody of meaning, the repository of learning, and the laying out of the archive—encrypts itself, becoming secret and
reserved, diverted from common usage, esoteric" and eventually "becomes the instrument of an abusive power, of a caste of 'intellectuals' that is thus ensuring hegemony, whether its own or that of special interests..." ("Scribble" 118).

As science and technology intervene at the most basic biological level (through manipulation of genetic coding), at the cultural and political levels, and at the level of man's interaction with his environment, the role of the reflective scientist is crucial. There remains the question that Eiseley attempts to answer through popularization: Where shall I live...? becomes also What is my role as a reflective scientist in disseminating scientific information to a public increasingly isolated from an institutionalized scientific community? Eiseley's fear for the loss of humanity that scientism has brought is close to Barzun's concern for a public that accepts science as "truth" instead of questioning What is science? And Eiseley's task as popularizer is in part to ask the question and to doubt science itself even as he explicates it. In the human sciences one uses the self to explore and to learn. Eiseley, as scientist, uses the self as a means for questioning science and for seeking values that science itself cannot give or that have been overlooked or distorted in the transmission of information from one generation to another.

Isolation of Specialists from One Another

Even the specialist is affected by increasing isolation and by the separation of science and the humanities as fields of study. C. P. Snow's rather glib announcement in 1956 that the modern world
is indeed divided into two cultures, with literary intellectuals and scientists, especially physical scientists, representing separate poles, is of primary concern to specialists. Snow's dichotomizing of "cultures," seen in the gentlest light as an oversimplification, remains significant. F. R. Leavis called Snow a "portent," since "he has become for a vast public on both sides of the Atlantic a mastermind and a sage" (42). Snow's concern with the "literary" culture's "total incomprehension" of science (inability to describe the Second Law of Thermodynamics is the equivalent of never having read anything by Shakespeare) leads him to suggest that nonscientific intellectuals in the West "have never tried, wanted, or been able to understand the industrial revolution, much less accept it" ("Two Cultures" 22). For Snow, specialization produces "a tiny elite . . . educated in one academic skill," but scientists, who "have the future in their bones," fare better in his account than benighted literary intellectuals ("Two Cultures" 17, 19). Increasingly, Geoffrey Vickers asserts, we move toward an "exaggerated dichotomy between science and nonscience" (161). As art has moved "into the purview of aesthetics" and science and machine technology have become dominant (Heidegger, "World Picture" 116), science and art, Vickers says, have become increasingly narrow, "diminished and incommensurable rivals—the one an island in the sea of knowledge not certified as Science; the other an island in the sea of skill not certified as Art" (Vickers 143).

Even between scientific disciplines communication is often ineffective, and scientists who do not communicate with each other are unlikely to communicate with the general public. The individual who hopes for communication between different sciences may even be treated
with suspicion as if he were attempting "to put scientific discussion on a mass basis and thus to misuse it ideologically" (Habermas, *Rational Society* 69). Whatever the realm of knowledge—whether natural, physical, or human science—the problem of isolation and lack of understanding continues even as communication between specialists becomes more limited to the initiated, more mysterious to the public. Habermas finds "an esoteric scientific public in which experts exchange knowledge through professional journals or at conferences," with at least fifty thousand professional journals making the discourses of knowledge almost impossible to survey, much less to gain an overview (*Rational Society* 77).

Even among scholars in the humanities, such lack of communication leads to an esotericism that Wayne Booth criticizes in his Presidential Address to the Modern Language Association in 1982. He attacks the profession for slipping into jargon and for its failure to lead students into "critical understanding": "... [W]hen we fail to test our scholarship by making its most important results accessible to nonspecialists, we also lose our capacity to address, thus recreate in each generation, the literate public who can understand its stake in what we do" (320). Criticizing "recondite" jargons, Booth contends that literary scholars have lost the "capacity to address each other" as well as a more general audience and as a result "produce more and more books and articles for fewer and fewer readers" (321).

Translation of information from one specialty to another and from specialists to the general public becomes increasingly important. Margaret Mead notes that we may be in danger of doing what other
civilizations have done—developing "special esoteric groups who can communicate only with each other and who can accept as neophytes and apprentices only those individuals whose intellectual abilities, temperamental bents, and motivations are like their own" (142-43). Eiseley recalls the topheavy Mayan system headed by astronomer priests who calculated time as no civilization had done, but who apparently became too burdensome and were toppled by revolution; their descendants worshipped their upended mathematical tablets ("Man in the Autumn Light," \textit{IP} 131).

Such recollections underscore the need for popularization in a world where specialists fail to communicate even with each other and turn to news magazines or daily newspapers, as Habermas suggests, to keep up with developments in other fields than their own. Habermas also notes the increasing use of journals of abstracts and explains the problem in spatial terms of "the distances that important information must traverse in order to enter into the work of another expert"; he suggests the need for a "detour" involving "the practical results of technical progress" as mediation before scientific research can be expressed in literature (\textit{Rational Society} 77, 52). Even though information must "take the long route of ordinary language and the everyday understanding of the layman" on its way from one specialist to another, such mediation may have advantages; in fact, "the lay public often provides the shortest path of internal understanding between mutually estranged specialists," and the result may even help "the endangered communication between scientists and the general public in the political sphere" (Habermas, \textit{Rational Society} 77-78).
The Specialist and the Pull of Tradition

Another concern that accompanies specialization is the immense difficulty that specialists themselves have in accepting views that challenge their philosophical framework, the lack of an interdisciplinarity that can open new insights and that comes only to those informed beyond the boundaries of narrow specialties. Of particular concern for Eiseley, this attitude reveals scientific study as paradoxically limiting, "apt to produce a restraint, laudable enough in itself, that can readily degenerate into a kind of institutional conservatism"—a conservatism that Darwin also noted in his age ("The Spore Bearers," IP 78). Like the peripheral figures whom Richard Rorty regards as keeping alive the notion "that this century's 'superstition' was the last century's triumph of reason" and that the latest terms borrowed from science "may not express privileged representations of essences" but may be just another vocabulary for describing the world (367), Eiseley repeatedly responds to science as a conservative body dependent on narrow professionalism and on mythmaking for institutional perpetuation that may become its chief concern.

Science, Eiseley suggests, conforms to "style"; he sees "styles in science just as in other institutions" ("Strangeness in the Proportion," NC 140). The early years of modern science, the eighteenth and nineteenth centuries, Eiseley perceives as "basking comfortably in the conception of the balanced world machine" that provided universal order ("The Unexpected Universe," UU 32) or dancing in the "fairy ring" of convention ("The Dancers in the Ring," ASH 181-95). For Eiseley, the modern scientific institution relies on "an
exaggerated conformity and, at the same time, an equally exaggerated assumption that science, a tool for manipulating the outside, the material universe, can be used to create happiness and ethical living" ("Strangeness in the Proportion," NC 140). In fact, Eiseley sees a "new class of highly skilled barbarians," as well as an "unappetizing puritanism which attaches itself all too readily to those who, without grace or humor, have found their salvation in 'facts'" ("Strangeness in the Proportion," NC 142).

And scientific style may also be affected by the general intellectual milieu. Eiseley chooses Coleridge as an example of a literary genius who realized, as many scientists did not, "the way in which the intellectual climate of a given period may unconsciously retard or limit the theoretical ventures of an exploring scientist," for Coleridge suggests that there is "a sort of secret and tacit compact among the learned, not to pass beyond a certain limit in speculative science" ("How Life Became Natural," FT 61). Ironically, Eiseley suggests, it may be the literary figure who can see the dancers in the ring, even even when the dancers themselves cannot.

Eiseley seems intent on explaining the misapprehension involved in nineteenth-century notions of objectivity and exact empiricism, using as an example a scientist who, at the turn of the century--before Einstein and Freud, or the rediscovery of Mendel--asserted that all past generations lived in a world of illusions ("How the World Became Natural," FT 5). Because scientists are limited by their own perceptions and by what their milieu tells them is important, they work within a framework suggestive of Thomas S. Kuhn's "paradigm
shift" (The Structure of Scientific Revolutions was published two years after The Firmament of Time and includes references to Darwin's Century). Eiseley states the pattern thus:

While proceeding with what is called "empirical research" and "experiment," the scientist will almost inevitably fit such experiments into an existing comprehensive framework, an integrative formula, until such time as that principle gives way to another. ("How the World Became Natural," FT 20)

Two restrictions limit what many perceive as "discovery": first, the scientist "must extrapolate his laws from what exists in his or his society's moment of time," and further, "he is limited by what his senses can tell him of the surrounding world" ("The Unexpected Universe," UU 30). For Eiseley, "even the great visionary thinker never completely escapes his own age or the limitations it imposes upon him" ("Strangeness in the Proportion," NC 131). And if individuals are susceptible to the pressures of the intellectual milieu, so are the professions as a whole: "Professional academic science tends to strengthen the mutual pull of the dancers already circling in the ring, not, on the whole, those trying to dance out" ("The Dancers in the Ring," ASH 189).

Nor are scientists exempt from the pull of emotions as well as the pull of tradition, philosophy, style, and professionalism. Gerald Holton notes the impact of "personal struggle" (19), of the elements of science which he treats as "themata" or "(usually unacknowledged) presuppositions pervading the work of scientists" (29). Holton is convinced that there is often "quite flagrant neglect of 'experimental evidence' when such evidence is contrary to a given thematic commitment" (14). Against the popular notion that science is "a
sustained, undeviating march toward some final truth," Eiseley places the "ambiguities, fears, and trends which may play upon and influence severely disciplined minds" ("The Dancers in the Ring," ASH 186). Even supposedly objective "experiments are apt to be colored by what we subconsciously believe or hope" ("The Coming of the Giant Wasps," ASH 239). Using Darwin and Freud as opposite poles of interpretation, Eiseley points out "that, in the supposed objective world of science, emotion and temperament may play a role in our selection of the mental tools with which we choose to investigate nature" ("Science and the Sense of the Holy," ST 187).

Another problem related to the pull of tradition and unacknowledged presupposition is that science itself is often hesitant to recognize what Eiseley considers an essential factor in nature, the "discontinuity in natural events"—a discontinuity underscored by quantum theory and Mendel's genetics and the unpredictable rhythm of the ice ages, all of which repeatedly reassert nature's "hidden powers" ("The Lethal Factor," ST 255). Eiseley regrets that for some scientists achievement in a single discipline is identified "with certitude on a cosmic scale"; as a "heretic," Eiseley is not interested, however, in denigrating science itself, but "in a farther stretch of the imagination" to the point where "predictability ceases and the unimaginable begins" ("The Unexpected Universe," UU 31). For Eiseley, "the tools, if not science itself," are linked to nature's discontinuities, which are not to be overlooked, and "things grow incalculable by being calculated" ("The Star Thrower," UU 82).

Eiseley, then, insists on science as a "construct," as a social institution worthy of objective study. But it is also an "atmosphere
[which] evolves and changes with the society of which it is a part" ("How the World Became Natural," FT 7). He recognizes that even supposedly objective specialists reflect the impact of the intellectual milieu, of the tension between tradition and change or between self and observation.

The Threat of Technology and the Need for Reflection

In addition to the lack of communication between specialized fields as well as between specialists and nonspecialists, there is the threat of technology. Technological application of science is often perceived as the greatest threat to modern culture, both because of its impact on culture and its ability to destroy both culture and life. But at least as dangerous as political manipulation or the physical threat of destruction is the role of man as "master" of technology, the determination to fulfill the possibility suggested by the vehicle of the essential technological metaphor. Heidegger suggests that the danger is not in technology itself, but in its "Enframing," which "threatens man with the possibility that it could be denied to him to enter into a more original revealing and hence to experience the call of a more primal truth" ("The Question Concerning Technology" 28). Similarly, writing of the fear of science, Richard Rorty echoes Heidegger in suggesting that what is most frightening is the elimination of "the possibility of something new under the sun, of human life as poetic rather than merely contemplative" (389). Those he calls "edifying philosophers" attempt to keep space open for the sense of wonder which poets can sometimes cause—wonder that there is something new under the sun, something which is not an accurate representation
of what was already there, something which (at least for the moment) cannot be explained and can barely be described.

Eiseley contends that "the human realm is denied in favor of the world of pure technics" ("The Illusion," ST 269). Thus arises Eiseley's concern with the recurrent appearance of the "unexpected" and the human need to feel wonder in an "unexpected universe." In his view, the function of the poet and the function of the scientist overlap in these two areas; they function as does Rorty's philosopher. Darwin, Einstein, and Newton, as well as Leonardo, Eiseley says, "show a deep humility and an emotional hunger which is the prerogative of the artist" ("The Illusion," ST 276).

Yet as Heidegger further warns, "So long as we represent technology as an instrument, we remain held fast in the will to master it" ("Question" 32). In the will to master technology, there is also the will to master and to manipulate the environment and to use technology in extending human manipulation beyond the earth. The result, in Eiseley's terms, is that we have become "secretly homesick for a lost world of inward tranquility," because "knowledge, or at least what the twentieth century acclaims as knowledge, has not led to happiness" ("The Ghost Continent," UU 5). What is needed, according to Eiseley, is an echo of Baconian hope: "The special value of science . . . lies not in what it makes of the world, but in what it makes of the knower" ("How Natural Is Natural? FT 172). The answer grows out of reflection. Even the oldest subjects of reflection—the questions that Job heard in the whirlwind—have, for Eiseley, "precisely the ring of modern science" ("The Hidden Teacher," UU 48).
In the reflection that asks the questions—in the sensitivity to both physical and animate surroundings, in the awareness of the web that connects all life, we at least refuse "to close our eyes to ultimate questions," and we reject mere "classification and experiment" as escape ("The Coming of the Giant Wasps," ASH 239). What Habermas calls "the self-reflection of the sciences themselves" is a means by which "philosophizing retains its universal power" and can serve as "interpreter between one specialized narrow-mindedness and another" (Rational Society 8). Heidegger suggests that "every researcher and teacher of the sciences, every man pursuing a way through a science, can move, as a thinking being, on various levels of reflection and can keep reflection vigilant" ("Science and Reflection" 181-82). Both Heidegger and Eiseley use the metaphor of the journey to describe the reflective intellectual quest of humankind—the wandering and wondering that constitute the method of knowledge. It is reflection, says Heidegger, that "first brings us onto the way toward the place of our sojourning" ("Science and Reflection" 181-82).

But reflection is more than mere consciousness: "It is calm, self-possessed surrender to that which is worthy of questioning" (Heidegger, "Science and Reflection" 180). And if "Enframing" is the danger of technology, there is still, within the essence of technology, a "saving power," which is, for Heidegger, "here and now and in little things" ("Question" 33). Thus, says Heidegger,

Because the essence of technology is nothing technological, essential reflection upon technology and decisive confrontation with it must happen in a realm that is, on the one hand, akin to the essence of technology and, on the other, fundamentally different from it. Such a realm is art. ("Question" 34)
Paradoxically, though, "the more questioningly we ponder the essence of technology, the more mysterious the essence of art becomes" ("Question" 34). Reflection through art, then, is one answer. In Hölderlin's words, which Heidegger quotes, "Where danger grows, there grows the saving power." Whereas Heidegger turns to poetry, Eiseley turns to poetry and to a form of the informal essay that blends science and poetry, anthropological insights and literary passages—a hybrid genre which I shall discuss in Chapter III. In Eiseley's reflection science is the vehicle for understanding; in learning about time, evolution, nature itself, one learns about man. What Eiseley attempts is what Jacob Bronowski calls the task "of making the physical world personal to each of us in our abilities and experiences," for "science for nonscientists needs to be directed towards an understanding of nature as she expresses herself in us, the human creatures" (1).

Habermas sees scientists themselves as lacking direct power, though an emerging "technocratic model" reverses the roles of professional and politician so that the politician comes to serve the "scientific intelligentsia," and he sees a need for discussion that brings together technical and practical knowledge (Rational Society 62-63). As both citizens and professionals, scientists need "to go beyond the technical recommendations that they produce and reflect upon their practical consequences" (Habermas, Rational Society 78). Eiseley reverberates the point, not abstractly, but through anecdote, in the account of an atomic scientist who chose not to move a turtle because he had already "tampered enough with the universe" ("How Human
Is Man?" FT 148). The scientist as citizen and professional must communicate. "A scientized society," Habermas contends, "could constitute itself as a rational one only to the extent that science and technology are mediated with the conduct of life through the minds of its citizens" (Rational Society 79-80).

One way to meet the threat of technology, then, is with the reflection that keeps the way open for a merging of disciplines and for dissemination of scientific insights to a broad audience. The reflective scientist—or any specialist, for that matter—can provide the Heideggerian "saving power." In response to notions of "two cultures," Eiseley asserts, "All talk of the two cultures is an illusion" ("The Illusion, ST 279). Gerald Holton suggests that controversies such as that between Snow and Leavis usually result from "erroneous definition," but that they serve to remind us how necessary it is for each age to re-think what "culture" is in each of its multiple senses, what makes the culture of a people cohere, and what forces and mechanisms are at work to change it. In this light the important topic is not to what extent science is separated from other activities, but rather how we may define and transmit culture in such a way that the sciences are seen to be valid components of our culture. (463-64)

Eiseley's answer to the threat of technology in a "scientized society" is to explore and to explain the place of science as a "cultural construct" through his own artistic medium.

Answers of a Popularizer: Reflective Union of Science and Art

In the reflective essay that combines popularization of scientific information with philosophic reflection and with literary methods, insights, and quotations, to produce a blend of science and
art, Eiseley finds one answer to the threat of technology and to the rift that many perceive between science and the humanities. As a popularizer, Eiseley incorporates science and art, the utilitarian and the aesthetic. Indeed, as he contends in "The Illusion of the Two Cultures," the two are not actually separate. In a stone carved by an anthropoid who might frighten us today, he finds a meeting of the two forces:

There had not been room in his short and desperate life for the delicate and supercilious separation of the arts from the sciences. There did not exist then the refined distinctions set up between the scholarly percipience of reality and what has sometimes been called the vaporings of the artistic imagination. ("The Illusion of the Two Cultures," ST 271)

The stone was the result of "the kind of mind which, once having shaped an object of any sort, leaves an individual trace behind it which speaks to others across the barriers of time and language," for the carver had "wasted time"; in a world filled with dangers he had shaped a practical tool and then "with a virtuoso's elegance, proceeded to embellish his product" (271). Art and science, brought together in this object, are not separable. Indeed, Heidegger reminds us:

There was a time when it was not technology alone that bore the name techne. . . .
    Once there was a time when the bringing-forth of the true into the beautiful was called techne. And the poiesis of the fine arts also was called techne. ("Question" 34)

Eiseley says that "it is the pebble that tells the story"; both science and art demand "a high level of imaginative insight and intuitive perception" ("The Illusion," ST 279,273). Both are, as the primitive model suggests, essential in creating man as "man" rather than as animal.
Indeed, science and art share more than just the creative process. Because scientific thought can be viewed as "the lived experience of scientists" (Gruber 124), science and art touch in the role of the scientist as observer as the artist is observer, with both recording "lived experience" and neither eliminating the element of creativity. Or the two may also be seen to merge in what Arthur I. Miller calls "a domain of thinking where distinctions between conceptions in art and science become meaningless" because there one finds "the efficacy of visual thinking" (95, 73). Such a domain is exemplified by the physicist's portrayals of light and matter as both waves and particles, which form "'complementary pictures,' . . . both necessary for a complete description of atomic phenomena" (95). For Miller this is "the domain where art and science merge," a domain addressed by thinkers such as Bohr, Einstein, and Poincare, who ignore traditional categorization of disciplines (95).

For Eiseley, symbols and analogies function in the scientist's domain as well as in the artist's, and "it is the successful analogy or symbol which frequently allows the scientist to leap from a generalization in one field of thought to a triumphant achievement in another" ("The Illusion," ST 274). Images such as fossil raindrops drawn from the world of science are every bit as powerful as great literary symbolism and equally demanding upon the individual imagination of the scientist who would fully grasp the extension of meaning which is involved. It is, in fact, one and the same creative act in both domains. ("The Illusion," ST 275)

For Eiseley, both poet and scientist bring together responses to the natural world. Observing that desert rocks still glow after sunset with the sun's warmth, Eiseley links the two creative roles:
"Similar emanations may come from the writer or the scientist. The creative individual is someone upon whom mysterious rays have converged and are again reflected, not necessarily immediately, but in the course of years" ("The Last Neanderthal," UU 213-14). Artistic and scientific creation, for Eiseley, "have sprung from the same being and have their points of contact even in division" ("The Illusion," ST 275).

Further, both poet and scientist deal with what Bergson called the "indetermination" that life adds to "matter," an indetermination that "is, in a sense, an intrusion from a realm which can never be completely subject to prophetic analysis by science. The novelties of evolution emerge; they cannot be predicted" (Eiseley, "The Illusion," ST 278). Transferred to the realm of scientific or artistic creativity, the "unexpected" continues to evolve. As both artist and scientist see through an "inexorable lens," what they see is the unexpected—"the unlawful, the oncoming world, whether endurable or mad, but shaped, shaped always by the harsh angles of truth ... as glimpsed through the terrible crystal of genius" ("Thoreau's Unfinished Business," ST 250). The artist, like the scientist, plays a role in shaping, even creating, humanity. Citing Lewis Mumford's description of man as "the self-creating animal," Eiseley contends that because the artist's symbols help "in releasing our humanity from the solitary tower of the self," an act of "self-creation" takes place, with the artist's role as crucial ("The Illusion," ST 274).

Although both artist and scientist ask the same questions, they are often questions that "the rigors of the scientific method do not
enable us to pursue directly" (Eiseley, "The Illusion," ST 274). In
the artist's brain, however, there can exist "the momentary
illumination in which a whole countryside may be transmuted in an
instant" in an "absolute unexpectedness" ("Strangeness in the
Proportion," NC 137), which reflects the unexpectedness of the ongoing
process that produced both the artist and the moment.

Tied as he is to the privileging of "light," "enlightenment," "illumination"—"reflecting" the traditional Western logocentric
philosophemes—Eiseley suggests that both artist and scientist
privilege observation. For him, "looking is in itself the business of
art" ("Thoreau's Unfinished Business," ST 236). Similarly, Darwin had
a "glimpse, as through the mosaic of a stained-glass window, at the
imperfect changing quality of life," even though his own ethnocentrism
prevented him from fully comprehending "the oncoming world of the
indeterminate and the possible that he had helped to initiate" ("The
Golden Alphabet," UU 123-37). The artist both simplifies and,
continuing the visual philosopheme, magnifies; in a single pair of
gloves washed up on a beach and in a charity house for sailors that
lacked provisions, Thoreau found a simplified vision, but as artist he
"magnified" the incident ("Thoreau's Unfinished Business" ST 249).

And Melville's Ishmael and Ahab provide insights into the uses of
science and art. For Eiseley, the whole of Moby-Dick becomes a
vehicle for contrasting two ways of looking at the universe—not "two
cultures," but the sensitive view as opposed to an obsessed view.
Ishmael, who says, "I only am escaped to tell thee," represents the
sensitive view of the universe, whereas Ahab symbolizes science in
monomaniacal form. All science is not represented by Ahab, for the
reflective scientist is close to the poet; but Ahab is the monomaniac who has lost all sense of awe, who has given himself over to extreme reductionism and aims only for "facts" which will "explain" the inexplicable. In a continuation of the visual treatment in terms of the artist's canvas, Eiseley says that Melville's tale is not of science, but it symbolizes on a gigantic canvas the struggle between two ways of looking at the universe: the magnification by the poet's mind attempting to see all, while disturbing as little as possible, as opposed to the plunging fury of Ahab with his cry, "Strike, strike through the mask, whatever it may cost in lives and suffering." ("Science and the Sense of the Holy, ST 200)

Ishmael and Ahab thus symbolize, respectively, the poet, who can be both scientist and artist, but who is open to the oncoming, unexpected process of the universe, and the reductionist, who is mindful only of his own pursuit, whatever the consequences. For Eiseley the "real business" of both artist and reflective scientist is to contribute to man's "understanding his ingredients" and thus "to make him less of an outlaw to himself" ("Thoreau's Unfinished Business," ST 237-38).

Using the recurrent motif of the outlaw, Eiseley treats all human beings as outlaws and returns to the artist's function of reuniting humankind with the nature from which it emerged. In this process there is a kind of catharsis. Man alone is aware that he and his kind "evaporate into the air and sun that once had nourished the dinosaurs. Man alone knows the way he came..." ("Thoreau's Unfinished Business," ST 243). Man can effect an "utter cleansing, either by the powers of art alone, or, more terribly..." (243). The "utter cleansing" may be the traditional catharsis of tragedy, but it may also be man's ability to destroy himself and the world that has
produced him. The artist's role, and the role of the reflective scientist in creating an informed populace who participate in rather than accept the decisions of the scientific institution, is to participate in the one catharsis that will render the other untenable.

As a popularizer, then, Eiseley is deeply concerned with the interconnectedness of the roles of scientist and artist, since they spring from the "same" creative act. If artistic contemplation is one answer to the dangers of technology, if creativity in art and science spring from the same source, and if communication among specialists as well as between specialists and laymen is essential in an informed and free society, then the role of the popularizer is indeed important. The contemplative scientist, aware of his closeness to art, can play a vital role, just as the popularizer did in the early days of science.

Eiseley's notion of popularization, as indicated in his statement of the purpose of the lectures in *The Firmament of Time*, includes a sense of sharing; these lectures were designed "to promote among both students and the general public a better understanding of the role of science as its own evolution permeates and controls the thought of man through the culture" (v). This statement suggests much of Eiseley's overall purpose: he treats more than scientific facts; his interest is in the evolution of science itself, in the role of science as it affects human thought. The popularizer inevitably engages the individual's relationship to such an institution. Further, if, as Edge suggests, essentially ambiguous successful metaphors are able "to alter feelings and attitudes towards oneself and others, and the natural world," and if we recognize "the role of metaphor . . . in establishing and reinforcing moral and social control" (140, 142),
then the role of Eiseley's specific form of popularization becomes clear. If the "hook of analogy" indeed "may color unconsciously the thinking of entire generations" ("How the World Became Natural," FT 20), then his task is to subvert and displace (supplement) those metaphors whose vehicles have led to misunderstanding. If models of struggle can be replaced with those of symbiosis, if models of reduction can be replaced with those of inexplicability, if models of teleology can be replaced by those of the unexpected, if models of a hierarchy of systems of knowledge can be replaced by those of equality or symbiosis of "science" and "art," if models of fixity can be replaced by those of change, and if models of decidability can be replaced by those of undecidability, then the popularizer can help to displace the caste system of cognoscenti and "others" and can help to replace the animal willingness to be manipulated with a desire, backed by understanding, to participate in mediation of ideas. In answer to the underlying question Where shall I live in such an embracing system? perhaps the model of the young Darwin's gentle perceptiveness can replace the harshness of Herbert Spencer's model or the destructive thrust of military machines.

Notes

1. For further discussion of the philosophical, political, and cultural impact of Darwinian thinking, see Ruse, The Darwinian Revolution. For excellent essays on the continuing "Darwinian revolution" and reactions of the general public in America, see Appleman, "Darwin: On Changing the Mind" (529-51) and "Darwin among the Moralists" (551-71).

2. Marx traces the theme of intrusion of the machine into the idyllic American setting, beginning with Hawthorne's description of a wooded area near Concord, Massachusetts, a place "like the lap of bounteous Nature" into which bursts "the long shriek, harsh, above all
other harshness" of a locomotive which "tells a story of busy men, citizens, from the hot street. . . , men of business" and "of all unquietness" (12-13). He traces this theme of mechanistic intrusion into the idyllic quietness from the Jeffersonian garden through Henry Adams' juxtaposition of the dynamo and the Virgin, through the peaceful greenness (the pastoral equivalent at sea) opposed by violent furnace flames aboard Melville's Pequod, through Thoreau's sense of the machine's ambiguous relation to nature, and through Fitzgerald's green lawns opposed by the valley of ashes. In British literature he notes the moment when Boswell became aware of technology through Thomson and Schiller; he cites the "mechanistic habit of mind" (297) that Carlyle found in his contemporaries and the fear of writers such as Carlyle, Ruskin, and Morris that technology might threaten "some cherished ideal of high civilization or art or craftsmanship" (347).
Certainly Eiseley is a popularizer. Haney considers him "an interpreter of modern science for a broad, unspecialized audience" (186) and links him to earlier literary naturalists who "hold up a mirror to reflect the nature of the human soul" (13). His popularization of evolutionary theory, she says, leads the audience to "judge the importance of evolution in terms of our present cultural goals" (211). As an informal essayist he touches "a varied audience of general readers," Kassebaum says, in an effort "to reconcile the humanities and the sciences in a century when such reconciliation is imperative" (3, vi). Schwartz finds Eiseley "primarily a scientist," although he studies the texts for their "imaginative integration" of science with "aesthetic intentions" ("The 'Immense Journey' of an Artist" 10-11).

But there is general agreement that Eiseley is more than a popularizer per se because of his literary intention and practice. "Place him in the company of other popularizing scientists," say Gerber and McFadden, who feel that his major contribution is to the essay as a genre, "and he will appear as merely the author of many beautifully written expositions, some of which rise to literary heights" (20). Carlisle credits him with having "discovered and developed a new prose idiom for science and for literature" ("Poetic Achievement" 112). Angyal treats Eiseley as a literary naturalist but
emphasizes his desire to produce "a more personalized scientific literature . . . where fact and knowledge are balanced by affection" (35). Eiseley's accomplishment, says Angyal, "is virtually to invent a new genre—an imaginative synthesis of literature and science—one that enlarged the power and range of the personal essay" (39). Angyal credits him with developing the kind of popular scientific essay that continues to be written by Lewis Thomas, Carl Sagan, Robert Jastrow, and Stephen Jay Gould, among others. "And," says Angyal, "if there is a movement among scientists today to reassert the humane values that are intrinsic to science wisely practiced, then credit for that must also be due in part to Eiseley" (125).

Hybrid Genre

In writing of the genre that attracts him, what Eiseley calls for is a kind of hybrid writing that defies categorization in literature or science, but is close to what the natural history writer produces and Eiseley describes in "The Enchanted Glass." It is writing that involves "a partial transformation of data" so that it "contains overtones of thought which is not science, nor intended to be, and yet without which science itself would be the poorer" ("The Enchanted Glass" 482). Such writing presents "personal experiences capable of being shared by every perceptive human being. They are part of that indefinable country which lies between the realm of natural objects and the human spirit which moves among them" (480). This writing treats more than external nature; it "is the natural history of the human soul itself. . . " (480). The writer of such a hybrid form will undoubtedly employ scientific theories, but he will nevertheless
record the "personal element, . . . the shifting colors in the enchanted glass of the mind which the extreme Baconians would reduce to pellucid sobriety" (480). Thus the writer becomes a "magician" who knows that "it does not lie within the power of science alone to make life or the shadows everywhere confronting it acceptable," but that what is needed is "the supreme synthesis of knowledge and emotional insight" achieved in Keats's letter describing his participation in the existence of the sparrow picking in the gravel outside his window (492).

The form that Eiseley devises, which he calls the "concealed essay," involves a blend of science, history of science, and personal observation. It is a form with which he experimented in the decade before the publication of The Immense Journey and Darwin's Century. The Immense Journey, the first collection of popular essays, was first published in 1957, after several years of work. Parts of the book had appeared in three journals (American Scholar, Harper's, and Scientific American) before the collection appeared, and Eiseley had copyrighted certain essays as early as 1946. The work on Darwin's Century began in the early 1950s, on request from Doubleday for a well-researched study to be published in time for the anniversary year of 1959; the book was first published in 1958 after extensive research that caused Eiseley, in Carlisle's words, to "interiorize" Darwin's theory "so that it functions as a major structure for perceiving and comprehending experience," a structure through which he "makes contact with reality" ("Heretical Science" 365). The work on Darwin's Century, say Gerber and McFadden, "served to crystallize Eiseley's
entire intellectual outlook"; *The Immense Journey* emerges as "a companion volume" (50).

As the thought was crystallized through painstaking scholarship on Darwin and his predecessors and successors, the form of the popular essays was shaped in the concurrent work on *The Immense Journey*. Clearly, work on the two books overlapped to some extent, and the similarity of ideas in the two—as scholarly and popular books—suggests the influence of the scholarship on the popular essays. (Indeed, a study of Eiseley's poetry reveals a parallel of subject matter and approach similar to those of the popular essays. The poems, however, are beyond the scope of this study, though deserving of further analysis.) My contention is that the rigorous scholarship of *Darwin's Century* provides the basis for most of the popular essays, though the strategies of popularization do not emerge until the Conclusion of the scholarly work but are emerging in the essays collected in *The Immense Journey* and developed through the other five collections of essays. *The Immense Journey*, say Gerber and McFadden, "vindicated Eiseley's confidence in the concealed essay as his artistic medium. In these two works, the whole of his future literary effort lay in concentrated form" (50). Certainly the complementarity of the two books further supports Eiseley's contentions that creative and intellectual activity necessarily interact.

In the "concealed essay," "personal anecdote was allowed gently to bring under observation thoughts of a more purely scientific nature" (ASH 277). The subject matter of the "concealed essay" "is framed or 'concealed' by the personal approach, which serves as a
rhetorical device to engage the reader's attention" (Angyal 39). But in addition to the "thoughts of a more purely scientific nature," there is a realm, Eiseley suggests, "which can never be completely subject to prophetic analysis by science"; it is the realm of "indetermination" ("The Illusion," ST 278), which will evoke much of his reflection. Eiseley expresses the Renaissance notion of the writer's adding his own creativity to nature even as his creativity springs from nature, for he asserts that the writer may share with Shakespeare and Bacon "a recognition of the creativeness which adds to nature, and which emerges from nature as 'an art which nature makes'" ("The Illusion," ST 278). For Eiseley, "the world of nature, once seen through the eye of genius, is never seen in quite the same manner afterward. A dimension has been added" ("Strangeness in the Proportion," NC 143). The artist is not only mirror but lamp, in a passage intertextual with M. H. Abrams (and indeed, as Jonathan Culler argues, the mirror and the lamp are the same metaphor [The Pursuit of Signs 162]): "It is within the power of great art to shed on nature a light which can be had from no other source than the mind itself" ("Strangeness in the Proportion," NC 143). Both mirror and lamp contribute to the "creativeness which adds to nature," and always, in the words of John Donne, "the substance of the truth is in the great images which lie behind" ("The Illusion," ST 275).

The "concealed essay" depends increasingly throughout Eiseley's writing career on literary references, often approaching science through apt passages from literature and philosophy, with some of the later essays ("Walden: Thoreau's Unfinished Business," "Thoreau's Vision of the Natural World," and "Man Against the Universe") adopting
a tutor text and using it to extract a personal reading. Eiseley's "concealed essay" thus becomes "a highly elaborate form, with frequent literary references and allusions, numerous quotations, multiple themes, and an interwoven structure of contemplative concerns" (Angyal 39). It is a "casual and informal, though sophisticated technique" that combines "memory, landscape, and visual imagination" (Angyal 41).

The form is, like the natural history essay from which it emerged, highly interdisciplinary, providing the advantages of perceiving interrelationships of organisms and of cultures, of developing what Haney calls "holistic" attitudes toward nature that incorporate more concerns than the exact scientist may recognize (3-4). It is a form that combines experiment and experience, a form in which "an extension of the senses has become an extension of science" (Carlisle, "Heretical Science" 354-55).

Eiseley's Hybrid Genre and the Paraliterary

Critics' difficulties in "categorizing" Eiseley's texts, placing them where they "belong," may be itself vidence of an emerging hybrid genre. Writing of the breakdown of "the solidarity of the old disciplines" that leads to emergence of a hybrid genre, Roland Barthes says that the "new object and new language" cannot find a place in the established sciences, "this unease in classification being precisely the point from which it is possible to diagnose a certain mutation" ("From Work to Text" 155). If indeed Eiseley is responsible for initiating a "new genre," as Carlisle and Angyal have contended—a genre that emerges out of natural history writing, history of science, pre- and post-Darwinian biology, autobiography, and use of tutor texts
from literature and philosophy—that genre represents a movement now already successful in science and often discussed among post-structuralist literary theorists as emerging in the humanities in the form of the "paraliterary."

Indeed, suggesting a hybrid genre mixing literary theory and philosophy, as well as cognizance of the role of language in thinking, Richard Rorty places the genesis of such a hybrid in the humanities in the nineteenth century:

Beginning in the days of Goethe and Macaulay and Carlyle and Emerson . . . a kind of writing has developed which is neither the evaluation of the relative merits of literary productions, nor intellectual history, nor moral philosophy, nor epistemology, nor social prophecy, but all of these mingled together in a new genre . . . often still called "literary criticism". . . . ("Professionalized Philosophy and Transcendentalist Culture" 763-64)

Jonathan Culler writes that texts of this genre "function not as demonstrations within the parameters of a discipline but as redescriptions that challenge disciplinary boundaries" (On Deconstruction 9). Identifying this mixture of literature and philosophy broadly as "theory," Culler writes of its "power to make strange the familiar and to make readers conceive of their own thinking, behavior, and institutions in new ways" and of the "persuasive novelty of [its writers'] redescriptions" (9).

Among poststructuralist literary theorists who identify a new interdisciplinary hybrid for the humanities, Rosalind Krauss identifies the "paraliterary" in reference to texts that engage creativity and the discourse of knowledge. Citing a lecture by Jacques Derrida and pointing to a significant portion of Roland Barthes's work, Krauss notes what "simply cannot be called criticism,
but . . . cannot, for that matter, be called not-criticism either," for "criticism finds itself caught in a dramatic web of many voices, citations, asides, divagations. And what is created, as in the case of much of Derrida, is a kind of paraliterature" (37). Krauss writes of "the paraliterary space," which "is the space of debate, quotation, partisanship, betrayal, reconciliation" as opposed to "the space of unity, coherence, or resolution that we think of as constituting the work of literature" (37). Paraliterature stands outside the non-university critical establishment, for "the paraliterary cannot be a model for the systematic unpacking of the meanings of a work of art that criticism's task is thought to be" (38). Finding Barthes and Derrida "the writers, not the critics, that students now read," Krauss contends that if modernism drew attention to its own structure, to reading as "critical," then postmodernist literature it likely to "be the critical text wrought into a paraliterary form" (40).

Finding collage/montage the model of hybridization adopted by "post-criticism" (post-modernist, post-structural, Derrida's model of the age as a post card), Gregory Ulmer notes Barthes' "'paraliterary' initiative" in Critique et Vérité and in "The Structuralist Activity":

The insight of paraliterature is that although by the 1960s the collage revolution seemed to have run its course, it was in fact being renewed in critical discourse, which was itself finally being affected by experiments with representation. ("The Object of Post-Criticism" 108, n. 10)

As Ulmer notes, both Barthes and Derrida have recognized the sensitivity of the critical establishment to touching or "tampering with" language ("The Object" 87). The question Ulmer asks is one that touches on hybridization as related to the humanities:
Will the collage/montage revolution in representation be admitted into the academic essay, into the discourse of knowledge, replacing the 'realist' criticism based on the notions of 'truth' as correspondence to or correct reproduction of a referent object of study? ("The Object" 86)

Barthes, as Ulmer notes, initiated the question when he contended that "literature" and "criticism" cannot continue to be separated, for now there are "only writers" ("The Object" 86). Michel Serres writes of literature and criticism, "Why should there be a dichotomy between texts, between the ones that operate and the ones that are operated upon? There are texts, and that is all" ("Michelet: The Soup" 38). Ulmer refers to paraliterature as "a hybrid of literature and criticism, art and science" ("The Object" 94), thus clearly emphasizing the shift from "criticism" as an isolated activity into a combination of creativity and the discourse of knowledge.

Certainly Roland Barthes's texts, which become increasingly more "paraliterary," help set the stage for the hybridization of the paraliterary. Barthes sees "no technical difference between structuralism as an intellectual activity on the one hand and literature in particular, art in general on the other" ("The Structuralist Activity" 150). Thus he can submit that there is today a new perspective of consideration which . . . is common to literature and linguistics, to the creator and the critic, whose tasks until now completely self-contained, are beginning to inter-relate, perhaps even to merge. ("To Write" 156)

Barthes's notion of the "text" is also relevant to paraliterature. Rejecting the notion of a "work" with an "ultimate meaning," Barthes turns to the "text," which "is made of multiple writings, drawn from many cultures and entering into mutual relations of dialogue, parody, contestation," all drawn together, not by the
"author," but by the reader ("The Death of the Author" 148). Further, and especially relevant in the present context of hybrid genres in the sciences and the humanities, Barthes addresses the effects of interdisciplinarity on the concept of the literary work or "text." As linguistics, anthropology, Marxism, and psychoanalysis have touched literature, the newness of the text is their "encounter in relation to an object which traditionally is the province of none of them. . . . Interdisciplinarity is not the calm of an easy security. . . ." ("From Work to Text" 155). Barthes finds the "text" not limited to "(good) Literature," but instead, "subversive" toward established categories (157). The text is "woven entirely with citations, references, echoes, cultural languages . . . which cut across it through and through in a vast stereophony" (160). And once he has created a text, the author may return to it, but only as a visitor, for "the I which writes the text . . . is never more than a paper-I" (161). Further, for Barthes, any "discourse on the text should itself be nothing other than text, research, textual activity" ("From Work to Text" 164).

If, indeed, thinkers from diverse backgrounds such as Rorty, Booth, Habermas, Derrida (whose media theory, Ulmer suggests, can be subsumed under the term popularization ["The Post-Age" 53]), Barthes, and Eiseley have all called for a kind of popularization—whether through an interdisciplinary hybrid (or collage/montage) of philosophy and social criticism, or of popularized humanities, or of science that can be absorbed by a populace that will no longer participate in its own depoliticization, or of science and art "for the uses of life"—then the hybrid genre is not to be overlooked. Even paraliterature
emerges in a world dominated by science. And Eiseley's combination of
the discourse of natural science with creativity is not unexpected.
Philosophically, Heidegger rejected "scientific" knowledge per se, as
many contemporary thinkers have rejected science as the means to all
knowledge. For Heidegger, the result of his rejection was to think and
write poetically, to find in art the "saving power." Eiseley compares
his identification with "the lost ones, the failures of the world" to
"the renunciation of my scientific heritage" ("The Unexpected
Universe," UU 86) and, despite deep admiration for Darwin, rejects
Darwin's tangled bank in favor of the failures of the world and the
poetic treatment of such humble subjects.

If one looks carefully at those texts considered "paraliterary,"
certain traits emerge. Such texts, for example, often move by motif
or image or theme rather than by argumentative discourse. These
writers often deal with what cannot be dealt with conceptually, but
must be approached by image: the "tissue" of the text in Barthes and
in Derrida, which becomes "web" and "tissue" in Derrida, or the
Derridean "invagination," which is a "non-concept." Thus style is a
matter for consideration, also. The whole scientific-rational-
empirical tradition demands clarity of thought and expression, but the
writer of paraliterature realizes that "plain style" may not always
communicate effectively. If even our thought-words contain visual
metaphors (as Richard Rorty has contended), the poetic style may
indeed be a more effective means of communicating than the "plain
style." In Heidegger's words, borrowed from Hölderlin, "Poetically
man dwells." And if only poetry is adequate to convey emotional, as
opposed to conceptual, knowledge, the hybrid genre provides a means of
transferring from the discourse of knowledge information that is not just unconventional, but emotionally moving as well.

"Dwelling poetically" is a means of celebrating feelings for which there are no words, an awareness of the "uncanny." Eiseley would say that man has fallen from instinct into wonder. In Eiseley's hybrid genre the movement by image or motif and the consciousness of style are important. Eiseley is constantly aware of the importance of style in treating knowledge, of the mediation by language of any reality. Increasingly, he turns to the use of a literary tutor text for personal analysis which he blends with scientific information to produce a hybrid form. "Walden: Thoreau's Unfinished Business," "Thoreau's Vision of the Natural World," "The Illusion of the Two Cultures," "Man Against the Universe," and the increasingly frequent references to Thoreau, Emerson, Kierkegaard, and process philosophy all help to create a form that is neither purely "essayistic" nor "scientific" nor "critical," but a hybrid form similar in the domain of life and social sciences to what Rorty describes as a cross between philosophy and social or moral criticism or to what Barthes describes as a blending of criticism and literature or to Krauss's and Ulmer's definitions of the "paraliterary" rather than to any established "genre."

Eiseley's texts clearly depend on subjects and metaphors that cross disciplinary borders. Barthes's "interdisciplinarity," a "mutation" which "is more in the nature of an epistemological slide than of a real break" ("From Work to Text," 153) emerges in these texts. The similarity of analogies and symbols in literature and
science is a major theme in "The Illusion of the Two Cultures."
Metaphors from ancient alchemy, from particle physics, from cell
biology, and from archaeology and paleontology mingle with metaphors
from the primitives' serious attitudes toward the relationship of man
and nature. Eiseley's essays, then, cross borderlines and bring
interdisciplinarity in subject and in metaphor. They are a blend of
literature with social, historical, and scientific history and
criticism, with a sprinkling of Eiseley's own literary readings.

