

J. THEOR. BIOL. (1982) 96, 49-65: “DEVOLUTION”

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Τῶι οὖν τοξῶι ὀνομα βίος,
ἐργὸν δὲ θάνατος.

Some species are prevented from causing the collapse of their niches' life-support systems by other species, while some species are able to self-limit in the absence of such help. We see a few “biologically insane” species like the crown-of-thorns starfish, the lemming and the human species which are neither other-limited nor effectively self-limiting and which seem almost like neoplasms as they spread across the landscape leaving behind a track of albedo. Natural selection for reproductive fitness eventually enables all successful self-limiting species to overcome their self-limiting **demostatic**² characteristics; the most competent do this immediately but the less competent either become extinct thru Darwinian **scarcity-extinction**, persist, or take a little longer to become extinct in an ecological spasm of excessive success. At a time when radiation into an unoccupied niche becomes possible, probably the only species still on the scene and capable of making such a radiation are the other-limited species and the marginally-competent self-limiting species, because the more competent self-limiting species and the entirely-incompetent species have exterminated themselves and are not present to make such a radiation. Thus the biosphere is as we see it, made up of many other-limited species, many self-limited species, and a few species which have recently slipped out of the network of reproductive limitation and are careering toward their own destruction. The life-cycle of a self-limiting species begins with radiation into a niche to which it is maladapted, in which it can survive only because of the low population density and consequent lack of intra-specific competition, continues thru a phase in which it becomes adapted to its niche, and terminates in a phase of overcoming self-limit after self-limit until (overcoming one last **demostatic** limit and going into yet another **lag-phase** of population- and **impact-expansion**) it is not restrained by another fortuitous self-limiting barrier but instead causes the ecological collapse of its niche. The history of our form of life on this planet, non-other-limited life, is a history of such extinctions thru excess of success, and thus our own eventual self-extermination seems inevitable. Were we not an intelligent species, capable of some minor comprehension of what we are doing as we do it, our extinction would come sometime within the next four human generations. With intelligent and deliberate **self-limitation** we may be able to last a little longer.

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2. Words in boldface are not here to be construed in their ordinary dictionary sense –even if they occur in a standard dictionary– but are to be understood as they have been explicitly cross-defined in the section entitled “Definitions.”

Definitions

- CAMBRIAN — Period during which early life-forms finally acquired the ability to predate and parasitize one another, thus greatly stabilizing the planet's surface thru the creation of the first ecosystems. The transition from **preCambrian** to Cambrian was marked by the evolution of **other-limitation** (*q.v.*), which enabled life to undergo an explosion of complexity, diversity and stability.
- CARRYING CAPACITY — The maximum level of exploitation which a niche can withstand without such wide oscillations in the life-support resources of the niche as to cause undernourishment of habitat populations. A level of cumulating **impact** (*q.v.*) not easily predicted in advance, but quite readily noticed with the benefit of hindsight.
- CENOZOIC — Period during which other-limited life forms first acquired the ability to self-limit their own **reproductive excess** within a species, without relying on any external assistance from coevolving species of the ecosystem, thus increasing the stability of the earth's ecosystems thru internalization of population control. This enabled the birds and mammals to undergo an explosion of radiations into niches left empty by saurians who had lost effective coevolving predators or parasites. The transition from **preCenozoic** to Cenozoic was marked by the evolution of **self-limitation** (*q.v.*) just as the transition from **preCambrian** to **Cambrian** was marked by the evolution of **other-limitation** (*q.v.*).
- CLOSET TELEOLOGY — Any of a number of current hopeful presumptions such as that self-limiting species have some way to inform themselves that they are approaching the **carrying capacity** (*q.v.*) of their niches, or such as that these informed species have evolved ways wisely to heed such information, or such that they are able to predict in advance just which parameter of a complex situation will be the first to be violated and will thus be the **most-limiting factor** (*q.v.*) to their lives. Closet teleology is sometimes coupled with a belief in **efficiency** (*q.v.*), such as the assumption that life “fills” the earth, efficiently utilizing as much of its **carrying capacity** as is possible without tempting fate. This form of insane optimism appears in many different disguises in the minds of those who equate human civilization with progress, because it helps them self-justify their mode of life.
- CUMULATING TOTAL DEFICIT — The extent to which the consumption of the life-support resources of a niche exceeds the regeneration of these resources, causing populations to draw down the reserves available for their consumption or to die in the absence of such reserves, at any moment in time.
- DEMOSTAT — Any factor which effectively impedes population or **impact** (*q.v.*) expansion, thru becoming more intense as expansion proceeds. Often termed “population-control mechanism” by those who believe falsely that any demostat can evolve or be maintained by evolution. (There are also inverse demostats which prevent populations from falling excessively, but this is irrelevant to the present topic.)
- DEVOLUTION — As the crown jewels *devolve* from the head of the dead monarch to the head of the new monarch, so the crown of life in a niche can be said to *devolve* from the extinct indigene to the living intrusive; when a niche temporarily closes thru exhaustion and the species occupying it becomes extinct, paying penalty and retribution to the ecosystem which gave it life for its injustice according to the assessment of time, and that niche later reopens to be **inosculated** (*q.v.*) from the living things of another niche, we may say that *devolution* has again taken place as it has taken place so many times in the bone-laden past.
- ECOSPASM — Wide oscillations in the life-support parameters of a niche or niches, with consequent partial or total destruction of living things adapted to live in them.
- EFFICIENCY — The presumption that if only we can go fast enough, it will no longer be necessary to steer.
- END-LOADED SPINDLE DIAGRAM — The typical spindle diagram predicted by the theory of **devolution** (*q.v.*) for self-limiting species is one marked by **lag-phases** (*q.v.*) of **impact** (*q.v.*) expansion and is widest just prior to **success-extinction** (*q.v.*).

