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RESEARCH ARTICLE

FOR THE FOND REMEMBRANCE OF CHARLES DARWIN

Latha V. and Meera B.K
Department of Zoology, Maharani Cluster University,Palace Road, Bangalore, Karnataka, India.

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Abstract

Evolution refers to genetic changes in populations of organisms through time that lead to differences among them and the theory proposed to explain this concept is called the '**THEORY OF EVOLUTION'.** The credit of deriving a probable evolutionary pathway through systematic study of evolution of contemporary organisms from the earliest protoplast goes to Charles Darwin. The present review article makes an effort to understand, Darwin's theory of evolution as such and its analysis in the light of recent advances in Science and Technology. The article has tried to introduce the concept of 'Neo-Darwinism" too.

Introduction:-

It is billions of years since life originated on our mother earth. With the combination of simple elements such as carbon, hydrogen, oxygen and nitrogen, life originated and over the years, it has attained the present diversified complexity. This path of transformation from unicellular organism to the current most complex life systems is called **EVOLUTION** [Technically speaking, Evolution refers to genetic changes in populations of organisms through time that lead to differences among them] and the theory proposed to explain this concept is called the **THEORY OF EVOLUTION**. The credit of deriving a probable evolutionary pathway through systematic study of evolution of contemporary organisms from the earliest protoplast goes to Charles Darwin. To date, one and a half century has gone on since Charles Darwin proposed his mind blowing theory of evolution. At this juncture, we all should make an effort to understand Darwinian Theory of evolution as such and its analysis in the light of recent advances in science and technology.

Darwin And Evolution:

Charles Darwin's theory of evolution through natural selection rests on four tenets:

1. That any given species (a group of organisms capable of interbreeding to produce fertile offsprings) reproduces more individuals than can possibly survive [**OVER PRODUCTION**].
2. That these individuals vary in all sorts of characteristics [**VARIATIONS**].
3. That such variations are heritable (i.e., are passed onto the offsprings) and
4. That individuals whose particular variations cause them to leave more offsprings than their counterparts, will come to dominate the population over successive generations [**NATURAL SELECTION AND SURVIVAL OFTHE FITTEST**].

Science is not a static system rather a dynamic one and as a consequence, any hypothesis/theory passes through transitions and improvements via suitable advances over time and space. This is also true of Darwin's theory of evolution. Some of the concepts which Darwin was unaware of have given a newer dimension to the theory of

Corresponding Author:- Latha V.
Address**:-** Department of Zoology, Maharani Cluster University,Palace Road, Bangalore, Karnataka, India.

evolution. The advancements in the field of science and technology have facilitated the modern evolutionary biologist to analyze and visualize the concepts in a critical manner. They have come out with more convincing explanations regarding evolution. To present a simple instance, Darwin was not able to understand the concept of 'variations'. But to date, it is a well known fact that heritable variations are cause due to genes. Presently we have realized that; "Isolation of communities", "Accumulation of heritable variations", "Sexual isolation of the species" play a major role in natural selection. The following paragraphs attempt to present a brief note of recent advances in evolutionary theory in the light of contemporary knowledge.

"THE FITNESS OF GENES, RATHER THAN OF INDIVIDUALS IS THE PRIMARY CURRENCY OF EVOLUTION" i.e., Darwin's proposal of natural selection has been explained in a modern version in the light of curious sex ratios as:
"Natural selection cares neither about the fitness of the species nor the fitness of the individuals, but only about genes" [Gene is a physical entity, transmitted from parent to offspring, that influences a hereditary trait. From the biochemical point of view, genes are fundamental units of genetic information that corresponds to a segment of DNA].

This concept can be understood in simple terms as: Evolutionary theory predicts that most populations should comprise of roughly as many males as females. i.e., typically there are as many men as there are women, more or less and this ratio is found in many species. However, it is not so in all organisms. For instance: i) in lady birds we find strains of females whose sons all die, producing populations in which there are more females than males. ii) Similarly, wasps reproduce asexually (i.e., without fertilizations of eggs), also producing only daughters.

Curiously, when fed with antibiotics, both the lady birds and the wasps reproduce normally, the sons of ladybirds survive and the wasps cease to produce asexually. To understand why this is so, it is necessary to look closely at the theory of evolution and we realize that natural selection cares neither about the fitness of the species nor the fitness of the individuals, but only about the genes.

In fact, a new aspect called '**SEX ALLOCATION THEORY'** has emerged in the field of evolutionary biology to explain how deviations from the earlier assumptions led to very different predicted sex-ratios.