Like other post-Heideggerian "texts," Eiseley's texts, perhaps
because of the anthropologist's awareness of the role of language in
the development of man, occasionally allow the play of the signifier
to enter. Dyersville, Iowa, becomes "that dire place" in "The Star
Thrower" (UU, 85); prehensile suggests prehension in "The Lethal
Factor" (ST, 251); wander and wonder are often juxtaposed, with wide
suggestiveness of the epistemological dimension of the journey (the
wanderer is also a wonderer, and knowledge is a journey; Ishmael in
Moby-Dick is "wondering man, the acceptor of all races and their gods"
["Science and the Sense of the Holy," ST 199]); in one of Eiseley's
wry references to the "mad Shepards," his maternal ancestors, he
recalls associating them with "people pictured in the family Bible"
(ASH, 25). The play of the signifier is thus sometimes the source of
an entry into the material other than the focus of the signified. Such
play—in the Derridean sense of looseness and fluctuation as well as
of engaging in play—is useful to the popularizer who writes a hybrid
genre, though it would hardly be accepted by the Royal Society.
The Observer-Participant and the Uses of Autobiography

Another consideration that further links Eiseley's texts to other notions of a hybrid genre is his emphasis on the role of the observer-participant and his use of autobiography. As an anthropologist and a student of nineteenth-century science, he discusses the impossibility of the mythical "objectivity" and turns to individual experiences in his essays; indeed, undermining the myth of "objectivity" becomes part of his task as a popularizer. Like Heidegger, Eiseley finds that what is important "is the necessary interplay between subjectivism and objectivism" ("World Picture" 128). Indeed, as Jones points out, since Kuhn (who credits Eiseley for insights into nineteenth-century scientific change), with his concept of "paradigm shifts," and Holton, with his treatment of the thema-antithema by which science moves, almost no one would deny that "the observer has an uncontrollable and nonremovable effect on what is observed" (6). And Jones cites Eiseley's work, in addition to that of Kuhn, Holton, Poincare, and Polanyi, in reevaluating the role of subjectivism in science (207-208).

In Eiseley's texts the role of the popularizer is that of observer-participant. The narrator in his texts makes no pretense to "objectivity," but involves personal narrative and privileges personal observation for literary purposes. But although autobiographical details appear frequently, they are not used in the usual sense of autobiography. The self becomes a particular point of entry into complex material. The I of the statement is not necessarily the I of the author, for Eiseley's use of personal narratives involves creation of a persona who narrates (compare Pickering's study of the various
personas that Eiseley creates). The "conscious 'I'" is referred to as insignificant to the phagocytes in the human body ("The Hidden Teacher," UU 50); similarly, the "conscious 'I'" is insignificant in the text itself, except as it provides access to the information presented. As with Heidegger, a "metaphysical meaning of the concept of subject has first of all no special relationship to man and none at all to the I" ("World Picture" 128). As with Barthes, "linguistically the author is never more than the instance writing, just as I is nothing other than the instance saying I: language knows a 'subject,' not a 'person'..." ("The Death of the Author" 145).

Barthes also notes that in primitive societies a shaman or mediator takes the responsibility for narrating events, leaving the "author" to be a creation of the modern world. With Eiseley's penchant for shamans and his identification of primitive societies as models for the relationship of man and the environment, he seems to prefer the function of this detached mediator or shaman rather than that of the modern "author." "Shamanism provides a model...," says Ulmer, "for the 'objective' use of the autobiography as a research tool applied to fields of knowledge beyond itself" (Applied Grammatology 328, n. 22). Eiseley's method involves, not autobiography per se, but autobiographical "glimpses" through which to treat the being and becoming of experience. The result resembles what Barthes refers to as the attempt among modern writers "to establish a new status in writing for the agent of writing," in effect "to substitute the instance of discourse for the instance of reality (or
of the referent), which has been, and still is, a mythical 'alibi' dominating the idea of literature" ("To Write" 166).

Writing of the I in post-structuralism, Terry Eagleton delineates the problematic of the conscious I in a text—a problematic echoed in Eiseley's assumption of personas of fugitive, gambler, and scholar (ASH 248 and passim), among others—when he says, "Not only can I never be fully present to you, but I can never be fully present to myself" (130). And Barthes disputes the notion that in the I a "person" is brought from "storage" into being: "When a narrator recounts what has happened to him, the I who recounts is no longer the same I as the one that is recounted... [T]he I of discourse can no longer be a place where a previously stored-up person is innocently restored" ("To Write" 162). For Barthes, using I as a sign "is an act which is always new," but "the I of the one who writes is not the same as the I which is read by thou" ("To Write" 163). To seek an "identity" behind the I is, then, to abandon text for history or biography. Eiseley's attempts to evade those who would pursue a "critical biography" (specifically Carlisle), as well as his own comments, would suggest agreement with Barthes and Eagleton.

For his "autobiography," in fact, Eiseley chose an epigraph from Browning's The Ring and the Book, which deals with the impossibility of discerning "truth" because multiple perspectives prevent the existence of a single identifiable "truth." The epigraph reflects—in the specular sense of the color spectrum—the changing perspective that comes with changing time: "I' the color the tale takes, there's change perhaps; / 'Tis natural, since the sky is different, / Eclipse in the air now, still the outline stays" (Qtd. in ASH iii). Not only
are the shifting colors present, but also the palimpsest effect in which the outline remains, as if to echo the subtitle, The Excavation of a Life, and the use of archaeology as a model of knowledge. Early in the "autobiography" Eiseley explains his use of the I:

I am every man and no man, and will be so to the end. This is why I must tell the story as I may. Not for the nameless name upon the page, not for the trails behind me that faded or led nowhere, . . . not for the confusion of where I was to go, or if I had a destiny recognizable by any star. No, in retrospect it was the loneliness of not knowing, not knowing at all. (23)

If the I in All the Strange Hours is "every man and no man," certainly it is not the I expected in autobiography. Nowhere does he deal diachronically with his own life's story. The book treats recollections that lead to reflection on recurrent Eiseleyan themes, but it does not reconstruct a personal life. As the subtitle indicates, it is "an excavation of a life," with incidental artifacts uncovered from a life with what seems the same chance by which artifacts are uncovered in an excavation. As an autobiography, it is more an account of the journey of knowing than a reconstruction of a life. "Excavation" becomes the model of the epistemological quest, for human knowledge, like the individual life, is sedimented with meanings and quests for meaning. And "the fragmentary narrative," says Angyal, becomes "a way of depicting the tricks of memory," for the "continuously existing personality in time," though it may not be an illusion, "is not accessible to memory" (109). The shattered mirror that recurs throughout the book is an apt metaphor for the autobiographical element. The I is the eye—observer and homophone, the cracked fragment of a mirror reflecting the whole yet also
participating in a strangely fragmented reflection of the whole that the intact mirror would have reflected.

In Eiseley's essays, the details from his life are as fleeting and as shifting as is the universe. These details shift as in a mirror or a kaleidoscope so that even the narrator who recalls emerging from a cave to see the modern world as "a little lost century, a toy" (ASH 104) is uncertain who the I is. The I of Eiseley's texts, like the I in this example, is a dramatized observer--part self, part observer and participant, part fictional creation. The I allows a seemingly personal, though sometimes obviously fictional, creation of a young man eye-to-eye with an owl in a cave ("Obituary of a Bone Hunter," NC 181-91) or an old biologist who, on a dark and foggy night, becomes an atavistic throwback who joins in the "dance" of thousands of frogs on their way to a lake ("The Dance of the Frogs," ST 106-115).

The I of Eiseley's autobiographical examples is "all men and no man," the part that, in a sense, reflects the whole, the individual who, in his own experiences, recreates the experiences of humankind, indeed of life. The I is the synecdoche for man and his history, retold through human tales whose "reality" or "fictionalism" is sometimes difficult to determine and assuredly irrelevant to the effect created. What is important, Eiseley asserts as he attempts to explain why one person writes, is that "we all live in a moving stream, as surely as a catfish groping with its whiskers in the muddy dark" and that even an obscure writer of a book on aquarium-building may play a role in forming the inclinations of a writer: "That is the wonder of words. They drift on and on beyond imagining" (ASH 170). The I is in language, part of the moving stream of time and becoming.
And the I is able, not only to employ the metaphors that guide the reader through Eiseley's texts, but to involve the reader in recreating a journey—the long journey of man, the journey into an old man's world, the journey of a fish down the Platte River, the journey into the world of a porpoise, the journey of knowledge. Eiseley's I is constantly shifting, but it is the I of the experience of life, the eye of the observer-participant. Like other writers of contemporary hybrid genres, Eiseley is more concerned with "living-through" than with mimesis.

Eiseley's essays, then, cross borderlines and bring in interdisciplinarity in subject and in metaphor. They are often part science and history of science, part literature, part social, historical, scientific, and literary criticism. They are part of a hybrid genre of texts that have become highly successful in popularizing science, just as similar hybrid texts are emerging as strategies of popularization in the humanities. These texts defy boundaries and closure, "live through" rather than represent, and allow language to speak itself, with the observer-participant as writer. For when "the voice loses its origin, the author enters into his own death, writing begins," and "the birth of the reader must be at the cost of the death of the Author" (Barthes, "The Death of the Author" 142, 148).

**Structure and Method: The Conclusion to Darwin's Century**

Because of the pivotal position that *Darwin's Century* holds in Eiseley's work, because the Conclusion summarizes the major themes that will recur in the popular essays, and because the Conclusion
employs the method of the popular essays (concurrently developed in *The Immense Journey*), the Conclusion to *Darwin's Century* may be seen as the prototype of Eiseley's popular essays. In the Conclusion Eiseley establishes four of the points on which he will hammer away in the popular essays: the need to assess man's powers, the understanding of man's role in "indetermination," the rejection of metaphors that perpetuate emphasis on struggle, and the validity of turning to primitive man and "primitive" thinking as models for a culture dominated by a scientific-industrial-military institution which is accepted and even worshipped by many people. The Conclusion is a combination of scientific information, which becomes the vehicle for the recurrent Eiseleyan themes, with metaphor and analogue, quotation, interpretation, and personal experience. In the later essays, the element of personal experience will often play a larger role, but here it adds a powerful affective dimension; and this essay, which summarizes the main points treated in *Darwin's Century* and looks toward their cultural and human implications, is nevertheless a model for the later work.

Like most of Eiseley's essays, the Conclusion begins with an epigraph that abstracts one of the main themes—in this case the theme of time and its human interpretation: "Life can only be understood backward but it must be lived forward" (325). In this line from Kierkegaard Eiseley pinpoints the problematic of the human relationship to time, which becomes the basis for organization of the essay into five sections: I. Time: Cyclic and Historic; II. The Pre-Darwinian Era; III. The Struggle of the Parts; IV. Evolution and Human Culture; and V. The Role of Indeterminism. Each section treats
the human awareness of time from one perspective or another, and the focus is on the impact that the prevailing concept of time has on human culture.

The Conclusion is about time and its relationship to human cultures, as is the whole of *Darwin's Century*. But in the research on Darwin as well as on pre- and post-Darwinian evolution, Eiseley has become acutely aware that popularization of evolution involves more than explaining natural selection and the "community of descent." Psychological, ethical, and moral implications are inextricably inverwoven in his study, especially in the Conclusion. In Eiseley's words, "the man of blood" and "the man of peace" have both utilized the arguments of evolution (from the age of the earth, to the gradual emergence of geological and animate forms, to the great quantity of individual variations and their roles in creating species, to the decline of acceptance of the world as a balanced machine [DC I-VIII; succinctly stated in FT 70-71]), but what is needed is "a long second look at the history of this concept and at its moral implications" (DC 326). The Conclusion, then, not only summarizes the main points of the book, but also provides the beginning of this "long second look."

In the opening paragraph Eiseley not only states the point that "ideas, like the disintegrating face of Hutton's planet, evolve, erode, and change" (325), but also introduces what will become the controlling metaphor for evolution in this essay. Some ideas vanish overnight, he contends, while others—metaphorically, rocky projections from the physical landscape—"may last for ages protruding, gaunt, bare, and uncompromising, from the soft sward of
later beliefs" (325). An idea—the very word is related to "seeing," to the Old English *wit*, "knowledge, intelligence," to the Latin *videre*, "to see," to the Greek *eidos*, "form, shape" (all dependent on the visual perception of form and boundaries)—is thus imaged in terms of a geological formation. Like the geological formation that is its model, the idea appears fixed but is nevertheless subject to erosion, to evolution, to constant and creative change. This "rock" is subject to the Eiseleyan process of "transmutation" through the kaleidoscopic effect of shifting light (*kaleidoscope*, too, descends from *eidos*—plus *kalos*, "beautiful"). The interaction of cloud and landscape produces the effect of shifting colors in the metaphoric *eidos*:

Sometimes, in the clouds that pass over the formless landscape of time, they will seem to shift and catch new lights, become transmuted into something other than what they were, grow dull, or glisten with a kind of sunset color reflected from the human mind itself. Of such a nature is that vast monument to human thinking which is now called evolution. (325)

The idea of evolution, we learn later, is not only a rocky formation, a "monument to human thinking," but a "structure," which "looms ever vaster and more impenetrable" (325). Eiseley suggests that this formation is linked both to the atom's mysteries (which introduce the unpredictable and indeterminate in nature—one might even add Epicurus's *clinamen*) and to "that intangible, immaterial world of consciousness" which is not quite identifiable "with the soft dust that flies up from a summer road" (326). The cloud itself, which gives shifting colors to a landscape that is equally but more slowly shifting, is constituted of fine droplets or particles of ice, of steam or smoke or dust; its formations are unpredictable. Further, *cloud* in Middle English referred to a hill or a mass of earth as well
as to what we know as "cloud." In the metaphoric rocky projection of the idea of evolution is the constant disintegration of the hill—a disintegration that produces the consciousness which is not quite identifiable with "the soft dust that flies up from a summer road."

Evolution itself is linked to the human consciousness, which cannot be totally explained by the dust cloud, as the cloud cannot be totally explained or predicted. Both are constantly shifting; as Eiseley will say later, "form is an illusion of the time dimension" ("The Star Thrower," _UU_ 78).

In addition, in all of Eiseley's cloud and dust metaphors there lurks a defamiliarization of the Judeo-Christian notion of man as supernaturally compounded of dust; Eiseley omits the supernatural but retains the shifting and diaphanous cloud of dust or moisture (in something of a Bachelardian sense, the ancient elements of fire, air, earth, and water recur in various guises in Eiseley's texts). It is relevant that he concludes this first section of the essay with a speculation that between Sedgwick's supernaturally oriented "progressionism" (which preceded but helped to pave the way for evolution) and modern scientific man's "complacency" in his scientific ability to explain all things, there may remain "other mysteries as great as those that intrigued Darwin" (326).

But the cloud can also be a cloud of ice, which is relevant to Eiseley's texts because of the omnipresence of his theme of modern man as a survivor of and a product of the last ice and his theme of the inevitable return of the ice. And a cloud is also a swarm or a moving body of creatures, such as the student of life inevitably perceives in
the swarming multitude of creatures. Consciousness, then, seems in one sense like the cloud of dust, yet "no one has quite succeeded in identifying" the two.

The equivocity of consciousness and its role in the evolutionary process is echoed in the equivocity of the history of evolution, for some have seen evolution as reducing man to a bestial condition, while others have viewed it in terms of potential progress. It is this tendency, above all, that leads Eiseley to posit the need for his "long second look" at evolution and its history, which becomes a look at evolution not only from the perspective of its social and moral ramifications, but also at evolution as itself a "figure" of thought. With the metaphor of evolution as a rocky projection, a monument, and of the cloud that diffuses shifting colors onto the monument, then, Eiseley introduces his consideration of these ramifications. Thus this concluding chapter is prototypical of Eiseley's concern with the social implications of evolution, the problem of the individual in relation to evolutionary theory, the question Where shall I live in this embracing system? and its epistemological extension How shall I know where I shall live...? And it is prototypical of the Eiseleyan method of organization, which employs (not in a fixed order) metaphor, quotation, personal reading of the quotation, and personal experience or anecdote, all in explication of a point of science or of its cultural ramifications.

The second part of the essay re-views and summarizes the pre-Darwinian nineteenth century, with its progress in geological understanding, growth in morophological biology, increasing awareness of the enormity of time, and theories of "progressionism," which
perceived a successive development of life forms from simple to complex, though with the notion of successive creations rather than actual phylogenetic descent of forms. Eiseley emphasizes the notion of the past as unreturning and undermines Lyell's "safe," cyclical time predicated on the Newtonian machine. As astronomy and paleontology discovered an increasingly lengthy past, "the historic ever-changing, irreversible, on-flowing continuum of events was being linked to galaxies and suns and worlds" (330). Gradually the clues emerged that would present time as itself creative and thus would emphasize both cosmic and organic novelty. Even Malthus, Eiseley notes, with his notion of the "balances" on population, was a product of eighteenth-century notions of "balance" inherited from Newton. What Darwin and Wallace left to the next century was a new sense of time, which brought with it a new, continuously and infinitely creative world.

The stylistic strategy with which Eiseley makes the point is a metaphor as wild and uncontrolled and teeming with creative life as the Newtonian metaphor of the universal machine is fixed and controlled and not creative but representative: time, no longer subject to a Newtonian "natural government" (the word natural provides great tension in Eiseley's texts because man seems to accept as "given" anything that comes to be seen as "natural"), has become "instead a vast chaotic Amazon pouring through unimaginable wildernesses its burden of 'houses and bones and gardens, cooks and clocks'" (332). Time, then, is a wild, unknown, and romantic river rather than a machine. As such it carries forward the synecdoches of human life, in the phrase quoted from Alfred Russel Wallace.
The discovery of the spectroscope, Eiseley notes, led to astrophysics and to confirmation of Newton's contention that the sun's rays are a combination of colors separable by means of the lens. Thus begins the Eiseleyan consideration of the solar spectrum, which provides metaphor and model in the popular essays. *Spectrum*, meaning appearance, image, form, emerges from the same root as *speculate*, the Latin *specere*, "to look at," which is related to other terms from the life sciences, including *specimen*, *spectacle*, *speculum*, as well as to other "sight" words that are relevant to the consideration of life and its development: the Latin *species*—a seeing, sight, form—as well as *spex*, "he who sees" (a chapter in *All the Strange Hours* dealing with the inadequacy of observation to explain all of nature's cruelty and creativity centers on the coming of the *sphinx* wasps), and "sight" words such as *aspect*, *expect*, *prospect*, *inspect*, *introspect*, *perspective*, *respect*, *retrospect*.

The emergence of astrophysics is treated by a metaphor that carries forward the notion of the immediacy of man's groping for the "fire" of the stars; man could now "dip a ladle into the glaring furnace of the sun and stars" (333). The spectroscope thus becomes the means of breaking light and of bringing heat closer, not of touching the "glaring furnace" but of using a characteristically human tool to dip into it. Traditionally, light is knowledge, the philosopheme of sight. The metaphor is related, too, to the metaphor of the journey—which Eiseley began in the first chapters of *Darwin's Century* with the Renaissance voyagers of discovery, who were followed by "time voyagers" such as the Comte de Buffon and Erasmus Darwin, and with reference to the "pirate chart" of the early time explorers—in
its relationship to the "shining" of dies, the Latin root of journey. After the spectroscope, "marvellous and unexpected phenomena" "flashed, as it were, into the human cognizance," wrote C. Pritchard in 1869 (Qtd. 333). Thus was created what Eiseley calls a "sidereal chemistry," and, we might add, a chemistry whose crucible (either the vessel used for melting materials or the bottom of a furnace where molten metal collects) can be dipped into by means of a ladle of broken or splintered light (the "splintered radiance" of consciousness and the shattered mirror become insistent intertexts in later essays). Through spectroscopic investigations, the "sidereal chemistry" led Pritchard to observe "that the whole visible material universe is an evolution of things" (Qtd. 333).

The chemical metaphors lead, then, to an understanding "that the matter of the entire visible universe was largely identical with the chemical elements known from our own solar system" (333). Pritchard perceived from this "chemistry" that man might break through "that hitherto impenetrable veil which seems to separate what we term inorganic from what we term organic and vital" (Qtd. 333). The visual and "chemical" metaphors dependent on fiery furnaces and "gaseous or vaporous matter" (Qtd. 333), as Pritchard called it, are related to two previously established points—the "cloud" of dust or ice or moisture that breaks the light and scatters varying colors on the rocky monument (evolution) and the prevalence of fire as an energy source; but they also have imaginative import that foreshadows Eiseley's later attention to the human movement up the "fiery ladder" (IP 63) which is the "energy ladder," and his observation that links
The Immense Journey to the four ancient elements ("The Slit," IJ 13). In the words of Northrup Frye, ". . . earth, air, water and fire are still the four elements of imaginative experience, and always will be" (Introduction to The Psychoanalysis of Fire vii). As elements of poetic experience, fire and water are also essential "elements" for the poetic popularizer.

Ending the second section of the Conclusion, Eiseley returns to what the spectroscope confirmed—that time was not the circularity that it had been thought to be, that it was unreturning, that "it was a loneliness, an on-going. Through the ruins of vanished eras one could trace the silver thread of genetic continuity winding on toward the always looming and unknown future" (334). The section's concluding metaphor brings us back to the import of this new view of time; it makes possible a comprehension of the "silver thread of genetic continuity." The silver thread is as cool as the chemical metaphors are hot. It is a winding thread, and the winding will appear again later in Eiseley's texts, as, for example, in his description of the illusion of a trunk snuffling, growling, winding behind a fresh-faced student who has asked a question about evolution ("How Natural Is Natural?" FT 167-68). And the winding thread of genetic continuity repeats the motion of the model of life, the spiral of the DNA molecule, which becomes an important model in Eiseley's later texts.

The third section of the Conclusion treats the emergence of evolutionary thinking and its rejection of Platonic notions of preconceived "ideal forms." As he will say in various ways in the later essays, Eiseley says, "The fixed taxonomy of life is an illusion
born of our limited experience" (335). And he compares our limited perception of the "writhing" of one form into another with a slowed-down motion picture; if the frames were speeded up, we would be aware of the illusion produced by our tempo of living.

But the emergence of evolutionary thinking produced the root metaphor of the struggle within the tangled bank, the "war of nature," which becomes, Eiseley says, "an apt illustration of the way in which a successful theory may be carried to excess" (335). As a counter-model Eiseley posits that "the co-operative aspects of bodily organization, the vast intricacy of hormonal interplay, of cellular chemistry, remained to a considerable degree uninvestigated" (335). In this context Eiseley suggests but does not further develop these models of cooperation within the organism, though in The Immense Journey he finds in the symbiosis of plant and animal life a model for development in the essay "How Flowers Changed the World." In the present context, however, he focuses on the intensity of the notion of struggle. Even in the fertilized ovum the early evolutionists perceived a battle; figuratively, "in a fertilized cell the very ancestors were struggling as to which might emerge once more into the light" (336). As embryological studies increased, cellular mechanics was better comprehended; but Eiseley's concern in this section of the essay is with the tendency, to which he will return throughout the popular essays, to "minimize" cooperation among animal forms and to omit emphasis on "internal stability and harmony" (336) within the individual organism as well as within society. It is this approach
for which the Malthusian model became—unconsciously for the Darwinian observer—the shaper of observation.¹

Metaphorically, Eiseley concludes that the notion of struggle provided a "set of spectacles" for a generation of Darwinians (336). If we recall the spectrum and the associated "sight" words, then Eiseley's metaphorical spectacles reverberate with what language "knows" about sight; for spectacles frame and alter and shape sight, and "speculation," itself subject to shaping from a given mind-set, involves a root metaphor of sight. The specular metaphors, including spectacles and mirrors and kaleidoscopes, become shapers of the later Eiseleyan texts.

Section IV of the Conclusion centers on the chief concern of all of Eiseley's later popular essays—the relationship of the concept of evolution to human culture and the role of the individual in an unfixed, nonteleological world. Here Eiseley establishes the dangers of the notion of man as nothing more than "animal" subject to struggle and survival of the fittest. His silent dialogue with Herbert Spencer and "social Darwinism" will run throughout the popular essays, though he never explicitly takes on Spencer but attempts to establish, instead, that continuous creation through evolution gives man the ability to become more than he has been. Eiseley attempts to present the positive aspect (another specular word) of evolutionary becoming, though his efforts often end in a skepticism concerning human use of its potential, as embodied in the frequent references to his poem "The Maya," which evokes the astounding mathematical and astronomical achievements of the Maya, who used the zero and calculated time in
eons, though they never knew the wheel, and who came, as all civilizations have, to nothingness:

Behind, nothing,
before, nothing.
Worship it the zero. . . .
("The Maya," AKA 23)

In this section of the Conclusion, titled "Evolution and Human Culture," Eiseley discusses the parallels of biological and anthropological thinking, and the mutual influence of the two. Mistakes in developing the biological theory were, he says, duplicated or paralleled in social thinking. Despite Biblical literalism, he suggests, the Christian world had absorbed enough of the Aristotelian ladder of taxonomy to provide "the seeds of speculation." Biological notions of "progress" and similar social notions seem to have emerged concurrently, once the earth's antiquity was known. Biological notions of stratification among human beings led to confusion of actual cultural levels with biological potential. Only with rejection of the unilinear in biology could cultural unilinearity be discarded. With the analogous development of the two, it became clear that every culture is unique and that no observable "primitive" culture is an antecedent of others.

Another parallel that Eiseley notes is in relation to Darwin's concern with the unfixed, changing world to the exclusion of concern with the nature of the specific organism. In anthropology, similarly, there was a period of studying the widespread "diffusion" of cultural characteristics over scattered geographical locations, of studying cultures as made of "shreds and patches" combined from varied sources—to the exclusion of the combining of these cultural traits into
societies that functioned, as it were, organically, as shaped "by inner organizing forces" (343). The tendency toward partition thus functioned in both biological and cultural studies until cultures began to take on "individual personalities," as studied in the twentieth century. Eiseley's movement away from partition is evident as he suggests "that the holistic, organismic approach which finally emerged in biology when the intricacy of inner co-ordination and adjustment began to be realized has, once more, its analogue in the social field" (344).

Thus is the way prepared for one analogue for social change—society as an organism. "Like organisms," Eiseley says, "societies ingest or reject materials which come to them" (344). Societies also, like organisms, assimilate what they take in so that "when it reappears as part of the social body it has been molded to fit a purpose other than what was envisaged in another time and place where the trait arose" (344). Often, too, a given cultural or psychological trait will survive its political or technological usefulness, just as physical traits sometimes outlast their functions; as in the physical organism, there is an "inner cohesiveness" in the "social mind" (344). The organismic model leads Eiseley to suggest that the emergence of the human brain makes possible a social tradition which parallels heredity. Man is still at the beginning of complex social organization, and Eiseley frequently emphasizes the need for awareness of this fact and the human capacity for cooperation.

Yet in the attempt to free man from superstition, evolutionary thinking places a burden on him because it may lead him to focus on
the past and on his animalistic qualities rather than on his evolutionary potential. Used as a rationalization for bestial behavior, evolution becomes a danger. Even if Darwin and his immediate followers were overly concerned with the animal struggle, evolution still reveals life's infinite creativity. And for this point Eiseley turns to Henri Bergson's notion that "the role of life is to insert some indeterminateness into matter" (347). For Eiseley in this text as in the later popular essays, Wallace's contention that the brain has made unnecessary the further evolution of parts deserves more contemplation than does the notion of the struggle in the tangled bank. No longer subject to determinism, the human mind has become "the arbiter of human destiny" (347), and Eiseley as a popularizer treats this possibility while nevertheless noting Darwin's remarkable contributions, his blind spot of focus on struggle, and the influence of intellectual systems of his day—such as utilitarianism and Malthusianism—in the formulation of early evolutionary thinking.

Concluding this fourth part, Eiseley returns to the metaphor of chemistry that he established in the first part, a metaphor that again provides a counter-model to the tangled bank: body chemistry depends on the cooperation of cells, on their joining and even sacrificing themselves for the larger being, and the individual cell "is a laboratory where chemical processes are being carried on in an amazingly co-ordinated fashion" (349). As opposed to the nineteenth-century notion of ancestors warring for emergence in the fertilized ovum, Eiseley turns to Bergson's suggestion that, in the cellular chemistry, each generation "bends lovingly over the cradle of the next" (349). Thus are established the two tendencies of man—
aggressiveness and cooperation. As he will do in the later essays, Eiseley quotes and interprets; this time he quotes from a popularizer (James R. Newman, What Is Science?) in establishing that, of the two tendencides, cooperation is both "the more elusive and the more important" (349).

The last section of the Conclusion centers on "The Role of Indeterminism," already established as a part of the blind spot of several early Darwinians. In this section Eiseley most clearly foreshadows the themes and methods of the later popular essays. He notes again Wallace's contribution to evolution in his suggestion of the brain's escape from specialization of parts (a recurrent theme in all the essays) and sees in this escape the insertion of human volition into nature—a point the early evolutionists did not exactly perceive. Man "represents the genuine triumph of volition, life's near evasion of the forces that have molded it," but he is threatened by "confusion of the word 'progress' with he mechanical extensions which represent his triumph over the primeval wilderness of biological selection" (350). For Eiseley this confusion is a "reversion" that is manifested in enormous expenditures on industrialization and also on developing military implements that provide little more than a mechanical replay of the world of the dinosaurs.

To illustrate his next contention that what the twentieth century considers "gracious living" is spuriously associated in the contemporary mind with amenities and machines, Eiseley inserts a personal example from his own field explorations. It is the only personal example in the scholarly Darwin's Century, but it exhibits
the compassion and the use of individual experience as a means of thinking through larger problems that will become hallmarks of the popular essays, and it gives a powerful affective dimension to the last pages of the book. In the passage, which is reminiscent of Lévi-Strauss's descriptions of the Bororo tribe of South America, he recalls wandering with a companion, both men tired and lost, into a Mexican peon's rude camp.

This man, whose wife and newborn child were sheltered in a little hovel of sticks into which one could only creep on hands and knees, supplied our needs graciously. To our amazement he gently refused any payment, and walked with us to the edge of his barren lands in order to set us on the right path. (350-51)

Having established the primitive conditions under which the family lived, Eiseley uses the family as an example of simplicity and dignity and as a contrast to modern North American notions of these qualities.

There was a dignified simplicity about this man and his wife, in their little nest of sticks, that was a total antithesis to gracious living in the great land to the north. It demanded no mechanical extensions, no stewards with shining trays. We had drunk from a common vessel. We had bowed and spoken as graciously as on the steps of a great house. I had looked into his eyes and seen there that transcendence of self is not to be sought in the outer world or in mechanical extensions. They can be used for human benefit if one recognizes them for what they are, but they must never be confused with that other interior kingdom in which man is forever free to be better than what he knows himself to be. (351)

From this simple example Eiseley draws the conclusion to an exhaustive work of scholarship that has traced the development of evolutionary thought from its roots in the Greek ladder of things through the scala naturae of medieval and Renaissance man and through Darwin and his followers. The question that remains is one of the individual's part in a Darwinian world. Does the individual, perceiving primarily the
selfish struggle in nature, abstract from it a role of struggle, a continuing battle of selfishness? Or does the individual perceive in evolutionary nature and modern cell chemistry a model of cooperation, of the social "organism"? For Eiseley, the mechanical world "tickles [man's] fancy" (351) but does not lead to concentration on the unfolding future. The mind behind the machine provides its "color"—an echo of the spectrum that began the Conclusion, of the colors into which light is broken, and of the breaking itself as ongoing process.

The concluding paragraphs, however, also provide a defense of Darwin, "a master artist" who "entered sympathetically into life" (351). Darwin, at age twenty-eight, had a "vision" such as none of his predecessors had. Eiseley turns again to quotation, which he takes from the journal in which Darwin wrote with pity of "the whole vista of life," providing a model that will be recurrent in Eiseley's texts:

If we choose to let conjecture run wild, then animals, our fellow brethren in pain, disease, suffering and famine—our slaves in the most laborious works, our companions in our amusements—they may partake of our origin in one common ancestor—we may be all melted together. (Qtd. 352)

Using the strategy of focusing on "here and now" and "little things," Eiseley suggests that few young people in his time would "pause, coming from a biology class, to finger a yellow flower or poke in friendly fashion at a sunning turtle on the edge of the campus pond" or would write that we are "all melted together" (352). With this detail of the individual's response to the natural world Eiseley concludes that Darwin's impact—his "shadow," another reverberation of the "spectrum" of "speculation"—is due not solely to the exact and
complex reasoning that produced the *Origin*, but also to his sympathy with life, which is "his heritage from the parson-naturalists of England" (352), who, like Darwin, "entered sympathetically into life" (351).

The Conclusion, then, not only attempts to place in perspective the difficult path of development of the idea of evolution, but it marks the concerns that will inform Eiseley's popular essays. Early in *Darwin's Century* he notes the impact of the popularizer as "a very significant figure in the earlier centuries of science," whose "work might plant the germ of new ideas in other, more systematic minds" and whose popularity can indicate "the ideas which were beginning to intrigue the public imagination" (30). The Conclusion marks the beginning of Eiseley's strategies as a popularizer: the suggestive epigraph from literature or philosophy; the statement of focus followed by simple and specific explanation of a scientific fact and one or more metaphors that condense or model the idea being explained; quotation from philosophical or literary texts rather than from scientific treatises, with personal rather than formal readings; and—what is perhaps most memorable in Eiseley's writing—use of personal narration to think through the scientific material that is the subject of popularization and the vehicle of reflection.

**Metaphor and Method**

Using a theoretical model is often an effective means of approaching complex material. Eiseley's major stylistic strategy is to use the concrete—simple objects and images--though he often weaves a complex tissue of images in a given essay. His metaphors often
function as models to provide access to and organization of the scientific information that is a vehicle for the Eiseleyan understanding. Basic to all of Eiseley's texts is the concept of evolution, both in the natural world and in the cultural world. His multiple purpose and the rationale for his extensive use of metaphor and image lie not only in popularizing basic evolutionary principles, but also in visualizing the theory in terms of process and change and in exploring models that emphasize Bacon's "uses of life." For in the words of E. H. Gombrich, "it is notorious that there really is no way of conveying an aesthetic response except by metaphor" (120). And Eiseley's purpose, as established earlier, is both scientific and aesthetic.

Eiseley's metaphors do not appear accidentally, nor are they mere ornaments. Eiseley turns to the Heideggerian "saving power" in "little things," which are simple objects and images from nature and from simpler human cultures than that which has produced the mechanistic world of today. Eiseley's metaphorical objects resemble what Terry Eagleton terms "the consolations of the concrete . . . in a period of major ideological crisis" (57).

The Uses of Metaphor

Indeed, metaphor may have a number of simultaneous or separate functions. The expected use of metaphor in texts such as Eiseley's is exegetical. Judith Wechsler cites Niels Bohr's notion that sometimes "we can fully understand a connection though we can only speak of it in images and parables. . . ." (Introduction 6). Richard Boyd discusses metaphors that go beyond the "exegetical or pedagogical" sense and
actually "constitute, at least for a time, an irreplaceable part of
the linguistic machinery of a scientific theory..." (359-60). Such
metaphors include the notion of the brain as a kind of computer and
the notion of consciousness as a kind of "'feedback' phenomenon"
(360).

But metaphor is also a way of perceiving the world. Says
Nietzsche, "That impulse towards the formation of metaphors, that
fundamental impulse of man... constantly shows its passionate
longing for shaping the existing world of waking man..." (513).
Metaphor may, Roger S. Jones suggests, go beyond its exigetical use
"to extend theories and even to make new ones," for "scientists (and
indeed all who possess creative consciousness) conjure like the poet
and the shaman," and for Jones "their theories are metaphors which
ultimately are inseparable from physical reality" (45).

Metaphor may bring pleasure to its creator and reveal "an
intimate connection between visual and poetic imagery and productive
scientific thought" (Gruber 124). Such a metaphor, Gruber suggests,
is Darwin's irregularly branching tree, whose pleasurable elaboration
also provides a means of exploring the "irregular" movement of
evolutionary change.

And metaphor can also create for us "the novelty and unlikelihood
of order in the midst of chaos" (Jones 49). Thus metaphor, says
Jones, "implies the creation of an idea or symbol, which not only
stands for something else but, in fact, stands alone as a new
evocation of meaning" (51). In such uses, the organizing power of
metaphor is vital. As Gruber maintains, complex imagery can provide
organization of information "in complex packages, schemas, or frames,
and these can be activated as needed. New perceptual data are mapped into them, behavior is regulated by them" (136). Noting the privileging of the visual in Western thinking, Richard Rorty contends, "It is pictures rather than propositions, metaphors rather than statements, which determine most of our philosophical convictions" (Philosophy and the Mirror 12).

The suggestion of metaphor as a means of shaping philosophy or controlling behavior brings us back to the important consideration, as noted in my Argument, of the uses of scientific metaphor. David Edge sees metaphor as a means of social control because successful metaphors are basically ambiguous and thus open to manipulation (137-40); because metaphor can affect the individual's responses toward himself, toward others, and toward the environment (as exemplified in the notion of the universe as clock or natural selection as warfare) through the human tendency to attach to the tenor of the metaphor the attitudes already associated with the vehicle (140-41); and because metaphors can be used to affect moral and ethical decisions (the notion of the human nervous system as an electrical network, complete with "nervous energy," helped to alter behavior in the late nineteenth century)(142-43).

Metaphor, then, is a powerful force with multiple applications. Owsei Temkin contends "that metaphors have exercised considerable influence over the biologists' thought" (169). Since Darwin's time, biological metaphors have often emphasized struggle and warfare, with reinforcement from machine metaphors traceable even to the Roman
Empire. The metaphor of warfare today represents an increasingly deadly combination of struggle and machine.

For Eiseley, there are "two reigning models involving human behavior today" ("Thoreau's Vision of the Natural World," ST 230). The first involves man as a reflection of his primate origins, man as Huxley's "ape and tiger'; this is what Eiseley calls the "conservative paradigm of the neo-Darwinian circle" ("Thoreau's Vision," ST 231). Its images are not only the ape and the tiger, but warfare in Darwin's tangled bank—images which Darwin himself transcended, though his contemporaries and followers stressed the metaphor of struggle—expressed earlier by Tennyson's "nature red in tooth and claw."

Eiseley's second paradigm is voiced by Thoreau, who writes that change "is a miracle that is taking place every instant," and by Whitehead, who writes that "passage is a quality not only of nature, which is the thing known, but also of sense awareness, which is the procedure of knowing" (Qtd. in "Thoreau's Vision," ST 231). In this view man, indeed all life, is in process, open to continuous new creation. As a creature in process, man possesses the tension of opposite tendencies of unification and disruption ("The Lethal Factor," ST 258).

Even today, Eiseley maintains, there is a strong tendency to look to the human struggle rather than to the innate cooperation that is far more responsible for civilization ("The Inner Galaxy," UU 184). "The nineteenth-century evolutionists, and many philosophers still today," he says, "are obsessed by struggle," defining natural selection in a single sense that Darwin himself shunned ("The Inner Galaxy," UU 187). Natural selection, Eiseley maintains, "is a
shifting chimera, less a 'law' than making its own law from age to age" (187). Darwin himself, ambivalent about whether man should be visualized as a fanged warrior or a weakling requiring protection, "had failed to quite perceive the outlines of that invisibly expanding universe which man had unconsciously created out of airy nothing," the cultural universe (Eiseley, "The Invisible Island," UU 166).

And the notion of warfare has historically been transmuted to a war within the individual. From Shakespeare's reference to the warfare within, to late Victorian tendencies to find the "war of nature" within the organism (DC 335), to notions of struggle between conscious and unconscious, the emphasis on struggle continues. However, the uncertainty principle in physics, which introduces random movement, may provide an alternative to the images of struggle. Writing of the indeterminate nature of human thought, Eiseley says, "It is my contention . . . that the rare freedom of the particle to do what most particles never do is duplicated in the solitary universe of the human mind" (Strangeness in the Proportion," NC 136). The uncertainty of the particle does not portend warfare within. Cultural evolution is not an organized, planned, even (as in the minds of many Victorians and some moderns) teleological battle with Western man man as the result, Tennyson's "roof and crown of things." Our world view, Eiseley suggests, remains Ptolemaic because we still see ourselves as the end, the purpose for which the struggle exists. The uncertainty of the particle, as duplicated in the human brain, from which cultural evolution stems, displaces struggle for freedom, displaces teleology for randomness.
In the realm of chance, once a single chance is activated, other chances are also activated. Volition becomes an element in determining what becomes of man. The brain, as Eiseley often reiterates, becomes the specialized organ whose function is to allow man to escape additional specialization—to control the sequence of chances that he has set in motion, to control, in other words, his own destiny.

Man, then, is more for Eiseley than a mere product of struggle, and his abilities to cooperate and to shape his future require emphasis. As a popularizer of evolutionary thinking, both pre- and post-Darwinian, Eiseley stresses the need for cooperation among men and for "a perceptive rather than an exploitive relationship with his fellow creatures" ("The Last Magician," IP 146). If "the ape and tiger of Huxley's analysis . . . are bad metaphors at best" ("The Inner Galaxy," UU 185), other metaphors must displace them—metaphors that reflect the cooperative tendencies that have played a major role in cultural evolution and metaphors that reflect the interdependence of all life with its environment. ³

Because his purposes are heuristic as well as explanatory, affective, and persuasive, Eiseley explores various models and their implications. He emphasizes not just the "fittest," but also the "failures" that have survived—the fish that failed as a fish but became a land creature, the "mousy insectivore" that became a man. He looks to the cooperation and imagination that produced culture, and to "the value of man the unique against that vast and ominous shadow of man the composite, the predictable, which is the delight of the
Thoroughly familiar with mechanistic metaphors, Eiseley traces them from the political and military machine of the Roman Empire ("The Unexpected Universe," UU 43) to the Newtonian *Machina Coelestis*—according to which, complete in some views with cogs and wheels, "the machine reigned" ("How the World Became Natural," FT 15), to Hutton's world machine which was "the quintessence of Newtonian world order" (DC 328), and even to the late-nineteenth-century quest for the *Urschleim* which revealed that, still, "mechanism was the order of the day" ("The Great Deeps," LJ 36). Even among Darwin's contemporaries, "the machine that began in the heavens had finally been installed in the human heart and brain" ("How Death Became Natural," FT 55).

Today, Eiseley contends, man is awed by the machine, and "the march of the machines has entered his blood" as he looks to space for expansion of his domain ("The World Eaters," IP 70). Clearly Eiseley engages the machine metaphor and its problematic, though he rejects it for natural and cultural metaphors. The machine itself is a source of ambivalence for Eiseley, who quotes Garet Garret for the epigraph to the central chapter of *The Invisible Pyramid*: "Either the machine has a meaning to life that we have not yet been able to interpret in a rational manner, or it is itself a manifestation of life and therefore mysterious" (Qtd. in "The Spore Bearers" 73). Eiseley speculates that the machine may lead humankind to become a kind of "spore bearer" of the first complex form of life to enter space, or it may lead man to program the human personality into "the deathless machine itself" and, in a sense, escape mortality ("The Spore Bearers," IP 76-77).
The human encounter with the machine suggests its danger as a metaphor. For Eiseley, the triumph of the machine as a cultural artifact can be nothing more than an "atavistic return to the competition and extermination represented in the old biological evolution of 'parts'" unless an "inner triumph" accompanies it (DC 350). The machine as metaphor carries with it an assumption of human control. We are in danger, Eiseley says, of seeing the world as "an instrument or a mere source of materials" ("The Last Magician," IP 143). And the machine as metaphor suggests collective man, "man in the mass marching like the machinery of which he is already a replaceable part" ("One Night's Dying," NC 175). If man functions collectively and sees himself as dominant over nature rather than functioning as part of nature, he may also see himself as only a projection of the machine, as a tool. He "grows convinced that he is himself only useful as a tool." ("The Illusion of the Two Cultures," ST 269).

The machine concept, in addition to developing "collective" man and leading man to see himself both as dominant over nature and as a mere projection of the machine, also creates a notion of "a permanent, rather than dynamic, balance" in nature ("How Life Became Natural," FT 73), a balance that the Darwinian view cannot sustain. Eiseley's suggestion is that man must "pursue the paradox of return" ("The Last Magician," IP 150)—a return to sympathy with the natural world, which is, metaphorically, the "sunflower forest" of a more primitive time (156). If life is viewed as machinery, Eiseley learned from his early days working in a hatchery, it is "gambling machinery" (ASH 120).
"It's life I believe in, not machines" ("The Bird and the Machine," IJ 182), he says after reading an account of a mechanical mouse that can outperform its live counterpart.

Eiseley is, then, aware of the function of metaphor or symbol in science and of the role it has played, historically, in shaping human thinking. He recognizes the function of the root metaphor in science, maintaining, "It is only by the hook of analogy, by the root metaphor, ... that science succeeded in extending its domain" ("How the World Became Natural," FT 20). Even if the analogy is false, as was the machine analogy construed by eighteenth-century thinkers, it may color the thinking of generations, despite "empiricism" (20). And further, analogy makes possible the movement from one specialty to another: "It is the successful analogy or symbol," he says, "which frequently allows the scientist to leap from a generalization in one field of thought to a triumphant achievement in another"; and these analogies function as do literary analogies, "whose meanings similarly can never be totally grasped because of their endless power to ramify in the individual mind" ("The Illusion," ST 274).