- EUGENICS — The presumption that all a species need do to avoid extinction is keep its numbers from falling to zero either thru increasing the fitness of the individual or thru deselecting the less fit. Equivalent to the belief that all one needs to do to prevent auto accidents is keep a full tank and be able to accelerate out of any local difficulties, this idea inhabits the minds of biologists who suppose Darwinian **scarcity-extinction** (*q.v.*) to be the only possible mode of extinction.
- EXTREMISM — Willingness, due to ignorance, to allow actions which have unknown **impact** (*q.v.*) on the **carrying capacity** (*q.v.*) of one's niche. Confidence that new **impact** will never cause the future to differ from the past. Syn: optimism.
- FILIATISTIC SELECTION — Selection for that complex of phenotypic traits causally related to those genotypes which engender the greatest number of the highest-quality viable, reproductively-competent offspring. (This term originated by Garrett James Hardin.)
- GRANDPARENT TEST — A rough measure of the real, as opposed to the apparent, relative contribution of an individual organism in one generation to the population gene pool, combining a measurement of quantity with a measurement of quality: the number of surviving, reproductively-competent descendants at the time of death of that organism.
- HOPEFUL BIOLOGY — Biological theorization and observation channeled by a desire for the world to be the way it would need to be, if the human species were to survive and become happier and happier and more and more fulfilled. A form of intellectual blinders similar to the blinders we used to put on draft-horses, which effectively prevents many scientists from accepting the real situation of our species. Often accompanied by the implicit presumption that the more humans there are, and the more powerful our human technologies, and the higher the average standard of consumption of human individuals, the less the likelihood that the human species will suffer extinction. Equivalent to the belief that the way to avoid the rock of Scylla is to sail directly into the whirlpool of Charybdis.
- HUBRIS — The assumption that the violation of limits will not bring a day of reckoning. (ὕβρις — In this font package I cannot represent the Greek accents.)
- IMPACT — A pot-category for the consequences of three separate influences: (1) population size (2) gigantism (3) mistakes. This pot-category being useful in attempts after the fact to discover the causes of an **ecospasm** (*q.v.*). (Note that standards of consumption are part of the second category of impact, and that DDT is part of the third category of impact, and that the current "ZPG" Zero Population Growth movement is concerning itself only with the first category of impact, allowing reductions in the first category to be paid for by increase in the other two categories of impact.)
- INOSCULATION — The venturing of organisms of one niche into another, empty niche to which they are initially maladapted but in which they can survive due to low levels of intraspecific competition. The prime cause of the punctuation to be seen in the paleontological record.
- LAG-PHASE — The period of exponential population or **impact** (*q.v.*) expansion following the disintegration of a **demostat** and preceding the encounter with another **demostat** (*q.v.*), or preceding **success-extinction** (*e.g.* human civilization).
- LIFE-WINDOW — A way to conceptualize, with marks on a flat piece of paper, the mathematical construction of the complex, compound *n*-parameter selection landscape area within which a population can safely live. The area of the drawing termed the "life-window" is the area not touching any of the **impact-parameters** (*q.v.*) which would create instability and cause the life-window to wink shut, exterminating its occupants which require wet-and-warm continuity and reopening upon a landscape containing one more layer of bones.
- MAINTENANCE SELECTION — As opposed to **filiatistic selection** (*q.v.*), selection for those characteristics which bring success at meeting all other life-challenges than reproduction and the passing of the grandparent-test.
- MOST-LIMITING FACTOR — That positive factor of a situation which is first exhausted by a population in a niche, leading to oscillations and frequently to **ecospasm** (*q.v.*), or that negative factor which holds a self-limiting or other-limited population below the maximum carrying-capacity of its niche, such as territoriality or predation.

