The Future Of Human Evolution Essay, Research Paper

The Future of Human Evolution

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Darwinism and Evolution

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Evolution, the science of how populations of living organisms change over

time in response to their environment, is the central unifying theme in biology

today. Evolution was first explored in its semi-modern form in Charles Darwin ’s

1859 book, Origin of Species by means of Natural Selection. In this book, Darwin

laid out a strong argument for evolution. He postulated that all species have a

common ancestor from which they are descended. As populations of species moved

into new habitats and new parts of the world, they faced different environmental

conditions. Over time, these populations accumulated modifications, or

adaptations, that allowed them and their offspring to survive better in their

new environments. These modifications were the key to the evolution of new

species, and Darwin proposed natural selection or “survival of the fittest” as

the vehicle by which that change occurs. Under Natural Selection, some

individuals in a population have adaptations that allow them to survive and

reproduce

more than other individuals. These adaptations become more common in the

population because of this higher reproductive success. Over time, the

characteristics of the population as a whole can change, sometimes even

resulting in the formation of a new species. Humans have survived for thousands

of years and will most like survive thousands of more. Throughout the history

of the Huminoid species man has evolved from Homo Erectus to what we today call

Homo Sapiens, or what we know today as modern man.. The topic of this paper is

what does the future have in store for the evolution of Homo Sapiens. Of course,

human beings will continue to change culturally; therefore cultural evolution

will always continue; but what of physiological evolution? The cultural

evolution of man will continue as long as man can think; after all it’s the

ideas we think up that makes up our cultures. In a thousand years man might

complete a 180 degree turn culturally (not to mention physiologically) and as

seen by our fellow inhabitants of earth we would in essence be different beings.

One can say that this new culture has chosen its ideas based on Natural

Selection. One can see this in the spread of ideas in the past history of homo

sapiens, the ideas which cause man to succeed are chosen such as science and

democracy (the present growth of Islam is also worthy of mention, but would be a

paper in itself). Lamarck’s fourth law, that is, ideas acquired by one

generation are passed on to the next, describes this transfer of ideas from one

generation to another.

The question is can humans evolve (physically), that is through changes

of some sort to the general human gene pool, enough to be considered a different

species sometime in the future. The answer to this is tricky. The answer is

“yes” if there is no human intervention and “not likely” (or atleast controlled)

if there is human intervention. The more interesting answer is the latter. The

first answer deserves some mention. Through the subtraction or addition (that

is through chance changes of some sort) of alleles (different forms of a

characteristic gene) from the overall gene pool until homo sapiens are no longer

is feasible. One might ask how and were this is occurring. The answer is human

genes are changing all the time through radiation and spontaneous mutations (the

latter more rapidly no than ever since the human population is now larger than

ever) and one can see these changes to the overall gene pool in the

disappearance of certain human tribes within parts of Africa and South America..

These tribes unfortunately take exclusive alleles with them. What about Natural

Selection in present human culture. Some peoples are growing faster than others,

for example-Chinese faster than any other in the present world, thus the large

Chinese population. Therefore some group traits ae more common than others. Yet

the loss of these alleles and the gain of these mutations offer marginal

contributions to our species and thus have little or no effect.

The first step in understand evolution in present terms is to mention

genetic engineering (including genetic drift). The first step to understanding

genetic engineering, and embracing its possibilities for society, is to obtain a

rough knowledge base of its history and method. The basis for altering the

evolutionary process is dependant on the understanding of how individuals pass

on characteristics to their offspring. Genetics achieved its first foothold on

the secrets of nature’s evolutionary process when an Austrian monk named Gregor

Mendel developed the first “laws of heredity.” Using these laws, scientists

studied the characteristics of organisms for most of the next one hundred years

following Mendel’s discovery. These early studies concluded that each organism

has two sets of character determinants, or genes (Stableford 16). For instance,

in regards to eye color, a child could receive one set of genes from his father

that were encoded one blue, and the other brown. The same child could al so

receive two brown genes from his mother. The conclusion for this inheritance

would be the child has a three in four chance of having brown eyes, and a one in

three chance of having blue eyes (Stableford 16).

