The Continuity of Life

"What I love about this place is the quiet... and the stars. We don't have stars in L.A." Sara Sittser; Mother, Church secretary

Life, and the earth that supports it, were born of the dust of the stars. Their chemical elements are interchangeable, and as such, life and Earth are inseparable. The vital essence of life is a manifestation of the laws of chemistry. As a consequence, living organisms are chemically dependent. The maintenance of life's internal harmony and precision requires a finely tuned and complex support system. Broadly speaking, this support system consists of all the elements that make up the minerals of the earth's crust (lithosphere), the gases that envelop the earth (atmosphere), the water that clings to and permeates its surface (hydrosphere) and the millions of different life forms (biosphere) that distinguish planet Earth from every other known celestial body in the universe. All of these various components are collectively known as the environment.

As complex as the planet and its myriad organisms may seem, it is heartening to "know" that all this elaborate diversity springs from fewer than 100 basic building blocks of matter. Living organisms, as distinct from non-living substance, are comprised mainly of fewer than one dozen of these elements. The hundreds of thousands of different substances that are known to exist, both natural and synthetic, result from different combinations of these individual elements.

Many of these elements are familiar; carbon, oxygen, helium, iron, aluminum, sodium, mercury, iodine. In their usual form, they may be solid (iron), liquid (mercury) or exist in a gaseous state (oxygen). Many elements are unfamiliar; zirconium, gallium, scandium, selenium. Several are radioactive (i.e., unstable and emit harmful radiation); uranium, radium, plutonium, radon and may occur naturally (uranium, radon) or synthetically (einsteinium), the latter being produced in tiny amounts by massive instruments known as particle accelerators.

The naturally occurring elements that make up the substance of the earth, according to one scientific theory, were created when vast swirling nebulae of hydrogen gas in an otherwise empty universe began to coalesce. As the gravitational field of this amorphous cloud continued to gain strength, the spherical geometry of the nubile planet began to emerge. Along with this emergence of form came the evolution of substance. Under the pressure of the increasingly intense gravitational force field, elemental hydrogen, the simplest and most basic of all the elements, began to combine into the various more massive and complex elements of which present day Earth is comprised. The relative abundance of these building-blocks of matter was essentially fixed at the time of creation and ranges from the vast amounts of elemental iron contained in the earth's crust, and presumably its core, to the tiny quantities of "Rare Earth" elements which have unheard-of names like praseodymium.

A unique feature exhibited by most of the 90 or so naturally occurring elements is an intrinsic "ability" to form associations with certain other elements, resulting in compounds. In some cases these combinations occur spontaneously. In others, specific conditions of concentration, temperature, pressure, etc., must exist before these compounds can form. In living organisms, these reaction conditions are extremely precise, to the point that virtually every single aspect of metabolism requires the presence of a unique and specific catalyst in order to promote new elemental associations. Additionally, biological systems require a constant energy input in order to make the thousands of chemical reactions that constitute "living" possible. In any event, it is the

often predictable associations of the various elements into "molecules" that provides the basis for the variety of substances found on our planet and the incredible diversity of biochemicals that define living creatures.

Various combinations of the elements result in a nearly endless variety of substances. Again we are familiar with many. Rust or iron oxide results from the combination of the element iron with the element oxygen. Carbon will combine with oxygen to yield the compounds carbon monoxide (poisonous to humans) or carbon dioxide (necessary for the survival of plants). Carbon also combines with itself and several other elements to form the thousands of different organic molecules that comprise living organisms. In addition, thousands of synthetic organic substances have been created by chemists in laboratories around the world and hundreds of new ones are produced each year.

