THE PROBLEM OF EXTINCTION AND NATURAL SELECTION

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Abstract

The problem of animal extinction was reviewed, finding that the literature shows that little evidence exists to conclude that extinction occurs because of Darwinian evolution, i.e., the least fit are more apt to become extinct than the better fit. Researchers have been able to find few consistent differences in biological fitness of animals which become extinct and those that have not. Today, a clear tendency exists for the so-called higher organisms to become extinct, as shown by an evaluation of endangered species lists and a study of animals which have become extinct in recent history. Most types of animals that have become extinct in the past are generally not less fit than surviving types, are very similar to many extant types, and any differences are often irrelevant to survival. The reasons for extinction are either chance or unknown, not a pruning of the inferior species as biological evolution predicts.

Introduction

During the last decade, most westerners have read or heard about the problem of animal extinction. Of those animals which are threatened with extinction *almost all are on the higher end of the so-called evolutionary tree* (Colinvaux, 1978). The animals that our conservation programs are aimed at helping are likewise at the *highest end* of the so-called evolutionary hierarchy, primarily mammals, including several groups of primates (Kohm, 1991). Little concern is expressed over bacteria, houseflies, viruses, fruit flies, or any of the myriads of micro-organisms and other "lower" forms of life becoming extinct. Actually, it is taxing our resources just to keep the population of many of the animals at the bottom of the tree under control.

The many organizations that support programs designed to help prevent various animals from becoming extinct focus on whales, dolphins, and many members of the cat family as well as numerous types of primates, supposedly our closest relative. One group, after claiming that many types of whales are "dangerously close to becoming extinct," noted that the brain of the sperm whale is perhaps, "the most complex brain ever evolved on earth." To illustrate how these complicated "highly evolved" brains are used for intelligent, complex communication, the brochure claims that whales can communicate with each other by sending a series of high pitched noises which sound like singing, and can be heard as far as 200 miles away in open waters.

A major reason why many animals now become extinct is partly because of the technologically advanced complex hunting techniques of humans, and because of human caused *environmental changes,* the very factors that are supposedly responsible for their existence. Yet, most all "lower level" water and land animals are surviving quite well in spite of our enormous efforts in the opposite direction. For many other animals, such as the panda, we are rightfully concerned that they cannot survive without us and the help of our best DVM's and biology Ph.D's.

The ratio for the various groups of phyla and classes confirms an inverse relationship between supposed evolutionary developmental level and survival, the opposite of what is expected if survival of the fittest somehow propels animals to a "higher" level of "fitness." The 1991 US Department of Interior Endangered Species List contains only 21 insect species out of almost 1,000,000 identified (0.000021%) compared to a whopping 337 mammals. A total 699 mammals, birds and fish are on the list, or almost 0.2 percent of all known varieties (36,000). They are thus over *9,000 times more likely* to be threatened with extinction than insects. An order which is far less likely to be bothered by chordate predators than most is birds, and they would therefore appear to be highly resistant to extinction, yet 240 are on the list. One-hundred and two fish, 107 reptiles, 19 amphibians, 11 snails, 10 crustaceans and, ironically, 41 mussels plus 3 arachnids are listed. Many of the animals that have already become extinct are mammals, including the Badlands Bighorn (which became extinct in 1910) the sea mink (1890) and the Eastern Elk (1880). Well known birds which have become extinct include the Heath Hen (1932), Carolina parakeet (c. 1920), the Passenger Pigeon (1914), the Solitaire (c. 1760), and the Dodo bird *(Didus Ineptus)* (c. 1681)—see Masckenzie (1977).

The endangered species list is a useful, but not infallible, method to determine extinction threats for several reasons. Including an animal on the list is an involved process requiring public hearings, petitions, and much detailed research (Kohm, 1991). Once an animal or plant is added, it is eligible for costly federal aid, protection programs, and research funds. The government for this reason endeavors to insure that an animal included clearly belongs. Up to 1973, only vertebrates were eligible, and possibly for this reason more vertebrates are on the list. A negative correlation would *still* exist, though, even if four or five times the number of insects, for example, were found to meet the criteria. Future research and investigation may add more non-vertebrates, but if past trends continue, many more vertebrates will also likely be added. In addition, although most all vertebrates have been classified by scientists, some estimate that more than twice the number of insect species as currently identified may actually exist. The reason few lower animals are on the list is because many insects and other small "simple" organisms are extremely resistant to extermination, as the millennial long human efforts to control the insect population have proved (Norton, 1986).

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Extinction and Evolutionary Fitness

The fact of extinction is well-known; the why is not. As noted by Douglas (1978, p. 233) ". . . surprisingly little is known about just what causes a particular species go extinct. Aside from the cases of extinction for which mankind was directly responsible, it has proved extremely difficult to determine the specific biological cause for most of the rest" of extinction cases (Gould, 1989a; Kaufman and Mallory, 1987). The best-known set of massive extinctions—the whole dinosaur world which consisted of dozens of reptile types, both land and water, large and small—has generated many conflicting hypotheses. None has been proved so far, and most border on science fiction. Another mass extinction, which some estimate to have occurred at the end of the Cambrian, caused fully two-thirds of the trilobite families to disappear. But, the most massive extinction is generally claimed to have occurred at the close of the Permian when an estimated *one-half* of the then known animal species disappeared from the Earth forever. The dinosaur extinctions are believed to have occurred at the close of the Cretaceous age.

Biologists have found that the larger an animal's physical body, the more likely it will become extinct. Many of the species now endangered are quite large, and the same was true in the past; the dinosaurs are a superb example. This view, though, is the opposite of what evolution predicts: size itself is explained as a result of selection success, and this trait often enjoys the best support of any natural selection pillar, holding up more than its share of the theory's weight. Why largeness should cause extinction is not clear: it often seems to confer on the animal a major survival advantage in its conflicts with other animals (Colinvaux, 1978).

Animal extinctions generally are not a result, or even related to, most of the classical survival of the fittest factors, such as inferior physical structures that result in their having less ability to compete for food, water and space. The hypotheses suggested to account for extinctions, especially the mass variety, are events such as germ-carrying comets destroying life in certain areas, supernovas showering the earth with bursts of high energy radiation (and since water is an effective shield against many types of radiation, it is theorized that land organisms were more affected than marine types) rapid climatic changes (and except those caused by glaciers, many are difficult to document), mountain building, sea level fluctuations, extensive flooding or a hypothetical biological instinct that causes behavior calculated to lead to extinction.

Curry-Lindahl (1972) concluded from his study that the variety of extant animals has not been increasing, but *declining* with time. Since the 1600's, an estimated over 500 species and subspecies of native once extant biota have become extinct in America, and the government is continually adding new animals to their endangered species list. Usually only after expensive and heroic national efforts are any removed from the list (Reffalt, 1991). In prehistoric times, the rate of extinction is estimated to have been one species per 10,000 years, by 1600 the rate was one per thousand years, and today it is over one per month. Evolution predicts an *increase* of *diversity* with time—but instead of more types of animals (specifically more higher taxa, phyla, class and orders), what has in fact been occurring is the exact opposite. Sullivan, et al. (1980, p. 168) note that although evolutionists teach that extinction is the eventual outcome of all species as newer and better forms "win the survival battle," the *rate* of extinction appears to be dramatically increasing, and no new forms whatsoever are appearing, to say nothing of better forms. A major cause of this increase are the changes that humans have caused, but many other reasons exist. This rapid total loss of various species creates serious problems, including a reduction in the total gene pool, a loss which scientists will never know the total consequences because of the difficulties in measuring the uses an extinct species might have achieved (Sullivan, et al., 1980). Penicillin, a drug which has saved millions of lives, is derived from penicillin mould, and who would have thought of championing the cause of this green mould? Numerous minor and seemingly "worthless" plants and animals exist that have proved extremely valuable to human medicine and other sciences (Kaufman, et al., 1983).