Genes are transmitted through chromosomes which reside in the nucleus of

every living organism’s cells. Each chromosome is made up of fine strands of

deoxyribonucleic acids, or DNA. The information carried on the DNA determines

the cells function within the organism. Sex cells are the only cells that

contain a complete DNA map of the organism, therefore, “the structure of a DNA

molecule or combination of DNA molecules determines the shape, form, and

function of the [organism's] offspring ” (Lewin 1). DNA discovery is attributed

to the research of three scientists, Francis Crick, Maurice Wilkins, and James

Dewey Watson in 1951. They were all later accredited with the Nobel Price in

physiology and medicine in 1962 (Lewin 1). “The new science of genetic

engineering aims to take a dramatic short cut in the slow process of evolution”

(Stableford 25). In essence, scientists aim to remove one gene from an

organism’s DNA, and place it into the DNA of another organism. This would

create a new DNA strand, full of new encoded instructions; a strand that would

have taken Mother Nature millions of years of natural selection to develop.

Isolating and removing a desired gene from a DNA strand involves many different

tools. DNA can be broken up by exposing it to ultra-high-frequency sound waves,

but this is an extremely inaccurate way of isolating a desirable DNA section

(Stableford 26). A more accurate way of DNA splicing is the use of “restriction

enzymes, which are produced by various species of bacteria” (Clarke 1). The

restriction enzymes cut the DNA strand at a particular location called a

nucleotide base, which makes up a DNA molecule. Now that the desired portion of

the DNA is cut out, it can be joined to another strand of DNA by using enzymes

called ligases. The final important step in the creation of a new DNA strand is

giving it the ability to self-replicate. This can be accomplished by using

special pieces of DNA, called vectors, that permit the generation of multiple

copies of a total DNA strand and fusing it to the newly created DNA structure.

Another newly developed method, called polymerase chain reaction, allows for

faster replication of DNA strands and does not require the use of vectors

(Clarke 1).

Genetic drift, another important factor when discussing evolution, is

the study of statistical population genetics. ). One aspect of genetic drift is

the random nature of transmitting alleles from one generation to the next given

that only a fraction of all possible zygotes become mature adults. The easiest

case to visualize is the one which involves binomial sampling error. If a pair

of diploid sexually reproducing parents (such as humans) have only a small

number of offspring then not all of the parent’s alleles will be passed on to

their progeny due to chance assortment of chromosomes at meiosis. In a large

population this will not have much effect in each generation because the random

nature of the process will tend to average out. But in a small population the

effect could be rapid and significant. Suzuki et al. explain it as well as

anyone I’ve seen; “If a population is finite in size (as all populations are)

and if a given pair of parents have only a small number of offspring, then even

in the absence of all selective forces, the frequency of a gene will not be

exactly reproduced in the next generation because of sampling error. If in a

population of 1000 individuals the frequency of “a” is 0.5 in one generation,

then it may by chance be 0.493 or 0.0505 in the next generation because of the

chance production of a few more or less progeny of each genotype. In the second

generation, there is another sampling error based on the new gene frequency, so

the frequency of “a” may go from 0.0505 to 0.501 or back to 0.498. This process

of random fluctuation continues generation after generation, with no force

pushing the frequency back to its initial state because the population has no

“genetic memory” of its state many generations ago. Each generation is an

independent event. The final result of this random change in allele frequency is

that the population eventually drifts to p=1 or p=0. After this point, no

further change is possible; the population has become homozygous. A different

population, isolat ed from the first, also undergoes this random genetic drift,

but it may become homozygous for allele “A”, whereas the first population has

become homozygous for allele “a”. As time goes on, isolated populations diverge

from each other, each losing heterozygosity. The variation originally present

within populations now appears as variation between populations (Suzuki 704).

The evolution of man can be broken up into three basic stages. The first,

lasting millions of years, slowly shaped human nature from Homo erectus to Home

sapiens. Natural selection provided the means for countless random mutations

resulting in the appearance of such human characteristics as hands and feet.

The second stage, after the full development of the human body and mind, saw

humans moving from wild foragers to an agriculture based society. Natural

selection received a helping hand as man took advantage of random mutations in

nature and bred more productive species of plants and animals. The most

bountiful wheats were collected and re-planted, and the fastest horses were bred

with equally faster horses. Even in our recent history the strongest black male

slaves were mated with the hardest working female slaves.