Among the largest and most complex molecules known are those comprising the genes of plants and animals. These DNA molecules consist of only 5 different elements (carbon, hydrogen, oxygen, nitrogen and phosphorus) yet hundreds of thousands of different DNA molecules exist. These differences result from the different order or arrangement of elements within the various different molecules of DNA , much like different arrangements of musical notes result in different melodies. These different DNA molecules in turn determine the difference between a giraffe and a spider, or a pine tree and a house fly, or a woman and a man. Slight changes in the DNA molecules of reproductive cells (mutations), can lead to serious or fatal genetic disorders, such as diabetes and hemophilia in humans and stunted growth in plants. Genetic mutations occur naturally, at a very low rate, as a result of errors in DNA replication (when sperm and eggs are produced) and as a result of continuous cosmic bombardment by electromagnetic radiation emanating from the stars. Sources of naturally occurring radiation contained in the Earth itself (radioactive ore deposits) also contribute. Within the last few decades man has increased, to some extent, the exposure of life on the planet to both ionizing radiation and the mutational and carcinogenic (cancer causing) effects of some synthetic chemicals. Radioactive releases into the environment as a result of nuclear materials production, nuclear weapons testing and operation of commercial nuclear power plants has contributed to the increase in ionizing radiation, as has the chlorofluorocarbon destruction of the ozone layer. Manufacture and application of synthetic chemicals used in industry and agriculture, such as PCB, DDT, carbon tetrachloride and formaldehyde, has contributed to a sharp increase in exposure to chemical mutagens. In fact, cancer, which is second only to heart disease as a major cause of death in the U.S., has been described as a "disease of modern civilization." The disease can be triggered by exposure to a wide variety of substances including asbestos, benzene and nicotine. The number of potential carcinogens listed by the EPA continues to grow as industrialization progresses. The increasingly widespread distribution of these substances in the environment, a result of large-scale manufacture, utilization and disposal, is deleterious to all life, not just humans. The high prevalence of cancerous tumors found in bottom fish in Seattle's Puget Sound, a rather pristine body of water compared to Boston and Hong Kong harbors, is indicative of the extent of the problem. Furthermore, we can be assured, the visible damage wrought by global pollution is only a small fraction of the likely effects yet to emerge.

Mutations in the germ-cell DNA of organisms are not always harmful. They are occasionally beneficial (depending on the biological complexity of the organism in question, the degree of mutation and the stability of its environment) because they may confer structural or behavioral changes that enhance the ability of the organism to adapt and survive. Spontaneous genetic mutations coupled with the ability of many organisms to exchange or share genetic information

(sex) have been the motivating force behind the evolution of life on Earth. However, the rapid rate at which mutagenic agents are accumulating in the environment does not bode well for man and his best friends because the vast majority of mutations are deleterious or lethal. Only the lowly bacteria are likely to adapt, and perhaps ultimately inherit a planet that humankind does not seem to sufficiently respect.

Although "our" world is inhabited by a plethora of exceedingly complex organisms, of which we humans are not the least conspicuous, this has not always been the case. Fossil evidence laid down in sedimentary strata indicates a very gradual evolution of life forms from simple single-celled to present-day highly specialized multicellular species. Over this time period of perhaps 3 billion years, not only did organisms become more complex, but they diversified into hundreds of thousands of different species as the very earliest creatures began to move from the sea to the land and the air. Even within the various major habitats of ocean, land and air, organisms continued to evolve into new species as they took advantage of variations within each given environment, e.g., land dwelling organisms adapting to such varied habitats as rain forest, savanna, desert and polar ice.

The diversification of life continued as both plants and animals competed for the same turf. Some equatorial rain forest dwelling animals, for instance, opted to live on the forest floor while others acquired adaptations for living in the tree tops. As organisms continued to exploit every conceivable environmental niche, they likewise continued to specialize and diversify to the point where most require habitats which are highly defined (in terms of such parameters as aridity or humidity, sunlight or shade, particular types of vegetation or insect availability, precise limits to soil or water acidity or alkalinity, or narrow temperature ranges). As life continued to evolve, these specialized requirements intensified and the interdependency of organisms on one another became more and more profound. Even small alterations in habitat could be deadly for many organisms. Chain reactions leading to the diminution or extinction of numerous life forms can occur as a consequence of a small habitat change that directly effects only one species. This is so because the loss of one link in a complex food chain disrupts the entire chain. The large-scale demise of a tiny sea shrimp, for instance, due to a particular toxic pollutant can ultimately lead to the death of organisms that feed on the shrimp, and other organisms that feed on organisms that feed on the shrimp. The most specialized and complex of organisms, including higher animals such as man, are potentially the most seriously affected by these alterations in the biosphere. Being at the top of the food chain, any and every intrusion into the ecosystem will exert some effect. These effects may be benign and of little consequence, immediate and deadly (eating toxic shellfish) or chronic, cumulative, unseen and unfelt with unknown eventual consequences. A remarkable fact, however, must be taken into account with reference to the adaptability of *Homo sapiens*. Humans are highly specialized in a biological sense, like monkeys and apes, rendering genetic adaptation to environmental change difficult. Unlike monkeys and apes, however, humans, because of their intelligence and culture exhibit a remarkable degree of behavioral adaptation which more than compensates for an intrinsic biochemical resistance to physiological adaptation. As a consequence, humankind has extended its geographic habitation over the entire planet, despite the lack of the kinds of physical adaptations that other creatures have acquired to protect them from heat, cold, drought, aggression and other contingencies. Our intelligence and ability to manipulate conditions and events allows us to deal directly with situations that threaten us. No other species on earth possesses this capability. Paradoxically, this ability to manipulate the environment has created a situation in which more and more of our collective energy and capital must be diverted away from