A major explanation for extinction is simple weather changes: "Extinction is the fate of *most species*, usually because they fail to adapt rapidly enough to changing conditions of climate or competition" (Gould 1977, p. 90). Severe weather changes, such as ice ages, although often alleged to cause evolution of at least some creatures, actually tend to extinguish *all* plants and animals. If drastic climate changes were a longstanding occurrence, it would seem that mechanisms would surely have evolved via selection for at least a few of the millions of types of animals that would effectively help them to withstand extreme cold and live for long periods of time without food. If more animals survived the colder temperatures, more food would exist for the carnivores, thus even more would survive, limiting the driving force that climate has on evolution. Yet, few animals are equipped to survive much temperature and climate variations, and many kinds, especially mammals and even more so the higher primates, have extremely little tolerance for much climatic variation (Sheppard, 1959; Milne and Milne, 1969).

For these reasons, although both the fact of extinction and its commonality is an important aspect of evolution theory, little evidence exists that most extinct animals were less fit than those that survived (Gould, 1989a). Gould's study on the Burgess shale found that the fossils of lower life show an incredible diversity, far greater than previously imagined. He has also found that the vast majority of these creatures died, leaving no survivors that exist today. Because they were not superior in any obvious way, Gould concluded that whether an animal becomes extinct or survives is most often not a matter of being more or less fit, but luck. Trilobites were probably one of the most successful living forms, once outnumbering all other forms of animal life, yet they became extinct. Their remains are among the most common of all fossils found today. These crab-like creatures lived in the bottom of the sea, seemingly well equipped to survive, and although speculation abounds, we have no plausible reason why they became extinct.

Some creationists also have had a difficult time dealing with extinction. Historically, many have maintained that extinction could not, and did not, happen because species extinction was viewed as inconsistent with God's goodness and perfection (Gould, 1977, p. 82). Animals which were believed to be extinct, they argued, were actually not, and if we looked long and hard enough, living examples would be located. The fact that some animals have become extinct, and many are threatened with such today, requires a response. The creationists' best answer is whether or not the Creator allows species or kinds to become extinct is a theological question related to the nature of God, but both the *fact* that certain species have become extinct and the factors involved are scientific questions. In many cases, only minor types have become extinct, certain types of deer for example, while the deer family itself God may not allow to be lost. Others argue that the Scriptures teach that God has assigned us the responsibility of being earth's caretaker, and if we abuse that privilege, God may grieve, but it is our fault and our problem. It is not the builder's fault if the owners wreck their own house. From this view, whole animal families may become extinct from human abuse. This view is the basis behind the Christian ecology movement, a theology that teaches humankind is the official caretaker of the earth and must exercise a high level of responsibility over it. It may be God's earth, but as we live on it, we must take care of it; and if we abuse it, God usually will not intervene (which seems obvious to an historian). Of course, one cannot know the degree of intervention that may have occurred (and speculation on this topic is on tenuous theological ground).

What Selection Actually Does

Natural selection seems to operate primarily to counteract downward evolution and functions to *maintain* the species at the same quality level, not to improve or "cause" a higher level of development (Howe and Davis, 1971). Birth defects which cause what are known today in medical parlance as "monsters" or "chimeras" are generally fatal to those so afflicted. A body mechanism in the mother serves a fetus quality control function to cause rejection, and often spontaneous abortion, regardless of whether the defects are genetically or environmentally caused. The fact that only the more "fit" or the healthier survive serves primarily to reduce the number of undesirable characteristics that may be passed onto one's offspring, not to evolve the race. It does not eliminate, but only lowers the number of misfits or less developed organisms, whether they are caused by genetic or structural defects—ensuring that the race as a whole stays at about the same quality level (Howe and Davis, 1971). In Tinkle's (1964, p. 148) words, it maintains a "lower limit, in the kinds of plants and animals." In a study by Lammerts (1984, p. 104) no evidence was found for any type of evolution and that ". . . natural selection at best only maintains the status quo."

An example of this is the phenomenon called "Siamese twins." Identical twins, those which develop from a single egg fertilized by a single sperm, must separate early in order to develop normally. If these early cells divide "imperfectly" and some type of embryo attachment remains, the children will be physically connected at the back, abdomen, chest or, occasionally, even the top of the head. Most are born dead or die shortly after birth. Drimmer (1973, p. 46) notes that: "Most oddities of this kind, like most conjoined twins, are stillborn. Nature chooses this way to rectify her gravest mistakes." The fusing may be such that only a small portion of the two bodies actually physically connect, and thus can be surgically separated without much difficulty. If larger portions or vital organs connect, surgery is usually very risky.

In eliminating or reducing those creatures that deviate from the norm, natural selection actually serves both to help ensure that the animals are able to survive year after year, and also to retard any change or evolution. Korshinsky (1969) added that the struggle for existence and the natural selection connected with it are biological agencies that tend to restrict the development of existing forms by *preventing* or reducing biological variations. They never contribute to the production of new forms, but are actually a mechanism that is antagonistic to evolution. Only new forms which possess a radically new structure that is *completely developed,* or at least highly functional, can result in a survival advantage—and except possibly the sickle cell anemia and Tay-Sachs traits (which are beneficial only in the heterozygous forms) not a single beneficial macroevolutionary change has ever been shown to have resulted from a documented mutation. Even if positive, small changes would rarely confer a selection advantage because most slight structural variations are of little survival advantage. Generally, only large, extremely complex and *complete* biological innovations would result in a clear survival advantage.

Many other systems also exist which serve to reduce the deterioration of organisms. A typical example is a repair mechanism in the cells of all living organisms which identifies most mutations when they occur, and then cuts out the mutated DNA section with *excision enzymes,* and finally repairs the damage. One type of mutation occurs during the DNA replication, causing a mistake in base pairing which results in the incorrect A-C pair instead of the proper A-T pair. Repair enzymes in the daughter cell, if they recognize the mismatch (which depends on an intact allele), will excise the incorrect bases and replace them with the correct ones. If the base in the daughter DNA is replaced, then the resulting base pair is identical to the original pair—see Audesirk and Audesirk (1986, p. 212). Interestingly, the human disease called *zeroderma pigmentosum* results from malfunction of the excision repair mechanism. The result of this mechanism's inactivity is a disease that is most often fatal. Differential survival and *excision enzymes* are but a few of the many systems which serve to prevent or reduce the rate of an organism, and also a race's deterioration and deevolution. They do not cause its evolution, as Berg (1969, p. 63, 64) notes,

> . . . it doubtful whether mortality in natural conditions possess selective value, i.e., contribute to evolution; as a rule, individuals approaching the standard survive, and those which deviate therefrom perish, no matter whether their distinguishing characteristics are retrogressions giving no promise of being able to advance [the species].

Do Only the Fittest or Strongest Survive in Nature?

The Darwinian view of survival of the fittest, which has pictured nature as being characterized by fierce struggles, has now dominated our view of the natural world for over a century. According to this position, nature ruthlessly eliminates those creatures who are, for whatever reason, "less fit" to survive, or in some way weaker than their competitors. Pictures of ferocious lions devouring helpless antelopes, or even ruthless bacteria ravishing the bodies of innocent lambs, have dominated not only our view of the natural world, but also our culture and even our scientific research. Darwin (1962, p. 42) stated: "What a book a devil's chaplain might write on the clumsy, wasteful, blundering, low, and horribly cruel, works of nature." Evolutionist Teller's (1972, p. 2) description is:

> Evolution knows no moral feeling. The earth is a gory battle-ground, where the weakest animals [die] . . . in a pitiless struggle of tooth and claw. Evolution, century after century, repeats its own follies, by bringing into existence billions of the lowest types of life when it might produce only the highest; continues the production of useless and harmful organs; turns out beings, some of which live only a day or an hour, or sometimes for only a few seconds. It is a ruthless, blundering, non-moral process, without a glimmer of guidance behind it.