Here Eiseley effectively states the basis of his own literary method. The images preserved by great scientists lead to mystery as well as to understanding, he suggests. In addition, he notes what happens to such images in the public mind. Once ideas or images (such as evolution and the expanding universe, which he treats as "root metaphors") are established in science, they "frequently escape from the professional scientist into the public domain," where "they may undergo further individual transformation and embellishment" and "are now as free to evolve in the mind of the individual as are the
creations of art" ("The Illusion," ST 275). Thus through the images that both express and contain the idea, science itself becomes subject to human imagination, to human "enrichment" that could not have occurred in a framework of "objective" empiricism. What happens once an image moves into the public mind is as unpredictable as the universe: "As figurative insights into the nature of things, such embracing conceptions may become grotesquely distorted or glow with added philosophical wisdom" (275). The popularizer, however, at least has a role in shaping the images that move into the public mind.

Thus metaphor for Eiseley is more than a strategy for imparting information; it is a means of blending science and art in the creation of his hybrid genre. And in this hybrid, as I have noted, he explores metaphors that will displace the metaphors of struggle and warfare and machine, of fixity, of hierarchy, of reductionism, of teleology, of determinacy and decidability. Since Eiseley's basic question Where shall I live in this embracing system? is also expanded to How shall I know where I shall live . . . ? the heuristic and epistemological dimensions of the metaphors he employs in displacing (supplementing) existing metaphors are, I submit, at least as important as the more obvious affective, persuasive, and explanatory dimensions.

Eiseley's Metaphors

Basic to Eiseley's metaphorical method is his central concern—the development of life and most recently of man, both biologically and culturally, through evolution. For Eiseley, evolution itself is both subject and method, both the subject of the quest and the source of the question, for evolution has already become a symbol. With
evolution as the central concern and the central metaphor of Eiseley's texts, through which he examines human becoming, two groups of metaphors emerge: from the cultural "world" come the journey and its necessary factor of contingency; from the physical world come the metaphors for cultural evolution—spiral or whirlpool and circle are natural images, and metaphors that begin with the eye, the tongue, and the hand (organs of the basic philosophemes that dominate Western thinking) come from the physical body of man. Paradoxically, analogues from the physical represent cultural evolution, whereas analogues from the cultural represent physical evolution.

The theoretical model Eiseley uses is the journey of man, initially developed effectively and comprehensively in The Immense Journey and further developed in several other texts. But within the comprehensive metaphor of the journey, factors the texts must confront are the changes of life through time, and chance or contingency. Life, as subject of the journey, moves through its various forms to its present biological stage.

At this point the term metaphor itself deserves further exploration. Eiseley's method is metaphor, his encompassing metaphor is the journey, and metaphor itself is vehicular, as Jacques Derrida underscores in "The Retrait of Metaphor" with a half-page of architectural symbols of vehicles from limousine to double-decker bus. Metaphor, Derrida says,

occupies the West, . . . proceeding from station to station, going on foot, step by step, or in a bus. . . . Metaphora circulates in the city, it conveys us like its inhabitants, along all sorts of passages. . . . We are . . . the content and the tenor of this vehicle: passengers, comprehended and displaced by metaphor. (6)
Derrida's circulating vehicular philosopheme reappears in *La Carte postale* (the card is from Socrates to Freud), in which the post card becomes a model of logocentrism. Gregory Ulmer comments:

The feature that makes the letter exemplary of the logocentric era (a synonym for 'postal era') is that it is addressed and signed, directed or destined ("Destinataire" = addressee). We take for granted the postal institution . . . . The entire history of the postal *techné* rivets "destination" to identity. The technology of identification (postal networks, telephone exchanges) can in turn serve as a model for exploring our theories of the self—as in Freud's use of the 'messenger' as an anasemic metaphor for communications between the Unconscious and the Conscious. *(Applied Grammatology* 126-27)

Using the postal model, Ulmer notes, Derrida "shifts his attention . . . to the possibility that a letter might not be delivered (the discontinuity disruptive of tradition), thus remotivating the model, studying it from the side of dysfunction" *(Applied Grammatology* 143).

In this view, the post card is a model for the age (with its teleological expectations), which Derrida's program is to deconstruct.

*Metaphor*, from the Greek *metatherein*, "to transfer," has its roots in *meta-*, suggesting change, and *pherein*, from Indo-European *bher*, "to bear." *Metaphor* itself, then, is a method of moving from one point in space to another, or from one *eidos* to another. The method of metaphor is the metaphor of method. *Metaphor* carries, bears (also "to bear children"), endures (forbears), provides a bier or a billow or a bore, becomes or bears a burden, brings, shakes, confers, defers, differs, suffers, and transfers. *Metaphor* itself makes a journey. The metaphor of the journey is a journey of metaphor. It is filled with chance, change, undecidability, indeterminacy, unexpectedness; it is not a journey involving ends or closure, whether
of warfare or machine. If we expect the journey to have a destination, we encounter the Derridean possibility that discontinuity will interrupt, that the post card will not reach its appointed destination.

Through the journey of metaphor and the metaphor of journey, the means of knowledge become indistinguishable from the knowledge itself. The journey enters the epistemological dimension. Through the journey Eiseley—aware of sidetracks and detours—attempts to effect the transfer of information from the discourse of science to the public mind. The journey is a transfer, but also a shuttle, weaving the texture of the text. The journey of wandering—as opposed to the postal journey (and how often does a letter wander, Odysseus-like, before reaching its destination?)—is a model for the way we learn—stopping, starting, sometimes moving without direction, occasionally lost, wandering like Odysseus and Darwin among the islands of knowing.

With the evolution of the human brain comes a cultural journey from the security of instinct to the insecurity of questioning modern man. Life is both a quest and a questioning, "for man ha[s] fallen out of the secure world of instinct into a place of wonder" ("Man Against the Universe," ST 221). Man is "a creature who has abandoned instinct and replaced it with cultural tradition and the hard-won increments of contemplative thought" ("The Ghost Continent," UU 7). Cultural evolution has brought man into a world of technology, of machines (compare Leo Marx's machine in the garden), of "objectivity," of scientism. A frightening result for humankind is the loss of humane concern, of pity, of the capacity for wonder. The fall from instinct, itself an analogy to the Judeo-Christian "fall," is a fall
into the journey of knowledge (a fall into metaphor), but for Eiseley, "knowledge, or what the twentieth century acclaims as knowledge, has not led to happiness" ("The Ghost Continent," UU 5).

The metaphors for the physical universe, which come, paradoxically, from the cultural universe, begin with the journey, with Eiseley's first literary analogue based on Odysseus' journey ("The Ghost Continent," UU 3-25). The literary journey, like Odysseus' voyage, is a wandering, meandering, random passage, like Serres's *randonée* (Harari and Bell xxxvi). As with Serres, "to read and to journey are one and the same act" (Jouvences 12, qtd. in Harari and Bell xxi). Within this journey is contingency, which has been represented in various cultures by symbols for those elements in nature that man cannot understand. Contingency is the "trickster" of primitive man, moving behind the devout priest; and "the dance of contingency, of the indeterminable, outwits us all" ("The Star Thrower," UU 77). At times contingency is a dice game. Other cultural figures, such as alchemy, witchcraft, art, the theater, and archaeology, provide models for the physical journey of man, which is symbolically an epistemological journey as well.

Within the metaphor of the journey and its accompanying contingencies, Eiseley employs a no less integral framework of biological metaphors to represent man's cultural evolution; these metaphors, primarily hand, eye, and tongue from the human body, are drawn from simple elements of biology. Obviously these begin metonymically, each functioning as a synecdoche for the function represented; but each also takes on metaphoric overtones as if in a kind of oscillation
between Jakobson's "metaphoric and metonymic poles" ascribed to romantic and realistic texts, respectively (1114). More importantly, hand, eye, and tongue are the organs of the founding philosophemes of Western tradition, the shapers of the voice-ear, inside-outside, eidetic concepts. They form the epistemological circuits by which the journey is made possible and through which the journey is a journey of knowledge.

Anthropologically, hand, eye, and tongue are the organs, in addition to and coordinated with the brain, that have evolved specialized uses which have made further physical specialization unnecessary. The link between the evolving brain and the other organs is clear. In Eiseley's words, "brain, hand, and tongue would henceforth evolve together. Fin, fur and paw would vanish into the mists of the past" ("The Star Dragon," IP 19). The human eye provides a depth perception which, with brain and hand, makes possible a conscious, directed coordination leading to hunting, tool-making, building, map-making, journeying in its multiple senses. The tongue and associated "speech" organs, through their "overlaid" or superimposed linguistic powers, have enabled man to displace the present for the future, to create an "other world" of human culture. And through writing, these organs enabled man to break the time barrier, to read the past and write the future, to write the past and read the future. Because of the biological and evolutionary importance of these organs, they dominate Eiseley's texts as they shape Western philosophemes. Anthropologically, man is near the beginning of his journey, despite popular perceptions to the contrary. In Eiseley's epistemological journey, anthropology itself is the
intersection of biological and cultural knowledge. And Eiseley's heuristic purpose is to discover ways of exploring where man is, how he came to be there, and how he can become more than he is; the epistemological circuits provide a vehicle for both explanation and exploration, for both defamiliarizing misconceptions and displacing misleading metaphors arising from evolutionary thinking.

Thus the eye comes to represent not only the simple visual function, but the whole problem of observation and cognition. The eye is the organ for the philosophemes of observation and perception; it is the center of the light-dark, inner-outer oppositions that are basic to Western thinking. Further, the eye serves as a focal point for a series of metaphors, from the "terrible crystal" of genius, to the "eyes on stalks" of poets, to the shattered mirror through which the eye perceives the individual's life.

From primitive man who read Coleridge's "mighty alphabet of the universe" ("The Golden Alphabet" UU 145) to the eye as "an awesome crystal whose diffractions are far greater than those of any Newtonian prism" ("Walden: Thoreau's Unfinished Business," ST 49), the eye serves as a focal point for a series of metaphors. Through the eye man perceives the two worlds that Eiseley (like Bacon) perceives—the world of nature and the world of the mind, the inner and the outer. With the eye man "reads" the outer world; with visual images man examines the inner world. The eye thus controls and shapes many of Eiseley's tropes.

Further, the eye is a homophone for the "I." Eiseley's use of autobiography and his dramatizations of events from his own past as
well as from the past of man lead to an omnipresent "I" who is also an eye. For Mary Ann Caws, "the point is not the text in the eye, but the I too, in the text itself. From this perspective, this dual-faced image should illuminate the double textual interest . . ." (35). What Caws calls an "obsessive desire of the onlooker to be included in the scene" brings about "the constant addition of the 'je'" (35). The "I" of the statement, as in Jakobson's concept of the shifter, becomes commingled with the "eye" and the "I" of the observer.

But Eiseley's most forceful use of the eye/I comes in his repeated treatment of its response to the mirror. In All the Strange Hours, a shattered mirror provides the central metaphor for "the excavation of a life," for the individual's sifting through the strata in his quest for an identity that is as fleeting as man himself. In the shattered mirror, each part reflects the whole, so that the shattered mirror becomes a means of access to an autobiography that is not linear, not diachronic, but a series of fragments, each reflecting a part and, in a sense, the whole of the individual's quest for identity. (All the Strange Hours may be seen as Eiseley's treatment of the stade du miroir, his reflection, in the dual sense, of and on the passage from the Imaginary into the Symbolic.) M. H. Abrams observes that "the mirror as an analogue for poetry suffers from the conspicuous defect that its images are fleeting" (33), but for this very reason the mirror as an analogue for the quest for identity in Eiseley's texts is highly appropriate; man and time and form are but fleeting expressions to Eiseley. Through the mirror, the eye, drawn from physiology, is joined with the inner quest which is both part and product of cultural evolution.
The hand is the metaphor of concept because it grasps, holds, gathers together, speaks to the notion of thinking as having, and, for Eiseley, provides the means of reaching and probing into the universe. The hand's ability to probe and its link with the eye make it an intermediary between the "chemical senses" of taste and smell and the "theoretical senses" of sight and hearing.

The tongue, seat of the chemical sense of taste, is also the metonym for language. Though language itself (Saussure's langue, the larger pattern of language, as distinguished from parole, the specific speech utterance) depends on certain brain centers, speech itself is considered by linguists an "overlaid" phenomenon because the "speech" organs have other purposes more basic to simple survival. Similarly, culture—for which language becomes the metaphor in Eiseley's texts—is an "overlaid" process in the evolution of man.

And if the tongue is the metonym for language, then language is, in turn, the metonym for culture. Eiseley, like other twentieth-century thinkers deeply impressed by the often-discussed "paradigm shift" from being to language, perceives language as man's most significant ability. Thinking, even awareness of existence, is a product of language. Language is at once the means of perception and the shaper of that perception. It makes possible the exploration of both inner and outer "worlds," the inner world of consciousness and the outer cosmos. For Eiseley, as for Roland Barthes, "the exploration of language, conducted by linguistics, psychoanalysis, and literature, corresponds to the exploration of the cosmos" ("To Write: An Intransitive Verb?" 167). (Not insignificantly in the present
context of heuristic purpose, Barthes uses the word exploration.)

For Eiseley the

_mundus alter_—this other intangible, faery world of dreams, fantasies, invention—has been flowing through the heads of men since the first apeman succeeded in cutting out a portion of his environment and delineating it in a transmissible word. With that word a world arose which will die only when the last man utters the last meaningful sound. ("The Lethal Factor," ST 256)

Language makes possible the development of culture and thus serves as a metonym for culture.

The awareness that the observer participates not only through the eye, but also through and because of language, is significant in eroding nineteenth-century notions of objectivity in Eiseley's analysis of Darwinian and pre-Darwinian thought. As the differentiating development in the evolution of man, language is the link with past and future. Through language the present creates the future, the past creates the present, the part creates the whole, the related represents. Vehicle cannot be separated from understanding. Only through memory, which is a function of language, can the eye survey a torn photograph which brings the observer to a new awareness of the "rift" in scientific objectivity ("The Star Thrower," UU 67-92).

The eye, the tongue, and the hand at once represent man's cultural evolution, function as organs for the basic philosophemes, and serve as focal points for metaphors that convey the thought in its own journey. Since the Eiseleyan journey is also the journey of knowledge, each of these organs is the center of an epistemological exploration.

Although they do not function as Richard Boyd's "constitutive metaphors" (359) or even as Howard Gruber's "images of wide scope"
(122), Eiseley's metaphors are what I have called "informing" metaphors; they function in the etymological sense of the Latin *informare*, "to give material form to" or "to form an idea of."

Eiseley's metaphors "inform" in the sense of giving form to an idea or helping to shape the information imparted, but they also "inform" in the usual exegetical sense. Even in the rare sense of helping to shape the mind, Eiseley's texts fit the term, since a major purpose is not only to impart information but to (re-)shape the reader's mental constructs concerning science, evolution, and culture. Eiseley's metaphors inform without constituting what Boyd calls "an irreplaceable part of the linguistic machinery" that distinguishes "constitutive" metaphors such as the brain as a kind of computer and the notion of consciousness as a kind of "'feedback' phenomenon" (359-60). The Eiseleyan metaphors inform but also explore, so that the form they give is, like all forms, "an illusion of the time dimension" ("The Star Thrower," UU 78).

In some instances, however, Eiseley is explicit enough about the import of his metaphors that they become allegory in the sense that Northrup Frye suggests: "We have actual allegory when a poet explicitly indicates the relationship of his images to examples and precepts, and so tries to indicate how a commentary on him should proceed" (Anatomy 90). Angus Fletcher finds "the grandeur science imparts to whatever it influences" (242) an impetus to allegory. In treating eighteenth-century interpretations of nature, the emergence of the sublime and the picturesque, or nineteenth-century "naturalist" fiction, Fletcher finds in the piling-up of details from nature a
powerful thematic effect that leads the mind to look for more than
details—in effect, for allegory. Whether in the extensive details of
the picturesque or in twentieth-century surrealism, the detailing of
"merveilleux du quotidien," Fletcher suggests, leads to an allegorical
effect (266, n. 82; 267; 294-95) because such details suggest
"powerful thematic conceptions" (315). The relevance of Fletcher's
insights in the present context is, of course, in Eiseley's use of
merveilleux du quotidien which not only function as metaphors and
models but also lead, on occasion, to explicitly allegorical
sequences.

The metaphorical journey, then, is complex. With the journey and
its accompanying assortment of informing cultural metaphors for the
physical reality of contingency within the evolutionary process as the
encompassing frame for a sequence of physical informing metaphors,
which begin metonymically but experience the transition from metonymy
to metaphor, Eiseley explores an ever-shifting, unpredictable physical
and cultural universe and simultaneously explores metaphors that
displace traditional figures of struggle, mechanism, fixity,
hierarchy, teleology, determinism, and reductionism.

A Postscript to Method: The Continuing Hybrid Genre

I turn now to a kind of postscript to my contention that Eiseley
represents a viable "hybrid genre" involving popularization of the
natural sciences. If Eiseley is indeed responsible for creating a new
hybrid genre, it is a genre that continues in the essays of Lewis
Thomas, among others. Thomas has produced four books of essays: The
Lives of a Cell: Notes of a Biology Watcher (winner of the 1974
National Book Award), The Medusa and the Snail: More Notes of a Biology Watcher, The Youngest Science: Notes of a Medicine Watcher (quasi-autobiographical in a manner similar to that of All the Strange Hours), and Late Night Thoughts on Listening to Mahler's Ninth Symphony. Although the two writers begin from different perspectives, which are reflected in their work, interesting similarities emerge in Thomas's and Eiseley's attitudes toward science and the scientific establishment, in metaphors and models of cooperation and symbiosis, and in their sense of the unexpected as a determiner of what life has become and is becoming.

Eiseley, of course, reflects the cultural perspectives of an anthropologist, though his background in physical anthropology and paleontology leads him into emphasis on the physical body of man as well as the larger cultural outlook. Thomas, on the other hand, is a clinician as well as a researcher, with emphasis on immunology. Whereas Eiseley looks to the cultural background for his examples and examines broad issues, such as conceptions of time, that shape the human outlook, Thomas looks to cell biology for many of his examples and extrapolates from the cell some of his key points, such as the simile of the earth as a cell, surrounded by the atmosphere as an enormous cell wall ("The Lives of a Cell" and "The World's Biggest Membrane," Lives).

As writers, both express concerns for the environment, though Eiseley's fear focuses on man's determination to master space and machines, while Thomas, who has served on government commissions, is less abstract, more pointed in his political commentary. Eiseley assumes a supposedly apolitical stance, though his comments on equal
education for the disadvantaged, among others, reveal the
impossibility of his apoliticism (he remarks on more than one occasion
that he might not have qualified to be a member of the student body
that he is addressing). He recalls depression days when the advice of
an old vagrant ("The capitalists beat men into line. Okay? The
communists beat men into line) in the midst of "radical talk" left him
"free of mobs and movements" (ASH 10). Thomas, however, is explicitly
concerned with diminishing government support for basic research.

Stylistically, the two writers differ considerably. Eiseley is
consciously literary, increasingly so in the later collections such as
The Star Thrower. He is prolix, often rambling, concerned with his
own readings of Thoreau and Melville, eager to explore multiple
metaphors in his program of displacing metaphors of struggle and
fixity and machines with natural and simple cultural metaphors. His
sentences are long, sometimes self-conscious ("So poor were we
...", "I slept as the temple slept in the timeless Caribbean sun"
[ASH 263]). Thomas, however, is concise, informal ("I have been
trying to think of the earth as a kind of organism, but it is no go"
(Lives 4). He began writing regular editorial pieces for the New
England Journal of Medicine after a chance essay intrigued an editor
friend. All the essays in the award-winning Lives of a Cell and many
of his later essays appeared first in the New England Journal as brief
musings or extended analogies leading to insights as various as the
implications of human pheromones for human culture or the suggestion
that the first sounds we send into outer space should be Bach's.
Thomas's texts incorporate humorous musings and the serious concern
for man's future that characterizes many scientists, but he is not consciously literary as Eiseley is.

Thomas, like Eiseley, expresses concern for the world that has produced us, but he also expresses a sense of wonder. Thomas calls it "bewilderment" as he addresses, like Eiseley, the notion of "two cultures" and seeks a "single underlying view of the world that drives all scholars":

There is, I think, such a shared view of the world. It is called bewilderment. Everyone knows this, but it is not much talked about; bewilderment is kept hidden in the darkest closets of all our institutions of higher learning, repressed whenever it seems to be emerging into public view, sometimes glimpsed staring from attic windows like a mad cousin of learning. It is the family secret of twentieth-century science, and of twentieth-century arts and letters as well. Human knowledge doesn't stay put. What we have been learning in our time is that we really do not understand this place or how it works, and we comprehend our own selves least of all. And the more we learn, the more we are—or ought to be—dumbfounded. (Night Thoughts 157)

Thomas considers "bewilderment," writes a succinct paragraph about it, and moves on. Eiseley revels in it, seeks the philosophical meaning of not knowing, seeks out examples and metonyms, and worries the subject through narrative, image, quotation, and speculation.

Yet for all their differences, Eiseley and Thomas share the same quest for metaphors of cooperation or symbiosis. A pair of essays may make the point clearer. In "How Flowers Changed the World" (IJ) Eiseley finds a model of cooperation that is responsible for our very existence. He writes with a view to the past and chooses the perspective of looking from space at the earth (IJ 62). His thesis, "Flowers changed the face of the planet," is expanded with a reference to Francis Thompson's line that "one could not pluck a flower without
troubling a star" and the comment that "intuitively he had sensed like a naturalist the enormous interlinked complexity of life" (62).

In painstaking detail Eiseley traces the emergence of creeping green life and the link of higher metabolic rates to the appearance of flowering plants. The encased seeds, with the ability to travel, which flowers brought, marked a new energy source. In the midst of this consideration Eiseley inserts a small personal mystery tale about an exploding wisteria pod that has disturbed him in the night, and as he studies the seeds he reminds himself that "somewhere in here, I think, as I poke seriously at one particularly resistant seedcase of a wild grass, was once man himself" ("How Flowers Changed the World," LJ 70). With the emergence of flowering plants—embryonic plants in little boxes filled with food—plant life traveled and adapted. "All over the world, like hot corn in a popper, these incredible elaborations of the flowering plants kept exploding" (72). Concurrently, specialized insects emerged to feed on the flowers and to pollinate them. The great herbivores appeared, providing food for the carnivores that fed on them. Thus "apes were to become men, in the inscrutable wisdom of nature, because flowers had produced seeds and fruits in such tremendous quantities that a new and totally different store of energy had become available in concentrated form" (75). When the bison and mammoths were gone, the hand of a man-like creature "would pluck a handful of grass seed and hold it contemplatively" in a moment that held the future of man (76).

Without flowers, Eiseley suggests, "man might still be a nocturnal insectivore gnawing a roach in the dark. The weight of a petal has
changed the face of the world and made it ours" (77). Eiseley's model is complex, involving the interlocked energy requirements of animal life and concluding with the synecdoche of "the weight of a petal." But it is a model that emphasizes the interdependence of human and other life forms.

Thomas, in "The Lives of a Cell" and "The World's Biggest Membrane," similarly looks for a model of interdependence. He finds life on the earth anything but fragile. "Man is embedded in nature," he contends, even to the point that "we are shared, rented, occupied" by the mitochondria that are descendants, probably, of primitive bacteria (Lives 2). We are as dependent on them as they on us.

Searching for an analogy for the earth and its inhabitants, Thomas decides that, though the analogy is not perfect, the earth "is most like a single cell" (4). The analogy returns in the last chapter of the collection, in which Thomas succinctly traces the earth's "constructing its own membrane, for the general purpose of editing the sun" (171). If the earth is to be "most like a single cell," it requires a cell membrane: "It takes a membrane to make sense out of disorder in biology. You have to be able to catch energy and hold it..." (170). The sky, he suggests, is essential: "There was simply no other way to go" (174). Like a cell membrane, the sky "breathes for us," and Thomas pursues the simile until he finds security in knowing that this "membrane" protects us from meteorites, which produce, though we can only imagine it, something "like the random noise of rain on the roof at night" (174).
These two essays underscore the similarities and differences in Eiseley and Thomas—the perspective of the archaeologist/paleontologist/historian of science as opposed to the perspective of the cell biologist/immunologist, yet the search for models of cooperation or symbiosis; the complexity versus succinctness; the "literary" style versus the colloquial style. Still, the two as writers have produced texts that have been highly successful in a hybrid genre of scientific popularization. In their continuing popularity, the hybrid genre remains viable.

Notes

1. Edward Manier contends that Darwin's "moral views were not rooted in the individualism of Malthus nor of the English social philosophy articulated by Spencer or by Mill. . . . Rudimentary as they were, his ethical views centered on the 'social instincts' of love and benevolence" (194). Although his studies link Darwin with Malthus, Eiseley does emphasize Darwin's sense of the interlinking of all things, the "net" that holds together man and animal (DC 352).

2. Manier argues that for Darwin the term struggle was ambiguous and that Darwin did develop a concept of chance, though he did not express it forcefully. Nevertheless, Manier concedes that the public perception of the word struggle did not take into account Darwin's ambiguity and that the lack of force in expressing his notions of chance prevented it from gaining attention (5, 181). Whatever Darwin's intentions, the fact is that the public's perception of Darwinian thinking and the perception of "Darwinism" on the part of his followers both include the vehicle of warfare, with its implications of determinism and of a nature "red in tooth and claw" (though, significantly, Tennyson's phrase was published ten years before the Origin).

3. Even Richard Dawkins, who argues in The Selfish Gene that "a predominant quality to be expected in a successful gene is ruthless selfishness," explicitly separates the behavior of genes from the behavior of organisms (2-3). Even if genes code us for selfishness, Dawkins suggests, we can learn to "disobey" such genetic commands on the organismic level (3).

4. For a further treatment of the hand and the philosopheme of concept, thinking in terms of "having," see Ulmer, Applied Grammatology 100, 48.
5. For further discussion of the "theoretical" sense of sight, the "chemical" senses of taste and smell, and associated philosophemes (in the context of Derrida's program of grammatology), see Ulmer, *Applied Grammatology* 34-36.
CHAPTER IV
CULTURAL METAPHORS FOR THE PHYSICAL UNIVERSE

Metaphorical Framework: The Journey

Evolution itself is, then, for Eiseley, not only a concept but a contemporary root metaphor or philosopheme, not only scientific fact but a tool for expression of the "enormous implications" that come from the fact. Since science moves "by the hook of analogy, by the root metaphor," contemporary thinking is necessarily colored by evolution. Just as the fact of evolution assumes a structure, gradually changing, with the old imbedded in the new, with old physical forms embedded in man's present stage, the metaphor of evolution also assumes a gradually changing structure, with old experiences embedded in man's present consciousness; both the physical forms and the referent of the evolutionary metaphor—psychological, social, cultural, and intellectual forms—are constantly changing. But evolution, itself metaphorical, is presented metaphorically—primarily in terms of Eiseley's informing metaphor of the journey.

Eiseley's journey is multifaceted: it begins as a personal journey, with the individual using his own experiences as the basis for knowledge; it thus becomes an epistemological journey. But it is also the journey of life itself, the journey of man the evolved and evolving creature, the human inner journey that leads to culture, a quest (wandering/wondering), a journey of exploration, and the journey
of science. Finally, in a blending of rhetoric and metaphor, the journey becomes a rhetorical technique as the narrator asks the reader to accompany him on a journey into a strange, wavering realm of underwater sight and insight, into a movement backward into time, or into the physical experience of water flowing to the sea. Figuratively, Eiseley's journey has been treated as the "journey of an artist" by several scholars. This multiple use of the journey, a figure from human culture, as metaphor for the physical journey of life is the subject of this chapter.

As I have already established, metaphor itself contains a vehicular philosopheme (metaphor as bus, "taxi" in Greek). Fittingly, this vehicle of thought is a method of transportation of concepts from one discourse to another, specifically, from the discourse of knowledge to the popular audience. The method of metaphor is also a metaphor of method. The sojourn is the classic metaphor for method, and reading is the dominant method of knowledge. In Serres's terms, "Science is the totality of the world's legends. The world is the space of their inscription. To read and to journey are one and the same act" (Jouvences 14, qtd. in Harari and Bell xxii). But one reads (at least Barthes's text of pleasure) as one journeys: "We read a text (of pleasure) the way a fly buzzes around a room: with sudden, deceptively decisive turns, fervent and futile. . . " (Barthes, The Pleasure of the Text 31). What is suggested in this sojourn, in addition to the sense of movement, is that the journey is a spatializing of temporality, a means of dealing with surfaces that can be touched; even the word concept suggests touching, gathering, grouping, holding, grasping, or "taking to oneself" in the mind.
The journey is also the Tao, the Way, the way to enlightenment, in which happiness is achieved through intuitive knowledge and spontaneous action (reflecting, as Fritjof Capra points out, the qualities increasingly evident in the "new" physics: "The Tao is the cosmic process in which all things are involved; the world is seen as a continuous flow and change" [92, 95]). Eiseley quotes the words spoken "in the dreaming Buddhist cities that slowly ebbed away beneath the jungle . . . , 'Thou canst not travel on the Path before thou hast become the Path itself,'" and he explores the notion that "written deep in ourselves is a simulacrum of the Way and the mind's deep spaces to travel" ("The Spore Bearers," IP 77). The journey is clearly a journey of the mind, a journey toward knowledge. It is not, however, a journey toward closure or toward the centered "illumination" of Western thought. The illumination of the Tao is, in Barthes's words, "a panic suspension of language, the blank which erases in us the reign of the Codes," a "state of a-language" or "'awakening to the fact,' apprehension of the thing as event" (Empire 75, 78). As in haiku, "what is abolished is not meaning but any notion of finality . . ." (Barthes, Empire 82). "Mercurial and shifting," man has "at heart no image, but only images," says Eiseley ("The Lethal Factor," ST 263). The illumination of the journey is recurrent, varying; it leads to change rather than to fixity or closure.

The way or path appears epistemologically in Wittgenstein, too, as he addresses the role of the rule that serves as a sign-post on the journey, asking how one is to determine whether to follow the pointing
finger of the signpost or to take the opposite path: "is there only one way of interpreting. . .?" (39). The "rule" or "sign-post" clearly introduces the epistemological question of the "way" of knowing. "Philosophy," Wittgenstein suggests, "is a battle against the bewitchment of our intelligence by means of language," and the aim of philosophy is "to shew the fly the way [as a manner of speaking] out of the fly-bottle" (47, 103)—a notion that Eiseley echoes when he says that, in his days of riding the rails, "the problem was to stay free and buzz out of the fly bottle," though at the time he did not know Wittgenstein and was "spared the knowledge that the real fly bottle was the world" (ASH 46).

Freud, too, uses the sojourn as metaphor for method as he leads the reader from the dream of Irma's injection into the clearing where the path divides and we consider which way to go. The plan, he says in a letter to Fliess, follows

the model of an imaginary walk. First comes the dark wood of the authorities (who cannot see the trees), where there is no clear view and it is easy to go astray. Then there is a cavernous defile through which I lead my readers—my specimen dream . . . --and then, all at once, the high ground and the open prospect and the question: "Which way do you want to go?" (55, n.1)

The question of choice of paths is especially significant in the present context. In Eiseley's popularization of evolution, the underlying question is one of choice of paths: whether to choose the image of the beast, which is the image of man as fixed and determined by his origins, or to choose the image of man as a changing creature who can insert "indetermination" into the evolutionary process and be "more" than he is today. And the path Freud seeks, as in the Tao,
leads through confusion and darkness into the clearing or light of
day, which is itself linked to the word *journey*.

The word *journey* derives from the Latin *diurnum*, "daily portion,"
and ultimately from *dies*, "day," which derives from the Indo-European
*deiw*, "to shine." Thus *journey* is etymologically related to the
notion of the day's traveling, the space covered in a day, the "daily
portion." The journey is a means of giving spatial borders
(touchable, graspable [in the context of the hand and the philosopheme
of concept], tangible) to something that cannot be "grasped"—time.
(Conceptualizing time as a fourth dimension is more difficult than
visualizing it—hence the popular metaphors of time as an arrow or a
cycle.) But the word *journey* is also related to the notion of
luminosity, the traditional root metaphor for understanding. Compare
Heidegger's sense of luminosity when he says, "Freedom governs the
open in the sense of the cleared and lighted up, i.e., of the
revealed" ("Question" 25). In Western metaphysics, as Derrida points
out, metaphors of presence always give "the same circle, the same fire
of the same light that is manifest or hidden, the same turning of the
sun," for

it is to that main item signified in onto-theology that the
tenor of the dominant metaphor will always return: the
circle of the heliotrope. . . . Prior to any determinate
presence or any representative idea, natural light
constitutes a kind of ether of thought and of the discourse
proper to it. ("White Mythology" 68–69)

Further, Derrida links the sun and the journey, which is both interior
and exterior: "The sensible sun, which rises in the East, allows
itself to be interiorized, in the evening of its journey, in the eye
and the heart of Western man. He it is who sums up, assumes, and
fulfills the essence of man 'illuminated by the true light'" (71).
In Paul Ricoeur's words, "By being images for idealization and
appropriation, light and sojourn are a figure for the very process of
metaphorizing and thereby ground the return of metaphor upon itself"
(289). The sun is linked not only to the journey or to metaphor as
method or to the metaphor of the sojourn, but to all metaphors of
light or looking, to the philosopoheme of seeing.

The journey is, then, a wandering, an *errance*, which derives from
*errare*, "to wander, err, go astray," or "to wander about, looking for
something" (Thomas, *Medusa* 24). It is in *errance* that the journey of
knowledge finds perhaps its greatest rewards. It is particularly
relevant that, in the sense of error, the little mistakes in DNA,
which are the "wandering" of evolution, have brought us to where we
are. "The capacity to blunder slightly," says Lewis Thomas, "is the
real marvel of DNA. Without this special attribute, we would still be
anaerobic bacteria and there would be no music" (*Medusa* 23). When,
despite its amazing fidelity in copying, the DNA-copying mechanism
makes minute mistakes, "it is ultimately these mistakes which make
evolution possible," Dawkins notes (18). Whether in evolution of
forms or in evolution of knowledge, the factor of *errance* is basic to
the journey.

The journey as a metaphor for method or as a point of
organization is as old as literature (Derrida would say as old as
metaphysics). Homer, Dante, Chaucer, Cervantes, and Bunyan all used
the journey. Eiseley's journey, however, is closer to Odysseus's
journey than to Dante's or Bunyan's. Dante, of course, is guided
through each portion of his journey. Dante's rigidly teleological world view makes the guide, purpose, and destination imperative.

Chaucer's pilgrims, too, had a destination, although, like Odysseus and the Wife of Bath, they knew much of wandering by the way.

Bunyan's wanderer has a definite goal; in his world, "progress" toward the destination is essential. Cervantes' questing knight and Odysseus, sidetracked and wandering, moving in a "day's journey" at a time, are more apt models for Eiseley's journey, as is Michel Serres's notion of the _randonée_, the random movement.

Maurice Blanchot links the journey with literature itself when he writes of "the reality of literature" as "the illusion of infinity" ("Literary Infinity" 222), referring to the literary journey as "the fact of being on the road without the possibility of ever stopping" and comparing the traveler on this road to the wanderers in the Biblical wilderness:

> To the regulated, regular man a room, a wilderness and the world are precise, well-defined spaces. To the nomadic, labyrinthine man, condemned to wander on a journey which is inevitably a little longer than his life, the same space will be truly infinite even when he knows—and the more so when he knows—that it is not. (222)

Blanchot's "journey has neither starting point nor start; even before starting it restarts, before finishing it is already harking back" (222). In the notion of the world as book and the book as the world, Blanchot finds an "innocent tautology" that brings "terrifying consequences" (222-23).

And because the Eiseleyan journey is also epistemological, this random journey becomes a model for the way we learn—stopping, starting, moving sometimes without direction, wandering and wondering
and open to discovery (at least until a "professionalized" or organized body of knowledge draws a circle around itself and thus restricts exploration). Eiseley's notion of a daily portion of travel is apt. His journey is not a movement toward a fixed goal, not a teleological movement. Its vehicle is evolutionary change, movement through "unexpected" rather than predetermined stages, a quest whose object is unknown. But the Heideggerian sense of the "cleared and lighted up" of freedom is also apt. The nineteenth century, which Eiseley studied thoroughly for Darwin's Century, clung to teleological notions even while accepting evolution. Even Darwin in the Origin made a polite bow to orthodoxy when he wrote of natural selection acting for the good of each and tending toward perfection ("Man Against the Universe," ST 15). And twentieth-century thinking, Eiseley submits, often refuses to see man as other than the ultimate product. The Eiseleyan journey is a journey into the unexpected, a journey without specific direction, a journey of freedom of becoming and discovering. Carlisle stresses Eiseley's journey as a means of implying both "quest and discovery" ("Heretical Science" 362).

Eiseley often refers to the journey of Odysseus and portrays life as wandering, encountering the unexpected, becoming. As Charles Feidelson suggests of Melville's memorable voyage, this "journey is nothing but the progressive unity of the voyager and the land he enters; perception, which unites the seer and the seen, is identical with the real process of becoming" (18).

Eiseley begins with the evolutionary journey of mankind. In "The Slit," the first essay in The Immense Journey, the narrator descends into a slit about as wide as his own body, until the sky itself
becomes a mere slit. As he chisels around the skull of an animal and thinks of the human journey as symbolized by the hand, the narrator rejects seeking a "meaning" for the journey:

Perhaps there is no meaning in it at all . . . save that of journey itself, so far as men can see. It has altered with the chances of life, and the chances brought us here; but it was a good journey—long, perhaps—but a good journey under a pleasant sun. Do not look for the purpose. Think of the way we came and be a little proud. (6-7)

In this statement are some of the themes that will recur throughout the texts: evolution as a journey, the chance that produced human life, continuing change, and the length and pleasantness of the journey. These are the elements of evolution that man can feel pride in. This journey displaces the warfare and determinism—either natural or supernatural—stressed in the nineteenth century and the notion of fixity, or man as the purpose of the journey.

The Slit, the narrator thinks, is a symbol of "a dimension denied to man, the dimension of time," for man is "rooted in his particular century" (11). Though he sees into the past and imagines into the future, man's knowledge is limited, and he has simply "joined the caravan"; as participants, "we will travel as far as we can, but we cannot in one lifetime see all that we would like to see or learn all that we hunger to know" (12). Then in a rare direct address to the reader, Eiseley explains the purpose of the book, which will be the purpose of his other collections of essays. He points the reader directly to the epistemological dimension of the journey as he warns that these essays are "a somewhat unconventional record of the prowlings of one mind" (12-13). Then he explains the personal journey:
Forward and backward I have gone, and for me it has been an immense journey. Those who accompany me need not look for science in the usual sense, though I have done all in my power to avoid errors in fact. I have given the record of what one man thought as he pursued research and pressed his hands against the confining walls of scientific method in his time. It is not, I must confess at the outset, an account of discovery so much as a confession of ignorance and of the final illumination that sometimes comes to a man when he is no longer careful of his pride. . . . I can at best report only from my own wilderness. (13)

Echoing the archetype of man wandering in the wilderness (Freud's reader lost among the authorities who cannot see the trees or the Biblical wandering), Eiseley claims to report only from his own figurative wilderness, which returns us to the epistemological quest that underlies the journey. Thus the evolutionary journey begins as synecdoche, with one man's journey which soon becomes the journey of all men, both as evolution and as experience. It is a journey of knowing and not knowing, with the individual often in what Kassebaum calls the dominant role of man as a castaway (5). But although man may be a castaway, the individual's vision is unique and, in the context of popularization, worth sharing: "On the world island we are all castaways, so that what is seen by one may often be dark or obscure to another" (Eiseley, "The Slit," LJ 14). In concluding the statement of purpose, Eiseley disavows any pretense of recording, "in Baconian terms, a true, or even a consistent model of the universe," for what he presents is only "a bit of my personal universe, the universe traversed in a long and uncompleted journey" (13).

Though the journey is incomplete and man is often a castaway, Eiseley finds a feeling of security in the very incompleteness of the journey, knowing that nature is "still busy with experiments, still
dynamic, and not through nor satisfied because a Devonian fish managed to end as a two-legged character with a straw hat" (47-48). The dynamic quality of the evolutionary journey leads Eiseley as narrator to a sense of sharing with whatever creature he happens to encounter. In "The Angry Winter," the narrator leans on a fence post and exchanges stares with a western jack rabbit, aware that they have "both come across a way so immense tht neither my immediate journey nor his seemed of the slightest importance" (IJ 118). Later, with a similar feeling of one form for another, the narrator identifies with a girl who seems to be "the last Neanderthal," seeing her as "a creature so far back in time it did not know it represented tragedy," a creature whose home "lay somewhere in the past down that hundred-thousand-year road on which travel was impossible" ("The Last Neanderthal," UU 226). And through Odysseus Eiseley introduces the bond beyond the boundaries of form as he writes of Odysseus and the dog Argos retaining "both the recognition of diversity and the need for affection across the illusions of form" ("The Ghost Continent," UU 23). It is "that empathy clinging between man and beast" which "asserts our unity with life and . . . establishes, in the end, our own humanity. One does not meet oneself until one catches the reflection from an eye other than human" (24). Awareness of the incompleteness of the evolutionary journey thus leads Eiseley to suggest a greater empathy between unlike forms, all involved in continuing flux.

The evolutionary journey is also a cultural journey, in what George Gaylord Simpson calls the "new" evolution. A recurrent Eiseleyan motif is the potential of man, whether realized or not.
What he calls "latency" is perhaps the most fascinating part of the journey:

Tomorrow lurks in us, the latency to be all that was not achieved before. This is what led proto-man, five million years ago, to start upon a journey, at a time when night and day were strange and miraculous. . . . It was for this that man adorned his caverns in the morning of time. It was for this that he worshiped the bear. For man had fallen out of the secure world of instinct into a place of wonder. That wonder is still expanding, changing as man's mind keeps pace with it. ("Man Against the Universe," ST 221)

The wonder that marks the beginning of the journey also marks the present stage of the journey for the sensitive human being; it is one of the marks separating man from animal, and it exists because of and through language. Bacon's "inner" journey, the journey of consciousness, depends on the ability to verbalize. And "latency" is, of course, another way of expressing the lack of determinism in the journey. Building on Wallace's explanation, Eiseley emphasizes that the human brain makes possible the escape from the determinism of nature and the insertion of "indeterminism" into the journey. Again, the journey as Eiseley construes it is a displacing metaphor; fixity and determinism are displaced for chance and indeterminacy or "latency." The random journey replaces the warfare in nature as metaphor and model. The implications of this view of man's part in the process are, of course, significant. Aware of our role in determining the future, we may think of the kind of future we will create.

The journey is also the journey of science. In Darwin's Century Eiseley writes of early students of time and life as "time voyagers" who construct a "pirate chart." Darwin himself was a literal voyager
as well as a sojourner in libraries, and his observations made during the voyage of the *Beagle* filled the notebooks that made possible his figurative, intellectual voyage of discovery. Both Darwin and Wallace were travelers who were "profoundly impressed by what they had seen with their own naked eyes and with the long thoughts that come with weeks at sea" (DC 148-49). As a result of his literal and intellectual journeys, Darwin was able to formulate his contribution to the journey of science.

Carlisle notes Eiseley's references to scientists as explorers and suggests that just as explorers try "to piece together the charts and maps of unknown seas," nineteenth-century scientists tried "to piece together the theory of evolution" ("Heretical Science" 362). The metaphor, says Carlisle, suggests that scientific discoveries are "pieced together from the results of uncertain thrusts into the unknown" (362). Continuing the epistemological thrust, Carlisle finds in the metaphor a suggestion of how "new theories function"—as "new maps or charts of experience that enable us to understand the world more clearly" (362). Thus the metaphor is the method—and the message. And Carlisle observes that the journey metaphor suggests "the adventure, risk, and mystery characteristic of scientific search and discovery" (362). Finally, science, like a journey, requires "personal passion, commitment, and risk" (363). But the metaphor does more than parallel the piecing together of ideas or the adventure of an intellectual journey; journeys are made by men, and Eiseley's treatment of science suggests that the scientific journey is still a journey of man, that scientific "truths" are "still human constructions that are fundamentally personal and provisional"
(Carlisle, "Heretical Science" 363). As do most of the other metaphors, the journey thus begins in Darwin's Century, and its implications are established there, though the work on The Immense Journey was concurrent.