unconstrained creative endeavor, and channeled into the mundane and regressive task of rectifying problems emanating from an ignorance of and disrespect for our planetary support system.

Life has existed and proliferated on Earth for hundreds of millions of years. Once a tenuous foothold was established, life, figuratively, exploded in every direction. During the course of this advancement, many species of plants and animals (including a few early-human species) disappeared, their only legacy being a few imprints in the sand, a few fossilized bones or a handful of scattered artifacts. Why these organisms became extinct is seldom known, with the exception of those which have died out in recent history primarily because of the influence of humankind.

What is known is that the continuity of life has several requirements, all of which are interrelated and none of which are inessential. Among these requirements are sunlight (energy), resources, environmental stability, and reproductive balance (ratio of births to deaths).

The first of these, sunlight, is necessary for providing warmth and the energy needed to drive photosynthesis and the hydrologic cycle (the conversion of liquid water into water vapor with its subsequent condensation into rain or snow). In the absence of sunlight, life as we know it would not exist at all because of a need for continuous energy input to sustain energy- demanding life processes. Plants utilize carbon dioxide, water and the energy from the sun to produce carbohydrates and free oxygen, which in turn are utilized by humans and other animals as an energy source while producing carbon dioxide as a by-product (to be returned to plants for further photosynthesis). A balance between oxygen and carbon dioxide in the atmosphere is thus maintained. Of course, the large-scale destruction of the world's rain forests through intentional burning has the potential of drastically altering this balance. Not only is oxygen consumed by the burning process, but the vegetation which is estimated to produce over 20 percent of Earth's free oxygen is being destroyed in the process. While oxygen is being depleted, carbon dioxide is being produced in excess, both by the burning of rain forest and by the massive utilization of fossil fuels as the world's major industrial energy source. Since vegetation, predominantly rain forest, provides the major mechanism for effectively absorbing excess carbon dioxide, it is disheartening that the world's once massive forests are in severe decline.

Life-sustaining resources, essential for the maintenance of life, include nearly the whole of planetary creation, ranging from water and atmospheric gases to minerals and life itself. As might be expected, the abundant, complex and diverse variety of life requires an abundant, complex and diverse array of substances in order to survive and proliferate. Although all organisms require basic nutritional resources to survive, humans have upped the resource ante in a nearly exponential fashion. The trappings of civilization, including culture, commerce and armed conflict have created a resource drain unparalleled in the history of evolution. The magnitude of this resource grab has yet to be appreciated by any of the world's current political leaders, who continue to view the planet as a rather large shopping mall. This aspect of resource requirements and utilization is a major theme of this book. Suffice it to say that non-renewable resources are fixed in abundance, and are currently being depleted with reckless abandon, while renewable resources are being consumed at an ever increasing rate, far in excess of their rates of replenishment. This relentless consumption, coupled with the toxification of the planet and destruction of the ecological balance, may well represent the roots of the new Armaggedon.

In addition to sunlight and resources, the continuity of life depends upon a stable, nurturing environment. Although massive geological and other environmental changes have occurred throughout the history of life on Earth (and are still occurring), relative environmental stability has been maintained because these changes, with some exceptions, have developed very slowly over

huge expanses of time. Glaciers have advanced and receded over much of Earth's surface throughout geologic time, but the rate of glacial movement was invisibly slow with regard to organismal lifespans. The massive Rift Valley that extends through a large section of the African continent is an example of continuing geologic change. This tearing apart of the African continent through shifting of the crust will eventually result in two continents, separated by a sea that never before existed. Were this change to occur over a week, or a year, or perhaps even a hundred years, its impact on life in the area would be massively disrupting. But with tectonic movement averaging only about one millimeter per year, this major facelift of Earth's surface will not emerge for some 10 million years.