This belief is reflected even in literature. In Jack London's novel *The Sea Wolf* is the following statement made by Wolf Larsen, the main character, about a ruthless sea captain:

> Life? . . . Of the cheap things, it is the cheapest. Everywhere it goes begging. Nature spills it out with a lavish hand. Where there is no life, she sews a thousand lives, and its life eats life till the strongest and most piggish life is left. (1903, p. 48)

The struggle for existence idea has been extended or applied to almost every level of the living organism—from molecular, to biochemical, to molar. Roux (1881) in his theory of body conservation, suggests that the struggle for resources even results in one's own body organs struggling with each other over nourishment! Weismann (1892) taught that germ plasm particles were also in constant conflict. Many modern biochemists go further, concluding that *molecules* within each organism are competing with each other (Fox, 1988). E. O. Wilson's (1975) social biology theory adds that while individuals compete with each other, they also unite into groups which in turn compete with other groups. Pendell (1977, pp. 89-09) states selection in this way:

> . . . ordinarily we give little thought to how evolution works. The *modus operandi* might be called 'selective victimization,' which can be illustrated by the story of the dogs that Spanish sailors left on a barren island populated by hearty, native goats. Only the fastest dogs managed to catch the slowest goats, so the slow dogs died of starvation. Relentlessly and inevitably, the average speed of goats and dogs increased with each generation.

The only problem with this assumption is that there is no evidence that the average dog runs faster today due to being placed in such conditions. Of course, selection can "breed" certain characteristics, such as achieved with dogs, cows, horses, etc., but in natural conditions a number of factors work against this; the fastest dogs may catch the slowest goats, but the entire pack of dogs usually share the catch. A common human reaction to this view of selection described by Carrighar (1965, p. 138) as follows:

> For many a child the knowledge of nature's food chains comes early, when he learns that in real life the dear little woodfolk of his storybooks *eat* one another. . . . The older child . . . may absorb the idea that every wild animal lives in terror of instant death. Plants destroy other plants, usually by taking over their living space when the seeds of a stronger species fall among those that are weaker; animals eat plants, animals also eat other animals. . . . The relation between living things is seen as universally one of malice, a view which can furnish the basis for lifelong cynicism.

This view of life violates a core value of humanity, that of caring for the sick, the weak, and the less advantageous. Macbeth (1971, p. 57) notes that "after the implications to racism and genocide of 'survival of the fittest' became apparent, especially relative to social programs, the emphasis on struggle was played down." Instead of being obvious and self-evident, he concludes that it became almost invisible. Conversely, Simpson (1967) argues that this view of natural selection plays practically no role in the modern view of evolution. "Struggle is sometimes involved, but it usually is not, and when it is, it may even work against rather than toward natural selection." He (1967, p. 138) advocates the "differential reproduction concept" which has the advantage that it is usually a peaceful process in which the concept of struggle is often irrelevant. It more often focuses upon such things as better integration into the ecological situation, maintenance of balance of nature, more efficient utilization of available food, better care of the young, elimination of inter-group discords, especially those struggles that might hamper reproduction, and the exploitation of environmental possibilities that are not the objects of competition, or are less effectively exploited by others.

Selection as a Tautology

Many biologists have discussed the conclusion that "we must have survived because we were the fittest, and we are obviously the fittest because we were the ones that have survived" is a tautology (Maddox, 1991). This circular reasoning is oversimplified but, as Macbeth (1971, p. 69) notes, although a certain amount of harmony exists between the organisms and its environment (fish need water, mammals need air, and all animals and plants need food), this does not mean that living species are generally well adapted, or that extinct species were generally ill adapted. Simpson's (1967) conclusion that the amoeba survived because it adapted, but that the dinosaur died out because it did not, is true only in a very limited sense.

A study of the many animals that have become extinct finds that it is very difficult to correlate extinction with the possession or lack of some specific selection advantage. The passenger pigeon, although at one time one of the most populous birds in the country (over twenty-billion strong) became extinct. Yet, most biologists cannot pinpoint what structural inferiority caused their extinction and only pigeon experts can often even tell the difference between them and the other, still thriving, kinds of pigeons. The differences between the extinct Badlands Bighorn and other Bighorns, the sea mink and other minks, the Carolina parakeet and their cousins who are still around, often serve mostly to distinguish types, and are usually of little or no survival value. When various types of animals are compared, it is no easy matter to list the specific evolutionary survival advantages of most of the differences between them. Modern attempts to explain the usefulness of organs and structures "in terms of natural selection has proved so disastrous that most modern biologists are 'too sophisticated' to fall into such errors. They have learned that it is not wise to to try to explain why" (Macbeth, 1971, p. 75).

An example is the explanations of the major distinct difference between the African and Asian elephant, the size of the ears and the degree that the head is held. Evolution theory has failed to explain why *such differences* exist in terms of survival advantages. The difference in ears is not great enough to result in significantly improved hearing, and their floppiness may actually impede their effectiveness in windy weather. Why did the woolly mammoth became extinct, but not the elephant and many other very similar animals? The differences between the mammoth and the mastodon are minor, chiefly body hair, teeth and tusk variations. The mastodon's tusks were curved upward, their bodies covered with hair, and they were probably slightly larger than elephants. In spite of extensive research, it is not known *why* only the woolly mammoth became extinct (Williams, 1966). It was obviously *not* the cold weather where woolly mammoths lived—they survived in it quite well for eons (as similar animals do today) and could have migrated south during the ice age as many other animals do today. Commonly found in Arctic Siberia, Alaska, and even in New York and Europe, if they were able to survive in the far north, surely they could have continued to survive in Europe during the Ice Age.

The fact that animals at the so-called higher end of the evolutionary scale are more likely to become extinct indicates that evolution does not, as many of its supporters claim, constantly finely tune animal's survival skills, pushing development to a higher, more complex level, with the result that the animal is even more impervious to survival impediments. It is also true that many living animals are poorly adapted—thus the reason for the real fear of the impending complete extinction of hundreds of the so-called higher animals. Only through concerned care by humans can many mammals avoid extinction (Stanley, 1987; Ehrlich and Ehrlich, 1981).

The Case of Tusks and Antlers

Many animals possess elaborately designed structures which could be very helpful in improving their survival, and yet they are rarely used. Macbeth provides the example of the gorilla, which is supposedly perfectly designed for swinging from bough to bough. Yet they rarely climb trees, and usually scrounge for a living on the land (see also Ardrey, 1963, pp. 112-113). The fact that their excellent brachiation skills have little visible utility argues against the selectionists' theory which concludes that animals with elaborate structures were selected because of the structure's survival advantage. Good examples are the enormous tusks of the elephant which, as a whole, burden it with many more disadvantages than advantages. Elephants without tusks survive quite well—although almost all African males and most females have them, many Asian males and nearly all Asian females do not. Both groups are now having a difficult time surviving, but this is primarily because of human exploitation. The tusks are large and bulky, and impede movement, especially running. Their tusks are rarely used for fighting, and although they occasionally can be useful, they probably mostly hinder the elephants in combat. The fact that elephants have no enemies except germs argues against the evolution of *any* fighting system, especially tusks (Endler, 1986). Mankind has found animals with tusks very useful for moving logs and other heavy objects, and the tusks help the animal to dig out plants for food, but the trunk is a far more used and also a useful food gathering organ.

The fact that the tusks keep on growing as long as the animal lives can be a problem, especially with the older elephants. An elephant burdened with very large tusks may actually have to abandon the family herd. Their weight may prevent them from *keeping up,* a serious problem for social animals which protect and support each other. Since tusks are as a whole not a survival advantage, evolution would not favor larger tusks, and most animals with these structures have become extinct partly, it is claimed, because of their tusks. The tusks of mammoths and mastodons were more than 250 pounds and as long as 12 feet in length. It is hypothesized that selection caused their upper lip to gradually grow longer and droop while concurrently the 'eye teeth' begin to sprout into tusks, a development which reached its height in the glacial era mammoth. Tusks and antlers are highly resistant to decay, and thus are quite effectively preserved in certain burial locations for long time spans, yet *no* evidence exists of antlers or tusks evolving, or even slowly becoming larger in response to selection.