- **NEGATIVE LIMITING FACTOR** — Any parameter of a population or a niche which removes **impact**, the greater **impact** (*q.v.*) becomes. Termed “negative” in order to parallel the “negative feedback control circuit” of kybernetic theory. In a territorial species, the more individuals there are the more individuals go without territories and fail to reproduce. On a **spindle diagram** (*q.v.*) it is negative limiting factors which cause the straight lines called “asymptotes” and it is the disintegration of a negative limiting factor which gives rise to the bulge called “**lag-phase**” (*q.v.*) expansion.
- **OTHER-LIMITATION** — The process by which one species comes to be useful to another species, as leopards coevolve with gazelles and as cow-birds coevolve with starlings, by solving for that species the problem of how to dispose of its excess reproductive potential and avoid an **ecospasm** (*q.v.*) due to excessive **impact** (*q.v.*). Removal of many members of the limited population enables maximal nutrition of the remainder, and also keeps things interesting.
- **POSITIVE LIMITING FACTOR** — Any parameter of a population or niche which limits total **impact** (*q.v.*) by causing the general population to weaken, such as for instance a famine affecting all members equally. A dangerous way to regulate total impact, as it causes wide oscillations and tempts **ecospasm** (*q.v.*).
- **PRECAMBRIAN** — Long period prior to the development of **other-limitation** (*q.v.*) and the formation of the first ecosystems, in which population explosion, **positive limitation** (*q.v.*) and collapse followed on the heels of population explosion, positive limitation and collapse. During this extensive period, 449/500ths of the history of life on this planet, conditions were so unstable due to lack of population control that complex forms of organism had no chance to evolve.
- **PRECENOZOIC** — Long period between the **Cambrian** development of **other-limitation** (*q.v.*) and the **Cenozoic** origin of self-limiting bird and mammal species. During this period radiation into an empty niche could be effected only by groups of interdependent species, rather than by one species acting alone, because a species which did not take its coevolving other-limiting predators or parasites along with it as it moved into an emptied niche suffered a population explosion and caused an immediate **ecospasm** (*q.v.*) in which the niche again emptied itself.
- **PSEUDO-DARWINISM** — The worship of Spencerian success in the guise of biological theory (*e.g.* social “Darwinism,” nazism, humanist speciesism).
- **RATCHETING** — The phenomenon in which a population being limited by a **negative limiting factor** (*q.v.*) engenders some individuals capable of bypassing that negative limiting factor. These individuals cause the dissolution of that negative limiting factor by creating a population explosion and quickly taking over the entire population (principle of competitive exclusion), causing a **lag-phase** (*q.v.*) on the species’ spindle-diagram. The population expands exponentially until it begins to be again limited (hopefully) by a next-higher negative limiting factor, and this process is termed “ratcheting” because it is entirely, like a ratchet, a one-way phenomenon.
- **REMOVAL ERROR** — This common statistical error springs from a false assumption that a sample which has been created by some process of selection is typical of the total population not studied. Typically, it occurs when the process of selection is supposed to be random but is not random, containing a built-in unnoticed bias. In biology the removal error frequently occurs when it is assumed that living organisms can teach us everything we need to learn about life, thru disregard of the extinct species as “failures” at life who therefore could not conceivably have anything to offer to us successful types. Lest you should doubt that scholars could commit this error, I will quote Lawrence Basil Slobodkin and Anatol Rapoport (Slobodkin & Rapoport, 1974): “The concept of extinction is intimately connected with that of evolutionary success, since, while it may not be obvious at this stage of discussion what is meant by evolutionary success, we are quite certain that extinction represents evolutionary failure. If a population is extinct, it is of paleontological interest but not of interest from the stand-point of predicting how its descendants will evolve. Nevertheless, some function of the

likelihood of extinction would seem a proper measure of evolutionary health. We can speak of the probability of survival of a population (P_s) and of its complement, the probability of extinction ($1 - P_s$). Minimizing the probability of extinction is a valid procedure for maximizing evolutionary health.” (As I will show in this paper, attempts to maximize P_s and minimize $1 - P_s$, can lead only to extinction, for the perpetuation of a species requires not maximization but optimization of such things as “evolutionary health.”) Evolution is by its very essence a non-random removal process, a “natural selection,” and therefore biologists must be specially sensitive to the trap of this sort of sampling error. To study the whole of our subject, we must study not only those species which present themselves to our ready observation, but also those species which hide in holes during the day, and those species which remove themselves from our observation by being extinct.