Evidence suggests that a monumental transformation of the atmosphere occurred some 2-3 billion years ago, when certain primitive anaerobic (no air) organisms acquired a capacity to convert carbon dioxide in the atmosphere to carbohydrates while expelling free oxygen as a metabolic waste product (photosynthesis). Prior to this "event", theory holds that no free oxygen existed in the atmosphere and therefore organisms that must "breathe" in order to survive simply could not and did not exist. As oxygen gradually accumulated in the atmosphere a new path of evolution opened up, allowing for the emergence of the thousands of species of air-breathing animals that exist today.

To be sure, free oxygen posed a problem to the anaerobes. Oxygen is very reactive and as a consequence it was toxic to many of the early anaerobes. Most were either forced to retreat to oxygen-free zones, such as deep water, or evolve mechanisms to protect themselves from the deleterious chemical effects of oxygen. But because the transformation of the primitive atmosphere occurred ever so slowly, these organisms were able to adapt. Also, because primitive life forms are less specialized and often reproduce at phenomenal rates, they can adapt more quickly to environmental changes than specialized creatures, like humans.

Environmental transformations are not always slow. Historical evidence indicates a periodic occurrence of various cataclysmic events ranging from floods to volcanic eruptions to prolonged meteor showers. Although major catastrophic environmental changes due to this type of activity are immediately threatening to all life, the threat of extermination is considerably greater to more advanced life forms. Thus, the legendary dinosaurs who dominated much of the planet for some 130 million years, vanished from the fossil record in the wink of an eye, in geologic terms. The exact cause of this demise is much debated, but the concurrence of scientific thought centers around some type of rapid environmental change.

Major extinctions have occurred periodically throughout geologic time because of relatively slowly changing conditions, most notably during the Permian period, about 300 million years ago. Much of this havoc is believed to have resulted from climatic changes which induce periodic glaciation or desertification over large segments of the planet. Although all species of plants and animals were probably not directly impacted by these changes, the ultimate scope of extinction was often drastic, very likely because of the intricate interdependence that exists among organisms. Undoubtedly, future cataclysms will continue to affect species diversity on Earth, but it is prudent to suspect that the present, and avoidable, mass extinction that is occurring has the same potential for the domino effect as previous extinctions. Only sheer arrogance and ignorance can shield us from the reality that Nature harbors no favoritism. It places human beings on the same exalted plane as screw worms and bracket fungi. With the present species extinction rate, estimated by some to be around 100 per day worldwide (1) and due almost entirely to man's encroachment on once diverse habitat, how long will it be before the ecosystem is simplified to the point that it is rendered dysfunctional for *Homo sapiens*? Although golf greens are pleasing to the eye, they are, compared to ecosystems such as rain forests, biological wastelands. The substitution of zoos for natural

preserves, and wheatfields for the diversity of the plains and prairies (coupled with the burdensome human population) is a blueprint for the fall of civilization.

Although most organisms possess physiological mechanisms which allow for adaptation to normal fluctuations in environment, changes which exceed these limits (temperature extremes, changes in salinity or pH of water, pollutant accumulation, resource depletion, etc.) cannot be accommodated. In this regard, high altitude climbers, given sufficient time, can adjust physiologically to oxygen deficiency by a mechanism which induces red blood cell proliferation in oxygen poor environs. Under conditions of prolonged oxygen deprivation, however, many of these mountaineers have died because the ,limits of adaptability have been exceeded.

Finally, and of paramount importance, **no form of life can continue to flourish in the absence of reproductive balance**. The birth rate cannot exceed the death rate for any sustained period of time or else the population will expand beyond its resource base. It is axiomatic that life begets life, but the cycle of life would cease if death did not intervene. The substances making up the roots, stems, leaves, flesh, bones and blood of organisms were originally extracted from the crust of a lifeless planet. The materials presently locked in the physical form of plants and animals are a legacy of that early environment. As life has continued to evolve and proliferate, its sustenance has become increasingly predicated upon the resources which are the organic essence of living and dead creatures themselves. This organic substance is the fuel of life. If organisms never died, there could be no recycling of nutrients. Heterotrophy, the requirement by animals for organic nutrients (animals, unlike most plants, cannot synthesize their food supply from non-living matter) dictates that a substantial number of Earth's gentle creatures must feed upon other dead or living organisms.

Additionally, although not of direct nutritional importance, it is the dead remains of thousands of generations of plants and animals that has provided civilization with the precious oil and coal that it needs to prosper. Extensive tracts of lush vegetation buried under the crushing weight of massive crustal inversions resulted, after millions of years, in the rich hydrocarbon deposits that occur throughout the Middle East and many other areas of the world. This legacy of former life to present life will soon disappear forever. So perhaps will the human beings who use it so wantonly, as though a billion years of creation has no spiritual significance.