Rensch (1959) and others tried to explain the large antlers by the concept of *allometry,* the conclusion that because the body is a unified, integrated system, an increase in body size will cause a relative increase in the size of every organ, including the antlers. Huxley even used the Irish Elk to argue for natural selection. His conclusion, as Gould (1977, pp. 85-86) stated, "was based on no data whatsoever. Aside from a few desultory attempts to find the largest set of antlers, no one had ever measured an Irish Elk." To remedy this lack, Gould measured 79 Irish Elk skulls and antlers from museums and homes in Ireland, Britain, continental Europe, and the United States. He found that antler size increased two and half times *faster* than body size, disproving the allometry theory in this case. The antler size may be due more to proportion requirements that result from the animal's genetic design. Nonetheless, an antler increase rate of two and half times faster than body size would seem to contradict the "elementary hypothesis" that a one-to-one correspondence exists, i.e., huge deer would have huge antlers, and in the same proportion as smaller deer. Gould (1977, p. 88) admits that the opposite interpretation is also possible: selection operated primarily to increase antler size, thus increased body size occurred only as a secondary consequence. Those with larger antlers were more likely to survive, and thus larger bodies survive because of the larger antlers that they possess. Explaining the growth of the antler is especially problematic if they are useless or worse.

The real concern is, why would natural selection select for antlers? Some authorities assume that the antlers are used primarily to frighten animals with smaller antlers to achieve dominance. Most animals, though, are not frightened by size alone; smell is often more important. As to rival suitors, it is hard to imagine how this behavior furthered the evolution of anything except that of antler size. This theory seems a last resort to fill in the well-founded doubts about the usefulness of antlers for weapons. The authors also postulate that the antlers must have somehow been involved in courtship, and demonstrating that female deer were much more likely to mate with animals with larger antlers would provide direct evidence for sexual selection in this case. At most, it seems that they are used purely for ritual display in order to gain herd leadership, and are not used for reproduction dominance.

Many animals possess mechanisms which sometimes aid their survival: the smell of a skunk, the quills of a porcupine, the leg strength of a kangaroo, the camouflage and mimicry of insects are all good examples. One cannot argue from this that these features *significantly* aid in survival because many almost identical animals without these traits do very well, and many animals with similar traits have become extinct. The survival advantage of one feature such as camouflage does not even begin to explain how the extremely wide variety of techniques and structures designed to help the animal see, hear, eat, move, or protect itself arose from evolved variations of a *common* ancestor to facilitate survival—see Bergman and Howe (1990).

Most animal types live very close to the same lifespan length and have a similar average number of offspring as their parents, thus only one of these myriads of adaptation techniques do *not* seem to affect survival greatly (Kohm, 1991). Most animals which do not have fancy techniques for fighting or scaring enemies, such as rats (which mankind in their wisdom has been unable to eradicate) and rabbits (which, although both vulnerable to attackers and possess many enemies—most meat eaters from humans to dogs) are doing extremely well. A rabbit's acute hearing is certainly an assistance, and a porcupine's quills surely should be helpful, but except for germs it has few, if any, enemies. According to natural selection, all animals would eventually evolve a *similar, best type* which could survive in a wide variety of environmental situations.

As Macbeth (1971, p. 41) notes, "The early Darwinians thought that every aspect of every animal, right down to the number of spots or bristles, was determined by natural selection and was therefore 'adaptive,' i.e. important for survival." Research has now found clear biological functions for almost every *internal organ* of plants and animals, but the same is *not* true with many external structures (Bergman and Howe, 1990). Exactly why animals have certain colors, feather designs, scales, horns and muscle and bone structures which seem to affect the outward appearance only has proved elusive. It is difficult to correlate many, if not most, of these external features with survival. This immense variation in color, texture, design and physical shape may be largely for the purpose of variation, similar to the purpose of the variety found in the external appearance of automobiles or houses. The hypotheses that they *must* have some survival benefit is forced. Structures may simply exist, like the tail fins on a 1957 DeSoto because the designer put it there in an effort to be creative and not because they possess a survival function. Even if a survival function were found for every external biological feature, this would not prove evolutionism, but would support the design view. The creationist is in the enviable position of not being forced by his theory to locate a survival function for every external detail, only a purpose. These problems are noted by Gould (1989b) in a discussion of a new theory of evolution called the **neutral theory:**

> Kimura has never denied adaptation and natural selection, but he has tended to view these processes as quantitatively insignificant to the total picture—a superficial and minor ripple upon the ocean of neutral molecular change, imposed every now and again when selection casts a stone upon the waters of evolution. Darwinians, on the other hand, at least before Kimura and his colleagues advanced their potential challenge and reeled in the supporting evidence, tended to argue that neutral change occupied a tiny and insignificant corner of evolution—an odd process occasionally operating in small populations at the brink of extinction anyway.

A More Peaceful View of Nature

Another, far different view is now emerging from research: cooperation, not competition seems to be the dominant mode of animal interaction. Lewis Thomas (1974), argues that *the overwhelming tendency in nature is toward symbiosis, union, and harmony*. Thomas concludes that the Darwinian view of life as a constant murderous struggle, as immortalized in Tennyson's "tooth and claw" view of nature, is simply not accurate. Even Leakey and Lewin (1978) have concluded that it is often the organisms that *cooperate* which are the ones that are more likely to survive, adding another whole new facet to the word competition.

Widely traveled nature enthusiasts often notice that animals are at peace with both each other and the world around them for the vast majority of time. Even the stereotypic predators—lions, tigers, wolves, and other large carnivores—spend most of their time lazily lying in the sun, tending their young, sleeping or playing (Colinvaux, 1978). True, it is occasionally necessary for all carnivorous animals to hunt, and many do so aggressively, but when a victim is killed, it typically provides enough food for days, during which time the lions are at peace with nature (Tinkle, 1969). Custance (1976, p. 181) concluded:

> It must be apparent to millions of ordinary people who had any firsthand knowledge of nature that the picture proposed by Darwin of a state of chronic warfare was completely unreal. Obviously, nature has not essentially changed since Darwin's time, so the behavior we see in the open country . . . is what it was in those days. And we do *not see*

> animals constantly battling with each other. The supposed "struggle" for existence is comparatively mild. Animals establish their territories with enthusiasm rather than viciousness.

Carrighar's (1965, p. 139-140) own research supported the data gathered by Adolph Murie who

> . . . observed the large carnivores, leading their normal lives, as intimately as any living biologist. Of wolves, which feed almost entirely on caribou in some parts of the North: 'Generally, the caribou seem not to be worried much by wolves unless chased. I frequently noted caribou bands watching the wolves when they could have been moving away to a more secure position. . . . All day the caribou had been in the vicinity of the [wolves'] den, but the resting wolves did not molest them. . . . Once the black male galloped hard after a herd but stopped to watch when he was near it.' . . . The kills are made 'quickly,' many times with a bite on the neck. The victims are almost invariably the young animals, the diseased, or those too old to make a speedy escape.

Most carnivorous animals hunt only for what they need to live, and even then the kill is most often quick and relatively painless. Thomas (1979, p. 105), relying both upon his own hospital experiences and the published research on persons who were clinically dead and then revived, concludes that when death is imminent, the brain apparently realizes that pain is no longer useful as a warning or as an alarm to spur escape, and therefore "turns off" pain sensations, producing what he terms a "blissful surrender." This agrees with the numerous reports that conclude both human and animal sensations before death are very "peaceful experiences" As Thomas (1979, p. 105) added "If I had to design an ecosystem in which creatures had to live off each other and in which dying was indispensable part of it, I couldn't think of a better way . . ." Hunting is also necessary to maintain balance in the natural world: if predators such as lions and wolves were destroyed in large numbers, many animals would reproduce at such high rates that they would soon use up the food supply and die anyway, or natural mechanisms would reduce their numbers long before this point was reached.