For Eiseley, the journey of science requires reflection now more than ever, and he is most critical of the thrust of contemporary science in The Invisible Pyramid. He quotes a seventeenth-century writer who reminds us that "traveling long journeys is costly, at all times troublesome, at some times dangerous" ("The Spore Bearers," IP 87). But although this writer referred to journeys of exploration to uncharted lands, Eiseley links the words directly to the journey of science as an epistemological journey. The cultural model that Eiseley uses for the contemporary scientific journey is the pyramid. He sees contemporary man as obsessed with space, to the point that the reaching for space seems almost part of his evolutionary nature, and he compares the space enterprise with the building of the Egyptian pyramids:

Into the organization of this endeavor has gone an outpouring of wealth and inventive genius so vast that it constitutes a public sacrifice equivalent in terms of relative wealth to the building of the Great Pyramid at Giza almost five thousand years ago. Indeed, there is a sense in which modern science is involved in the construction of just such a pyramid, though an invisible one. (87)

The pyramid is an artifact in one culture's quest for knowledge of the unknown, for immortality. The "invisible pyramid" is another culture's quest for the unknown. Both are artifacts of the epistemological journey, with the contemporary pyramid linked to the journey of science: "Science, too, demands great sacrifice,
persistence of purpose across the generations, and an almost religious devotion. Whether its creations will loom to future ages as strangely antiquated as the sepulchres of the divine pharoahs, time alone will tell" (87). Linked explicitly to death, the pyramid of the scientific journey into space becomes another sepulchre of another culture. But man by his very nature must continue the journey, for man is not its end. The metaphor is from culture, but it describes what Eiseley projects as a kind of biological necessity, seemingly almost a destiny for space exploration (86).

The literary analogue for the multifaceted Eiseleyan journey is the voyage of Odysseus, the voyage filled with unexpected adventures and loss of a sense of direction or purpose. Odysseus, who at one point refers to himself as "Nobody" and who is both "Nobody" and "Everybody," in the opening of The Unexpected Universe "represents the human journey toward eternity" ("The Ghost Continent" 7). Later Eiseley tells us that "the Odyssean voyage stands as a symbol of both man's homelessness and his power" (UU 24).

The word odyssey interpenetrates the texts, appearing not only in reference to Homer's hero, but as a common noun, a synonym for journey. In the Eiseleyan journey, man himself is the quest hero, as Auden has noted (Introduction, ST 18); the common man parallels the common noun. In Darwin's observations Eiseley finds "the product of two odysseys, not one" ("The Golden Alphabet," UU 130). The first odyssey, of course, was the voyage of the Beagle. The second journey was another journey of knowledge—this time "groping through webby corridors of books" (130). The mental and cultural journey is solitary and mysterious; and at any point in evolution, the "magical
self-delineating and mind-freezing" word man could, if there had been such a word, "have held us hanging to the bough from which we actually dropped" ("Instruments of Darkness," NC 54). But always "man" overcomes the barrier because of his capacity for inner journeying: "Man is not man. He is elsewhere. There is within us only that dark, divine animal engaged in a strange journey— that creature who, at midnight, knows its own ghostliness and senses its far road" (54).

The Odyssean voyage, like the Eiseleyan "journey" of a writer, is the symbol of the individual, human, epistemological, and creative journeys. Blanchot finds Odysseus in every writer—Odysseus as creative, erring, wandering man. Tied to the mast, Odysseus hears the sirens' "imperfect" song, which draws him "towards the space where singing really begins" ("The Sirens' Song" 59). The practical Odysseus, who listens but devises his means of avoiding the sirens, is nevertheless lured "to undertake the successful, unsuccessful journey which is that of narration," to make a song that is "ode made episode" (61). "Art requires," says Blanchot, "that he who practises it... should become other, not another, not transformed from the human being he was into an artist with artistic duties, satisfactions and interests, but into nobody, the empty, animated space where art's summons is heard" ("Where Now? Who Now?" 197). Blanchot's Odysseus is exiled man whose exile is his essential condition. Like the Eiseleyan wanderer, he has but one rule: "to avoid the slightest allusion to a purpose or a destination," and he experiences "not the event of the encounter become present, but the beginning of that endless movement which is the encounter itself" ("The Sirens' Song"
61, 65). Without destination, wandering, Odysseus moves toward the infinite space of creativity itself. The journey of the artist is an "immense journey."

With the Odyssean voyage, Eiseley draws together the evolutionary, individual, human, epistemological, scientific, and creative journeys. His most comprehensive treatment of the Odyssean voyage comes in "The Ghost Continent" in The Unexpected Universe, in which Eiseley is willing to "claim no discoveries [but] . . . only the events of a life in science as they were transformed inwardly into something that was whispered to Odysseus long ago" (3). He divides the essay into three parts—the first establishing Odysseus and his journey as a model, the second treating "the Odyssean voyages" of eighteenth- and nineteenth-century science (9), and the third linking the Odyssean voyage of science with contemporary science through images from a Scandinavian "crossroads religion" (19) contemporary with Homer.

Eiseley compares Odysseus' journey to man's journey among "the shape-shifting immortal monsters of his earlier wanderings," which now "assume more sophisticated guises" ("The Ghost Continent," UU 4), with his treatment of the Odyssean journey becoming allegory in Frye's terms as he indicates how we should perceive the relationships. He links the Odyssean journey to the physical and epistemological voyages of man when he says that it "can be read as containing the ingredients of both an inward journey of reflection and an outwardly active adventure" (4). And in the technological world of this century, Eiseley finds that "all the psychological elements of the Odyssey are present to excess: the driving will toward achievement, the
technological cleverness crudely manifest in the blinding of Cyclops, the fierce rejection of the sleepy Lotus Isles, the violence between man and man" (5). Odysseus himself "represents the human journey toward eternity" (7) and the tension between desire for "illimitable knowledge" and yearning for "a lost world of inward tranquility" (5).

In this context, Eiseley compares Odysseus to Cook and Darwin, both the scientific voyagers who made journeys "as irretraceable and marvel-filled as any upon the lost sea charts of Odysseus" and who both found "another world" ("The Ghost Continent," UU 12). Eiseley's thesis concerns the "inner world," for "every man contains within himself a ghost continent" (3), which he circles with the same caution Cook used in circling Antartica. It is the link between this "ghost continent" within and the historical voyage of Cook and the physical voyage of evolution that Eiseley emphasizes. Linking the Odyssean voyage with Darwin's and Cook's voyages and with the voyage of science leads Eiseley to a parallel with how people react today to science. They "frequently turn to science for such knowledge of the hazardous future as can be gained by mortals," whereas in Homer's time the dead were thought to have such information (10). Like Odysseus, Cook "came to a land of Cimmerian darkness" (12), a "ghost continent" reminiscent of Homer's sunless lands. Darwin came to the "Encantadas," the Enchanted Isles, as Odysseus had come to Circe's island, where his crew were changed into pigs. In the Encantadas "the whole Circean labyrinth of organic change was precipitated upon the mind of man. What had appeared to Odysseus as the trick of a goddess was, in actuality, the shape shifting of the incomprehensible universe itself"
(15). The shape-shifting world of Odysseus, then, is figuratively the shape-shifting evolutionary world, and the effect on the human mind is not unlike the effect of Circe's tricks on Odysseus' crew, for Darwin found that all life could be changed by "a power hidden in time and isolation . . . into wavering shadows" (15).

But in the Odyssean analogue Eiseley finds one other point: the tendency of the mind to turn "homeward, seeking surcease from outer triumphs" ("The Ghost Continent," UU 18). For this analogue Eiseley turns to Giovanni Pascoli's "Ultimo Viaggio" (1904). Pascoli treats Odysseus' return home as an anticlimax. His Odysseus sets off to retrace his path, "the journey of all men down the pathway of their youth, the road beyond retracing"(18), only to find the obstacles merely trifles. "The nostalgia of space," Eiseley suggests, "which is what the Greeks meant by nostalgia, that is, the hunger for home, is transmuted by Pascoli into the hunger for lost time, for the forever vanished days" (18). In Pascoli's conclusion the waves take the dying Odysseus to Calypso, who hides him with her hair. At last "'Nobody' has come home to Nothingness" (18). Eiseley thus concludes the second part of the essay with the mind's sojourn, specifically its turning toward home. The journey ends in a return to nothingness, but within the calm of understanding. The Sirens do not sing for Pascoli's Odysseus, but he understands them, aware that "knowledge without sympathetic perception is barren" (18).

From Odysseus' journey as the model of the evolutionary journey and the journey of scientific knowledge as represented by Cook and Darwin, Eiseley turns to another journey from folklore—a Scandinavian tale from a time approximately contemporary with Homer. This metaphor,
also expanded to allegory in Frye's and Fletcher's definitions, involves "a strange crossroads religion"—a phrase that evokes further metaphorical associations of crossing of "paths" of cultures. In the tale an earth goddess rides through the forests in an enormous coach, wandering and only pausing with drawn curtains at villages where the poor and ignorant live. Priests and followers come before the coach, but none can look behind the curtains or speak to the coachman or touch the oxen that draw the coach. A ritual is performed, and a human sacrifice is cast into the bog, whereupon the coach moves on over untamed heaths. Haunted by the image, Eiseley suggests in a dreamlike sequence that "the same awkward coach still lurches through the darker hours of our assembled scientific priesthood" ("The Ghost Continent," 19-20). The coach is the vehicle of science itself (the vehicle of understanding is itself vehicular), which has become our version of the primitive "strange crossroads religion":

Suppose that in the ancient car there sits in one age the masked face of Newton, his world machine ticking like a remorseless clock in the dead and confined air; or suppose that Darwin lurks concealed behind the curtains, and all is wild uncertainty and change in the misty features of his company; or that Doctor Freud looks coldly and contemplatively down upon a sea of leering goblin faces. Or is it the Abbe Lemaître's followers who hear the alternate expansion and contraction of nature's pounding heart, like a rhythmic drum amidst the receding coals of the night start? Or imagine that, silhouetted gigantically in the fierce rays of atomic light streaming from the carriage, four sinister horsemen trample impatiently.

Suppose, I think, . . . the figure in the coach is a changeling and its true face is no face, as Odysseus was "no one" until he shouted a vengeful name before the Cyclops. Or deduce that behind the concealing drapery, hooded in a faceless cowl, there is caught only the swirling vapor of an untamed void whose vassals we are. (20)
In this "ancient car" (science itself has its origins in questions as ancient as those of the voice in the whirlwind questioning Job), the face is "No Face," and "we" are the acolytes, "toiling in a hundred laboratories with our secret visions of what is, or may not be, while the wild reality always eludes our grasp" (21). The threads of the dreamlike sequence are the mechanistic world view, the frightening world of the unconscious that remains unknown, the beginning of astrophysics, and the apocalypse of the atomic era. The figure in the coach is a changeling—a frequent Eiseleyan term used especially in the Renaissance to denote a child secretly exchanged for another by fairies. Archaic meanings, however, form a palimpsest for the word; once it referred to a fickle, changeable person or to a simple-minded person. In the use of changeling in the present context there is also the play on change, which derives from the Indo-European root skamb-, "to curve or bend." In Celtic camb- refers to "a turning" and in Late Latin cambiare means "to exchange." The word carries an intricate texture of exchange, turning, curving, changing, even simple-mindedness (which could be turned into a charge, in many of Eiseley's contexts, against the scientific establishment). The face of the changeling is "no face," just as Odysseus was "no one" until he declared an identity. Or perhaps "we"—followers of science—only serve the uncontrollable spiral of nothingness, whose "center cannot hold," in Yeats's words, in contrast to the centering and circling of traditional metaphysics. "It is almost as though man had at heart no image but only images..." Eiseley says elsewhere ("The Lethal Factor," ST 263). Linking the folk tale to the Odyssey, Eiseley refers to Homer's classic as "the world of the folk tale" and "the
arena of uncertain violence that confronts man on the voyage of life" ("The Ghost Continent, UU 21).

In the twentieth century, Eiseley notes, some have portrayed Odysseus "as a symbol of the knowledge-hungry scientist" ("The Ghost Continent," UU 23). Yet he turns to Circe's warning about "magic" as the source of its opposite. "Magic" is essential in the journey of knowledge.

But, as scientists, we have sometimes forgotten the inward journey so poetically expressed by Pascoli in 'The Last Voyage,' that inward journey whose true meaning was long ago expressed by Circe's cryptic warning. "Magic cannot touch you," she had said to Odysseus, but today we know that the heart untouched by the magic of wonder may come to an impoverished age. (24)

The Odyssean journey is, for Eiseley, "a symbol of both man's homelessness and his power" (24), and in that journey man needs the "magic" of wonder and the empathy of Odysseus and Argos. The Odyssean journey, then, is at once the journey of life itself, the "inner journey" or the journey of knowledge, and the journey of culture, which includes the journey of science. As a model of a random journey, with byways and unexpected adventures, it is a model that displaces the fixity and determinism and teleology often associated with Darwinian thinking.

But Eiseley also turns to other literary journeys as allegories for the physical journey and the scientific journey. Melville's Ishmael is another allegorical wanderer; he is also "the wondering man, the acceptor of all races and their gods" ("Science and the Sense of the Holy," ST 199). Ishmael, "namesake of a Biblical wanderer" (198), is juxtaposed to Ahab in an exploration of the quest for
knowledge, particularly in the context of science. In *Moby-Dick* Eiseley finds a condensed form of the pursuits of wondering/wandering man, for "reduced to the deck of a whaler out of Nantucket, the old immortal questions resound, the questions labeled science in our era" (198). Ahab is not the pursued but the pursuer; if the whale is evil, "it cannot be personalized" (198). Ahab, who in his frantic pursuit of the whale strips himself of his humanity, represents "the hidden obsession that lies at the root of much Faustian overdrive in science" (198-99). Only Ishmael, the wanderer, not the pursuer, can provide a counter-model as he gives "a magnificent picture of the peace that reigned in the giant whale schools of the 1830s"; and only Ishmael can say, "Deep down . . . there I still bathe in eternal mildness of joy" (199). Though "the tale is not of science," still Eiseley suggests that "it symbolizes on a gigantic canvas" the broad view of the poet and the narrowness of the monomaniacal side of science bent on a single object (200). And the essay ends with another juxtaposition of disparate journeys—a combination of the archetypal machine of the nineteenth century and the flower that Eiseley repeatedly associates with primitive men and primitive ways, the sunflower. All summer he has watched a sunflower growing on some clods atop a boxcar, only finally to begin a new journey as the boxcar is linked to a train. The sunflower, he knows, will not survive, but the seeds will be scattered for miles. For Eiseley they are travelers like Ishmael and can say with Ishmael and the narrator, "I only am escaped to tell thee" (201). From the journey of Ishmael, the wandering/wondering man, to the journey of a flower—and we recall Eiseley's synecdoche of the flowers that changed the world—the journey of science (through
Ahab) or of knowledge is linked to the physical journey of man and the journey of life. Human intervention is omnipresent. The sunflower is growing in the unlikely spot atop a sidetracked boxcar that only in late summer becomes part of a train, but it is growing. The sunflower is life itself, surviving thus far in spite of mechanical intervention, wandering because of mechanical intervention, and able like Ishmael to say, "I only am escaped to tell thee."

The journey, then, is the metaphor, and the metaphor is the method (metaphor itself is a transfer, a displacement, a journey) of exploring the physical journey of evolution and the mental and physical journey of knowledge. Eiseley's is an epistemology of journeys, a heuristic of intersections between disparate metaphors from diverse fields of knowledge, a displacement of metaphors of struggle and fixity with a random journey and its accompanying metaphorical intersections.\(^2\)

**Cultural Metaphors Within the Journey**

Along the journey of evolution and of humanity, other figures appear. Like the journey, these figures come from the cultural, though they apply to the physical. Cultural metaphors such as the theater and the artist's relationship to his material help to displace metaphors and notions of fixity at any evolutionary stage and to provide an image of man's relationship to his environment. The most frequent cultural metaphors, however, are figures for contingency. One such figure is the trickster, and other metaphors involve games of chance such as dice games, or magical and alchemical practices. These figures for chance reinforce the lack of a fixed goal for evolution
and emphasize the random turns that life itself has taken, thus displacing traditional metaphors of teleology and determinism.

Teleological evolution, as we have seen, seems much more acceptable to the popular mind than nonteleological evolution, and even Darwin suggested the teleological goal of producing man (apparently nineteenth-century northern European man). With the figures for contingency, Eiseley repeatedly introduces the lack of direction in evolution, the fortuitousness of any present condition, and the certainty that chance and change will combine to produce ever new conditions and forms of life—so long as man's interference does not totally destroy life itself. Darwin used the irregularly branching tree as a metaphor for the "tortuous multiformity" produced by the workings of chance, and the image includes dual aspects of nature—"some harmonious and pretty, others wild and ugly"—so that the image itself involves "a certain cosmological cast" (Gruber 126-27). Gruber cites Darwin on the points embodied in the irregularly branching tree: "fortuitousness," "irregularity," "explosiveness" (and the need to control it—an attitude in line with Victorian thought), and life's "complex interconnectedness" (127, 130).

Although Eiseley occasionally appropriates the tree image ("the weird tree of Igdrasil" ["How Natural Is Natural?" FT 168]) to express the interrelatedness of all life, his contingency figures reflect his own broad view of the "fortuitousness," "irregularity," and "explosiveness" in the cosmos. For all his admiration for Darwin's work, Eiseley finds Darwin somewhat too timid, too Victorian in his tendency to search for teleology. The "blind spot" that Eiseley finds
in Darwinian thinking is not only its Malthusian emphasis on struggle (DC 182) and the tendency to weave even into the *Origin of Species* a "powerful expression of the utilitarian philosophy of his time," to emphasize "selfish motivation," and to overlook the human ability to cooperate, but also the failure to emphasize the brain as "an organ of indetermination" (DC 348-49). The contingency figures are essential to his subversion of deterministic and teleological views. Man is "a reservoir of indeterminism" (350), says Eiseley.

**Trickster**

Contingency appears as the trickster, representing chance and changing form in a primitive ceremony:

> It is as if at our backs, masked and demonic, moved the trickster as I have seen his role performed among the remnant of a savage people long ago. It was that of the joker present at the most devout of ceremonies. This creature never laughed; he never made a sound. Painted in black, he followed silently behind the officiating priest, mimicking, with the added flourish of a little whip, the gestures of the devout one. His timed and stylized posturings conveyed a derision infinitely more formidable than actual laughter. ("The Star Thrower," UU 77)

The trickster mimics order; he is the figure of disorder that postures behind those, such as the priests, who would assume or impose a fixed order. The trickster is a cultural figure, but he represents both an element of external nature and a part of human nature. Remembering the landscape of his boyhood, Eiseley recalls the frequent tornadoes or "twisters" as a "contingent aspect of that landscape" and "the trickster part of an otherwise pedestrian landscape" (74-75). It was this trickster aspect of nature that led families such as Eiseley's to forego planning for fear of inviting what seemed a malevolent force that would persecute those who planned. But the trickster aspect of
the landscape has its counterpart, Eiseley suggests, in the human
mind's dualism, often treated in terms of good and evil or chaos and
antichaos.

Since form is an illusion and identity is a dream, whatever form
we hold, the trickster remains to remind us that "we are process, not
reality, for reality is an illusion of the daylight—the light of our
particular day" ("The Star Thrower," UU 76). The trickster element in
nature or in man is always there to mimic those who would assume the
fixity of form or would establish order. Even the narrator as he
writes feels the trickster gesturing behind him, mocking order and
fixity.

The trickster easily translates into a modern context. Not to be
ignored, contingency forces itself upon even the most self-assured
individual. Gesturing, posturing, "the dance of contingency, of the
indeterminable, outwits us all" ("The Star Thrower," UU 77). Thus the
primitive trickster is expanded into an allegorical figure as the
narrator delineates his significance:

In the moment when I had witnessed that fireside per-
formance I knew with surety that primitive man had lived
with a dark message. He had acquiesced in the admission
into his village of a cosmic messenger. Perhaps the
primitives were wiser in the ways of the trickster universe
than ourselves. . . .

. . . There was a shadow I could not henceforth shake
off, which I knew was posturing and would always posture
behind me. (77)

By admitting the trickster into their culture, the primitives were
able to live with contingency as a threatening figure and a humbling
figure. The magic of folklore recognizes the instability of forms.
Thus folklore
had long toyed symbolically with what the nineteenth century was to proclaim a reality, namely, that form is an illusion of the time dimension, that the magic flight of the pursued hero or heroine through frogskin and wolf coat has been, and will continue to be, the flight of all men. (78)

Although form, once it has appeared, struggles to hold its identity, the trickster contingency is always at its back. What the primitive culture incorporated and lived with, Eiseley suggests, modern cultures shut out. But the image of the trickster is inextricably linked to nature, to science, and to the unconscious in Eiseley's text.

Science, as part of the human journey, has brought man to a "region of terrible freedoms," where he has created tools that give him independence from nature, but cannot control the "ambivalent nature" of these tools. They—and perhaps science itself—are tied to the trickster part of man, "linked intangibly to the subconscious poltergeist aspect of man's nature" ("The Star Thrower," UU 81), which Eiseley has already established as the counterpart in human nature to contingency in the external world.

Applied to science itself, the image of the primitive, posturing trickster is incongruous, startling. Eiseley has already established that modern scientists have become a kind of priesthood. Science, modern man believes, pursues a steady path toward greater knowledge. But the priesthood that Eiseley equates with science undermines the hierarchical popular notion of science as "knowledge." In Eiseley's allegory, solemn science is mimicked by the trickster contingency. With each scientific illumination, "huge shadows leaped triumphantly," in a "magnified but clearly recognizable version of the black
trickster's antics behind the solemn backs of the priesthood" ("The Star Thrower," UU 81-82). The single difference is that the shadows no longer resembled the human form, and "no societal ritual safely contained their posturings, as in the warning dance of the trickster" (81-82). The trickster, a disparate image superimposed onto stable, progress-minded modern science, is a figure undermining its power over the popular mind.

The figures who released these enormous shadows, Eiseley says, were Darwin, Einstein, and Freud, though Bacon had anticipated the dual nature of science. Thus the trickster's shadow looms over studies of nature, of the physical world, and of the unconscious. But for Eiseley, the most frightening significance of their discoveries is "that at their backs the ritual figure with the whip was invisible. There was no longer anything to subdue the pride of man" ("The Star Thrower," UU 82). Primitive cultures, with their visible, humbling trickster, had what modern man does not have--an image to humble the hubris of science. Despite the magnitude of Darwin's insights, Eiseley notes specifically that the emphasis on the warring side of nature has been so great "that the sign of the dark cave and the club became so firmly fixed in human thinking that in our time it has been invoked as signifying man's true image in books selling in the hundreds of thousands" (84). Freud, too, released shadows from the unconscious--shadows "as real as anything that haunted the natural universe of Darwin" (84). Einstein, of course, released the shadow of the instability of matter. But the point is the trickster's invisible posturing behind the modern scientific priesthood.
The trickster reappears as the humbling figure of contingency in *All the Strange Hours* when Eiseley describes a rat that danced behind him at a professional meeting, gaining the audience's attention:

Wasn't it I who had once written that there was a trickster in every culture who humbles what are supposed to be our greatest moments? The trickster who reduces pride, Old Father Coyote who makes and unmakes the world in a long cycle of stories and, incidentally, gets his penis caught in a cleft pine for his pains. 

... I laughed but the trickster always brings pain. (11)

The trickster, then, "reduces pride," but Eiseley links the figure with time and contingency and disorder. He recalls himself as the dancing rat and says of the trickster that appears figuratively at "every funeral," "Only the old people from the silent ciff houses and the horse people of the plains had known and institutionalized him—the backward dancing man, the caricaturist of order" (12). The trickster, present in all solemn situations, is formalized in only a few cultures, but as "caricaturist of order," as the contingency that mocks humankind even in its solemnity, the trickster remains.

The trickster appears again in *All the Strange Hours* in a dream-like sequence that comes after the narrator has been on a frightful ride through the Sierra Madres with Manuel, a Latin whose frank espousal of *machismo* has led him on a reckless drive accompanied by much discussion of *cojones*:

Nights later, in a powerful dream by the campfire, a gigantic hooded figure like that of a monk sat on a log opposite me. He made no move. Still he raised his cowled head at my uneasy stare. Beneath the hood there was no face, nothing, merely a chill like the void. I endured the moment unafrightened. The compulsion to look had come from me, had been projected, as it were, from my own darkness. I had been drawn relentlessly to peer beneath the cowl. (220)
Coming in the context of discussions of *la vida*, metaphysics, and *cojones*, the hooded figure is ignorance, a symbol of man's not knowing and a reminder of change and contingency strangely like the earlier trickster, linked to the journey by Bunyan's words, "ignorance followed" (220). The dream that follows his discussion of *la vida* with Manuel leads him to link the figure with time. As "ignorance" or emptiness, the trickster contingency, the mocking figure of time and change, returns like the faceless figure in the Scandinavian myth, to stir doubt or to humble *hubris*.

**Games of Chance**

The importance of chance in Eiseley's cosmogony—whether in nature, in the course of an individual life, or in all life—determines another set of metaphors in the texts. From the earth's atmosphere, to the emergence of man, to genetic recombination, chance is dominant. The emergence of the human brain's linguistic centers has broadened chance, for "the spectrum of man's possible social behavior has widened enormously" ("The Unexpected Universe," *UU* 38). What concerns Eiseley is "the range of [man's] possible behavior" (38).

In a sense, man turns chance back upon itself. Even in 1897, the British naturalist D'Arcy Thompson saw an effect of man on chance itself, suggesting that, with the emergence of industrial man, "contingency itself is subjected to a kind of increasing tempo of evolution" ("Strangeness in the Proportion," *NC* 135). Thompson saw this increase in pace as "a sort of evolution of chance, an ever-increasing complexity of accident and possibilities. One wave started
at the beginning of eternity breaks into component waves, and at once
the theory of interference begins to operate" (Qtd. in "Strangeness in
the Proportion," NC 135). For Eiseley, such an evolution of chance,
which has begun in the human realm, returns to the natural world as
humankind destroys and unbalances its natural environment. Thus
chance itself evolves. And if "life in pond and thicket is not
equipped for the storms that shake the human world," still nature
prepares for contingency "as if nature in a thousand forms played
games against herself, but the games were each one known, the rules
ancient and observed" ("How Human Is Man? FT 123). Nature itself
participates in games of chance, Eiseley submits, but its rules are
known. Man, however, introduces other factors, in a sense plays his
own games of chance; and nature does not know his rules.

Chance for Eiseley becomes almost an obsession, and a dice game
he played as a child in an abandoned house becomes an allegory for the
contingency that he sees as dominant in the universe. The allegory
begins in the Prologue to The Invisible Pyramid. Asserting that man,
after contending with oceans and mountains and plague, now confronts
himself, Eiseley says:

As a boy I once rolled dice in an empty house, playing
against myself. I suppose I was afraid. It was twilight,
and I forget who won. I was too young to have known that
the old abandoned house in which I played was the universe.
I would play for man more fiercely if the years would take
me back. (2-3)

It is an image that he does not abandon. In Eiseley's cosmogony the
universe is the abandoned house, and the individual plays against
overwhelming odds. The child found the dice and a piece of paper like
a school examination paper with his own last name scrawled on the
cover; an incident of chance was accompanied by the symbol of chance. The dice were only "pretty cubes" to the child, who was awed by the identity of names and began to play with the dice, "making up my own game as I played" (ASH 28), as Eiseley says man himself makes up his own games.

The object of the game was lost to the boy, but the man recalls the image that runs as a leitmotif through his autobiography:

I think I played against the universe as the universe was represented by the wind, stirring papers on the plaster-strewn floor. I played against time, . . . I played for adventure and escape. Then, clutching the dice, but not the paper with my name, I fled frantically down the leaf-sodden unused road, never to return. (29)

In Eiseley's cosmogony teleology has no place; either there is no owner, or the owner will not return. And chance, the roll of the dice at a given time, determines something as complex as one man's path or the path of evolutionary change. The roll of the dice provides a disparate image from standard scientific images, but it is part of Eiseley's displacement of metaphors of determinism and teleology for metaphors of chance, the "indeterminism" that life has inserted into matter, the indeterminism that enables man to participate in shaping his own destiny.

In All the Strange Hours, recalling his "most memorable accomplishment" as chancellor of the University of Pennsylvania, Eiseley returns to the dice game in the abandoned house as he tells of improving a dangerous street corner and the effects the change might have had on the chances of death at that corner:

I seem preoccupied with chance, whether it be the chance that determines life or death upon a street corner, or what it may have been that hovered about me in the ruined
farmhouse where, as a child, I threw dice, mimicking a game whose scores I could never possibly determine. (ASH 248)

Explaining why he holds onto only one episode in what he calls the "spectral war" of a university administrator, he says that, in later life, "I have always walked past gambling houses. I know by instinct that I am playing at harder and more dangerous games every day in the week" (ASH 196). The journey itself involves these "harder and more dangerous games," and Eiseley remembers the single episode as the only one in his "spectral war" that seemed to matter. Eiseley's "spectral war" was also "a gambler's war" in which "we all lose eventually":

"And this is all you remember of the provostship?" asked my friend.
"This and some decent people," I added. "It's really quite enough. You see, I figure that, as on a green table, if the dice are fair, there are some lucky throws. That old short corner here at Walnut gave death a better edge, a percentage. . . . That's what I call the spectral war. It's unseen, but it's everywhere. If you are going to play, you need luck, sure, but the game has to have a kind of justice to it. . . ." (204-205)

At this point the narrator remembers the child playing dice in the abandoned house. "'Only one thing knows,' I said suddenly, . . . 'the Player, and he plays on all the corners of the world. Watching the percentages. But you can inch him over now and then'" (205). The spectral war, on a university campus or in an abandoned house, is the war of life and death, the immediate confrontation of figures in Darwin's tangled bank. And survival is not to the fittest only, but to the one who inches over the Player, the one who wins for the uses of life.

The roll of the dice is also the metaphor for genetic make-up and for the physical chances that determine an individual:
Whenever an infant is born, the dice, in the shape of genes and enzymes and the intangibles of chance environment, are being rolled again... Each one of us is a statistical impossibility around which hover a million other lives that were never destined to be born—but who, nevertheless, are being unmanifest, a lurking potential in the dark storehouse of the void. ("The Unexpected Universe," UU 40)

In this metaphor the dice emblematize not only the realized potentialities, but the unrealized as well. For Eiseley, the significance of what is not echoes from behind what is. Later he comments "that below the existent men of every given generation there lurks an army of potential men... In our germ plasm... are hidden the freaks, the geniuses, the anomalies of tomorrow" (ASH 120). The potential beings appear through the "gambling machinery" of life, which Eiseley came to know during his college days of working in a hatchery: "I had seen the reality in all its shapes, like dice throws on a green table. Moreover, I had come to know surprises, the one-in-a-million throw. I had learned never to underestimate the potential in favor of the actual" (ASH 120). In a rare metaphor involving the machine, Eiseley limits it to "gambling machinery" (120) as he attempts to subvert the deterministic view of change.

But it is not just the individual's genetic make-up that is determined by the throw of the dice. "To the unexpected nature of the universe man owes his being," says Eiseley. "More than any other living creature he contains, unknowingly, the shapes and forms of an uncreated future to be drawn from his own substance" ("The Unexpected Universe," UU 47). Man's discovery that he exists (Emerson's "Fall of Man") has led him to ask "terrible questions" (47), but these questions can lead to a knowledge of self that will bring the final
human dignity—a kind of goal for man. The metaphor, again, is that of "the Unseen Player in the void" who "has rolled his equally terrible dice" (47). In place of a teleological view of evolution, Eiseley suggests, through the figure of the dice, a universe shaped by chance, but a universe whose very uncertainty can bring humankind to its greatest dignity. And the human search for knowledge returns us to the journey as a means of exploring ways to knowledge.

For one man the metaphor of life is the image of multiple throws of the dice. Eiseley in All the Strange Hours describes himself in terms of other Americans whose lives are equally unpredictable:
"I am an American whose profession, even his life, is not more than a gambler's throw by the firelight of a western wagon" (24). Even his thought of his own end comes in terms of a merging of prehistoric creatures, the westward movement of earlier America, and the rattle of the dice: "I belonged further back—back on the altiplano with the great beasts of the crossing... There was a far-off sound like the rattle of tiny dice in my head" (ASH 93). The Other Player weaves in and out of the texts, rattling his dice and challenging the individual to try to defeat him.

Finally, in the last chapter of All the Strange Hours, which bears the title "The Other Player," Eiseley links two of his most important metaphors—the shattered mirror with which the book began and the dice game in the abandoned house. A dreamlike sequence takes him back to an empty boxcar whose only inhabitants are a young man and an old man, himself in youth and age. Then a third voice is heard—that of the Other Player. The young man leaps from the boxcar, leaving only the old man and the Other Player, who reminds the old man
of what he lost in the game and asks if he would like to play again for another ending. The old man, not trusting, declines, even though he lost the first game. To the faraway clicking of dice, the old man dreams for a while and awakes on the steps of a Mayan temple where, as the Player says, "the kind of time that bewitched you began," the "vertical time" of the Mayas (263). Next the narrator is back with the prison escapees that he remembers from his childhood, with the posse pursuing. When he realizes that the dream is gone, he has "no way to ask the Player to recast the dice" (265-66). He looks to the last confrontation with the Player in the snow, with a dog from childhood beside him and the trickster for help:

The Player could not stop him, for we would be no longer man or dog, but creatures, creatures with no knowledge of contingency or games. All the carefully drawn human lines would be erased between us, the snows deeper, the posse floundering, the dice cup muted in the Player's hand. We would vanish together as an anonymous grey blur. The time traders would scurry to help us, even Coyote the trickster, who is unscrupulous and wins at gambling. (266)

The vision of the end is tied to dominant images of Eiseley's personal past: the young man on the boxcar, the obsession with time and the impossibility of understanding it, the prison escapees with whom the young boy identified, and the metaphor of the Player and his dice.

The next dream, he suggests, will be "further back" in time, back to the last ice, and "the rifles will be silenced, the dice at last unshaken" (ASH 266). The end Eiseley anticipates will be back in a more primitive time and with simple companions, "the dog Wolf and the Indian, muffled in snow upon the altiplano" (266). Because chance is the controlling factor for Eiseley, the Other Player, the threatening figure who is an emblem of a kind of fate, is the figure who returns,
like Coleridge's Mariner, "at an uncertain hour," emerging like one of Freud's "shadows" of the unconscious out of the dreamwork. Eiseley's image of the end of life is linked with the metaphor of the Other Player who casts the dice. In the dream, the Player controls the dice, but, waking, the narrator refuses the notion. There is no control over the dice, and the Player is only anthropomorphized chance. The final vision is one of accepting chance. Eiseley the gambler accepts the throw of the dice and sees himself as one with the primitive and the animal, outside awareness of chance and thus no longer haunted by the rattle of the dice or the presence of the Player. Through the dream and the Other Player, Eiseley explores the question of knowing, understanding, and living with chance. The dream is another heuristic of intersections.

Another game of chance appears allegorically in "The Chresmologue," whose title is based on the notion of ancient Greek "dealers in crumbling parchment and uncertain prophecy" (NC 62) and their modern counterparts. Words of the chresmologue, Eiseley notes, "may also be spoken upon journeys, for it is then that man in the role of the stranger must constantly confront reality and decide his pathway" (62). The legend that Eiseley recounts and turns to allegory concerns two English gentlemen riding along a wild English moor near the coast and encountering a runaway coach that raced by while its frightened occupants screamed. According to the legend, the two gentlemen stopped their horses, then galloped to pass the coach and open the gate while they made a bet that the coach would lurch over the cliff.
After the coach dashed through the gate, no sound was heard, and the bettors were left wondering about the outcome.

Today, says Eiseley, outlining the allegory, man is "both the sporting gentlemen intent on their wager and the terrified occupants of the coach. . . . We are literally enduring a future that has not yet culminated, that has perhaps been hovering in the air since man arose" ("The Chresmologue, NC 61). We are, he suggests, both the bettors and the occupants of the coach; but among us chresmologues, soothsayers, multiply. "In an age of science the scientist may emerge as a soothsayer" (64). The point is that the soothsayer is a dealer in "uncertain prophecy." Neither the ancient dead (as in Odysseus' time) nor the modern scientist can actually foretell the future, which remains in the domain of contingency. The future is as unknown and as surprising as the hush that followed the sporting gentlemen's bet. The future "hovers about us," as unknown as the coach's end; but we have the power to modify it, as Eiseley illustrates with a tale of his own practice of taking seeds to mountaintops. Eiseley's answer to the popular penchant for scientific "chresmologues" is that "if our thought runs solely outward and away upon the clever vehicles of science, just so will there be in that future the sure intellectual impoverishment and opportunism which flight and anonymity so readily induce" (74). His answer to the riddle of the bettors is the reflection that will help to shape the hovering future, in Bacon's phrase, "for the uses of life," rather than for expansion of governments or struggles for power.

Whether in terms of the genetic dice or the individual's impromptu dice game in the abandoned house of the universe or the
bettors' wager on the end of the runaway coach, the games of chance that Eiseley interweaves assert the dominance of contingency and subvert notions of fixity and determinism. The games of chance are another heuristic of intersections in the epistemology of journeys.

Alchemy and Magic

Metaphors of alchemy and magic are crucial in Eiseley's exploration of figures that suggest alternatives to extreme reductionism, as well as in his continued exploration of figures for the constant shifting of forms that is part of the physical journey. Science, as Jung and others have observed, has its roots in alchemy and magic, though contemporary scientists and their followers who see science as marching steadily toward ever greater knowledge might seem to disavow this magical origin. As the epigraph to "The Innocent Fox," which treats the theme of a "magical" crossing of the boundaries of form, Eiseley uses a quotation from Peter Beagle:

*Only to a magician is the world forever fluid, infinitely mutable and eternally new. Only he knows the secret of change, only he knows truly that all things are crouched in eagerness to become something else, and it is from this universal tension that he draws his power.* (UU 194)

It is this "tension" and this mutability known to the "magician" that are relevant to Eiseley's purposes.

The term *alchemy* appears frequently among Eiseley's metaphors. Deriving from the Arabic *al-kimiya*, the term refers to the art of transmutation, particularly the notion of transmuting base metals to gold, though its use is now generalized to apply figuratively to any apparently miraculous change or improvement. Eiseley establishes the figurative quality of "alchemy" when he refers to the archaeologist
as an alchemist who removes from the earth "those forgotten objects Thoreau called 'fossil thoughts'" ("Thoreau's Unfinished Business," ST 241). In such actions the archaeologist as alchemist "is giving depth and tragedy and catharsis to the one great drama that concerns us most, the supreme mystery, man," for "only man is capable of comprehending all he was and all that he has failed to be" (241). In the metaphorical sense of comprehending and transmuting himself and his possibilities, the archaeologist as alchemist is capable of little more than any human being. In the epigraph to the third part of All the Strange Hours, in which he expresses doubts toward stable, professional, institutionalized science, Eiseley quotes Ruland the Lexicographer and introduces the individual's questioning, "the Alchemical meditato," as a counter to established, "disinterested" science: "The Alchemical meditato is an inner dialogue with someone who is invisible, as also with God, or with oneself, or with one's good angel" (Qtd. 215).

For the Egyptians Hermes was the inventor of alchemy. He was the god of science and of commerce, the messenger of Zeus, the weaver and disconnector of multiple spaces and places of knowledge, the great-grandfather of Ulysses, and the starting point of an epistemology of journeys. Hermes is the link of literature, myth, science, and philosophy in Michel Serres's program, which, like Eiseley's, sees myth in science and science as myth, uses the legend of Odysseus as model of the epistemological journey, and finds in literature the means by which science and myth can be brought together.

Thoreau, with whom, in his later essays especially, Eiseley expresses a continuing sense of kinship because of his similar
scientific pursuits, is the model of the Eiseleyan alchemist. "One man sees with indifference a leaf fall," Eiseley says, while "another with the vision of Thoreau invokes the whole of that nostalgic world which we call autumn" ("Thoreau's Unfinished Business," ST 241). One watches a red fox running in the sunlight and raises a rifle to shoot it, while another pleads for its life as "the last wild gaiety in the world" (241). Herein, says Eiseley, lies "the role of the alchemist, the true, if sometimes inarticulate artist. He transmutes the cricket's song in an autumn night to an aching void in the heart; snowflakes become the flying years" (241). It is in Thoreau's vision that "the true alchemist of Jung's thought must come to exist in each of us," for with such vision we "transmute, not iron, not copper, not gold, but our tracks through nature, see them finally attended by self-knowledge, by the vision of the universal eye, that faculty possessed by the alchemist at Walden Pond" (243).

An individual experience is a synecdoche for the "final act as alchemist" that humankind is capable of making:

to find the philosopher's stone in a desert varnished flint and to watch himself, his mind, his species, evaporate into the air and sun that once had nourished the dinosaurs. Man alone knows the way he came; man alone is the alchemical animal who can vaporize himself in an utter cleansing, either by the powers of art alone, or, more terribly, by that dread device which began its active life at Los Alamos. . . . ("Thoreau's Unfinished Business," ST 243)

Curiously, Hermes, father of alchemy, learned the art of divining the future from small pebbles (Harari and Bell xxxiii), as the Eiseleyan alchemist finds "the philosopher's stone in a desert varnished flint."

The alchemist is thus the opposite of the reductionist. Founded in myth--primitive, according to modern thinkers--alchemy is a
counter-model to the reductionist view. Introduced with obvious metaphoricity (not to be taken literally in the popular mind), the alchemist suggests the most valuable role for humankind in "transmuting" itself; and the alchemist reinforces Eiseley's attempt to popularize an understanding of the depths of the inexplicable and of contingency in the epistemology of journeys.

In addition to alchemy, magic provides a related metaphorical underscoring of the role of contingency in evolution and a similar exploration of the journey of knowledge. Once man is man, he ceases to accept the world without questioning; and magic is primitive man's "organizing power," the result of "man's first conscious abstraction from nature, his first attempt to link disparate objects by some unseen attraction between them" ("The Unexpected Universe,"UU 32). In primitive magic, there is thus a statement of Eiseley's own method. The primitive mind retains a sense of connection between man and his environment, and it attempts the linking of disparate objects which becomes a hallmark of Eiseley's method. Indeed, the method of metaphor is still the metaphor of method. In the linking of disparate objects by an unseen attraction appears the Eiseleyan attempt at synthesis, at choosing primitive sympathies rather than primitive warfare as models for modern study.

Further, chaos is called magic: "Black magic, the magic of the primeval chaos, blots out or transmogrifies the true form of things. . . . Instability lies at the heart of the world" (The Star Thrower,"UU 78). The human body appears as "a magical vessel" which could not exist without the photosynthesis that only plants can
accomplish—hence "the intricacy of man's relationship with other living things" ("The Hidden Teacher," UU 52). Science, too, is explicitly "magical," having its origins in the primitive organizing power; Eiseley refers to man as "the self-fabricator who came across an ice age to look into the mirrors and the magic of science" (55). Science is magic, clearly, in its wonders and its organizing power; but science is also a mirror, reflecting the maker or magician, for the scientist is reflected in his work. Magic thus becomes symbolic of the unpredictability of the universe and of the impossibility of reducing matter or life to simple terms.

The epistemological dimension of magic as a metaphor—knowing as unpredictable, indeterminate, not necessarily or predictably causal, and not reductionist—is underscored by the etymology of the word magic. The Greek magike is tekne, referring to the sorcerer's art, related to the Persian magus and the Indo-European root magh-, meaning "to be able" or "to have power." Closely related is the root magh-os-, meaning "that which enables" and becoming the Doric makhos, "device," "machine," "mechanism." Tekne, of course, is art or skill, also related to weaving and textiles and to technology. Magic thus belongs to the family of words to which both art and technology belong. As Heidegger has noted, there was a time when tekne meant art, not exclusively technology ("Question" 34). In magic the two come together, as technology and art, science and the "saving power." If language, as Heidegger suggests, indeed knows more than we know or more than we realize, then language in the linking of science and magic suggests that we may indeed know poetically rather than conceptually.
If magic is a means of knowledge, then the need for a metaphorical magician or a shaman is not unexpected. In The Invisible Pyramid Eiseley describes every man's encounter with "a magician, the man who made him what he is finally to be" ("The Last Magician" 137) and suggests that every man must, in a sense, be his own "last magician." The magic is metaphorical; it suggests the human ability to determine what happens in the physical and psychical worlds. Collective man encounters his "last magician" as he meets himself "at the doorway of the stars" (139). Eiseley describes his personal encounter with his last magician when he passed a man whom he took to be his friend and mentor, Frank Speck, himself a relic of primitive Indian thought. For Eiseley, the encounter led to a return to nature. Similarly, for humankind the encounter with the last magician should bring a new contemplation of "the world of the sunflower forest" (151). As his own last magician, man "must seek his own way home" (155) and devise his own enlightenment. The real "magic," Eiseley suggests, is in contemplation of self and in "a love for the green meadows we have so long taken for granted and desecrated to our cost" (156).

Magic assumes another form in "Instruments of Darkness," in which Shakespeare's Macbeth becomes the vehicle for Eiseley's examination of the "magic" that creates a future by foretelling it. The essay begins with a consideration of the magic of Macbeth's night world of witchcraft, whose "power lies in its symbolic delineation of the relationship of Macbeth's midnight world to the realm of modern science" (NC 47). Eiseley pursues the "magical" ability of the
cultural to control the physical by suggesting that the witches are only "an exteriorized portion of ourselves," and that "under the spell of such oracles we create, not a necessary or real future, but a counterfeit drawn from within ourselves, which we then superimpose, through purely human power, upon reality" (48). As Macbeth creates the future given only by these exteriorized phantoms, so, says Eiseley, does every age have its witches, who make "their claim to omniscience" (49). Today the demons are those who claim to know the future and, in making this claim, create it. Often a part of the military-industrial complex, these "phantoms in military garb" are all the more misleading "because their spells are woven out of a genuine portion of reality"; but ironically they foretell a future whose "leading characteristic . . . is its fixed, static, inflexible quality" (49).