A further and rather subtle assumption is that the genes controlling the sex ratio are equally only to be transmitted by fathers and mothers. We have 46 chromosomes, 23 each from our father and mother. The genes contained in these chromosomes are said to exhibit Mendelian inheritance, i.e., the chances that a given gene will be transmitted to progeny is the same as for all other genes regardless the sex of the parent. Some genes however, are not contained on these chromosomes and not transmitted by fathers. It is these genes (**CYTOPLASMIC GENES**) that hold the secret to the curious sex ratios of wasps and ladybirds. Cytoplasmic genes are typically only inherited from mother while nuclear genes are inherited from both the parents.

Thus the theory of evolution by natural selection is both the simplest but also one of the most misunderstood and subtle of ideas. "Selection" we will often think, is for the 'good of the species' but indeed, it is not.

It is indeed a simple statement that genes can spread within populations and the traits we see manifested in organisms around us are those which are consistent with the spread. Often when we think of this, we consider a gene coding for a trait , which influences the fitness" of the organism in which it is found; a gene coding for better eye spreads in the population because bearers of this gene will on average, leave more progeny than bearers of the alternative gene. It may be advantageous to the survival of a species, but this is a consequence rather than cause of the spread.

Although the idea of evolution by natural selection at first sight appears to be trivial, the subtility of the idea is easy to overlook.

In the last two to three decades, a number of facts have been added to the knowledge of evolution and the theory of natural selection has been analyzed in the light of Genetics, Mendelism, Population genetics and biological species concept. This has given rise to what is known as "**NEO-DARWINISM**". It is the merger of Darwinian selection and genetic theory. According to Neo-Darwinism (also called modern synthetic theory), origin of species can be explained on the basis of:

1. Genetic variability in population
2. Significance of genetic variability
3. Natural selection and
4. Isolation

The latest concept in this trend happens to be "**MOLECULAR EVOLUTION**". With the understanding of gene mutations (Change in the hereditary material) which introduced by the substitution of a single nitrogenous base in the DNA sequence, biologists are able to describe evolution at molecular levels. Scientists have become successful in explaining the molecular evolution of hemoglobin chains, cytochrome C molecule and so on.

One more concept which we all need to ponder over is whether evolution is still going on continuously among organisms. A logical response to this question is '**YES**'. If so what about human evolution? The answer is again certainly '**YES**', though impossible to visualize. The fact that evolution of man is an ongoing process is evidenced by the research finding of Bruis Lawn of University of Chicago.

From the past 14,000 through 60,000 years a gene called '**MICROCEPHALIN**' has appeared in the human brain and presently, it is spread over 70% of the human race. To quote, the appearance of one more such gene over duration of 500 through 14,000 years is '**ASPAM**' gene. Although the exact functioning of these two genes is not all that well understood, it can be concluded beyond any doubt that, human evolution has not come to an end.

Geneticists have been able to recognize the changes that have taken place in the human gene map over a period of seven million years. It simply means, we are not exactly the same as our ancestors who lived 7 million years ago. That means, human evolution is going on though not at a noticeable pace.

One more fact which deserves the attention is the concept of '**ARTIFICIALSELECTION**' (far away from Darwin's natural selection) being made possible through innovative techniques in the field of recombinant DNA technology and/ or medical biotechnology. What might happen to the natural process of human evolution with the artificial selection overruling the natural selection? Under such circumstances, the genes also lose their significance as far as evolution is concerned. This may hinder the process of natural evolution.

To conclude, it is not all that easy to trace the path of evolution and therefore predict too.

Supplementary: Additional Reading-Brief Biography of Charles Darwin.

- **BIRTH:** 12-02-1809 at Shrewsbury in England.
- **PARENTS:** Dr. Robert Darwin and Susan.
- **EDUCATION:** Childhood education at home; Graduated from University of Cambridge with Botany and Geology as core subjects.
- **HMS Beagle:** Voyage began on 4th November 1831 and culminated in 1836. Gathered enormous data pertaining to fauna, flora , geology etc.,

- **WORKS:**

1. **ORIGIN OF SPECIES BY NATURAL SELECTION-1859.**
2. **THE DECENT OF MAN.**
3. **THE VARIATION OF ANIMALS AND PLANTS UNDER DOMESTICATION-1868.**
4. **THE FORMATION OF VEGETABLE MOULD THROUGH THE ACTION OF WORMS.**
5. **INSECTIVOROUS PLANTS.**
6. **ORCHIDS FERTILIZED BY INSECTS.**

- **FAMILY LIFE**: Got married at the age of 28 to EMMA. Out of six children, three died at infancy and rest of the three became scientists.
- **DEMISE:** 19th April 1882-Wednesday.

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