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An Exposition of the
Theory of
Natural Selection.

June 1898. R. H. Lind.

Topics

Environment.

Reproduction - two methods.

Variation.

Variation and reproduction.

The function of sex.

Struggle for Existence.

Natural Selection.

Missing Links.

Divergence of character.

Maximum of life.

The aim of this paper is mainly to clearly present the ideas ordinarily implied by the term Natural Selection.

The various elements entering into the theory are so interdependent that a separate consideration of each and a systematic treatment of the subject is difficult. An outline has however been kept in mind and a recapitulation is appended to summarize the main points.

The environment of an organism is the total of conditions which affect it. Earth presents few localities which do not support some form of life. This means that life itself may exist subject to nearly all the conditions which earth affords. While this is true of life itself it is not true of every living organism. Few are the forms which can thrive in either of two diametrically opposed environments. Observation indisputably verifies the assertion that each species cherishes an ideal environment. For each form of life there is a habitat the resultant of whose conditions

is supremely adapted to the highest welfare of the organism.

These statements imply that life itself is infinitely variable and that although there may be an ideal home for each of its representative forms, - these forms possess the ability to more or less adapt themselves to environments not ideal.

A halophyte may exist and reproduce although compelled to grow in soil containing a much smaller percentage of salt than the soil of its ideal habitat. A mesophyte may live and reproduce in a soil containing a considerable percentage of salt and the transformation of halophytes to mesophytes or mesophytes to halophytes is not imaginary.

Life yields prey to circumstances when adaptation fails to rescue.

The most characteristic property of an organism is its capacity for reproduction. In fact it may be said that no form of life performs the mission of its existence which fails to leave an offspring. Making a fundamental classification

reproduction may be asexual, or sexual according to whether the offspring is obtained by mere division or by the union of two individuals.

No one has ever seen two organisms exactly alike. The fact of variation is self-evident and self-asserting. Now if variation is as characteristic of living forms as reproduction and it must be if no offspring is exactly like its parent, it may be assumed that variation aids in, and is essential to the perpetuation of living organisms.

If environments are variable, organisms must be, and those individuals possessing the highest index of adaptation and hence the better chance for perpetuation are those which can vary most. Organisms must be plastic.

I think there is no exception to the rule that all plants either do or can reproduce asexually. This method of propagation is evidently the simplest and most certain. Mere division requires no specialization of structure and takes no hazard.

Now if mere reproduction is the goal of life the asexual method would naturally be

considered the best.

But the offspring as usually produced possesses no greater inclination to vary than its parent, its chances of maturity are no better and if there is a method which will increase the index of adaptability it is certainly a better one.

In sexual reproduction two individuals similar in many respects but yet different because the product of various conditions unite to produce an offspring whose capacity for variation is greater than that of either parent and whose potential adaptability is increased. Hence the origin of sex in the necessity of maintaining the advantage accruing to each succeeding generation by virtue of its accumulated adaptation capacity.

Thus interpreting the philosophy of sex the function of crossing is certainly the amelioration of the specific type.

Observation indicates that there is no locality capable of supporting life which does not. That is the world is full of life and each new organism necessitates the

death of an existing one.

Each species produces a greater number of seed than there are already individuals of the species. Hence if all our plants were annual they would produce more seed each year than could possibly find room to grow the following season.

Since a large percent of plants are perennial it is evident that an enormous number of seeds have not the slightest chance of even germination.

The fact that all species reproduce in a geometrical ratio evidences the desperate effort of life to, in some of its varied forms, fill ^{up} all of the available room.

This is the relation of life to that which would destroy it. But the forms themselves constantly struggle to maintain their existence inducing a constant warfare of species and of individuals.

To illustrate the fact that reproduction occurs in a geometrical ratio and that the potential offspring greatly exceeds the actual number which reaches maturity the following short abstract is made from Wallace's Darwinism.

A single flesh fly produces 20,000 larvae which reach maturity in five days and each parent fly may be increased ten thousand fold every two weeks. If this rate of reproduction should continue unchecked for a single summer season there would be a greater number of individuals than probably ever existed at any one time.

To prevent such excessive propagation from maturing its offspring there is an incessant warfare carried on by both neighbors and physical conditions.

The number of individuals is approximately constant. Each species multiplies in a geometrical ratio hence a continued struggle for existence in which the fittest survive. The function of variation is to better equip for the struggle.

The function of sex is to induce variation. Natural selection is the evident result of the struggle for existence.

No one can dispute the fact that the speed of the trotting horse has been increased by breeders constantly selecting and breeding from those individuals

showing evidence of the capacity for greater swiftness.

It is generally admitted that all our domesticated animals and cultivated plants are being constantly improved by man's selection. New varieties of vegetables are not uncommon and they are continually being placed upon the market by energetic and painstaking gardeners. This of course would be impossible if forms did not vary.

If the pigeon fancier wishes to introduce a variety having longer beaks than any existing one, he merely breeds those individuals of each generation which have the longest beaks until a pigeon possessing a beak of the desired length is obtained.

Nature is represented by man and her aim is to cover the earth with the maximum of life.

The fittest each species is adapted to its environment. The fittest has chances for a beautiful offspring.

By the law of variation there are always some individuals in every species which are better adapted to their environment.

Those being better fitted to survive, will mature and reproduce, the indifferently or poorly adapted perishing in the struggle.

Thus are the processes of evolution carried out in nature by spontaneous selection, as is the evolution of domestic forms by the selection of man.

From the above necessarily follows the fact that the survivors in each generation represent the minority rather than the majority and hence the greater number of individuals perish leaving no offspring which fact may under many conditions mean the extinction of many of the intermediate forms producing the so called missing links which may be considered one of the best evidences of the origin of species by natural selection through struggle for existence.

Thus it is that variation and selection induce a constant divergence of character. Specific types are constantly becoming more differentiated and characteristic and varieties grow more and more unlike

tending to the origin of species.

That the process is one of advancing organization is self evident.

That divergence of character leads to a maximum of life is proved by the fact that if a plot of ground be sown with one species of grass and a similar plot be sown with several distinct genera of grasses a greater number of plants and a greater weight of dry herbage can be raised in the latter than in the former case.¹

The theory of natural selection is so well established that objections need not be considered.

1. Darwin; Origin of Species p. 88.

Recapitulation.

Organisms are subject to modification
by environment.

Reproduction is the mission of the individual.
Variation is a constant tendency.

Sexual reproduction induces variation.

Total number of individuals is
practically constant.

Offspring are produced in a
geometrical ratio.

The struggle for existence is unavoidable.

Natural selection the result of struggle.

Natural selection induces divergence of
Character.

Divergence of character establishes
Species.

Divergence of character promotes
organization and favors the
maximum of life.