Instead of an animal species taking a niche by an open struggle with those in it, extinction or other means often opens niches which it can then fill. A good example is, when ichthyosaurs became extinct, porpoises and dolphins for some still unknown reason took over what was evidently now an open ecological niche. Such cases are common in the biological world. When rabbits were brought to Australia by the British, they rapidly multiplied, taking over what was evidently an empty niche for some time. Many similar empty niches now exist, and even if certain animals were brought to another area, they could easily exterminate certain of its residents. Struggle is not always important, and in the long run may actually be relatively unimportant.

Several studies have confirmed that, by far *the most important factor* in whether a specific animal is eaten (or eats) is *chance*, not superiority (Smith, 1976). An anteater throws his tongue out and catches a few ants. Those that do not escape the tongue are usually *not* the ones that run the fastest or can hide the most effectively, or are stronger, bigger, or have the worst taste, but those who *happen to be in the wrong place at the wrong time.* Although some biological factors are affected by natural selection so as to facilitate survival in very limited set of circumstances (such as the famous example of the peppered moth in England), these examples are few and far between, and tend to be related to such factors as camouflage and others which do *not* tend to alter the species, but merely modify the *most common* form. In English history, when heavy black soot pollution existed, the darker moths were more common, but as the pollution became less and consequently the tree trunks became lighter, the whiter moths again became more common. The *moths* themselves never changed, only the ratio of dark to light moths had shifted (Williams, 1986).

Rather than being the source, intensive natural selection often actually slows or stops microevolution. The Cichlids (fresh water fish) are found in almost all the the great lakes of Africa. Where predators are common, such as in Lake Albert, only four species are present, but where few predators live, as many as 50 species exist. This inverse relationship of variety and selective pressure is the norm; the greater level of selection that exists, typically the smaller the variety of animals that live in that particular location. Less selective elimination allows the results of normal gene reshuffling, and thus more combinations to survive, producing greater variety (Williams, 1977).

The symbiosis of the *Nudibranch* (a sea slug or snail) and the *Medusa* (a jellyfish that lives in the Bay of Naples) illustrates this. The medusa lives permanently on the snail, parasitically attached to it near its mouth. It then reproduces there, and its offspring later become normal adult jellyfish. In the meantime, the snail produces larvae which are in turn consumed by the baby jellyfish as they grow. The ingested snails, though, are not digested, but begin to eat the jellyfish as soon as they enter its entrails—usually beginning at its radial canals. The snail progressively consumes the jellyfish until they outgrow their host, at which time they leave. The jellyfish then once again becomes a tiny parasite which now lives off of the snail! The whole cycle, which Thomas (1979) calls an "underwater dance," is endlessly repeated. Life, in other words, is often not a matter of "to eat or be eaten" but a balance between being both eaten and being an eater. Which particular creature ends up being eater or eaten depends greatly on chance, not organ or organism superiority (Fisher, 1958). Thus, as Scott and Fredericson (1951, p. 273) noted:

> Fifty years ago it was the fashion to picture the life of animals in nature as a constant battle for survival, with intense individual competition for food and hungry predators waiting around every corner, ready to snap up the unfit. We have since found that highly competitive situations occur very rarely except in populations which have become disorganized as the result of overcrowding or a disturbed social situation. . . . As for predators, they often lead lives which are the opposite of the bloody, slavering animals of fiction. We can watch the behavior of coyotes for days without ever seeing them kill a single living thing, and when

> their stomachs are examined it is evident that a coyote has to eat almost anything that it can get hold of: carrion from animals which have died of disease, garbage, old scraps of leather, and even berries. They do occasionally capture small rodents and sometimes are able to find an unprotected newborn fawn. One of the few cases in which coyotes have actually killed an adult deer is so remarkable that it has been written up as a special scientific paper.

Kropotkin (1955, p. 7) in an extensive study found that in areas where little pressure from numbers existed, little natural selection occurs. He found that in *most* areas of the world, *most animals* actually have relatively few enemies, and *small* populations exist compared to the area's potential. Even animals that reproduce rapidly, such as rabbits, seem to exist in considerably fewer numbers in land areas which could reasonably support much larger populations. For this reason, in most places little selection pressure exists and most living animals appear well and healthy. In locales where large numbers of animals co-exist, such as in the hot jungles of Africa, Kropotkin (1955, p. 7) concluded animal life is in abundance:

> on the lakes where scores of species and millions of individuals came together to rear their progeny . . . in all these scenes of animal life . . . I saw mutual aid and mutual support carried on to an extent which made me suspect . . . [this was] a feature of the greatest importance for the maintenance of life and the preservation of each species . . .

This "mutual aid" he concluded is a source of evolution that is far more important than the individualism survival of the fittest model. He also found that struggle, when it occurred due to such factors as local famine, tended to have the effect of *impoverishing* the animal involved: "No progressive evolution of the species can be based on such periods of keen competition" (1955, p. 7). Although competition for food exists, Kropotkin (1955, p. 7) concluded that in reference to Darwin, "We find [in a study of nature] . . . none of the wealth of proofs and illustrations which we are accustomed to find in whatever Darwin wrote." Kropotkin and others have also shown that many of the specific examples which Darwin used to support or illustrate his natural selection theory were in error (Allee, 1938)

In summary, it is not necessarily the animal that runs the slowest, or is somehow "least fit" that becomes prey to predators. Typically, *chance* is a major—if not the most important —factor. It is often the animal that happened to be in the wrong place at the wrong time that becomes a meal for another animal. In hunting, it is place and time, not "fitness" that are by far the most important factors, and both of these elements are highly influenced by chance. The extremely weak or the physically ill may sometimes be more prone to being caught, but many animals will not attack the obviously sick or lame, and many, or even most, ill adult vertebrates die before being caught by predators. What differential elimination of the sick does occur at most serves to assure that the species stays at the same level of quality; it rarely "advances" the species. *Selection seems to be a major mechanism primarily for preserving the status quo, and not causing so-called evolutionary advancement* (Howe and Davis, 1971).

Cooperation Is The Rule

In the natural world, cooperation and not competition is not only much more prevalent, but actually what is *labeled* competition may be a misunderstanding of *behavior that is truly cooperation*. The key to the whole science of ecology is *balance*, not competition (Ardrey, 1976). The implications that animals do *not* increase their gene pool, expand their population in direct proportion to their ability to "eat and avoid being eaten" or outdo their competitors are clear: the entire Darwinian view of life is not only inaccurate, but a serious distortion of reality. Yet, as Genoves (1970) noted, survival of the fittest natural selection was seen by Darwin, and to a great extent by his followers, as the *main element of evolution.* He concludes that Darwin placed exclusive emphasis on the part played by competition and struggle, neglecting cooperation and mutual aid as though the survival of the fittest always results in a victory for the strongest and the elimination of the unfit. Many animals are aggressive because their behavior is modified by conditioning and for these there is not much evidence of innate aggressiveness, contradicting Ardrey who endeavors to make a case for the view that war and acquisitiveness are part of "animal" nature.

Natural Checks

A crucial element in the theory of evolution is maintaining a high level of reproduction so that selection can work to keep these levels "in check" by preserving the best and thereby improving the species. Even many of the weaker animals survive long enough to at least reproduce, and most have natural internal mechanisms that serve as population checks. Darwin's reading of *Malthus'* ideas about *populations* increasing in *geometric* proportions, and *food* in *arithmetic* proportions was a major influence in his evolution speculations. This idea, though, is not valid for most higher level living things. Wynne-Edwards (1968, Ch. 22) found that many animals *can and do rigidly limit their own population* to far below over-population levels, often even below Carr-Saunders "optimum number." They use many diverse mechanisms to achieve this. The idea that an almost constant state of excessive fecundity exists and therefore a high level competition for survival is omnipresent, although valid for some lower animals, is largely invalid for many higher animals. Wynne-Edwards (1968) notes that during the history of most animal populations, periods existed during which natural or other events resulted in a heavy death toll. The survivors normally compensate by starting to breed at a high rate so as to restore their numbers to the previous level as rapidly as possible. In a completely isolated laboratory population, the growth almost always stops at some consistent ceiling density, and then remains at that level as long as the environment is constant. In wild populations, the same usually occurs even if the mortality rate is not abnormally high. In other words, a mechanism exists which causes the animal population density to remain close to a certain level, and if it rises too much above this, reproduction slows, and if it goes below this ceiling, it increases (Smith, 1970; 1976; 1985).