- **REPRODUCTIVE EXCESS** — Any surplus of births over deaths. Having an excess of births over deaths, or the capacity to produce this, is the only safe strategy, for it prevents a species from suffering Darwinian **scarcity-extinction**. Disposing of this reproductive excess capability is the only safe strategy, for it prevents that species from suffering **success-extinction** (*q.v.*).
- **SCARCITY-EXTINCTION** — The sort of extinction-mode visualized by Charles Robert Darwin in an effort to overcome the mental resistance of his contemporaries to the reality of species extinction, a mode characterized by a prior period of scarcity of the individuals in question. Extinction thru incompetence and failure, as contrasted with extinction thru overweening success and **ecospsasm** (*q.v.*). Extinction in which numbers go down and down to zero, and in which the spindle-diagram tapers off to a coprolitic point.
- **SELF-LIMITATION** — The fortuitous event in which a species temporarily interferes with its own reproductive success, by impeding itself with some negative **demostatic** (*q.v.*) control destructive of any excess individuals whenever and wherever such excess individuals are spawned, when this demostat does not **impact** (*q.v.*) the nutritional well-foundedness and reproductive vigor of a “cadre” of the species capable of perpetuating the species, and when this self-limitation is effective without assistance from other coevolving species such as predators or parasites or epizootics. It is my contention that the characteristic of birds and mammals which has enabled them to dominate the **Cenozoic** and the most recent moments of evolution has been a density-dependent spacing mechanism of self-limitation of **impact** dependent upon the destructive stress of repeated encounters with strange conspecifics.
- **STRESS SYNDROME** — A general hypothalamic/pituitary reaction to the presence or signs of conspecific males, possessed in various forms by all bird and mammal species not on the verge of current extinction, which dumps excitation-chemicals into the body and requires immediate large-muscle exertions of fight, display, or flight. This reaction is, under conditions of relatively-low density, beneficial to the individual organism and beneficial to the individual species, by causing a state of fitness for intense interaction with competitors or predators, but under conditions of relatively-high density, it is beneficial to the individual species and destructive of the individual organism’s health and reproductive competence. It thus functions (when it functions at all) as a density-dependent population-limiting **demostat** (*q.v.*).
- **SUCCESS-EXTINCTION** — As opposed to Darwinian **scarcity-extinction** (*q.v.*), in which due to general incompetence or climatic change the numbers of a species go down and down to zero, success-extinction is the phenomenon which occurs when the **impact** (*q.v.*) of a species on its niche goes up and up, until suddenly it also achieves zero. Extinction due to **eugenics** (*q.v.*), due to overweening pride, due to an excess of success, in which a species simply becomes too good to live in a limited world.
- **WINNING** — As opposed to losing (**scarcity-extinction**, *q.v.*), winning is the other way to leave a game (**success-extinction**). In the application of modern mathematical game theory to biology, it has been common to assume that life is analogous to a game we are trying to win; this is however a dangerous counterfactual assumption for living is a game we should be trying, not to win or lose, but simply to continue to play. Even those who recognize this as a truism (Slobodkin & Rapoport, 1974) might still sail us into the whirlpool of Charybdis by making the incorrect factual assumption that there is only one hazard, the rock of Scylla, and that the farther away we can get from that rock the safer we will become.

Discussion

On the general topic of extinctions and evolutionary progress, Charles Robert Darwin wrote to Alpheus Hyatt in 1872: “No doubt many new laws remain to be discovered. Permit me to add that I have never been so foolish as to imagine that I have succeeded in doing more than to lay down some of the broad outlines of the origin of species. After long reflection I cannot avoid the conviction that no innate tendency to progressive development exists, as is now held by so many able naturalists, and perhaps by yourself” (Darwin, 1903). In this paper we will explore the dark other side of the evolutionary coin, which I here term “**devolution** thru reproductive success.”³ This dark-side of descent has been at least partly glimpsed, previously, by Ernst Walter Mayr and by Karl Raimund Popper, and perhaps by many others who seem to have been emotionally unprepared to follow up on such a dark vision.

It has also been glimpsed by the great inhumanist poet John Robinson Jeffers, who prepared himself for the beautiful power of a god who, secretly smiling, “piles up cities for the poem of their fall/and gathers multitude like game to be hunted when the season comes.” (You should read his poem “Passenger Pigeons.”)