The witchcraft is that the world "is smoking with the caldrons of those who would create tomorrow by evoking, rather than exorcising, the stalking ghosts of the past" ("Instruments of Darkness," NC 49-50). These phantoms evoke the human image of bestiality, build on it, and draw a future out of it, rather than leading man to examine himself and to transcend his brutal nature (49-50). As in Shakespeare's vision, "It hath been taught us from the primal state / That he which is was wished until he were" (Qtd. 55). Though these are not the words of the witches, they are, for Eiseley, words that express the witchcraft of the modern age, humankind's fulfilling of its image of itself. At any point in its evolutionary journey, mankind could have paused and said, "This is man," and could have stopped reaching for more. (49, 55). The future, in Eiseley's view, which he
borrows from the unknown medieval author of the *Cloud of Unknowing*, 
"is neither ahead nor behind, on one side or another," but "is contained within ourselves" and "drawn from ourselves" (Qtd. in "The Chresmologue," NC 73). We have the capacity to be our own magicians or our own demons. The metaphors of alchemy and witchcraft and magic depict the control we have over the physical and psychical future. Eiseley's message is that we as magicians shape the journey of the future, and his metaphors from alchemy and magic help to displace notions of fixity (the future of man) and reductionism and determinism. Magic, like life, inserts "indeterminism" into matter, though the choice of magic is ours to make.

The Magic Theater

How much more we would see, I sometimes think, if the world were lit solely by lightning flashes from the Elizabethan atage. What miraculous insights and perceptions might our senses be trained to receive amidst the alternate crash of thunder and the hurtling force that give a peculiar and momentary shine to an old tree on a wet night. Our world might be transformed interiorly from its staid arrangement of laws and uniformity of expression into one where the unexpected and blinding illumination constituted our faith in reality. (Eiseley, "Strangeness in the Proportion," NC 136)

The theater appears in Eiseley's texts as a link between magic and mind, a "trick factory" which is another model for the shifting forms that the popular mind tends to see as fixed and real. Eiseley cites Jean Cocteau on "the magic light of the theatre" and on the theatre as "a trick factory where truth has no currency, where anything natural has no value, where the only things that convince us are card tricks and sleights of hand of a difficulty unsuspected by the audience" (Qtd. in "Man in the Autumn Light," IP 119).
Establishing the allegorical significance of his analogy, Eiseley says, "The cosmos itself gives evidence, on an infinitely greater scale, of being just such a trick factory, a set of lights forever changing, and the actors themselves shape shifters, elongated shadows of something above or without" (119). If the cosmos is a "trick factory" like the theater, then Eiseley sets the stage for his continuing metaphor of man as an actor in a play, which provides a cultural, non-machine analogy for the shifting illusions of the physical world. The beginning of this drama is linked to the emergence of writing. When writing began, "in the first of the world's cities man had begun to live against the enormous backdrop of the theater. He had become self-conscious, a man enacting his destiny before posterity" ("The World Eaters," IP 63). Through the ability to communicate with others in distant times, man seems to have been conscious of "performing" for the future, to have created for himself a stage existence.

Drama, then, becomes a metaphor working within the metaphor of the journey. Shakespeare's "traffic on the stage" becomes man's "traffic," "tracking," "pathmaking," journeying on the world stage. The metaphor of human life as a drama projects the image of man as a "shape-shifter" and a "changeling" whose forms and "realities" are never fixed, never what man may wish to think they are, changing costumes and styles of knowledge from one age to another.

In "The Star Thrower," for example, Eiseley addresses the notion of the instability of form, saying, "Our apparent shapes no longer have the stability of a single divine fiat. Instead, they waver and
dissolve into the unexpected" (UU 76). He sees human beings as "rag dolls made out of many ages and skins, changelings who have slept in wood nests or hissed in the uncouth guise of waddling amphibians," and he completes the metaphor by contending that "we have played such roles for infinitely longer ages than we have been men" (76). In this context he links identity to dream, reality to process. "Reality" is tied to "the light of our particular day" (76)—the "shining" of the sojourn—which is, in turn, no more than a stage effect, an illusion.

Life, Eiseley says, plays a theatrical role that varies with time and culture. Western man assumed one role with the coming of Christianity, which provided a new sense of time unlike that of "the historically shallow primitive or the endless cycles over which Greco-Roman thought had brooded in antiquity" (DC 60). The Christian concept of time, says Eiseley, is directly related to the dramatic metaphor. The concept is that of a "divine medium in which a great play—the drama of the human Fall and Redemption—was being played out upon the stage of the world. This drama was unique and not repetitious" (60). Earth-centered and man-centered, the Christian concept of time obliterated earlier notions of recurrent cycles of time. The play was "confined to a tiny immovable stage" but was "given force, direction, and significance beyond the purely episodic" by the cultural acceptance of "a single divinity [which] sustained the stage, the drama, and the actors" ("The Chresmologue," NC 67). Nor would the Christian concept of time accommodate long durations, for "this great drama was estimated as consuming but a few trifling millennia," whether calculated by Archbishop Ussher or by earlier writers who assumed similar brief chronologies of human existence (DC
60-61). This concept of time as a medium in which human existence is played out is the basis of the Christian dramatic metaphor of the fall of man, with man as "the center of divine attention" ("How Human Is Man?" FT 125).

More recently, however, man has assumed a new role in terms of the realization that time spans eons rather than thousands of years and that this span includes multiple changing forms. In this altered conception,

Only life, that furtive intruder drifting across marsh and field and mountain, altered its masks upon the age-old stage. And as the masks were discarded they did not come again. . . . Species died as individuals died, or, if they did not perish, they were altered beyond recognition and recall. ("The Star Dragon," IP 14-15)

The metaphorical drama is one that Eiseley sees as tending toward increasing specialization, which leads, eventually, to extinction; this process is "the essential theme that time had dramatized upon the giant stage" (17). The stage remains, though the masks are altered; and, if we can judge by the past, extinction seems the destiny for each species.

Eiseley pursues the epistemological dimension of the dramatic metaphor when he develops an extended comparison of life's drama with the Elizabethan stage. With the archaeologist's awareness, he remembers "the skeletons of dead actors under the floor boards, and the dusty scenery of forgotten dramas . . . abandoned in the wings" ("How Human Is Man?" FT 118). The inevitable teleological question of reflective man comes

with a sudden chill: What if we are not playing on the center stage? What if the Great Spectacle has no terminus and no meaning? What if there is no audience beyond the
footlights, and the play, in spite of bold villains and posturing heroes, is a shabby repeat performance in an echoing vacuity? Man is a perceptive animal. He hates above all else to appear ridiculous. His explorations of reality in the course of just three hundred years have so enlarged his vision and reduced his ego that his tongue sometimes fumbles for the proper lines to speak, and he plays his part uncertainly, with one dubious eye cast upon the dark beyond the stage lights. He is beginning to feel alone and to hear nothing but echoes reverberating back. (118-119)

Beyond metaphor into allegory, Eiseley develops the stage vehicle as yet another epistemological model: "Man's efforts to understand his predicament can be compassed in the simple mechanics of the theatre" (119). Following this model, he has touched upon the stage, the apparent plot, and the time of the play; "anything else is purely incidental to this drama" (119). The stage is the world; the apparent plot is the movement toward specialization and extinction, with man's role yet undetermined because of the indetermination the human brain has added; and the time is vast, noncyclical, and nonreturning.

Structurally, the stage metaphor frames Eiseley's examination of human mind's "role" throughout history as, using various "spectacles," it has seen apparent reality each time, has seen the plot "played accordingly" with "strange colorings" for reality—colorings that "have come mostly from within" and will continue to shift with the extension of science ("How Human Is Man? FT 120). For Eiseley, the "within" and the "without" become "intermingled" so that, allegorically, "in a sense, the great play is actually a great magic, and we, the players, are a part of the illusion, making and transforming the plot as we go" (120). In his exploration of the dramatic metaphor, which could easily be seen as having a fixed
direction as determined by the playwright, Eiseley removes the element of fixity by making the play an impromptu play such as Shakespeare used when characters devised a play within a play, turning to drama itself as a source of invention. The impromptu play is linked to the "dusty scenery of forgotten dramas," but its direction is not fixed. It remains a kind of magic, a "trick factory" by which the illusion of form and reality is created. Man is "the one great drama that concerns us most" ("Thoreau's Unfinished Business," ST 241), and the human drama thus far can be divided into "three acts," from the earliest man-apes through Paleoanthropic man the tool user and cave dweller, to the emergence of modern man during the last ice age ("Man the Firemaker," ST 45-46). As "trick factory" or vehicle for organizing the ages of man, the theater provides a nontechnological model for exploring the shifting forms of the participants in the impromptu stage journey.

Not only is the human journey a drama, but science is also presented in the dramatic context. In Bacon's treatment of the legend of Orpheus, Eiseley finds a model for "the role played by culture in controlling the otherwise uninhibited behavior of man" ("The Orphic Theatre," MWSTT 74). Drawing at first from Bacon's notion of Idols of the Theater, Eiseley uses Bacon's image as a basis for the essay "The Orphic Theatre" (MWSTT Chap. 3). Bacon suggested that "all the received systems are but so many stage-plays, representing worlds of their own creation after an unreal and scenic fashion" (Qtd. 69).

If life itself, cultures, and systems are merely stage plays, merely shifting creations of worlds, science itself is such a play. A metaphorical form of magic thus controls and shapes the physical
journey. Culture, itself biologically motivated, in turn shapes the physical and the continuing cultural journey in the theatrical metaphor.

In Orpheus's theatre, all creatures gathered, and beasts of prey remained beside their quarry to listen to the soothing sounds of the harp; but once the music stopped, the creatures reverted to their former behavior. The fable is an allegory for humankind, says Bacon, with its desires that can be made to listen "to precepts, to laws, to religion sweetly touched with eloquence, and persuasion of books, of sermons" (Qtd. in "The Orphic Theatre," MWSTT 69). But once these harps are stilled or made inaudible by commotion, "anarchy and confusion" result (Serres would treat the noise that occurs when coding is not present, and Eiseley later writes of the "giant background noise of the universe--order against disorder as amplified by the machine" [ASH 203]). Eiseley links the meaning of the Orphic theater to human culture: "The cultural tie--custom, in other words--subdues man to its strange music and holds back the expression of his wilder nature" (74). Referring to Frazer's notion of magic as "a kind of falsely conceived science based upon a naive projection of human desire upon the exterior universe" ("The Orphic Theatre," 75), Eiseley sees Bacon as the forerunner of Frazer's notion of the laws of magic. Bacon's concern for the mundus alter, the unknown other world allegorized in the fable, is that it should lead to "the uses of life." Eiseley's concern, too, is for the shifting reality that may be imaged as a theater through which conceptions of reality are formed. But with the theatrical metaphor--implying camaraderie and
cooperation in presenting the impromptu play—it is possible to recognize the shifting, magical nature of the universe and to turn it to "the uses of life."

One of Eiseley's most effective uses of the drama as a metaphor for the human journey as illusion comes in "The Inner Galaxy," when he tells of going with a young poet to a performance of an opera outdoors under a tent. During the performance, the poet touched his friend's arm and pointed upward toward the arc lights where an enormous moth flew from one stage light to another above the actors. The poet's sensitivity pinpoints the levels of dramatic illusion as he comments:

"He doesn't know. ... He's passing through an alien universe brightly lit but invisible to him. He's in another play; he doesn't see us. He doesn't know. Maybe it's happening right now to us. Where are we? Whose is the real play?" (UU 175-76)

The narrator's response is one of confusion, as he thinks back from the moth to the Egyptian Pharaohs, who, "like the moth among the arc lights, had been entranced by the flaming journey of the sun. Some had even constructed, hopefully, their own solar boats" (176). For the narrator, the fragile boats of the Egyptians are no more than emblems of the human journey, the human play: "There was a real play, but it was a play in which man was destined always to be a searcher, and it would be his true nature he would seek. The fragile vessel was himself, and not among the stars upon the mountain" (176). The vehicle, the journey, and the play combine in this allegorical speculation, which underscores the vehicular philosopheme and the epistemological nature of the journey. The only "vessel" that does not fail, says Eiseley, continuing the vehicular metaphor, is the "word" that Plato mentioned, but its efficacy is doubtful; it, too,
shifts, and it would be a vessel that "none could long identify or hold" (176).

And Eiseley further emphasizes the journey as epistemological in "Man in the Autumn Light" as he concludes with a reference to Marlowe's lines "Thou art still but Faustus / and a man," lines which for Eiseley "epitomize the human tragedy" because we, like Faustus, are "world eaters and knowledge seekers" yet still human (IP 134); always, "it is Faustus who remains a man" (134). Marlowe's Faustus seeks knowledge, but the power of knowledge; he is, therefore, a symbol of modern man, whose quests for knowledge and for power seem to go hand-in-hand. In this context, Eiseley treats man as knowledge-seeker, power-seeker, and consumer of what he touches.

Eiseley's treatment of Shakespeare's Macbeth in "Instruments of Darkness" combines the notion of magic with the notion of reality as a dramatization of our thoughts. Macbeth's witches are "an exteriorized portion of ourselves," a prophecy that we both create and fulfill, and the play is a "symbolic delineation of the relationship of Macbeth's midnight world to the realm of modern science—a relationship grasped by few" (NC 47). For Eiseley, "today's technologists" and "their claim to omniscience" are just as much "uncanny phantoms" as Macbeth's stage illusions. Macbeth's witches are creatures of the imagination of an actor in a play; today's "phantoms in militarist garb" are, in Eiseley's context, creatures of the imagination of man, who is merely an actor in a play, a participant in a shape-shifting process that only a "phantom" would call reality. The levels of illusion in Eiseley's treatment of Macbeth are thus a mise en abyme, and
Shakespeare's levels of illusion function in Eiseley's essay to remind man of the proximity between wishing and reality, of the human ability to "wish" a reality into being. Those who see "man" as complete are the surest victims of misconceiving illusion for reality, process for stability; and it is this tendency toward fixity that Eiseley's "magic stage" would displace.

The magic and illusion of the drama thus recur throughout Eiseley's collections of essays. Beginning in Darwin's Century, the metaphor serves as explanation, adds its affective dimension to serious statements of fact, and functions heuristically in exploring metaphors that displace accepted metaphors of fixity, teleology, and decidability. In the Eiseleyan impromptu drama, the illusion of drama is another nonmechanical, nontechnological metaphor; it is another intersection in the epistemology of journeys.

Art as a Cultural Model for Symbiosis

In interacting with his physical universe, Eiseley suggests, man has two visions and two visages. David Edge notes the interdependence of a way of looking at the universe and the society that holds this view (144). In the context of Eiseley's concerns, the still-surviving mechanistic view of the universe leads man to perceive the role of mankind as manipulator and the individual as no more than a tool for manipulation of the environment. The still-surviving metaphor of the war for existence leads man to perceive in himself the animal elements of ferocity and strength. As an alternative to the view of man as warrior and manipulator, Edge suggests the model of the artist's relationship to his materials:
Perhaps the experience of the artist is (or could be) more typical: as he struggles with his materials, he is forced to reconceive his goals (and himself); he neither dominates, nor is dominated by, his materials. The model of artistic creation, with its dialectic symbiosis, seems more congruent with the data of cultural anthropology, the experience of great scientists—and, indeed, with the interaction of men with computers. (146)

The relevance of Edge's suggestion to Eiseley's program of displacing established metaphors is evident in Eiseley's impromptu theater, but more particularly in the extended metaphor of the artist's gallery of the brain that he uses, in the context of autobiography, to explain his own interaction with his materials, when he has already established himself as "every man and no man" (ASH 23). Writing of the individual as artist and the artist as individual, Eiseley says, "Only man's own mind, the artist's mind, can change the winter in man" ("Thoreau's Unfinished Business," ST 238). We have seen that "looking is in itself the business of art" and that the eye of observation is "the alchemist's touchstone" which Thoreau possessed (236, 238).

Certainly Eiseley sees reflective thought presented through art as the answer to the separation of science and the humanities, which is itself misleading but may symbolize an inner dichotomy in man. Of the artist's relation to his material, Eiseley writes:

the brain has become a kind of unseen artist's loft. There are pictures that hang askew, pictures with outlines barely chalked in, pictures torn, pictures the artist has striven unsuccessfully to erase, pictures that only emerge and glow in a certain light. They have all been teleported, stolen, as it were, out of time. They represent no longer the sequential flow of ordinary memory. They can be pulled about on easels, examined within the mind itself. The act is not one of total recall like that of the professional mnemonist. Rather it is the use of things extracted from their context in such a way that they have become the unique possession of a single life. The writer sees back to these transports alone, bare, perhaps few in number, but endowed with a symbolic life. He cannot obliterate them. He can
only drag them about, magnify or reduce them as his artistic sense dictates, or juxtapose them in order to enhance a pattern. One thing he cannot do. He cannot destroy what will not be destroyed; he cannot determine in advance what will enter his mind. (ASH 151)

In Eiseley's personal gallery historical events are less significant than visual impressions--an African crane that he once joined in a mating dance or the childhood impression of an apparently dead woodpecker that twitched alive and triumphantly resumed its activity on a telephone pole. In his artist's loft there are more animals than famous people. His memories of graduate school and of presidents are superseded by the image of a baby ground squirrel lying on his back outside his burrow and patting his stomach. The effect of such images for Eiseley is to "reduce us to miniscule proportions" (ASH 155), but the point is that the artist's relation to his materials does affect his perception of the world. From images of animals that intrude (to the distress of the painter) in a friend's landscape where no animal was intended, to the image of huge boulders dropped by a retreating glacier as a child would drop toys on a sidewalk, the artist juxtaposes materials; his view of mankind is shaped by his materials, and his materials are shaped by his view of mankind.

The essay in which Eiseley treats this dialectic of the artist and his materials has the unlikely title of "Willy," and it ends with a visual image that the narrator has had to assimilate. In a context which asserts the human relationship to the ice ("we, mankind, arose amidst the wandering of the ice and marched with it. . . . Like the ice, we have been cruel to the face of the planet and the life upon it" [ASH 155]), the narrator remembers Willy, the night shift worker in a parking garage, an aged man who leaned on a fence to look out of
subterranean darkness into the bright lights of night. Willy was on the "wrong" side of the fence, and he could do no more than watch the life around him. Willy is, Eiseley says, one of the burdens that a writer carries. The writer's material shapes his perception as much as his perception shapes his material. The model is one of interaction, not control.

Within the evolutionary journey of life and the physical journey of man, then, Eiseley's basic informing metaphors are cultural in origin. Contingency figures, games of chance, alchemy and magic, the magic theater, and the artist's relationship with his materials all participate in the Eiseleyan program of displacing metaphors and notions of fixity, determinism, and struggle and of exploring the means by which the individual can understand his place in a continuously evolving world.

Notes

1. In the conclusion of the Origin Eiseley finds "a certain orthodox benignity" that seems to mask the struggle Darwin had emphasized. "As natural selection works solely by and for the good of each being," Darwin wrote, "all corporeal and mental endowments will tend to progress toward perfection." "Thus," he continued, from the war of nature, from famine and death, the most exalted object which we are capable of conceiving, namely, the production of the higher animals, directly follows. There is grandeur in this view of life, with its several powers, having been originally breathed by the Creator into a few forms or into one; and that, whilst this planet has gone cycling on according to the fixed law of gravity, from so simple a beginning endless forms most beautiful and most wonderful have been and are being evolved. (Qtd. in "Man Against the Universe," ST 215)

For Eiseley, the "idealistic" Emerson was more attuned to the prodigality of nature when he wrote:
That no single end may be selected and nature judged thereby, appears from this, that if man himself be considered as the end, and it be assumed that the final cause of the world is to make holy or wise or beautiful
men, we see that it has not succeeded." (Qtd. in "Man Against the Universe," ST 215-16)

2. In suggesting the "epistemology of journeys," I stress the similarity of Eiseley's and Serres's journeys and acknowledge the influence of Harari and Bell: "One must therefore conceive of a philosophy that would no longer be founded on the classification and ordering of concepts and disciplines, but that would set out from an epistemology of journeys, forging new relations between man and the world" (xxii). The voyage, Harari and Bell suggest in the context of Serres's program, is "the sum of all displacements" (xxii). My contention is that Eiseley, through his framework of metaphors and his interrogation of the dominant philosophemes, is concerned with a heuristic of intersections in his epistemology of journeys.
Within the metaphor of the journey and its accompanying contingencies appears the no less integral framework of biological metaphors, which develop themes of cultural evolution. The three most important physical metaphors—hand, eye, and tongue—both illustrate and inform Eiseley's themes of cultural evolution. Hand, eye, and tongue, functioning in conjunction with the brain, are the organs that have brought us to where we are culturally. Hand, eye, and tongue are also the primary organs of the philosophemes with which knowledge-gathering is associated. For these informing metaphors, Eiseley begins with synecdoche: the part represents the whole; the organ represents its function; by catachresis, the organ is the function. The eye, as Derrida has noted in "White Mythology," is the means of internalizing the "shining" of the sojourn; it is the organ of observing and participating in the world. The tongue and the hand are the instruments of a highly specialized brain, whose function, Eiseley emphasizes, following Wallace, is to evade further specialization. Each organ functions in the standard catachrestic manner, but each also takes on metaphorical meaning in the cultural context. And other metaphors center on these organs and their accompanying philosophemes; these metaphors are essential to the Eiseleyan program of shifting from machine metaphors—which lead to notions of fixity and decidability and to the paradoxical human
tendency to attempt either to control the machine or to see oneself as an extension of the machine—to natural and cultural metaphors which also subvert standard metaphors of struggle, reductionism, hierarchy, and teleology.

With hand, eye, and tongue a new dimension also appears, a thematic dimension arising from the dual capabilities of these organs in their cultural roles and from the essential metaphoricity of language. The hand has the dual capabilities of cooperation and destruction; there are "two eyes"—of summer and winter, of harshness and gentleness; the tongue is a "little member" with great potential for both positive and negative effects. Eiseley's emphasis on the positive cultural possibilities of these dualities provides thematic reinforcement for his program of metaphor.

Hand

The hand, as observed earlier, is the organ of the philosopheme of concept, of gathering to oneself or grasping or holding. The Latin root concipere means "to take to oneself," "to take into the mind," hence "to be impregnated" ("great with child to speak," in the words of Sir Philip Sidney). Ultimately it derives from capere, "to take or seize," which derives from the Indo-European root kap, "to grasp."

The hand is thus the organ of a spatializing philosopheme intermediary between the "idealizing" senses of sight and hearing and the "chemical" senses of taste and smell; the sense of touch is both abstract and concrete, both spatial and idealizing. It is a means of making tangible the abstract. (The word tangible derives from the
Latin *tangere*, "to touch," from the Indo-European root *tag*, meaning "to touch" and also "to set in order," thus linking the hand and the mental ability of classification, as we shall see.)

The hand is the organ, first, of "concept," but also, especially in Eiseley's texts, of groping, probing, ordering (cutting and combining), and even of the journey itself. And thematically, the hand is capable of both destruction and reaching out; manipulation can take the form of art—creation—or the form of altering nature or fingering a machine-gun; "reaching out" can be either the extension of self or a means of contact with other life. Bunn notes the importance of the evolutionary aspects of neurophysiology in semiology, suggesting that "the sensory-motor qualities of 'handling' are crucial for the modeling of discoveries" (47). He distinguishes between the abilities of the crafting hand to devise "cutting tools" and "combining tools" (47), and he links "handling" of objects with classifying and thinking about objects (49). In primitive art, for example, Bunn finds a "spatialized form of abstraction—in Latin *abstrahere*, 'to drag away,' 'to divert'—[which] forms the basis of substitution magic," whereas earlier man seemed "more oriented toward the temporal process of abstraction: tools and signs were implements of planning, of anticipation magic, where making the implement deferred immediate gratification in order to concentrate on a future goal" (52).

Bunn further notes the "separation of space and time" in classical mechanics, the "separation of subject and object" in classical philosophy, and "both kinds of separation" in classical language (54). The relevance of Bunn's comments in the present context is the parallel between what the hand does and the mental activities that
follow these manual operations. The hand is not only the organ
associated with the philosopheme of conceptualizing, but it is also
the organ by which cutting and combining, classification and
measurement of mass and surface and weight take place. "Hands, not
eyes," says Bunn, define the phenomena of mass, weight, surface, and
volume," so that they are directly related to the process of
classification (49). And the hand in Eiseley's texts is also the
heuristic of groping, probing, reaching—even of the whole journey.

Historically, Eiseley repeatedly emphasizes, man tends to
interpret himself in terms of what his hands have made. Homo faber is
more than classification; the term itself indicates the relative
importance human beings have given to "making" or "fabricating." This
emphasis on the toolmaking and machine-making aspect of man reached
its zenith in the tendency of eighteenth-century tinkering man to
perceive the world itself as a machine containing innumerable smaller
machines. The idea was manifested in many ways: clockwork dolls,
clockwork worlds. "A human being thought of himself in terms of his
own tools and implements," and this habit of thought carried over into
his model of the world: "He had been fashioned like the puppets he
produced and was only a more clever model made by a greater designer"
suggests, with the new awareness of the cell and the discoveries of
particle physics, we tend to think in terms of "an abstract chemical
machine" (182). The point is that the human outlook is so shaped by
the abilities of the hand in "making" that man is likely to view the
entire cosmos in terms of a similar "making," with further
implications of control of the materials and control of the machine
accompanying this view, for it is man's nature to seek "mastery over the materials of his environment" (Eiseley, "How Natural Is Natural?" FT 158-59).

Eiseley first emphasizes the neurophysiological importance of the hand and its correlation with thought in *Darwin's Century*. The epigraph to the chapter "Wallace and the Brain" is a statement by the Duke of Argyll, friend and critic of Darwin:

> The difference between the hand of a monkey and the hand of a man may seem small when they are both placed on the dissecting table, but in that difference whatever it may be, lies the whole difference between an organ limited to the climbing of trees or the plucking of fruit, and an organ which is so correlated with man's inventive genius that by its aid the Earth is weighed and the distance of the sun is measured. (287)

The hand is thus linked with invention through its participation in weighing and measuring. Later Eiseley writes of the hand as a kind of root metaphor or unconscious symbol: "Human beings think of intelligence as geared to things. The hand and the tool are to us the unconscious symbols of our intellectual achievement" ("The Long Loneliness," ST 42-43). In this statement he underscores the essential metaphoricity of the organs of "grasping." Once proto-man was able to walk upright with a "freed forelimb," Eiseley emphasizes, the neurophysiological importance of the hand became inescapable. Hand and tongue thus become, by catachresis, figures for human abilities: "brain, hand, and tongue would henceforth evolve together. Fin, fur and paw would vanish into the mists of the past" ("The Star Dragon," TP 19).

Building on Darwin's and Wallace's insights into the neuro-physiological link of man's "tools and mechanical devices" and the
evasion of "the specialized evolution which so totally involves the world of plants and animals" (DC 313), Eiseley singles out the hand, first for its physical significance as a means of carrying out messages from the brain, then as a metonym for the human ability to reach and grasp, then as an emblem of human brain's ability to reach and grasp intellectually rather than physically, and finally as a metaphor for the manipulative aspect of human cultural evolution. The hand is often referred to in terms of its anatomical capabilities: the hand is "prehensile" or "grasping"; it is capable of making tools, of chipping a flint or wielding an axe or designing and constructing shelter. By catachresis, the hand is an emblem of man himself, as the Duke of Argyll intimated; and for Eiseley it is a symbol of the whole journey of man. It is a figure, too, for man's reaching out in a second sense--for his reaching out to other beings, out of the compassion poignantly expressed in the mad "star thrower's" attempts to rescue and return to the sea the strangling starfish or in some unknown builder's labor to prepare the abandoned shelter that the troubled Thoreau wrote about in his journal. The hand is, further, a figure for man's expression of self and of culture through art and history and science.

One of the most important thematic and metaphorical dimensions of the hand in Eiseley's texts is its function as the organ of groping, probing, reaching out. On the notion of groping, Bunn chooses an epigraph from Henri Focillon's "In Praise of Hands," in Life Forms in Art:

"My hands," said the Centaur, "have felt rocks, waters, plants without number, and the subtlest impressions of
atmosphere, for I lift up my hands on dark, still nights to
detect the breeze and so discover signs to make sure of my
way." (Qtd. 48)

The Centaur's "'groping' for a sign," Bunn suggests,
is the most common metaphor for the prelude to discovery.
In the dark, a trial and error of the hand feels its way to
understanding: touching, spanning, grasping. However, as a
metaphorical state of incipience, 'groping' is a condition
that one longs to replace with some larger law in logic,
geometry, and semiotics, so that everyone need not repeat
the particular instance of an apple falling on one's head.
Groping is that wordless state, fraught with expectation,
prior to the successful articulation of word, phrase, or
formula. (48)

In a physical, cultural, and epistemological "journey," the hand is
the essential metaphor for this "incipience" and "expectation." The
reason the hand is so apt "as a latent metaphor for the discovery of
signs" is that it "signifies what it does: it gropes for and grasps
other probes, and it reaches, in the fashion of Tantalus, for
intangible connections with the whole" (Bunn 48). The hand is "both
utilitarian and magical," and it can "draw attention to a hypothetical
dimension of semiotics, one of evocation" (48).

This reaching, groping, evocative quality is one that Eiseley
attributes to all life and treats metaphorically in terms of "groping"
or "fingering." He recalls Sir Charles Thomson's discovery on the
North Atlantic sea bed of a round, cake-like sea urchin which was a
frightening creature, "a living fossil" ("The Great Deeps," LJ 30).
The sea urchin, like all life, was "reaching out, groping for a
billion years" (44). The juxtaposition of the panting, groping piece
of life from the bottom of the sea, held in the hand of the ultimate
reacher, groper, and manipulator--man--leads Eiseley to link the
"reaching" of life with contemporary human "reaching" and "groping" in
the form of rockets (44). The groping and reaching that are
associated with human hands are figuratively transferred here to all
life.

A similar groping occurs in "How Flowers Changed the World" as
Eiseley explains the importance of flowering plants in providing
mobility to the seeds of life and in providing energy-giving food to
sustain the creatures on which man would feed. The first green forms
of life were "wandering fingers of green" which "crept upward" (1J
62). Eventually these green fingers from the sea would make possible
the prehensile hand of the creature with a passion for looking about.
An ape "with inquisitive fingers" would hold a stone, and "the stone
in the hand [would] change to the flint ax and the torch" (76).
(Eiseley writes of man's "grasping" fire ["The Angry Winter," UU
115].) From the metaphorical fingers of the sea to the literal, or
catachrestic, fingers of early man, the groping and probing are toward
other forms of being, but once man emerges, the groping and probing
are also epistemological. The groping and probing are part of the
journey, which is both a physical journey of shifting forms and a
journey toward knowledge.

And finally, in "The Lethal Factor," Eiseley uses a metaphor of
the hand to address the generalized grasping of organic matter as
contrasted with inorganic:

The organic world, as well as that super-organic state
which exists in the realm of thought, is, in truth,
prehensile in a way that the inorganic world is not. . . .
The creature existing now--this serpent, this bird, this
man--has only to leave progeny in order to stretch out a
gray, invisible hand into the evolutionary future, into
the nonexistent. (ST 252)
In this prehensile reaching forward, an insect-eating creature becomes a bat, while a similar creature "draws pictures in a cave and creates a new prehensile realm where the shadowy fingers of lost ideas reach forward into time to affect our world view and, with it, our future destinies and happiness" (252). A metaphorical reaching and "fingering" identify organic life so that, "since the dawn of life on the planet, the past has been figuratively fingering the present" (252). The implications of this reaching forward and fingering are clear in terms of time: "There is in reality no clearly separable past and future either in the case of nerve and bone or within the less tangible but equally real world of history" (252). This organic "groping" is also a groping of thought toward the future, as the metaphor reverses the sequence and the future reaches to the past as the past reaches toward the future. Even extinct creatures may still be having unknown effects, Eiseley suggests, and potential creatures are unimaginable to man.

For Eiseley, the hand also becomes catachrestic for its abilities to manipulate, thus introducing the thematic tension of the dual capabilities of reaching out—as a selfish extension or as a link to others. Today "the hand that hefted the ax, out of some old blind allegiance to the past, fondles the machine gun as lovingly" ("Man of the Future," LJ 140). The earliest "hefting" of stones is linked to the desire for "mastery over the materials of [man's] environment" ("How Natural Is Natural?" FT 158-59). In hunting cultures, Bunn notes, hands were "intermediaries that magically symbolized a degree
of control over animals, which were the measure of all things in that they supported hunting life" (Bunn 49).

In "The Hidden Teacher," Eiseley introduces the dual metaphor of spider and web, man and "fingering" space. He remembers an enormous spider on the rim of an arroyo, "fingering its universe against the sky" (UU 53). The spider, of course, is an analogue for man, who is at the center of a web unlike any other and similarly "fingering" space with his probes, Bunn's extensions of hands. But if he has gained knowledge of history, his reach is, like the spider's, toward a web beyond his understanding:

Like the spider's claw, a part of him touches a world he will never enter in the flesh. Even now, one can see him reaching forward into time with new machines, computing, analyzing, until elements of the shadowy future will also compose part of the invisible web he fingers. (53-54)

The "claw," a word with connotations of rudimentary life and of the machine, links man's extensions to the reaching spider. And like the spider, which knows only its own small universe, man too is limited. In this context Eiseley links man's ability to "make" with his desire to "reach" when he describes man as the self-fabricator (fabricate derives from the Latin fabrica, "workshop," which derives from faber, "workman," "artisan") who "searches as the single living cell in the beginning must have sought the ghostly creature it was to serve" (55). The quest of man echoes not only the "spider's claw," but also the "reaching" of the sea urchin and the "fingers" of green life. Again we find the tension in the hand as theme and metaphor. Man the manipulator is more now than just a tool-user and a machine-builder. His task now is to reach beyond himself toward other creatures and other men, and his hand is a metaphor for that reaching.
The probing of space, with the tension of positive and negative, reappears in terms of "tentacular space probes" occasioned by both conflict and intellectual curiosity in "The Lethal Factor" (ST 254). Throughout history Eiseley finds "that behind every unifying effort in the life of man there is an opposite tendency to disruption, as if the force symbolized in the story of the Tower of Babel had been felt by man since the beginning" (258). The one truly "lethal factor" that Eiseley identifies is man's adaptability, which is now transferred to space itself. Eiseley treats this groping through the physical hand, which "fumbles" toward adaptation and toward shaping a future that is conceptual as well as physical. On an enormous scale, far out in space, "man's hands [are] already fumbling in the coal-scuttle darkness of a future universe" (264). Man's adaptability, which is part of his figurative "reaching" forward, is the mark of his humanity and of his capability for self-destruction.

Thus hands can go beyond their neurophysiologically associated meanings. "Their meaning is manifold, because their cauterization from the whole body signifies by that part a supplication for the whole" (Bunn 48). The hand appears as a symbol of the whole journey in the opening chapter of The Immense Journey, "The Slit." The slit of the title is a body-width crack in a barren area of the American West where the narrator chips away to remove the skull of a prehistoric creature imbedded in the rock. As he contemplates "the cunning manipulability of the human fingers," he perceives in the hand a "symbol of that long wandering . . . --the human hand that has been fin and scaly reptile foot and furry paw" (6). It is the hand that,
physically in conjunction with the eye, makes possible the journey of man; and it is the hand that, in this figure, opens Eiseley's immense journey.

The most striking use of the hand as a symbol for the whole journey of man comes in "The Creature from the Marsh" when, sensing in a dream-like state that the great city (clearly New York City) is already a relic, the narrator goes out to walk the streets, searching for a symbol of man to last when the city is gone. He tells of coming upon the remains of a little shop where he saw "among the bits of glass, a little cluster of feathers, and under a shattered pane, the delicate bones of a woman's hand that, dying, had reached wistfully out" (NC 155). It is an image that he turns to allegory: "The human hand, the hand is the story. I touched one of the long, graceful bones. It had come the evolutionary way up from far eons and watery abysses only to perish here" (155). The narrator is struck by the irony that five million years of evolution had led to nothing more than "that the shining thread of life could die reaching after a little creation of feathers in the window of a shop" (155).

Returning to reality, the narrator is aware of his wife's tugging at his sleeve, and he waits while she enters the shop and motions from the window toward the cluster of feathers. The narrator hastily summons her away, having felt "the terrible déjâ vu of the archaeologist, the memory that scans before and after" ("The Creature from the Marsh," NC 156). In the archaeologist's "terrible déjâ vu," the hand is not only the symbol for man, but a reminder that the process of change is ongoing, that fixity is an illusion, and that humankind could end in an activity as trivial as reaching for a
cluster of feathers ("not with a bang but a whimper," in Eliot's words, and ironically reaching for the feather that symbolizes an earlier stage of life).

In the autobiographical All the Strange Hours the hand appears as a reminder of the whole journey and of the dual capabilities associated with humankind. Eiseley recalls from his hobo days the wanderers whose gestures of the hands signify their proximity to the primitive's use of his hands and also their aimlessness and helplessness as "they all held their hands loosely across their knees as though they were waiting unconsciously for . . . either a tool or a stone to be thrust into their fists" (54). They were men wandering aimlessly, throwing stones at a barrel. The narrator thinks of them as symbols of a return to the primitive after the destruction of the cities:

We would be here . . . when the city had fallen, gross and neanderthaloid. . . . We would throw stones and break what we could not understand, as before. It was part of us, that restless, manual cruelty from some dark tree in a vanished forest. It was our glory and it was, at the same time, our ending. (56).

The "manual cruelty" that seems to be a holdover from the darkness of a tree-dweller's instincts is balanced against the human capabilities associated with the hand. The hand can be the instrument of cruelty or the means of reaching out across the barriers of form to aid another creature. The hand can express the best and the worst of all that is human. It suggests, as Eiseley often says, the beginning and the end of man.

If the hand represents this duality that Eiseley frequently treats, it may also be the emblem of hope. Eiseley's concern is that
man must learn to redirect his manipulative capabilities. In fact, Eiseley even suggests a heuristic counter-model to the hand in the essay "The Long Loneliness," in which he posits the hand as the mark of separation between man and animal, particularly in the development of the ability to write. Man is, he contends, totally alone—aware of past and future, while to the animals past and future do not exist. Man is isolated because he "is so locked in his own type of intelligence—an intelligence that is linked to a prehensile, grasping hand giving him power over his environment" (ST 38)—that he has difficulty imagining another creature with comparable intelligence.

In an attempt to imagine having intelligence as great as man's without manipulative ability, Eiseley invites the reader to accompany him on a journey through an entirely strange domain, the porpoise's domain. On this journey he asks the reader to "sacrifice" hands for flukes and to imagine living as an intelligent being in a different medium and without the ability to manipulate his surroundings. Once we are in the porpoise's world, one point is clear: "No matter how well we communicate with our fellows through the water medium we will never build drowned empires in the coral; we will never inscribe on palace walls the victorious boasts of porpoise kings" ("The Long Loneliness," ST 40). With flippers instead of hands, man might "still be a philosopher, but there would have been taken from him the devastating power to wreak his thought upon the body of the world" (43). That the hand can "wreak"—drive, vent, expel, with the usual connotation of vengeance—thought upon the world, through the written word, is indicative of Eiseley's concern with the dual capacity of the
hand, whether employed in building or in recording human plans or human accomplishments. "Only the poet who writes," says Eiseley, "speaks his message across the millennia to other hearts" (41). Only the "invention made possible by the hand" (41) has led us "to equate the use of tools in a one-to-one relationship with intelligence" (39). In presenting the counter-model of the porpoise living with intelligence apparently equal to man's in the water medium with flippers instead of hands, Eiseley explores a new perspective of simple observation and cooperation for man.

And he gives a counter-model to the "restless manual cruelty" of humankind, not through metaphor but through a symbolic incident. In "How Natural Is Natural?" the narrator recalls an incident in a desert area of the American West, where he encountered a puzzling sight that looked something like a shimmering rope dangling from a ball. As he neared, he discovered the rope to be an enormous blacksnake with the sun reflecting from its scales. The snake had attacked a pheasant hen, probably not deliberately but because she surprised it in the act of stealing her eggs. The bird was too big for the snake, and the two had become intertwined, with neither able to extricate itself. With waning energy, the bird kept beating the snake against the stones as she attempted to fly, each contending for its own kind against the future. But the man becomes the intervening force by reaching out with a prehensile limb and letting the snake coil onto his arm. He takes it over the ridge and releases it where it will not interfere further with the bird. The human being alone is capable of this extension of himself; he can reach out to destroy, but he can also reach out in compassion. This experience is the vehicle for Eiseley's
realization that man can "contain more than himself" (FT 176). The narrator, in this instance, "struggled ... for a greater, more comprehensive version of myself" (176). His separation of the two creatures "was not for knowledge" and "not for anything I had learned in science. Instead, I contained, to put it simply, the serpent and the bird" (177-78). The serpent, of course, is the traditional monster (dragon, deceiver of Eve) and a traditional masculine symbol (phallus). Two entwined serpents are associated in early Greece with the staff of the god Hermes, messenger and god of the crossroads (a herm is a bust of the god mounted on a pillar, with the entwined serpents on one side and an erect phallus on the other). Thus fertility is indicated, but also, in this context, "Hermes is Trickster in a different role as a messenger, a god of the crossroads, and finally the leader of souls to and from the underworld. His phallus therefore penetrates from the known into the unknown world. ..." (Jung et al. 155-56). Later the god gained attributes of the bird and became associated with the winged hat and the winged staff as the Roman Mercury, an association which Jung calls "transcendence from under-world snake-consciousness, passing through the medium of earthly reality, ... to superhuman or transpersonal reality in its winged flight" (156). The relevance of this "transcendence" in the present context is in the "transpersonal reality" that Eiseley suggests. The bird has other associations, too, from symbolizing freedom, to the feminine guide on a journey of release, to its own association with the Trickster, who, having moved to the stage of shaman, has the power to leave the body and fly as a
bird flies (Jung et al. 151). Whether as masculine and feminine, yin and yang, good and evil, bondage and freedom, or merely as warring creatures struggling for the destiny of a clutch of eggs, the serpent and the bird carry intense meaning. But what is most important is that, in the act of separating the two—intervening in the struggle—man performs an action of which no other creature is capable. Most significantly, man can "contain both the serpent and the bird" ("How Natural Is Natural?" FT 177-78) both in the evolutionary sense and in the sense of transcending their war and seeking a peaceful path.

Returning to the notion of man the toolmaker with which he began, Eiseley concludes that "it is not the outward powers of man the toolmaker that threaten us," but the creation of an "idol" that is "man made natural" ("How Natural Is Natural?" FT 180), which is the assumption that man's manipulation is a "natural" part of the world. From man the toolmaker the essay moves to man who can figuratively reach outside himself. He is a creature who can go beyond what he now knows as "natural" and into the compassion that links one form with another and one human being with another.

It is the same reaching of one form to another that Eiseley records in "The Star Thrower" as the narrator realizes that the madman attempting to save strangling starfish on the beach represents both a "rift" and a "joining" in nature, as he turns from the cold reductionism of the scientist to find "the rift that lay beyond Darwin's tangled bank. For a creature, arisen from that bank and born of its contentions, had stretched out its hand in pity" (UU 87-88). The outstretched hand is a commonplace of popular language; it is, nevertheless, in Eiseley's context, a gesture of reaching beyond the
boundaries of form. The gesture of the madman on the beach is a model, like the gesture of the man who intervened in the struggle of serpent and bird, for compassion rather than manipulation: "From Darwin's tangled bank of unceasing struggle, selfishness, and death, had arisen, incomprehensibly, the thrower who loved not man, but life" (91). The gesture represents, in Eiseley's metaphorics, an attempt to shift from the model of the hand and the ax, the model of man as warrior, to a model of compassion. As Eiseley says elsewhere, "Homo faber, the toolmaker, is not enough" ("How Natural Is Natural?" FT 159). Nor is it enough that the epistemological association of the hand and the concept is based on having, grasping, controlling, taking to oneself. Eiseley's hand as concept emphasizes reaching, probing, groping, and reaching out beyond the boundaries of form. And the hand, as in "The Star Thrower," sends the message on its journey.

Eye

Like the other organs of knowledge that also take on metaphoric functions, the eye begins metonymically and is linked to the other figures that grow out of physical metonyms. The eye is man's means of observing and participating in the world. The link between eye and ear, organs of the "idealizing" philosphemes, is evidenced by the fact that, as Theodore Thass-Thienemann points out, Germanic words for "eye," such as the Old English erage and the German Auge, begin with a diphthong likely derived from words for "ear," as in the Gothic auso (210). Eiseley stresses the neurophysiological link of eye and hand in the process of evolution, and he frequently returns to the link
between eye and hand as he emphasizes the role of writing (hieroglyphic or alphabetic) in the development of culture.