An example of an internal factor which limits population growth was discovered by Christian (1956). In the early 1950s he studied the Sika deer population of James Island, a half of a square mile of territory located in Chesapeake Bay. Five Sika deer were originally imported to the Island in 1916. Forty years later, when Christian began his field work, the herd had grown to about 300. Two years after his arrival, the deer began dying off in astonishing numbers for no apparent reason; over half died within just three months, and by the middle of 1959 only 80 deer were left (Christian and Davis, 1964). Then, as mysteriously as the deaths began, they ceased. Research into the cause of these deaths included an examination of their feeding habits, the possible presence of disease, etc. None of the reasons that he researched could explain either the starting or the stopping of the deaths. A detailed study of their internal organs revealed that *only one difference existed* between the deer that died during the massive deaths in 1959 and those that perished from natural causes: an enlarged adrenal gland. In some cases, it was nearly twice as large as in those deer that had died at other times. The researchers concluded that the deer had died due to *psychological overcrowding.*

The deer were not overcrowded from our viewpoint—each had over an acre of space. But that was evidently enough "overcrowding" to produce the conditions which caused the enlargement of their adrenal glands which in turn flooded the deer's systems with adrenalin hormones, causing hemorrhages in the brains and kidneys. Because deer are non-aggressive animals and cannot reduce their number by fighting, their only response to "overcrowding" is an innate physical mechanism which lowers the population until it reaches a certain number. As this level is well above the animal's survival requirements, this mechanism would not be a result of natural selection:

> . . . considerable evidence [exists] both from the field and the laboratory that crowding in higher vertebrates results in enlarged adrenal glands, which are symptomatic of shifts in the neural-endocrine balance that, in turn, bring about changes in behavior, reproductive potential, and resistance to disease or other stress. Such changes often combine to cause a precipitous "crash" in population density. For example, snowshoe hares at the peak of density often die suddenly from "shock disease" that has been shown to be associated with enlarged adrenals and other evidence of endocrine imbalance. In the cyclic insects . . . on the upswing of the cycle, tent caterpillars *(Malacosoma)* build elongated tents that are shifted about, and the individuals are active in moving out into the foliage to feed. At peak density the caterpillars become inactive . . . feed less, and are more subject to disease. . . . Such adaptation syndromes would certainly seem to be mechanisms for 'dampening' oscillation so as to prevent too great a fluctuation that might damage the ecosystem and endanger the survival of the species (Odum, 1971, p. 195).

The tendency to expand to a certain population level per square mile, and then having something trigger an internal mechanism to drastically reduce the population, may at first seem non-functional, but is necessary for the animals to achieve a certain *quality of living.* It is assumed that a mechanism such as this is "nature's way of controlling the population." A creationist would see this response as the Creator's way of insuring, not just survival, but adequate survival for the remaining animals, not just life, but "the good life." While an acre could easily support many more than one deer, it generally does *not* insure a quality life style, but many thin, slightly undernourished, yet adequately surviving animals. This mechanism helps to insure *healthy, well-fed, strong animals.* How common this mechanism is, is not yet known, but it is evidently present in many non-aggressive animals—see Smith, 1970; 1973; 1985.

Mass Suicide

The self-preservation instinct is perhaps the most basic drive found in all living things. Yet, some creatures such as lemmings frequently commit mass "suicide," evidently for reasons similar to those which cause Sika deer to commit physiological suicide. When food is plentiful, these mouse-sized rodents with long silky fur, lead quiet, peaceful lives high in the mountains in the icy regions of northern Scandinavia. They flourish on reindeer moss and various roots, and live in cozy underground nests. McFarland (1976, p. 119) noted:

> . . . every few years the lemming population grows so large that their food supply can no longer sustain them. Then all the lemmings leave their burrows. . . . Like an army heading for a great battle, they swarm out of the highlands and rush downward over the sloping plains. Normally, lemmings fear and avoid water. But, during their mass march . . . after running for weeks, the lemmings finally reach the seashore, and then, row upon row, plunge headlong into the water! For a short time the frantic rodents remain afloat, breasting the rough tide like millions of tiny rowboats cutting into the surf. But soon the creatures tire, and one by one sink to their doom. During a lemming migration, the bodies of the animals can completely cover the surface of the water. One steamer off the Norwegian coast reported that for a full hour the ship had to cut its way through a thick shoal of lemmings swimming out to sea—swimming out to die!

Why they respond this way is still being debated, but such population control behavior is a major reason why ". . . very few parts of the earth are in any way crowded with animals"—see Custance (1976) and also Carrighar (1965). Calculated by weight, only a few pounds of birds live in an acre large area, and the density of individual birds per square mile is typically well below the land's support level. When seen as a flock, flying south for the winter or on an island which serves as a stopping or resting place for animals, it appears that millions of birds live in crowded places. These animals normally live in a very large area. Although in some areas animal and plant life is "crowded," this seems to be primarily because of human interference. Humans have cut down forests, set up farms and cities, and spread like wildfire throughout the earth—and historically (at least in modern history) this has probably been the major disrupting factor in the natural world (Curry-Lindahl, 1972). Observing that thousands and sometimes millions of birds live in a very small area, rarely fighting and displaying little overt competition for food, is common.

If the population increases beyond a "comfortable" level, the animal often may simply spread out to a wider area. When this cannot be accomplished, the animal may slow down its reproduction level or, for the reasons discussed above, many will die. This mechanism results in maintaining a certain level of animals living within a given area:

> An ironic turn in the history of science took place when both Charles Darwin and Alfred Russell Wallace found their inspiration for natural selection in Malthusian doctrine, a thesis which sooner or later must be accepted as in large part false. . . . Darwin and Wallace saw in the Malthusian doctrine a natural law which must apply to all species, and so they deduced that through competition for a limited resource, food, selection must take place between fit and unfit. The Malthusian logic seemed inarguable . . . And undoubtedly supply of food places a theoretical limit on animal numbers, just as there must be cases in which deficiencies of quantity or quality of food contribute to a limiting effect. Yet [research in] the new biology provides no proposition more demonstrable than that of the self-regulation of animal numbers. Rare is the population that has ever expanded until it reached the limits of food supply. Rare are the individuals who directly compete for food. An infinite variety of self-regulatory mechanisms, physiological and behavioral, provide that animal numbers—except in the case of climatic catastrophe—will never challenge the carrying capacity of an environment. Birth control is the law of the species (Ardrey 1970, pp. 200-201).

Evidence that areas can support a far greater number of animals than usually exists is also demonstrated in the domestication of animals. Farmers have been able to graze horses, cattle, and sheep comfortably on an area of land at a density level that one would rarely find in nature. The fact that most areas can support far larger populations of animals than are usually found in the wild clearly demonstrates that the numbers of many types of animals are often *not* necessarily being held down by competition. Nor does nature normally overpopulate, but the number of animals is for many reasons typically far less than a given area could support.

Except for humans, animals which tend to fill land space far more than others are often not more advanced or much different than other animals. Mice, gophers, and rabbits exist in comparatively large numbers per square mile, whereas far fewer anteaters and porcupines usually live in the same space, yet no evidence exists that the animals which are more numerous are in anyway physically more evolved or more evolving as would be expected. All other factors being equal, the larger the population, the more opportunities exist for mutations to occur and thus Darwin's evolution. Yet, those animals blessed with far greater numbers do *not* seem to be more capable of survival or outwitting their enemies when compared to animals which have less dense populations per square mile.

