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On Being Natural

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About the Author: Kevin Timoney is an ecologist by vocation and avocation. Recently he moved to Ft. Smith, NWT to assist Wood Buffalo National Park in ecological studies aimed at long-term monitoring and restoration of the threatened Peace-Athabasca Delta and of clearcut old growth spruce forests along the Peace River. His interests include gardening, music, nature, and living outdoors.

Humankind's role in precipitating mass extinction is discussed here from a biological and ethical perspective. Mass extinctions are as natural as evolution itself, and may be the stimuli that trigger mass speciation into vacant niches. The ebb and flow of life on Earth is tied to little understood cosmic and Earth-borne processes that precipitate violent ecological change. Yet all previous mass extinctions were precipitated by physical processes, never by a single species that prides itself on its conscience and religious and ethical behaviour. The threat to humans of the global extinction event is discussed. Whatever life is, maybe the only wise and natural goal for humanity is to love the Universe in all the wondrous shapes the millennia have handed down.

Where does humankind fit in the current wave of extinction sweeping the Earth? Is there a plan for the Universe, for the Earth, humans, wildflowers, lemurs, whooping cranes, weeds? Is the present global extinction event natural? Does it pose a threat to the human species? What can the evolutionary history of life on Earth tell us?

From the origin of the ecosphere till the present day, various life forms have arisen, reached their peak, and then have fallen from dominance or to extinction. Life recognizable as organisms arose in the Precambrian as single-celled cyanobacteria (blue green algae) and bacteria. By the end of the Precambrian, some 600 million years ago, "modern" cells with nuclei had arisen and been organized into multicellular plants. With a base in the food chain then established, the Cambrian explosion of life brought the appearance of all invertebrate phyla, and the dominance of the Earth's seas by trilobites. This once great group gave rise to no other life forms, and was extinct by the end of the Paleozoic. Their gradual decline spanned hundreds of millions of years during which they survived repeated mass extinctions. Their demise may have been aided by the rise of predaceous cephalopods during the Ordovician and later by the hordes of fishes that came to dominate the Earth's seas in the Devonian. Eventually, the last of the trilobites vanished in the great Permian extinction that extirpated some 90

The Silurian brought the rise of vascular plants and the invasion of land by arthropods. During the Devonian, fishes were the dominant animals on Earth, and plants and amphibians colonized the land. The Carboniferous brought the first forests (of ferns, lycopods, horsetails, and gymnosperms), the radiation of

amphibians, and the origin of reptiles. By the end of the Paleozoic, reptiles had displaced amphibians as the Earth's dominant vertebrates.

The Mesozoic, the Age of Reptiles, spanned some 160 million years. Much of that time, the Earth's plant cover was dominated by cycads and ferns, and reptiles ruled the land, air, and seas. Primitive mammals and birds had arisen, modern flowering plants began to diversify. The Mesozoic's dominant vertebrates, the dinosaurs, crashed to extinction en masse at the close of the Cretaceous. An increasing body of evidence, largely from soils containing high levels of iridium and microtektites, points to the impact of a trillion ton meteor as the impetus for a catastrophic climatic change.

The following wave to sweep the Earth's land, during the Cenozoic, is being led by the placental mammals and the flowering plants. By number of species, however, we now live in the Age of Beetles (one in five species on Earth is a beetle). Humans arose about 250,000 years ago and have since come to dominate the Earth, and indeed threaten the entire ecosphere.

Mass extinctions, prior to the appearance of humans at least, are as natural as evolution itself, and indeed may be the stimuli that trigger mass speciation into vacant niches. While no consensus on the cause of all mass extinctions has been reached, they appear to occur with striking periodicity every 26 million years. They have been correlated with meteor impacts, major and sudden drops in sea levels, intense vulcanism, and migration of the continents due to plate movements. Some extinctions may even be related to the release of cosmic rays from exploding stars and to influx of cosmic rays during a reversal of the Earth's magnetic field. It is fairly clear that the ebb and flow of life on Earth is tied to little understood cosmic and Earth-borne processes that precipitate violent ecological change.

Wave upon wave of life forms have lapped at the Earth's shores and risen and fallen in the seas and skies. The succession of one life form over another is a recurrent theme in the Earth's history. Evolutionary replacement requires no conscious thought. It is simply the result of natural selection. The ecosphere is alive and life changes the ecosphere. Symbioses knit together the fabric of life so that each action, each event, ripples through the fabric. Yet it is each individual (or in some cases, each genetically related group), that passes or does not pass on its genetic legacy.

The reproductive strategy followed by species, according to current theory, is to produce the most offspring, either sexually or asexually, that can survive to repeat the cycle and thus carry on the genetic story. No thought is given to how this will change the Earth or affect other creatures. Some creatures, such as the cod, use a strategy of having many offspring, each with a small chance of survival, while others such as African elephants, produce few offspring, each of which has a high chance of survival. While shortage of high-quality food, or disease, may feedback with an animal's or plant's hormonal system to limit

reproduction, this may be simply an adaptation to use resources efficiently, to minimize reproductive waste and thereby to maximize the total number of offspring over a life span. Each reproducing creature, whether asexual or sexual, cares for its offspring to the extent that "care" maximizes gene contribution over time. Nature unfolds forever without thought of what is fair. In the unfolding, nature produces stunning beauty, grandeur, and diversity beyond our understanding.

Enter humans, God's answer to the monkey wrench. Enter a species that modifies the ecosphere to produce food for itself, that combats disease, pestilence, drought, and sometimes even provides for humans less fortunate. Humans have spread across the entire planet, some would say like a metastasized cancer, destroying not only organisms, but the Earth's ability to create and support life. With time, they have evolved religions that place themselves apart from nature, above nature, favoured by the god of their making. In their view, only human life is sacred, and large families are "God's Plan." There are those of us, in the great minority, who believe that the Earth is sacred, who believe humans are one with nature, not above it, and who limit our reproduction. Here is where things get confused.