It is common to regard the history of the evolution of life as a triumph of the fit over the unfit, or of the strong over the weak, but in this paper you will see evolution regarded as the perpetuation of the marginal and the ruthless elimination of the unconstrained. The niche of a species will be presented as analogous to a host, and the species itself, whatever its role in the ecosystem, will be presented as analogous to a parasite on that host. On the basis of this analogy, and as the result of other reasoning, it will be maintained that just as a parasite species can become unwisely effective, exhaust its host, and thus exterminate itself, so also any species whose reproduction is not constrained in some effective manner and whose total cumulating **impact** (*q.v.*) on its niche is not restrained in some effective manner efficiently exhausts its niche and thus extincts itself. This will be seen to have direct application to the predicament of our own species at the present time, and to our homocentric pride in being such an overwhelming success at life: we may well be too good for this world. If our species is indeed the glory of creation, then we’d best watch our act, for in biology as elsewhere $\upsilon\beta\eta\tau\zeta$ goeth before a fall.

With the warning that if you accept my distinctions you will accept my conclusions, let us proceed. The first distinction to be made is between those species which multiply, gigantize, or otherwise increase their ecological impact until their reproductive “cadre” is no longer capable of producing new generations of well-founded, reproductively-competent individuals, and those species which are prevented from doing this by some negative limitation which effectively removes this **reproductive excess** without damage to “cadre” individuals. The former species become extinct and some of the latter species survive.

The second distinction to be made is between those species which survive because they are involved in some evolving coevolutionary relationship with another species which benefits them by furnishing a density-dependent negative **demostatic** (*q.v.*) control, and which they benefit in turn by providing nourishment or a place to hang out, and those species which survive because they possess some fortuitous internal limitation not involving any other coevolving species. The former we will term “other-limited” species and the latter we will term “self-limiting” species. (It is not intended that these be exclusive categories.)

3. Again, the terminology appearing in boldface is intended as explicitly cross-defined in the section titled “Definitions.” A special problem of understanding is created when, as here, many concepts are being tweaked and twisted simultaneously.

Every characteristic of life must have originated at some particular place at some particular period in time. It will be mentioned here, but not substantiated, that the development of the first other-limited symbiotic associations in the first real ecosystems was a grand event of enormous repercussions, suitable as a cause for the immense explosion of the complexity, stability, and diversity of life in the **Cambrian** period (Stanley, 1973). And that the fortuitous origination of the negative self-limiting-feedback system entirely within one species was also a grand event of enormous repercussions, suitable as a cause for the explosion of the bird and mammal species in the **Cenozoic** era (*q.v.*). It is my insistence that the first occurrence of such limitation, **other-limitation** and then **self-limitation** (*q.v.*), must have been of vastly greater significance than the development of sexual reproduction, or of air-breathing lungs, or of any of the other mere mechanisms of self-maintenance which we use to mark the chapters of the conventional story of evolutionary progress.

The theory of descent with modification allows the members of a symbiotic association of other-limiting species to coevolve — excess removes excess. As the prey species becomes more efficient in avoiding predation, the normal course of events is for the predator species to become more efficient at accomplishing its predations, and vice versa. Coevolution. Other-limiting mechanisms tend to arise in the course of evolution and, once originated, they tend to be maintained by **maintenance-selection** (*q.v.*). Under such circumstances fitness is harmless, for it is promptly removed by fitness and the limits of a limited planet are not tempted.

The theory of descent with modification makes the origination of self-limiting factors an exceedingly improbable event. Under almost any conceivable circumstance other than the founder effect, the law of competitive exclusion requires that a more-fecund population will quickly replace a less-fecund population, defining fecundity in terms of the **grandparent test** (*q.v.*). **Self-limitation** (*q.v.*) will persist in a world governed by the theory of descent with modification only so long as it is unchallenged by any subpopulation which has acquired the ability to infiltrate such a self-limit barrier. Rather than self-limitations being maintained thru **maintenance-selection** (*q.v.*), as **other-limitation** (*q.v.*) is maintained thru such selection, self-limiting factors are promptly destroyed thru **filialistic selection** (*q.v.*) once some individuals of the population have acquired the ability to beat the system.

Leaving non-vertebrates out of consideration due to my ignorance, it may be that **self-limitation** has arisen only once, perhaps thru some chance “Adam and Eve” situation in the early **Cenozoic** in which all bird species and all mammal species were presaged in one species made up of two individuals each of which happened to possess the same genetically-determined mechanism of **demostatic** (*q.v.*) self-control. Or it may be that this has happened twice, once for birds and once for mammals. It is exceedingly improbable that the correlatable demostats of the various present species of birds and mammals were each created in a separate event of fortuitous evolution.