The Problem of Crowding

Admittedly, some examples of aggressive animals exist which fit the picture that Darwin felt nature as a whole exhibited (Harlow and Woolsey, 1958). Even the better examples, such as rats, though, provide at best mixed evidence. Both human caused overcrowding and the condition of cities have influenced this rodent to behave "unnaturally." Rats living in the country do not exhibit the aggression typical of city rats. Even so, such crowding and the accompanying viciousness that they exhibit is characteristic of very few animals in the wild, even in crowded conditions (Genoves, 1970). This research also has direct relevance to the effects of stress on humans (Selye, 1955).

Studies of animals forced into unnatural situations by humans, such as the thousands we crowd in stockyards together before slaughter, have found that they tend to physically align themselves in rather ingenious ways so as to reduce conflict. For example, many birds position themselves quite evenly with respect to the other animals, and those towards the periphery face outward so as to utilize the "facial distance" in front, and also provide more facial distance to those animals towards the center of the pen. Another method is to "truce," as described by Krutch (1961, p. 571):

> . . . when two wolves threaten one another the less aggressive often turns his cheek. This is not a signal to the other one to move in for the kill. The wolf who turns his cheek asks for a truce, and though the snarling continues, the truce is always granted. Turning the other cheek, the wolf teaches us, is not abject surrender but an honorable way to prevent a fight and save the species.

The Concept of Adaptation

As Sterns and Sage (1980, p. 65) noted, biologists are increasingly modifying the whole concept of biological adaptation:

> Field biologists commonly assume that the organisms with which they deal are well adapted—even optimally adapted—to local circumstances. [They have] . . . de-emphasized the role of gene flow in preventing large scale geographic differentiation and local adaptation. This paper documents a case in which gene flow may have prevented small scale local adaptation in one population of mosquito fish, *Gambusia affinis.* It carries two messages: field-workers should check the assumption that their study organisms are adapted to the local environment because that assumption does not always hold, and there are limiting cases involving high dispersal rates over short distances in which gene flow can overwhelm local selection pressures.

Sterns and Sage then assert that adaptation exists only in degrees: all animals could be more perfectly adapted to their environment, and all "suffer" from lack of perfect adaptation. If the *mean* temperature of a certain area is 23°C and a certain insect can live within plus or minus five degrees of this value, it could be said to be fairly well adapted. If, on the other, even though the summer mean may be 23°C, and the temperature occasionally drops to ten or lower, insects able to survive in this wider range of temperature are adapted to a *greater* degree to the environment. Natural selection judgments as to why this flexibility exists tend to be naive in that a great deal is unknown about specific adaptation and selection pressures (Horn, 1971). It is clear, though, that adaption to the widest temperature range possible is very advantageous. An excellent summary of these problems is supplied by Endler (1980, p. 76).

> All too often in evolutionary biology we are led to speculate or infer the mode of action of natural selection; we usually do not know why some individuals are more adaptive than others. Very often attempts to measure natural selection are unsuccessful, leading to heated arguments about the relative importance of selection, genetic drift, and epistasis in evolution (Lewontin, 1974). Until we know more about how and why natural selection occurs, attempts to measure it are quixotic, and discussions of its importance are theandric. It is of no coincidence that most of the successful studies of natural selection have dealt with animal color patterns; it should be obvious which color patterns are more adaptive in the presence of visually hunting predators. The adaptive significance of warning coloration and mimicry of distasteful species has been worked out. . . . But, most species are neither distasteful nor memetic; most have inconspicuous or cryptic color patterns in their natural habitats.

In many discussions of selection, this mechanism has been highly over-simplified (Huxley, et al., 1954). Endler (1980, p. 76) notes that "Most field and experimental studies have shown that the overall color or tone of inconspicuous species matches or approximates the background. . ." Animals that are able to blend in with the background can better "hide themselves" the theory goes, and are thus less apt to be destroyed by predators. On the other hand, animals which *contrast* with their background are also often avoided, the opposite of what one would expect given the common natural selection argument. Krebs (1979, pp. 14-16) concludes, as summarized by Corliss (1980, p. 1) that:

> Darwin believed that many male birds are brightly colored because females prefer flashy finery and thus puts evolutionary pressure on the development of these characteristics. A large-scale study by Baker and Parker indicates that Darwin erred and that the evolutionary pressure comes instead from predators avoiding brightly colored targets. Instinct tells the predators—incorrectly in many cases—that colorful prey taste bad or are noxious. The remarkable (possible strange) aspect of bird coloration is the incredible external similarity of unrelated birds occupying similar habitats . . . the American eastern meadow lark closely resembles the African yellow-throated long claw. . . . How do the genes orchestrate this amazing convergence in response to environment factors? Why was evolution not equally clever in equipping predators with countermeasures to see through these ruses?

Attempts to explain the existence of many structures and behavioral traits by natural selection often become ludicrous. Macbeth (1971, p. 75) relates to the assumption that bright colors and natural selection have produced a variety of conflicting explanations, noting that flowers, the theory says, develop distinct colors to attract bees, wasps develop colorful black and yellow stripes to "warn" enemies of their sting, and partridge birds develop camouflage to help them escape detection by the hawk, yet the peacocks have a *bright plumage* so that they are more visible and can stimulate their mates yet this color *also* attracts enemies. Simplistic assumptions such as these have been challenged in recent years. Flowers' distinctive colors also attracts predators, the animals which consume them. The wasps' black and yellow stripes also make them much *more* visible to enemies, and the partridges' camouflage which hides them from enemies also makes them *less* visible to potential mates.

Another major problem with natural selection is that most insects and many other animals progress through two stages, an infant or larvae stage followed by an adult stage. The classic examples include the metamorphosis such as from the tadpole to the frog, or the caterpillar to the butterfly. Behavior which facilitates survival at the first stage may not be helpful, and could well be harmful, at the adult level or vice versa. And a favorable characteristic for an adult individual would be unlikely to develop unless it is *equally favorable*—or at least neutral—when the individual is young and an extremely high mortality rate is common.

The Struggle for Life and Evolution

The major evidence against the natural selection theory is the total lack of correlation between the amount of, for example, competition, and how high the animal is on the evolutionary scale. If competition causes evolution, we would expect that it would be higher and more intense at the "higher" end of the evolutionary scale. This is rarely found, but the opposite often is. Animals which are biologically closest to humans, such as the orangutan, the gorilla (actually usually a very gentle, "family" creature), and the chimpanzee, usually do not fight with one another, even for territory. This factor has been studied extensively because of the concern over whether or not aggression in humans is innate, and evolutionists believe that one way of answering this question is to research animals believed to be evolutionally closest to us. Aggression is sometimes severe between monkeys and apes living together in captivity, but is far less so in natural conditions. Part of the reason for this is because psychological abnormalities appear far likelier to develop in animals born and raised in captivity (Harlow and Woolsey, 1958; Ardrey, 1976).

The claim that a primary aspect of competition is often not one animal against others of different species, but within the species so that the most fit within it survive, also faces a number of problems. In the classical research on territorial fighting, it was assumed that the stronger usually wins. Many animals fight for territory and, aside from physical fitness and size, territory is a major survival factor—and this would seem to insure only that the existing population is physically fit and would not select for the "fittest." The courage of the defender to defend is most often far greater than that of the trespasser. The same phenomenon is found in human society; a person who is right and knows it will usually work much harder than one who is wrong. Studies of chipmunks, squirrels, and other animals has revealed that they have a "geographical center" in their territory. When near it, the defender is full of valor—and conversely, his enthusiasm wanes as he chases the trespasser farther away. As he travels farther away from his center, the valor of the other animal increases as it travels toward its own geographical center. When the two are roughly between their two geographical territories, the animals often part and go home. This is comically shown when two chipmunks chase each other furiously across their territorial "boundary"—and the chipmunk which was formerly being chased will now chase the other with equal vigor until the "boundary" is again crossed. Sometimes this chasing will repeatedly alternate, producing a seemingly nonsensical comical spectacle (Ardrey 1966, p. 90).