Not even the soil of the earth could survive the absence of death and decay. Without continual replenishing, the soil would become barren and lifeless. Evolutionary expansion would cease, and begin a retreat into oblivion. It is in this context that our fear of death and the sometimes bizarre ways we deal with the dead, reflect our lack of understanding of Nature. We celebrate life but mourn death, when both are essential for life. We cremate or artificially preserve human remains and incinerate our garbage (both are rich sources of nutrients) further isolating ourselves from full participation in the cycle of life. The authors personally would rather be buried at sea, planted in a forest or thrown to the wolves (after dying, of course) than to have our lifeless remains pumped full of formaldehyde and thereby rendered toxic and useless.

Finally, death is the counterpart to reproduction. In order to sustain a population within acceptable limits (defined by the resource base) the rate of reproduction cannot exceed the rate of mortality or else the population will exceed the ability of the ecosystem to maintain it. This relationship between reproduction and death is the definition of reproductive balance. This balance is particularly critical for the human race because of the excessive demands placed upon the environment and the resource base by the intrinsic, intrusive nature of civilization. To determine the upper limit to the human global population solely on the basis of the short-term provision of food, as most theologians, politicians and economists do, is to suffer the extreme prejudice of ecological

ignorance. The human population continues to increase because the fertility rate exceeds the mortality rate. **As a direct consequence of this fact, virtually all other native plant and animal populations on this planet are in decline**. For humans to exempt themselves from the effects of the population equation is both selfishness and folly, in the extreme.

As we have seen, the dynamism of life depends upon several exigencies which are themselves elements of the environment. The "living state" is most fully characterized as an intricate and directed molecular interaction. The surest way to alter life, per se, is through alteration of its physico-chemical components or conditions. Remove a simple chemical component like free oxygen, and life ceases irrevocably for each and every organism that has evolved to depend upon it. Introduce a foreign component, like Dioxin or arsenic, into life's chemical brew in sufficient concentration, and life is just as rudely insulted. Manipulate the environment (knowingly or in ignorance, with malice or good intent) and the reaction conditions of life are changed.

The indirect effects of environmental tampering are at once the most insidious and the least conspicuous. As humans harvest the last remaining stands of old growth forest, we celebrate the jobs created in the forest products industry and the housing provided for yet more families. We disregard the death of the spotted owl, the Roosevelt elk, the wolverine and all the other creatures, plants and animals alike, whose livelihood depends upon roadless forest habitat. We also disregard the fact that our own resource base has been further depleted, but why worry? Timber-related stocks are booming.

As we pump 200 million gallons of oil from the ground every day, we celebrate the automobile and the commercial success of the industry. We applaud the jobs that are created by industries that depend upon the ready and inexpensive availability of oil and coal. We exalt reductions in the inflation rate, for this means we have more money to spend on products and services that ultimately depend upon oil for their availability. We ignore the fact that oil is essentially a gift from Nature that took millions of years to craft, while we will have consumed every precious drop in only a few generations.

We accept the fact of atmospheric pollution ("We don't have stars in L.A.") that is almost entirely due to our frenetic use of fossil fuel to sustain the immediate extravagance of our "western lives." We continue to dump our residential and industrial wastes into the skies, rivers, lakes and oceans, or to bury them out of sight, out of mind. Huge crude-oil spills, which are an inevitable consequence of oil transport in an energy gluttonous world, increase in number and severity. The fate of thousands of birds and sea mammals is left to a handful of "volunteers" who are sufficiently moved to expend the effort to save a few dozen of these hapless creatures from oil-soaked deaths. The combined effect of this massive environmental manipulation is the rapid alteration of the chemical and biological conditions which resulted in life in the first place, and the very conditions required to sustain it.