It is contrary to all Darwinian theory to hypothesize, as so many do these days, that **demostatic** mechanisms of **self-limitation** originate in order to preserve species which would otherwise destroy themselves thru population excess or thru some other form of excess **impact**, and it is contrary to the theory of descent with modification as we know it to hypothesize that, once originated, such demostatic mechanisms of self-limitation are capable of maintaining themselves thru individual selection. However, this **closet teleology** (*q.v.*) fills the minds of hopeful biologists, who seek in the life sciences to discover some tricky way to equate human civilization with their fantasy of evolutionary progress. (Some do this not by toying with theory but thru the invention of counterfactual assumptions, such as the assumption that there is reproductive isolation among groups at lower than the species level, total isolation, isolation sufficient to prevent the spread of a deleterious gene even as it forces its local population into an **ecospsasm** of **success-extinction**.) Such biologists are capable of disregarding these direct and clear and immediate derivations from standard evolutionary theory just as they are capable of staring at the strata of bones of extinct species without actually seeing anything at all. They are ideologs, and their ideology is not the theory of descent with modification but some semi-formulated, semiconscious doctrine of strength and superiority and triumph, a wet dream which in their minds totally preempts the theory of descent with modification.

The theory of Charles Robert Darwin is a theory of limits. It was a generalization of the thesis of Thomas Robert Malthus and holds that only those species which take a proper tack in regard to the limited nature of the resources of this earth will survive. This concept of limitation is implicit in the Darwinian notion of competition because Darwinian competition is an interaction between similar organisms on the basis of similarity of need under circumstances in which one organism's gain must be the other organism's loss and vice versa. The propositions expressed in this paper are intended to be not only compatible with this theoretical framework of population biology on a finite spherical surface, but immediate consequences within that theoretical framework. They are not perceived by the author as esoteric or difficult. They are such immediate derivations that the question in the history and philosophy of the life sciences, of how they could have remained underived for over a century, becomes a very alarming question. How expert are we, at concealing things from ourselves? What is the real function of the academic establishment?

Just as trees in the forest seldom fall, but every tree falls eventually, so every self-limiting species eventually evolves to the point, thru **filiatistic selection** (*q.v.*), that it is able to overcome its self-limiting characteristic. Whether that mechanism is territoriality as we observe in various species of birds, or whether that mechanism is annual mass-migration of overstressed individuals as we observe in some species of small mammals, filiatistic selection eventually overwhelms the barrier and the species goes into a final **lag-phase** (*q.v.*) of population expansion, or gigantism, or some other form of ecological **extremism** (*q.v.*), until fortuitously it becomes extinct, or until fortuitously it discovers itself being self-limited by some other self-limiting characteristic standing between itself and **ecospasm** (*q.v.*), or until fortuitously it discovers itself being other-limited by some friendly-partner-in-life such as *Plasmodium falciparum*. (It is part of the central insanity of civilization, the pride of success, that we are presently attempting to destroy such friends so we can stand alone in the universe.)

Only those self-limiting species which can radiate, placing daughter species in empty adjacent niches before they solve their problem of **self-limitation** (*q.v.*) and destroy themselves, continue for any geological length of time. It is only a matter of **eugenics** (*q.v.*), how long it takes for a successful self-limiting species to get so good as to discover a way to solve the only problem it has not yet solved in its existence, the problem of how to become extinct. (A living species does not have to learn how to live, for that is a problem it has already solved; it has to learn how to die, for that is the one accomplishment it has not yet mastered.)

Self-limitation can be, in terms of geological time, only a "short-term" strategy, for use during brief periods in between episodes of safe **other-limitation** (*q.v.*). When sustained within a protective framework of other-limitation, when assisted by the presence of parasites and epizootics and perhaps a few predators, a species with a self-limiting **demostatic** (*q.v.*) mechanism may be able to sustain this mechanism in effective condition, and not discover a way to beat it, evolve past it, for relatively a longer period of time, but if such a species is left without coevolving friends its future is inevitably shortened.