Obviously, this mechanism facilitates animals maintaining a *living distance* from others without doing violence to them by reducing crowding and facilitating survival at a "quality level" norm. It also reduces fighting, because territories produce guidelines that control behavior, resulting in safer areas. Another result is that animals do not crowd into a territory because the territorial imperative drive often results in an animal population existing well below the point where much survival competition is able to occur—and at a low level so that often far more food than is necessary exists (Ardrey, 1966). A squirrel, for example, probably only needs a few dozen square feet to survive adequately—but most have scores more, primarily because of the territorial imperative and not food needs. If size and fight were the major factors, we would expect that in areas where much fighting over territory occurs that these animals would evolve into physically larger and stronger types compared to similar animals elsewhere. In these highly competitive areas, deer would eventually evolve to be as large as elephants, and continue growing until many were as big as dinosaurs—changes which no evidence exists to support. All things being equal, larger size would *seem* to have an adaptive advantage (Endler, 1986). When the evolutionary history is plotted, the animals at the "higher" level, and thus only the more recent evolved parts of the standard evolution tree, tend to be larger in size. The putative horse and primate evolution are the best-known examples. A set of conditions exist which made it more difficult for some larger animals to survive. Size may even account for the disappearance of the dinosaurs, an event which numerous wild theories have been proposed to account for this so far unexplained historical occurrence. The limited evidence explaining dinosaur extinction is why a great deal of conjecture and speculation is required to build a theory, often one that is obviously not amenable to several important aspects of the scientific method, such as replication.

The Clowns, Craftsmen, and Wizards

Macbeth (1971, p. 72) has divided adaptation into three levels: *clowns, craftsmen,* and *wizards.* The clowns appear to fit poorly into nature. The *craftsmen* use a utilitarian ingenuity to fit themselves in with a consummate art (and from this group come most of the examples of evolutionary adaptation). The *wizards* use nature as their clay, less to adapt to it than to rise above it. Macbeth (1971, p. 73), concludes

> How do these different groups fare in nature? Strange to say, they *all* seem to get along in much the same way. The clowns do not die out, although a few examples such as the mammoths and the Irish Elk are gone. The *craftsmen* do not take over the earth, and the *wizards* maintain their places with no apparent gain or loss.

Darwin observed that the numbers of a given species actually remains more or less constant, and this has been confirmed by later students. McAtee (1932) concluded after analyzing reports on the contents of about 80,000 birds' stomachs that, with a few exceptions, animals were eaten by the birds largely according to the *proportion of their availability*. The famous peppered moth—the most commonly cited example of evolution ever, although only an example of microevolution—is a major well known exception (Johnson, 1991).

All animals abound with structures which do not seem to help them be as "fit" as possible—all living creatures have parts that ostensibly *seem* dysfunctional, and many that are obviously not beneficial. Darwin himself noted, according to Eiseley (1958, p. 142), "I did not consider sufficiently the existence of structures, which as far as we can . . . judge, are neither beneficial nor injurious, and this I believe to be one of the greatest oversights as yet detected in my work." The *only* effective way of determining the survival value of any factor is to observe, over long periods of time, the animals with the trait in question compared with those which are identical *except* they lack the trait. One can then determine after several generations whether the trait difference affects survival to a significant degree. Even this technique is limited because conditions in the natural world *change,* and a set of conditions which are beneficial in one area may be less useful or even an impediment to survival in a different environment. Many factors which at first appear to aid survival turn out to be unimportant. Porcupines removed of their quills have survived in many areas of the natural world quite well (Tributsch, 1984).

Even the few examples given to support selection break down under scrutiny (Mosher and Tinkle, 1970). Extensive observation of the males who display elaborate dances *seemingly* to gain the favor of the female often finds that the females are either absent, not watching, or busy pecking at food. Further, research has found that many supposedly "admiring females" are color-blind (Macbeth, 1971, p. 83). Mating with defeated animals in some cases occurs as readily as with the victors—see Mathiessen (1967). Tinbergen (1963) concludes that the function of brightly colored patches of skin around the genital aperture of female baboons and chimpanzees is to help guide the male to the female's copulatory organs. Macbeth (1971, p. 75) calls this "arrant nonsense" because it assumes that baboon and chimpanzee males at one time needed more guidance than most other primates—all of whom seem to do quite well at finding the female aperture. Anthropomorphic rationalizations such as these are precisely what brought Darwinism contempt by some scientists before the turn of the century—see Stebbins (1950).

Ardrey (1966) concludes that most animal fighting and aggression are concerned with territory, not females, shattering the importance of sexual selection theory, one of Darwin's strongest arguments. And territory establishment is clearly counter to evolution; it does not help the species as a whole because it reduces the number per unit of area, and for many animals it may not even increase their survival likelihood if their successfully established territory is a poor area for food or shelter. Ardrey (1963, 1966) also notes that some animals seem to fight for no apparent reason; they are non-territorial and are obviously not fighting for females. The cuckoos do not homestead territory, but are parasitic and do not build nests. Neither does his conquest result in romantic ends—when the fighting has finished and the real estate property apportioned, the embattled mate will amicably share his bride with other cuckoos!

Darwin was thus incorrect in applying certain principles from population demographics to selection—as was Malthus. Although Malthus' ideas may have some validity in certain limited human economic situations, Darwin's application of it to animals is often invalid. As Medawar stated (1957), fallacy of this Malthusian syllogism "lies in its major premise. . . . Far from producing a vastly excessive number of offspring, most organisms produce just about that number which is sufficient and necessary to perpetuate their kind. . . ." And for animals that do reproduce in larger numbers, such as the proverbial rabbit and certain kinds of birds, the evidence is that these *do not evolve or change faster than other animals.*

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FOSSIL WOOD FROM BIG BEND NATIONAL PARK, BREWSTER COUNTY, TEXAS: PART II — MECHANISM OF SILICIFICATION OF WOOD AND OTHER PERTINENT FACTORS

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Abstract

A theoretical mechanism for the silicification of wood is presented. Possible rapid burial and silicification are discussed within the framework of a young earth model. Laboratory means to implant silica in wood are reviewed. Autochthonous and allochthonous deposition of woody material in various locations is explored.

Key Words: Silicification, Silicic Acid, Fossil Wood, Autochthonous Deposition, Allochthonous Deposition.

Introduction

The formations in which the fossil wood specimens were found in Big Bend National Park were discussed in Part I (Williams and Howe, 1993). The importance of bentonite deposits in relation to the silicification of wood also was presented. Applications were suggested within a tentative catastrophic model. This part discusses: how wood is petrified, how rapidly it silicifies, and the process by which the material is carried to its burial site. In mentioning time estimates, I am quoting the opinions of the various workers involved. I do not subscribe to the standard geologic timetable.

Petrification of Wood

For readers who do not wish to wade through the technical aspects of the petrification of wood, a brief but accurate discussion of the process can be found in Barghoorn (1987).

> One of the most remarkable mechanisms by which the remains of extinct organisms are preserved in the fossil record is the process of petrifaction. In petrifactions (though chiefly in the case of plants rather than animals) the original shape and topography of the tissues, and occasionally even minute cytological details, are retained relatively undeformed (p. 250).

Through the years there has been controversy as to whether the organic matter of wood is replaced molecule-by-molecule with mineral matter (replacement) or whether the mineral infiltrates the cellular structure and is deposited from solution (infiltration). The latter process is thought to be more likely and the details of that model will be elucidated.

Common agents involved in petrification are silica (SiO_2) and calcium carbonate ($CaCO_3$, in the form of calcite). Occasionally phosphate minerals, pyrite and hematite are involved in petrification. Where silica is the major agent in petrification, the process is called

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