The chemical and physical environment that defined the planet up until only a few centuries ago underwent gradual change that encompassed virtually eons of time. With rare exceptions, this nurturing environment was relatively stable. Since the advent of the Industrial Revolution, less than 200 years ago, human activity has drastically altered the ecosphere. Huge tracts of forest throughout Europe, Asia and the Americas have been virtually wiped out, to clear the land for agriculture and to provide raw material for the wood products industry. Remaining forests continue to disappear, solely to provide for one species of animal: Man. Although timber is a so-called renewable resource, reforestation efforts are paltry, even in the U.S. and Europe, and virtually nonexistent in Africa, South America and Asia. Major reasons for this are, of course, that reforestation is expensive and

time consuming (one must wait for trees to mature), while deforestation is inexpensive and immediate. Also, the 5 billion human inhabitants need wood products and agricultural land now. The inherent value of rain forest in underdeveloped countries is further denigrated by a slash and burn policy which essentially considers such forests to be a liability. The hundreds of species of animals occupying these forests aren't considered at all.

As the forests are burned to the ground, the waste products of their combustion belch into an atmosphere already saturated with the waste products of the automobiles and smokestack industries of the developed countries. Sunlight is reflected away from the earth by the particulate matter suspended in the atmosphere. Toxic gases of nitrogen oxide and sulfur dioxide, along with massive amounts of oxides of carbon, react with rain water to produce acids. The result is acid toxification of lakes and streams (producing fishkills) and further deforestation, caused by the deleterious effects of acidic water on soil and vegetation.

Perhaps one of the most intractable and persistent environmental degradation problems is that posed by the gradual accumulation of complex synthetic-organic compounds in the soil, in the water and volatile chemicals in the atmosphere. In our ever-urgent quest for mastery over Nature, humans have succeeded in synthesizing compounds Mother Nature never dreamed of. To be sure, the reverse is also true. But then, life evolved in a soup of "natural" ingredients and if these ingredients were not more or less conducive to life, life would not have flourished. Man's efforts to one-up nature have resulted in the creation of thousands of completely novel chemicals. Perhaps you've heard of a few, mostly by their abbreviations or brand names: DDT, PCB, Dieldrin, Roundup. Most of these man-made chemicals you have never heard of. The Handbook of Data on Organic Compounds lists the names and molecular formulae of 25,000 organic compounds (an abbreviated listing), few of which exist naturally and most of which are hazardous.(2) These compounds have official names like 1,2-epoxy-3,3,3-trichloropropane and 2,7-Napthalene disulfonic acid. Hundreds of new substances, whose properties are unknown, are synthesized every year, while thousands remain classified under the heading "properties not fully characterized", which means no one knows how many milligrams are required to kill a rat. Of course a dead rat is usually a dead human since the biological differences between the two are less than most of the latter are willing to admit. In fact, the physiological similarities among species are strikingly close, whether the comparison is dandelions and dogs or slime molds and people. This is why a pesticide, developed to kill cockroaches, will do a remarkably good job on birds and humans. The obvious differences between different species are only superficial: four legs as opposed to two or none. The real similarity is found in their chemistry. For example, plants catabolize carbohydrates the same way monkeys and men do, and for the same reason--to obtain energy. The fact that plants can also synthesize their own carbohydrates, while humans cannot, tends to diminish the common notion of human superiority. It is this very notion that lies at the root of our increasingly troublesome predicament.

So, in pursuit of the good life, to bolster agricultural productivity and feed the teeming masses, millions of pounds of synthetic fertilizers and herbicides are applied to the soil by enlightened high-tech farmers. Thousands of tons of petroleum-based pesticides are then applied to the crop to "control" the insects. The produce is finally harvested, treated with appropriate fungicides and preservatives and finally eaten by the teeming masses of humanity. Meanwhile, the toxic and usually non-degradable residues accumulate in the soil, wash to the lakes and sea via streams and rivers and ultimately enter the food chain. In a few short decades, the environment that once nurtured life now threatens it. And the multitudinous human population grows.

When someone splashes acid on a Van Gogh painting it is considered a truly uncivilized,

unthinkable act of vandalism. Such a swift and irrational action qualifies one as mentally disturbed. The creation of the planet upon which we live is the most incredible masterpiece conceivable. It has taken billions of years to create the atmosphere upon which we depend, the resources which we are using so rapidly, and the environment which we are making unlivable in such a short time. Two hundred years is not a dot on the graph of the lifespan of the planet, and yet for approximately 200 years we have been splashing acid on the masterpiece. In doing so we have shown that we have no values, no spirituality, no intelligence and no understanding. If we are willing to sacrifice not only the human race but all other species to our unthinking egotism, then there is no rationale which can support our being and we truly deserve our fate. There is no sense at all in mourning the possible destruction of our "civilization," our masterpieces, our technology, our history and our burning brilliance. It is all of little or no import. We might better have chronicled the history of ants.