But the eye takes on more significance than metonymic representation of seeing. In Eiseley's texts, from the primitive who read Coleridge's "mighty alphabet of the universe" ("The Golden Alphabet," UU 145) to the eye as "an awesome crystal whose diffractions are far greater than those of any Newtonian prism" ("Walden: Thoreau's Unfinished Business," ST 249), the eye is both physical reality and metaphor. Strongly linked to the Western metaphysical tradition which unites light (the sun) and the sojourn, Eiseley follows the inside-outside, light-dark oppositions as elaborated by Bacon. And light, as established earlier, is basic to the sojourn, to the "shining" of the journey. (The Irish language uses the same word, suil, for both "sun" and "eye" [Thass-Thienemann 262]). Repeatedly, the notion of bringing in the light appears in the traditional sense symbolized by the candle as bringer of light to darkness (Thass-Thienemann 262). With visual images, an "inward eye," man examines and creates an "inner" world. Indeed, says Eiseley, "The world cannot be said to exist save by the interposition of that inward eye—an eye various and not under the restraints to be apprehended from what is vulgarly called the natural" ("The Star Thrower," UU 88).

Eiseley adopts the notion of the "inner" and "outer" worlds from Bacon and adapts it to his purposes. He uses the eye to link inner and outer as it reads both nature and the printed word to perceive the
inner. Thus the eye's "reading" function becomes a major intersection in the epistemological heuristic.

Although the notion of "inner" and "outer" is a continuing philosophical issue, Derrida suggests that "one would attempt in vain, in order to wean language from exteriority and interiority, . . . to forget the words 'inside,' 'outside,' 'exterior,' 'interior,' etc., and to banish them by decree . . ." (Writing and Difference 112-13). The notions of inside-outside and light-night, he suggests, are actually "embedded . . . at the very heart of conceptuality," so that an "original and irreducible" "equivocity" comes with the language that philosophy must use (113). Retaining the vocabulary that Richard Rorty calls "a seventeenth-century vocabulary largely dependent on visual imagery, especially mirror imagery," Eiseley nevertheless attempts to move, like Rorty's "intentionally peripheral" figures (Philosophy and the Mirror 6, 369), beyond the seventeenth-century concepts of order and fixity that have been absorbed in evolutionary thinking and even beyond the notion of representation that troubles Rorty. As a popularizer, Eiseley does not attempt to alter the vocabulary; but, remaining within the visual imagery and vocabulary, he is concerned with undermining, even "soliciting" in the Derridean sense of "shaking" or causing to "tremble" the accepted, "stable" referentiality of the vocabulary.

Eiseley is concerned, not with the notion of a perfectly clear, unclouded mirror, but with "the shifting colors in the enchanted glass of the mind which the extreme Baconians would reduce to pellucid sobriety" ("The Enchanted Glass" 480). He is concerned with the individual's observation rather than with a hypothetical objectivity.
Thus his models of observation are more often the parson-naturalists who brought personal experience to observation of nature (Darwin, we recall, is, for Eiseley, also a descendent of these natural history writers) than the strict empiricist. For, Eiseley says, "when the human mind exists in the light of reason, and no more than reason, ... man and all that made him will be in that instant gone" ("The Enchanted Glass" 482). "Poetically man dwells," in Heidegger's words; poetically man observes, in Eiseley's cosmogony.

Although the dominance of the visual is clear in Eiseley's texts, the interplay of the eye with the hand and the tongue is important. At the level of the sensorium the three are interdependent; at the level of "sense" or signified the three become metaphorical. And through these metaphors Eiseley explores the interrelationship of sensation and sense, of the physical senses and the acquisition of knowledge from the physical universe.

Further, as a homophone for the I of the texts, the eye links autobiography and dramatizations of events from the narrator's past and from the past of man to an omnipresent I who is also an eye. The I and the eye link autobiography and observer as participant. The I is commingled with both the "eye" and the "I" as the person of the observer. And the I as the I/eye of all men brings an extension of perception into the reader's domain.

The eye itself, Lacan suggests, is both a receptacle and a labyrinth (The Four Fundamental Concepts 93). The light that the eye receives "may travel in a straight line, but it is refracted, diffused, it floods, it fills—the eye is a sort of bowl—it flows
over, too, it necessitates, around the ocular bowl, a whole series of organs, mechanisms, defences" (94). Thus "the relation of the subject with that which is strictly concerned with light seems, then, to be already somewhat ambiguous" (94). Both the ambiguity of Lacan's "light" and the eye as a receptacle are relevant to Eiseley's exploration of the relationship between sight and meaning, for ambiguity dominates in Eiseley's metaphors and themes, and the eye as a kind of receptacle parallels the functions of the other two organs, as we shall see later.

In Eiseley's texts several metaphors cluster around the eye as metonym and as the philosophememe of the idealizing sense. First, the eye itself appears as metaphor, usually carrying the theme of "two eyes"—the two eyes of microscope and telescope, the "double vision" of a fish and a poet, or the two "eyes" of Walden Pond. Further exploring the eye's function, the mirror functions metaphorically as an image of reflected light. Eiseley's mirror is often a shattered mirror or a distorted glass which reflects, not a fixed or idealized notion of "truth," but the shifting forms or illusions of reality. The kaleidoscope, also dependent on the visual philosopheme, metaphorically employs refracted light as a model, again for shifting, illusory perceptions of reality. Finally, the hieroglyph, tied to the philosopheme of sight, is a major metaphor for man's "reading" the universe, the environment, or other living creatures, with the "reading" always dependent on the reader's insights rather than on a fixed signification. What emerges in this reading is thus an interaction of reader and text, of man and nature, in an unrolling
process of a "text" that the reader creates; life and evolution are but processes that the "reading" both reveals and creates.

The eye as the organ of the philosopheme of sight, then, is the source of metaphoric presentations that displace notions of fixity, truth, and reality for the Eiseleyan shifting, unfixed, uncertain forms that are only illusions of the time dimension and that further displace notions of science as either fixed or unmediated vision or knowledge. Like the hand that reaches but often only probes or explores what is ungraspable, the eye sees only to have the mirror or the kaleidoscope shift. Thus Eiseley's epistemological exploration leads to a realization that knowing is not-knowing, that the world is process rather than fixity. The ramifications of this thesis for the project of popularization are significant, especially in view of the relationship between our view of the world and cultural, political, and civic praxis, as we shall see in Chapter VI.

Eye as Metaphor

The eye in Eiseley's texts is not only the organ of the philosopheme of "idea" (from the Greek eidos, meaning "form"), but also the source of other metaphors. Because visual perception is constantly shifting, the eye becomes an integral factor in Eiseley's shifting reality, in his perception of life as process. The eye as metaphor and the visually oriented metaphors associated with the philosopheme are part of Eiseley's displacement of notions of fixity, stability, and objective reality, as well as a means of exploring the problem of knowing. Through the dialectic of "two eyes," the eye as metaphor suggests alternating perceptions and, in some instances, the
visual form of the synthesis that Eiseley as humanist would propose. In announcing the purpose of *The Immense Journey*, Eiseley observes that he simply reports "such miracles as can be evoked from common earth," though he remains aware that "men see differently" ("The Slit" 13). The word *miracle* derives from *miror*, a Latin deponent verb--passive in form though active in meaning and thus carrying an embedded sense of the passive and suggesting both "admiring" or "wondering" and "being admired" or "being wondered at," as is characteristic of all the uncanny marvels of man and nature.

The figurative eye is, on the most basic level, a metonymic extension of seeing. Both telescope and microscope are "eyes." In Thoreau's question, "Who placed us with eyes between a microscopic and telescopic world?" Eiseley explores the eye as a means of further extending human "vision," whether through science or through poetry ("The Mind as Nature," *FT* 219). Similarly, he suggests that the metaphorical eye of man on Mount Palomar began metonymically in the eyes of myriad creatures: "A billion years have gone into the making of that eye; the water and the salt and the vapors of the sun have built it; things that squirmed in the tide silts have devised it" ("The Great Deeps," *IJ* 45). This metaphorical eye is a palimpsest of evolving sight apparatuses. It haunts the observer who remembers the first eyes and is reminded by a frog's eye "warily ogling the shoreward landscape" of "those twiddling mechanical eyes that mankind manipulates nightly from a thousand observatories" (45). For Eiseley this awareness of the palimpsest of eyes "is the most enormous extension of vision of which life is capable: the projection of itself into other lives. This is the lone, magnificent power of
humanity" (46). This metaphorical extension of vision Eiseley calls "widening the eye of the world" (ASH 235) and suggests that it can be accomplished by unwinding a snake from a pheasant, by the communication of Odysseus and the dog Argos through the recognition of life across the boundary of forms, or by the "timeless eye" of the essayist, whose vision can "reduce us to minuscule proportions" (ASH 155).

Telescope and microscope also provide the poles which lead to a kind of Hegelian synthesis that Eiseley calls the "balanced eye." Both the "eye" at Palomar and the "eye" of the electron microscope are "eyes of understanding," which "balance and steady each other. They give our world perspective; they place man where he belongs" ("The Spore Bearers," IP 88). These mechanical eyes, however, remain "subject to their human makers," while a contrasting metaphorical eye exists--"the balanced eye, the rare true eye of understanding" (88). The "balanced eye" is, in a sense, the eye of the ancient seer; it "can explore the gulfs of history in a night or sense with uncanny accuracy the subtle moment when a civilization in all its panoply of power turns deathward" (88). The eye of the telescope and the eye of the microscope thus parallel the inner and outer eyes, through which Eiseley underscores the necessity of looking outward and inward in finding the balanced view that can provide "some triumph beyond the realm of technics" (94).

The two eyes seeking balance appear in the metaphor of man's viewing himself through different "spectacles," one set for the past and another for the future, in a metaphor adapted from The Wizard of
Oz. Eiseley suggests that we need both pairs of spectacles to provide a balanced view or synthesis. Darwin looked through the spectacles of the past and became the needed synthesizer of his time who had "a wonderful glimpse, as through the mosaic of a stained-glass window, at the imperfect changing quality of life" ("The Golden Alphabet," UU 137), though he remained caught in social notions of the day, specifically Malthusianism. Thoreau, Eiseley says, employed the spectacles of the future, for he lived, in a sense, "in the age after tomorrow," seeing "civilizations like toadstools springing up by the road" and accepting that "everything is in the flowing, not the past" (139). Through the two sets of "spectacles" Eiseley approaches the problem of backward-looking and forward-looking man, the strengths of each, and the synthesis that he repeatedly calls the "balanced view."

Two metaphorical eyes appear also as the eye of science and the eye of the poet. The image is that of a scientist, a "remorseless experimenter," in whom one eye had been used so much that it distorted his face. Metaphorically, Eiseley suggests, "one bulging eye, the technological, scientific eye," whose "objectivity" has "become so great as to endanger its master," is in modern times "willing to count man as well as nature's creatures in terms of megadeaths" ("The Last Magician," IP 144). In the same essay Eiseley suggests that the eye of the poet is needed by everyone who lives in an age of rockets. In this metaphor, science comes under question as perfect knowledge or as unmediated vision. The eye of the poet represents a mediated vision, explained after the image of the bulging eye in a discussion of the linguistic term displacement, which enables man "to make use of the imaginary in order to control reality" (145). The mediated vision of
the poet displaces and balances, for Eiseley, the distorted vision of science; in a balanced view each individual becomes his own "last magician" and finds his way back to a conscious interrelationship with nature.

The "eye" of science and the "eye" of compassion appear again in "The Star Thrower," perhaps Eiseley's most powerful essay, in a juxtaposition which I shall detail because of its centrality to the Eiseleyan "eye" and its important affective dimension. Beginning with the epigraph from Seccho—"Who is the man walking in the Way? / An eye glaring in the skull" (Qtd. 67)—the eye becomes the instrument of asking the "terrible questions" that Emerson considered, the questions of science. The skull and the eye symbolize the pitiless scientist, intent on observing but with no patience for feeling. The narrator has become "the inhumanly stripped skeleton" which is "devoid of pity, because pity implies hope" (UU 68). In the skull there is only an eye like a pharos light, a beacon, a search beam revolving endlessly. . . . With such an eye, some have said, science looks upon the world. I do not know. I know only that I was the skull of emptiness and the endlessly revolving light without pity. (68)

On the shore of the fictional beach of Costabel, "the revolving eye begins its beam and the whispers rise in the empty darkness of the skull" ("The Star Thrower," UU 69). The narrator's brain is reduced to the skull, part of the "inhumanly stripped skeleton" that can feel no emotion, while the eye is the pitiless eye of objective science. In the early morning before dawn, the pitiless eye observes the equally pitiless and greedy professional shell collectors. The place seems fit for the eye without pity, yet beneath an exquisite rainbow
stands a madman who flings suffocating starfish back into the sea because they "throw well" and can be "helped" (72). Though the old man has "the posture of a god," the "world-shriving eye" observes that the thrower is only "a man, and death is running more fleet than he along every seabeach in the world" (72).

All the "devious, tattered way" of evolutionary history is clear to the narrator, the eye in the skull. But now removed to a hotel room, he senses a second eye in the room, an "other eye" that has no scientific explanation: "It may have been a projection from the mind within the skull, but the eye was, nevertheless, exteriorized and haunting" ("The Star Thrower, UU 79). As a symbol of sympathy, this eye evokes awareness of nonhuman eyes of suffering creatures and finally of "an eye that seemed torn from a photograph, but that looked through me as though it had already raced in vision up to the steep edge of nothingness and absorbed whatever terror lay in that abyss" (79-80). The last is the eye of the narrator's mother, long dead. The narrator has consciously moved beyond "the level plains of science" to perceive man "in vaporous metaphoric succession as the homeless and unspecified one, the creature of the magic flight" (80).

Even wearing sunglasses as a shelter against the eye that demands pity, the narrator feels the gaze from the photograph as if he were "being asked to confront, in all its overbearing weight, the universe itself" ("The Star Thrower," UU 86). Remembering the Biblical injunction against loving the world and things in it, the narrator feels the "revolving beam" stop and the eye from the photograph watch him. His response is a whisper: "But I do love the world.... I love its small ones, the things beaten in the strangling surf, the
bird, singing, which flies and falls and is not seen again. . . . I love the lost ones, the failures of the world" (86).

For Eiseley, as narrator, this identification with the "lost ones" and the "failures" is "like the renunciation of my scientific heritage" ("The Star Thrower," UU 86). The eye from the torn photograph looks sadly at him and departs, leaving him aware of "one of the last great rifts in nature" as "the merciless beam" of the searchlight eye ceases to revolve (86-87). The "rift" that Eiseley describes, like Heidegger's rift (Riss) between "world" and "earth" in the formation of the work of art, is at once a break but also, as Heidegger says, a "rift-design" that is "the drawing together, into a unity, of sketch and basic design, breach and outline" ("The Origin of the Work of Art" 63). The madman hurling stars had crossed this rift, which Eiseley also calls "a joining," an "expression of love projected beyond the species boundary by a creature born of Darwinian struggle, in the silent war under the tangled bank" (87). In this act the madman crossed the boundaries of his own nature. At this point the narrator returns to the symbolic eye of knowledge:

Out of the depths of a seemingly empty universe had grown an eye, like the eye in my room, but an eye on a vastly larger scale. It looked out upon what I can only call itself. It searched the skies and it searched the depths of being. In the shape of man it had ascended like a vaporous emanation from the depths of night. The nothing had miraculously gazed upon the nothing and was not content. It was an intrusion into, or a projection out of, nature for which no precedent existed. The act was, in short, an assertion of value arisen from the domain of absolute zero. A little whirlwind of commingling molecules had succeeded in confronting its own universe. (87)

The manifestation of pity of which the human being is capable is the "rift"—cleft and joining, breach and design—beyond the Darwinian
struggle; and for Eiseley "the fate of man is to be the ever recurrent, reproachful Eye floating upon night and solitude" (88).

Abandoning indifference, the narrator becomes aware that "thought mediated by the eye is one of nature's infinite disguises," and he chooses to join the madman in his futile effort to work, in Bacon's phrase, "for the uses of life" ("The Star Thrower," ST 88, 91). The two men—scientist and madman—have found the secret that primitive cultures always know, the need of man for other life forms. For Eiseley, the realization is a confirmation of "the discontinuities of the unexpected universe" and "a hint that there looms, inexplicably, in nature something above the role men give her" (91-92).

In this use of the eye as symbol Eiseley juxtaposes the two eyes of pitiless science and of compassion and, in what seems like a renunciation of the science that motivates him, aligns himself with the symbol of compassion. His "heretical science," as Carlisle calls it, makes room for more than the pitiless eye revolving in the skull, the distorted view of science unbalanced by humane concerns. The powerful affective dimension aids in undermining the notion of science as all knowing or as the only path to knowledge.

Another effective metaphorical treatment involves the dual vision of the poet. For analogical purposes Eiseley establishes the double vision of a Brazilian fish that "sees with a two-lensed eye, a kind of bifocal adjustment that permits the creature to examine the upper world of sunlight and air, while with the lower half of the lens he can survey the watery depths in which he lives" ("Man in the Autumn Light," IP 119). And in comparison to the fish, he introduces William
Blake's "double vision into a farther world than the natural" (120). If the fish sees into two "worlds of reality" at once, man, Eiseley observes by analogy, "has always possessed the ability to escape beyond naked reality into some other dimension" (120). Through this set of metaphorical eyes Eiseley thus introduces another series of reflections on man's "phantom universe" (120) of culture, for which, he suggests, man needs both the bifocal eye of the fish and the dual eye of the poet.

Blake's dual eye leads Eiseley to reverse Thomas Love Peacock's derisive comment that a poet is "a semi-barbarian" whose intellect moves, crab-like, backward. Turning Peacock's image back on itself, Eiseley treats the derisive metaphor of the crab as an eye metaphor for a fortuitous development. The poet is, Eiseley says, a "fortunate creation," "born wary and . . . frequently in retreat because he is a protector of the human spirit" ("Man in the Autumn Light," IP 124). Poets, he likes to imagine, are capable of "lurking about the edge of all our activities, testing with a probing eye, if not claw, our thoughts as well as our machines" (124). The poet thus links eye and hand, "probing." Combining this metaphor with Blake's "double vision of poets," Eiseley says, "There is no substitute, in a future-oriented society, for eyes on stalks, or the ability to move suddenly at right angles from some dimly imminent catastrophe" (124). This is the kind of "eye" that will enable human survival. The poet as a crab, with "eyes on stalks," is a startling image reminiscent of Pound's notion of poetic images "charged" with meaning. That the poet, crab-like, is able to see before his contemporaries and to move quickly is
inter textual with Shelley's notion of poets as "the unacknowledged legislators of the world" (513).

The blending of the eye as sense organ and the eye as metaphor into the two eyes of poetry and reductionism dominates Eiseley's two essays that center on the texts of Henry David Thoreau. In "Thoreau's Vision of the Natural World" Eiseley begins with Thoreau's remark that "there has been nothing but the sun and the eye since the beginning" (ST 233). (The sun is the eye and the eye is the sun, as we have noted.) The "eye" that recurs in Thoreau's text is the poetic eye that defies reductionism. Although the science that intrigued Thoreau would "reduce everything to infinitesimal particles and finally these to a universal vortex of wild energies" (233), still the poetic "eye" remained, no less insistent even though "all it experienced were the secondary qualities, the illusions that physics had rejected" (233). Involving his own experience among the leaves, Eiseley realizes: "We were particles but we were also the recording eye that saw the sunlight—that which physics had reduced to cold waves in a cold void. Thoreau's life had been dedicated to the unexplainable eye" (233). For Eiseley, Thoreau's observations reveal "the unrolling reality of the process philosopher" (234). The point, of course, is that poetic seeing requires the observer's participation in, engagement of, what is seen. The individual in Thoreau's world "is forever the eye" (234), participating in a metaphorical "seeing" of process.

Eiseley's notion of the function of art is further linked to the "eye" in "Walden: Thoreau's Unfinished Business." For Eiseley, "looking is in itself the business of art" (ST 236). Walden Pond is
metaphorically two eyes, the eyes of "alternate glazing and reflection," and "man, himself, is Walden's eye of ice and eye of summer" (236-38). One of man's eyes is "gray and wintry and blind," but his summer eye can spy "another world just tantalizingly visible and dismissed as an illusion" (238). The summer eye of observation is "the alchemist's touchstone" that Eiseley perceives in Thoreau. It is an eye that observes both outer and inner worlds, that observes the metaphoric Walden "eye" of both winter—cold and uncaring and blind—and summer—involved and seeing in the larger metaphorical sense. This "eye" of the alchemist is a metonym for the artist as Eiseley says, "Only man's own mind, the artist's mind, can change the winter in man" (238). The human eye, he contends, "constitutes an awesome crystal whose diffractions are far greater than those of any Newtonian prism," and the artist helps to shape the "oncoming world . . . by the harsh angles of truth, the truth as glimpsed through the terrible crystal of genius" (250). The "terrible crystal" does not represent, but distorts, for all art distorts in creating its own "other" space or other reality, as Blanchot has suggested.

The onto-theological metaphor of the sun and the eye thus leads Eiseley into a maze of eye metaphors but also into a reading of Thoreau that stresses, as do the other uses of the eye as metaphor, the mediating (even distorting) power of the eye as opposed to notions of unmediated observation, reality as process and change as opposed to fixity and decidability, and the importance of the unexpected or the inexplicable in nature as opposed to reductionism. The eye as metaphor continues Eiseley's displacement of metaphors and notions of reductionism, fixity, and decidability, as well as his exploration of
the relationship between the physical senses and understanding of the human place in the natural world.

Metaphors Dependent on the Eye

Mirror. Central to Eiseley's eye metaphors is the mirror, historically associated with the eye as the organ of perception and with the homophone of the "I." Eye and mirror are associated with knowledge, with self-knowledge and identity, as well as with warning. In Lacanian terms the stade du miroir marks the child's passage from the domain of images, the Imaginary, into the domain of language, the Symbolic. In Lacan's view the infant, held by its mother before a mirror, sees itself and begins to perceive itself in perceiving the Other. As the infant perceives through Freud's "Fort! Da!" its ability to make the image appear and disappear, it passes from the stage of the Imaginary, founded on image, to the stage of the Symbolic, founded on language. The realm of the "Imaginary, with its specular images, is informed by the structures of vision, of seeing..." (Ulmer, "The Discourse of the Imaginary" 63), whereas the realm of the Symbolic is fragmented. "What lies 'beyond' the mirror stage is a loss of totality, the fragmentation of the body and the self," specifically in castration and in "accepting the possibility which language brings of the discontinuity of the self" (Culler, The Pursuit of Signs 165). Also significant in the linguistic "mirroring" is the Derridean concept of the signifier that "doubles back" upon the signified to create a mirror effect in which the signifier is reflected onto the signified, in contradistinction to the traditional
notion of the signifier as mirror of the signified, of the vehicle as reflection of the "idea." 2

As Bachelard suggests, the very fascination of psychoanalysis with the significance of Narcissus' relationship to his reflection lends credence to the significance of the mirror in relation to the unconscious. Noting the fascination of psychoanalysis with the figure of Narcissus and "the love of man for his own image" as "reflected in the tranquil water," Bachelard sees water as the reflecting agent "naturalizing" the image; before a mirror, Narcissus would encounter a kind of "barrier" from glass and metal, whereas the mirror provided by the fountain makes possible an "open imagination," without the "stability" of an artificial mirror (L'eau et les rêves 32-33). The mirror of the fountain is thus, for Bachelard, the source of the "complete poetic experience" (32). Before this fountain, Narcissus experiences "the revelation of his identity and of his duality, the revelation of the double male and female powers, the revelation above all of his reality and of his ideality"; for Narcissus contemplates more than himself at the fountain: "His own image is the center of the world" (32-37). Bachelard thus reverberates Jacques Lacan's notion of the stade du miroir. The significance of these theoretical discourses for Eiseley's texts is in his stress on the mirror as a source of identity and on the shattered mirror as a fragmentation that reflects the whole, but in which each part also reflects the whole. The mirror is the symbol for piecing together the individual's identity.
Also worthy of consideration in the Eiseleyan context is the link between Narcissus's mirror and Melville's Ishmael, who appears repeatedly as, for Eiseley, the symbol of "wondering [and wandering] man," the "acceptor of all races and their gods," the one who can say, "I only am escaped to tell thee" ("Science and the Sense of the Holy," ST 199, 201). Addressing the human "endless fascination with visible nature," Leo Marx focuses on a passage in which Melville's Ishmael describes a shepherd gazing on a "magic stream":

He singles out water for its 'magical' properties: at times transparent, at others a mirror, water bemuses us with the possibility of penetrating the surface of nature, yet it flatters and disturbs us by casting back our own image. What do we actually see—the object or ourselves? A shepherd gazing at the water thus epitomizes the exasperating, yet perhaps unavoidable, mingling of the "I" with the object in the act of perception. All of which is illustrated, Ishmael says, by the story of Narcissus, who because he could not grasp the tormenting image he saw in the fountain, plunged into it and was drowned. What makes the water the telltale element in landscape is that it so clearly elicits the narcissistic response. The image that Narcissus saw in the fountain, Ishmael concludes, "we ourselves see in all rivers and oceans. It is the image of the ungraspable phantom of life, and this is the key to it all." (291-92)

Marx's insight is relevant not only to Eiseley's recurrent references to Ishmael, but also to his concern with identity and to his use of water as a poetic "element." In the first essay in The Immense Journey Eiseley perceives in his essays a kind of Bachelardian combination of "the four ancient elements of the Greeks: mud and the fire within it we call life, vast waters, and something—space, air" ("The Slit" 13). "For the poet," says Northrup Frye, "the elements will always be earth, air, fire and water. . . . It is only in science where such myths are a nuisance; yet even in science the tendency to
make them is extraordinarily persistent" (Preface to Bachelard, *The Psychoanalysis of Fire* vi).

The "fleeting" quality of the mirror's images, which leads M. H. Abrams to consider the mirror an imperfect metaphor for poetry (33), makes the mirror as an analogue to the quest for identity in Eiseley's texts highly appropriate in that man and time and form are treated as fleeting expressions, mere process. Through the mirror, the informing metaphor of the eye, drawn from physiology, is joined with the inner quest which is both part and product of cultural evolution.

Linking the mirror, too, with the thematic emphasis on transitoriness and wonder in Eiseley's essays is the etymological connection between the word mirror and the group of words related to admire and wonder. Mirror comes from the Old French miroir, which comes from the Latin miror, mirari, "to wonder at," related to the Latin mirus, "wonderful"; admire comes from the Latin admirari, "to wonder at," a combination of ad, "to," plus mirari. Etymologically, the mirror is linked to both identity and wonder. As Gerber and McFadden note, referring to another derivation from mirari in Eiseley's texts, "Miracle is a matter of philosophic seeing. It is an awareness of the vast spaces between subatomic particles and the lurking potentiality of evolutionary change" (136). But wonder also suggests questioning, "wondering," the epistemological dimension of Eiseley's heuristic of intersections of the inexplicable and the unexpected. Wonder and and wander are signifiers whose impact is reflected onto the signified.
Further, the mirror in the medieval and Elizabethan sense suggests a warning. *The Mirror for Magistrates* was a warning. Similarly, one of Eiseley's main concerns is to warn contemporary man of the dangers of manipulating the environment, of tampering with nature without awareness of what Bacon called "violence in the returne." In this context, Eiseley's texts are clearly intended as "mirrors" for contemporary manipulative man. As the mirror reflects, the eye perceives the ominous shadow of the hand's accomplishments in an interweaving of the dominant philosophemes of the texts.

In Eiseley's texts the fascination with the mirror takes several forms. Usually the source of the mirror effect is a dark window or a simple mirror. But in *All the Strange Hours* a shattered mirror provides the central metaphor for Eiseley's "excavation of a life," for the individual's quest for an identity that is as fleeting as man himself. In the shattered mirror, each part reflects the whole, so that the shattered mirror becomes a means of access to an autobiography that is not linear, not diachronic, but a quest for identity, a series of fragments, each reflecting a part and, in a sense, the whole of the individual's quest for identity. Indeed, *All the Strange Hours* may be seen in Lacanian terms as Eiseley's treatment of the *stade du miroir*, his reflection of his own passage from the Imaginary into the Symbolic, where, as Carlisle suggests, he creates an identity through language (*Loren Eiseley: Development* 76).

The mirror, then, is a means of approaching the philosopheme of the eye. It is a means of seeking identity in a cultural context, as well as an entry into the linguistic identity of the Symbolic and the epistemological heuristic of the sources of knowledge. Like the
fleeting image in the mirror, knowledge, for Eiseley, is not fixed or present, but the shifting of process. As a metaphor, the mirror helps to displace notions of fixity and to link the wanderer/wonderer to the unexpected. Like the eye itself, the mirror suggests a dual aspect of man that cannot be fixed but that an evolving culture needs to understand.

In an early essay the mirror appears as the "enchanted glass of the mind," which Eiseley perceives as a glass "colored" by the individual's perception. The metaphor of the enchanted glass is an early statement of Eiseley's view of the contemplative naturalist, but the position remains the same throughout his texts. Writing of "the contemplative naturalist" (as distinguished from the strict Baconian empiricist), Eiseley describes method by means of metaphor, suggesting that the naturalist tells a story from personal experience, sometimes using science to do so: "Essentially, however, he is recording the personal element in his experience, the shifting colors in the enchanted glass of the mind which the extreme Baconians would reduce to pellucid sobriety" ("The Enchanted Glass" 480). The contemplative naturalist thus works in an "indefinable country," a realm "between the realm of natural objects and the human spirit which moves among them," to record "fragments of a natural history so vast, shifting and impermanent as to confound the strict empiricist" (480). Eiseley suggests that the natural history writer is "the great magician who knows intuitively the true nature of the magic glass" (492). Such a writer can, Eiseley contends, shifting the metaphor from the human mind to the social mind, "create the worlds that permeate the
enchanted glass of the social mind" (492). In an early statement of his position on popularization, Eiseley thus refers to the human mind as an enchanted glass and attributes to the natural history writer the ability to make an impression on the "enchanted glass of the social mind." Only such a writer, he suggests, can observe the flight of an "instinct-baffled" bird both from a scientific perspective and as part of a larger drama and can perceive the oneness of man and bird; in this perception the artist "knows and contains within himself leaf, man and falling bird" (492).

Trick mirrors appear, too, as metaphors for the basic concept of time as creative:

The situation is something like that of walking through a hall of trick mirrors and being pulled out of shape. The mirror of time does that to all things living, and the distortions stay. Nevertheless, there is a pattern of sorts, so that if you have come by the mirror that makes men, and somewhere behind you there is a mirror that makes black cats, you can still see the pattern. You and the cat are related; the shreds of the original shape are in your bones and the shreds of primeval thought patterns move in the eyes of both of you and are understood by both. But somewhere there must be an original pattern; somewhere cat and man and weasel must leap into a single shape. ("Little Men and Flying Saucers," IJ 160)

If time is the mirror, and the "shreds" of an earlier shape are present in this mirror, then the reflected image is what Eiseley elsewhere calls the "indecipherable palimpsest" which is man ("The Chresmologue, NC 59). The mirror image is both Bachelard's surface reflection that entrances Narcissus and the deep reflection of times long past, mirrored in "the time stream."

As in the other explorations of metaphor, Eiseley also moves into the epistemological domain with the mirror. Science itself is a mirror as he describes man as "the self-fabricator who came across an
ice age to look into the mirrors and the magic of science" ("The Hidden Teacher," UU 55). Like other forms of knowledge, science is fleeting, deceptive, and subject to the whims of fashion. But man is more than Narcissus and the quest for individual identity: "Surely he did not come to see himself or his wild visage only. He came because he is at heart a listener and a searcher for some transcendent realm beyond himself" (55), a creature who may realize his own identity after seeing in a darkened window the reflection of a face that is his own but not his own—a palimpsest of other faces (66). Like Narcissus gazing into the fountain, like Lacan's child perceiving his own identity before a mirror, man identifies himself, but more: he identifies himself in relation to others.

As the mirror of popular and intellectual fashion, the mirror continues the epistemological exploration. Eiseley suggests that "humanity studies itself in the mirror of fashion, and ever the mirror gives back distortions, which for the moment impose themselves upon man's real image" ("The Inner Galaxy," UU 179). Linked with the popular notion of the mirror of fashion, this mirror of intellectual fashion allows us at one time to perceive "immutable laws" that rule us, at another time to see ourselves as "the product of a meaningless and ever altering chemistry" (179). The "mirror" that modern writers on prehistory provide, Eiseley contends, may lead man to believe that he is basically an animal; yet even as the words are pronounced, "the picture begins to waver and to change. St. Francis of the birds broods by the waters; Gilbert White of Selborne putters harmlessly with the old pet tortoise in his garden" (180). We see, then, what
intellectual fashion tells us to see, and artists' notions of earlier man reflect changes in this mirror of intellectual fashion. In such portrayals "fashion"—intellectual and popular—shows Neanderthal man as an "open-mouthed brute" and Peking man as "neatly groomed... looking as clear-eyed and intelligent as a broker on the way to the Stock Exchange" (183). Such "fashion" overlooks the fact that both are on the same anatomical level and that the artists' conceptions have distorted the facts.

And in attempting to envision the psychological make-up of man as stable from the first real "human," we further distort the mirror and see what we choose to see. If we choose to see humanity in terms of the struggle in the tangled bank, then the social mirror reflects that chosen image, though St. Francis of the birds is an equally true reflection of man; and to perceive him we have only to shift our gaze into the mirror. As social and intellectual mirror, then, the metaphor furthers Eiseley's project of displacing metaphors of fixity and struggle. To shift from warring nature to St. Francis of the birds requires only a shift of perspective. The fleeting and fluid qualities of the mirror thus reinforce Eiseley's project of displacement. The mirror is clearly manipulable as a source of identity.

In All the Strange Hours the mirror takes on its most vivid role in assembling an identity, but it also functions powerfully in the epistemological dimension. Though not a standard autobiography in the diachronic sense, All the Strange Hours is nevertheless a fragmented autobiography, as suggested in the subtitle The Excavation of a Life. The book gives glimpses of Eiseley's own life that make up a kind of
whole, as suggested by the dominant metaphor, established in the opening chapter, in which Eiseley describes one of his earliest memories: "a beautiful silver-backed Victorian hand mirror" whose glass his mother had shattered in her world of deafness and frustration (3). Eiseley remembers "looking into the mirror as a child, admiring the scrollwork on the silver"; and he makes clear the mirror's importance as a symbol of identity as he recalls, "Finally it disappeared. The face of a child vanished with it, my own face. Without the mirror I was unaware when it departed" (3). Subconsciously, however, nothing departs, and the mind in age is left "picking endlessly over the splintered glass of a mirror dropped and broken long ago" (4). In this context the mirror is not only the source of a search for identity (he was unaware when his child's face departed, because the mirror was gone), but also the symbol of a life that is "splintered" in the memory. Yet each piece of this splintered glass can reproduce the full image. In a sense the splintered memories reproduce a life—both individually and collectively—in a metaphor sustained throughout the book.

In the final chapter Eiseley returns to "the shattered mirror which can never be repaired but which lies in bits in the hallways of the mind itself" (ASH 258), as he approaches the vehicle on the literal level:

Feet crunch upon the glass as in an abandoned house; sometimes a ray of light strikes through a closed shutter and something still glitters, devastatingly beautiful, upon the floor. Or, similarly, a moonlit dream turns the fragments to soft shadows out of which come voices. (258)
The abandoned house we know to be the universe. Out of the fragments comes the unexpected or the beautiful, though "an hour comes when reality, the reality we know, gives way to combinations no longer causal or successive in character" (258-59). The fragmented mirror and the dice game in an abandoned house piece together the fragments of an identity that remains shifting while, throughout the book, the narrator (as synecdoche for all men) reflects a reality that is not "causal or successive" as he assumes, in turn, the identities of gambler, scholar, and fugitive.

In the epistemological dimension, as in the quest for identity, the splintered mirror repeatedly suggests the fragmentation of knowledge, science, vision, culture, individual awareness. What we know is fragmented, and the fragmentation adds another dimension of distortion to an already fleeting and distorted image. Yet each piece fits, perhaps haphazardly, into the whole, as in the shattered mirror each piece also reconstructs the whole.

The mirror, then, especially the shattered mirror, is linked to the function of the eye in its perception of reality and identity, and to the acquisition of knowledge. The mirror is not an exact representation, but a source of distortion, a trick for the eye, as evidenced in the "enchanted glass" and the trick mirrors. The mirror of intellectual fashion suggests that there is no unmediated vision of reality. And the shattered mirror is another model of the discontinuities in an unexpected universe. As models for change, the unexpected, and the undecidable, Eiseley's mirrors are part of his larger project of displacing themes of fixity, reductionism, and decidability.
Kaleidoscope. In addition to the eye's response to the reflected light of the mirror, Eiseley pursues its response to broken or splintered light through the kaleidoscope as metaphor. Drawing on the ancient tradition of "reality" as a shattering or splintering of a mirror or of light (Schaya 43), Eiseley frequently treats "reality," the shifting process that "realism" takes as the subject of representation, in terms of a kaleidoscope. In the epistemological domain, the kaleidoscope provides an exploration of observation, fragmentation, and reassertion of order. In a similar vein, Wolfgang Iser compares the activity of reading to a "kaleidoscope of perspectives, preintentions, recollections," in which each sentence provides "a preview of the next and forms a kind of viewfinder for what is to come; and this in turn changes the 'preview' and so becomes a 'viewfinder' for what has been read" (54). In terms of the eye's exploration of pattern, of the dissolution of pattern, and of the reestablishment of pattern, and in terms of Eiseley's explorations of the eye's "reading" of nature's signs (which I shall address shortly), the kaleidoscope effectively moves into the epistemological domain.

Addressing the senses' reception of patterns that we perceive as objects, E. H. Gombrich writes of the kaleidoscope as an instrument that "permits us to study these contrary effects of fragmentation and integration," suggesting that "it is precisely by draining the individual elements of their identity that the overall order makes them fuse into a large unit which tends to be perceived as an object in its own right" (157). Because "the view through the Kaleidoscope, with its multiple mirrors resulting in multiple symmetries,
exhibits maximal redundancy," Gombrich approaches it as a means of exploring "the visual effects of order" (150). Following Sir Karl Popper's "searchlight theory" of the mind, which suggests that any organism remains in constant activity in the process of scanning its surroundings, Gombrich notes that such a theory becomes inevitable in view of Darwinian evolution. Even paramecia respond when they bump into impeding objects, and Gombrich posits the continual testing and refuting of hypotheses as part of any organism's learning process—from the lowly paramecium in its encounters with obstacles, to the human eye's search for order in the process of perception, and even to the process of scientific investigation (1-4).

Gombrich's hypothesis of human perception and of the role of the kaleidoscope in studying fragmentation and integration is relevant to Eiseley's context because of the continuing heuristic purpose of the metaphors. In his exploration of the eye's perception, Eiseley employs the kaleidoscope to explore another vehicle for the constantly changing nature of reality that the human being perceives. The kaleidoscope "shifts," and reality is other than what at first seemed fixed. Through the kaleidoscope past thought is reorganized into new knowledge or new organizations of reality.

The kaleidoscope as a means of organizing and "radiating" a perception of the world appears in Eiseley's discussion of Bacon:

The great synthesizer who alters the outlook of a generation, who suddenly produces a kaleidoscopic change in our vision of the world, is apt to be the most envied, feared, and hated man among his contemporaries. Almost by instinct they feel in him the seed of a new order. . . . Such a man is a kind of lens or gathering point through which past thought gathers, is reorganized, and radiates outward again into new forms. ("Strangeness in the Proportion," NC 131)
Eiseley's "synthesizer" as one who shifts the kaleidoscope to produce such a change in view of the world is intertextual with Thomas S. Kuhn's notion of the "paradigm shifts" by which scientific revolutions move.  

In terms of knowing, of how we perceive and of challenges to that perception, Eiseley's kaleidoscope appears in his description of Herbert Winlock's encounter with what seemed to be a miniature world of moving beings spied through a crevice as he looked into an ancient Egyptian tomb. Eiseley reminds us that the Egyptian miniature world prepared to accompany the dead on his journey was "a gentle game, a game of childlike make-believe" (ASH 98). But in Winlock's illusion that the little people were going about their business Eiseley sees a parallel with the changing of any individual's world: "Then some fine day, the kaleidoscope through which we peer at life shifts suddenly and everything is reordered" (99-100). The challenge to a mind-set or a philosophical orientation thus is presented through the philosopheme of the eye. The kaleidoscope shifts, and our visual and philosophical perceptions are reordered; as eidos shifts, so does the idea.

Using Darwin as an example of compassionate and "speculative" (in the multiple senses of sight and philosophical reflection) man, Eiseley introduces the kaleidoscope as a visual model for "speculation" that also carries the suggestion of childlike openness to the unexpected nature of the universe:

it was not the tough-minded, logical inductionists of the early nineteenth century who . . . solved the problem of evolution. Rather, it was what Darwin chose to call "speculative" men, men, in other words, with just a touch of the numinous in their eye, a sense of marvel, a glimpse of what was happening behind the visible, who saw the whole of
the living world as though turning in a child's kaleidoscope. ("Science and the Sense of the Holy," ST 193)

This turning of the whole world was accomplished not just through observation and induction, but also through the "speculation" that Eiseley metaphorizes in terms of a "child's kaleidoscope," emphasizing the child's toy that provides a metaphor for one of the world's greatest scientific revolutions. As the colors shift, the wonder of "speculation" remains, and for Eiseley the child is effectively the "father of the man." In the epistemology of journeys that evolutionary thinking brings, one intersection is with a child's toy.

The kaleidoscope, then, further helps to displace notions of fixity, decidability, and reductionism in favor of change, undecidability, and the unexpected. It further reinforces the point that there is no fixed, direct perception of "truth" and "reality." An evolutionary epistemology is a kaleidoscopic epistemology.

Hieroglyph. One other set of metaphors arises from Eiseley's eye as philosopheme—the metaphor of the reading, deciphering eye observing nature's "hieroglyphs." Nature as alphabet or as hieroglyph is a traditional metaphor, to which Eiseley brings the understandings of twentieth-century linguistics and anthropology. For the student of language and of writing, a distinction exists between "hieroglyphic" and "alphabetic" writing. A hieroglyph is a symbol that may be read as ideograph or pictogram, or as a phonetic symbol—hence many of the difficulties in interpreting the Egyptian hieroglyphs, some of which functioned pictographically while others functioned phonetically. A true alphabet requires, ideally, a single
symbol for a single sound, or at least (as in the case of the Roman alphabet and the English language) an approximation thereof.

Although a practiced reader of alphabetic writing bypasses the phonetic quality in reading alphabetic writing, Derrida has noted, as part of his deconstruction of Western metaphysics, the hieroglyphic quality of writing that does not require sound as mediator. This "nonphonetic moment" of writing "menaces at once the breath, the spirit, and history as the spirit's relationship with itself. . . . [It] is the principle of death and of difference in the becoming of being" (Of Grammatology 25). For Derrida, the impact of nonphonetic writing is not to be underestimated: "Nonphonetic writing breaks the noun apart. It describes relations and not appellations. The noun and the word, those unities of breath and concept, are effaced within pure writing" (Of Grammatology 26). The hieroglyph, as nonphonetic writing, displaces the "voice" and "breath" and "presence" of logos, serving as a kind of model.

"The model in science," suggests Ulmer, "is yet another incarnation of hieroglyphics" (Applied Grammatology 152). Citing Bunn's treatment of "the model as a tool contemplated as hieroglyph of the world," Ulmer links models and hieroglyphs to the next phase, the applied phase, of grammatology (153). Says Bunn, "Seen as reflections of the end itself, the principles by which a tool are constructed may be construed as hieroglyphs, omens, signatures, symptoms, laws, or models of higher function. Our definitions therefore are perspectivist; depending upon the oblique perspective given a semiotic object, it becomes sign, tool, or model" (24). The relation of these semiotic studies of hieroglyphs to Eiseley's texts is in the approach
to popularization. Ulmer contends that Derrida's concern is ultimately with a strategy of population, with his "Writing" going beyond the book to include the electronic media of our age ("The Post-Age" 53-56). Eiseley, employing the book, nevertheless undermines book culture as he returns to primitive notions and approaches "reading" of texts and codes other than the book: of nature itself, of civilizations, of man himself as a palimpsest of what and where he has been. Drawing on and adapting for his purposes the historical tradition of the world as hieroglyph—in the eighteenth and nineteenth centuries the world as book—Eiseley treats the epistemological problem of the search for meaning in nature through models in nature perceived by the eye.

Clearly Eiseley is aware of the problems with the historical use of the hieroglyph as metaphor. In Darwin's Century he notes the presence of an early nineteenth-century, pre-Darwinian philosophical school in Germany that viewed the world "as a gigantic system of hieroglyphics, as the language of God or the book of nature" (Alexander Gode-von Aesch, Natural Science in German Romanticism, qtd. in DC 95). To the English progressionists (who saw life as developing through series of forms yet not through phylogenetic descent), "the fossils were true hieroglyphs, signs from earlier ages as to God's intention and design" (DC 96). The teleological thrust of such notions is, of course, problematic to the neo-Darwinian approach.