For an omnivorous, omnipresent species, there are no further niches which could be filled with differentiating daughter species. Therefore an omnivorous, omnipresent species does not radiate before it becomes extinct, and there is in such a case no distinction to be made between nominal or taxonomic extinction, and actual or phyletic extinction. The human species is an omnivorous, omnipresent species, fated to be a dead end. The question is not whether we are going to behave in such a way as to have a grand future, but whether we have the heart to do the things necessary to enable our grandchildren and great-grandchildren to live out their lives. We stand at the culmination of 4500 years of civilized progress and expansion, and there is real question whether the earth can endure even as many as four more struggling, impacted, marginal human generations before its inevitable collapse. The question is a question of how long we will want to, and be able to, postpone this **ecospasm** (*q.v.*). Could we stretch a hundred years into perhaps a thousand, thru the application of great wisdom and unprecedented self-restraint?

As a small joke on all the closet teleologists who mistake hopefulness for rationality, we might say that if they are correct, if our evolution has been teleologically directed toward some final purpose, then the life sciences have discovered that the final purpose of life is to extinguish itself. Or we might put this more succinctly by saying that there is no hope, because the end of life is death. Or we might offer this humor in a non-verbal manner, by showing these closet teleologists the little black box that is available in novelty stores, the little black box with the switch that, when you flip it, a little plastic hand comes out of a door in the box and turns the switch back off and then disappears back into the box.

Instead of facing this, we have hidden behind our status as the intelligent species, something unique, the cream of creation. Which means that our intelligence is a device for lying to ourselves as we allow our game to escalate toward the final solution for all our life-problems. We have conned ourselves into believing that, because of this intelligence, laws of life which obtain for all other species do not necessarily obtain for us. This is yet to be demonstrated, of course, but it is said to be “pessimism” not to believe it.

The conviction that the extinct species have been “unfit for life” has caused many biologists to commit a sampling or statistical error known as the “**removal error**” (*q.v.*). Knowing that evolution is a non-random removal process by its very nature, and knowing that non-random sampling biases a sample, making it unrepresentative of the total field of study, these biologists have yet persisted in studying presently-surviving species as if they were entirely representative of the subject-matter of biology. This has been exacerbated by our habit of referring to our study as “the life sciences.” The implicit question seems to be “What could a failure of a species possibly have to tell us about what it takes to be a success of a species?” This is implicit in such notions as “evolutionary health,” previously cited, and the corrective for that sort of eugenic bias must be to offer that to be a success, and to be snuffed, is also part of nature’s plan.

It has been said that every biological theorist tries to prove his or her case by use of the Irish elk. In the light of this theory of **devolution** (*q.v.*), or in the dark of this theory of devolution, a careful analysis needs to be made of the facts bearing on such extinctions of apparently-successful megafauna, to find out whether we need to postulate some hidden flaw or whether we can merely accept that they perished thru an excess of grandeur. Likewise the other giants of the Wurm/Wisconsinian glaciation, in order to determine which of these species became extinct thru the loss of a self-limiting **demostat** (*q.v.*). In particular, within this present interglacial, the case of the American passenger pigeon should be re-opened, to raise the possibility that the vast swarms of these passerines we saw as we intruded into our “New (meaning as yet undestroyed) World” were at the last phase of their species’ path and would have done themselves into extinction whether or not we had limed them and peppered them with shot and fed their obscenely-plentiful carcasses to our hogs.

We should re-examine our theories about species now exhibiting lack of population control, such as the fabled lemming, in the light of the conception of **success-extinction** (*q.v.*). Perhaps the lemming is simply a species which is evolving to bypass an annual **stress syndrome** (*q.v.*), by introducing a greater and greater lag-factor into the mechanism until at this point it only works every third or fourth year, as part of a trend toward exhausting its tundra environment in one last big lemospasm. As part of this effort we should attempt to discover what **demostatic** (*q.v.*) limit it was that our own species began to infiltrate in the disintegration of tribal society and the advent of civilization a few hundred generations ago, what violation it was which has caused our present phenomenon of citification and ideological self-justification.

Many of the misconceptions of **hopeful biology** (*q.v.*) cluster around the Spencerian tautology “survival of the fittest (to survive),” a tautology which taught us that the appropriate categories to use in the study of natural selection were fitness to survive *vs.* unfitness to survive. Since this tautology is of course logically equivalent to the inverse tautology “extinction of the fittest to become extinct” (just as the statement “this glass is half-full” and the statement “this glass is half-empty” both describe accurately the identical real-life state of affairs), perhaps it would do some good for our confused heads if we were to exercise them for a while by thinking in terms of that alternate set of categories, fitness to become extinct *vs.* unfitness to become extinct. I have personally found this mental exercise to be most helpful (Meredith, 1981), altho perhaps it doesn’t show.

