

organic beings at all times. These always seem to branch and sub-branch like a tree from a common trunk; the flourishing twigs destroying the last vigorous, — the dead and lost branches tidely representing, extinct genera and families.

This sketch is most imperfect; but in so short a space I cannot make it better. Your imagination must fill up ^{many} wide blanks — Without some reflexion it will appear all rubbish; perhaps it will appear so after reflexion. —

C. D.

This little abstract touches only as to accumulation power of natural selection, which I look at as far the most important element in the production of new forms. The law governing the incipient a periodical variation (unimportant as to groundwork for selection to act on, in which respect it is all important) I shall do up with several heads, but I can come, as you may well believe, as to very partial & imperfect conclusions. —

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I. It is wonderful what the principle of selection by Man, that is the picking out of individuals with any desired quality, and breeding from them, and again picking ^{out}, can do. Even Breeders have been astonished at their own results. They can act on differences inappreciable to an uneducated eye. Selection has been methodically followed in Europe for only the last ^{half} century. But it has occasionally, and even in some degree methodically, been followed in the most ancient times. There must have been, also, a kind of unconscious selection from the most ancient times, — namely in the preservation of the individual animals (without any thought of their offspring) most useful to each race of man in his particular circumstances. The "rogueing" as nurserymen call the destroying of varieties, which depart from their type, is a kind of selection. I am convinced that intentional and occasional selection has been the main agent in making our domestic races. But, however, this may be, its great power of modification has been indisputably shown in late times. Selection acts only by the accumulation of very slight or quite variations, caused by external conditions, or by the mere fact that in generation the child is not absolutely similar to its parent. Man by his power of accumulating variations adapts living beings to his wants, ^{he} may be said to make the wool of one sheep good for carpets and another for cloths. —

II. Now suppose there was a being, who did not judge by mere external appearance, but could study the whole internal organization — who never was capricious, — who should go on selecting for one end during millions of generations, who will say what he might not effect! In nature we have some slight variations, occasionally, in all parts: and I think it can be shown that changed ⁱⁿ conditions of existence is the main cause of the child not exactly resembling its parents; and in nature geology shows us what

changes have taken place, and are taking place. We have almost unlimited time: no one but a practical geologist can fully appreciate this: think of the glacial period, during the whole of which the same species of shells at least have existed; there must have been during that period millions on millions of generations.

III. I think it can be shown that there is such an unerring power at work, or Natural selection (the title of my Book), which selects exclusively for the good of each organic being. The elder De Candolle, W. Herbert, and Lyell have written strongly on the struggle for life; but even they have not written strongly enough. Reflect that every being (even the elephant) breeds at such a rate, that in a few years, ^{and} at most a few centuries a thousand of years, the surface of the earth would ^{not} hold the progeny of any one species. I have found it hard constantly to bear in mind that the increase of every single species is checked during some part of its life, or during some shortly recurrent generations. Only a few of those annually born can live to propagate their kind. What a trifling difference must often determine which shall survive and which perish.

IV. Now take the case of a country undergoing some change; this will tend to cause some of its inhabitants to vary slightly; not but what I believe most beings vary at all times enough for selection to act on. Some of its inhabitants will be exterminated, and the remainder will be exposed to the mutual action of a different set of inhabitants, which I believe to be more important to the life of each being than mere climate. Considering the infinitely various ways, beings have to obtain food, by struggling with other beings, to escape danger at various times of life, to have their eggs or seeds disseminated &c. &c., I cannot doubt that during millions of generations individuals of a species will be born with some slight variation profitable to some part of its economy; such will have a better chance of surviving, propagating, this variation, which ^{again} will be slowly increased by the accumulative action of Natural selection; and the variety thus

formed will either coexist with, or more commonly will exterminate its parent form. An organic being, like the woodpecker or mistletoe may thus come to be adapted to a score of contingencies: natural selection, accumulating those slight variations in all parts of its structure which are in any way useful to it, during any part of its life.

V. Multifarious difficulties will occur to everyone on this theory. Most can I think be satisfactorily answered. — "Natura non facit saltum" answers some of the most obvious. — The slowness of the change, and only a very few undergoing change at any one time answers others. The extreme imperfections of our geological records answers others. —

VI. One other principle, which may be called the principle of divergence plays, I believe, an important part in the origin of species. The same spot will support more life if occupied by very diverse forms: we see this in the many generic forms in a square yard of turf (I have counted 20 species belonging to 18 genera), — or in the plants and insects, on any little uniform islet, belonging almost to as many genera and families as to species. — We can understand this with the higher, ^{animate} ~~animate~~ habits we best understand. We know that it has been experimentally shown that a plot of land will yield a quarter weight of cropped with several species of grasses than with 2 or 3 species. Now every single organic being, by propagating so rapidly, may be said to be striving its utmost to increase in numbers. So it will be with the offspring of any species after it has broken into varieties or subspecies or ~~form~~ ^{true} species. And it follows, I think, from the foregoing facts, that the varying offspring of each species will try (only few will succeed) to seize on as many and as diverse places in the economy of nature, as possible. Each new variety, or species, when formed will generally take the places of and so exterminate its less well-fitted parent. This, I believe, to be the origin of the classification or arrangement of all



Darwin, Charles. 1857. "Darwin, Charles Sept. 5, 1857 [enclosure]." *Charles Darwin letters to Asa Gray*

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