Still, the established use of writing and the book as figures provides a kind of code that can be defamiliarized and renewed for the purposes of popularization. E. R. Curtius writes:
The use of writing and the book in figurative language occurs in all periods of world literature, but with characteristic differences which are determined by the course of the culture in general. Not every subject matter, that is, can be employed by figurative language, but only such as are value-charged. . . . (303)

Curtius traces the notion of the "book of nature," as does Eiseley, from its medieval and Renaissance uses through seventeenth- and eighteenth-century references. Eiseley, however, turns also to the prevalence of the metaphor of "reading" nature among primitives, especially among the Indians of North and Central America, whom he studied in depth.

And Eiseley, of course, both builds on and departs from the assumptions of eighteenth- and nineteenth-century European thinkers when he uses the hieroglyph as metaphor. Eiseley's treatment of the metaphor is part of his epistemological quest and his exploration of the philosophemes by which we learn. Though the historical tradition is useful in providing a ground of familiarity, a code, for the popularizing scientist, Eiseley treats the hieroglyph as another intersection of his epistemology of journeys, his heuristic of intersections. Epistemologically, Eiseley's world is a book, and, as Blanchot suggests, "if the world is a book each book is the world and this innocent tautology has terrifying consequences" in "the labyrinth . . . at the dizzy end of our quest for understanding" ("Literary Infinity" 223).

Eiseley is less interested in hermeneutic investigation of hieroglyphs—interpretation for him is largely individual—than in exploring their potential as metaphors and popularizing the notion of involving oneself with the environment as a means of understanding how
we came to where we are. The Eiseleyan "hieroglyphs" of nature are writings in the process of becoming; deciphering them is as much the individual's task as reading a text is. Eiseley's hieroglyphs of nature place man in the process of devising, deciphering, in a sense creating his own text. Marshall McLuhan suggests that since the invention of printing a "reader" is one who scans, but "before printing, a reader was one who discerned and probed riddles" (344). Such is Eiseley's use of the "reading" of the hieroglyphs of nature, of civilizations, of man himself.

For Eiseley, the metaphor of the hieroglyph is close to that expressed by Coleridge and practiced by the Eskimo or by our primitive forebears:

Man, since the beginning of his symbol-making mind, has sought to read the map of that same universe. . . . Man is, in reality, an oracular animal. Bereft of instinct, he must search constantly for meanings. We forget that, like a child, man was a reader before he became a writer, a reader of what Coleridge once called the mighty alphabet of the universe. Long ago, our forerunners knew, as the Eskimo still know, that there is an instruction hidden in the storm or dancing in auroral fires. The future can be invoked by the pictures impressed on a cave wall or in the cracks interpreted by a shaman on the incinerated shoulder blade of a hare. . . .

But the messages, like all the messages in the universe, are elusive. ("The Golden Alphabet," ST 144-45)

Although eighteenth- and nineteenth-century "readings" of the book of nature depended on answers already in the mind, on underlying assumptions of teleology and onto-theological "meaning" in nature's book, Eiseley attempts to displace such notions in favor of the individual's interaction with the book or the alphabet: "Each man deciphers from the ancient alphabets of nature only those secrets that his own deeps possess the power to endow with meaning" (146). Among
such messages, Eiseley notes, some will be unreadable. Still, "man will always try" (146). Such is the nature of Eiseley's alphabet or hieroglyph as symbol: it is never fixed, just as reality is never fixed and never interpreted teleologically in Eiseley's texts, but the eye "reads" the sign according to the purpose and insight of the individual reader.

As Roland Barthes uses "figures" that are "gymnastic or choreographic" figures—"the body's gesture caught in action and not contemplated in repose"—as his codes or hieroglyphs in A Lover's Discourse (3-4) and as primitive, medieval, and seventeenth- and eighteenth-century man alike sought to read "nature's alphabet," Eiseley—an ironic mixture of modern scientist, eighteenth-century naturalist, and primitive—extends the function of the eye in knowing through the metaphor of reading "hieroglyphs" and "alphabets." As Derrida suggests, "writing" can apply to "all that gives rise to an inscription in general, whether it is literal or not and even if what it distributes in space is alien to the order of the voice"—for example, cinematography and choreography (Of Grammatology 9). In his system of writing that embodies more than "writing," Derrida says: "Occupying the center within the succession of types of writing, the hieroglyph is also ... the elementary milieu, the medium and general form of all writing. It is twice marked, occupying a space and all the space" ("Scribble" 125). But, he continues, "hieroglyphic writing does not surround knowledge like the detachable form of a container or signifier. It structures the content of knowledge" (126). Derrida tries "to restore a sense of the 'unnaturalness' of the signs by which men and women live," says Terry Eagleton (14). Eiseley attempts to
restore a sense of the "unnaturalness" and "unexpectedness" of the entire universe. We had to learn to see the world as "natural," he insists ("How the World Became Natural," FT 3-30). As he plays with the notion of "reading" the universe, Eiseley's emphasis is on the unnatural and the unexpected. Language is a matter of convention, and his metaphors of hieroglyphs are a means of achieving a nonphonetic reading of his unexpected universe.

Nature itself is constructed according to a system of codes like hieroglyphs or alphabets, Eiseley suggests. Even a single "filamentous seed" is "one of the jumbled alphabets of life" ("The Hidden Teacher," UU 56-57). Like all of life, the human body is produced by "an alphabet we are only beginning dimly to discern" (58-59). Life *instructs* its way into form, and species change as the genetic code changes; for "the genetic alphabets, like genuine languages, ramify and evolve along unreturning pathways" (59). Thus "natural" and "unnatural" codes, physical and cultural codes, share similar characteristics, each helping to explain the other.

Eiseley explores the epistemological dimension of nature perceived as hieroglyph at some length in "The Golden Alphabet," an essay flawed by sentimentality and an over-extended metaphor of human "spectacles" borrowed from The Wizard of Oz, yet still memorable as an exploration of the hieroglyph. Thoreau and Darwin are presented as comparable yet contrasting "readers" of nature as hieroglyph--Thoreau as reader of "the ever widening ripples on a pond until they embraced infinity," and Darwin as reader of life on the extended voyage of the Beagle (UU 120-21). Invoking the primitive as reader of the universe,
Eiseley quotes the Eskimo's advice: "Be not afraid of the universe." Lacking instinct, he says, man searches for meanings, reading the universe as alphabet. Darwin and Thoreau, scientist and poet, sought to "read" as their experience and learning prepared them to read.

In the shell that gives the essay its name, Eiseley finds an allegory for man's reading nature's pictograms. "Golden characters like Chinese hieroglyphs ran in symmetrical lines around the cone of the shell," he says, observing it as if it bore some message from the sea ("The Golden Alphabet, UU 145). A shell dealer quickly classified the shell as "Conus spurius atlanticus, . . . otherwise known as the alphabet shell" (145). Eiseley rejects the word spurious, feeling sure the shell contains some message, though not a fixed message or what one might ordinarily expect in a moralistic or even a philosophical sense. "We live by messages," he says, "—all true scientists, all lovers of the arts, indeed, all true men of any stamp" (146). The point is the quest for the message, which is a quest for knowledge, though the knowledge may ultimately come from the self and lead simply to engaging the imagination.

The shell is as precious, Eiseley suggests, as "the tablets of a lost civilization," but the man who named the shell was not a careful reader; for "each man deciphers from the ancient alphabets of nature only those secrets that his own deeps possess the power to endow with meaning" ("The Golden Alphabet," UU 146). Like the dream or the unconscious, the natural alphabet has no fixed or generalized meaning, but is to be untangled according to the individual context. The name Conus spurious is a misnomer, for "the golden alphabet, in whatever shape it choses to reveal itself, is never spurious. From its
inscrutable lettering is created man and all the streaming cloudland of his dreams" (146). Out of the eye's perception of nature as alphabet or hieroglyph, a perception that suggests an interaction with rather than a domination of the natural world, man creates himself, his dreams, his culture. Eiseley's metaphor is informed with the notion of interaction with nature and exploration of the imagination rather than with any sense of fixity or determinism in the message, which shifts as quickly as nature or the human imagination can shift.

The hieroglyph is combined with a reverberation of Narcissus in "The Innocent Fox," as Eiseley explores the epistemological dimension through the creation of myth: "Since man first saw an impossible visage staring upward from a still pool, he has been haunted by meanings. ... The image in the pool vanished at the touch of his finger, but he went home and created a legend" ("The Innocent Fox," UU 194). The identity and the legend that the image evoked are the important elements of the "reading." Eiseley maintains that "the compulsive reading of such manuscripts will continue to occupy man's attention long after the books that contain his inmost thoughts have been sealed away by the indefatigable spider" (194). With this introduction of the metaphor of reading nature as hieroglyph, Eiseley begins the essay that presents one of his most memorable moments of human activity frozen in a Barthesian "figure" to be read: the moment is his brief romp with a fox cub on a foggy seacoast. In the "figure" of man and fox cub, Eiseley finds the embodiment of the "unexpected":

For just a moment I had held the universe at bay by the simple expedient of sitting on my haunches before a fox den and tumbling about with a chicken bone. It is the gravest, most meaningful act I shall ever accomplish, but, as Thoreau
once remarked of some peculiar errand of his own, there is no use reporting it to the Royal Society. (212)

Recalling this "figure" or hieroglyph, Eiseley perceives the human and the fox cub as one, both products of the same nature despite evolutionary separation. The universe is, suddenly, "a child's universe, a tiny and laughing universe" (210) as codes and roles are reshaped in one individual's hermeneutic of a natural figure.

Again in suggesting that that each person must be his own "last magician" to find a way back to sympathy with the natural world, Eiseley recalls that, after traveling for days along an isolated seacoast, he began, "in the silence, to read again, to read like an illiterate. The reading had nothing to do with sound. The faces in the cracked shells were somehow assuming a human significance" ("The Last Magician," IP 141). Clouds became "archaic, voiceless pictures" which reassured him that the reading of such pictures has long preceded what men of today call language. The reading of so endless an alphabet of forms is already beyond the threshold of the animal; man could somehow see a face in a shell or a pointing finger in a cloud. He had both magnified and contracted his person in a way verging on the uncanny. (141)

(As Derrida suggests, "If writing is no longer understood in the narrow sense of linear and phonetic notation, . . . no reality or concept would therefore correspond to the expression 'society without writing'" [Of Grammatology 109].) Eiseley posits a kind of pre-linguistic Lacanian Imaginary in the form of a place in the cortex "where mental pictures multiplied and transposed themselves" before language burst upon the scene ("The Golden Alphabet," UU 141-42). Even in the early days of symbol forming, as in contemporary simple cultures, man remained close to nature, and his philosophy was still
"a kind of oracular 'reading' of its nature" (143). But as language developed, the "human universe" became "a universe displaced from the natural in the common environmental sense of the word" (142-43). And out of this displacement of the natural world came reading in the modern sense and separation from nature's alphabet.

In Thoreau's writings Eiseley finds further stimulus for commentary on nature's hieroglyphs. For Thoreau the snow was a kind of tablet on which "were inscribed all the hieroglyphs that the softer seasons concealed" ("Thoreau's Vision of the Natural World," ST 232). Thoreau read nature's inscriptions for "the unrolling reality . . . 'that will not wait to be explained'" (234). Thus Thoreau was basically a student of nature as hieroglyph, Eiseley says, and the text "is as unreadable as it ever was and so is her equally wild and unpredictable offspring, man" ("Thoreau's Unfinished Business," ST 237). Like the scientist, Thoreau studied man only indirectly, as part of "that greater order known as nature" (237). The study of nature's, and man's, hieroglyphic inscription that Eiseley finds in Thoreau centers on Thoreau's reference to arrowheads as "humanity inscribed on the face of the earth," as "mindprints" or "fossil thoughts" (239).

Taking Thoreau's coinage, mindprint, as a unique and simple term for his "hieroglyphs," Eiseley suggests that both nature and the first and last men share the leaving of mindprints. Thoreau also used the phrase "another civilization" to describe nature's "mindprints," which include inscriptions such as "the mysterious hieroglyphs left by a deer mouse" ("Thoreau's Unfinished Business," ST 240). Thus Thoreau
Thoreau's nature, Eiseley suggests, was constructed of hieroglyphs, "a journal in which the script was always changing, like the dancing footprints of the fox on icy Walden Pond" (242). And most importantly, "tiny and brief in that journal were the hieroglyphs of man," who could read only that he had a past and could discover that he had a future (242).

Looking at a quartz knife perhaps ten thousand years old, Eiseley adds his suggestion of the allegorical significance of the arrowheads that Thoreau called "mindprints": "They were free at last. They had aged out of human history, out of corruption. . . . They were a sign now beyond man" ("Thoreau's Unfinished Business," ST 243). The arrowhead as merely an extension of nature's hieroglyphs merges in this essay with the role of the artist, who sees in his own way, Eiseley suggests, and shapes the "oncoming world" (250). What is left behind is civilization, art, "mindprint." The notion of "mindprint" thus fits into Eiseley's projection of nature itself as a system of "hieroglyphs" to be read as the individual is able to read, but it also places man in perspective as simply a part of nature's hieroglyphs and links nature to another kind of hieroglyphs, those created by civilizations.
Eiseley the archaeologist also perceives civilizations as ideograms, just as Barthes the semiologist perceives cities as ideograms. "The City is an ideogram: the Text continues," says Barthes (Empire 31). For Eiseley, civilizations record their hieroglyphs in "the final ambiguous lettering of the earth's own book of stone" (ASH 212). The remnants of civilizations are fragile and transitory:

As the delicate printing on the mud at the water's edge retraces a visit of autumn birds long since departed, so the little scrabbled tablets in perished cities carry the seeds of human thought across the deserts of millennia. In this instance the teacher is the social brain but it, too, must be compressed into minute hieroglyphs, and the minds that wrought the miracle efface themselves amidst the jostling torrent of messages, which, like the genetic code, are shuffled and reshuffled as they hurry through eternity. ("The Hidden Teacher," UU 59-60)

The individual vanishes, but the institutions are hypostatized: "the institutional structures stand, or if they change, do so in an invisible flux not too dissimilar from that persisting in the stream of genetic continuity" (61). Civilization subsumes the individual as the "hieroglyphs" subsume individual sounds; it is the figure that is readable.

The Maya Indians' civilization specifically exemplifies Eiseley's metaphor of civilizations as hieroglyphs. Of the Mayan civilization, Eiseley finds that the actual "remaining hieroglyphs tell us little" ("Man in the Autumn Light," IP 129). The Maya (ironically, the Sanskrit maya refers to the illusory nature of the world) could calculate time with an accuracy unheard of in Europe, and their mathematical accomplishments are the hieroglyphs of their culture. Nevertheless, as Eiseley notes, their descendants worshipped upside
down the stone tablets of their calculations. Eiseley looks for a similar hieroglyph for modern civilization, which he seems to find in a snow-covered clearing of fallen trees and abandoned machinery.

"This was the pyramid that our particular culture was in the process of creating," a symbol of "energy beyond anything the world of man had previously known" (133).

In another context Eiseley compares the hieroglyphs of civilizations to the paw marks of a dog that a group of children impressed in a sidewalk. As the dog seemed to want to be human, so "every ruined civilization is, in a sense, the mark of men trying to be human, trying to transcend themselves" and leaving "a figurative paw mark" in the process ("Paw Marks and Buried Towns," NC 80). The homely metaphor leads Eiseley to trace with the "archaeological eye" buried towns from various civilizations, including a Roman theater with bold lettering announcing the name of the donor. In all these civilizations he finds the "marks of men trying to express themselves, to leave an impression upon the earth" despite the vastness of time (85).

Finally, man himself is metaphorized as a palimpsest or a combination of hieroglyphs. The palimpsest sets the metaphor in the essay "The Chresmologue," whose title refers to a dealer in old parchments. Eiseley portrays himself as the chresmologue and man as an indecipherable palimpsest, a walking document initialed and obscured by the scrawled testimony of a hundred ages. Across his features and written into the very texture of his bones are the half-effaced signatures of what he has been, of what he is, or of what he may become. (NC 59-60)
As a dealer in such palimpsests, Eiseley traces human concepts of time and recalls, as a Barthesian "figure" to be interpreted, an old man on a train buying "a ticket to wherever it is" (63). The metaphor of the palimpsest suggests both the great amount of time that has brought man to where he is and the outlines of previous forms retained in the physical body. For the man on the train neither time nor destination had meaning, but for the popularizing scientist a visual metaphor of time is calculated to spur a new look at the individual's relationship to the community of descent.

Further defending the work of the literary naturalist in "reading" nature, Eiseley continues in "Strangeness in the Proportion" the notion that the natural history of man himself can be found in the world about him:

We forget—as Bacon did not forget—that there is a natural history . . . even of man himself, which can be learned only from the symbolism inherent in the world about him. It is the natural history that led Hudson to glimpse eternity in some old men's faces at Land's End, that led Thoreau to see human civilizations as toadstools sprung up in the night by solitary roads, or that provoked Melville to experience in the sight of a sperm whale some colossal alien existence without which man himself would be incomplete. (NC 148)

Such a symbol is the concluding figure of the essay, a man with a dual face, riding atop a swaying hayrick in the midst of an evening thunderstorm. The man, whose face is beautiful on one side and grotesque on the other, is a synecdoche and a symbol for man, "with his toppling burden of despair and hope, bearing with him the beast's face and the dream, but unable to cast off either or to believe in either. For he is man, the changeling. . . " (149). In this Barthesian figure, in his furious and desperate movement, Eiseley's
"hieroglyph" is "read" on both an individual and a universal level. One man physically symbolizes the dual mental nature of man, the inner tension that we have not yet resolved.

As metaphor, then, the hieroglyph is found in nature itself, in civilizations, and in the natural history of man. Eiseley draws on a traditional metaphor or code—nature as a book—as he defamiliarizes and renews it in exploring the possibilities of seeking messages that bypass sound—hieroglyphic messages. The "hieroglyph" is dependent on the eye as philosopheme. As a metaphor it continues the notion of "meaning" in nature, but defamiliarizes the notion of nature as a book—that is, nature framed, closed and enclosed, teleologically prepared for the "right" reading. For Eiseley's readings, like readings of dreams or of the subconscious, depend on the individual. Though his approach to the hieroglyph is hermeneutic, it is nevertheless also heuristic, for Eiseley explores the metaphor as he attempts to displace fixed, decidable, teleological "messages," even as he employs the traditional metaphor. The hieroglyph connotes ambiguity; one of the difficulties with deciphering the Rosetta Stone was that some characters were pictographic while others were phonemic. Eiseley's hieroglyphs suggest the ambiguities of a discontinuous, unexpected universe that cannot be read as the traditional book, with a movement toward closure and "truth," but as an unfolding of ambiguities requiring interaction with the individual. And it is the perceiving that is worth doing, for man is by nature "oracular," seeking messages. To seek these messages through a close relationship with the nature that produced him is, in a sense, to return to a
primitive mode of observation; in Eiseley's view, it is the return that may save man from himself.

Linked by their dependence on the eye, then, mirror, kaleidoscope, and hieroglyph thus function with the eye as metaphor in Eiseley's epistemological heuristic, in his displacement of metaphors and notions of fixity, and in his emphasis on the individual's engaging his own reality.

**Tongue**

For Eiseley, as for other twentieth-century thinkers deeply impressed by the often-discussed "paradigm shift" from being to language, the tongue is a metonym for man's most significant ability. Thinking, even awareness of existence, is inseparable from language. Language, as thinkers such as Ernst Cassirer and Benjamin Whorf have suggested, shapes our perception of the world and our understanding of it. Cassirer links language and science as "the two main processes by which we ascertain and determine our concepts of the external world" (907). In Eiseley's texts science is the vehicle and language is the mediator of thought about the individual's relationship to the world.

The tongue in Eiseley's texts is more important thematically than figuratively, though the catachrestic sense is everywhere present. In some of the texts the tongue takes on an additional, metaphorical sense, but more often Eiseley uses the tongue in the catachrestic sense of "language" as he continues to explore the relationship between the senses and "sense" as meaning. But *sense* is also related to "direction" (deriving from the Latin *sentire*, "to go mentally," a meaning that is relevant to Eiseley's epistemology of journeys and
his heuristic of intersections. As organ of the voice-ear philosopheme that pervades Western thought, the tongue is a major intersection in the human journey. And language itself is the starting point and metonym for culture, for society and its institutions.

"The tongue," Thass-Thienemann suggests, "is an external part of the body as well as an internal one," thus linking internal and external perceptions of the body-self and invoking both anatomical and psychological realities (247). Associating the tongue with licking (the Latin lingua should have been díngua except for a possible fusion with lingere, "to lick"), Thass-Thienemann finds "a blending which fused the objective anatomical reality of the tongue with the subjective experience of 'licking'" and continues to associate the tongue with "licking" flames and their association with the sexual, as in the German Brunst, "fire, sexual drive" (247). Not even the eye, says Thass-Thienemann, is linked to meanings as widely as the tongue. The use of tongue for languages, he suggests, is not just metonymic, "not simply the anatomical reality in question. It is rather the subjective kinesthetic feeling of the motion of the tongue while speaking" (247).

Further, the tongue is traditionally linked to creativity. Thass-Thienemann suggests that the complex of meanings surrounding the tongue "absorbed the attributes which belonged originally to the creative and generative spirit" (249). Thus "the creative word appears as a primary act of the generative spirit," which in early thinking was assumed to precede existence (Thass-Theinemann 249). Therefore, the word as presence is related to the Presence of the
Word. In primitive societies cutting out the tongue, like castration, was a means of "depriving man of his generative power" (Thassen-Thienemann 250).

Speech itself is, in linguistic parlance, an "overlaid function." That is, the organs used for speech, with the exception of the vocal cords and of the brain centers that make speech possible, have other functions actually necessary to the survival of the organism. Speech is a step removed from necessity, hence an "overlaid" function. Since language functions as metonym for culture, it is significant that culture, too, is an "overlaid" function--an addition that has altered man and the planet he inhabits. Any consideration of language necessarily involves an interrogation of the relation between the two.

Language for Eiseley is at once the means of understanding and, with the eye, the shaper of that understanding. It makes possible the exploration of both inner and outer "worlds," the inner world of consciousness and the outer cosmos. For Eiseley, as for Barthes, "the exploration of language, conducted by linguistics, psychoanalysis, and literature, corresponds to the exploration of the cosmos" (Barthes, "To Write" 167), thus becoming another intersection in the journey. Language can be seen "as a kind of transformer," says Jürgen Habermas, through which "psychic processes such as sensations, needs and feelings are fitted into structures of linguistic intersubjectivity, [and] inner episodes or experiences are transformed into intentional contents. . . " (Legitimation Crisis 10). Language is, then, the mediator of experience and of thought, and the interrogation of this
relationship of mediator and mediated is essential in considering language and culture.

No group of human beings has ever been found who lack language. This fact leads Roland Barthes to suggest that man creates language "to 'express' what is taking place within him: it is language which teaches the definition of man, not the reverse" ("To Write" 163). It is language that opens for man a new world, Eiseley suggests, "a vast interior world" onto which man "stumbled," but which "would dominate his outer world" ("The Time of Man," DMX 229). As speech created culture, "man entered ... into the strangest and most rapidly changing environment on the planet, an environment limited only by his own creativeness. He entered into himself; he created society and its institutions" (232). Man creates a second world, Eiseley suggests, and this Baconian

*mundus alter*—this other intangible, faery world of dreams, fantasies, invention—has been flowing through the heads of men since the first ape-man succeeded in cutting out a portion of his environment and delineating it in a transmissible word. With that word a world arose which will die only when the last man utters the last meaningful sound. ("The Lethal Factor," ST 256)

And in a parallel with the human creation of a second world through language, Eiseley, Carlisle suggests, created an identity of his own that emerged only through writing: "Not only did Eiseley achieve a language and an identity together, he realized each through the other. Idiom and identity were inseparably interwoven" (Loren Eiseley: Development 185). Bachelard suggests that as the poetic image "becomes really our own," actually "expression creates being"; thus "one would not be able to meditate in a zone that preceded language." And, says Bachelard, "The poet, in the novelty of
his images, is always the origin of language" (Poetics of Space xix, xvii-xviii).

In dissecting nineteenth-century notions of objectivity, Eiseley is aware that the observer participates through and because of language. The capacity for wonder remains a distinguishing mark of the human being, but this capacity is tied to language; without language, wonder cannot exist. As the differentiating development in the evolution of man, language is the link with past and future, but also the separation between the violence of Darwin's tangled bank and the gentleness of the early human being who pours gifts of flint into the grave of a loved one and imagines that loved one's destination. Through language the present creates the future, the past creates the present, the part creates the whole, the related represents. Vehicle cannot be separated from understanding.

The tongue is vital to Eiseley's heuristic purposes. In its catachrestic identity with language the tongue is another means of exploring the relationship between the physical senses and meaning. Thus man's acquisition of knowledge is explored. Further, speech as an "overlaid" function is interrogated in a continuation of the epistemological dimension that parallels Eiseley's interrogation of the other two philosophemes. The word that best expresses the Eiseleyan "reaching" for knowledge, parallel to the hand as the organ of reaching, probing, and grasping, is Bunn's use of groping in relation to language. "Groping," says Bunn, "is that wordless state, fraught with expectation, prior to the successful articulation of word, phrase, or formula" (48).
Eiseley also explores the relation between language and reality, through the linguistic notion that language makes possible the displacement of one reality for another—the present reality for the future, for example. Since the beginning of language

man has possessed the uncanny power of symbolically reworking his surrounding environment in his head. He can displace or transform the existent world for a prospective emergent reality reoriented in the mind. But that emergent reality can only be brought into being by enlisting, through speech or writing, the aid of other individuals. (Introduction to The Shape of Likelihood: Relevance and the University 6-7)

This linguistic ability to "displace or transform" the world also makes possible the creation of the "inner world" that Bacon called the mundus alter and that made civilization possible.

In the project of displacing misleading metaphors and misconceptions that have arisen from limited understanding of Darwin's work, the tongue is vital. Eiseley uses the tongue in displacing notions of determinism. The mind of man has escaped the evolutionary struggle because of "indetermination," which works through thought and communication, both dependent on language. Through symbolic communication, the human being could exist "at least partially within a secret universe of his own creation" and could share that universe, for he "had escaped out of the eternal present of the animal world into a knowledge of past and future" (DC 120).

Eiseley also uses the tongue in displacing the notion of direct or unmediated creation of ideas. Because of the word, man is no longer able to accept the universe as given; for him "it has to be perceived and consciously thought about, abstracted, and considered" ("The Unexpected Universe," UU 32). Human artifacts are "defined
before their existence, named and given shape in the puff of air that we call a word" (40).

And the tongue plays a role in the attempt to displace notions of fixity in meaning. As the "unexpected," to which man owes his very existence, is to the universe, so is ambiguity or equivocality to language. Ambiguity is the essential condition of language:

> Anything achieved by man has been created first by words, and words . . . partake of human ambivalence. . . . [F]rom the same mouth proceed the blessing and the curse. The observation is just as germane to the field of science, for science is also subject to the frailties and fallibilities of human endeavor. (Introduction to The Shape of Likelihood: Relevance and the University 9)

Like the eye, the tongue has a dual aspect; it is both bane and blessing. If the effect of ambiguity in science is sometimes devastating, if in politics it can lead to misunderstood notions of "relevance" (Eiseley's immediate concern in this context), still he defends the inevitable ambiguity that can also lead to thoughtful and insightful reflections in literature and history. As Derrida suggests that the equivocality of philosophical language is "original and irreducible" and thus that "perhaps philosophy must adopt it, think it and be thought in it, must accommodate duplicity and difference within speculation" (Writing and Difference 113), Eiseley posits the equivocality of all language. But for Eiseley ambiguity can be as useful as the "unexpected" to the observant individual. If for Blanchot language (the word) is what drives man into exile (Josipovici, Introduction to Blanchot, The Sirens' Song: Selected Essays 15), for Eiseley "on the world island we are all castaways" ("The Slit," LJ 14). If the model for the Eiseleyan journey is the
wandering of Odysseus, then the unexpected and the equivocal are to be accepted, even celebrated.

And the tongue helps displace metaphors and notions of fixity of knowledge. Tied as it is to the use of language, which is essentially ambiguous, knowledge cannot be fixed. In his exploration of the relationship of knowledge and the senses, of knowledge and the perception of reality, Eiseley finds that the shift of knowledge is not only a shift of the kaleidoscope, but a shift or a gap in what might erroneously be assumed to be the fixed meanings of words.

Eiseley's explorations of the voice-ear circuit, catachrestically represented by the tongue, are interlinked with his explorations of hand and eye, just as the organs themselves are interlinked with the brain in the neurophysiological development of man. In the epistemological domain the tongue presents a problem similar to the problems with the other organs of the dominant philosophemes—the elusiveness of knowledge. The tongue, to use Bunn's term, "gropes" for meaning only to have the meaning shift.

But more than the other organs, the tongue is problematic in the metaphorics of a visually oriented artist. For Eiseley the visual image is paramount, although he recognizes that reflection on and expression of the image must come through words. The tongue is clearly the metonym for language, which is recurrently the metonym for human culture. (And we recall Eco's contention that metaphor itself, based on similarity rather than contiguity, "can be traced back to a subjacent chain of metonymic connections" [68]). Occasionally the tongue itself serves as metaphor, but Eiseley's references to language
are often more thematic and metonymic than metaphorical. The problem is metaphorizing language or the tongue, neither of which has established visual associations. Eiseley turns, therefore, to visible or tangible support metaphors, exploring various possible metaphors. Sometimes the figure for language is the traditional code "word," sometimes a "puff of air." But other, more visible metaphors cluster around the tongue and language. Language becomes a "prison house," a "seed capsule," the "cradle of the universe," and "streaming shadows." Man, through his linguistic ability, becomes a "spore bearer" of thought, and poets appear as "word-flight" rather than "space-flight" specialists. Metaphors suggest the source of language, what language is, and what language creates—always with indirect or overt references to the neurophysiological link between tongue and brain; and these metaphors further displace notions and metaphors of fixity and decidability.

Eiseley's attention to language—and to the tongue as its metonymic instrument—appears from his earliest texts onward, especially as he develops and reiterates the theme of man's escape from evolutionary struggle through the brain's "indetermination," which works through thinking and communication. He stresses Alfred Russel Wallace's recognition that even primitive tribes were able to form sounds quite as well as more "advanced" human beings (DC 311). Although speech is an overlaid function, Eiseley separates it from conscious achievements such as the discovery of fire and emphasizes the neurophysiological link of language and the brain. The potential for language
is dependent upon the germ plasm. Its nature, not its
cultural expression, is written into the motor centers of
the brain, into high auditory discrimination and equally
rapid neuromuscular response in tongue, lips, and palate.
We are biologically adapted for the symbols of speech. We
have determined its forms, but its potential is not of our
conscious creation. . . . Speech has made us, but it is a
human endowment not entirely of our conscious devising.
("The Angry Winter," UU 115)

But in explaining the human ability to rework the world
symbolically by displacing or transforming exterior reality, Eiseley
invokes the metonym of the tongue through a Biblical allusion,\(^5\)
recalling the words of the writer of the epistle of James who
"observed long ago that although the tongue is a little member it sets
the course of nature on fire" (Introduction to The Shape of Likelihood
7). This metaphorical fire suggests the human mobilization of energy
that characterizes culture, but the observation may also recall Thass-
Thienemann's cross-cultural associations of the tongue with fire and
with sexual power. Further, Eiseley says:

James fully recognized the ambivalent and frightening
shapes that can be summoned up by language when he remarked
that the tongue "can no man tame" and that it was capable of
loosing deadly poison into the world. Thus, though man's
full life is acquired and his culture and institutions
transmitted by the word, speech has not been an unmitigated
blessing. Men can distort or manipulate the meaning of
words. . . . (7).

Tongue and word, then, are both metonyms for language, which is itself
a metonym for culture. The theme of language as both bane and
blessing is recurrent, as is the catachrestic extension of the tongue
to refer to language, from a group of man-apes who "clucked together
in a throaty tongue" ("How Flowers Changed the World," LJ 76) to the
allusion to the Biblical writer's treatment of the tongue. As
catachresis or metonym, the tongue is another means of exploring the
relation between sensation and meaning (direction, in the context of
the journey) or between experience and knowledge, as well as a means
of displacing concepts and metaphors of determinism.

Nevertheless, as Eiseley the visually oriented writer encounters
difficulties in metaphorizing the tongue or language, he turns to
visible or tangible support metaphors. One such metaphor arises from
the attempt to explain the source of language in metaphorical terms.
Because human language and thus the human being as such began with the
third ice, Eiseley treats the source of language metaphorically
as "a similar superimposed layer of crystalline thought substance"
which "superseded the dark, forgetful pathways of the animal brain"
("The Angry Winter," LL 104). The products of this "thought
substance" then "named stones and gods," as well as living beings.
And the "thought substance" made possible awareness of past and
future and the fables that would explain them: "there was no longer
a single generation" (104). Language is at least as important as the
tool-making capability, and "by voice and primitive projectile weapon,
man would eventually become a space leaper" (111-12).

In addition to presenting the source of language as a
"crystalline" substance emerging "superimposed" on the brain as the
third ice began, Eiseley also turns to an insubstantial metaphor to
suggest what language does. Communication with symbols made man a
"dream animal," Eiseley says, a creature capable of "living at least
partially within a secret universe of his own creation and sharing
that secret universe in his head with other, similar heads" ("The
Dream Animal," LL 120). Insubstantial as this "dream animal" is, it
is a metaphor designed to convey the new isolation of man from other animals. The point is the linguistic displacement that Eiseley defines and explains as the source of increasing separation of man from nature—"the way by which man came to survive in nature," "the method by which he created and entered his second world, the realm that now encloses him," and "the primary instrument by which he developed the means to leave the planet earth" ("The Last Magician," IP 144). Eiseley defines displacement in terms of what it makes possible; it allows man "to talk about what is absent, to make use of the imaginary in order to control reality" (145). Through language man can "manipulate time into past and future, transpose objects or abstract ideas in a similar fashion, and make a kind of reality which is not present, or which exists only as potential in the real world" (145). Displacement, then, makes possible cultural traditions and the tools that can shape the environment, all of which "exist in the dark confines of the cranium before the instructed hand creates the reality" (145).

Thus because of linguistic displacement man "escaped out of the eternal present of the animal world into a knowledge of past and future" ("The Dream Animal," LJ 120). And if symbols mean communication, they also mean interpretation; they open a hermeneutic dimension. Thus Eiseley defines the "dream animal" as "a user of invisible symbols, . . . bereft of instinctive instruction and dependent upon dream, upon, in the end, his own interpretation of the world" ("The Angry Winter," UW 112-13). Eiseley further treats the mind as a metonym for language, for he says that "through the human mind, time and darkness, good and evil, would enter and possess
the world" (121). And in the mind of this "dream animal," human change began to occur more rapidly than any other evolutionary change.

Language has also made man metaphorically a spore bearer (the analogue is a slime mold which produces spore capsules that explode, scattering spores widely). As a spore bearer man is able to spread his explorations (explosions), even modern culture, throughout the world and even into space. The spore bearers must be able to use the world's resources, and this ability directly stems from "the drastic reordering of man's mental world" by taking "knowledge through the doorway of the tomb--namely the achievement of the written word" (63). Whatever its end, the "invisible pyramid" that our society creates--a pyramid of ideas, of sometimes fanatic devotion to science, of devotion to the machines that can take man beyond his natural environment--is, metaphorically, "the incidental product of a primitive seed capsule, the human brain" ("The Spore Bearers," IP 93), whose propulsion of its seeds is dependent on the languages of communication and of mathematics. By linking the human quest for space with the metaphor of man as a spore bearer (as well as transgressor of the door of the tomb and builder of an invisible pyramid), Eiseley again approaches the impact of language in visible and tangible terms. Elsewhere he refers to "word spores" in comparing the emergence of man to the sudden appearance of mushrooms in an overnight fog, wondering "what kind of word spores, what night-fog in the proto-human cranium, induced the emergence of that fantastic neurofungus which is man" ("The Invisible Island," UU 160). Like any "organic" metaphor, the "word spores" seem to take on a life of their
own, exploding and spreading according to their own laws as man has done since the emergence of language.

The "spore bearers of thought," Eiseley contends in another mixed metaphor, have discovered "the keys to what originally appeared to be the impregnable prison of selfhood" ("Man in the Autumn Light," IP 125). Language can reach across distances that are more formidable than space, for language can traverse "light-year distances between individual minds"; therefore, poets were "ancient word-flight specialists" (125) sensitive to both time and the spaces between thinking beings. Through his "word-loving trait" (125) man reaches beyond himself, in a synesthetic combination of the "reaching" hand and the "groping" word. The play on spatial dimensions of communication between human beings is still an insubstantial comparison, but it represents an attempt at making visible or tangible what Eiseley considers the most important activity of the human brain.

In another attempt at spatializing and visualizing the effects of the neurophysiological cooperation of brain and tongue, Eiseley explores the notion that with language man creates "a new type of ecological niche," which is "a speaking niche, a wondering niche which need not have been first manifested in tools but in family organization, in wonder over what lay over the next hill or what became of the dead" ("Science and the Sense of the Holy," ST 194-96). At least as important as tools and equally dependent on language is the family structure that marks the emergence of man. The metaphorical "niche" that language creates is "not a niche in nature, but an invisible niche carved into thought" (196). It is another insubstantial, visible-invisible attempt at metaphorizing the tongue
as inside and outside. Thus "when man cast off his fur and placed his trust in that remarkable brain linked by neural pathways to his tongue he had potentially abandoned [environmental] niches for dreams"; when his "niche" became mental, "henceforth the world was man's niche" (196). The metaphor extended from the anthropological code "niche" thus compares language with a secure, comfortable place in nature, a "place" that is itself a metaphor.

Spatially, the vehicle is more exact when Eiseley metaphorizes nature as an old house with "monsters in every cupboard," an "echoing and ghost-ridden mansion" of which man is "inheritor" ("Man Against the Universe," ST 221). Man began, says Eiseley, when he internalized nature through language, but in doing so he gained fear and an "aroused curiosity [toward] every nook and cranny of the world" (221). In returning to the metaphor of the universe as an old house (like the abandoned house in which he played dice as a child), Eiseley finds a more substantial metaphor than the "invisible niche," and he reminds us that we are "nature's children" who continue to "go visiting" (221). Reminding us of our roles as children in an old house filled with nooks and crannies to explore, Eiseley keeps us in perspective; we are small and we are curious, and language is our means of exploration.

Finally, Eiseley treats language as the creator of an "other world," which is Bacon's mundus alter or the "world of culture" that began with the first delineation of a portion of the world "in a transmissible word" (The Lethal Factor," ST 256). All the metonymic uses of "word" for language and of language for culture join in this
consideration of the language-created world that is also linked to the journey, for it has made man a "wanderer" who exists "between an instinctive mental domain he has largely abandoned and a realm of thought through which still drift ghostly shadows of his primordial past" (256-57). Eiseley equates culture with order, with the creation of structures that replace instinctive guidance, though at the expense of suspicion toward members of other tribes who spoke other tongues. In the inner world, "extended through the written word and the contributions of science" (264), man is both within and without time and history. The answer that Eiseley suggests for the semi-alienated state of the "other world" of culture and consciousness, in which "objects and men are no longer completely within the world we call natural," but "are subject to the transpositions which the brain can evoke or project" ("The Last Magician," IP 142), is a return to nature through the broader view of art and history. The metaphor of the "other world" or "inner world," sustained throughout the texts, continues the suggestion of a spatial and visual domain created by language.

In addition to metaphorizing the source and the "creations" of language, Eiseley explores metaphors for what language is. It is a "world of streaming shadows" ("The Dream Animal," LJ 121) in a metaphor that combines the "dream animal" and the "other world" with the flickering shadows of what we know as reality as seen on the walls of Plato's cave. The Platonic intertext underscores the unreliable nature of language, which may seem "real" or fixed but is subject to constant change. And the "shadows" reappear later in a complex metaphor in which man is compared to a water strider dancing over the
surface tension of water as Eiseley suggests that man precariously "dances upon shadows, the shadows in his brain" ("The Invisible Island," UU 154). The added precariousness of the insect's dance on the water's surface further reinforces the metaphor's suggestion of language as unfixed and constantly changing.

In an essay-length exploration of what language is, Eiseley extends spatial metaphor to allegory, treating language as an "invisible island" existing in the human brain, "clouded in a mist of sound" and peopled by Shakespeare's Caliban and Prospero ("The Invisible Island," UU 162). It is an island "created by sound vibrating with meaning in the empty air" (162). This "phantom domain" fascinated early societies even in "the barbarian north," where men "would come to speak in wonder of the skald who could unlock the 'word hoard'" (162-63).

Continuing the hypostatization suggested by the metaphor of "unlocking" the "word hoard," Eiseley sets up a complex link between the "invisible island" and the Darwinian tangled bank. The word, he says, was the means by which man "had broken through the [Darwinian] network of strangling vines" and separated himself from other creatures ("The Invisible Island," UU 165). Paradoxically, the very word that separated man from his kindred is the only way back; imaginative insight might lead to a return. Language as an "invisible island" evokes Darwin's speculation that perhaps man arose on an island where he could escape the violence of the great carnivores, as well as Darwin's probings in the Galapagos. For Eiseley, the "island" where man began was the "invisible island" of language. Insubstantial
as the invisible island may be, it represents another attempt to add a visual and spatial dimension to the voice-ear circuit that Eiseley continually explores but finds difficulty in metaphorizing. Because Eiseley's primary purpose is dissemination of scientific information in order to create empathetic (as opposed to "textbook") understanding of how we came to where we are, the "invisible island" as metaphor provides a stopping place or an intersection in the exploration of how we might consciously return to sympathy with the nature that produced us.

Eiseley's exploration of the "invisible island" ends with a discovery of the island's first owner and its present ruler. Man is "dwarfed" as he "stands on the border of his invisible island," which "is Prospero's realm, whose first owner was Caliban. It is Shakespeare's island of sweet sounds and miraculous voices" ("The Invisible Island," UU 167). In the allusion and synecdoche, man is both Caliban and Prospero, both the beast-like creature whose rudimentary speech portends the emergence of the new island and the present ruler and practiced user of abstract verbal symbols.

The invisible island is the source of "both triumph and disaster" ("The Invisible Island," UU 169); it is an island that has grown larger, though still invisible. "The sounds--passing from brain to brain, defining, measuring, remembering how stones could be broken--were responsible" (169-70). As the island grew, man forgot his connection to the animals' world, and he learned that the "sounds could be made to lie" (170). Concluding the allegory, Eiseley reminds us that "the wooded shores that now confine us lie solely within ourselves. But they are the shores still frequented at midnight by a
vengeful Caliban" (171). If the human body is a palimpsest of evolutionary vestiges, it is also an island to which the half-man, half-monster Caliban returns as a figure for earlier proto-human creatures whose vestiges we bear. The "wooded shores" of the "island" are a tangible reminder of the complex intangible processes of physical evolution and evolution of language.

Finally, language appears as a kind of prison as Eiseley explores the limits that it imposes on man. Language as a "cosmic prison" suggests enclosure, limitation, even a kind of sorcery:

Language implies boundaries. A word spoken creates a dog, a rabbit, a man. It fixes their nature before our eyes; henceforth their shapes are, in a sense, our own creation. They are no longer part of the unnamed shifting architecture of the universe. They have been transfixed as if by sorcery, frozen into a concept, a word. Powerful though the spell of human language has proven itself to be, it has laid boundaries upon the cosmos. ("The Cosmic Prison," IP 31)

Once again, language has a dual aspect: if it brings freedom to the imagination, it also brings limitations. Like the confinement of the invisible island, the cosmic prison sets boundaries. The quest for space, Eiseley suggests, is part of man's desire to escape his "prisons" (language and other cultural prisons) through physical flight, though escape is impossible. In devising the "unnatural world" of culture, man has made of the universe "a cosmic prison house which is no sooner mapped than man feels its inadequacy and his own" (32). But if language imposes boundaries, it also provides a surer freedom than physical flight. The human mind can, through language, project itself beyond itself in "a crossing beside which light-years are meaningless" ("The Cosmic Prison," IP 49), for man "cunningly devised language to reach across the light-year distances between
individual minds" ("Man in the Autumn light," IP 125). As prison house and as means of escape, language takes on spatial dimensions.

The tongue, then, as the organ of the voice–ear philosopheme and articulator of the "word," is the source of both metonymic and metaphorical explorations in Eiseley's texts. The tongue itself is a metonym for language, which in turn is a metonym for culture. Clearly Eiseley is less effective in metaphorizing the voice–ear circuit than the other dominant philosophemes, but the metaphors that cluster around the tongue are nevertheless integral in his heuristic of intersections. Language mediates and shapes what we learn, and Eiseley embodies the abstract in metaphors from nature that provide visual and spatial dimensions as he describes language in terms of an "invisible island" and a "cosmic prison" and its source as a "crystalline substance" reminiscent of the ice associated with modern man. And the "streaming shadows," "dream animals," and "spore bearers" that language produces continue the displacement of metaphors and notions of fixity and decidability.