When a species, in overcoming its **currently-most-limiting factor** (*q.v.*) thru its **efficiency** (*q.v.*) in passing the **grandparent test** of **filiatistic selection** (*q.v.*), discovers that it is no longer constrained by any **negative limiting factor** (*q.v.*) and that instead its **lag-phase** (*q.v.*) of expansion brings it into contact only with **positive limits** (*q.v.*), it is in an exceedingly precarious phase of its existence. At any point this **hubris** (*q.v.*) may create the sort of **cumulating total deficit** (*q.v.*) that will cause it to **win** (see formal redefinition of this concept under “WINNING”) its game of life, and its **life-window** (*q.v.*) will wink shut on it. A self-limiting species which is thus in the end phase of its **end-loaded spindle diagram** (*q.v.*) deserves a special name, and I have chosen that name on the basis of the proto-Indo-European root from which we derive in English such terms as “noxious” and “obnoxious.” A self-limiting species which has overcome all **self-limitation** (*q.v.*) will be known as a *noxius* species, and this will be regarded as its last Waagenons or successional sub-species and used as the last term of the trinomen. Thus, for example, civilized humanity will be regarded as a successional subspecies which sprang from the *Homo sapiens sapiens* tribalists of a few hundred generations ago, after millions of years of stability, and will be known as *H. sapiens noxius*.

There are a number of factual generalizations in biology and paleontology which have been made precisely because the facts have been inexplicable in terms of the presumption that evolution means increase in fitness as a function of time. Each of these “rules” describes a situation in which fitness seems paradoxically to decrease with time: Depéret’s rule that many lines of animals increase in size continually, presumably becoming more and more formidable, until extinction; Louis Dollo’s law of the irreversibility of evolutionary processes; Cope’s notice of the survival of the unspecialized; Ernst Heinrich Hæckel’s and Schindewolf’s observations with regard to senescence. All these observations have been specially formulated because in the light of synthetic neoDarwinism they are paradoxically contrary to orthodox expectation. **PseudoDarwinists** (*q.v.*) may marvel to their hearts’ content over the perpetuation of the marginal, but in **devolutionary** (*q.v.*) theory this is not paradoxical at all, it is precisely what is predicted.

Much attention has been paid to species which seem to have evolved troublesome characteristics, such as the extravagant plumage of the male bird of paradise. This can be accounted for as a case of **removal error** (*q.v.*) in our thinking. Extravagant plumage, leading to heavy predation, might be just the ticket, might be precisely the item which would slow a species down enough to make it become extinct less rapidly than another similar species without extravagant plumage. And, upon the reopening of some emptied niche, it would be more probable that this niche would be **inosculated** (to use Charles Robert Darwin’s term for radiation) by a species with such extravagant plumage, simply because the other species without extravagant plumage would already have extincted itself due to filiatistic excess. There is excess, and then there is excess. A species that specializes in plumage excess is obviously into a much safer version of $\nu\beta\rho\tau\zeta$ than is a species that specializes in **reproductive excess**, or a species that specializes in gigantism, or a species that specializes in messing its own nest.

Discovery of the breakthru which enabled the human species to abandon its sane and healthy tribalistic **self-limitation** (*q.v.*) and venture off into population-explosion and civilization is not automatically going to tell us what we need to do to delay our **success-extinction** (*q.v.*). This phenomenon of the overthrow of self-limiting characteristics is a **ratcheting** (*q.v.*) phenomenon: like a ratchet it is one-way only. Once the governor has fallen off the engine, the engine races out of all control. Perhaps, however, in exploring this question of our history, we will be able to “psych” ourselves into the appropriate attitude toward limits, an attitude in which limits are not to be overcome but to be respected.

Conclusion

For an intro to this topic of devo, I quoted Charles Robert Darwin's letter to Professor Alpheus Hyatt of the Massachusetts Institute of Technology, forswearing any metaphysical bias that life-phenomena must exhibit an "innate tendency to progressive development" (Darwin, 1903). By way of conclusion, I should like to suggest that perhaps Darwin was speaking to all of us. Perhaps we have, all of us, for over a century, been victimized by presumptions which cluster about our self-appointed task as apologists for the excesses of civilization. We have all assumed that **eugenics** is something our species needs, if only we can figure out how to accomplish it, but it may be eugenics that is destroying us and, thru us, this ecosphere we call Gaia. It may be that we have been choosing to avoid the rock of Scylla by sailing straight into the whirlpool of Charybdis: "Wow, are we ever going to miss that rock by a wide margin!" It may be, if this theoretical frame is an unassailable one, that if we are to survive for any great number of generations beyond this point we must do something unprecedented in the history of life, something unnatural. What?

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