Are we who care for the ecosphere running counter to nature by trying to behave like no other creature? Perhaps. Are we unwittingly causing more destruction of nature by trying to defer the population crash of the offending species? Perhaps, from a cosmic viewpoint, humans function on a 250 thousand year population cycle, like a seven year snowshoe hare - lynx cycle, only unimaginably longer.

We who love nature feel the ecosphere has an inherent right to carry on its evolutionary destiny. We feel that the Earth should not be degraded, landscapes and life forms not destroyed; that we should love the planet, its trees, oceans, soil, and birds, frogs, everything. We place the ecosphere above ourselves. We know that we are as dependent upon the microbes in our guts as they are upon us; dependent on plants and animals that are dependent on living, breathing soils; dependent on grasslands, forests, freshwater, oceans, and they in turn dependent on sun, rain, snow, wind, the spinning of the Earth, the seasons.

But thinking this way sets us apart from nature, without precedent in the history of life on Earth. If the grand plan is brought to fruition by evolution, which seems to be the case for the last 4 billion years, then why not be "natural"? Why not procreate as the Pope and others want us to, without thought of what is to become of the ecosphere? Simply hand down our genes to the next generation in the greatest numbers, and let evolution sort things out? That privilege, however, carries with it a responsibility to be aware of what our own selfish genes are up to, for only then do we have a chance to upset their designs (Dawkins 1989).

Some would argue that maximum procreation threatens the survival of our offspring, of the human species itself. They maintain that those who produce

few offspring invest wisely in education and nurturing and thus maximize their children's chances for success. If success is measured by personal fulfillment, then this is true, but not in an evolutionary sense.

The average person in a developed country depends precariously on an infrastructure of food growers, manufacturing and trade, transportation, and high energy flow. Remove this artificial life support system and well-nurtured people die, and probably more rapidly than unschooled peasants hardened by lifelong adversity. Moreover, a family with eight children, two of whom die before reproducing, has nevertheless contributed three times the genetic endowment to the future than has a family with two children. Well-nurtured children are free to develop their human potential, but their genetic complements are in no way adaptively superior to those of deprived children. Nurturing society further protects less fortunate people from natural selection, thus enabling the survival and reproduction of individuals who would have died were it not for advanced medical care. While it is right to care for people, it is wrong to deprive from care the supraorganic entity that created and sustains people and all other forms of life.

If humans are natural, perhaps the current wave of extinction of life, of Earth-scale destruction, is natural. It has happened before. Punctuated equilibria bounded by periods of rapid change appear to be the rule in nature, not the exception. Yet all previous mass extinctions were precipitated by physical processes, never by a single species that prides itself on its conscience and religious and ethical behaviour. The last mass extinction, moreover, occurred in the Miocene some 13 million years ago, and the next mass extinction is not "due" for another 13 million years. The evidence indicates that the current mass extinction is unprecedented.

In spite of whether it is natural or not for humans to cause a mass extinction, is it any danger to the human species? No. Certainly, societies dependent on modern agro-industrial and technological infrastructure are in grave danger in a rapidly deteriorating ecosphere. The demise of 26 great civilizations that have fallen during human history has had one common trait, according to historian Arnold Toynbee: they could not change their direction, their way of thinking, to meet the changing challenges of life (Easwaran 1986). Mass death of perhaps 90

Yet it is unlikely that "primitive" hunter-gatherers such as Kung bushmen, Mbuti pygmies, and some Amazonian tribes would be adversely affected at all. The Mbuti pygmies personalize their forest home and refer to it as father and mother. They know that the forest sustains them, provides them with life itself. In times of trouble they sing songs to awaken the forest to the plight of its children (Nowak & Paradiso 1983). More likely, the sum effect of a human species crash on these people would be a profound sense of relief.

If there is a grand plan, then perhaps we're an experiment to see if conscious-

ness and love mean anything at all. Yet if the grand plan permits humans to consciously destroy humans, even their own babies, in mindless warfare and religious and ethnic strife, to rape the oceans of their whales and fish, and plunder the land of its elephants, rain forests, of everything vulnerable, then what is God up to? Is God love, indifference, or does the concept of God not apply? Maybe "God love" is symbiosis (Stan Rowe, pers. comm. 1993). It may be that the grand plan is nothing more than a series of extinctions in which ecological niches are emptied by impersonal catastrophes and later filled by opportunistic survivors (Lampton 1986).

Are we in the Earth-loving minority an aberration of evolution, a dead end? When I think of the trilobites, the dinosaurs, the wave upon wave of life that have swept the planet and in turn been swept away, I wonder. Since humans are intelligent conscious beings and compulsive communicators, it is inevitable that some people will understand what is happening to the Earth and will attempt to warn the others (Ben Gadd, pers. comm. 1992). To do so is human nature. Yet are we imposing uniquely human concerns upon nature, fretting for an Earth that can and will take care of itself? In the long term, yes.

From a species-selfish view, consciousness may not matter in the long run. The ecosphere will eventually limit our numbers regardless - only the timing and magnitude of the adjustment in our numbers will vary. In the meantime, I'll continue to care, to love the ecosphere, to live as if rattlesnakes, red cedars, and salt marshes mattered, because otherwise my life is meaningless. Whatever life is, maybe the only wise and natural goal for humanity is to love the Universe in all the wondrous shapes the millennia have handed down. It is time for us, like the Mbuti pygmies, to sing songs to awaken our mothers and fathers the forests, grasslands, and oceans for we, their children, are in trouble.

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