Notes


2. For further discussion of the signifier reflecting onto the signified (as opposed to the standard assumption that the signifier simply reflects the signified), see Derrida, Of Grammatology 7, 10-11.

3. Indeed, in his concluding chapter in which he rejects the notion of "science as the one enterprise that draws constantly nearer to some goal set by nature in advance," Kuhn refers to Eiseley's account in Darwin's Century of pre–Darwinian attempts to see evolution as fulfilling a goal (170-71). Darwin's Century was published in 1958; The Structure of Scientific Revolutions, in 1962.
4. A significant study of the history of writing is Gelb's *A Study of Writing*. For a consideration of "hieroglyphs" and of "grammatology" in its eighteenth-century inception as "a science of decipherment of nonalphabetic scripts," as well as its contemporary employment by Jacques Derrida, see Ulmer, *Applied Grammatology* 16-18.

5. Eiseley frequently turns to Biblical references, which are deeply encoded in our culture, and defamiliarizes, demythologizes them to explain the physical journey or to explore allegorical implications. Particularly prominent is the notion of the fall. For example, Eiseley quotes Coleridge's comment that without the notion of "a Fall of some sort or other . . . man is unintelligible" and explores the notion in terms of a fall away from primitive man's identification with nature ("The World Eaters," *IP* 61-71).
I have argued that the popularization of scientific information—indeed, of any information—by means of the written text falls within the domain of the literary specialist, for in an increasingly specialized academic environment, popularization is essential in achieving interdisciplinarity. The need for popularization is emphasized by the well-known debate between C. P. Snow and F. R. Leavis over the notion of "two cultures." Basic to this dichotomy is the contemporary problem of "scientism," including the institutionalization of science, the estrangement of this institution from a public that willingly defers to "experts" for decision-making and assumes a god-like quality in the scientific establishment, the isolation of specialists from one another, the effect of tradition in perpetuating scientific knowledge that has become coded in our culture, and the dangers of technology in preventing us from exploring new possibilities of "truth" or of human potential (what Heidegger calls "Enframing," what Rorty and Eiseley attempt to subvert in calling for openness to the poet's sense of wonder at something new under the sun).

My contention is that Eiseley's answers to these problems of popularization is in the reflective essay combining popularization of scientific information with philosophic reflection and with literary techniques and insights to produce a blend of science and art intended
for the intelligent general reader. Thus the "rift" that many perceive between science and the humanities is for Eiseley like the conflict of "world" and "earth" in Heidegger's conception of the formation of a work of art:

The conflict is not a rift (Riss) as a mere cleft is ripped open; rather, it is the intimacy with which opponents belong to each other. . . . It is a basic design, an outline sketch. . . . The rift-design is the drawing together, into a unity, of sketch and basic design, breach and outline. ("The Origin of the Work of Art" 63)

As I have noted, Eiseley takes into account the power of the popularizer and of his metaphors in shaping attitudes toward oneself, toward others, and toward the natural world. As a popularizer, he deals more with the evolution of science itself and its influence on human thought than he does with scientific fact alone.

"Only recently," says Gruber, "has it been recognized that ways of representing complex contents are inescapably part of the process too" (136). Eiseley's thrust as a popularizer is closely related to his metaphorical method: first, toward displacing metaphors and models of fixity, decidability, teleology, hierarchy, struggle, and extreme reductionism with metaphors and models of change, undecidability, the unexpected, equality, the inexplicable, and symbiosis; and second, toward exploring the means and processes by which we learn, the root metaphors and philosophemes by which the human being engages the natural world.

**Eiseley and Science: What We Have Learned**

In addressing the texts of a highly successful popularizer whose primary purpose is to treat "the ramifications of evolutionary theory" in order to emphasize "the importance of evolution in terms of our
present cultural goals" (Haney 211), I have encountered the problem of what he does actually popularize. As Eiseley himself suggests, evolution has by now become so well known that it may be considered a "figurative symbol" or a "root metaphor." Thus one does not look to Eiseley for an exact treatment of phylogenetic descent, for tables of Precambrian life forms, or even for a phylogenetic tree of hominids, though a considerable amount of such information appears throughout the texts without a textbook approach. What one does find in Eiseley's popularization is an exploration of the ramifications of evolutionary knowledge, a continual exploration not only of the question that Gerber and McFadden suggest, Where shall I live in this embracing system? but, equally important to the exploration of the question of popularization, the epistemological dimension, How shall I know where I shall live in this embracing system? At issue in Eiseley's texts, then, is not the elementary explication of a theory so well known that it has become a kind of root metaphor, but an attempt to engage the theory, to internalize it in terms of the individual's response to other individuals and to the natural world that produced us all, and to interrogate the processes by which we learn in an effort to escape the dangers of enframing.

In its widespread dissemination since Darwin's publications and Huxley's popularization, evolutionary theory itself, as Eiseley has suggested, has evolved. The major reason for his project of displacing machine metaphors and of displacing metaphors and notions of struggle, reductionism, fixity, decidability, and teleology is that Darwinism has, like any other idea that "escapes into the public
mind," become distorted—as exemplified in the (mis)application of biological principles to sociology in the case of Herbert Spencer (what Bunn treats in terms of a metaphorical transfer that is perceived as a panacea or a principle to be applied across borderlines that it cannot validly transgress) or in the continued acceptance of Malthusian notions that nature "balances" excesses, machine-fashion, through poverty, war, and famine. Such distortion requires what Eiseley calls "a long second look," a defamiliarization and a renewal. Thus what we find in Eiseley's texts, as opposed to specific details of phylogenetic descent, is more like what Olson and Robinson call a "phylogeny of knowledge," a reversed phylogeny in which the concepts of (1) the age of the earth, (2) extinction, and (3) natural selection (arising from observations of domestic breeding, variation among living organisms, and excessive reproduction) are seen as the specific branches leading to modern evolutionary thinking, with Mendelian genetics and molecular inheritance as contributors along the way (227). Three of the specific branches of this phylogenetic tree—the age of the earth, the concept of extinction, and the variety of life—are three of the four points which Eiseley develops in scholarly detail in *Darwin's Century* and in popular form in *The Firmament of Time* and which underlie many of his later essays: (1) the great age of the earth, (2) the extinction of species, (3) the great quantity of individual variation and the significance of minute changes in creating species, and (4) the decline of the eighteenth-century notion of the world as a perpetually balanced machine (though remnants of this notion, Eiseley insists, still affect our thinking). (For details, see *DC* Chaps. I-VIII, and for a summary of these
perspectives, see "How Life Became Natural," FT 70-71.) The other contributing branches are similarly treated, though not part of the basic organization of the books.

Thus what we have learned from Eiseley's texts is more general than specific from the biologist's perspective—a phylogeny of biological thought rather than phylogenies of vertebrates or of hominids—though much specific information is gathered from anthropology, archaeology, and paleontology. What we have learned can be gathered, however, under several basic headings.

The age of the earth. From Darwin's Century onward, Eiseley continually returns to the immense age of the earth. Before Darwin's thesis could be articulated, the immense age of the earth (five billion years is a period of time difficult for the nonspecialist to conceptualize) and the infinitely slow succession of geological forms had to be conceptualized.

Extinction. Time and geological change underlie the "naturalness" of death—extinction—as a concept that had to be established before evolution itself could be articulated.

Continuous change. Thus form is, Eiseley contends, not reality but illusion. And thus is established the notion of continuous change—constant, indeterminate, nonteleological—that is basic to Eiseley's texts and to his metaphors. As Eiseley presents it, evolution is an ongoing, unfinished process. That this process is continuous, that man is not the "roof and crown of things" as Tennyson and other mid-Victorians, including the early Darwinians, conceived him to be (with northern European man the pinnacle of nature's
achievements), may be the evolutionary concept most difficult to internalize. The concept is basic to Eiseley's metaphors of change, undecidability, and the unexpected, which help to undermine a notion firmly fixed in the public mind—even in the minds of those who would claim thorough understanding of evolution.

**Failures as successes.** That evolution creates the paradox of failures that become successes is a concept that undermines even some early evolutionary notions. Eiseley emphasizes that the Devonian fish that struggled ashore was a failure as a fish but an evidence of the tendency of life never to be satisfied with what it is. "There are still things coming ashore" ("The Snout," LJ 54), he suggests. Emphasis on emerging mutations as failures rather than on the warfare in nature which allows the fittest to survive is, of course, counter to some fixed notions of the "best" or the "fittest" surviving—all the way to man as the highest achievement of which evolutionary nature is capable.

The "community of descent." Eiseley also stresses the "community of descent" of all creatures; again it is the emphasis, not the fact, that is the subject of Eiseley's effort. If man persists in seeing himself as nature's highest achievement, he is likely to persist in seeing himself as master of nature, animate and inanimate. Eiseley's emphasis is on man's connection to the long thread of life that runs behind him—exemplified in the narrator's dream-like image of a questioning student attached to a "trunk that stretches monstrously behind him. . . . It writhes, it crawls, it barks and snuffles and roars, and the odor of the swamp exhales from it" ("How Natural Is Natural?" FT 168). The individual is "a many-visaged thing . . . ,
the weird tree of Igdrasil shaping itself endlessly out of darkness toward the light" (168). Man may be, in Auden's terms, the quest hero in Eiseley's texts, but he is such only because he is the product of the "community" that has produced him, of the "reaching" toward more than what it is that characterizes life itself.

The escape from determinism. But if man is part of this "community" of life, he has also escaped physical evolution with the emergence of his specialized brain, which makes possible the transfer of such functions as protection against cold and the quest for food to tools conceived by the brain. As biologists and anthropologists continually remind us, the new evolution is cultural, and man can control it—for ill or for good.\(^1\) Particularly relevant in this context is the concluding statement from a textbook on evolution prepared for college students not specializing in the sciences and giving an integrated view of philosophical and biological perspectives:

Where we go from here is uncertain, for having gained the power to direct evolutionary change and to predict with some certainty the outcome of any course of action we may undertake, we have not been very successful at deciding what we want to do with the future. . . . Evolution, in a very real sense, creates the very problems we are trying so desperately to resolve. (Olson and Robinson 253)

In concluding an excellent introduction to the biological facts of evolution, Olson and Robinson find themselves very much in the position that Eiseley assumes. The individual in a Darwinian world bears a responsibility that the individual in the medieval heaven-centered universe or the individual in the eighteenth-century mechanistic universe did not face. One answer Eiseley proposes is a
return to a kind of primitive union with nature, for primitive
cultures that worship nature do not see themselves as manipulators of
nature as do some advanced cultures, especially Christian ones. Eiseley often finds himself a fugitive from culture itself, like all
humankind a "castaway" on the "world island."

**Defamiliarization.** I have argued (following Eco's contention
that metaphor itself depends on the subjacent contiguity of metonym) that Eiseley's rather loose system of metaphor and metonym—cultural
metaphors for physical evolution and physical metaphors for cultural
evolution—is basic to his task as a popularizer, to his de-
familiarization and reformulation of evolutionary concepts. Here we
must bear in mind his displacement of metaphors and notions of fixity,
struggle, teleology, reductionism, determinacy, hierarchy, and
decidability, as well as his use of metaphor and metonym in an
exploration of how we know.

**The heuristic of knowing.** I have suggested that Eiseley's pur-
poses are at once explanatory, affective, persuasive, and heuristic—
the first three being clearly the purposes of the popularizer, while
the last, which is part of the Eiseleyan indeterminacy, contributes to
what we learn as well as to our understanding of how we learn. What I
have called the heuristic of intersections is an exploration of the
way we learn, through exploration of the basic cultural metaphor of
the journey and of the philosophemes by which knowledge is
internalized (eye), gathered (hand), or contained (the tongue, since
language has often been treated as a container for ideas).

Hand, eye, and tongue, I have argued, begin metonymically and
sometimes oscillate into metaphorical functioning, at other times
serve as focal points for other metaphors. Physical metaphor and metonym play a major role in Eiseley's interrogation of the means by which we know or perceive, of the relation between the organs of sense and "sense" as meaning, between physical sensation and intellectualization. In his expansion of the question How shall I live in this embracing system? to the question How shall I know how I shall live? Eiseley uses hand, eye, and tongue, which by catachresis become the root metaphors or philosophemes with which knowledge-gathering is associated, as starting points for this heuristic of intersections on the journey. Hand, eye, and tongue, however, lead not to understanding or pursuit of "absolutes," but to knowing that is also not-knowing. The hand reaches and probes, occasionally grasps, but finds that what it reached for or grasped has slipped just out of reach. The eye sees only to have the kaleidoscope shift slightly so that instead of a Platonic eidos the eye perceives that "form is an illusion of the time dimension" ("The Star Thrower," UU 78). The tongue, too, "gropes" (to use Bunn's term) for words to shape knowledge, only to find that the meanings shift even as the words are formed. Human knowing, then, is not-knowing.

The result, in Eiseley's world, is not disillusionment but renewed energy to grasp, to see, to shape meanings. From this epistemological dimension arises further figurative displacement of metaphors and notions of fixity, teleology, and decidability. Centering on the eye are metaphors that directly suggest vision: the mirror, the kaleidoscope, and the hieroglyph—all serving to explore the philosopheme of sight, as well as to displace notions and
metaphors of fixity, determinism, decidability, and teleology. And finally, centering on the tongue, which is coded throughout history as the linguistic ability, are visual and spatial metaphors that Eiseley devises in exploring this non-visual philosopheme: language becomes a "prison house" or "streaming shadows"; it creates "spore bearers" of thought.

Eiseley's interrogations of the organs of the dominant philosophemes—the "theoretical" senses of sight and the voice-ear circuit, as well as the "intermediate" sense of grasping—are interlinked, just as hand, eye, and brain are linked in the neurophysiological development of man that Eiseley repeatedly explores. The hand is the philosopheme of concept—gathering information together, collecting it into sets, taking it to oneself. The eye is the organ of "idea," of the Hegelian sublation of the sensible into the intelligible. But the eye is also, as Lacan has suggested, a kind of bowl. "Light may travel in a straight line, but it is refracted, diffused, it floods, it fills—the eye is a sort of bowl—it flows over, too, it necessitates, around the ocular bowl, a whole series of organs, mechanisms, defenses" (The Four Fundamental Concepts 94). And the tongue catachrestically represents language, which has been considered a kind of container for ideas. The point is that, with each of the organs of the philosophemes, Eiseley is epistemologically dealing with an attempt to hold, to fill, to take to oneself the information that the world provides. The attempt is not totally successful. The hand reaches but only probes or finds things eluding its grasp; the eye sees only to have the kaleidoscope or the lens shift so that knowledge or reality is not what it seemed to be; the tongue "gropes" for
meaning only to have the meaning shift. But evolutionary failure is also evolutionary success. Knowing is not knowing, but the journey is worth the effort. Eiseley finds a kind of solace in the lack of fixity and teleology in the natural world. "It gives one a feeling of confidence," he says, "to see nature still busy with experiments, still dynamic" ("The Snout," LJ 47-48).

The need for art and science. If exile is the condition of modern man, then, as Josipovici suggests, art may "help him to understand that condition and rejoice in it" (16). As Blanchot says of the Sirens, "Yet through their imperfect song—a song as yet unborn—they lured the navigator towards the space where singing really begins" ("The Sirens' Song" 59). Clearly Eiseley's task as a popularizer includes emphasizing the need for both art and science, effecting an awareness of the inseparability of the two.

Thus what we have learned from Eiseley's texts may be considered under several broad headings. The information presented is not, however, without specificity. Eiseley includes details from neurophysiology (extensive consideration of the brain's evolution, including controversy over whether human brain size emerged "explosively" or gradually), from paleontology (how far one can go in determining the exact morphology of the living creature from an incomplete bone structure), from biochemistry (the poetic account in "How Flowers Changed the World" of the interrelationship of oxygen-producing and oxygen-consuming organisms in the emergence of life forms). That the creature who became man was once a "mousy insectivore" which, except for a change to arboreal habits, might
just as easily have barked out his days in "prairie dog town" is an interesting detail among many in Eiseley's texts, but it is a detail that is less important in the Eiseleyan project of (re)shaping and (re)examining our evolutionary concepts and codes than is the individual's direct engagement of the major concepts and the individual's responsibility in this "embracing system." Most importantly, what we have learned in reading Eiseley's texts concerns the human relationship to evolutionary science as a way of looking at the world, a way of thinking about human and environmental concerns.

Eiseley's Texts and the Case for Popularization

At first glance one might well ask how and why the Eiseleyan oeuvre fits into the case I have built for popularization. How is popularization of Darwinian concepts for an educated general audience, with its requisite demythologizing and renewing of evolutionary science, related to the problems of institutionalization of science and its estrangement from the public? What has the isolation of specialists from one another or the role of tradition in perpetuating even (especially) scientific thought or the danger of technology to do with a literary naturalist? Surely the scientists who conceive of germ warfare or design nuclear submarines, who work with artificial intelligence, and who devise gene-splitting techniques are subject to these forms of estrangement and to the danger of technology. But has the writer of natural history any relevance to these concerns? For the student of Eiseley's hybrid genre, the subject of his popularization is related to the problems I have discussed. My task now is to demonstrate these relationships.
Benjamin S. P. Shen defines science literacy in terms of "an acquaintance with science, technology, and medicine, popularized to various degrees, on the part of the general public" (45). One advantage of scientific literacy would be its enabling the general public "to take advantage of science's many benefits while avoiding its many pitfalls" (46). Shen discusses "practical, civic, and cultural" (46) science literacy—the practical leading to problem-solving and subject to development even in the absence of alphabetic literacy, the civic suggesting citizens' awareness of issues related to science so that the individual will be willing to participate in democratic processes, and the cultural suggesting, for example, artists who read *Scientific American* for information on DNA or individuals who enroll in physics courses for nonscientists (46-50).

Though limited to a rather small number of individuals, cultural science literacy can affect human affairs by influencing leaders of public opinion and by reducing the impact of the "pseudosciences" (such as food fadism and astrology) that many young Americans seem eager to embrace (Shen 50). Shen calls for an "ordinary-language science" (parallel to ordinary-language philosophy) that will draw scientists and the general public closer together in the realization that similar logic prevails in science and in everyday thinking and decision-making (51-52). What Shen proposes is a popularization of concepts that will lead to more effective practical influences of science, to more knowledgeable civic participation, and to an interdisciplinary cultural awareness of science. Similarly, A. B. Arons suggests that wider scientific literacy requires careful illustration of the role of science in intellectual history (93,
105-107). In their stress on popularizing concepts, on effecting "cultural" science literacy, and on illustrating the impact of science in intellectual history, Shen and Arons posit the need for what Eiseley does.

As a physical anthropologist with a background including extensive field work in paleontology and archaeology, Eiseley could easily have retreated into investigations of interest primarily to other specialists. However, Eiseley's concern with the history of science, with the evolution of evolutionary thinking, and with the impact of evolution on world history leads him into popularization. As part of the scientific institution, Eiseley is nevertheless the scientific "heretic" who dares to question that establishment. Because he stands as part of the scientific establishment, but nevertheless with a deep interest in the humanities, Eiseley is directly concerned with pointing out to the intelligent general reader the dangers of institutionalized science: its single-minded pursuit of knowledge at the expense of the environment, its Ahab-like pursuit of space at the expense of other avenues of knowledge, its tendency to remain enclosed within its own specialties like dancers in "fairy rings," its acceptance of idolatry, its dependence on the military-industrial complex. Because of his personal position, Eiseley is able to bring to the popular attention a sense of perspective on the scientific establishment.

But he is also concerned to bring a similar sense of perspective on time and creative change, on what Olson and Robinson call the responsibility of man in a world that, in a sense, evolution has
created. If "volition has taken its place in the world of nature" and evolution and its implications require "a long second look" (DC 350), then popularization through reexamination and defamiliarization of well-known concepts in the life sciences is just as important as popularization of information about nuclear science. If we understand the interrelationships of life, we should be better able to make decisions that will affect it. Even Richard Dawkins, who contends that the basic evolutionary unit is the gene and that the gene's survival is based on its essential selfishness, suggests a separation between "the level at which altruism is desirable" and the genetic model (11). In other words, if the gene is above all selfish, human culture need not perpetuate—at the cultural level—this trait. But we need to know the difference. Essentially, this is what Eiseley is saying when he suggests that the human brain is able to insert "indetermination," to affect cultural evolution for better or for worse.

What Eiseley treats as public misunderstandings of Darwinian thinking may have been either deliberate distortions or simple ignorance. But Herbert Spencer's transfer of the biological struggle for survival to the economic sphere exemplifies what human misunderstanding and misuse of biological principles can do in the socio-cultural context. Man might choose a "mystical and mind-freezing word" and say, "This is man" ("Instruments of Darkness," NC 54). To choose not do to so but to grope, like the palpitating red sea-urchin dredged up early in this century, a relic from prehistoric times, to be more than it is, Eiseley contends, is the nature of life;
and this choice, rather than any rationalization for less than humane actions, must define man if he is to survive.

Further, because Eiseley considers the machine metaphor for the universe not dead but actually extended, even incorporated into the popular view of Darwinism (nature as a great machine producing struggling beings who behave as nature determines), institutionalized science becomes an extension of the machine. As we unwittingly draw meaning from the vehicle of the metaphor, we see man in the position of control over the machine, in the position of user of nature, rather than as a product of nature dependent on it for survival. Institutionalized science, in this view, is a kind of organized machine whose responsibility is to control the natural machine. All is distance, delegation of responsibility. The primitive notion of close contact with nature, with gods in trees and magic in the wind, is a more effective model of symbiosis, Eiseley suggests, than is machinized evolution. The Eiseleyan program of engaging nature and its evolution from an individual perspective is an important link in the chain of human responsibility.

Isolation of specialists from one another, of course, only compounds the problem. A layman outside his own field, the isolated specialist may even reinforce the tendency to allow decision-making to fall into the hands of specialists chosen by a political elite for advice in decision-making. Further, if tradition perpetuates an established system of scientific thought, as Kuhn and Eiseley have argued, then isolated specialists are truly caught up in what Heidegger defines as the "danger" of "technology," which is not itself
technological, but is the "Enframing" of technology that renders man unable "to enter into a more original revealing and hence to experience the call of a more primal truth" ("The Question Concerning Technology" 28). In this context Eiseley's preoccupation with the role of the concerned scientist's reflections is especially relevant. What Eiseley does as essayist is what Habermas suggests: scientists, as both citizens and professionals, need "to go beyond the technical recommendations that they produce and reflect upon their practical consequences," to consider ways of ensuring "that science and technology are mediated with the conduct of life through the minds of . . . citizens" (Rational Society 78-80). And at least as much as the physical sciences, the life sciences, as we have seen, need this mediation and this reflection, which come in Eiseley's work through his own hybrid genre of science and art.

**How the Vehicle Explains**

If signs, tools, and models serve as daemons that transcend the limitations of here and now, the semiotic dimension is nonetheless reached by instruments that are forged from wax, feathers, and other mundane stuff. So the Daedalian artifice that extends our conditional limits is a winged boundary between the stuff of nature and the operations of culture. (Bunn 6)

Eiseley's texts, as we have seen, present an intersection of science and the public mind, of biology and culture. In this intersection we find not only a popularization of science, but a science of popularization. "When the understanding of scientific models and archetypes comes to be regarded as a reputable part of scientific culture, the gap between the sciences and the humanities will have been partly filled," says Max Black. "For exercise of the
imagination, with all its promise and its dangers, provides a common ground" (243).

Eiseley's target audience consists of intelligent general readers, though he suggests that, in writing for a larger audience, "no man expounds upon great ideas to a single audience," for "man is not one public; he is many" ("Man Against the Universe," ST 208). A specialist in one field is a general reader in another. The target "reader" or audience is, of course, hypothetical. And Eiseley realizes what can happen as man the (multiple) audience responds: "the messages he receives are likely to become garbled in transmission" (209). Still, this "garbling" is inevitable because scholarly ideas are sometimes "distorted, reoriented, or trimmed to fit the public needs of a given epoch" (209). Thus Eiseley contends that "no great act of scientific synthesis is really fixed in the public mind until that public has been prepared to receive it through anticipatory glimpses" (209). Such "glimpses" are clearly part of Eiseley's own notion of the popularizer—even though his task is to defamiliarize and reshape concepts, to provide "anticipatory glimpses" of concepts less distorted than those lodged in the popular mind.

Eiseley's science of popularization, I have argued, depends on the "here and now" and "little things" that Heidegger finds as the source of a "saving" power in a technological age, or as Bunn suggests, on "instruments that are forged from wax, feathers, and other mundane stuff" that form the "winged boundary" between nature and culture (6), or the surrealist artist's merveilleux du quotidien. More specifically, I submit that the Eiseleyan vehicle works through what Carlisle calls the "rhythms" of his discourse, through
reexamination of simple objects or "mundane stuff" in metaphors that appeal to what Barthes identifies as the "cultural codes," through moving from metaphor to model, and through reexploration of the dominant philosophemes associated with the organs through which knowledge is acquired.

**Rhythms**

Eiseley's clearly literary purposes set him apart from some popularizers. In analyzing Eiseley's development of a consciously literary style, Carlisle notes that the basic vision embedded in analytical, especially scientific, discourse is one of discontinuity (Loren Eiseley: Development 182). The dominance of discontinuity as a theme in Eiseley's texts is clear. Carlisle, however, finds that "Eiseley began to develop a language of continuity or wholeness to counter the discontinuities and fragmentation that he found in science and scientific discourse, as well as in himself" (182). The key to this continuity is extension—of vision, of tactile experience, of participation in time; and the result is that what Carlisle calls Eiseley's "new idiom" is characterized by "layers" of science, autobiography, figurative language, and speculation which create "rhythms" of mind and of prose (182-83). These rhythms—of identities of the self; of movement between inner and outer; of time, present, past, and future; of "intensive" analysis and "extensive" interpretation (as in giving details about the brain and then turning to man as a "dream animal"); of "form and stability in relation to process and change"; of science and myth or science and ethics—identify Eiseley's idiom and enable him to "intertwine" the layers of
discourse and to extend the senses (Carlisle, Loren Eiseley: Development 183-84).

Another rhythm also appears. A frequent device in explaining new material to an audience, or in demythologizing familiar material, has traditionally been alternation of the familiar with the unfamiliar, of the personal and subjective with the impersonal and objective, of the near with the remote. Eiseley establishes a rhythm of alternation between fact and myth, between past and future, between personal experience and species experience, between explanation and exploration. Thus he is able to combine the specific and scientific with the general ramifications of science that we have seen as his major concern. And thus is established another important rhythm: alternation of the explanatory and persuasive dimensions with the heurisic and affective.

Codes

At the most basic level, however, Eiseley breaks into the popular consciousness at the level of what Barthes calls the "cultural codes," the always "already-written" clichés of the culture that are "implicit proverbs" or "récupérés of common knowledge" which "are extracted from a body of knowledge, from an anonymous Book whose best model is doubtless the School Manual" (S/Z 21, 100, 184, 205). The code appeals to "what has been written, i.e., to the Book (of culture, of life, of life as culture)" and "makes the text into a prospectus of this Book"; thus the code is "one of the voices out of which the text is woven" (20-21). The cultural code is "a fragment of ideology," which "inverts its class origin (scholastic and social) into a natural
reference, into a proverbial statement" (97-98). Drawing on these already-familiar, already-written references, the writer has a meeting ground with the popular mind. He can engage the code personally, he can explore it, or he can defamiliarize and renew it.

Eiseley’s metaphorical system enables him to enter the popular mind at the level of the cultural codes. The journey itself is a code—in the traditional Christian motif of the conscious human journey, in the evolutionary sense of the journey of all life, in the notion of the individual's quest for meaning, in the ritual journey or the journey of initiation. On a more scholarly level and less likely to be evident to the public mind, the journey is a code for literary method; as I have suggested, the metaphor of the journey is also the journey of metaphor.

Eiseley's cultural metaphors that fall within this journey are no less coded than the journey itself. The code of magic or alchemy evokes medieval stereotypes. Applied to modern science (itself a code), the older code subsumes the newer, the magical roots of science are evoked, and science is demythologized as an object of idolatry, renewed as a cultural construct deserving of attention as such. The code of the primitive—at least as old as the eighteenth-century "cult of the noble savage"—is evoked in Eiseley's metaphor of the trickster who, mocking, postures behind the most serious human occasions, even in the form of a sewer rat dancing behind a learned lecturer. But the code of the primitive is everywhere present—in the notion of primitive man's closeness to nature, in the sympathy that Eiseley feels with primitive as opposed to modern man. And the appeal to the code of the theater, particularly through the Elizabethan theater and
Shakespeare, is an appeal to a code known by any intelligent general reader, a code employing illusions of "reality," of actors playing parts and sometimes playing the parts of actors in a play within a play, thus adding illusion to illusion.4

In employing the organs of the dominant philosophemes as part of his heuristic of knowledge, Eiseley further appeals to cultural codes. "The body-self," says Thass-Thienemann, "has set the primary patterns for all subsequent understanding of the world" (211). Eye, hand, and tongue—as the organs of internalizing (visualizing), grasping or probing (taking to oneself or reaching beyond oneself), and containing (language as a "container" for "ideas")—are basic to what we might call the code of the body; and each evokes unconscious responses just as other codes do. The intelligent general reader may not think of the hand as a root metaphor for concept, but the reader knows what it is to reach, probe, grope. The reader may not be aware of the dominance of the visual in Western philosophy, but he finds light/dark, day/night, inner/outer oppositions comfortably comprehensible; the notion of visually "internalizing" experience draws on the code of what we might call popular psychology. Because the tongue as instrument reflects Biblical usage, it belongs to the code of mythology as well as to the code of the body. Eiseley's explorations of the relation of sensation and knowledge, then, begin with the body codes. And these codes, like any codes established in a culture, "afford the discourse a basis in scientific or moral authority" (Barthes, S/Z 18).

Metaphors centering on the body codes evoke similar coded responses. The mirror evokes the multi-faceted code of identity--the
quest for identity, the mythological code of Narcissus, the unconscious recognition of self as a separate entity. The shattered mirror draws on the code of science (physics) through which the part-for-the-whole and the fragmented personality are able to function as codes for human experience. In the similarly eye-oriented "hieroglyph" and metaphors of "reading" are some of the most basic coded references. The hieroglyph, identified with funereal inscriptions, is the Book of Death, as nature itself is the Book of Life. Both are ancient codes. "The garden is speech, the desert writing," Derrida says (Writing and Difference 68, italics in original), drawing on the code of the Word of Presence and suggesting that the book, writing, is a wandering in the desert. Similarly, evolution, whose "book" Eiseley reads, is a wandering without direction. Modern man, Eiseley says, creates an "invisible pyramid" in adulation of science—another appeal to the Book of Death.

More general cultural codes appear as well. Thus Eiseley appeals to the code of mythology in the extended Odyssean metaphors, in the Biblical references and defamiliarizations (equating the story of Eden with the dawn of consciousness, linked to language), and in metaphorizing science itself from one age to another in terms of a Scandinavian crossroads religion in which worshippers followed a carriage bearing a hooded figure (Newton, Darwin, Science). The code of literature includes evocations of Emerson, Melville, and Thoreau especially, but also intertexts of Shelley ("the splintered radiance of consciousness" ["Adonais"] and the poet's responsibility to synthesize science ["A Defense of Poetry"]) and the extended
comparison of Macbeth's witches to those today who would conjure up the future by giving it verbal form.

No less coded are the references to philosophy—whether in flickers of Plato's cave-wall shadows of reality in the "streaming shadows" of language or in direct references to Kierkegaard's "fear and trembling" (surely by now coded in the popular mind) or to Bergson's dynamism (which intrigues Eiseley, though it wars with his scientific stance).

Science itself, warfare, technological devices, art, time, and evolution are all codes of the already-written which afford a basis for the discourse. And in his personal stance as essayist Eiseley appeals to an established rhetorical code. "That the self and its minute adventures may be interesting every essayist from Montaigne to Emerson has intimated," Eiseley writes, "but only if one is utterly, nakedly honest and does not pontificate" (ASH 178). As a rhetorical code (all codes are cultural, of course), the assertion of honesty has a long history. This is not to say that Eiseley is not an honest essayist (though he could easily be accused of pontificating on occasion). The actual honesty of his autobiographical sequences is the subject of another study altogether, but the point is that the rhetorical code takes over upon this assertion, as it does similarly when he voices his doubts about the scientific institution to which he belongs. A major element in audience response to a personal essayist is trust of the narrator, and the appeal to these rhetorical codes is part of establishing a foundation of trust.

What Barthes terms "proairetic" codes—of the always already-written action, the "novelistic"—are narrative codes: "whoever reads
the text amasses certain data under some generic titles for actions (stroll, murder, rendezvous), and this title embodies the sequence" (Barthes, S/Z 19). My point is that Eiseley's "new idiom" brings about an unexpected intersection of the cultural codes and the "novelistic" codes in its blending of science and narrative. The novelistic codes reflect stratification of many forms and types of tales: the Chaucerian exemplum in the encounter with the dual-visaged man atop a hay-rick ("Strangeness in the Proportion"); Thoreauvian withdrawal in the tale of a man sitting underneath a bridge watching a muskrat bring in his breakfast ("How Natural Is Natural?"); and reverberations of Jack London's adventure tales in the motif of escaped prisoners pursued by a posse in the snow that recurs throughout All the Strange Hours, or of Mark Twain or Ambrose Bierce in the tale of Old Mullens, a fundamentalist who led a party of bone-hunters to discover an important fossil quarry that he labeled "Noah's garbage heap" ("The Relic Men"). If, as I have argued, Eiseley's is an epistemology of journeys, a heuristic of intersections, one of the most important intersections for the popular mind is that of the codes of science and the novelistic.

Models

In addition to appealing to the cultural codes, some metaphors also serve as models. As Bunn notes, "Our definitions therefore are perspectivist; depending upon the oblique perspective given a semiotic object, it becomes sign, tool, or model" (24). The journey itself, as a random journey, is a model for the random movement that Darwin imaged as an irregularly branching tree.
As the encompassing metaphor, the journey is a model of indetermination, undecidability, change, the unexpected. As the metaphor of journey and the journey of metaphor it is linked to the very process in which the audience is participating—reading discourse. Discourse itself derives from the Latin discursus, "a running back and forth." As Serres says, "To read and to journey are one and the same act" (Jouvences 14, qtd. in Harari and Bell xxi). In the random journey on which Eiseley leads the reader, a movement occurs between the cultural codes and defamiliarizing or demythologizing them. Wolfgang Iser describes the movement of reading:

first, a repertoire of familiar literary patterns and recurrent literary themes, together with allusions to familiar social and historical contexts; second, techniques or strategies used to set the familiar against the unfamiliar. Elements of the repertoire are continually backgrounded or foregrounded with a resultant strategic over-magnification, trivialization, or even annihilation of the allusion. This defamiliarization is bound to create a tension that will intensify [the reader's] expectations as well as his distrust of those expectations. . . [W]e will find ourselves subjected to this same interplay of illusion-forming and illusion-breaking that makes reading essentially a recreative process. (62-63)

In portraying life as process and using the journey as metaphor, Eiseley provides a literary model. Iser suggests that through Ingarden's "Konkretisation" we construct the "virtual" reality of literature, which is parallel to the "virtual" reality of living. The becoming of the literary "reality" thus involves interaction between reader and text. Ultimately, Eiseley's texts describe man in the process of creating (reading) his own literary work of art. Far from the eighteenth-century Book of Nature, it is an incomplete, shifting,
changing, interactive reality. The individual shapes it. Just as man, having escaped physical determinism, shapes his becoming, the becoming of the literary text is the model for the human journey even as the journey is the model for the text. The model involves the individual in a creative process, an engaging of nature and life, a participation in the process rather than a passive observation or a relegation of participation to a scientific or military-industrial-political elite.

The journey (literature, science, life, text) as a model eliminates the determinism of metaphors of warfare or struggle in the tangled bank. But it also eliminates the purely organic metaphor, which is itself open to a form of determinism. M. H. Abrams first noted the tendency of organicist logic to deconstruct itself when he suggested that "to substitute the concept of growth for the operation of a mechanism in the psychology of invention seems merely to exchange one kind of determinism for another" (173). Jonathan Culler points out the tendency of organic metaphors to invoke a kind of theological economy when "a transcendent principle of some kind (an absolute origin or plenitude)" is hypostatized and thus "commands the field" (The Pursuit of Signs 167). But the model of the reader's or the artist's relationship to his material, as a supplement to the natural (organic) metaphor, suggests—outside the traditional author-god assumptions—the continual accommodation of mind and material. Neither is dominant; from the dialectic of the two comes an accommodation that, in turn, is subjected to the tension of the reader's creation of text as part of the reading process. The model of art/literature/life opens itself to continual shifting and change,
creative change. It echoes the back-and-forth movement of discourse and shows man in the process of creating his own text.

Cultural metaphors—the trickster, games of chance, magic and alchemy, the theater—serve as symbols of the lack of a fixed goal for evolution and the randomness of life's changing. The trickster is an anti-model, mimicking order; he postures behind science itself, mimicking the cultural hierarchy that generates idolatry of science. And the child's dice game in an abandoned house, among other metaphors of games of chance, is a model for the individual's "game" in the universe in which the dice symbolize unrealized, as well as realized, potential.

Magic and alchemy, too, are anti-models suggesting no fixed schema for reproduction. Superimposed on the rigid schematization of science, magic and alchemy establish a dialectic that calls into question the notion of scientific hierarchy (which places what Lord Snow called the "hard sciences" at the pinnacle of a hierarchy of knowledge). And if magic, like poetry, is an other kind of knowledge, then the metaphor suggests a model of coexistence or symbiosis of systems of knowledge.

The theater is a link between magic and mind. As a "trick factory," it becomes a model for the shifting forms that can easily be taken as "fixed" or "real." If the cosmos is a "trick factory," a theater, and the actors are "shape-shifters," the impromptu theater provides a model for the concept of man as an actor on a stage—with skeletons of earlier actors beneath the floorboards—playing an ever-changing role and improvising his way through time and change, not
quite knowing which play is the real one. Even science itself is a kind of magical play that is shaped by and in turn shapes its own stage production.

The mirror and the kaleidoscope are similar eye-oriented models. The mirror as symbol of identity evokes the Freudian model of the child's playing "Fort! Da!" to discover his own control over the presence or absence of the figure in the mirror—an essential stage in establishing his own identity. And the fragmented mirror serves as a model for the fragmented identity that Eiseley treats in terms of his own self, but more importantly, using the self as a means of thinking, the fragmented identity of man, who is a composite of fragments. Similarly, the kaleidoscope, whose slightest movement brings a shift in the view, models, through a simple child's toy, the shifting illusion that we may perceive as reality.

Other metaphors serve as models—the prison house of language, the fairy ring that confines the scientists who dance within, the seed capsules that symbolize the explosive spreading tendency of the human brain, the layers that the archaeologist finds in studying culture or the biologist finds in studying the fossil record. Such models help to explain the larger concepts that are Eiseley's reason for writing.

Models and the Reexamination of the Dominant Philosophemes

If, as I have suggested, with each of the organs of the philosophemes Eiseley deals epistemologically with the attempt to hold, to fill, to take to oneself the information that the world provides, then hand, eye, and tongue (including the catachrestic sense) are models as well as means of reexamining the process of
knowing. The hand is a model for reaching, probing, grasping, touching (tactile internalizing of information), and for gathering together or collecting. Bunn suggests that the asymmetrical form of the hand gives a freedom of movement and a precision of grip that enable it to function as a model of grasping but also "draw attention to a hypothetical dimension of semiotics, one of evocation" (48-49); Eiseley's suggestion is extension of oneself, reaching out. The eye provides a model for internalizing or "filling," as Lacan notes in regard to the refraction, diffusion, filling, and overflowing as light reaches the eye (94). The tongue in its catachrestic sense suggests containing. In its physiological sense the tongue can be seen as a model for internalizing through the paradoxically internal-external action of the tongue (Thas-Thienemann 247). For Eiseley, this internalization occurs neurophysiologically because of man's "remarkable brain linked by neural pathways to his tongue" ("Science and the Sense of the Holy," ST 196).

The vehicle explains, then, by means of the multiple "rhythms" of the discourse, by appeals to the cultural codes which give access to complex material that can then be defamiliarized, and by models. And Eiseley's reexploration of the organs through which knowledge is acquired combines the appeal to the codes and the use of models in an epistemological heuristic.

Science as a Vehicle for Thought

In his hybrid genre Eiseley uses science as a means of thinking through the human relationship to time, the natural world, and other human beings, just as another writer might use a different vehicle to
think through similar concerns. Faulkner's vehicle, for example, is the fictional web of characters and actions in his mythical Yoknapatawpha County; through his tangled web of fictions he engages the problems of man's holding onto certain misery for fear of the unexpected and man's rationalizations for his own inhumanity, against the certainty of human endurance. James Joyce uses Leopold Bloom--outsider, scapegoat, wanderer (the Wandering Jew)--in his own Odyssean voyage. Through the individual consciousness and the ability to link disparate incidents ("spots of time") into a whole, William Wordsworth traces the "growth of a poet's mind." As a writer, each finds in his individual vehicle a means of thinking through larger ethical, psychological, and philosophical problems.

At the end of The Immense Journey the reader has encountered an unsuccessful fish that, adapting to air breathing and struggling from the ooze to land, marked the beginning of land life and of the human brain; the skull of a Boskop man who lived ten thousand years ago and fit mid-twentieth-century projections of the "man of the future"; and a flock of desert birds that murmured as a raven devoured a nestling, only, moments later, to forget the murmur and break into a celebration of life. In The Unexpected Universe the reader has encountered a series of personal events and reflections, from Cook and Darwin and Odysseus to events selected from Eiseley's experiences: wandering from a stalled commuter train and talking with a city dump attendant against a background of smoke and flames; joining the memorable, mad old "star-thrower" who stood with the posture of a god beneath a rainbow to "help" beached starfish; wrestling with a fox cub in the early morning fog, seeing the world turn upside-down, and proclaiming
the event the "gravest, most meaningful" of his life ("The Innocent Fox" 212). At the end of The Night Country the reader has encountered a mixture of night-haunted personal experiences: visiting a prairie farmhouse with a basement door opening onto a blue chamber of subterranean water; talking an isolated old man into giving up a bison skull to a museum, but only if the field workers would also take a concretion that the old man had imagined a petrified woman; and hearing the story of an old pioneer who, returning home after growing up with the Indians who had killed his young Aunt Lucinda and captured him, retrieved Aunt Lucinda's skull to keep in the china cabinet until his grandchildren convinced him to let a museum have it. Eiseley's characters and tales create vignettes that are interwoven with scientific facts and insights into time, change, indetermination, and the role of the scientific institution.

The insights—whether from characters sprung from the brain of a novelist, from a poet's recollections of sensations, or from personal recollections and scientific fact blended into a hybrid genre of science and art—are equally dominant and all "literary." My point is that science and personal experience can serve as vehicles of thought, as do Wordsworth's "spots of time," as do characters in Faulkner's Jefferson or Joyce's Dublin. I have attempted to demonstrate that popularization of scientific information, especially as presented in a hybrid genre that makes use of literary techniques, can have not only the expected explanatory and persuasive dimensions, but also an important heuristic dimension, as well as the affective dimension that we expect in the literary work of art.
Moving increasingly toward the literary, from his starting point with exact scientific information in *The Immense Journey*, *Darwin's Century*, and *The Firmament of Time*—the one popular, the second scholarly, and the third "lyrical and meditative" (Angyal 57)—to the more personal and anecdotal, yet still popularizing works, *The Unexpected Universe*, *The Night Country*, and *All the Strange Hours*, Loren Eiseley establishes a model of using science as a vehicle of thought. If science is one source of man's uncertainties today, if evolution and particle physics have undermined the traditional mythical structures, still Eiseley finds in the very indeterminacy and uncertainty of the universe a consolation that life is not "finished."

The human brain's escape from determinism gives man a chance to shape his future, to choose immobilization at this stage of the journey by accepting a definition of man as violent and selfish or to be, as life has always tried to be, more than it presently is. The chance is one that requires of man an understanding of the web of life and a consciousness of his relationship to the nature that produced him.

**Notes**

1. George Gaylord Simpson firmly established the notion of "cultural evolution" in his landmark study *The Meaning of Evolution*.

2. Eiseley frequently treats the attitude of Christian cultures toward domination of nature; reinforced by the mechanistic world view, such an encoded attitude is difficult to displace. See specifically Chaps. 3-7 of *The Invisible Pyramid*. For further analysis of the history of contemporary attitudes toward nature, see White 341-50.

3. Fletcher notes the surrealists' quest for the merveilleux du quotidien (266, n.82). Gerber and McFadden find a significant vein of surrealism in Eiseley's texts, particularly in the pieces which resemble science fiction ("The Dance of the Frogs," ST 106-115, for example). Their chapter is titled "Eiseley Unleashed: Ventures in Surrealism" (127-38).
4. In *When the Theater Turns to Itself*, Sidney Homan provides a significant "metadramatic" exploration of the Renaissance notion of the world as a stage and of the levels of illusion involved in Shakespeare's theater.
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I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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