Darwin's Theory of Natural Selection

Dr. C. Chatterjee

The Principle of Natural Selection:

The principle of natural selection stems from five important observations and three inferences (Ernst Mayr 1982) which have been mentioned below.

Natural Selection Stems from Five Important Observations and Three Inferences

	Observation	Inferences
I	1. Rapid Multiplication 2. Stability of Populations 3. Limited Food and Space	Struggle for Existence
II	1. Struggle for existence 2. Variations	Natural Selection or Survival of the Fittest
III	1. Natural selection 2. Inheritance of useful variations over many generations	Formation of New Species

Natural selection is differential success in reproduction and its product is adaptation of organisms to their environment. Thus natural selection occurs through an interaction between the environment and the variability inherent in the population.

Salient Features of Darwin's Theory of Natural Selection:

The main features of the theory of Natural Selection are as follows:

1. over production (Rapid Multiplication):

All organisms possess enormous fertility. They multiply in geometric ratio. Some examples are cited below:

Insects lay hundreds of eggs. A cod-fish lays several hundred eggs at a time. A female rabbit gives birth to six young ones in one litter and produces four litters in a year. Six- month-old rabbit is capable of reproduction. If all the rabbits survived and multiplied at this rate, their number would be very large after some time.

Each pair of mice produces dozens of young ones. It is assumed that elephant is the slowest breeder, which matures at the age of 30 years and lives for about 90 years. Each female gives rise to about six offspring.

Thus some organisms (living beings) produce more offspring and others produce fewer offspring. This is called differential reproduction.

2. Limited Food and Space:

Despite of rapid multiplication of all types of species, food and space and other resources remain limited. They are not liable to increase.

3. Struggle for Existence:

The struggle for existence can be of three types.

(i) Intraspecific Struggle:

It is the struggle between the individuals of the same species because their requirements like food, shelter, breeding places, etc. are similar. Many human wars are the examples of intraspecific struggle. Cannibalism (eating the individuals of its own species) is another example of this type of struggle.

(ii) Interspecific Struggle:

It is the struggle between the members of different species. This struggle is normally for food and shelter. For example, a fox hunts out a rabbit, while the fox is preyed upon by a tiger.

(iii) Environmental Struggle:

It is the struggle between the organisms and the environmental factors, such as drought, heavy rains, extreme heat or cold, earthquakes, diseases, etc. Thus, climate and other natural factors also help in restricting the number of individuals of particular species.

4. Appearance of Variations:

Except the identical twins, no two individuals are similar and their requirements are also not exactly the same. It means there are differences among the individuals. These differences are called variations. Due to the variations some individuals would be better adjusted towards the surroundings than the others.

Adaptive modifications are caused through the struggle for existence. According to Darwin, the variations are gradual (continuous) and those which are helpful in the adaptations of an organism towards its surroundings would be passed on to the next generation, while the others disappear.

5. Natural Selection or Survival of the Fittest:

The organisms which are provided with favourable variations would survive, because they are the fittest to face their surroundings, while the unfit are destroyed. Originally it was an idea of Herbert Spencer (1820-1903) who used the phrase ‘the survival of the fittest’ first time. While Darwin named it as natural selection.

It is to be noted that only survival of the fittest is not enough. But organisms should also adapt or change themselves according to the changed conditions of the environment as environment is always changing. To explain the phenomenon of survival of the fittest, the extinct reptiles can be cited as an example. During the evolution of reptiles, giant reptiles, the dinosaurs etc., appeared.

Majority of them were herbivorous, but due to certain climatic changes, the vegetation disappeared and, therefore, most of them became extinct. However, small animals who could change their feeding habits from herbivorous to carnivorous diet survived, because they could easily get adapted to the changed environment.

These, therefore, will survive more and hence are selected by nature. Darwin called it natural selection and implied it as a mechanism of evolution. Alfred Wallace a naturalist who worked in Malay Archepelago had also come to similar conclusions around the same time.

6. Inheritance of useful variations:

The organisms after getting fitted to the surroundings transmit their useful variations to the next generation, while the non-useful variations are eliminated. Darwin could not differentiate between continuous and discontinuous variations. In this respect, Darwin agreed with Lamarck's views, because according to Darwin acquired characters which are useful to the possessor could be inherited.

7. Speciation (Formation of new species):

Darwin considered that useful variations are transmitted to the offspring and appear more prominently in succeeding generations. After some generations these continuous and gradual variations in the possessor would be so distinct that they form a new species.

Criticism of the Natural Selection Theory:

Darwin was unable to explain the mechanism of inheritance of characters. Darwin proposed the theory of pangenesis to explain this phenomenon. He said that every cell or organ produces minute hereditary particles called pangenes or gemmules. These were carried through the blood and deposited in the gametes. This theory was not accepted.

b. According to natural selection, only useful organs are favoured by natural selection. The existence of vestigial organs in organisms could not be explained.

c. In some species of deer, the antlers develop beyond the stage of usefulness. These structures are of no functional significance to the animal.

d. Darwin was unable to explain the source of variations in organisms.